





# Prehistory to Early Civilizations

**1.1** (left) Paintings of Anubis, Tomb of Pa-schedu, Thebes, c. 1500 B.C.E.

*Images of Anubis, the jackal-headed god of the dead, stand guard on simulated doors on either side of the passage leading to the inner chamber where the sarcophagus stood. The ceiling is covered with hieroglyphic inscriptions. While the intentions are mystical, the form and color generate spaces with richly decorative character typical of ancient Egyptian art.*

Living in the modern, technologically advanced world, we take it for granted that a major portion of our time is spent inside, or “indoors.” We live in houses or apartments, we work in offices, shops, or factories, we study in schools and colleges, we eat in restaurants, we stay in hotels, and we travel inside automobiles, buses, trains, ships, and airplanes. To be outside is most often a temporary situation while traveling from one inside space to another. Human beings differ from other living creatures in this acceptance of inside space as the most usual environment for living everyday life.

## PREHISTORIC INTERIORS

There have been human beings on earth for about 1.7 million years. The detailed record of events and developments that we call “history” stretches back for only about six or seven thousand years. Before the beginning of history we have only myths, legends, and guesswork to tell us what events occurred and in what order. Thus the questions of when and where people first learned to use shelters, and what the earliest shelters were like, have long been the subject of much speculation.

Guesswork is aided in some measure by information that comes from two lines of inquiry. These deal with, on the one hand, prehistoric remains of various kinds known to archeologists and, on the other hand, with the current or recent practices of the “primitive” peoples usually studied by anthropologists. Prehistoric materials are physical objects, artifacts, or structures that date from times before the beginning of the recorded history of the regions where they exist. The term “primitive,” as used here, does not signify simple, crude, or inferior, but refers to peoples, cultures, or civilizations untouched by the modern technological world as it has developed during the few

thousands of years for which we have detailed history.

## Archeological Evidence

### The First Shelters

It is reasonable to assume that the first shelters were either found—caves, for example—or were made with materials that were easy to work with bare hands or with very simple tools. Although the term “cave men” is often used to describe early human beings, and while there is certainly evidence that ancient people made use of caves, it is unlikely that caves were the most widely used of early human living places. Caves exist only in certain places and their number is limited, nor are they particularly comfortable or attractive places to live. While the famous cave paintings at Chauvet (1.2), Lascaux, and Altamira clearly prove that early peoples used these caves, there is no certainty that they were dwelling places. Perhaps they were emergency shelters, places for special rites or ceremonies, or they may have been used for the works of art that we admire because they preserved them from the weather.

Constructed shelters from prehistory have survived only where they were made from durable materials. The most available and easy to

**1.2** (right) Lion Panel, Chauvet cave, Ardèche, France. 15,000–10,000 B.C.E.

*Evidence of human occupancy of caves comes from paintings that were made with only fire-light as illumination. The intention of the paintings was probably not to ornament or decorate the natural spaces of the caves, but rather to provide images that might grant mystical power over hunted animals. To the modern viewer, the paintings have the effect of making the natural caves into spaces under some degree of human control.*







**1.3** Stonehenge, Wiltshire, England, c. 2750–1500 B.C.E.

*Huge stones were carefully placed to create interior spaces with a strong aesthetic impact, whether they were originally open to the sky (as now) or roofed with materials that have since disappeared. The purpose seems to have been connected with rituals relating to the movements of the sun, moon, and stars. The circular form is characteristic of many ancient human constructions.*

work materials—twigs and branches, leaves, rushes and similar plant materials, and animal materials such as skins or hides—are all short-lived, subject to decay and disappearance within relatively brief time spans. Inorganic materials such as mud or (in cold climates) snow have limited lasting qualities, while stone, although very durable, is so difficult to work as to have had very limited possibilities for shelter building. These realities mean that the materials surviving from prehistoric times are largely small objects of stone such as arrowheads and spear points, or large arrangements of stones set up in patterns or assembled into structures.

### ***Dolmens and Barrows***

The arrangements of stones called **Alignments** and the **Dolmens** of Brittany (France) and other European locations are thoughtfully designed structures dating from prehistoric times. Most speculations assume that the larger sites, such as Stonehenge on Salisbury Plain in Britain, were used for ceremonies or rituals connected with observation of astronomical movements; dolmens are more often linked to burial rites. The arrangement of a large stone placed on top of two or three upright stones that makes up the many dolmens seems to have created the inner chamber of a tomb that took the form of an artificial hill. Where the earth has eroded away, the stone dolmen remains. Where the earth is still in place, it forms the kind of tomb called a **Barrow** in England. It is possible to go into the interior chambers of some of these surviving tombs. They are dark, mysterious,

and often impressive, if only for their evocation of unimaginably ancient origins. In some of these structures, it is possible to see carved or incised patterns cut into the stones with patterns of beauty, although their meanings are unknown.

Estimating dates for prehistoric sites was a matter of guesswork until the fairly recent development of the technique of radio-carbon dating, in which measurements of the radioactivity of organic materials (such as bones or shells) gives a measure of their age. Stonehenge (**1.3**) is now dated with some confidence at about 2750–1500 B.C.E. All such structures date from the era now designated as the stone age in reference to the fact that the most advanced technologies of those times involved the working of stone as the best, most lasting, and most effective of available materials. For many parts of the ancient world, the stone age extended to c. 4000 B.C.E., after which the working of metals became the determining feature of many human civilizations. However, in areas such as northern Europe, the working of stone continued to be the predominant aspect of civilization up until c. 1000 B.C.E.

It is virtually certain that the lack of houses surviving from these times can be explained by the use of less-lasting materials, but that can in turn be explained in part by the reality that such ancient human life patterns were generally migratory or at least unattached to fixed locations. Early human life depended on water sources, hunting, and food gathering for sustenance and therefore required populations to move in pursuit of game and other food supply. Whatever shelter



was used needed to be easily portable and therefore made of light materials—wooden sticks, leaves, and rushes rather than stone. Ease of working and mobility worked together to favor shelter of modest scale, light materials, and easy mobility.

### Evidence from Tribal Cultures

The oldest known traces of built human shelter, found in Terra Amata in southern France, are believed to be 400,000 years old. These most minimal remains suggest the form of huts made from tree branches. Although archeological evidence is scarce about the nature of the earliest built structures, there is evidence to be found by turning to the other source of clues to early human shelter—the practices of “primitive” societies. Although now in retreat as modern societies press in upon them, “primitive” peoples survive in many inaccessible geographical regions and many others were extant as recently as one or two centuries ago. “Primitive” societies are characterized by a powerful conservatism, a devotion to traditional ways (often reinforced by a system of taboos that discourage change), and a mistrust of the concept of “progress” that dominates modern “developed” societies. As a result, “primitive” ways can be regarded as exemplifying more ancient ways—ways that can be traced back to the stone age. Most “primitive” societies depend on hunting, fishing, and food gathering for sustenance. They are therefore generally to some degree migratory and must build shelter that is readily portable.

Peoples in tribal Africa, in the islands of the Pacific, in the Arctic, and in the North and South American continents before the coming of Europeans are now, or were recently, living in ways that had not changed in many generations. Villages in tropical Africa, settlements in the Sahara and Mongolian deserts, Native American (American Indian), Inuit (Eskimo), and Australian Aborigine communities are all “primitive” living systems that provide examples of shelter types that can be assumed to be evidence of how human shelter may have developed.

In his 1876 book *The Habitations of Man in All Ages*, the French architectural theorist and historian Eugène-Emmanuel Viollet-le-Duc (1814–79) tried to show how shelter making began. In one illustration he shows us a “primitive” group of people building a structure made up of tree branches tied together at the top, with enclosing surfaces being built up by weaving

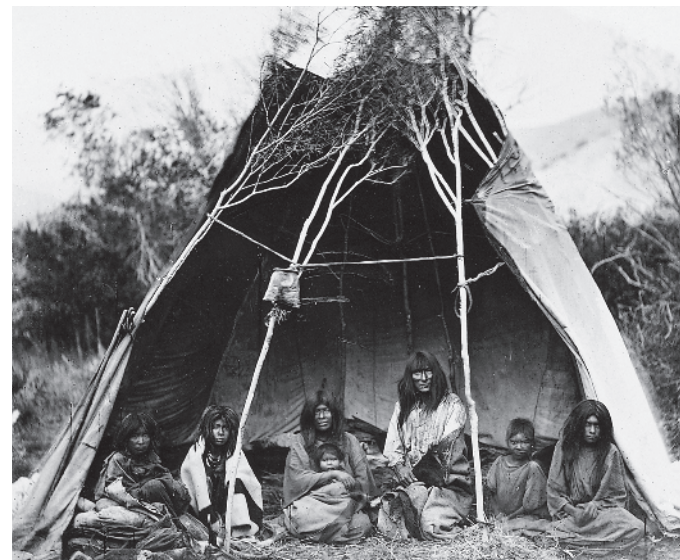
more flexible twigs and branches through the main structure. This is clearly an early form of shelter of the kind that appears in many “primitive” cultures—a **Wigwam**, or if covered with skins, a **Tepee**. It might receive an exterior plastering with mud or, in the Arctic, a similar structure may be built up of blocks of snow in the dome-like form we call an **Igloo**. In other locations where trees and branches are scarce, a similar form may be built of mud brick with a topping like a hat of straw or thatch.

