

ARCHITECTURE

Charles Edouard Jeanneret, known as Le Corbusier, b. La Chaux-de-fonds, Switzerland, Oct. 6, 1887, d. 1965, was a Swiss-French architect who played a decisive role in the development of modern architecture. He first studied (1908-10) in Paris with August Perret, and then worked (1910) for several months in the Berlin studio of industrial designer Peter Behrens, where he met the future Bauhaus leaders Ludwig Mies van der Rohe and Walter Gropius. Shortly after World War I, Jeanneret turned to painting and founded, with Amedee Ozenfant, the purist offshoot of cubism. With the publication (1923) of his influential collection of polemical essays, *Vers une architecture* (Towards a New Architecture, Eng. repr. 1970), he adopted the name Le Corbusier and devoted his full energy and talent to creating a radically modern form of architectural expression.

In the 1920s and '30s, Le Corbusier's most significant work was in urban planning. In such published plans as *La Ville Contemporaine* (1922), the *Plan Voisin de Paris* (1925), and the several *Villes Radieuses* (1930-36), he advanced ideas dramatically different from the comfortable, low-rise communities proposed by earlier garden city planners. During this 20-year span he also built many villas and several small apartment complexes and office buildings. In these hard-edged, smooth-surfaced, geometric volumes, he created a language of what he called "pure prisms"--rectangular blocks of concrete, steel, and glass, usually raised above the ground on stilts, or pilotis, and often endowed with roof gardens intended to compensate for the loss of usable floor area at ground level.

After World War II, Le Corbusier moved away from purism and toward the so-called new brutalism, which utilized rough-hewn forms of concrete, stone, stucco, and glass. Newly recognized in official art circles as an important 20th-century innovator, he represented (1946) France on the planning team for the United Nations Headquarters building in New York City--a particularly satisfying honor for an architect whose prize-winning design (1927) for the League of Nations headquarters had been rejected. Simultaneously, he was commissioned by the French government to plan and build his prototypical Vertical City in Marseille. The result was the *Unite d'Habitation* (1946-52)--a huge block of 340 "superimposed villas" raised above the ground on massive pilotis, laced with two elevated thoroughfares of shops and other services and topped by a roof-garden gymnasium that contained, among other things, a sculptured playground of concrete forms and a peripheral track for joggers.

His worldwide reputation led to a commission from the Indian government to plan the city of Chandigarh, the new capital of the Punjab, and to design and build the Government Center (1950-70) and several of the city's other structures. These poetic, handcrafted buildings represented a second, more humanistic

phase in Le Corbusier's work that also was reflected in his lyrical Pilgrim Church of Notre Dame du Haut at Ronchamp (1951-55) in the Vosges Mountains of France; in his rugged monastery of La Tourette, France (1954-59); and in the structures he designed (from 1958) at Ahmedabad, in India. Le Corbusier accidentally drowned in the Mediterranean on Aug. 27, 1965.

Frank Lloyd Wright, b. Richland Center, Wis., June 8, 1867, d. Apr. 9, 1959, was one of the most innovative and influential figures in modern architecture. In his radically original designs as well as in his prolific writings he championed the virtues of what he termed organic architecture, a building style based on natural forms.

After briefly studying civil engineering at the University of Wisconsin, Wright moved to Chicago, where he went to work (1887) as a draftsman in the office of Adler and Sullivan. While working under Louis Sullivan--whom Wright called "Lieber Meister"--he began designing and building on his own a few private houses for some of Adler and Sullivan's clients. These "bootlegged houses," as Wright called them, soon revealed an independent talent quite distinct from that of Sullivan. Wright's houses had low, sweeping rooflines hanging over uninterrupted walls of windows; his plans were centered on massive brick or stone fireplaces at the heart of the house; his rooms became increasingly open to one another; and the overall configuration of his plans became more and more asymmetrical, reaching out toward some real or imagined prairie horizon.

In contrast to the expansive openness of those houses which inspired the prairie school, Wright's urban buildings (unlike Sullivan's, for instance) tended to be walled in, somewhat inhospitable to the city, and lit primarily through skylights. Whereas two of the finest buildings of Wright's early period--the Larkin Company Administration Building (1904; demolished 1950) in Buffalo, N.Y., and the Unity Church (1906) in Oak Park, Ill.--seemed to proclaim Wright's distaste for urban environments, houses he designed in the same period (such as Buffalo's Martin House, 1904, and Chicago's Robie House, 1909) reached out into the landscape with large, glazed walls, terraces, and low-slung roof overhangs.

Wright worked on his own after 1893, when the issue of his bootlegged houses finally caused a break with Adler and Sullivan's office. During the 20 years that followed he became one of the best-known (and, because of a tempestuous personal life, one of the most notorious) architects in the United States. Two editions of his work brought out (1910, 1911) by the Berlin publisher Wasmuth, along with a parallel exhibition that traveled throughout Europe, boosted Wright's fame in European architectural circles and influenced such key figures in contemporary architecture as Ludwig Mies van der Rohe and Le Corbusier.

