

# Chapter 4

## The Lower and Middle Paleolithic

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### Ice Age Europe: Chronology and Environment

Europe in the ice age was a very different place than today, or rather, it was many different places. During the vast time period examined in this chapter the continent underwent numerous, dramatic changes in habitat and climate. Studies of these changes have focused on the geological record of river gravels and soil deposition, on the evidence for climatic changes preserved in deep sea cores, on the vegetational record preserved in pollen, and on the varying evidence of human artifacts. Each of these approaches has developed and modified its own chronological scheme; changes in one sort of evidence, however, tend not to correlate well with changes in others, so that there is an often bewildering variety of terms and stages used to describe the record of the past.

### *The Geological Record*

Beginning about 2.3 million years ago, a fundamental change occurred in earth's climate. Apparently due to changes in the planet's orbital tilt and spin, together with the cumulative effects of mountain uplift that altered air circulation patterns, a pronounced cooling commenced. The ensuing record is one of alternating cold and warm phases called glacial and interglacial periods. This entire time period is called the *Pleistocene*, from its onset until approximately 10,300 BP, when the last warm interglacial period, called the *Holocene*, began.

The geological record created during the repeatedly changing conditions of the Pleistocene varied dramatically through time. Glacial periods generally had a slow beginning of gradual, episodic cooling, marked by warmer phases called *interstadials* alternating with increasingly cooler periods called *stadials*, which culminated in the coldest phase, or glacial maximum. Glacial periods appear to have ended with a much faster, although still episodic, climatic warming. Based upon terrestrial geologic evidence, it has been difficult to determine how many of these glacial periods occurred. Initial descriptions of four major glacial periods were based upon studies of river gravel on the northern flank of the Alps, but this scheme was soon superseded by more elaborate frameworks that recognized a greater number of such events.

Conditions during a glacial maximum differed immensely from those during an interglacial period. At times of maximum cold, huge glaciers formed across Scandinavia and spread southward over northern Europe. Smaller glaciers formed in the Alps and other mountainous regions and expanded

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downslope. Because so much water was locked into the ice sheets, sea level dropped by varying amounts, by as much as 197 meters, exposing large expanses of the continental shelf and creating a land bridge between England and the rest of the continent. The climate was not only cold, but often dry as well, with shifts in ocean currents to the south and alterations in wind patterns.

Under the most rigorous conditions, even the heartiest of trees could not survive, and much of the continent was covered by varying kinds of steppe and tundra, increasingly dry and grass-dominated to the east. The very northernmost parts of the continent, as well as the ice-free part of central Europe situated between the Scandinavian and Alpine glaciers, had very sparse vegetation. The high winds were able to cause significant erosion of the open landscape, transporting and redepositing huge amounts of dust to create thick layers of *loess* in central and eastern Europe. Western Europe was always moister than areas farther east, and southern Europe was always warmer and stabler than the more northern regions, serving as a refuge for many varieties of trees.

The geologic evidence of glacial periods is diverse. The ice sheets scoured basins and carved valleys, leaving behind *ground moraines* (deposits of clay, sand, and gravel) and *end moraines* (ridges of gravel and other material pushed ahead of the glaciers) as they melted. The melting process formed drainage channels and filled basins, creating landscapes of numerous ponds, lakes, and streams in northern Europe and around the Alps. Unglaciated areas often show little evidence of true, humic soils, but rather deposits of loess and other materials. River valleys contain evidence of erosional downcutting in some areas (especially near the coasts as the rivers found their way to the lower sea) and of deposition of sand and gravel in others.

Animal communities, which included numerous now-extinct species, had to adapt to these conditions. In the harshest areas, both plants and animals were much scarcer than in regions farther south and west. The species best suited to these conditions, varying in their distribution during the Pleistocene, included the woolly mammoth, woolly rhinoceros, reindeer, and musk ox. In somewhat more temperate grassy steppes there were horses, bison, antelope, and ass, while red deer and aurochs were more abundant in open parklands with scattered trees, and ibex were frequent in mountainous regions. Carnivores were abundant and included the wolf, hyena, cave lion, and cave bear.

Interglacial periods, by contrast, were much warmer and more humid. Ice sheets melted, pouring water into the sea and raising it to modern levels or higher. At the same time, many areas of the coast were now freed of the weight of the ice sheets and showed a rebounding uplift. River mouths and land bridges were flooded, and many rivers slowed and deposited considerable material along their lower reaches. Trees and other vegetation spread from their southern refuges and virtually the entire continent became forested. True soils formed under this vegetation that stabilized the landscape. Cold-adapted animals retreated northward and woodland communities of elephants (in the earlier Pleistocene), deer, boar, and other animals developed. As lakes gradually filled in, wetlands diminished.