Many such “primitive” shelters share certain characteristics. They are generally quite small and are almost invariably round. The small size reflects the limited availability of materials and the need to conserve effort, while the round form can be explained as a reflection of several realities that reinforce one another. The forms of nature are rarely straight-lined and square-cornered. Observation of trees and rocks, of the shelters built by birds and insects, would suggest circular forms; in the materials available the making of square corners might be difficult and create weak points in a fragile structure. A circle is also the geometric figure that will enclose most area with least perimeter, a concept that might not be understood in theoretical terms but could still be grasped intuitively in the process of constructing a building.

The tepee (1.4) of the American plains had a frame of long poles tied together at the top. Its outer walls were skins arranged to permit a flap doorway and a top flap that could be adjusted to control air circulation, allow penetration of daylight, and act as a smoke outlet. The whole tepee was easy to take down, pack, and transport when the migratory hunting users needed to follow the

**1.4** William Henry Jackson, photograph of a Bannock family camped near Medice Lodge Creek, Idaho, 1871.

*The native American tepee was a round, portable structure with a frame of wooden poles and a covering of skin. Its interior was simply the inside of its structure without added treatment or furniture.*



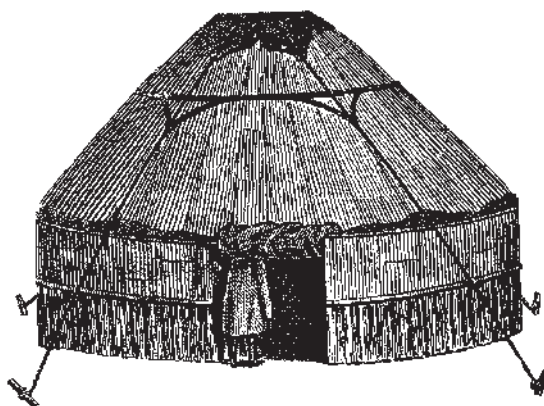


herds that were their food supply. The **Yurt (1.5)** or **Ger** of the Buryat peoples of Mongolia uses a vertical wall frame of lattice strips that collapse for transport but are expanded (like a modern elevator gate) and tied to form a circle. Willow strips form a roof structure and layers of felt are applied to form the wall and roof enclosure. The portable yurt, still in use, is an interesting example of a design developed to fit a particular way of life in a particular geographical location.

The snow house or igloo of the Inuit people of the Arctic region (**1.6**) is a circular construction built from blocks cut from snow. The blocks are laid up in concentric circles of diminishing size to form a dome. An entrance tunnel of snow blocks is angled to prevent penetration by the prevailing winds, and it includes a space to accommodate dogs. Within the house proper, skins are used to line the walls, leaving an air space that helps to insulate the interior while preventing the heat from melting the snow dome. Raised platforms lift the interior floor level and also act as a substitute form of furniture. The domed exterior form is strongly resistant to the high winds that occur in winter. The snow house is usable only during the cold months, and is replaced by a tentlike house of skins in summer or, in some regions, by a grass house of domed shape similar to the winter igloo, which uses an internal frame of thin strips of wood.

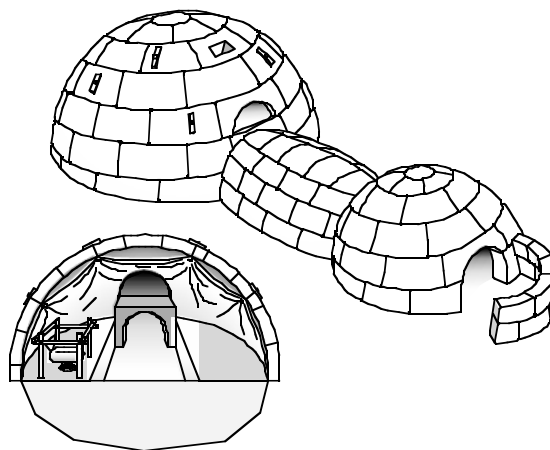
The round, portable structures built by migratory peoples generally stand alone; each house is a single unit, usually enclosing a single space. More complex houses of several rooms appear in villages in locations where climate, water, and food sources were sufficiently consistent to make constant relocation unnecessary. In Cameroon, in Africa, there are villages of multiroom houses where each room is actually a separate round hut with a special function (living space, kitchen, store room, or stable, for example), with covered doorway links between related hut-rooms. Walls are constructed of mud, with roofs of thatch resting like hats on the walls (**1.7**).

Other “primitive” house types are not round. It is probably the use of strip materials, wooden poles, or branches that suggests straight-line walls and so leads to more-or-less rectangular box forms (**1.8**). The A-frame form of the Dawi ceremonial chief’s house, the dwellings of the people of New Guinea, packed-mud houses in Yemen, Pueblo building in the American southwest, some wigwams (known to us from drawings made by early European settlers), and many



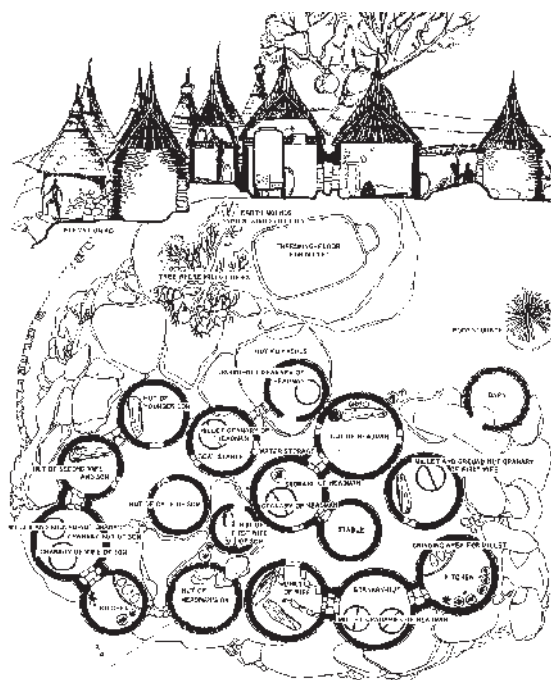
**1.5** An engraving of a Mongolian yurt.

*The yurt is a portable structure with an enclosing wall of lattice strips supporting a roof structure of poles. The exterior is covered with skins or mats. Inside, boxes to hold possessions, rugs, and stools create spaces with considerable aesthetic character.*



**1.6** Drawing of an Inuit igloo.

*In this drawing of a typical Inuit igloo or snow house, the interior, shown in partial section, is lined with skins to give insulation, and the bench “furniture” on either side is formed of snow.*



**1.7** Plan and sectional elevation of a Matakam homestead or tribal village in Cameroon, Africa.

*The circular form of the mud or stone hut creates a room, and several similar structures are grouped together to make a house complex. The simple interiors hold storage containers and sleeping pads on the dirt floors.*

house types built by South American natives have rectangular plans. In Apulia in southern Italy, an ancient house type still in regular use is built of dry field stones to form a roughly square room. This is topped by a round dome built by laying rings of stone in gradually diminishing circles until a single stone can cover the topmost



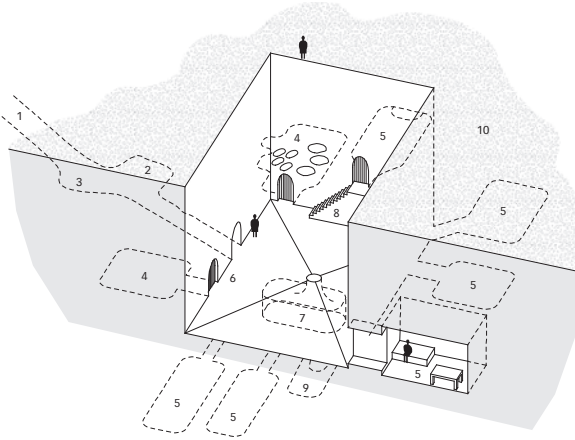
**1.8** John Webber, engraving of the interior of a house in Nootka Sound, Canada.