His reputation assured on both sides of the Atlantic, Wright began to reinforce the philosophical underpinnings of his innovative building style. In keeping with his agrarian bias, Wright proclaimed that the structural principles found in natural forms should guide modern American architecture. He praised

the virtues of an organic architecture that would use reinforced concrete in the configurations found in seashells and snails and would build skyscrapers the way trees were "built"--that is, with a central "trunk" deeply rooted in the ground and floors cantilevered from that trunk like branches. Spaces within such buildings would be animated by natural light allowed to penetrate the interiors and to travel across textured surfaces as the incidence of sunlight and moonlight changed.

His view of architecture was essentially romantic. Although Wright often paid lip service to the rational systems called for by mass-produced building (modular planning and prefabrication), his efforts in those directions seemed halfhearted at best. The most spectacular buildings of his mature period--Tokyo's Imperial Hotel (1915-22; demolished 1968); Fallingwater (Kaufmann House; 1936), Mill Run, Pa.; the S. C. Johnson and Son Wax Company Administration Center (1936-50), Racine, Wis.; Taliesin West (1938-59); and New York City's Guggenheim Museum (completed 1959)--were based on forms borrowed from nature, and the intentions were clearly romantic, poetic, and intensely personal. At his death he left a rich heritage of completed buildings of almost uniform splendor; few disciples, however, could match the special genius reflected in his works. Unlike Walter Gropius, Mies van der Rohe, Le Corbusier, and other giants of modern architecture, Wright was, at heart, an essentially idiosyncratic architect whose influence was immense but whose pupils were few.

Modern architecture is a form of building design characterized by the use of unornamented industrial materials--principally steel, glass, and concrete--to make simple, geometric forms standing free in space. Such buildings, which began to appear around 1922 in Germany, the Netherlands, the USSR, and France, were first grouped together under a single stylistic heading in a 1932 exhibition titled "Modern Architecture" held at the Museum of Modern Art in New York City. The exhibition's organizers, the critic Henry-Russell Hitchcock and the architect C. Philip Johnson, detected in a variety of post-World War I buildings from several countries a shared emphasis on volume over form, asymmetrical composition, and avoidance of ornamentation. These elements, Hitchcock and Johnson proclaimed, constituted an International Style--the result of a century-long search for a style suited to modern materials and engineering techniques, freed from borrowed forms.

Some of the architects cited by Hitchcock and Johnson as exponents of the International Style resisted this narrow, formal definition. The dissenters asserted that their work was only the direct, logical manifestation of contemporary science and society, that it would change as its preconditions changed, and that architecture had in fact finally escaped the limitations of stylistic fashions. The course of architecture since 1932 has proved both camps correct: if the International Style has been universally accepted as the symbolic expression of modernity in building, it has also been shown to be essentially an artificial construct that is neither the inevitable nor necessarily the most logical reflection of 20th-century conditions.

The Bauhaus

Among the architects who developed the International Style, the Germans formed the largest and initially the most important group. By 1918 a group of radical designers, centered in Berlin, had emerged as the champions of an architecture featuring simple shapes in steel and glass and based on an industrial and socialist ethic that had as its primary goal the overthrow of 19th-century eclecticism. The strong intuitive flavor of this so-called expressionism in turn triggered a reaction led by Walter Gropius and Ludwig Mies van der Rohe, who accepted steel-and-glass construction and pure geometric forms as architectural ideals.

The chief theorist of what its adherents called the *Neue Sachlichkeit*, or the new factualism, was Gropius, who from 1919 served as director of what had formerly been the Weimar Art School and was now called the Bauhaus. When the Bauhaus moved to Dessau in 1925, Gropius implemented his theories in the buildings that he designed for the new site. After Gropius left the Bauhaus to go into private practice in 1928, the leading light of the movement became Mies van der Rohe. In his German Pavilion at the Barcelona Trade Fair of 1929, Mies carried the features of the International Style to their furthest limit of abstraction. Neoplasticism and Constructivism

The Bauhaus architects' final step from expressionism to the *Neue Sachlichkeit* is widely credited to the influence of two contemporary art movements: Dutch neoplasticism, usually called *de Stijl*, and Soviet constructivism. The neoplasticist group was assembled (1917) by the poet-painter Theo van Doesburg. Van Doesburg and Cornelius van Eesteren outlined the neoplasticist ideal in a 1922 Paris exhibition of a series of house projects whose arrangements of colored planes resembled the paintings of abstract artist Piet Mondrian made three-dimensional.

Constructivism was initiated in the Soviet Union with the nonobjective sculptor Vladimir Tatlin's execution (1918) of a model for a hypothetical Monument to the Third International, in which a series of glass volumes were to rotate within a spiraling steel tower meant to express the triumph of the new technology over traditional masonry construction. Once brought (1922) to Germany by emigres such as Laszlo Moholy-Nagy, the constructivist concept of a building as a technical mechanism in motion soon assumed a key role in European architectural theory.

Le Corbusier

The contemporaneous work of the Swiss architect Le Corbusier, differed in its premises, if not in its outward appearance, from that of the Germans. His early buildings--for example, the Villa Savoye (1929-30) in Poissy--resemble those of Gropius and Mies in their asymmetrical and flowing spatial arrangements, as well as in their unornamented glass and stucco planes.

