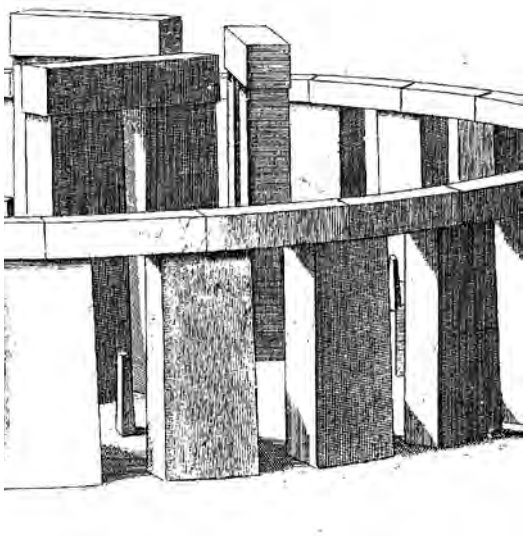
1

EXPLORING THE PAST



THE DISCOVERY OF THE ICEMAN

In October 1992, the cover of *Time* magazine, a space usually reserved for celebrities and politicians, displayed the face of a man about whom virtually nothing was known, not even his name, and who had died more than 5000 years ago (Figure 1.1). The discovery of the Iceman, as he was called, generated a press sensation. Scores of newspaper and magazine articles and several books on the Iceman soon appeared, including one denouncing the find as a fraud. Most scientists, however, are quite convinced that he is genuine. The body was discovered in September 1991, high in the Tyrolean Alps between Italy and Austria. The summer had been warm, and a deposit of dust on the glacier resulted in an unusual degree of melting. The Iceman's frozen body, entombed in the glacial ice for millennia, was finally released. German tourists hiking through the pass came upon his remains just poking through the ice. Had they not found him, within a few days he would have been covered with a fresh fall of snow and returned once more to the glacier.

FIGURE 1.1 The 5000-year-old body of the Iceman, recovered from a glacier in the Tyrolean Alps.

CHAPTER OUTLINE

FIGURE 1.2 A copper axe and a flint knife, a few of the numerous items in the Iceman's equipment.

Why should the Iceman, whose possessions were humble in the extreme, who hailed from a time scarcely known to the average person, have aroused such excitement? Much was made of the claim that the Iceman was the oldest completely preserved human, but, in truth, some Egyptian mummies are older. For some Europeans, surely, the fact that the Iceman was himself a European provided a tie to their past. Most likely, though, he was so interesting because he was a common man, the antithesis of the pharaohs of Egypt or the emperors of China. Possibly, he was a shepherd, not so different from the Tyrolean shepherds of today. He carried with him only the equipment that served him in his everyday life. His garments, equipment, and weapons buried with him in the ice told of an ordinary man.

The methods of archaeology tell us all we know about who the Iceman was. (Physical anthropologists and biologists study the man's body itself.) The Iceman carried with him a metal axe (Figure 1.2), at first believed to be bronze because it closely resembled the axes found in sites dated to the early Bronze Age of the region (starting about 2200 B.C.). When samples from the Iceman, however, were dated using radiocarbon (to be discussed in detail in Chapter 9), he was found instead to have died between 3500 and 3000 B.C.—the early Copper Age. The blade of the axe was analyzed chemically; it turned out to be copper. Its flanged form, though, was unusually sophisticated for that early date. The early Copper Age from this part of the Alps is so poorly known that the local occurrence has not even been given a name. The closest analog to the flanged axe comes from a nearby cemetery at Remedello, Italy, but about 500 years later. The rest of the Iceman's equipment has even fewer parallels, and much of it is unique, because objects of wood and leather are very rarely preserved. It was a remarkable set of equipment. His leather clothing, although crudely patched, perhaps by the Iceman himself, had been finely stitched together, by a practiced hand, from the contrasting skins of several animals. His shoes were well-made, grass-insulated against the cold, and he wore a fur-lined cap on his head. He carried his supplies in a wood-framed backpack, including a quiver filled with arrows, a few of which still had feathers attached. Around his waist he wore a leather pouch that contained some flint tools and tinder for fire making. He had a birch-bark container as well, blackened on the inside as if it had contained fire. Very likely, the Iceman was making himself a new bow when he met his death, for he carried an unfinished longbow made from yew, the best wood known for that purpose. There were other items as well, some 20 in all. Particularly interesting are some bits of fungus threaded on a thong. Known to have antibiotic

value, they perhaps served as a first-aid kit. The sophistication of the Iceman's clothing, his tools, and his evident knowledge of the natural world all came as a surprise.

In 2001, the Iceman made the news again. New X rays of his body revealed evidence that had been missed before. An arrowhead was deeply embedded under his left shoulder. Furthermore, a deep stab wound was found in his right hand (Dickson et al. 2003). Even more recently, DNA analyses by Thomas Loy of the University of Queensland indicate that the blood of four different individuals were on the Iceman's weapons and clothing, suggesting he may have been in a battle. Was the Iceman murdered while defending himself? This question is still being debated.

The European Copper Age, or Chalcolithic, is known only from archaeology. All that we know of the people of the European Copper Age comes from the material traces they left behind. **Archaeology** means, literally, the study of ancient things; it refers in practice to the study of the material remains created by past human beings. Archaeologists use a wide range of techniques to puzzle out the past, and they enlist the aid of many specialists from other fields. Archaeology is more, though, than the collection of methods and techniques needed to uncover individual facts about the past. Archaeology provides a variety of ways for integrating these isolated facts into a broad picture of the world of the past and a framework for understanding how that world developed and changed.

In Europe, the people of the Copper Age did not write. Indeed, we can only speculate about what sort of language they may have spoken. More than 2000 years would pass before the epics of Homer would mark the beginning of written history in Europe. The events of the Copper Age are the stuff of prehistory, as are all the events in which humans participated before the advent of written records. **Prehistory** (as archaeologists use the word) is the sum of all that we know of the activities of humans before the beginning of written history. Prehistory ends at different times in different parts of the world. Some regions, such as China, have a long tradition of written records extending back for almost 4000 years. In other areas of the world, such as Poland and Scandinavia, the earliest written records do not appear until about A.D. 1000. Archaeology is the means by which we have gained almost all our knowledge of prehistoric times.

ARCHAEOLOGY

Written records are available for only a minute fraction of past human societies. Writing is the exception rather than the rule. For most of humanity's time on earth, all that is left to us are material remains: stone tools and potsherds, skeletons and animal bones, trash pits, structures, stains in the soil. Yet the material vestiges of past human behavior tell us much about how these ancient human societies subsisted, developed, and interacted, and even, through careful inference, something of their ideas and beliefs.

Archaeology, as noted earlier, is the study of the material remains of past societies. If we are to understand the forces that shaped human society, we must try to interpret these remains, to understand what they were and how they came to rest

ON THE CUTTING EDGE *Differing Attitudes toward the Dead*

Most Americans and Europeans greeted the discovery of the Iceman with wonder, curiosity, and fascination, as he provided a glimpse of life in an almost unknown past. Few people objected to the widespread publication of his image. Austria and Italy vied with each other for the right to study him, preserve his remains, and put him and his possessions on public display.[1]

The 1996 discovery of the almost complete skeleton of a man near Kennewick, Washington, however, provoked a very different response. When a radiocarbon age determination showed him to be about 9000 years old, Native American groups soon claimed him. According to their traditions, their people had been in America since the beginning of time. Clearly, therefore, this man was one of their ancestors. They demanded his immediate reburial and condemned any further study as disrespectful of the dead.

A number of scientists objected strenuously to the Native Americans' claim. They said that the Kennewick Man differed physically from living Native Americans and that there was no clear cultural link between the ancient man and modern Native American peoples. They insisted instead that Kennewick Man belonged to all people, not just Native Americans, and that the reburial of the Kennewick bones would deprive science of invaluable evidence about the ancient world.

The conflict over the fate of the Kennewick skeleton became the subject of an extended legal debate that will most likely reach the Supreme Court. Whatever the Court's decision, though, it is unlikely that either the scientists or the Native Americans will change their views.[2]

Such profound differences in worldview are a reflection of the gulf between European and Native American cultural and religious traditions. Europeans have been concerned primarily about those individuals from the past who lived after the historical beginnings of the Christian or Jewish faiths. When, for instance, a medieval Jewish cemetery was excavated in the city of York, England, the chief rabbi of Britain oversaw the reburial of the bodies. On the other hand, pagans, such as early Anglo-Saxons, are not generally reinterred, and some are displayed in the British Museum today. Native Americans, however, view their culture and religion as deeply rooted in an indefinite past. They have objected strenuously to museums or other institutions that have put any Native American remains or ceremonial objects on public display.

Archaeologists today must always be cognizant and sympathetic to the sensibilities of the modern people among whom they work. This is rarely an easy course to follow. Scientific goals and conclusions are sometimes deeply at odds with strongly held religious beliefs and cultural traditions. For example, those whose religious beliefs teach the special creation of humanity will surely discount the evidence for human evolution as it is presented in this text.

[1]The Iceman ultimately came to the South Tyrol Museum of Archaeology in Bolzano, Italy, established especially to house him.

[2]The full story of the Kennewick controversy is recounted in the final chapter of this book.

where they were found, and to infer from them human behavior, social organization, and the relationship between early humans and their environment. It is a bit like a detective story in which an unseen crime must be pieced together from often elusive clues. Like Sherlock Holmes, the archaeologist must exercise careful logic in interpreting the archaeological data and then formulate likely **hypotheses** (tentative explanations designed to account for a set of facts) to explain what is observed. These hypotheses must then be tested against further observations so that unsatisfactory explanations can be eliminated. Archaeologists try, in the end, to arrive at the most likely explanation for events in the past.

THE ISSUES AND PROBLEMS OF PREHISTORY

This text will concentrate on the prehistoric periods around the globe and on archaeology as it is applied to the study of prehistory. Many of the crucial events that have shaped humanity and human society have left behind no record other than

stone tools, some food remains, and the skeletons of our predecessors. Prehistoric archaeologists find themselves with some fascinating and challenging problems to solve. Some of the most important issues are the following:

- Who were our earliest human ancestors? What were their lives like? Did they hunt for their food, or did they obtain it by scavenging kills left behind by more powerful carnivores? How were early human societies organized? We will address these questions in Chapters 2 through 6.
- How, when, and where did modern humans evolve? How did they come to replace more ancient forms of human beings, and when and how did they spread throughout the world? These questions will be addressed in Chapters 7 through 12.
- How did human populations respond to the climatic changes at the end of the Ice Age? These questions will be addressed in Chapters 13 and 14.
- When, where, and why did farming replace hunting and gathering? When did the first permanent villages appear in the Old World and in the Americas? Chapters 15 through 18 will address these issues.
- Can we trace the development of the great civilizations of the Old World? How did the pre-Columbian civilizations of the New World develop? These questions will be addressed in Chapters 19 through 26.