A structure of wooden logs creates an enclosure in which a fire generates heat. Fish are hung to dry, while blankets and mats serve as both clothing and minimal furnishings. Totem-like carvings have both mystical and aesthetic value.



**1.9** Drawing of a Matmata house.

This diagrammatic illustration of an underground house of the North African Matmata people shows an entrance tunnel (1) leading from the surface (10), with stables for a donkey (2) and a goat (3), leading down into the central courtyard open to the sky. Individual bedrooms (5) and other rooms [(4) granaries and (9) a kitchen] are tunneled into the surrounding ground, with steps (8) leading to some rooms. A cistern (7) in the center of the courtyard collects and saves water.



opening. Such **Trulli** houses have been built for thousands of years in the region.

Other types of “primitive” house forms are determined in part by the powerful environmental realities of topography, weather, availability of materials, and particularly climate. The snow-built igloo is well-known but the underground houses of the Matmata in the Sahara are less familiar. A Matmata house is made up of a central court, a deep open-topped pit dug into the desert which gives access to surrounding rooms that are totally underground. A long, sloping entrance tunnel gives access to the court. This underground scheme requires no added material and provides insulation against desert heat by day and extreme cold at night. The central courtyard, open to the sky, receives light but is deep enough (30 to 40 feet) to cut off the angle of the sun, leaving the bottom of the court always shaded and cool. A diagram (1.9) gives a view into this type of house from above, and shows how it fails to have any visual impact above ground level.

Whether round or rectangular, on the surface of the earth, raised up on posts, or dug into the ground, it is the interior space of such houses that is their reason for existence. Such interiors are not “designed” with the sophistication of concept that we associate with modern interior

design; the interior is simply a hollow space created by the technique of building the outside. Into the inside of all such houses must go the equipment used in daily life—cooking and eating utensils, weapons, stored clothing, blankets, and whatever there may be in the way of furniture. Tables and chairs are rarely used. Most “primitive” peoples sit on the ground and use the earth surface as the only table. Sleeping arrangements use portable materials laid on the ground rather than on a constructed bedstead. Rudimentary furniture appears in some “primitive” house types—shelf-like platforms or benches constructed as part of the built structure of mud huts, underground dug chambers, and snow-built igloos. Storage devices, bags, baskets, and, where they have been developed, pottery bowls, pots, and jugs are the most ubiquitous of artifacts in such dwellings.

### Pattern and Design

The technique of weaving is an ancient invention, which has appeared in many locations, making possible baskets, blankets, and rugs (and, of course, clothing) of a manufactured membrane as an alternative to animal skins. The weaving of fibers of varied colors, either from natural sources or through dyeing, leads to the discovery that patterns too can be woven. Such simple patterns as stripes and checks lead to the invention of more complex geometric patterns that appear in basketry, pottery, and woven blankets and rugs. The human urge toward the introduction of designed pattern is in clear contrast to the hives and nests made by other creatures where pattern appears (as in the webs of spiders) only where it is a structural or other functional necessity. Painted decorative elements appear as fired pottery comes into use, with both geometric pattern and more-or-less representational imagery.

The patterns and images that enliven clothing, blankets, baskets, pots, and other objects of the interiors of these shelters allow them to be compared with more modern interiors where rugs, wall treatments, furniture, and other objects are the elements that make an interior space a designed entity. In “primitive” practice, pattern and imagery are rarely strictly ornamental, however they may appear to modern viewers. There are purposeful meanings in color, pattern, and design that serve to designate identity within a society, tribal loyalties, religious or mythic references, or magical significance. The designs





of an African woven cloth (1.10) or a Navajo blanket, for example, follow customs that make the visible designs significant in reinforcing tribal traditions and taboos. Entering a house where a few utilitarian objects offer some visible expression of a particular way of life gives the occupant reassurances that offer comfort and a kind of aesthetic experience. To the modern viewer, even if the significance is unknown, the aesthetic value can remain powerful.

## THE FIRST PERMANENT SETTLEMENTS

The key inventions or discoveries on which civilization is built are the controlled use of fire, the invention of language, and the development of agriculture. Of these three it is agriculture, or fixed-base agriculture, as it is often called, that has most directly influenced the design of built shelter. As long as food supply was dependent on hunting and gathering, humans were forced to travel to where food was available. The discovery that it was possible to plant crops and harvest a larger and more reliable food supply was the basis for a chain of developments. Once crops are planted, it is necessary to remain close by to harvest the results. When staying in one place, it is no longer necessary to use only portable housing, so that more lasting house types can be developed. Further improvement in food supply also makes growth in population sustainable.

With more people and the development of more permanent building types, villages and towns were established. The making of the necessities for living (clothing, utensils, weapons) gradually became more specialized with systems of trade emerging to make it possible for a farmer, a shepherd, or a fisherman to make exchanges with a weaver, a potter, or a builder to the benefit of both.

It is generally thought that around 10,000 B.C.E. this shift from nomadic hunting and gathering cultures to those centered on agriculture began to gain impetus (particularly in regions like the Near East), and there was a connected shift to more permanent dwellings. The most obviously desirable non-portable material for wall construction would have been stone, but stone was not always easily available. As a result, a substitute was invented: the **Mud brick**—made by compacting mud in a mold and drying it in the sun. It was used in much early building and is still used in modern times (such as the adobe brick used in the Americas). Mud brick, however, is a difficult material with which to make roofs. As a result, roofs had to be made using wood, poles of rush, and animal hides spread over whatever type of framework could be devised. Dome-like structures made entirely of mud brick are possible, but, for obvious reasons, they are only practical in very dry climates.

Among the earliest known excavated structures are the frames made from mammoth bones found at Mezhirich (Ukrainian Republic), and dating to c. 15,000 B.C.E. (1.11). Over these circular frames would have been stretched animal hides, and they may indicate a stage in the transition from a highly portable wooden-framed structure to something more stable and lasting. This round shape continued to be popular with the transition to stone and mud brick, as demonstrated by the round houses dating from the seventh to fourth millennia B.C.E. at Khirokitia (Cyprus). The single chambers of these houses were each topped by a sleeping loft within the dome, reached by a ladder.

**1.10** Kente cloth, West Africa, c. 1975.

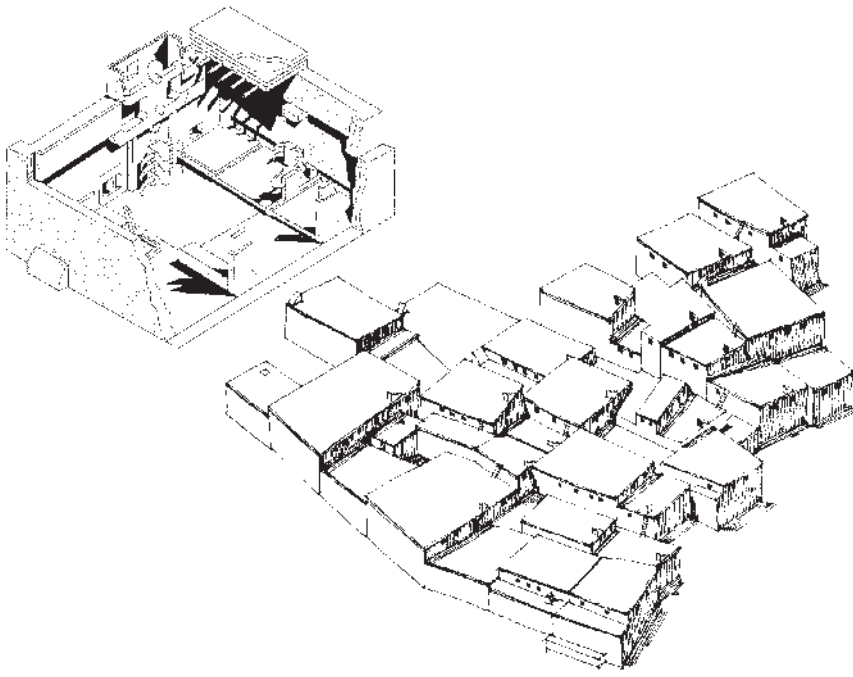
*This African weaving uses bright colors in contrasting bands. The weaving is done in narrow strips that are sewn together to make wider areas for use in robes, blankets, or hangings.*