Le Corbusier's explanation of his art in his immensely influential *Vers une Architecture* (1923; trans. as *Towards a New Architecture*, 1927) emphasized that a new and purer classical architecture of forms seen in light could be created by following the logical conceptual processes of the engineer. He also insisted that the reorganization of the city was the first task of modern architecture. His 1922 exhibition entitled "Modern City for Three Million Inhabitants" led eventually to a model apartment tower that he called a *Unite d'Habitation*, the first of which was erected in Marseille in 1946-52. An overriding concern for urban planning made him one of the key figures at a 1928 meeting of modern architects that resulted in the formation of the *Congres Internationaux d'Architecture Moderne* (CIAM). Greatly influenced by Le Corbusier, the CIAM architects overruled the aesthetic goals of the expressionists by setting urbanism, rather than design, as the organization's chief concern.

Frank Lloyd Wright

Also active at the time of the epochal "Modern Architecture" exhibition was another leading exponent of modern architecture, the American Frank Lloyd Wright. Although his work was recognized in the 1932 exhibition, Wright was set apart from the practitioners of the International Style because of his "individualism" and "romantic" attachment to nature. He was also a generation older than his European counterparts and had actually influenced some of their work through the publication (1910) in Berlin of the *Wasmuth Portfolio* of his work. Wright accepted the machine as an aid to architecture and made early use of such modern materials as reinforced concrete in his compositions of cantilevered roof planes, unornamented surfaces, and flowing spaces. On the other hand, he believed in what he termed the "organic" use of building materials and in the close relationship of a building to its site--19th-century ideas rejected by his European contemporaries. His idea of modern organicism is expressed in such works as the Johnson's Wax Company Headquarters (1937-39) in Racine, Wis., a great space wrapped with brick and fiberglass tubing whose roof is supported by slender, mushroom-shaped columns; and in the dramatically cantilevered concrete-and-glass Kaufmann House, "Fallingwater" (1936-37), at

Mill Run, Pa.

Triumph of the International Style

In 1932 the International Style embraced only a small proportion of recent architecture; outside of private houses its influence was limited to certain housing projects in Germany, Austria, and the Netherlands. During the great Depression of the 1930s, however, the simplicity and economy of the International Style posed a desirable alternative to the extraneous ornamentation and lavish use of space inherent in eclectic architecture, and only CIAM seemed to have any clear solutions to the pressing problem of social housing. This new socioeconomic environment, as much as the aesthetics of modern architecture, paved the way

for the triumph of the International Style in France, Great Britain, and the United States, particularly after its German masters were forced into exile by Hitler. After World War II the International Style provided the basis for the rebuilding of European cities--for example, van den Broek and Bakema's Rotterdam rail terminal (1953-54). In the United States the architects of the building boom of the 1950s and 1960s turned to the International Style in designing technocratic office buildings such as New York City's Lever House (1950-52), by Gordon Bunshaft of the firm of Skidmore, Owings, and Merrill (SOM).

Equally attracted to the philosophy and the aesthetics of the new architecture were institutions that sought to project a modern image, such as the Air Force Academy, whose Colorado Springs, Colo., campus was designed (1954-57) and built (1956-62) by SOM. Even the New York City headquarters of the United Nations (1947-50) was rendered in the International Style by a team of architects that included Le Corbusier, who had been passed over (1927) for the design of the

League of Nations building. Limits of the International Style

If the term modern architecture is understood to consist of a particular form-vocabulary (the International Style) embodying a certain philosophy (functionalism), then the term cannot be used to signify all the architecture produced in the modern epoch, but only one architectural tradition extending backward and forward from an accepted year of conception (1922). Frank Lloyd Wright's so-called Prairie style (from c.1900; see prairie school) clearly foretells the International Style, as do the contemporaneous concrete designs of Auguste Perret and Tony

Garnier in France.

In another vein the Art Nouveau movement of the 1890s also sought to produce an innovative modern style using the industrial materials of metal, glass, and concrete; only its sculptural, biological form-vocabulary separates it from the buildings of 30 years later. Art nouveau, in turn, represented the culmination of a search for a new style adapted to new materials and new institutions that commenced around 1830 with the work of European romantic rationalist architects. Going back in time even further, direct expressions of materials and function in works of engineering can be discerned in the mills and iron bridges of England dating from the beginning of the Industrial Revolution (1770s).

The fact that such pioneering movements of modern architecture can be identified as much as two centuries ago indicates that modern architecture did not primarily evolve out of the conditions and demands of modern society. Its aesthetic and philosophical roots can actually be traced back through a long line of artists and theorists.

Modern architecture claimed to be based on a logical expression of the spatial and structural facts of building, yet its practitioners have rarely approached the structural ingenuity of conceptual technicians such as R. Buckminster Fuller. Similarly, although its apologists claimed that modern architecture represented a democratic style expressing the taste of the general public, its works often have been seen as aloof and oversophisticated by their residents. Finally, modern

architecture's efficacy in solving the problems of redesigning cities into finely tuned social organisms was questioned by those who saw it as the destroyer of cohesive neighborhoods through wholesale urban renewal.