Today, archaeologists believe they have some answers to some of these questions, but many basic problems are yet unresolved. Many alternative hypotheses have been offered concerning these issues, and much lively (and sometimes rancorous) debate continues among archaeologists. There is much work for the future.

The methods and archaeological viewpoints to be discussed in this book are primarily those developed in the West, specifically Europe and North America, in the wake of the explosive growth in the natural sciences during the eighteenth and nineteenth centuries. In the early twentieth century, the political dominance of the West led to the adoption of Western archaeological practices and prehistoric frameworks throughout much of the world. Some peoples outside Europe, however, held quite distinctive views of their own most ancient times. The Chinese, in particular, have recorded their own history for millennia, and even in the earliest writings they took notice of the material remains from bygone ages. Chinese historical writings were sometimes supplemented with detailed descriptions (with a distinctly archaeological flavor) of objects belonging to ancient periods. Like the ancient Greeks, the early Chinese were aware that their own use of metals was preceded by a time when people depended on stone tools. (Early Chinese society will be discussed in greater detail in Chapter 22.)

The modern-day search for our early human ancestors, however, surely found its impetus in the scientific and humanistic developments in Europe during the eighteenth and nineteenth centuries. In the late nineteenth and early twentieth centuries, Western scholars journeyed to Africa, Southeast Asia, and China in search of the antecedents of humanity. They took Western science with them, particularly the methods of geology and the concepts of biological evolution. National scholars in Africa and Asia by and large accepted these ideas. The methods of European archaeology and the prehistoric framework originally developed for Europe came to be applied in many areas of the world. Archaeologists soon came to realize, though, that the prehistory of most of the world could not be forced into the European mold. Today, archaeologists from China, Japan, Africa, Latin America, and elsewhere are hard at work refining the unique prehistories of their regions; in so doing, they are expanding the horizons of scientific archaeology as a whole.

THE HISTORICAL GROWTH OF ARCHAEOLOGY IN EUROPE

Until a few hundred years ago, almost no one could conceive of the great antiquity of human presence on the earth. The medieval European universe, for example, was short-lived and firmly centered, both physically and philosophically, on the earth and humanity. For European Christendom, the world

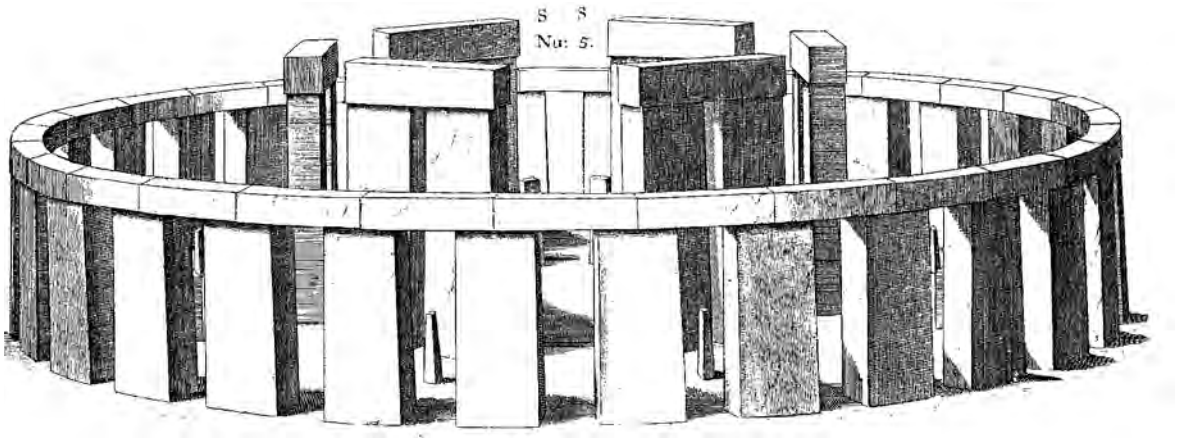


FIGURE 1.3 Seventeenth-century architect Inigo Jones's interpretation of Stonehenge as a Roman temple.

began shortly before the creation of Adam and Eve, and Armageddon lay not very far in the future. In the sixteenth and seventeenth centuries, new astronomical discoveries brought a better understanding of the size and complexity of the physical universe, but, in the popular mind at least, the life span of this universe was derived from a reading of the Bible. In 1636 the Irish archbishop James Ussher calculated, on the basis of the text of the Bible, that the world had been created in 4004 B.C. Together with the works of classical antiquity, the Bible provided all that was known of history.

During the seventeenth century, however, scholars began to examine the world of nature ever more closely. As the telescope had revealed the universe, the invention of the microscope opened up the world of the very small. The sciences of chemistry and physics were developing, and the earth's array of plants and animals began to be classified. This growing interest in the natural world also drew the curiosity of many to the mysterious monuments scattered across the European countryside—earthworks, stone chambers and rings, and standing stones. Among the most well-known of these ancient monuments were the standing stones that make up Stonehenge. Seventeenth-century scholars attributed the building of Stonehenge to the Celts or Britons or other peoples known from the classical writers. In 1620 the royal architect Inigo Jones concluded that Stonehenge was a Roman temple (Figure 1.3). John Aubrey (1626–1697) was the first to undertake a detailed study of the great stone circle: "The celebrated antiquity of Stonehenge . . . I affirme to have been temples, and built by the Britons [the inhabitants of Britain at the time of the Roman conquest of the island in the first century A.D.]" (Aubrey in Daniel 1967: 37). Aubrey believed Stonehenge was the work of Druid priests living in Britain before the Roman conquest of the island. This myth was popularized in the eighteenth century and remains embedded in popular culture even today. Neo-Druids congregate at Stonehenge on the summer solstice (June 21) to celebrate this popular myth. Stonehenge, in fact, far antedates the Britons; its earliest phases were probably erected before 2000 B.C. (For an up-to-date review of the archaeology of Stonehenge, see Chippendale 2004.)

Medieval farmers frequently encountered stone axes in their fields; such things were usually attributed to magic, leprechauns, or the action of lightning. The sixteenth-century voyages of discovery brought a better answer: These objects were stone tools made in the absence of metals, not unlike the tools and weapons used by many native New World and Pacific Island peoples. Still, the true antiquity of these stone tools could not be imagined. Not until the nineteenth century, in fact, was it possible to

appreciate how very old these objects were. In 1802 the Danish archaeologist Rasmus Nyerup could still lament:

> Everything which has come down to us from heathendom is wrapped in a thick fog; it belongs to a space of time we cannot measure. We know that it is older than Christendom but whether by a couple of years or a couple of centuries, or even by more than a millennium, we can do no more than guess (Nyerup in Daniel 1967: 36).

For this fog to be lifted, the chronology of the earth had to be recast, and the evidence for this new chronology was to come from the developing science of geology.

THE NEW GEOLOGY

Today we take it for granted that the many meters of consecutive rock layers that make up the earth's crust (seen clearly in places like the Grand Canyon) were laid down layer by layer over many ages. At the start of the eighteenth century, this concept was not so clear. The prevailing idea at that time was that the rocks of the earth had precipitated all at once from a world-encircling ocean, perhaps the Great Flood of Noah.

The key figure in refuting this explanation was the Scotsman **James Hutton** (1726–1797). Hutton would not accept that the geological features of the earth were laid down by the Great Flood. Instead, he argued, we must look to processes still at work on the earth today, such as soil erosion and volcanic activities, to explain what happened in the past. This view was later called the uniformitarian principle, or **uniformitarianism.** The crust of the earth, according to Hutton, was constantly being uplifted and eroded, and the deep layers of sedimentary rock had been laid down over many millennia from the sediment carried from the uplands to the sea, a process that may be observed today. The layers of rock are immensely thick, and such processes are very slow. The earth, therefore, must be far older than the 6000 years calculated by Ussher.

Most scholars of Hutton's time, however, saw the appearance and disappearance of fossil species in the rocks as the result of a series of catastrophes, which, like the Great Flood, had swept away the living species, after which new species would appear. This theory, known as **catastrophism,** was more in keeping with the early nineteenth-century worldview; Hutton's ideas were practically forgotten.

Between 1830 and 1833, however, **Charles Lyell** (1797–1875) published a textbook, *Principles of Geology*, that revived the uniformitarian principles introduced by Hutton, but which was bolstered by much additional evidence. Lyell argued his position extremely convincingly; the textbook saw many editions, and the uniformitarian view of geology came to be practically universally accepted. By the mid-nineteenth century most scientists had come to accept the deep antiquity of the earth, an earth shaped by the slow, gradual effects of ordinary geological processes—the erosion of the rocks and soil by wind and water and the slow buildup of sediments by rivers and streams. Among those scientists was **Charles Darwin** (1809–1882). During the 1830s Darwin signed on as natural history officer aboard the HMS *Beagle* and began his famous voyage of discovery down the coast of South America and through its offshore islands. (Darwin had read Lyell's book before embarking.) During this trip he made the crucial wildlife observations that would lead to his publication of *On the Origin of Species* in 1859 (for a more detailed discussion, see Eiseley 1958). The mechanism proposed by Darwin for the evolution of new species, natural selection, proceeded by the extremely slow accumulation of minute changes; only the time depth provided by Lyell's geology could make evolution possible.

HUMAN ANTIQUITY

During the nineteenth century, the evidence for the true antiquity of humans began to pile up (Daniel 1959; Daniel and Renfrew 1988; Grayson 1983). In 1797, **John Frere** (1740–1807) recognized that humans had lived on earth for a very long time, based on his discoveries at Hoxne, Suffolk, in eastern England. Many flint tools, including chipped flint axes (Figure 1.4), and the bones of extinct animals were found buried in a layer some 4 m (12 ft.) below the ground surface. As Frere noted:

> The situation in which these weapons were found may tempt us to refer them to a very remote period indeed, even beyond that of the present world (Frere in Daniel 1967: 47).