**1.11** Reconstruction of mammoth-bone structure, Mezhirich, Ukraine, c. 15,000 B.C.E.

*The bones of mammoths served as the material for structural frameworks. Wooden poles helped support the roof that was probably made from hides.*







**1.12** Reconstruction views of the buildings and shrine room of Çatal Hüyük near Konya, Turkey, c. 6500–5700 B.C.E.

*All the buildings at Çatal Hüyük were accessed from the roof-tops. They form a continuous grouping, the exterior walls of which form a de facto perimeter fortification. The buildings comprised dwellings, workshops, and shrine rooms. It is unknown what many of the features of the shrine rooms signify, but the human figure with outstretched legs represents a woman giving birth, while the bull skulls were thought to represent masculine power.*

Round buildings, however, are more difficult to group together than rectangular forms, and the latter become more common in the earliest towns and cities. Similarly stone or mud brick as a building material facilitated this change in shape. The box-like houses comprising the town of Çatal Hüyük (near Konya, Turkey) dating from c. 6500–5700 B.C.E. (1.12) are the earliest known such structures. These single-chamber houses of mud brick are crammed together with access between them being provided across their flat roof terraces. As the town had no formal fortifications, it is thought that the doorless and largely window-less exterior walls of the connected structures formed the defensive perimeter for the community. The chamber of each house had a raised sleeping platform and a hearth for cooking and heat. Access to the outside was provided by a ladder to the roof hatch that also served as a smoke vent. A few wooden beams supported smaller poles that in turn supported the roof surface of clay or mud.

Around 4000 B.C.E., larger towns—even cities—began to appear. With food and shelter adequately assured, human energies over and above the needs of subsistence made possible the development of increasingly complex inventions and the arts. All of these developments occurred at different rates in different places and all took thousands of years. The two areas where early Western civilization first developed to high levels of complexity are the Nile valley of Egypt and the region in the Near East between the Tigris and Euphrates rivers called Mesopotamia.

**1.13** A clay tablet with an inscribed map of Nippur, Sumeria, c. 1500 B.C.E.

*The oldest known city map shows the positions of important buildings such as temples, rivers and canals, and walls and gates. Although no records of the interiors of buildings exist, the sophistication of the map suggests that this was a highly developed civilization with a comparable level of design activity.*

## Mesopotamia: Sumeria

The beginnings of a settled Sumerian civilization based on agriculture and making use of irrigation can be dated around 3500 B.C.E. when a system of picture writing came into use. Surviving traces of this and other subsequent societies in the Mesopotamian region include pottery, clay tablets (1.13), various other artifacts, and traces of buildings and cities. Unfortunately for the study of interior design, the available building materials were limited, with sun-baked mud brick the primary material of construction. While large cities and many major buildings were built in mud brick, the poor lasting quality of this material has left only ruins as survivals. Excavations by archeologists in this region find layer after layer of remains of successive cities built in sequence, as older cities were destroyed or allowed to crumble and subsequent cities were built on top.

It has, however, been possible to reconstruct in part plans of houses, temples, and palaces from these ruins. Excavations at the site of the ancient Sumerian city of Ur have uncovered traces of 4000-year-old closely packed neighborhoods of houses, each having several rectangular rooms around an open central court. This house type has continued to be used in many warm-climate regions up to the present time. **Arched** or **Vaulted** roofs of mud or clay brick may have been used. Mud-brick houses with **Domed** roofs (similar to those of the Italian trulli described earlier) are still in use in regions of Iraq and Syria, suggesting that this house form may also be of very ancient origin.

The ancient temple, viewed by its builders as a house of a deity, tended to be an enlarged and elaborated version of the local house type. The White Temple in Uruk, so-called because





of the traces that indicate that its walls were whitewashed, was built before 3000 B.C.E. It is a rectangular block with a number of rooms surrounding a central space that may have been a covered or open court. Deep walls have thickened vertical bands to aid in strengthening the inherently weak mud brick. Even earlier construction in Uruk includes fragments of walls surfaced with an elaborately patterned studding of small cones of clay painted in black, white, and red; the mosaic-like designs suggest the zigzag and diamond forms of woven textile patterns.

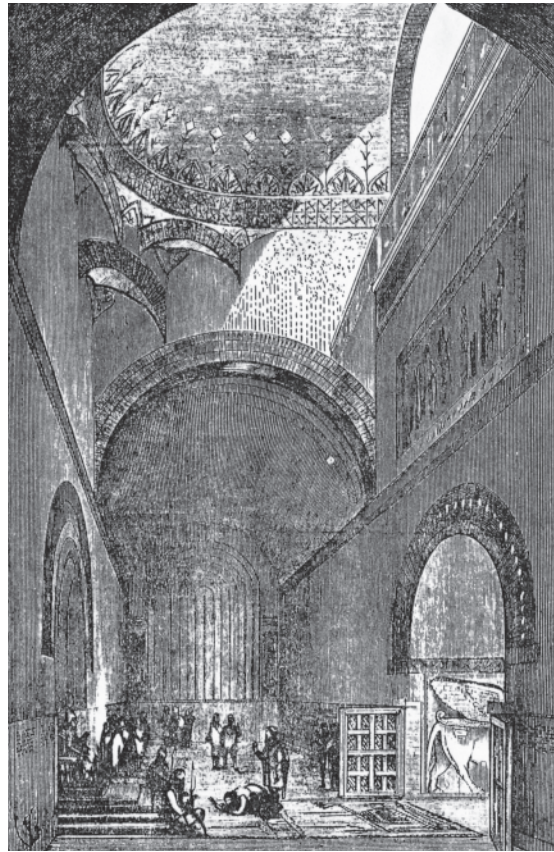
Much later, Assyrian cities included vast and complex palaces with plans that can be studied as they survive in excavated remains. Large rooms in the palace of Sargon in Khorsabad (c. 720 B.C.E.) are thought to have had vaulted roofs and possibly made use of half domes. Glazed tile in rich colors was used as a surface material, and enough examples of these decorations survive to give some basis for imagined reconstructions. A conjectured restoration drawing (1.14) from the Viollet-le-Duc book mentioned above gives an idea of the magnificence of an interior in such an Assyrian palace.

### Pre-Columbian America

Before the arrival of Columbus on the American continent in 1492, there were a number of established communities, totally unconnected with developments in Europe and elsewhere in the world. In the mistaken belief that he had reached the coast of India, Columbus identified the occupants of the Americas as “Indians.” The term remains in use in spite of efforts to substitute “Native Americans.” The pre-Columbian Americans were of a number of differing groups quite isolated from one another.

#### North America

Europeans arriving on the East coast of America encountered a number of tribal native peoples that came to be known by various names such as Seminoles, Cherokees, Iroquois, Onondagas, Hurons, and Eries, among others. Most of these groups had developed agriculture and so were able to establish fixed settlements. They built their dwellings from wood with roofing of grass, leaves, bark, or thatch. Round structures, called wigwams, were common, but rectangular structures called “longhouses” were also built. Interiors were simple spaces, necessitated by the materials and building techniques available. The



**1.14** Viollet-le-Duc, “Interior of a hall in the Assyrian Palace,” from *The Habitations of Man in All Ages*, 1876.

A conjectured restoration drawing from a book by Viollet-le-Duc of 1876 shows the great hall of an Assyrian palace as it might have appeared c. 720 B.C.E. The structure makes use of arches and half domes, while an arched entrance gateway is guarded by sculptured reliefs of winged bulls, which would have been painted and glazed in bright colors.

only variant on the strictly structural elements were woven rugs and blankets, dyed with natural dyes, that introduced color into interiors.

The tribes of the central plains, however, lived by hunting and so required portable housing structures, such as the teepees discussed above (see p. 15), so that they could follow the animal herds that provided their main source of food.

In what is now the southwest region of the United States, remarkable towns containing as many as two hundred rooms were created in shelves on cliff edges. The Anasazi moved from these locations around 1300 C.E., leaving only impressive ruins such as those at Mesa Verde, Colorado (1.15). Hopi, Taos, and Zuni tribes adopted agriculture, making possible the building of more permanent structures forming villages made up of the rectangular structures known as pueblos. Walls were built of adobe brick while roofing was made from wooden poles that supported smaller wood members. Navajos built round structures with walls of stone supporting a teepee-like roof. The making of baskets, pottery, and woven materials provided some color and variety within the strictly functional dwellings (1.16).