Modifying the International Style

As these contradictions in modern architecture began to emerge clearly in the 1950s, many architects sought to modify the codes of the International Style so as to create buildings at once modern and monumental, as well as functional and responsive to the needs and expectations of a wide audience. An international group of architects formed (1953) under the name Team X succeeded in 1959 in dissolving CIAM and setting its own goals for a new, more humane system of public housing. Team X members such as Alison and Peter Smithson and Aldo van Eyck, working from the aesthetic basis of the International Style, evolved from it more visually complex, texturally rich, and physically substantial buildings. Late in his career Le Corbusier himself became a major figure in this development, particularly with his sculptural concrete chapel at Ronchamp, France (1951-55). Another convert was Philip Johnson, the theorist of the International Style, who executed a number of monumental public buildings in rich materials.

If Eero Saarinen turned the International Style to expressionistic ends in works such as his TWA Terminal (1956-62) at J. F. Kennedy Airport in New York City, his buildings are scarcely more extraordinary than the later works of Frank Lloyd Wright, whose spiraling, concrete Guggenheim Museum was conceived in 1942 and completed in 1959. Finally, Louis I. Kahn developed a new monumentality that was first expressed in his Yale University Art Gallery (1951-53) and culminated in such buildings as the Exeter Library (1967-72), a symmetrical, almost classical composition of brick, wood, concrete, and glass. Kahn was perhaps the last of the great modern architects. The full emergence of postmodern architecture took place shortly after Kahn's death (1974), and many prominent architects are now pursuing a variety of formal images beyond the doctrinal limitations of the International Style.

Two opposite forces have coexisted in American art since the establishment of the first colonies. On the one hand, American artists have been aware of their European cultural heritage and of continuing innovation in Europe; on the other hand, they have had to adapt European forms to the exigencies of their native situation. This interaction between rival forces is hardly unique to American art--all art grows within a tradition--but what distinguishes the American experience is the ambivalent attitudes brought to that tradition. To many of the early settlers, the ambivalence was clear, since so many of them were religious and political exiles. Yet despite the pressures of conscience and conviction, the European traditions persisted in memory, so that the first American art and architecture were adaptations of European styles and modes, modified to suit the colonists' urgent needs in a new and often hostile world. The conflict, aroused by traditions at once alienating and indispensable, has served as the underlying dynamic for the rise and progress of art and architecture in the United States.

AMERICAN ARCHITECTURE

In a virgin land the art form that developed most rapidly was the one for which the need was most pressing--architecture. The earliest extant buildings are the dwellings, meetinghouses, and churches that made up the nuclei of the first colonial settlements in Virginia and Massachusetts. The dwellings, simple in plan and elevation, like the Adam Thoroughgood House, Princess Anne County, Va. (1936-40), resembled English houses of the late medieval or Tudor style. The most innovative in design were New England meetinghouses, because the separatists sought to avoid any associations with the established church in England. These handsome buildings, such as the Old Ship Meeting House, Hingham, Mass. (1681), were either square or rectangular in plan and served as the focal center for northern towns.

Colonial Buildings

As the colonies flourished, more and more elaborate structures were required. By the end of the 17th century, most American public buildings were derived from Sir Christopher Wren's designs for the rebuilding of London after the Great Fire in 1666. The best were the so-called Wren Building (1695-1702) of the College of William and Mary and the Governor's Palace (1706-20), both at Williamsburg, Va. To stay the random growth of cities, the concept of urban planning was introduced, beginning with Thomas Holme's grid plan of 1682 for Philadelphia, then second in population to London within the English-speaking world. By the middle of the 18th century, architects were designing churches, mansions, and public buildings in the current English Georgian style, named for King George I.

Post-Revolutionary Architecture

After the Revolutionary War, the first attempt to create a style expressive of the new republic was made by Thomas Jefferson. He based the design of the new capitol building at Richmond, Va., on that of a Roman temple, the Maison Carree at Nimes, France. In so doing he laid down an American precedent of modifying an ancient building style for modern use. The Virginia State Capitol (1785-96), both building and symbol, was meant to house the kind of government envisioned by Jefferson, and the Maison Carree became a paradigm for American public structures.

Jefferson was influential in setting forth the style of monumental neoclassicism that supplanted Georgian architecture with its taint of monarchy and colonialism. Monumental neoclassicism came to represent the new political and social entity that was the United States of America. Architects committed to neoclassicism designed not only the new Capitol of the United States in Washington, first designed (1792) by William Thornton and Stephen Hallet, and other government buildings, but also factories, schools, banks, railroad stations, and hospitals, modernized by the frequent use of materials such as iron,

concrete, and glass. The English-born Benjamin Latrobe, who began his American employment working with Jefferson on the Richmond Capitol, brought American neoclassicism to maturity. Latrobe invented new formal configurations for buildings as varied in function as the Bank of Pennsylvania (1798-1800) and the Centre Square Pump House (1800; both in Philadelphia and both destroyed) and Baltimore's Roman Catholic Cathedral (1806-21). Chosen in 1815 to supervise the rebuilding of the Washington Capitol, gutted by fire during the War of 1812, Latrobe set about producing a truly monumental American architecture. In 1817 he procured the assistance of Charles Bulfinch, who had just completed Boston's Massachusetts General Hospital. Together the two men completed plans for the first major building phase of the Capitol.