Although the exact number and chronology of these glacial cycles has been difficult to determine on the basis of terrestrial evidence, the alternation of true soils and loess deposits in parts of central and eastern Europe documents far more than four. A few clear indicators have been used to subdivide the Pleistocene into three long periods. The Lower Pleistocene spans the time from the beginning of this epoch until about 730,000 years ago, the date when the earth's magnetic polarity showed the last of a number of reversals called the *Brunhes/Matuyama boundary*. This boundary can be relatively clearly detected in geological sediments. The Middle Pleistocene extends from this boundary until approximately 128,000 years ago, when the last interglacial period before the present started. Finally, the Upper Pleistocene dates from 128,000 to 10,300 BP and includes that interglacial period together with the last glacial period.

## *The Deep Sea Record*

Because geological evidence on land is reflective largely of local conditions and varies across regions, it has not proven appropriate for developing a record of a global, or at least a continent-wide climate change. Much more useful in this respect has been the record of sea-floor deposits obtained by deep coring. Undisturbed deposits essentially contain a record of the sea surface temperatures in the form of the types and chemical composition of the minute shells they contain. As sea surface temperature changed, so too did the species of shellfish in the surface waters, as well as the oxygen isotope ratios in their shells. Long cores contain a record of these changes that can be analyzed and dated.

Studies of such cores have now been done in many parts of the world. Remarkably, they document consistently a general pattern of changes in sea surface temperature and, by extension, in world climate. On this basis, it has been possible to determine eight different glacial/interglacial cycles since the beginning of the Middle Pleistocene, and another 22 back to approximately 1.6 million years ago (Gamble 1999). This amounts to about 50,000 years per cycle, but in fact, it appears that the cycles have become longer in duration through time, with the more recent lasting approximately 100,000 years. True interglacials form a small proportion of this period, about 10,000–13,000 years, while the rest is the glacial period. As van Andel and Tzedakis (1996:481) point out, however, the long glacial periods were not uniformly cold: “the glacial landscapes were for much of the time less barren than is generally assumed.” During an interstadial dated to 39,000–36,000 BP, for example, much of the continent was actually forested, largely with conifers or mixed coniferous–deciduous vegetation.

On the basis of worldwide correlations among the deep sea cores, a climatic framework of *oxygen isotope stages* (OIS) has been established. These are numbers backward, with the present Holocene warm period as OIS 1, the preceding glacial maximum as OIS 2, and so forth. Warm periods (both interglacials and some interstadials) are odd numbers; colder periods are even. A total of 63 different stages have been recognized extending back to 1.6 million years ago, well into the Early Pleistocene. A clear feature of the Pleistocene climate is its variability.

## **The Early Europeans: The Biological Record**

Coinciding with the Pleistocene geological period is the archaeological period of the *Paleolithic*, or Old Stone Age. Largely on the basis of changes in technology and tool type, the Paleolithic has been subdivided into three substages: the Lower, Middle, and Upper Paleolithic, only the first two of which are the focus of this chapter. Specifying the dates for each of these stages is difficult, as there has been some confusion whether they should be used as chronological or technological indicators. Traditionally, the boundary between Lower and Middle Paleolithic has been drawn at the boundary of the Middle and Upper Pleistocene, that is, at the onset of the warm interglacial approximately 128,000 years ago (Fig. 4.1). Recently, however, archaeologists have noted that some artifacts and assemblages that are technologically “Lower Paleolithic” occur after this date as well, while some assemblages that are undeniably Middle Paleolithic in technology and typology appear much earlier. In general, these discrepancies have led to a shifting of the boundary between Lower and Middle Paleolithic earlier, to perhaps around 240,000 years ago (the beginning of OIS 7). This would have the additional advantage of bringing this boundary in closer agreement with significant changes in the human skeletal record leading to the appearance of Neanderthals at the beginning of the Middle Paleolithic.