The Aleut and Inuit cultures in the Arctic region of Alaska were and are the builders of the round snow houses (igloos) discussed above (see p. 16).





**1.15** Ruins at Mesa Verde, Colorado, begun c. 550 C.E.

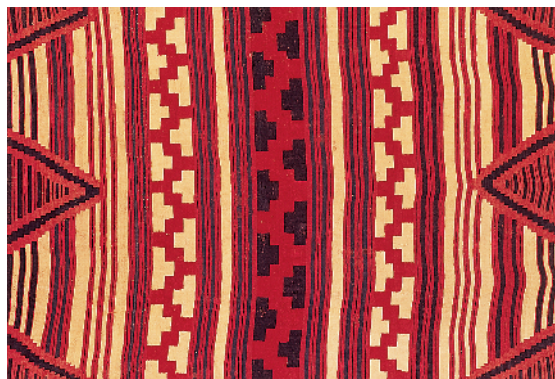
*The ruined Anasazi village known as the "Cliff Palace" built into the side of a cliff included round elements that were, when roofed, places for cult ceremonies.*

All of the North American native cultures are pre-Columbian, in the sense that they existed before 1492 and were gradually discovered as European explorers pushed across the continent. Most of these peoples maintained their ways of life until recent times, so that most of their dwellings are well documented through verbal

accounts, drawings, and paintings and, in many cases, with photography. Native American traditions have been much altered through contact with modern society, although vestiges survive in such areas as the American southwest and in the Arctic areas of Canada and Alaska.

**1.16** Navajo blanket, United States, c. 1855–65.

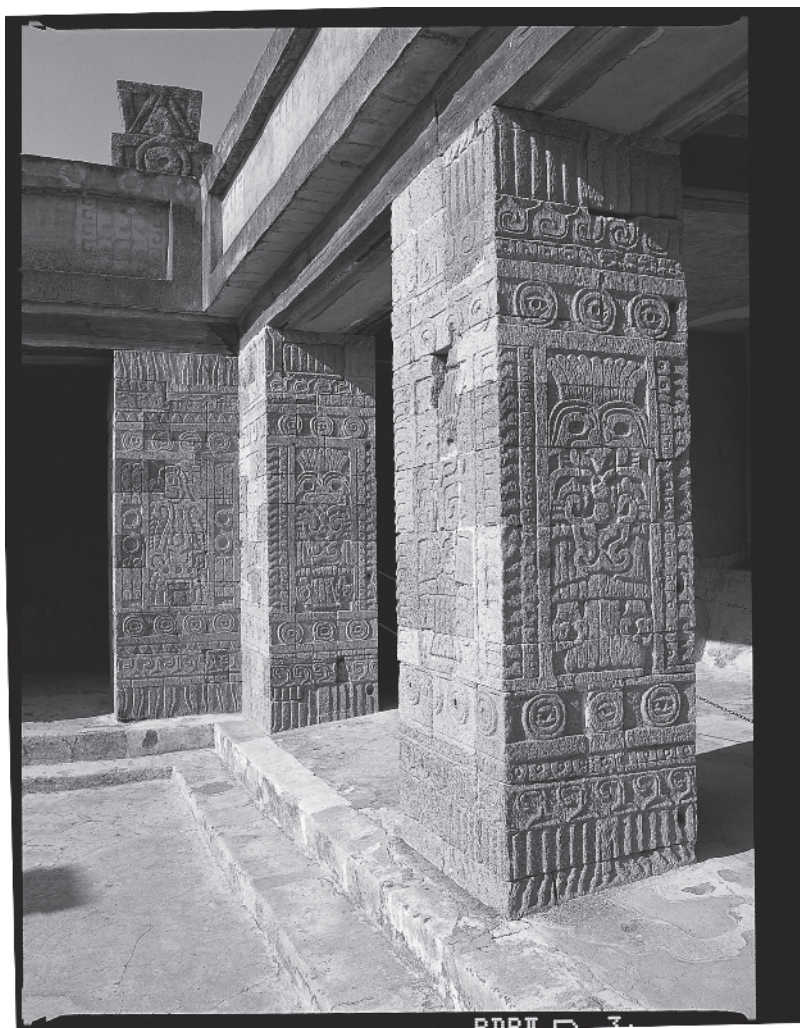
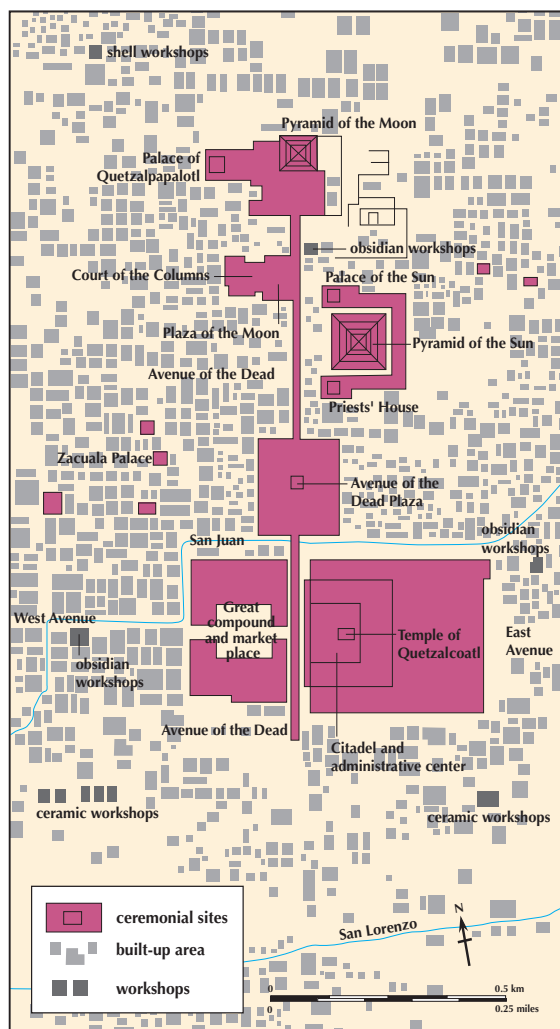
*This Native American blanket by Navajo weavers is woven of bayeta and Saxony fibers dyed in strong colors. The patterns are traditional, but the individual weaver has freedom to introduce variation, so that no two such blankets are identical.*



### **Central America**

Before the arrival of the Spanish conquerors under Cortés in 1519, there had been several highly developed civilizations in Mexico. The Spanish, interested only in gold and other plunder, decimated these cultures so that study must deal with largely ruined communities. Near what is now Mexico City, successive Toltec, Aztec, and Mayan peoples developed the 7-square-mile city of Teotihuacán, the layout of which can be seen in the existing ruins (1.17). Major surviving structures, such as the Palace of Quetzalcoatl





(seventh century C.E.), include patios, porticos, and other elements, decorated with reliefs, giving some idea of the character of interior spaces (1.18). There are also murals surviving in an apartment compound, one of which is reputed to show a fertility goddess (c. 650 C.E.; 1.19).

Many Mayan sites exist in the Yucatán peninsula of Mexico. In Palenque, the Temple of the Inscriptions (1.20) has survived at the top of a stepped pyramid (700–800 C.E.). Its interior consists

of a number of chambers with a hidden stair leading down to a burial chamber below the pyramid structure. The Mayans never developed arches and true arched vault construction and were, therefore, limited in their building to spaces that could be spanned by roofs supported by stone corbelling. Wood and thatch were used to roof most structures other than temples, resulting in the absence of many surviving enclosed interior spaces.

An eighth-century Mayan painted ceramic (1.21) does give some clues about furniture by illustrating a figure, the god L, seated on a cloth-covered thronelike stool or chair, which is in turn placed on a low, raised platform.