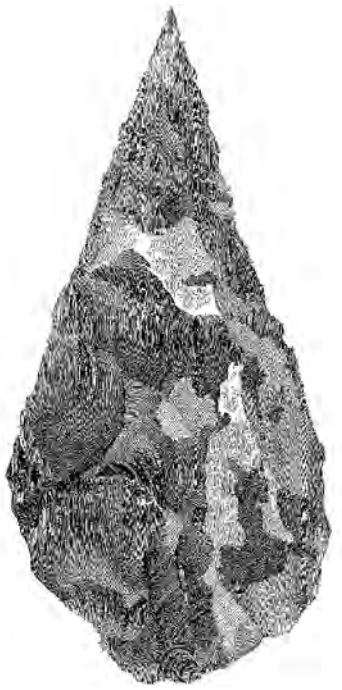


FIGURE 1.4 A drawing of a flint handaxe found by John Frere at Hoxne, Suffolk, in 1797, which he realized came from the remote past.

Could humans really have lived at the same time as extinct animals? In the 1830s, at a cave known as Kent's Cavern in England, flint tools were found together with the bones of extinct animals, sealed beneath a layer of limestone that had been deposited by the percolating water in the cave. The scientific establishment of the time, however, would not accept the contemporaneity of the tools and extinct animal bones. It could not be proved that the limestone layer had not been broken and the tools introduced much later than the fossil bone. Yet, further associations of flint tools and ancient animals continued to come to light. In 1832 the Frenchman **Jacques Boucher de Perthes** (1788–1868) found a flint **handaxe,** a stone tool, in a gravel pit at Abbeville in the Somme Valley. Over the years Boucher de Perthes collected thousands of stone artifacts, found in the company of the bones of mammals long extinct in Europe, such as mammoths and rhinoceroses.

The turning point was an excavation conducted by **William Pengelly** (1812–1894). Pengelly was a natural science teacher and a talented amateur geologist. In 1846 he decided to reexamine the finds from Kent's Cavern; he became convinced that the simple stone tools were indeed contemporary with the bones of extinct animals, implying that humans had lived at the same time as those prehistoric beasts. He could not, however, convince the members of the English scientific societies, who pointed out that the cave had been extensively disturbed by the earlier excavations. Their minds were no longer closed, however, and Pengelly was given an opportunity to prove his point. In 1858 Pengelly undertook the excavation of Brixham Cave, near Windmill Hill, Torquay, in southwest England. His work was closely observed by a group of prominent scientists, including Charles Lyell, from the Royal Society (a highly influential, learned scientific society) and the Geological Society of London. The cave contained an unbroken floor of stalagmite. Pengelly broke through the floor, and beneath it were stone tools in the company of the bones of mammoth, woolly rhinoceros, cave bear, cave lion, and other ancient mammals. The learned societies were convinced; ancient humans had lived at the same time as extinct animals. Later that year two of Pengelly's observers visited Abbeville. They came back assured that Boucher de Perthes's observations too were correct. In 1859 these conclusions were presented to the Royal Society. Many questions were still unresolved, but from then on, most scientists would accept the antiquity of humanity.

What, though, of Stonehenge, the stone tombs, and the many objects of bronze and iron found scattered throughout Europe? These things were obviously far later than the stone tools in the Somme gravels and the English cave sites, but they too could not be accounted for within the time of written history. Scandinavia was particularly rich in such finds, and by the early 1800s many such artifacts had been collected to form the core of the Danish National Museum. **Christian J. Thomsen** (1788–1865), the first curator of the museum, had an idea about how this large collection could be organized logically. Thomsen had experience in organizing ancient coins in chronological order. When dates were not present on the coins, stylistic similarities suggested which coins were closest in time. He applied the techniques he had learned to the objects in the museum. Thomsen grouped the objects into those of stone, bronze, and iron.

He went further, however, and suggested that they represented three successive ages: the Stone Age, the Bronze Age, and the Iron Age. Thomsen recognized that bronze and stone objects, for instance, might continue to be made in the Iron Age. He used stylistic similarities among the objects, as he had with coins, to sort out which of them were likely to be contemporary. This straightforward ordering of Scandinavian antiquities became known as the **Three Age System** and was soon extended to much of Europe north of the Alps.

Thomsen was assisted in his research and later succeeded by **Jens Worsaae** (1821–1885), who is now recognized as one of the founders of the discipline of archaeology. Worsaae examined the burial mounds and other ancient sites of Denmark. It was Worsaae who recognized that a bronze or an iron object found in isolation would do little to unravel the chronology of prehistory. It was critically important to observe which kinds of objects were regularly found together and which were associated with particular burial practices and monuments. Groups of objects usually found together could be assumed to be contemporary, and if one group of objects was found to overlie another, the overlying group was clearly later in time. When the successive groups of artifacts were taken all together, a pattern emerged that could be interpreted as gradual change. Worsaae's careful excavations established the chronological validity of the Three Age System. He was able to show that sites and burials containing artifacts only of stone were older than those that also contained bronze artifacts. Worsaae published his work in 1843. He was far ahead of his time; only many years later would an appreciation of his methods reach beyond Scandinavia to the rest of the world. Many problems remained, but today the emergence of scientific dating methods has done much to clarify the chronology of the European Bronze and Iron Ages (see Chapter 23).

THE BEGINNINGS OF ARCHAEOLOGY IN THE AMERICAS

While the beginnings of archaeology in Europe were closely linked to growing European nationalism, the beginnings of archaeology in the Americas were linked to colonialism and the relationships between Europeans and Native American peoples. In the wake of Columbus's voyages, and the European explorers, conquerors, and settlers that followed, the fate of the native peoples of the Americas was inextricably caught up in the course of European history. Native American peoples, for the most part, were never afforded the opportunity to write down their own history, and most of the newly arrived Europeans assumed that the native peoples knew no history. Today, scholars realize that this view was not accurate. Many nonliterate Native American groups had rich traditions of oral history; the literate Maya (Chapter 24), we now know, recorded historical events for future generations.

Still, archaeology as it developed in the Americas, and as it has been practiced until recently, has had a fundamentally European perspective. Although change is on the horizon (see Chapter 27, "The Future of Archaeology"), the role of Native American perceptions and insights has been relatively minor. American archaeology has its academic roots in the European scientific developments we have just discussed. Seen less positively, Native Americans have been viewed largely as they appear to European eyes.

The first Europeans to encounter Native American peoples had considerable difficulty fitting them into the traditional European worldview, since American Indians held no obvious place in either classical history or religious teaching. Some speculated that they were the descendants of the Ten Lost Tribes of Israel. Others saw the American natives as scarcely human and thus rationalized the Europeans' right to displace them from their lands. In Mexico and Peru, the Spanish conquerors sought to consolidate their own colonial power and suppress the native religion. They did what they could to cut off the native peoples' contact with their history by destroying their monuments and burning their texts. In North America, Native Americans were commonly viewed as simple, unchanging savages, and many years of strife and warfare between the colonists and natives exacerbated such beliefs.

Not all Europeans, however, shared these attitudes toward Native Americans. An exception was surely Thomas Jefferson, who would ultimately become president of the United States.

Jefferson was a member and eventually president of the American Philosophical Society. He shared the society's interest in scientific debate, including the ongoing controversy over the nature of the ancient mounds found in many areas of eastern America. In 1784 Jefferson undertook the excavation of several of the burial mounds he found on his Virginia plantation. He took note of the distinctive layers in the soil and how some graves overlay others, indicating a long series of burials over time. Most important, Jefferson excavated these mounds to try to learn something of the Native American past.

Thomas Jefferson sometimes has been called the father of American archaeology. As Willey and Sabloff (1980: 38) have pointed out, however, he was a parent without intellectual offspring. Very little notice was taken of his archaeological endeavors. In the climate of the times, it is not likely that many European colonists would have favored research that demonstrated the antiquity of Native Americans' claim to the land. The most impressive ancient features on the North American landscape, the great mounds of the Ohio Valley, were assumed to be the work of a vanished Mound Builder people, who had been driven away by the savage Indians. Throughout the nineteenth century, a majority of scholars stereotyped Native American cultures as uniformly simple and unchanging. Even the achievements of the Inca and Aztec civilizations were explained away as simply the products of Spanish exaggeration, intended to heighten the glory of their conquest.

Eventually, the accumulation of evidence would sweep away that point of view. A series of travelers and explorers penetrated the jungles of the lowland Maya homeland and brought home stirring tales of their adventures and magnificent images of the hidden, ancient cities they found there. These popular accounts suited the public tastes of the time and were read avidly. New scientific expeditions of discovery were mounted, and by the end of the nineteenth century a variety of surveys and studies of the antiquities of Central and South America had been completed or were under way.

Archaeology, in close association with anthropology, continued to develop in the United States during the late nineteenth century. It was recognized that much of the diversity of Native American culture was fast disappearing, in part because in the late nineteenth and early twentieth century American Indians were not permitted to speak their native languages in school. In 1879 the Smithsonian Institution formed the Bureau of Ethnology (later called the Bureau of American Ethnology) to record the vanishing languages and traditions. Archaeology was seen as a part of those studies, but archaeological findings were interpreted largely as projections of modern Native American societies into the past. Only in the twentieth century have archaeologists recognized the depth, diversity, and complexity of the North American archaeological record. Nineteenth-century efforts to describe and classify Native American antiquities gave way to the establishment of prehistoric sequences and chronologies (Willey and Sabloff 1980), and more recently, to attempts to explain the events of American prehistory.

THE FIELD OF ARCHAEOLOGY TODAY

Archaeology as it is practiced today is broad and varied. Archaeologists study a wide range of ancient peoples and work in a broad variety of settings, from universities and museums to federal and state governments and private companies. All the different varieties of archaeology, however, share a basic premise: that the material remains left behind by people in the past can be interpreted to yield an understanding of past human behavior.