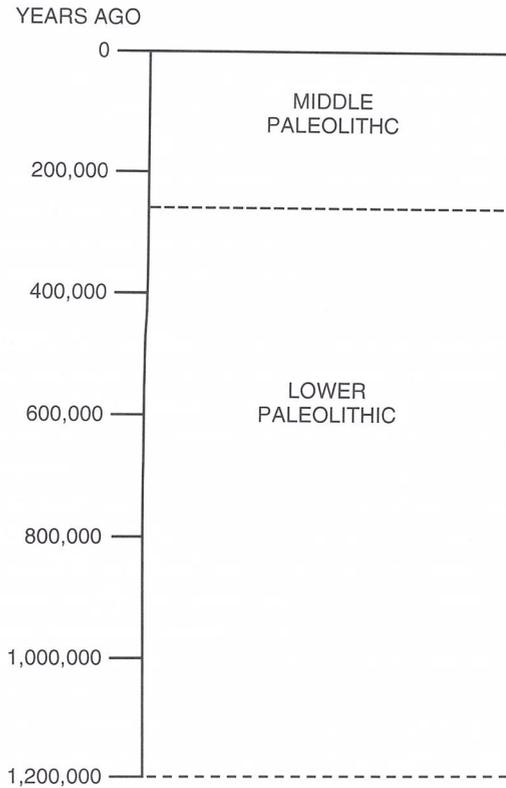


Fig. 4.1 Chronological chart of the Lower and Middle Paleolithic

## The Early Europeans: The Biological Background

The record of human evolution began in Africa with the appearance of *Australopithecus* between 5 and 4.5 million years ago. Over the course of the next 2 million years, there seem to have lived several different named species within this genus, varying considerably in size and skeletal characteristics, but all smaller than modern humans and with cranial capacities of up to about 550 cubic centimeters (modern humans show a range of 1300–1600 cubic centimeters). By around 2.5 million years ago a form appears alongside the Australopithecines that is sufficiently different and sufficiently “modern” to merit assignment to our own genus, *Homo*. The earliest representatives, called *Homo habilis*, were small creatures (barely over 3 feet tall) with smaller teeth and larger brains (up to approximately 700 cubic centimeters) than the Australopithecines. It is probably no coincidence that the first known stone tools appear at the same time, primarily crude flakes struck from pebbles.

Findings dating to around 1.9 million years ago indicate that the genus *Homo* underwent rapid evolutionary change, enough so that a new species name has been assigned: *Homo erectus*. Actually there is considerable disagreement about the naming of species, with many paleoanthropologists preferring to call these forms *Homo ergaster*, and to reserve the “erectus” name for later finds in Africa and Asia. However, because these various finds share many characteristics, and because the significance of the observed skeletal variation is not clear, the designation of *Homo erectus* is used here as a broad category for similar forms throughout the Old World, including Europe.

*Homo erectus* lived alongside the Australopithecines in Africa until approximately 1 million years ago, but differed considerably from them. This was a much bigger hominid, sometimes over 5 feet in

stature, with a braincase of up to 1000 cubic centimeters in size. Initially, its stone tool technology continued to resemble that of earlier times, dominated by flake tools and coarse pebble-chopping tools, but around 1.5 million years ago a new tool appears. This is the handaxe, a symmetrical, bifacially flaked implement with two converging sharp edges. Accompanied by an increasing variety of flake tools, this became the hallmark for a complex called the *Acheulean*, discussed below.

It was *Homo erectus* who first left Africa and began the peopling of the rest of the Old World. Recent finds suggest that this occurred relatively fast and early. Dates of between 1.6 and 1.8 million years ago have been obtained for *Homo erectus* finds in Indonesia (Swisher et al. 1994), although not all scientists accept these early dates. Fragmentary bones found in south-central China, claiming to show similarities to *Homo ergaster*, have dates of almost 2 million years ago and are accompanied by a few flake and pebble tools (Larick and Ciochon 1996), but some uncertainty exists about the identification of the bones as hominids. The site of Ubeidiya in Israel, dating back to about 1.4 million years, contained fragmentary hominid remains and stone tools, including crude handaxes, as well. Much discussion surrounds this remarkable expansion. It took place early in the Pleistocene, when world climate was changing significantly. Shifts in the distribution of forest and grassland, in the availability of waterholes, and in the distribution and composition of animal communities no doubt forced adjustments on the African hominids. Greater mobility may have been one of these adjustments, bringing the people into new areas and new habitats. Their relatively large brains and stone tool technology would have facilitated their coping with new environments, assisted, perhaps, by one new cultural development: the mastery and use of fire. Certain evidence of hearths is difficult to determine in the archaeological record, as bones and artifacts can easily be burned by natural brushfires. But some finds in south and east Africa of stone tools and burned animal bones in association with areas of baked clay hint that crude hearths may have appeared as early as 1.6 million years ago. More definite evidence comes from Chinese sites much later during the Middle Pleistocene. There is no doubt that the controlled use of fire for warmth and perhaps cooking would have been particularly valuable as people moved out of tropical Africa into more northern regions, and may have facilitated the expansion into Europe as well.

### *The First Europeans: Homo erectus*

Debates surround the age of the first Europeans, largely because of conflicting interpretations of the validity of the evidence. This evidence of early human presence takes one of two forms: apparently early stone tool assemblages and archaic forms of human skeletal material. A number of finds of stone artifacts have been advanced as candidates for evidence of human presence well before 500,000 years ago, in some cases reaching back to over 1.5 million years. For a variety of reasons discussed below, however, most of these sites have been challenged, either because the purported artifacts may be simply naturally broken rocks, or because their age is in doubt. Finds of human skeletal material obviously provide much firmer evidence, although the problems of dating remain.

The European skeletal record for the Lower and Middle Pleistocene, however, is not rich. Scattered across the continent and across the hundreds of thousands of years are relatively few finds of various fragmentary bones. Skulls or skull fragments are most informative and have been emphasized in monitoring the evolutionary changes of the early Europeans.