In Uxmal, a Governor's Palace and a building called a "nunnery" (1.22) survive as interesting ruins. The latter has a central court surrounded by a number of small rooms (c. 900 C.E.). The exact uses of many Mayan structures are not known so that the titles given to them are the result of guesswork and speculation. This is true of the Temple of the Warriors (c. 1000–1200 C.E.; 1.23) at Chichén Itzá. Hundreds of closely spaced columns surround the pyramid at its base. The number of columns suggests that they

**1.17** (above left) Plan of Teotihuacán, Mexico, seventh century C.E.

*The now-ruined city of Teotihuacán (near Mexico City) can best be appreciated in a plan such as this one. Prominent are the large ceremonial and governmental sites, which dwarf the surrounding buildings.*

**1.18** (above right) Courtyard, Palace of Quetzalcoatl, Teotihuacán, Mexico, seventh century C.E.

*In the courtyard of the palace, bas reliefs of a bird are carved in the faces of the square stone pillars.*

**1.19** (left) Mural, Tepan-titla compound, Teotihuacán, Mexico, c. 650 C.E.





**1.20** Temple of the Inscriptions, Palenque, Mexico, 700–800 C.E.

The Mayan temple at the top of a stepped pyramid contains an inner stairway leading to a tomb chamber buried deep within the structure. The five doorways visible here lead to a narrow outer chamber, which gives access to three inner chambers beyond.



**1.21** Painted Mayan ceramic, Central America, eighth century C.E.

This Mayan ceramic portrays figures seated on a stool placed on a raised platform. Mayan furniture must have taken similar forms to those depicted here.



**1.22** “Nunnery” at the Governor’s Palace, Uxmal, Mexico, c. 900 C.E.

The so-called Mayan “nunnery” at this site is related to the Governor’s Palace (c. 900 C.E.). Decoration in stone mosaic appears above and between the entrance doorways to the many rooms.



**1.23** Temple of the Warriors, Chichén Itzá, Mexico, c. 1000–1200 C.E.

The many closely spaced square columns around the base of the central stairway are carved with different images of Toltec warriors, some of which still bear their original color. The entire group of pillars is known as the Group of a Thousand Columns.



served to support a structure of wood providing flat roofs over this area.

A carved stone reclining figure, or “chacmool” (meaning “Red Jaguar” or “Jaguar King”) found at Chichén Itzá (1.24) was a piece of ritual furniture used to hold offerings in sacrificial ceremonies that took place in the pyramid-top temple. It was painted in bright colors which, along with the polished gold wall covering, would have made the temple interiors visually spectacular.

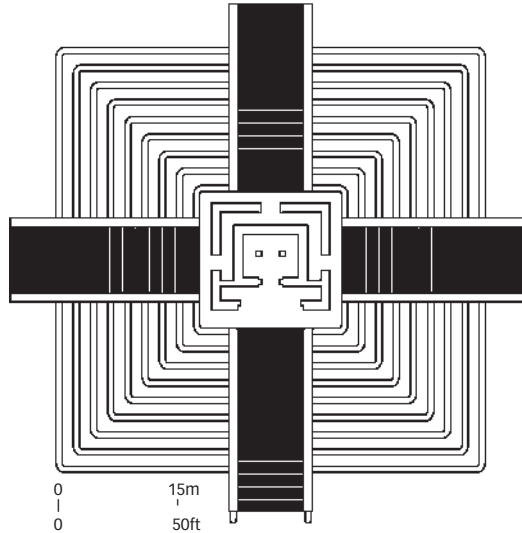
The mis-named “Castle” (El Castillo) in Chichén Itzá (1.25 and 1.26) is of a similar date. It is, in actual fact, a temple of Kulkulkan, a 180-foot





**1.24** (far left) Chacmool, Temple of the Warriors, Chichén Itzá, Mexico, c. 1000–1200 C.E.

*This carved, seated figure at the Temple of the Warriors holds a round plate or bowl believed to have been used to hold offerings to a god as part of Mayan religious ceremonies.*



**1.25 and 1.26** (above left and left) Il Castillo, Chichén Itzá, Mexico, c. 1000–1200 C.E.

*During the spring and fall equinoxes, the setting sun casts an undulating shadow on the north stairway and is said to suggest a great serpent descending from this temple to the earth below. Il Castillo lies just southwest of the Temple of the Warriors.*

square, 780-foot high stepped pyramid, topped by a temple structure. Its interior layout corresponds to the “Golden mean” of geometry, with walls placed so that the outer spaces relate to the center chamber in a 0.618:1 (Golden) ratio.

### South America

With the arrival of the Spanish explorers under Pizarro in 1530, the developed civilizations of earlier native cultures first became known to Europeans. Unfortunately, the Spaniards were interested only in spoils and were largely responsible for the destruction of cultures that had existed for centuries. The Chimu kingdom dominated parts of the western coast of South America in the area that is modern Peru. From about 1100 until the domination of Inca peoples, beginning around 1470, the Chimu were the builders of cities of which Chan Chan is the most impressive. It is now known only in ruins (**1.27**), but two successive palaces can be studied in plan. Courtyards and gardens, long passages, and groups of small houses are all laid out in strict rectilinear geometry. Pyramids were built as burial monuments and Spanish explorers found vast hoards of objects of gold and jewels within them.

The Inca civilization, which followed the Chimu, was the dominant culture at the time

of the coming of the Spaniards. The Incas occupied both coastal areas and mountainous country in the Andes. With its capital at Cuzco, by the middle of the fifteenth century, Inca civilization had become the most important power in the American continents. Using carefully shaped stones of irregular form, fitted together without mortar, walls of houses, temples, and palaces were built, including parts of the old city of Cuzco and the great fortress of Sacsayhuaman (**1.28**). The Incas never developed a method of roofing better than the use of wood and thatch so that complete interiors have not survived. Important spaces in temples and palaces were said to have been lined with gold having pol



**1.27** Ruins at Chan Chan, Peru, c. 1300–1470 C.E.

*Adobe walls among the ruins at Chan Chan include carved figures such as the birds visible here. Similar elements appear in the design of surviving woven textiles.*



ished, reflective surfaces relating to sun worship.

The typical Inca house, at Machu Picchu and elsewhere, was a single square room with walls of adobe and a roof of thatch. In the adobe walls, hollow niches served to hold utensils and other objects that were both utilitarian and decorative. The stone construction of Machu Picchu houses has led to their partial preservation, although roofs are missing (except for a restored example, 1.29). The use of animal skins and woven mats

on floors and brightly-dyed woven materials for blankets and wall hangings made for spaces that can be imagined as colorful and lively.

Samples of Peruvian weaving have been preserved that use varied and handsome dyed coloring and often illustrate figures of human and animal forms showing images of gods and other mythic beings (1.30). The use of woven materials for rugs and blankets may have contributed warmth and color to Inca interiors.

**1.28** Fortress of Sacsayhuaman, Cuzco, Peru, fifteenth century.

*The carefully cut and fitted stones (called “cyclopean”) of this Inca fortress, although large and irregular in shape, form walls of great strength and stability.*



**1.29** (below left) Reconstructed house at Machu Picchu, Cuzco, Peru, mid-fifteenth century C.E.

*The fine stonework of the ruins of Machu Picchu is typical of both the major structures and the small buildings that are believed to have been houses. The original wood and thatch structures have disappeared throughout the city; the builders had no way of roofing with stone. This reconstruction suggests the appearance of such a roof.*



**1.30** (far right) Textile, Chimu culture, Peru, twelfth–fifteenth century C.E.

*Woven textiles have survived from Chimu culture in considerable number. They offer images of figures of conventionalized forms thought to represent gods or other mythic beings.*





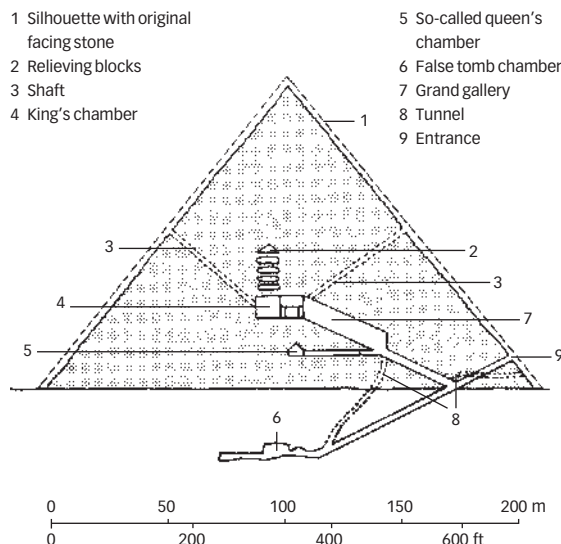
## Ancient Egypt

The civilization of ancient Egypt has left far more evidence for study so that, although no complete interiors survive intact, it is possible to gain a clear idea of what those spaces must have been like. Several circumstances have worked together to preserve Egyptian design. Stone of good, lasting quality was available in the Nile valley, and the Egyptians learned to use it for important buildings, although the everyday architecture of houses and even palaces continued to rely on mud brick. Many Egyptian structures of stone have survived, some ruined to a degree, but some, like the famous **Pyramids**, in quite good condition. The pyramids were built as tombs and they call attention to the religious beliefs that were central to ancient Egyptian society.