In America archaeology has developed as part of the broader discipline of **anthropology.** In the late nineteenth and early twentieth century, the new social science of anthropology was growing up, and early anthropologists saw themselves in a race against time to record native languages, traditions, and religious practices. They approached their topic along four fronts, which were to become the four major branches of American anthropology. American **cultural anthropology** began with the **ethnography** of Native American peoples—the detailed recording of these peoples' societies and lifeways. **Anthropological linguistics** started with comparative studies of Native American languages,

and **physical anthropology** involved comparative anatomical studies of the people themselves. American **anthropological archaeology** was concerned with the material remains of the Native Americans' predecessors. All these fields have since grown far from their original roots as the discipline of anthropology has evolved. Today, cultural anthropologists study contemporary human societies around the world; biological anthropologists study human evolution, primate biology and behavior, and modern human biological adaptations; and anthropological linguists are interested in languages and the social context of language throughout the world.

Until about 35 years ago, most American archaeologists, particularly those interested in prehistory, were trained as anthropologists and held appointments in college and university departments of anthropology. While most U.S. archaeologists are still trained as anthropologists, the majority of American archaeologists today work outside the academy. Since the early 1970s, federal environmental legislation has required that any federally funded construction include environmental impact statements describing the effects that the new construction will have on existing archaeological resources. Later legislation was directed specifically toward the preservation and protection of archaeological resources, and similar laws were enacted by the states. More recently, the Native American Graves Protection and Repatriation Act (NAGPRA) was enacted to help protect Native American cultural heritage. These topics will be discussed further in Chapter 27. As a result of these laws, many archaeological surveys and excavations have been conducted in advance of highway, bridge, and building construction in the United States. For example, the Five Points site (Figure 1.5), a nineteenth-century immigrant neighborhood in downtown New York City, was discovered and excavated in advance of construction carried out at the New York federal courthouse building. These explorations reveal much about the day-to-day lives of the people whose neighborhood was popularized in the 2002 film *Gangs of New York*. Unfortunately, the finds recovered from these excavations were stored in Building 7 of the World Trade Center and destroyed in the attacks on September 11, 2001. Today, many archaeologists are employed within cultural resource management (CRM) divisions of federal, state, and local government agencies, within similar CRM departments of large private engineering and architectural firms, or within independent archaeological firms providing their services to government agencies under contract.

FIGURE 1.5 Excavations on the site of a new courthouse at Foley Square in lower Manhattan exposed the remains of tenements that were part of the infamous Five Points neighborhood. The excavation was done by Historic Conservation and Interpretation (HCI) in 1991; artifact analysis and interpretation were completed by John Milner Associates under contract to the U.S. General Services Administration.

In Europe the development of archaeology took a somewhat different path. Archaeology grew up as part of the desire to understand local cultural and national origins. As we saw earlier, it grew up too in the company of the developing natural sciences of geology and paleontology. As a result, depending on the period of interest, most European archaeologists see themselves closely linked with the disciplines of history and geology, and they frequently hold university appointments in these departments. Many European universities now include independent departments of archaeology

FIGURE 1.6 The site of Lothal in northwest India. The excavation of this important Indus Valley site was sponsored by the Indian government in the 1950s.

that accommodate archaeologists with a diversity of interests. This same interest in local culture history and national origins has encouraged the growth of archaeology in Latin America, Africa, and South and East Asia, especially in the postcolonial period. In India, for example, the end of British colonial rule in 1947 was followed by an explosive growth in indigenous Indian archaeology. A striking example is the excavation of the major port city of Lothal (Figure 1.6) in northwest India by the Indian archaeologist S. R. Rao between 1954 and 1958. (For a more complete discussion of Lothal and the Indus Valley civilization, see Chapter 20.) As in America, in many other nations today, much archaeology is conducted following the mandates of archaeological preservation laws.

In North America until about 20 years ago, archaeologists who studied literate societies were found in departments of classical archaeology, biblical archaeology, Egyptology and Assyriology (the studies of ancient Egypt and Mesopotamia, respectively), art history, and history. In recent years, however, North American archaeologists have applied the methods and techniques of prehistoric archaeology to historically documented societies. Historical archaeologists in North America study the changes that have occurred in the New World since Columbus's voyages 500 years ago. They have used archaeology, for example, to provide new insights into the lives of enslaved African Americans in the antebellum South (Orser 1990). In the Old South, many slaves were prevented from learning to write, and the available historical records were written mostly by and about the white planters. Archaeological evidence can provide unique information about the daily lives of enslaved people and about the institution of slavery itself.

In Europe the methods and techniques of prehistoric archaeology have been used to cast new light on historical periods such as the early medieval Dark Ages. The collapse of the Western Roman Empire in the fifth century A.D. led to profound changes in settlements, farming technologies, and trade. For much of the Roman Empire, there are very few documents that provide information about daily life after the end of Roman rule. Archaeological excavations of Dark Age sites, such as the early Anglo-Saxon site of West Stow (Figure 1.7) in eastern England (West 1985), have provided information about post-Roman settlements and subsistence practices in the former Western Roman Empire.

GOALS OF ARCHAEOLOGICAL INTERPRETATION

Medieval and historic North American archaeologists share both methods and approaches with prehistoric archaeologists. Like prehistoric archaeologists, they are interested in using material remains to study the ways humans lived in the past and to explore changes in human societies through time and space. Today, archaeologists generally share five goals for research and interpretation. First, *they aim to build a time and space framework for the past*. Archaeologists want to answer the basic who, what,

where, and when questions of human prehistory. Second, *archaeologists try to understand how humans lived in the past.* What kinds of houses did they build? What kinds of food did they eat? How did they make their living? Third, *archaeologists want to be able to answer the why questions of human prehistory,* that is, to try to explain why change takes place in human societies. These first three goals have formed the basis of archaeological research for more than 30 years. Two additional goals have come to the forefront in recent years. The first is the goal of *understanding the nature of the archaeological record itself.* Archaeologists want to understand the relationship between material remains, such as pieces of pottery and house foundations, that are discovered through excavations and the actual prehistoric behavior that produced those remains. Second, *archaeologists are interested in preserving the past for the future.* Each of these goals will be examined in detail as follows.

RECONSTRUCTING CULTURE HISTORY: ARCHAEOLOGY AS HISTORY WITHOUT WRITING

During the early years of the discipline, archaeologists were concerned primarily with gathering the data needed to fill in the vast span of time before writing began—to develop histories without written records. In Europe much of the early impetus for research came from the desire to know more about national and cultural origins. In Scandinavia, as we have seen, the formation of the Danish National Museum led Thomsen and Worsaae to undertake their pioneering work. The antiquities of Denmark in particular were of interest to the museum; the goal was a better understanding of the origins and early history of the Danish people. Nationalistic motivations played a strong role in the development of archaeology in Germany, Italy, and England as well. At the same time, the discovery of ancient stone tools, fossil humans of archaic form (to be discussed in Chapters 2 through 6), and the general intellectual climate following Darwin's *On the Origin of Species* soon led many archaeologists into a search for human origins. While anatomists and paleontologists studied the fossil humans themselves, archaeologists concentrated on the objects those early humans made and what those objects could tell us about the lifeways of early humans and the relationships among the peoples who made them. Archaeologists sought, and have continued to seek, the origins of new technologies and the beginnings of major changes in social life: the first stone tools, the earliest use of fire, the beginning of farming, the first cities. The finding of a new, earlier date for an invention or event still captures the popular

FIGURE 1.7 The early Anglo-Saxon village of West Stow. Excavations carried out at this Dark Age site provided information on day-to-day life in Britain after the collapse of the Western Roman Empire. The photograph shows reconstructions of the early Anglo-Saxon houses that were built between the fifth and seventh centuries A.D.

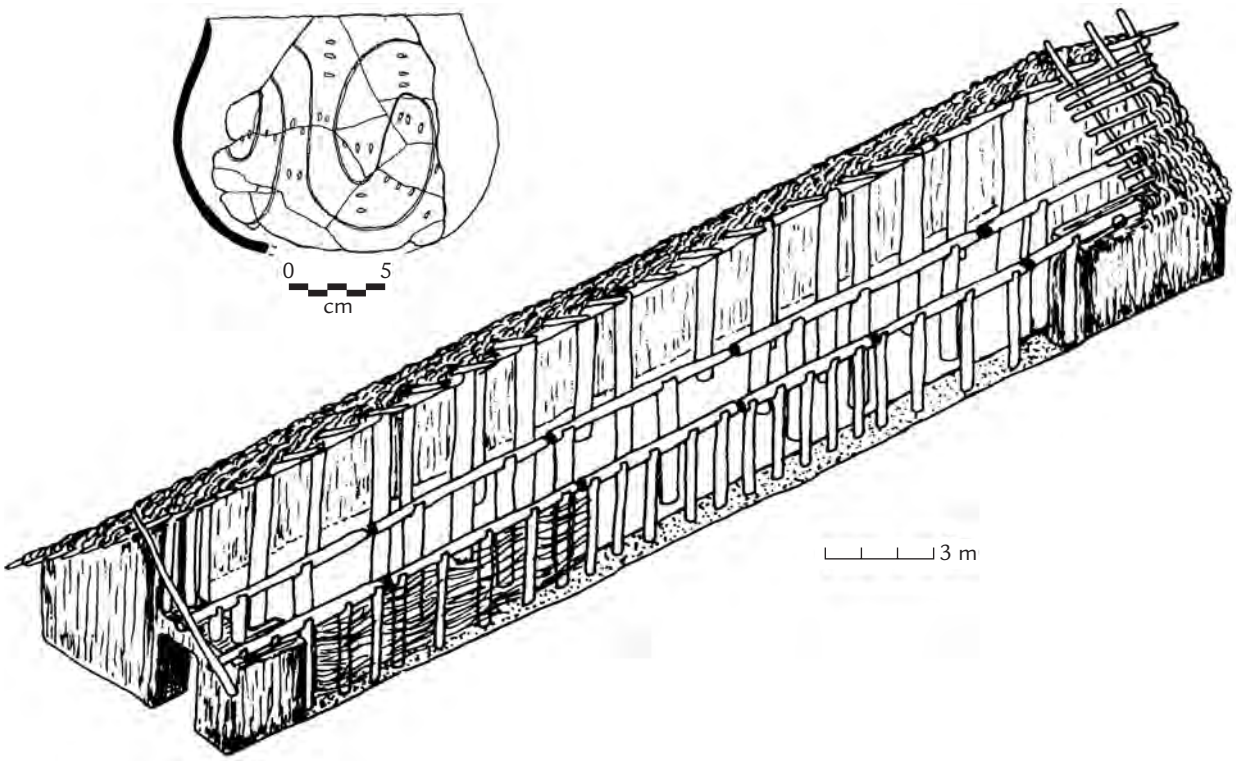


FIGURE 1.8 An example of an archaeological culture: the Linear Pottery culture of central Europe. Large rectangular timber houses and pottery marked with curvilinear designs are typical of the Linear Pottery culture.

imagination, but today archaeologists agree that it is far more important to try to understand *how* and *why* such changes occurred.