The earliest relatively secure finds of material relevant to the initial peopling of Europe come from Dmanisi, Georgia, at the edge of the continent. These finds consist of two skulls as well as a jaw and a foot bone. The skull of an adult male has a cranial capacity of 780 cubic centimeters, while the other, of an adolescent female, measures 650 cubic centimeters. Both show traits nearly identical to the early *Homo ergaster*. Several dating techniques applied to an unweathered volcanic layer

immediately below the finds indicate an age of approximately 1.7 million years, which is supported by both paleomagnetic readings of the sediments and associated faunal remains. Along with the bones, archaeologists found stone tools – flakes, scrapers, and chopping tools.

The oldest certain European skeletal finds come from an astounding site complex called Atapuerca in northern Spain. One of the sites in this complex, Sima del Elefante, has yielded a fragment of a mandible with a few teeth, accompanied by stone tools and processed faunal remains (Carbonell et al. 2008). These have been dated to 1.1–1.2 million years ago. An old railway cut revealed a nearby cave, Gran Dolina, which is now completely filled in with sediments, that has produced both human skeletal remains and stone tools dated to roughly 800,000 years ago, before the last magnetic reversal. Excavations continue at these sites, but already they have had a profound effect on our knowledge of European prehistory. Among the highly fragmentary bones at Gran Dolina were the remains of six individuals ranging in age from toddler to young adult. Importantly, facial bones and a number of teeth were among the finds; both of these body parts have been critical in determining patterns of evolutionary change. The bones from both Atapuerca sites share a number of traits with *Homo ergaster* but are different enough (particularly in the “modern” features of the face) that the excavators have suggested a new species name, *Homo antecessor*. They suggest that Europe was first colonized by this species, a descendant of African *Homo ergaster*, perhaps even in a second wave of expansion, separate from the one that led to the Asian groups of *Homo erectus*.

Their reasons for invoking the possibility of a second wave of hominid dispersal out of Africa include not only the differences between the Atapuerca finds and Asian skeletons, but also the delay in the peopling of Europe in comparison to much of the rest of the Old World. If people were already at Dmanisi by 1.7 million years ago, why did it take another half million years to move into Europe? There are two possible answers. First, they did move into Europe earlier, but we simply do not have adequate conclusive evidence. In this case, the disputed finds of early stone tools might, indeed, represent traces of this early occupation. A second possibility, however, is that the delay is real and caused by environmental conditions in Europe that initially posed too great a challenge to groups coming from the tropics. However, temperate regions of China appear to have been colonized before 1 million years ago, and perhaps as early as 2 million years ago, as mentioned above. Ecological frontiers were no insurmountable obstacles to this expansion.

If the initial peopling of Europe was by very small, mobile groups, it is likely that their archaeological record will be sparse and visible only upon accidental discovery. Such discoveries occur frequently in archaeology and often provide surprises that overturn conventional interpretations of the past. The first finds at Gran Dolina were not made until 1976, at Dmanisi in 1991, and Sima del Elefante in 2007. More surprises are probably waiting to be discovered.

One additional feature of the finds at Gran Dolina, Atapuerca deserves mention: many of the hominid bone fragments show signs of cutting and purposeful breakage. The excavators suggest that these are signs of cannibalism, with meat removed from the bones using stone flakes and with bones (especially vertebrae) broken open for marrow. If true, then the hominid bones at the site represent *prey*, not occupants, and the question of who was doing the eating remains open. Other groups of *Homo antecessor* would be likely, but the excavators raise the possibility that other, more “erectus-like” hominids were responsible.

In fact, later skeletal finds in Europe, dating back to around 500,000–400,000 years ago, do represent individuals with features more similar to *Homo erectus*. They have sufficient unique characteristics, however, for yet another species name to have been developed: *Homo heidelbergensis*. The finds include a tibia (shin bone) found at the English site of Boxgrove and a mandible (jaw) at the German site of Mauer near Heidelberg, both dating to around 500,000 years ago. Other bone fragments thought to date to approximately 400,000 years ago include finds from Vértesszöllös in Hungary, Bilzingsleben in Germany, Tautavel in France, and Petralona in Greece. By this period of the Middle Pleistocene, the archaeological record is much richer and occupation is known throughout most of the continent.

Recently, the number of these finds has increased dramatically by discoveries at another location at Atapuerca, the Pit of Bones (Bermudez de Castro et al. 2004). In a deep cleft in a former cave, excavators have uncovered over 4000 bone fragments dating to around 400,000–500,000 years ago. They represent the remains of at least 28 individuals, male and female, who range in age from 4–35 years, with two-thirds between 11 and 20 years. Remarkable about this collection are the extreme differences in skeletal characteristics among individuals. Cranial capacity varies widely, ranging up to 1390 cubic centimeters. The adults appear quite tall and robust, with male height between 5 feet 7 inches and 6 feet. The teeth are heavily worn, but there are few signs of injury or trauma. A number of traits characteristic of later Neanderthals are evident. There is no accumulation of stone tools or bones of other animals with these finds; hence, it is not a campsite. However, one well-made but unused handaxe accompanied the bones. It has been suggested by the excavators that this was a location where bodies were tossed into a pit, possibly in conjunction with ritual activities or simply as a convenient disposal of the bodies.