Revival Styles

Latrobe and Bulfinch were the preeminent architects in the neoclassical mode. The generation following preferred Greek over Roman forms and produced the Greek Revival. A principal contribution of this style was a modification of the Greek prostyle temple (columns only across the front portico) for domestic and public buildings; the style's influence was rapidly extended north, south, and west. Major surviving examples are William Strickland's Philadelphia Merchants' Exchange (1832-34) and Alexander Jackson Davis's La Grange (Lafayette) Terrace (1832-36) in New York. Up to the 1850s classical revival styles led to a homogeneity in American architecture that was never to prevail again.

Yet even before 1810, American architects, following the lead of their English contemporaries, had begun to introduce a rival style on the American scene--the Gothic Revival. It is appropriate that this movement, which originated with the rise of romanticism in England, should have been taken over in a country where romanticism constituted the first intellectual flowering after the nation's founding. Not surprisingly, the style lent itself most naturally to church architecture. Richard Upjohn, a prolific ecclesiastical architect, made his Trinity Church (1839-46) in New York the prototype for Gothic Revival churches. The style was also widely applied to college buildings, thus identifying those institutions with the prestigious English universities of Oxford and Cambridge.

Before the Civil War other revival styles such as the Romanesque, the Egyptian, and the Italian villa style were introduced, but with less applicability. More widespread was the cottage architecture for the middle class advocated by Andrew Jackson Downing. Moderate in price and well constructed, these Downing designs exploited the possibilities of wood both as construction material and as decoration.

Cast-Iron Architecture

An important development was the proliferation of industrial and commercial structures requiring extensive use of iron. At first engineers rather than architects were responsible for buildings that demanded advanced technical planning. Because cast- and wrought-iron columns replaced heavier masonry

construction, it became possible to construct a lighter skeleton, use prefabricated modules, and introduce more glass into the facade. James Bogardus, an inventor and manufacturer of machinery, is generally credited with the development of cast-iron architecture, as demonstrated in his "Cast Iron Building" (Laing Stores; 1848) in New York. In his proposed plan for the Industrial Palace of the New York World's Fair (1853), also called the New York Crystal Palace, and his Wanamaker Department Store in New York (c.1859; destroyed), he pushed this type of engineered building to the limits then possible.

After the financial crash of 1857 and the Civil War, both of which had temporarily halted building construction, Americans gravitated to a style that demonstrably symbolized the nation's rapidly increasing wealth. Mansions and government and civic buildings were designed in the Second Empire style, promoted in France by Napoleon III to bolster his imperial ambitions and exemplified by John McArthur's massive Philadelphia City Hall (1874-1901). Also of great importance was the extension of the Gothic Revival into its Victorian phase. This movement, inspired by the writings of John Ruskin, emphasized craft and permitted the manipulation of architectural detail to create bold new effects. Two great architects, Frank Furness and Henry Hobson Richardson, emerged from Victorian Gothic; Furness created works of idiosyncratic originality, while Richardson created a new vision within a revival style. Richardson, the most independent and imaginative architect since Latrobe, attained prominence when he gave a new Romanesque form to Boston's Trinity Church (1872-77). Besides churches, Richardson designed numerous residences, libraries, railroad stations, civic and commercial buildings, and even a prison, achieving models of their kind for each type. He favored the Romanesque because he believed it expressed the pervasive energy and dynamism of the American scene. But it was his Marshall Field Wholesale Store (1885-87) in Chicago that was to prove seminal. Its rusticated masonry and multistoried arrangement of arches, reminiscent of Romanesque and expressive of Richardson's sense of ordering masses on a large scale, would be applied by his successors in Chicago to problems of skyscraper design.

Skyscraper Architecture

The skyscraper, defined here as a tall commercial structure, is America's original contribution to the history of architecture. Commercial buildings of several stories, constructed during the 1850s in Philadelphia, anticipated the skyscraper. But before it could become a reality, architects had to incorporate the elevator into the structure. This was done, beginning in the 1850s in New York. Chicago, however, was the city where skyscraper design soon attained a kind of canonical perfection.

Since many of the city's commercial buildings needed to be replaced after the great fire of 1871, Chicago served as an excellent testing ground for architects. Preeminent among them was Louis Sullivan. He and others working in teams evolved the glass cage that became the hallmark of the Chicago school of architecture. William Holabird and Martin Roche's Tacoma Building, Daniel H. Burnham and John Wellborn Root's Reliance Building, and Sullivan's Gage

Building are outstanding examples of the progressive stages in the skyscraper's development.

Yet just at the time that an architecture of originality and daring was emerging in Chicago, the New York firm of McKim, Mead, and White successfully introduced a monumental Beaux-Arts style for impressive public buildings such as the Boston Public Library (1887-98). This preference for revival styles continued well into the 20th century, with interesting variations. When, for instance, New York began its campaign to raise the world's tallest buildings, their decorative systems were adapted to revival styles, culminating in the best-known Gothic skyscraper, Cass Gilbert's Woolworth Building (1913) in New York.