Culture history is the chronicle of the changes that occur within an archaeological culture over time. In Europe in the early twentieth century, the eminent prehistorian V. Gordon Childe used the term **archaeological culture** to denote widespread and regularly associated occurrences of archaeological finds. For example, the Linear Pottery, or Linearbandkeramik culture, the material remains of the earliest farmers of central Europe, is characterized by distinctive pottery with curvilinear decorations; rectangular, timber longhouses; the cultivation of emmer wheat; and livestock husbandry, principally cattle (Figure 1.8). Commonly, an archaeological culture can be subdivided into a number of successive periods based on relatively minor temporal changes in the constellation of characteristics that typify the culture. One archaeological culture may also succeed and replace another. Culture history chronicles these kinds of changes.

Anthropologically trained archaeologists working in the Americas have preferred to avoid the restricted usage of the term *archaeological culture* because it conflicts with anthropology's broader definitions of culture. The concept of culture is central to anthropological research. Although it has been defined in numerous ways, **culture** refers to the system of values, beliefs, customs, behaviors, and artifacts that the members of a particular society share and that allows those individuals to cope with their world and with each other (Bates and Plog 1990: 7). Although this terminology is still widely used in Old World archaeology, an archaeological culture, which is defined on the basis of artifacts and features alone, is not necessarily the same thing as a system of shared beliefs and values.

THE INVESTIGATION OF PREHISTORIC LIFEWAYS

By the 1950s archaeologists in both the Old World and the Americas had established a temporal and

FIGURE 1.9 Organic materials preserved from the Swiss lake dwellings include wooden items, textiles, and plant foods.

spatial framework for prehistory. A sequence of successive archaeological periods had been developed, and the location and geographic extent of various archaeological culture areas had been delineated. At the same time, there was great interest in both the Old and New Worlds in interpreting what life had been like in ancient times. Such interpretations were stimulated initially in Europe by the mid-nineteenth-century discovery of the Swiss lake villages. In 1853 an uncommonly dry year led to an unusual lowering of the Swiss lakes' waters, revealing remarkably well-preserved wooden structures built on pilings. These proved to be the dwellings of late Stone Age and early Bronze Age farmers, dating from approximately 4000 to 1500 B.C. The water had preserved a wealth of materials that normally would have disappeared: wooden utensils, basketry, matting, ropes, fishnets, balls of linen thread, and fabrics, as well as plant foods such as wheat and barley, hazelnuts, and apples (Figure 1.9). These things provided a rich visual image of daily village life.

American archaeologists working in the southwestern United States enjoyed some similar advantages. The prehistoric pueblo dwellers of the Southwest had lived in a desert climate that also preserved much of their organic **material culture,** notably plant foods and basketry (Figure 1.10). Even more important, the direct descendants of these peoples lived on in the area (see Chapter 26). Much in the prehistoric culture that might not have been interpretable otherwise became comprehensible when compared with modern practices. The prehistoric sites, for example, contain features that are similar to kivas, subterranean religious structures still in use today. This interpretive approach, the projection of the present into the past, is known as **direct historical analogy.** It is meaningful only if a direct historical relationship can be demonstrated between a historically known and a prehistoric people. For most of prehistory, there are no such links.

In the early 1950s, the British archaeologist J. G. D. Clark investigated the waterlogged site of Star Carr, in East Yorkshire, England. Star Carr was a campsite of hunters who lived at the very end of the Stone Age. Clark's work went beyond the simple description of the way of life of these hunters to attempt to sort out how they functioned within their

FIGURE 1.10 Coiled baskets recovered from Broken Roof Cave in Arizona.

natural environment. A major goal of the excavation was the recovery of the well-preserved organic remains, which an interdisciplinary team of botanists and zoologists helped analyze. One of Clark's major aims was the interpretation of the subsistence pattern of the Star Carr hunters—the range of foodstuffs on which they lived and the means used to procure them (Figure 1.11). J. G. D. Clark trained many students while at Cambridge University. He and his work have been a major factor in shaping British archaeology today. The results of Clark's work at Star Carr will be discussed in greater detail in Chapter 13.

Eric Higgs, one of Clark's students, focused even more directly on the **paleoeconomy** of prehistoric societies. Higgs's method involved a detailed investigation of the natural resources available within the region of an archaeological site and an analysis of the exploitation of those resources. A number of Higgs's own students have followed his lead, but the paleoeconomic approach frequently has been criticized for assuming that the subsistence economy was the major factor in shaping prehistoric societies. Paleoeconomic approaches often take no account of religion, ideology, social structure, and other noneconomic variables that may also play important roles in governing past human behavior.

Today, all archaeologists would agree that human societies are much more than economic and technological systems. An effort to gain an understanding of social life, religion, and ideology is critical in the study of prehistoric societies. For example, archaeologists have used differences in house forms, burials and grave goods, and even diets to study differences in social status. In an archaeological study of medieval nunneries, Roberta Gilchrist (1994) showed that wealthy medieval nuns feasted on venison, porpoise, and crane, while poorer religious women ate chicken, goose, and conger eel, supplemented by bread, beer, and vegetables. Gilchrist's study also showed that gender is an important structuring principle for premodern social systems. She found significant differences between nunneries and male monasteries that reflect differences between male and female roles in medieval society.

ARCHAEOLOGY AS THE STUDY OF CULTURE CHANGE

Archaeologists must do more than reconstruct the ways of life of a particular historical period. They need to understand how and why lifeways changed in the past. The approaches that archaeologists have taken to the study of culture change have varied dramatically over the past 50 years (see Trigger 1989). This section presents a brief historical overview of differing approaches to the study of culture change and the ways those changes are explained by archaeologists.

The process of fitting a particular site or group of sites into a wider context lies at the heart of

FIGURE 1.11 *Life* magazine (from the 1950s) illustration of daily life at Star Carr.

archaeological interpretation. Even within the framework of culture history, archaeologists attempted to explain why cultures change. Until the 1950s archaeologists explained change in essentially historical terms—in terms of the movement of peoples from one region to another or the exchange of ideas between one group and another. The wholesale replacement of the artifacts and features typifying one archaeological culture with an entirely different set was often interpreted as evidence of the **migration** or movement into the region of people with new traditions. For example, during the first few hundred years A.D., the stone-tool-using hunters of much of southern Africa were largely displaced by the southward migration of iron-using farmers, probably related to today's Bantu speakers. Most of the changes that are observed in archaeological cultures are less pervasive. A new trait—a technological innovation or a new artistic style, for example—may appear within a region. If the new technology or artistic style is known from an earlier time in an adjacent region, the acquisition of the new trait is usually ascribed to **diffusion.** Diffusion is the spread of cultural traits, such as artistic styles or technological methods, from one culture to another. Diffusion may mean that some new item of material culture, such as a pottery style or a metalworking technique, may be introduced bodily from an outside source, perhaps through trade. Diffusion might also occur if new individuals with a special skill, such as skilled potters, should enter the group, perhaps through a marriage. Finally, if no outside source for a new trait or technology is apparent, its appearance may be attributed to **independent invention.**

During the 1950s and 1960s, archaeologists became increasingly dissatisfied with historical explanations of culture change. All the culture-historical "explanations" were essentially descriptive; they provided little insight into how and why a new trait developed, or why it should be accepted from an outside source. Why should a culture develop in a particular way? Why, too, did some unrelated cultures come to follow similar courses of development? Anthropologist Julian Steward (1955) suggested that the answer lay in the complex relationship

between a culture and its environment. He termed the study of this relationship **cultural ecology,** an extension of the biological study of ecology that examines the mutual relationships among various organisms and their environments. Culture change, Steward argued, could come about as a given culture adapts to changes in the environment. Change arises through the interplay of the culture (as determined by its previous history), its physical habitat (climate and geography), the animals and plants on which it depends, and the influence of neighboring cultures.

The 1950s and 1960s saw several major archaeological projects that incorporated a broadly ecological approach. These projects were also distinguished by their explicit problem orientation. The excavators set out to answer a specific set of questions. For example, several projects focused on the investigation of the beginning of farming in the Old and New Worlds. The Iraq-Jarmo Project, directed by Robert Braidwood, investigated a wide range of archaeological sites in Iraqi Kurdistan (northern Iraq). This region, because of its topography, its climate, and the availability of the wild ancestors of sheep, goats, wheat, and barley, was a very likely location for the appearance of the earliest Old World farmers. Braidwood's research will be discussed in some detail in Chapters 15 and 16. In highland Mexico Richard S. MacNeish undertook the Tehuacán Archaeological-Botanical Project. This project investigated the beginnings of food production in the New World, as well as the ways in which the landscape was utilized, both seasonally and over the longer term (see Chapter 17). Both Braidwood's and MacNeish's projects brought together large teams of geologists, biologists, and archaeologists to lend their particular insights to the research. While these projects set out to attempt to explain the process by which agriculture came into being, they were far more successful in describing how early farmers functioned in relation to their environment.

Ecological approaches continue to play a major role in archaeological interpretation. Today, the environment is defined broadly to include not just the physical and the biological environments but also the social environment—that is, the relationships with other people. Modern ecological explanations emphasize the interrelations between humans and their environment. Archaeologists investigate the effects of human behavior on the environment as well as environmental constraints on human behavior.

Archaeology as a Science

Is archaeology a science? In the 1960s the American archaeologist Lewis Binford, introducing what has come to be known as the **New Archaeology,** contended that archaeology, as a part of anthropology, should be a science, and that archaeological research should follow the methods of science (Binford 1962). This view of archaeology was most fully articulated as an explicitly scientific approach by P. J. Watson, S. LeBlanc, and C. Redman (1971, 1984). Julian Steward had called for archaeologists to look beyond the goals of culture history and to begin to investigate the *processes* by which cultures changed. Binford took up this cause. He further argued that if archaeologists were to discover the reasons cultures function as they do and why cultures change, they must try to find broadscale regularities in the way cultures function and develop. Binford and others argued that the ultimate goal of archaeological research should be the formulation of **covering laws,** similar to the laws of physics, to explain ancient human behavior and the process of culture change.