Egyptian religion, like many other religions, included belief in a life after death, but it put extraordinary emphasis on the preservation of the bodies of dead persons. The afterlife would last as long as the body survived—hence the development of techniques of embalming and the concern for the building of tombs of maximal lasting qualities. Moreover, it was believed that objects placed in a tomb along with the carefully protected mummified body could be taken into the afterlife. Objects too large to be placed in a tomb—a house or a boat, for example—could be represented by models. On the walls of tombs and temples (1.1), texts spelt out in hieroglyphic writing were combined with visual images, incised and painted in plaster or directly in stone. Taken together, the stone buildings, the objects found in tombs, and the surviving written and illustrated texts have made it possible for archeologists to develop a clear picture of ancient Egyptian ways and to place this knowledge in an accurate chronological history.

### Geometry and Proportion

The largest and best known of ancient Egyptian structures, the pyramids (1.31) are among the oldest surviving works (the oldest dating from c. 2750 B.C.E.), but their small interior passages and chambers are of less interest than their demonstrations of Egyptian conceptual thinking. Ancient Egypt developed great knowledge of, and skill in, geometric planning. The pyramids at Giza are positioned with a north–south axial orientation of great precision (particularly impressive since the spherical form of the earth with its north and south poles was unknown). It



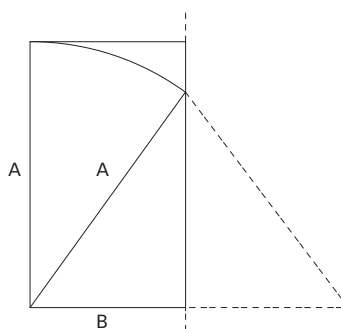
**1.31** Cross-section of the Great Pyramid at Giza, Egypt, c. 2550–2480 B.C.E.

*Although the internal spaces are tiny in comparison with the huge mass of the pyramid, their forms and relationships are complex and significant. A passage leads to a false tomb chamber, while the entrances to the passages leading to the actual tomb were carefully concealed in the hope of defeating any efforts to break into the actual tomb of Khufu (Cheops), the pharaoh for whom the pyramid was built.*

might seem that the slope of the pyramid sides (51 degrees 50 minutes 35 seconds) was an arbitrary choice until it is noted that this is the base angle of a triangle having a base and hypotenuse that are respectively the short and long sides of a “golden” rectangle, a figure in which the ratio of the short side to the long side is the same as the ratio of the long side to the sum of the two; that is, calling the short side A and the long side B:

$$\frac{A}{B} = \frac{B}{A + B}$$

In numerical terms, the only value that satisfies this relationship is the ratio of 0.618:1, which is equal to the ratio 1:1.618. This relationship, often called the **Golden mean**, has been discovered and rediscovered at various times in history as a unique proportion believed to have both aesthetic and mystic significance. That the Egyptians knew of it and used it seems certain. Without mathematical techniques a “golden” ratio can be constructed with straight edges and a compass by laying out a right triangle with an altitude equal to one half the base (1.32).



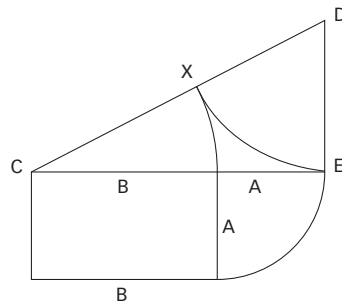
**1.32** Geometric construction of a golden rectangle.

*CDE is a right triangle with DE equal to one half CE. With D as a center and DE as a radius, an arc is swung to the hypotenuse CD marking point X. With C as a center, an arc is swung from point X to the baseline CE. The base is now divided in a “golden” ratio, A:B. With B as its length and A as its width, a golden rectangle can be drawn.*



### 1.33 Derivation of pyramid angle from a golden rectangle.

Using a golden rectangle, the long side *A* is swung to make contact with the opposite long side. The resulting triangle has *B* as its base and *A* as its hypotenuse; it can be called a golden triangle.



Another arc transfers the long side to make it the hypotenuse of the triangle that represents a half elevation view of the pyramid (1.33).

Egyptian art and design make regular use of this subtle relationship and many other simpler geometric concepts in architecture, in art, and in the design of everyday objects. This leads to the conviction that the striking aesthetic success of so many Egyptian works derives from such “harmonic” controls—so-called because of their relationship to the parallel mathematical bases of musical harmony. The musical chords that offer a pleasant (“harmonious”) sound are made of tones with vibration frequencies in simple ratios such as 2:3, 3:4, and 3:5. Irregular ratios such as 17:19 produce harsh, discordant sounds. The proportions used in Egyptian design are “harmonic” in the same sense as the harmonious musical chords.

#### **Egyptian Temples and Houses**

The plans of Egyptian temples are expanded and elaborated versions of Egyptian house plans, with an innermost chamber—home of the god—surrounded by layers of walled spaces and reached only through a succession of outer walls, gateways, and courtyards. The mud-brick material of house building (probably retained in early, now vanished temples) was translated into construction using carefully cut and polished stone. The design of the typical stone column, with its suggestion of a binding of cord at the base and below the **Capital**, was derived from the mud columns strengthened with bundled reeds of houses and palaces. The inward slope (called **Batter**) of walls that had been used to improve stability in mud construction was retained in stone and is a common characteristic of ancient Egyptian building. Flat stones used as a roofing material can span only short distances and so compel plans that

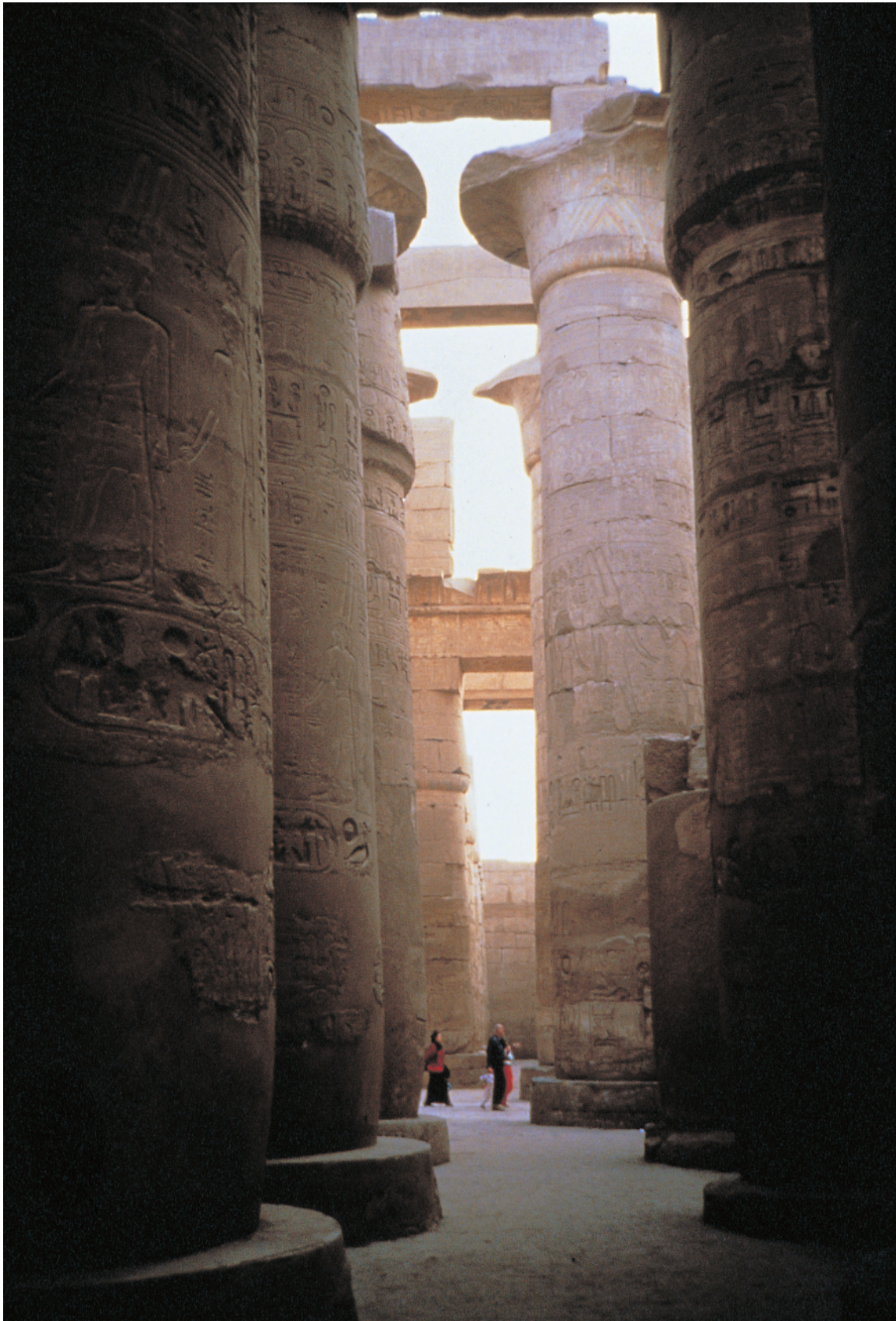
stick to small rooms and narrow passages, or, when a larger space was required, fill the space with columns spaced closely enough to make it possible for stones to span from one column to the next. Such spanning stones are called **Lintels**; building that is based on columns and lintels is called **Post and lintel** or **Trabeated** construction.