Modern Architecture

Far more significant than revival styles to modern architecture was, on the one hand, the unfolding of the brilliant indigenous talent of Frank Lloyd Wright and, on the other, the infusion of European modernism through the work of the Bauhaus architects Walter Gropius, Marcel Breuer, and Ludwig Mies van der Rohe, and the independent work of Eric Mendelsohn and Eiel Saarinen. Wright, who early in his career worked for Sullivan in Chicago, believed that the West and Midwest embodied the "real American spirit." Acting on this belief, he designed the houses that were to win him international renown. His "prairie houses" were horizontal, often of one story, with rooms merging in a continuous open space. Wright was a man of fertile imagination; before his long career ended, he designed buildings as various as the Imperial Hotel (1916-22; destroyed) in Tokyo; the Johnson Wax Company Building (1936-39) in Racine, Wis.; and New York's Guggenheim Museum (1956-59).

Despite some native resistance--including Wright's objection that the International Style of architecture exhibited at New York's Museum of Modern Art in 1932 was "un-American"--the presence of European modernism was felt in America's urban and industrial culture from the 1930s. After Gropius was appointed chairman of architecture at Harvard's Graduate School of Design in 1938, many young Americans were trained in the ideas of the German Bauhaus.

Postwar Architecture

The stark, boxy forms of European modernism by way of the Bauhaus dominated American cityscapes in the building boom following World War II. Of special importance was the use of glass curtain-wall construction for the design of large skyscrapers and other buildings, as in the United Nations complex, erected in 1947-53 under the supervision of Le Corbusier and Wallace K. Harrison, and the Seagram Building (1956-59) of Ludwig Mies van der Rohe and Philip Johnson.

By the mid-1970s, however, the reaction against the plain, unadorned "glass box" of the International Style was well under way, carried forth by Michael Graves, Robert A. M. Stern, and Robert Venturi, among many others, as well as by Philip Johnson, who had been the chief American proponent of the International Style. These architects returned once again to the use of color and decoration and revived such once-spurned architectural devices as the column. Postmodern architecture may have produced a few extreme statements, but the movement also brought American architecture a new vitality.

Greek Architecture

Any consideration of Greek architecture must begin with mention of Aegean civilization, typified by the great Minoan palaces on the island of Crete, in particular the huge complex of Knossos and the magnificently sited structures at Phaistos (both c.1700-c.1400 BC). Constructed of massive masonry, they were several stories high and incorporated large pillared halls, dozens of labyrinthine smaller rooms, sweeping terraces looking to the sea, and plumbing arrangements of astonishing modernity. The walls were decorated with brilliantly colored frescoes (see fresco painting) and stucco bas-reliefs. The Minoans were conquered by the Mycenaeans of mainland Greece, whose architecture was subsequently strongly influenced by Cretan prototypes.

This early Greek architecture (3000-700 BC) is characterized by the use of massive stone blocks for walls and by the occasional use of corbeled masonry to make primitive forms of vaults and domes, as in the Lion Gate and so-called Treasury of Atreus at Mycenae (1400-1200 BC). Columns sometimes were also used to frame doors and gateways and to provide internal colonnades for palaces, as in the courtyard at Tiryns. It was, however, the column and the beam--post and lintel--that formed the basis of classical Greek architecture and that give it the simple, straightforward character that, together with its details, has led many scholars to speculate on its origins in the construction of primitive wooden huts.

The Greeks developed a vocabulary of architectural detail in stone that was fundamental to European architecture for more than 2,000 years. The Greek "language of architecture" reached its zenith during the 5th century BC. Classical Greek architecture consisted of three orders--the Doric, Ionic, and Corinthian. Each represented the assembly of the basic components of a simple rectangular building with a pitched roof--that is, column, capital (or column head), entablature (the "beam" connecting the columns), and pediment the triangular gable of the roof). Different proportions and decorative conventions imparted a distinctive character to each order, regardless of the bright colors applied to the original buildings or the subject matter of the sculptured decoration along the frieze or in the triangular pediment (tympanum). The proportions of each order were fixed within narrow limits, and, strictly speaking, the components of each order could be correctly assembled in only one way. The Greeks never mixed different orders on the same building. This, and other rules, were modified in Roman architecture. The Romans created two additional orders, the Tuscan and the Composite, and employed all five orders as decoration for buildings constructed on principles different from those the Greeks used.

The basic building material of the classical period was marble, a strong stone that could be shaped to give great precision of line and detail. The basic temple form was also very simple: a rectangular chamber with a shallow-pitched gabled roof, surrounded by a row of columns (or fronted by a columned porch), standing on a podium of three steps. Given the simplicity of the construction system and the building form, the essential achievement of the Greeks was the refinement of the building and its components into an architectural system of proportion and

decoration--exemplified by the buildings on the Athens Acropolis, in particular the Parthenon (447-432 BC)--that remained the basis of the Western European architectural tradition until the mid-19th century.