If archaeology were to develop such a set of laws, that is, to take on a theoretical structure similar to that of the physical sciences, then archaeological research would have to be conducted according to the rules of scientific method. The use of the scientific method was not simply a matter of incorporating the findings of other scientific disciplines, such as scientific dating methods, into archaeological interpretation. The use of the scientific method, as recommended by the new archaeologists, required archaeologists to begin research by formulating hypotheses (models) to explain past human behavior. They then had to develop research designs to test those hypotheses against real archaeological data.

Only hypotheses that could withstand repeated rigorous testing could be accepted as theory. The application of scientific methods to study the processes of culture change has been termed the **processual approach** to archaeological interpretation.

In attempting to understand how and why cultures change, processual archaeologists often viewed human cultures as systems of behaviors that allowed humans to adapt to the constraints of their natural and social environments. Processualists emphasized the dynamic relationship between human cultures and their environments, and cultural changes were often seen as adaptive responses to changes in the biological, physical, or social environments.

While the goals of the New Archaeology were admirable, in practice, archaeologists found it difficult to develop meaningful general laws to explain past human behavior. As yet we have no archaeological equivalent of the laws of thermodynamics. Archaeology today is probably no closer to uncovering significant cultural covering laws than it was when the goal was first conceived. Human societies are too varied, and the limitations of the archaeological record have proved a much higher hurdle than was once hoped.

Contemporary Approaches to Archaeological Interpretation

While many contemporary archaeologists continue to rely on a processual approach to archaeological interpretation, others have grown increasingly wary of the optimistic outlook of the New Archaeology. Processual models and hypotheses have been drawn, for the most part, from the natural sciences, particularly from ecological models for animal behavior. Such models, it is argued, are too simplistic to explain how and why human cultures change. Culture provides humans with a wider range of available responses to change than is available to other animals. On the other hand, the cultural beliefs or values of a specific human group may restrict and shape that group's response to a new situation. Further, processual models do not allow for the effect on a society of the sometimes unpredictable and idiosyncratic actions of individuals.

Reaction to the limitations of the processual approach led to the beginnings of the **postprocessual movement** in archaeology approximately 20 to 25 years ago. While archaeologists recognize that the processual approach brought scientific rigor to archaeological method, some contemporary archaeologists are not satisfied with processual explanations for cultural change. They argue that the processual approach failed to appreciate the dynamic roles that ideology and social and political structures can play in the process of social transformation. Moreover, the postprocessualists argue that the processualists viewed human societies as made up of a series of "faceless blobs" (Tringham 1991), rather than seeing societies as made up of individual actors. Members of different political factions, different social classes, and even different genders may think and act in very different ways. In order to understand how and why cultural changes come about, archaeologists must begin to examine the social, political, and economic diversity that characterized ancient societies. In order to do this, postprocessual archaeologists have drawn on social theories that were developed by cultural anthropologists and scholars in other social sciences and the humanities. Today, postprocessual archaeologists are drawing alternative models for the interpretation of culture change from perspectives as diverse as feminist theory, literary criticism, and Marxist economic interpretations (see, for example, Hodder and Hudson 2003). In addition, many archaeologists have tried to combine processual and postprocessual approaches in an attempt to create a more holistic picture of ancient peoples and their societies.

THE ARCHAEOLOGICAL RECORD

All the structure of interpretation we have discussed—culture history, explanation of culture change, descriptions of ancient lifeways—rests on a fundamental foundation: the discovery, recording, and decoding of the archaeological record. Survey, excavation, cataloging, the analysis and interpretation of finds, as well as the integration of data from

history, geology, biology, and other fields, are the essential first steps that archaeologists must pursue in their attempt to understand the past.

The attention of the general public is often captured by spectacular discoveries such as the Iceman or a gold-filled tomb, but the vast bulk of archaeological research is focused on the prosaic. The gradual accumulation of archaeological knowledge is the result of extensive preparation, patient and persistent fieldwork, and careful analysis of what is found. Discoveries are not usually made purely by chance. Our knowledge of the prehistoric past is built by asking and answering many limited research questions. Archaeologists undertake surveys and excavations with well-defined research goals in mind. Research is usually designed to address a specific hypothesis or competing hypotheses about events in the past. An archaeologist, usually with the assistance of others in the sciences and humanities, must interpret the data that result from fieldwork and decide whether these data provide new insight into his or her research goals. Such interpretation can be very difficult and must be approached in the full light of peer review and criticism.

Wresting an understanding of the past from what remains in the earth can be a daunting task. Nearly all our knowledge of the prehistoric past comes from the study of ordinary things, usually small fragments of such materials as stone tools and pottery that have been preserved because of their chemical stability. Almost everything that was made or used by humans in the distant past has disappeared. Except under the most fortuitous circumstances (in the extreme aridity of a desert or a perennially waterlogged peat bog, for instance), organic materials such as wood, hides, horn, and fabric soon rot away. Most metals corrode and are gone as well. Bone, too, can sometimes disintegrate, depending on the nature of the soil. The skeletons of ancient humans, though, are sometimes preserved, as are the bones of the animals they ate. Stone tools have been preserved in vast numbers, and they are by far the most common finds from early prehistory. Pottery, which was first invented about 14,000 years ago, is a common find in later archaeological sites. Whole vessels are rare; most pottery is found broken into small fragments. All these things together can provide only a dim reflection of the lives of ancient humans, but this is the evidence that is available to prehistoric archaeologists. The challenge for the archaeological detective is to extract from these data as much understanding as is possible of the world of the distant past.

Artifacts, Ecofacts, and Features

Before we can move on to our discussion of archaeology and prehistory, we must define some of the fundamental terms used by archaeologists. The basic unit of archaeological analysis is the **artifact,** which is any object made, modified, or utilized by humans. A stone axe, a pottery vessel, a bronze sword, and a marble statue are all artifacts. The Iceman's copper axe and his bow, arrows, and quiver are artifacts as well (Figure 1.12). Broadly speaking, a stone tomb or a discarded soup bone is also an artifact. In practice, however, archaeologists frequently use the term *artifact* to refer to a portable, intentionally manufactured or used object. Artifacts are sometimes found singly, but more commonly, artifacts of varying kinds are found grouped together. Any such group of artifacts found together, and which appear to have been deposited together, is known as an **assemblage.** Sometimes an artifact grouping was intentional, as in the case of offerings that were placed with a body in a grave. These might include, perhaps, a bronze dagger and a distinctive pottery vessel used for a food offering, as well as personal items of adornment on the body, such as pins, bracelets, and earrings. Other assemblages are unintentional, such as those in a trash pit, which might include food wastes, broken pottery fragments, and other worn-out and cast-off items. Another example of an unintentional assemblage is the small objects, such as coins, pins, and bits of pottery and glass, that frequently accumulate beneath the wooden floor of a house.

Ecofacts (a term introduced to archaeology in the 1960s) are those remains deriving from the natural environment that, while not intentionally made or manufactured by humans, become incorporated into archaeological deposits. They can provide information about past environments or ways of life. Ecofacts include the products of human

FIGURE 1.12 The Iceman's arrows and quiver.

activities such as the preparation and consumption of food. Food wastes may include animal bones or charred plant fragments and seeds. The analysis of these materials can provide insight into what was eaten, as well as how it was obtained, prepared, and distributed. For example, the contents of the Iceman's intestinal tract indicate that he ate einkorn (a primitive wheat) that was ground to make flour for bread (Figure 1.13). Other ecofacts may enter the deposit purely accidentally. Pollen may be blown in by the wind or carried in on people's feet. Pollen found in the Iceman's intestinal tract indicates that he died in the late spring. Various kinds of insects and small mammals such as mice may take up residence in people's houses. Pollen, insect remains, and the bones of small mammals can yield much valuable information about climate, local plant and animal communities, and the degree to which the local environment has been altered by human interference.

Features are the immovable products of human activities that are affixed to or embedded in the landscape. Buildings are features, as are trenches and earthworks. Smaller features include such things as burials, hearths, and stone pavements. The soil discoloration left behind by the rotting away of a timber post (a post mold) or the filling in of a storage pit are also features. Movable artifacts are frequently, but not necessarily, included within features. Archaeologists expend a good deal of effort in working out the spatial, functional, and chronological relationships among archaeological features.

Sites

Artifacts, ecofacts, and features found together constitute an archaeological **site.** A site is a rather loosely defined entity that may range from a few stone flakes scattered on the ground to an entire ancient city. It is an area where artifacts and features indicate that human activity has taken place. There are a multitude of types of sites. Some sites result from only a short period of human activity, such as a butchery site where a game animal was cut up for transport, leaving behind only some waste bone and a few worn-out stone tools. Another site might represent an encampment of a few days or weeks, including, perhaps, debris from the making of stone tools, some food remains, traces of a hearth, or a ring of stones where a tent was pitched. Sometimes a favored camping place was revisited time after time, creating a cluster of superimposed and partially overlapping campsites. Other sites are

FIGURE 1.13 Grains of einkorn wheat, an example of an ecofact.

formed by long-term, continuous or nearly continuous occupations. In settled villages dwellings are built and abandoned, walls constructed and torn down or weathered away, and new structures built over the rubble of the old dwellings and the refuse of the previous inhabitants. Layer by layer these sites grow thicker, the older occupations buried below the more recent. The great artificial mounds, called tells, of the Middle East, often many meters high, were formed in just this fashion. At the base may lie a tiny farming village; above it many layers, or **strata,** of refuse, decaying walls, and silt were deposited through hundreds or thousands of years of occupation. The superimposed strata in an archaeological site are frequently compared to a layer cake, but this comparison is an oversimplification. The disentangling of the complicated relationships among the strata in a site, the art and science of **stratigraphic analysis,** is one of the principal preoccupations of the field archaeologist. In this analysis, the sequence of events that created the site can be worked out.

Understanding How the Archaeological Record Was Formed

The Archaeology in Practice box reveals some of the difficulties that archaeologists face in trying to interpret complex archaeological sites. Most archaeological sites result from a combination of human activities and natural processes such as sedimentation. Archaeologists must be able to distinguish traces of human activity from deposits that result from geological or biological processes. In addition, archaeologists seek to identify the human behaviors that produce specific combinations of artifacts, ecofacts, and features. The American archaeologist Lewis Binford has been in the forefront of the development of a series of theories that are intended to explain specific archaeological phenomena. These theories, known as **middle-range theories,** are designed to serve as bridging arguments, establishing relationships between the archaeological record and the dynamic behavioral processes that produced it. Hypotheses and data can be drawn from a variety of sources, including experiments and the observations of modern peoples. The field of **ethnoarchaeology,** the study of the behavior of modern peoples and of the material remains of that behavior, has developed as part of the search to develop middle-range theories that can establish links between the static archaeological record and the dynamic behaviors that produced those material remains.