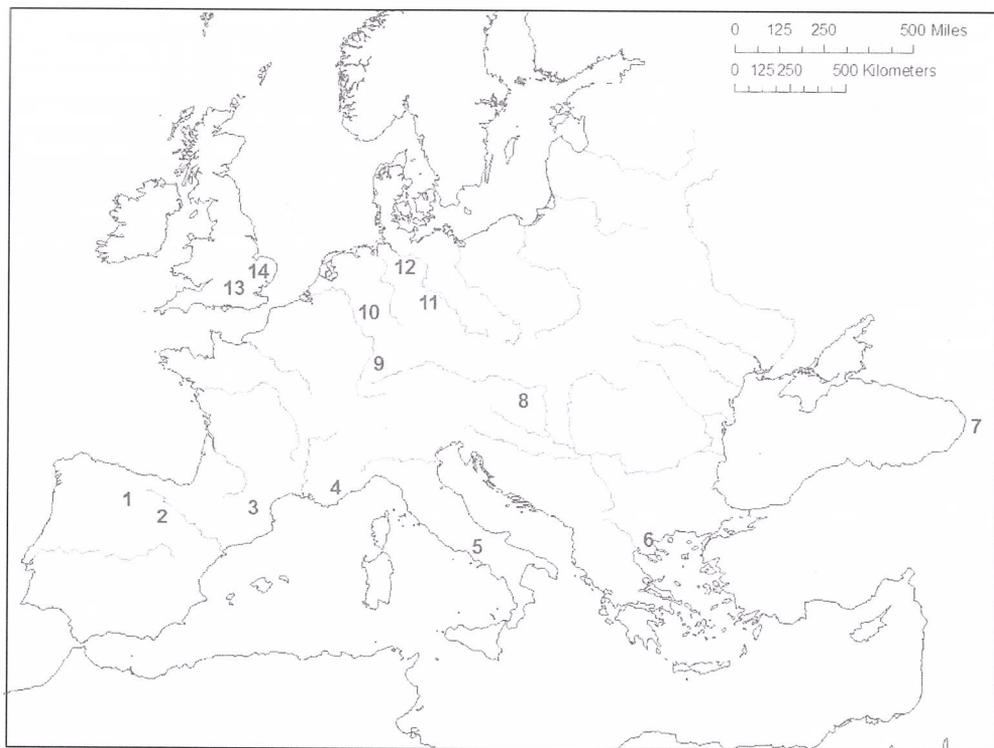
### ***Later Forms and the Emergence of Neanderthals***

The second half of the Middle Pleistocene, after 400,000 years ago, is known for a number of skeletal finds characterized by considerable variability. Again, this variability has fueled many debates over the number and identity of different species to be recognized in our ancestral line. In general, the “erectus-like” populations (including *Homo ergaster*, *Homo antecessor*, and *Homo heidelbergensis*) are followed in Europe by a group of finds variously called Archaic *Homo sapiens* or Pre-Neanderthals, all characterized by larger brains than earlier forms. Dating between roughly 300,000 and 250,000 years ago, they include isolated skulls found at Swanscombe in England (1325-cubic centimeter cranial capacity) and Steinheim in Germany (1100-cubic centimeter cranial capacity), both dated to around 250,000 BP.

By around 230,000 years ago, sufficient changes had occurred in European populations for most paleoanthropologists to assign them to the Neanderthals, *Homo sapiens neanderthalensis*, as a subspecies within our own. Finds are much more abundant than previously, with more than 30 different individuals represented (Stringer and Gamble 1993:70). The traditional picture of Neanderthals actually applies primarily to the latest forms, dating to the first half of the last glacial period. These “classic Neanderthals” were rather short and stocky individuals with relatively short arms and legs and very robust musculature. Their brains were fully modern in size, but the skull was quite different from ours, long and flat on top, with a large brow ridge over the eyes and a protruding “bud” at the lower back of the skull. The nose was long and wide, perhaps in order to heat cold, dry air adequately, and the jaw and front teeth were quite large. Many of the skeletons show evidence of both arthritis and numerous injuries, suggesting a dangerous and difficult life. They appear to have developed more rapidly than modern humans, reaching physical maturity at around age 15 years, and most died before the age of 40 years (Shipman 2004). Earlier Neanderthals share many of these traits, but are generally less robust.