Roman Architecture

During the 2d century BC the Romans, in conquering North Africa, Greece, Anatolia, and Spain, absorbed the architectural traditions of those areas (most significantly that of Greece), to which they added the constructional skills of the Etruscans, their immediate neighbors in central Italy (see Roman art and architecture). The most significant achievements of the Romans were in their technology of building, their use of a much wider range of materials (including concrete, terra-cotta, and fired bricks), and their refinements of the arch and vault and the dome--all of which had been pioneered by the Etruscans. Roman temples generally remained modeled on those of Greece, with the common addition of a high plinth (base or platform) and the frequent omission of the side and rear columns, typified by the Maison Carree at Nimes, France. Roman civic monuments included a number of building types of unprecedented size and complexity, which could not have been built using the Greek beam-and-column construction system. Aqueducts, thermae (such as the Baths of Caracalla), basilicas (law courts), theaters, triumphal arches, amphitheaters (such as the Colosseum), circuses, and palaces involved enclosing much larger spaces or bridging much greater distances than could be achieved by the use of timber or stone beams. The Roman use of domed construction in mass concrete is best represented by the well-preserved Pantheon in Rome (constructed AD 120-24), which subsequently became a Christian church. Later Roman or Early Christian churches, however, generally took their form from the basilica, whose central nave, side aisles, triforium, and apse became characteristic features of the Romanesque and Gothic church. Emperor Constantine I built huge basilican churches at all the major Christian sites in the Roman Empire in the 4th century, thus firmly establishing the basilica as the predominant form of Christian church architecture (see Early Christian art and architecture).

Byzantine Architecture

Byzantine art and architecture developed in the Eastern Roman Empire founded by Constantine I when he moved the capital from Rome to Byzantium (subsequently Constantinople--present-day Istanbul) in the 4th century. In southern and eastern Europe, in particular in those parts of Italy, Greece, and Anatolia that remained under the sway of the Byzantine Empire, the continuity of Roman plans and techniques was strong. Only slightly modified Roman basilican plans were used for such Italian churches as Sant'Apollinare in Classe, Ravenna (534-39); in Constantinople itself huge domed churches, such as Hagia Sophia (532-37), were built on a scale far larger than anything achieved by the Western Roman Empire.

Romanesque Architecture

In northern Europe, where Roman remains were less frequently encountered, greater freedom of experiment existed in Merovingian, Carolingian, and Ottonian architecture, as the early periods are known. From the mid-10th to the mid-12th century greater progress was made toward the development of a successor style--the Gothic. The primary characteristics of Romanesque architecture (or Norman architecture, as northern Romanesque is often known) were Roman in origin, however: large internal spaces were spanned by barrel vaults on thick, squat columns and piers; windows and doors had round-headed arches; and most of the major churches were laid out on the basilican plan, modified by the addition of buttresses, transepts, and towers. The buildings are solid, heavy, and, because of the comparatively small windows, dimly lighted, exemplified by Durham Cathedral (begun 1023) in England. Portals, capitals, and altars are embellished with sculpture of superlative skill and powerful effect; stained glass first appeared in Europe, but on a limited scale, because of the restricted size of window openings.

Gothic Architecture

From the mid-12th century to the 16th century northern European architecture was characterized by the use of flying buttresses, pointed arches, ribbed vaults, and traceried windows. The thin walls, slender columns, and very large areas of glass in Gothic buildings gave an impression of lightness that contrasted markedly with the Romanesque. Gothic architecture originated at the royal abbey church of St. Denis, built by Abbot Suger between 1137 and 1144. It was refined in the great churches of northern and central France, such as Amiens Cathedral (1220-70), notable for its great height and the slenderness of its columns, and the Sainte-Chapelle in Paris (1247-48), in which exceptionally large wall areas were filled with glass and tracery. Indeed, Gothic architecture was most fully developed in France and England, where the style spread in the late 12th century. The spread of Gothic to Germany was delayed until the mid-13th century, and in this country only a few cathedrals, such as the one in Cologne (begun 1248), approached the size and quality of the northern French prototypes. The most thorough application of northern Gothic to Italy was in the Milan Cathedral, built at the end of the 14th century by French and German masons. In general, the Italians tended to use Gothic as a decorative feature rather than as a total building system.

Many Gothic secular buildings survive, some of the finest examples being the Bruges Town Hall (1376-1420) in Belgium, the Palazzo Pubblico (begun 1298) in Siena, Italy, and the Pont Valentre (early 14th century) in Cahors, France. The greatest concentration of Gothic secular buildings is in Belgium, then the most prosperous part of northwest Europe.

Renaissance Architecture

During the early 15th century European culture became inspired by the rediscovery, known as the Renaissance, of classical literature, art, and architecture. Italy was the center of this rebirth, and in Florence, where the movement started, architecture was influenced by the use of the orders, the round arch, the barrel vault, and the dome--all Roman features. In northern Europe, where Gothic continued to flourish well into the 16th century, the Renaissance at first made only a superficial impact and was for a much longer time confined to decorative changes. In both France and England a truly classical style was not established until the first half of the 17th century: in France by Francois Mansart and in England by Inigo Jones.