A large space filled with many columns is called a **Hypostyle hall**. The enormous (170 × 338 feet) hypostyle hall of the Temple of Amon in Karnak (begun c. 1530 B.C.E.) contains 134 columns with surfaces covered with incised and painted hieroglyphic inscriptions (1.34). The columns are built up of stone drums topped with capitals carved in papyrus bud or flower forms. The center portion of the hall is higher than the sides so that high, unglazed **Clerestory** windows could admit light. Access to the hall is through two gateways centered between huge masonry elements called **Pylons** with a large open courtyard between. Beyond the hypostyle hall three more gates between pylons protect the vast complex of smaller chambers and passages, now partly in ruins, which led to the most sacred interior space, the chamber of the god.

Temple plans can be analyzed to demonstrate their use of complex systems of geometry, which set the relationships and proportions of spaces, walls, and columns in a way that must have had mystic, symbolic significance as well as aesthetic impact. Simple bilateral symmetry is an almost invariable controlling concept. Only traces of mud-built palaces remain, but restoration drawings give some idea of what their interiors might have been like. For example, another illustration from Viollet-le-Duc’s book shows a courtyard in a palace, with columns forming shaded aisles on either side, while awnings above partly shade the court (1.35). There are surviving traces of whole towns of houses built as “suburbs” to house workers employed on vast royal building projects. Surviving traces have formed a basis for suggested reconstructions of houses built at one end of an enclosed garden used for food production as well as amenity. In some tombs, wooden models of houses, shops, and other facilities of everyday life have survived, giving additional information about the pleasant and colorful character of these aspects of ancient Egyptian life.

Egyptian use of color was both strong and effective. Pigments in clear primaries (red, yellow, and blue) as well as green were used, along with





**1.34** Temple of Amon, Karnak, Egypt, c. 1530 B.C.E.

*The hypostyle hall is a vast space almost filled by the columns that supported a stone roof. Incised hieroglyphics covered the columns. Originally, the surfaces were painted in bright colors (still partially visible), which would have glowed in the dim light admitted by roof-level clerestories.*

white and black, the latter generally only for linear forms that edged and defined areas of strong color. In interiors, ceilings were often painted in a strong blue, representative of the night sky. Floors were sometimes green, possibly symbolic of the Nile.

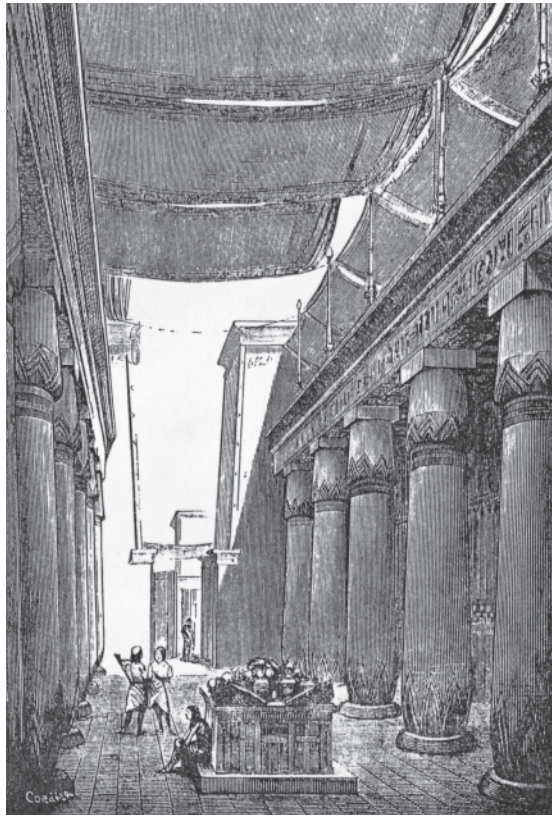
#### ***Egyptian Furniture and Other Interior Furnishings***

Knowledge of Egyptian furniture comes from two sources: images in wall paintings that show scenes of everyday life in royal or other aristocratic houses, and actual examples that were



**1.35** (near right) Viollet-le-Duc, "Interior of Egyptian Palace" from *The Habitations of Man in All Ages*, 1876.

In this Viollet-le-Duc drawing the courtyard of an Egyptian palace is shown looking toward the pylons of the entrance gate. The columns would have been of reed, coated with mud plaster and painted in colorful designs.



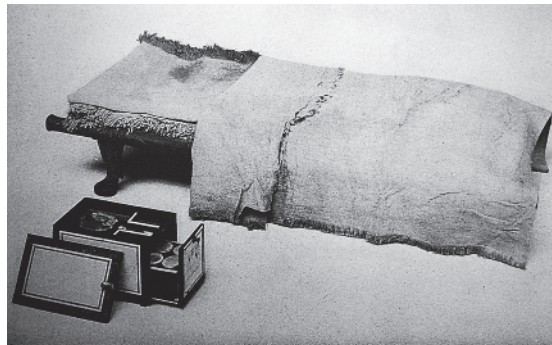
**1.36** (far right) A ceremonial throne from the tomb of Tutankhamen, c. 1345–25 B.C.E.

The basic structure of ebony wood can be glimpsed only in the legs of the chair, which is encrusted with inlays of gold and ivory with panels of painted, symbolic imagery. The seating function is clearly subordinated to the display of wealth, grandeur, and power conveyed by the richness of material and sublime craftsmanship with which they have been assembled.



**1.37** Egyptian bed and box, c. 1314–1158 B.C.E.

These examples of Egyptian furniture were retrieved from a tomb. The bed has feet carved in animal form while the box of ebony and ivory is made in proportions that relate to the Golden mean of 1:1.618, that is much used in architecture.



**1.38** Egyptian chair, c. 1400–1295 B.C.E.

In this Egyptian chair of wooden construction, beautifully crafted joints (made with stone tools) form a wide back and frame the seat, which is of woven rush caning. The low seat height suggests that cross-legged seating was the norm.



placed in tombs and that have survived. The latter include chairs, tables, and cabinets, many of them richly decorated for use and display in the homes of the wealthy and powerful. The typical preserved chair has a simple wooden frame with a low seat webbed with bands of rush or leather. Legs usually end at their base with carved, clawed animal foot forms. Simple folding stools

of an X-form of great elegance also survive. The elaborate objects from the tomb of the pharaoh Tutankhamen (c. 1345–25 B.C.E.) are well-known examples of the colorful and ornate phases of Egyptian design (1.36). Many smaller objects, pieces of pottery, and glassware have also survived. Small wooden boxes, sometimes inlaid with ivory, were fitted out to contain cosmetics and tools for personal adornment. Such objects are often designed with attention to systems of geometric proportions, including the golden section. Other surviving examples, such as a bed, a cosmetics box (1.37), and a modest chair (1.38) give an idea of the elegance of more simple Egyptian furniture design. Surviving bits of woven textiles suggest that the Egyptians were also highly skilled weavers and colorists of woven cloths.

Ancient Egyptian civilization survived, in gradually diminishing strength, up until Roman times. Its influence on later European development is a matter for debate. Certainly, other peoples around the Mediterranean visited Egypt, but the extent to which the design of ancient Greece may have been influenced by knowledge of design in Egypt can only be guessed. Whether or not there is a direct path of progressive development, the design of ancient Egypt was clearly demonstrative of the power of strong conceptual thinking in generating a powerful aesthetic expression.