An example of such research had been carried out by C. K. Brain, a specialist in the study of archaeological animal bone remains. Working in South Africa, Brain (1967, 1981) examined the bone remains of domestic goats that had been eaten by Hottentot herders and discarded outside their camp. These bones were later scavenged by numerous dogs. Brain found that the dogs destroyed certain kinds of bones and left others, producing a distinctive pattern of bone survival. Brain could then hypothesize that similar patterns of animal bones found in the archaeological record might also be the result of carnivore scavenging. These observations have been of great importance. Carnivores may have actually created certain sites that had been attributed to the activities of early human ancestors. Brain's research will be discussed further in Chapter 2.

PRESERVING THE PAST

One of the biggest challenges facing all archaeologists today is the preservation of the world's archaeological heritage. Each archaeological site is unique and contains information that may not be available anywhere else. Every year, hundreds of sites are damaged and destroyed as a result of development, vandalism, and looting. For every one site that is excavated by a team of professional archaeologists, many are destroyed, and the information that they contained is lost forever. Archaeologists have an obligation to preserve the world's archaeological heritage for future generations.

This obligation can take a number of different forms. At the most basic level, archaeologists work to pass laws that protect archaeological sites and to end the trade in artifacts that have been removed illegally from archaeological sites. In addition, archaeologists have a responsibility to educate the public about our shared past. All archaeological excavation involves destruction. If archaeologists fail to publish and publicize their results, they are no better than the looters and pot hunters who destroy

ARCHAEOLOGY IN PRACTICE

Stratigraphy and Stratigraphic Analysis: How Do Archaeologists Reconstruct the Sequence of Events at an Archaeological Site?

Archaeologists are often asked how they trace the sequence of events that occurred at an archaeological site. How do they know that one building or structure was built before another? How can they be sure that two buildings were in use at the same time, or that one grave is older than another? The answers to these questions depend on detailed stratigraphic analyses, the critical interpretation of the layers and features that make up an archaeological site. In practice, this interpretation involves many complexities and subtleties, but the fundamental principles involved are simple and straightforward.

The simple **principle of superposition of strata,** first widely applied by geologists in the eighteenth century, states that if the strata in a geological deposit are piled up like the layers in a cake, the oldest must be at the bottom. Archaeologists also use this principle, but the deposits in an archaeological site may derive from a wide variety of sources. An individual stratum or layer may be distinguished by its distinctive color, texture, and composition. Often inclusions such as pebbles or charcoal help define strata. A fine greenish clay stratum, for instance, may be easily distinguished from a layer of coarse yellow sand. Frequently, however, stratigraphic boundaries are difficult to perceive, and they can tax the skill of the field archaeologist in following them.

Some of the strata are purely geological in nature. The underlying soil or bedrock is, of course, of geological origin. Later, the debris of human activities may be covered by soils and silts carried by natural agencies such as the wind and running water. Soils and deposits near the tops of hills may be washed down by rainstorms to collect in the hollows of the landscape (slopewash). Fine silts may be carried by the wind to cover broad areas of the landscape, including archaeological sites. The most dramatic of natural deposits to cover or intrude on archaeological sites are the products of volcanic eruptions, such as ash and pumice. Pompeii, magnificently preserved by the fall of ash from nearby Mount Vesuvius, is the most famous of such sites, but others will be discussed in this text.

Archaeologists are most interested in the deposits of anthropogenic origin—the products of human activities. Humans disturb natural soils (and older archaeological deposits) in a multiplicity of ways. Holes and pits may be dug for food storage, trash disposal, and burials. Trenches and pits may be dug during construction activities. Those features cut through earlier strata, and the soils they contained (including artifacts) may be displaced. Later, when dwellings are occupied, debris from everyday life accumulates, including artifacts and food remains. Some of those deposits may be trampled into dirt floors; other trash may be spread around dwellings or be carried to trash dumps (middens). Fireplaces or hearths for heating and food preparation, often containing charcoal and food remains, are another such localized deposit. When a structure is abandoned, it may be intentionally destroyed and the rubble spread around to make a base for a new structure. If a site is no longer occupied, the forces of rain and wind may accomplish that dispersal. Many sites show alternating phases of occupation and abandonment, with strata of human origin alternating with naturally deposited silts or sands.

Archaeological sites that are repeatedly reoccupied or occupied for a long time will contain many interdigitated layers, small localized deposits (called lenses), and features (Figure 1.A). Some strata may extend across the site; others may be very limited in extent. At the start of an excavation, archaeologists frequently dig a small test trench to ascertain the nature and duration of the occupation and the sequence of occupations, from earliest to latest. A **stratigraphic cross section** of the test trench is prepared to serve as a guide for further excavation. This is a carefully prepared measured drawing, supported by photographs, of one or more of the vertical faces of the trench. The face is made as clean, flat, and vertical as possible so that subtle changes in the stratigraphy may be seen and recorded. Distinctive characteristics of each of the strata and lenses, such as color, texture, and inclusions, are noted on the cross section. These data may prove helpful in correlating (provisionally, at least) the stratigraphy in different parts of the site. Because test trenches are frequently misleading, good judgment must be exercised in their placement and interpretation. The earliest, the latest, or intermediate phases of occupation might not be represented in the place where a particular test is dug. If, for example, the eastern portion of a large site was occupied during the earliest and latest phases of occupation and

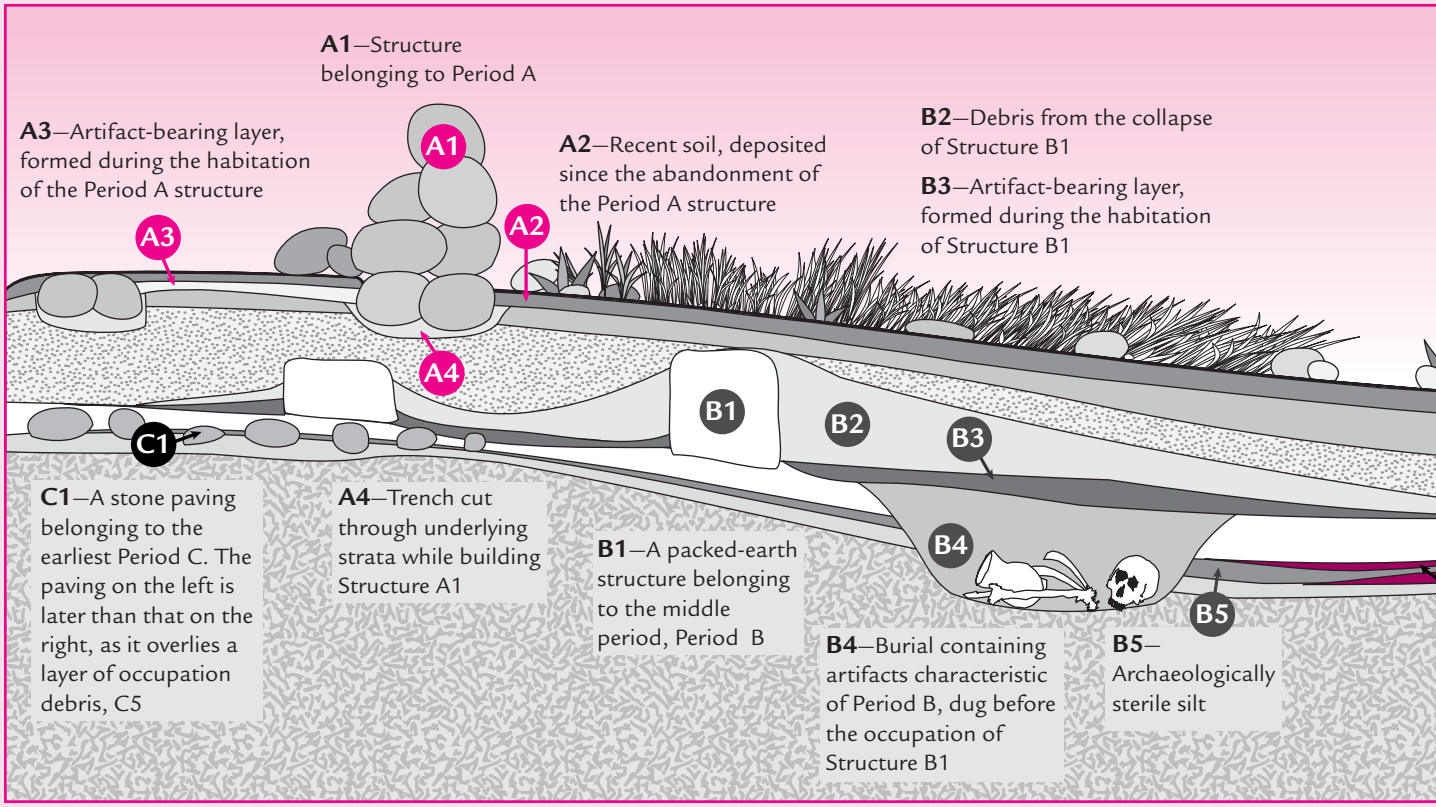
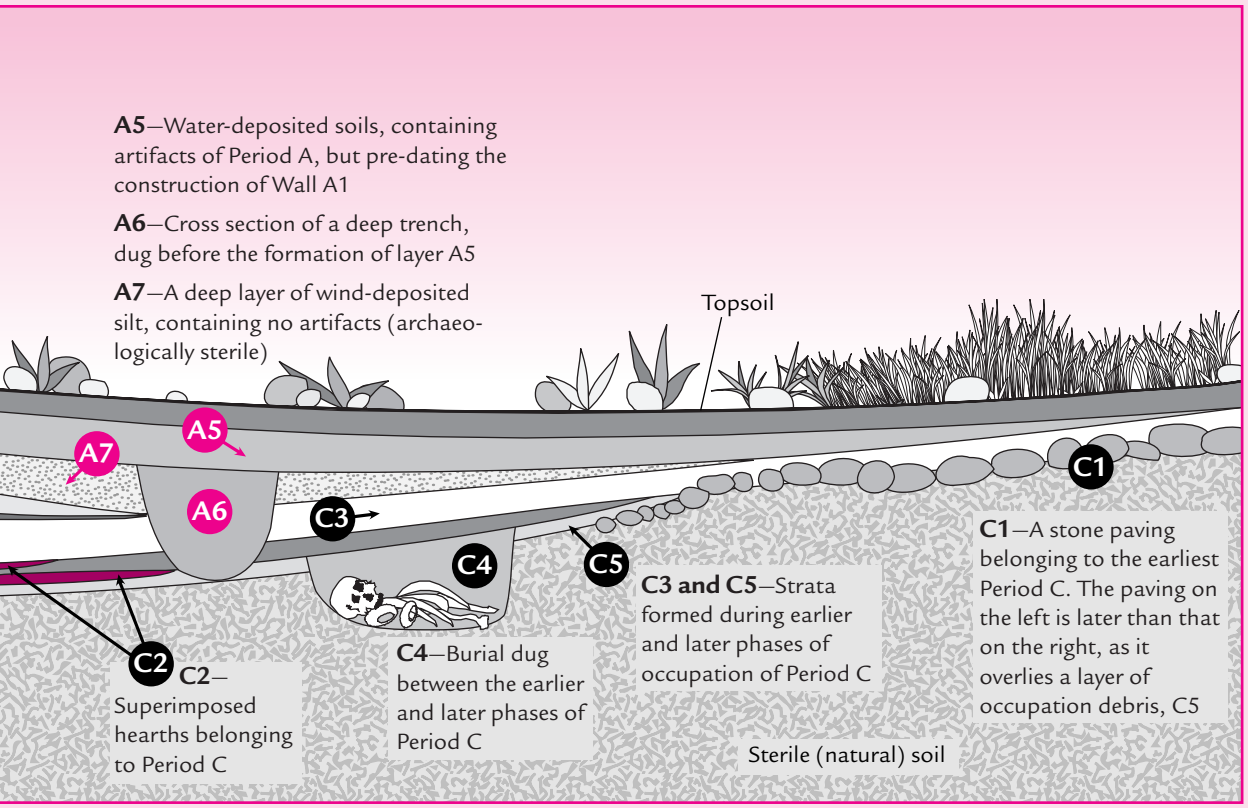