The Florentine Renaissance did not initially mean the complete break with traditional practice that was implied in the Gothic north. For the church of Santo Spirito (begun c.1436), Filippo Brunelleschi used a basilican plan, round arches, and a flat ceiling; but these traditional Italian Romanesque elements were combined with a new sense of proportion, the use of Corinthian columns, and a dome over the crossing of nave and transepts. Brunelleschi's later design for the vast, still unfinished cathedral of Santa Maria degli Angeli (also called the Duomo of Florence) took the form of a domed octagon with eight radiating chapels, a centralized plan that became the ideal among his contemporaries in Florence (Leon Battista Alberti and Michelozzo) and his followers in Rome. There, during the 16th century, a more monumental version of the style was developed by Donato Bramante, Raphael, and Michelangelo, as in their various plans for Saint Peter's Basilica.

Baroque and Rococo Architecture

In the 15th century Florentine architecture relied for effect upon proportion, simple straight lines, and the correct use of classical details. During the 16th century, however, architects such as Michelangelo and Giulio Romano abandoned this restraint for a more exciting, idiosyncratic version of the style, now called Mannerism, in which the classical rules were deliberately flouted for effect. Giovanni Lorenzo Bernini and Francesco Borromini further developed the style by introducing curvilinear forms and by incorporating sculpture and painting in their buildings to give a rich and dynamic version, known as baroque, which spread during the 17th and 18th centuries from Rome to much of southern Europe and to South America.

In northern Europe, especially in Austria and Germany, baroque architecture achieved an exuberance and freedom unmatched elsewhere, climaxing in the rococo, as in Germany's Wurzburg Residenz. In France baroque and rococo were tempered by neoclassicism, with a resultant elegance and refinement in both architecture and decoration, exemplified by the 18th-century sections of the Palace of Versailles. The spread of neoclassical architecture during the 17th and 18th centuries was due in no small measure to the illustrated books that brought it to the attention of educated patrons. Although fine architecture has never been created by untalented architects, the rules of the classical orders enforced systematic convention in design that enabled many moderately competent architects to produce well-proportioned and finely detailed buildings. In part this

explains the extraordinary success of the Palladian (see Palladio, Andrea) interpretation of Romanized Greek architecture. It was, for example, the source of almost all country-house building in England during the 18th century, as well as of numerous mansions, courthouses, state capitols, and universities along the eastern seaboard of North America.

The Age of Revivals

During the late 18th and 19th centuries Europe and America witnessed a series of stylistic revivals. The period was dominated by the proponents of the classical (themselves split between "Greeks" and "Romans") and the northern Gothic. Buildings were also designed in self-conscious imitation of Byzantine, Oriental, Egyptian, Venetian Gothic, and Florentine Renaissance architecture, however. This was not, of course, the first time that ancient styles had been revived; the Italians of the 15th century and the architects of Charlemagne's court in the 9th century had incorporated classical motifs in their buildings. Both the revived classical and the Gothic Revival, however, were essentially different from the architecture that inspired them.

The country mansion of England and colonial America bore a classical portico, but it was attached to a type of building never seen in ancient Rome or Greece. The revived Gothic applied during the 19th century to private houses, office buildings, railroad stations, hospitals, and waterworks was by no means the same as the Gothic architecture of the northern medieval cathedrals. New engineering techniques and modern materials--in particular in cast-iron architecture--removed many of the age-old practical constraints on building design. Rapid urban growth during the 19th century produced a great many fine and essentially original buildings, the quality of which is only beginning to be appreciated.

Modern Architecture

Contemporary architecture takes a bewildering variety of forms and makes use of a far wider range of materials than ever before. The International Style, promulgated by Walter Gropius, Le Corbusier, and Ludwig Mies van der Rohe in theory and practice, dominated architecture for most of the 20th century. Most of the earlier buildings by these architects were small private houses, usually rectangular, with undecorated walls, flat roofs, and large areas of glass set in metal frames. Conscious avoidance of any previous styles or recognizable antecedents was combined with highly sophisticated proportioning to achieve sleek, elegant structures, such as Mies's German Pavilion for the 1929 Barcelona Exhibition. To the dismay of its originators, the International Style was enthusiastically adopted by far lesser talents and profit-minded builders to produce numerous "modern" office buildings, apartment complexes, hospitals, and motels all over the world.

Not all contemporary architects subscribed to Mies's dictum of "less is more," and hence their work is difficult to classify as "modern." Frank Lloyd Wright, probably the outstanding native-born American architect of the 20th century, Kenzo Tange

of Japan, Alvar Aalto of Finland, and the Finnish-Americans Eliel Saarinen and Eero Saarinen produced many buildings of great beauty and originality. Although some of their work does reflect the International Style, most of their buildings are instantly recognizable in their individuality, as were the great buildings of the past. In short, these architects and others like them seem to be part of a continuing architectural tradition rejected by the practitioners of the International Style (see modern architecture).

The social turmoil of the 1960s was emphatically reflected in architecture. Complexity and Contradiction in Modern Architecture (1968) by the architect Robert Venturi was a revolt against the ubiquitous glass boxes of the modernists, and it signaled the emergence of postmodern architecture. Since that time, architects have found new strength in the traditions of the past, as well as in the vernacular architecture seen all about them.

Stephen Bayley and Simon Pepper

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