### **Sites and Findspots: The Archaeological Record**

The archaeological record of Paleolithic Europe (Fig. 4.2) is extremely fragmentary and heavily biased. Thousands of years of sea level change, erosion and deposition, and human occupation have transformed the landscape, destroying or masking sites. Any coastal sites dating to periods when sea level was lower than today are now underwater, except for a few, exceptional areas where the



**Fig. 4.2** Lower Paleolithic sites mentioned in the text: 1 Atapuerca; 2 Torralba; 3 Tautavel; 4 Terra Amata; 5 Isernia; 6 Petralona; 7 Dmanisi; 8 Vértesszöllös; 9 Mauer, Steinheim, Cannstatt; 10 Kärlich; 11 Bilzingsleben, Wallendorf, Markleeberg; 12 Schöningen; 13 Boxgrove; 14 Swanscombe

continental shelf drops off very steeply or where postglacial uplift has raised the old shoreline. Sites in areas of glaciation (primarily the far north and around the Alps) may have been destroyed by later expanding ice sheets. Sites along rivers may have eroded away completely or may have been buried beneath tens of meters of deposits. Farming and construction activities doubtless destroyed countless other sites. What remains for archaeologists to discover, then, is only a tiny fraction of the sites created in the past. The earlier the period of interest, the more sites are likely to have been destroyed.

Undisturbed sites from these early time periods, consequently, are exceptional, and their discovery is often by accident. Most open-air sites, which seem to be the majority for the Lower Paleolithic and probably the Middle Paleolithic as well, have, in fact, been found by accident. Construction of roads and railways, excavation of building foundation, and quarrying for gravel or travertine have been responsible for a large number of early finds, constituting a very haphazard sample of the past that may not be representative of lifeways or the patterns of land use.

Caves and rockshelters, as visible fixed spots on the landscape, have more often been the focus of deliberate investigation by amateurs and professionals alike. It is likely that they are overrepresented among the known archaeological sites, not only because they are easier to find, but because they have protected and sealed archaeological remains from destructive processes, creating the potential for rich archaeological assemblages of stone and bone. If caves and rockshelters were used prehistorically only for certain activities, however, our interpretations of past lifeways will be significantly biased.

Because archaeology has a long history in Europe, many of the most obvious and important sites were excavated quite early, using techniques that are deficient by today's standards. Common among

these early excavations was a lack of attention to the fine details of stratigraphy, resulting in the assigning of materials to very thick “cultural levels,” surely representing multiple occupations over long time periods. Moreover, screening of the excavations surely failed to retrieve many smaller artifacts and bones. Often, only the “most typical” or prettiest artifacts were saved during excavations, leading to the casual disposal of much stone waste and many bones, now considered vital sources of information. Unfortunately, it was also a common practice for collections to be divided and dispersed among several museums and private collectors, making it difficult for modern studies of complete assemblages. The vast upheavals of the world wars led to the loss or destruction of many of these collections, as well as of many of the excavation notes that might have existed.

Another confounding factor has been the typological focus of much of Paleolithic archaeology. In an attempt to bring order out of the chaos of stone tool variability, some classification of techniques, tools, and assemblages is necessary, but it is most useful when the basis of the classification system is explicit and its meaning is clear. This has not been the case. Artifacts have been classified in part according to technology of manufacture, in part on the basis of shape and retouch. Vague, but untested, ideas about artifact function (spear points must be pointed, for example) have driven some interpretations of these tool types, but more often, cultural styles have been sought in the types and proportions of different tools. The facts of European history have played a role in this approach. Europe has a long history of ethnic and cultural variability and a detailed record of different group migrations. Perhaps it is only to be expected that prehistorians would also seek to identify groups and their movements in the Paleolithic record. Unfortunately, it may well be that stone tools are poor indicators of ethnicity or group identity and that vague, intuitive classifications simply make it difficult to investigate either activities or culture.

## The Lower Paleolithic

### *Spotlight on Two Sites*

#### **Bilzingsleben**

The travertine quarries near Bilzingsleben in central Germany have been known as a place of animal fossil discoveries since at least 1710. In 1969, however, human artifacts were found during quarrying and led to the excavation of roughly 600 square meters over the next 20 years. The site that emerged from these excavations is one of the most intriguing and controversial Lower Paleolithic sites in Europe.

The site (Fig. 4.3) is located on the shore of a former lake, next to a spring. After the site was abandoned, the spring water flowed by and over the site, gradually depositing dissolved minerals in a precipitate that formed a hard layer of travertine, sealing and preserving the site. Based on this work, the excavator has created a remarkable picture of life during the Middle Pleistocene (Mania 1990).

Several fragments of human skulls and teeth found at the site have been attributed generally to *Homo erectus*. Supporting this are the estimated dates for the site based on geological and paleontological evidence, which suggest an age ranging from 350,000 to 400,000 years. The site was occupied during a warm interglacial period, when average yearly temperatures were 2–3 degrees Centigrade higher than today. Winters were mild, summers warm and dry. The surrounding vegetation was a mosaic of moist forest of oak, beech, and alder and open bush and grassland.