FIGURE 1.A A simplified, imaginary cross section of an archaeological site, illustrating some of the typical strata and features that are encountered. Three main periods of occupation are represented: A, B, and C. A structure belonging to the latest phase, Period A, still stands at the surface.

the western portion was occupied only during the middle and latest phases, tests placed in these different areas would give quite different impressions of the site's contents. A small test can easily be misplaced within the boundaries of a feature or into soil that was disturbed in ancient times, leading to difficulties in interpretation. Only when a reasonably extensive area of the site is excavated can these difficulties usually be resolved.

Archaeologists today often attempt to expose large areas of a site to try to trace activity areas and to interpret functional relationships within the site. The occupants of a dwelling may manufacture their pottery in an area nearby, use these vessels to cook their food on a hearth within the house (where a few broken fragments fall through the floor), and dispose of broken pottery, along with food remains, in a trash pit out of the way of daily traffic. They may bury their dead in a grave adjacent to their dwelling or even beneath its floor. All these activities produce distinctive features and artifacts. A structure, burial, or hearth might belong to any of the periods of occupation represented at a site. A functional interpretation of the features and artifact distributions within a site is meaningful only if we are certain that the features and artifacts were actually in use at the same time. Within an individual site, archaeologists need to determine which of the various deposits and features are contemporary. They must be sure that artifacts and features interpreted as a unit were found within the same or demonstrably contemporary strata, a procedure known as maintaining **stratigraphic control.** Archaeologists must follow stratigraphic distinctions over broad areas and find ways to correlate the stratigraphic cross sections in different parts of the site, which is rarely easy to do. The excavators need sharp eyes and a sensitive touch to follow subtle color and texture changes and to expose a single layer over a broad horizontal area. This work is guided by constant cross-checking against vertical cross sections that are preserved at the margins of the excavated area.



Features and artifacts that are found within the same layer are said to be associated, and, if they are not greatly displaced from their original locations, can be assumed to be contemporary. Great care must be taken, however, to ensure that the artifacts found in a layer are not intrusive. Many processes can result in the intrusion of younger or older artifacts into an archaeological deposit. Pits, ditches, and burials from later periods penetrate the strata laid in earlier times, carrying more recent materials downward and bringing earlier materials upward. Burrowing animals, such as mice, rats, and porcupines, do the same. Often these problems can be controlled for by careful recording of the features and the locations of animal burrows.

Geological forces can also move artifacts. Very ancient archaeological sites may have been subjected to the same geological forces that have modified the rest of the earth's surface. Archaeological strata may have been eroded, or even folded or tilted. Alternating periods of freezing and thawing may have churned the soil. Stream actions, in particular, can mix artifacts from many different strata and locations, creating artifact associations that have little to do with human activities. The stratigraphic interpretation of such sites often requires a thorough knowledge of soil formation processes and the geology of wind- and water-laid sediments. It has been especially difficult to unravel the complicated relationship between geologic forces and human activities that formed the sites associated with our earliest human ancestors. We shall return to this problem in Chapters 2 and 3.

An Archaeologist's Toolkit

The Archaeology in Practice boxes in each chapter of this text will introduce a range of methods used in the analysis and interpretation of archaeological data. In this chapter, for example, the methods used in stratigraphic analysis have been described in detail. However, before interpretation can begin, archaeologists must locate, assess, and excavate archaeological sites. Excavation is the most important way that archaeologists collect new data. Since all excavation involves destruction, archaeologists have developed standardized ways of recording and preserving archaeological data.

The first challenge is the location of archaeological sites. Many important sites have been discovered by accident, as a result of construction or agricultural activities. Others are discovered as a result of systematic reconnaissance or field survey. In the United States, federal environmental laws require archaeological surveys to be conducted in advance of any construction that involves federal money. Archaeological reconnaissance can be conducted in a number of different ways. Old maps and photographs may show the location of walls and other archaeological features. Aerial photographs (see Archaeology in Practice, Chapter 22) may reveal the location of sites and features that are not visible at ground level. Systematic field surveys can also identify possible archaeological sites. Archaeologists walk across the landscape and note the location of artifacts, such as pottery and stone tools, that may reveal the location of buried sites. Field surveys are often conducted shortly after agricultural fields have been plowed, since plowing may bring buried artifacts to the surface.

Once a possible site has been identified, its location must be recorded in relation to a published map. Today, many archaeologists use GPS (global positioning system) technology to record the precise location of their sites. Archaeologists often use test trenching to evaluate the archaeological potential of possible sites. A **test trench** is a small (often one meter square) excavation designed to reveal the stratigraphy at the site (Figure 1.B left). Test trenches can reveal the nature and depth of the archaeological deposits, but since they are very small excavations, they provide very little information about the distribution of artifacts and features across a site. As a result, test trenching is often followed by open-area excavation.

In an **open-area excavation,** a large portion of the site is excavated to reveal the spatial relationships between artifacts, ecofacts, and features (Figure 1.B right). Test trenches can serve as guides to the stratigraphy, so that the site can be excavated stratigraphically—that is, one layer at a time. The goal of excavation is to remove the soil around artifacts but to leave them in place so that their spatial relationships to other artifacts and to features can be determined. Trowels, brushes, and even dental picks are used during excavation. Plans and photographs are used to record the precise locations of artifacts and features before they are removed and cataloged. These data are crucial for archaeological interpretation, since the context in which an object is found is as important as the object itself. For example, a pottery vessel found in or near a grave may mean something very different than a pot discovered in a hearth. Coins, beads, small bones, and other small artifacts and ecofacts are easily overlooked during excavation, so all the soil removed during excavation is carefully sifted through fine screens.

Careful record keeping is the key to successful excavation. Maps, plans, photographs, and other records can preserve archaeological data long after the site has been fully excavated.

FIGURE 1.B Methods of excavation. Left: a one-by-one meter test trench at the site of Salibiya I in the West Bank. Right: an open-area excavation at the Valley Forge, Pennsylvania, National Historic Park.

archaeological sites. Since many excavations today are funded by public monies, archaeologists have an obligation to share their research with the taxpayers who funded it. Moreover, an educated public is more likely to support archaeology and historic preservation legislation. We will return to these important issues in Chapter 27.

CONCLUSION

Although archaeologists study many different time periods and work in many different areas of the world, all archaeologists share common goals and methods. Archaeologists are interested in reconstructing culture history, studying the ways people lived in the past, and understanding why human cultures change through time. Modern archaeologists also seek to understand the complex nature of the archaeological record and to preserve our common cultural heritage for future generations. In the following chapters, we will begin to explore our common human past, starting with the earliest human ancestors who appeared in Africa more than 6 million years ago.

KEY TERMS

QUESTIONS FOR DISCUSSION

1. Today many public school districts are debating the roles of evolution and creationism in the science curriculum. Creationists accept the Bible literally and argue that the world is only a few thousand years old. Can you see parallels between creationist thought and the catastrophist theories of the eighteenth and nineteenth centuries?
2. Native American views of the past are based, to a large extent, on oral traditions that are passed down from generation to generation. What role has oral tradition played in your family's and community's views of the past? How well do these oral traditions correspond to what is known from written history?
3. Archaeologists attempt to understand the past from the material evidence left behind by ancient people. What kinds of such evidence do you think might give us some insights into the daily lives of these people, their relationships with one another, or their cultural or religious beliefs?

FURTHER READING

Dickson, James H., Klaus Oeggle, and Linda L. Handley
2003 The Iceman Reconsidered. *Scientific American* 288 (5): 70–79.
This article presents an up-to-date review of the status of the Iceman. It is well illustrated and readable.

Hodder, I. and James Hudson
2003 *Reading the Past: Current Approaches to Interpretation in Archaeology*. 3rd ed. Cambridge: Cambridge University Press.
A contemporary view of the interpretation of the archaeological record. This book is the most accessible introduction to the postprocessual movement in archaeology.

Trigger, Bruce G.
1989 *A History of Archaeological Thought*. Cambridge: Cambridge University Press.
A detailed and authoritative history of archaeology, focusing on the changing approaches to the interpretation of the archaeological record.