The major prey taken by the people camped here were species of forest- and steppe-rhinoceros, but a large variety of other prey were taken as well. The minimum number of individuals of each species is as follows:

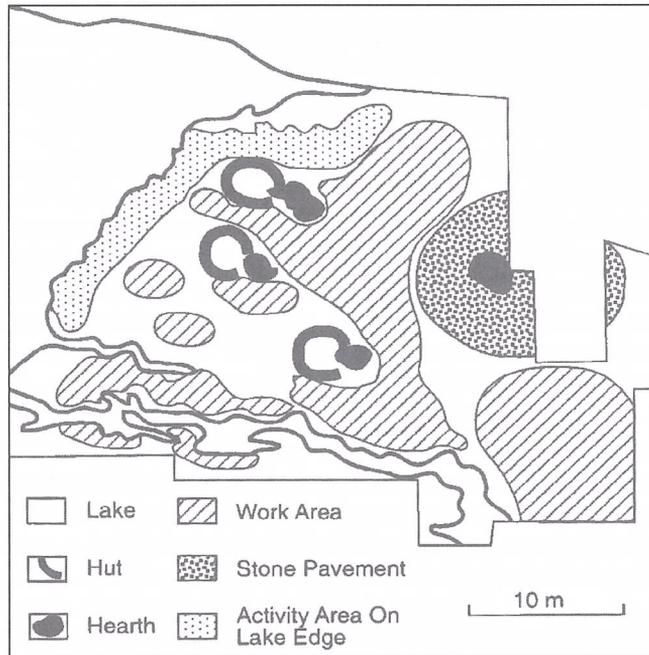


Fig. 4.3 Bilzingsleben site plan (after Mania 1990)

- 68 Rhinoceros
- 31 Forest elephant
- 13 Bovids (aurochs, bison)
- 7 Horse
- 32 Red deer
- 5 Boar
- 5 Roe deer
- 29 Bear
- 3 Lion
- 1 Wolf
- 1 Lynx
- 11 Giant beaver
- 37 Beaver
- 12 Other small mammals

In addition, fish bones, mussel shells, eggshells, and wild cherry pits were found.

The excavator suggests that these diverse species were hunted largely with wooden spears, based on finds of such spears in sites elsewhere in Germany and England. The largest animals are represented by bones from only the meatiest portions of the body, suggesting that they were killed elsewhere and only those parts brought back to camp. Smaller prey, such as deer and beaver, are represented by fragments from entire skeletons, indicating that they were killed nearby and could be easily transported whole.

Among the most notable features of these sites are three huts that have been reconstructed. These consist of almost closed circles of large rocks and bones, with the openings all facing the same direction. At the entrance to each is a hearth of charcoal and fire-cracked rock. In comparison to the rest of

the site, the interiors of the huts are relatively empty, containing primarily small bones and stones and a large anvil stone.

Outside of the huts, work areas have been identified, consisting of concentrations of fragmented bone and/or chipped stone; some of these have large anvils of stone or bone. Another special area was an oval "pavement" of pebbles, 9 meters long, compressed or trampled into the sediments. The pebbles are said to be foreign to the site location and were brought in. Trash middens, consisting of large scatters of especially small stone and bone debris, lay downslope, both into the lake and behind the huts away from the lake. Other features include a line of large rocks and bones about 5 meters long and a number of whole elephant tusks close to the huts.

Approximately 150,000 stone artifacts were found, of which 22,000 were retouched as informal flake tools used for cutting, scraping, and sawing. These tools were made from a variety of locally available materials, including quartzite, limestone, travertine, quartz, and flint. In addition, many pebbles have traces of battering from use as hammer stones. Over 200 bone fragments appear to have been crudely flaked to create hammers, picks, chisels, knives, and scrapers, and antlers were used as clubs. In addition, four bones were found to bear engraved parallel lines or geometric figures, suggested to represent non-utilitarian art objects.

The excavator interprets this site as a seasonal base camp for a small group of foragers. They were attracted by the fresh water and the location suitable for active hunting in the surrounding forests and grasslands. During their stay they made substantial modifications to the site, structuring the space into different areas of work, sleep, and discard. This interpretation, however, has not gone unchallenged. Gamble (1999:153–172), for example, argues for an interpretation of much more unstructured, opportunistic behavior. In this view, the circular patterns of stones and bones reflect rings of materials discarded by individuals sitting around trees or anvil stones, and the hearths simply burned portions of fallen trees. The site is certainly relatively unique in its complex spatial structure, suggesting that sweeping interpretations of Lower Paleolithic behavior on its basis may be unwarranted.

### **Terra Amata**

The site of Terra Amata was discovered during the construction of an apartment building in 1965 and excavated over a period of 5 months (de Lumley 1969). Situated in Nice on the edge of a hill next to the French Mediterranean shore, it is a deeply stratified site, the age of which is uncertain. Geological estimates suggest a date of approximately 400,000 years ago, while two thermoluminescence dates indicate a younger age of around 230,000 years (Villa 1983:54–55). The artifacts were found deposited in beach and dune sands over a vertical distance of 1.5–2 meters, suggesting repeated occupations. The excavator identified 21 different levels or "living floors," most of which had the remains of a hunt together with stone and bone artifacts.

All the identified huts, many of which were exactly superimposed on earlier ones within the dune, were ovals ranging in width from 4 to 6 meters and in length from 8 to 16 meters. These outlines were visible as lines of small postholes, 7–8 centimeters in diameter, from stakes driven into the sand to form a palisade or windbreak, and as arrangements of large rocks, up to 30 centimeters in diameter outside of the line of stakes. Some of the huts also show evidence of central posts measuring about 30 centimeters in diameter, presumably serving as roof supports. Within each hut was a hearth, recognizable as a concentration of charcoal and heated stones. Some seem to have been constructed on small stone pavements, others in shallow pits. Small windbreaks of piled stones often were placed next to the hearths.

Artifacts of stone and bone were concentrated within the huts. Almost 11,000 stone artifacts were recovered, of which the majority were waste flakes of limestone, silicified limestone, and flint. Among the retouched tools, flaked pebbles and pebble fragments, choppers, and picks predominated, accompanied by a few bifaces and small tools made on retouched flakes. The coarser limestone was used

primarily to make the larger pebble tools, while the finer-grained material predominated among the small tools. All of the raw material was available in the vicinity of the site, the farthest source identified being 30 kilometers away. The high proportion of waste flakes suggests that much stone-working took place at the site, an interpretation supported by the fact that a number of flakes and cores can be refitted (Villa 1983). Several bones also appear to have been sharpened as tools, and a few pieces of red ochre mineral pigment were found.

Animal remains, which have not yet been fully analyzed, are not abundant, but contain a relatively high diversity of species, including red deer, forest elephant, rhinoceros, boar, ibex, aurochs, rabbit, and bear. In addition, a few burned shells of mussels and oysters and a small number of fish bones were recovered.

Pollen analysis suggests a largely forested environment with pine and fir, presumably on the slopes, and Mediterranean pines and oaks at lower elevations. Human feces, or *coprolites*, were found and also contained pollen, the analysis of which indicated plants that flower in late spring or early summer. On the basis of these finds, the excavator interprets the site as a repeatedly used seasonal residential camp, utilized largely in spring. A very small group would come to the shore and establish camp by building a hut near a small spring that provided fresh water. While there, perhaps only for a few days, they manufactured stone tools, hunted in the forests, and collected some shellfish and fish as well. This interpretation suggests a highly patterned seasonal round of activities, with groups returning to the same location at the same time of year.

New analyses have raised questions about some portions of this interpretation. Finds of two unshed red deer antlers suggest kills in fall or winter, indicating that the seasonal use of the site may have been more variable than supposed. More importantly, examination of the vertical distribution of the finds, together with refitting of a sample of the stone artifacts, suggests that the site has been considerably disturbed (Villa 1983). Many flakes from different levels can be fit together, reflecting vertical artifact movement by as much as 45 centimeters. The factors causing such displacement are unknown, but may have included human trampling, rainwater percolation, or animal burrowing. The implication of this finding is that the recognized archaeological levels may be artificial and patterns found within each of the supposed living floors of dubious behavioral meaning. This has caused many archaeologists (Fagan 1998:94–95, Gamble 1999:161) to doubt the existence of the huts and other patterns.

Nevertheless, Villa (1983:77) emphasizes that the *horizontal* displacement of artifacts appears to be minimal and concludes that “the fireplaces and the possible structural features strongly suggest that Terra Amata was a living site.” Whatever the status of the huts, this site provides strong evidence for repeated occupation of the Mediterranean shore by groups utilizing a variety of large and small animal foods. Using large stones and wooden stakes or posts, they constructed living spaces around hearths, which formed the focus of stone-working and butchering activities.

### *Lower Paleolithic Stone Tools and Technology*

The most obvious feature of Lower Paleolithic stone tool assemblages is their variability. Differences in tool types, technology of manufacture, and tool size present a bewildering array of combinations that have resisted easy classification. Archaeologists have tried to identify and name recurrent groupings, but have been only partially successful. It appears that Lower Paleolithic people had a diverse repertoire of working stone, varying with needs and raw material. As *cultural* markers of different groups, archaeological “cultures” may be inappropriate.

A primary distinction among assemblages that has traditionally been emphasized is between those with *handaxes*, or bifaces, and those without. The handaxe, often considered to be the characteristic tool of the Lower Paleolithic, is a symmetrical tool that has been shaped by bifacial retouch to have two

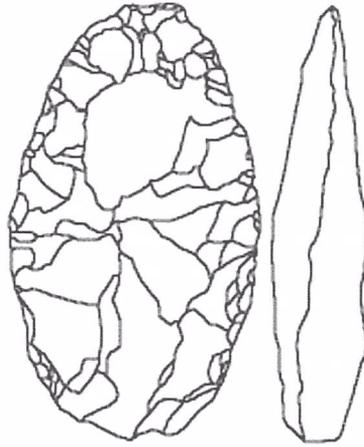


Fig. 4.4 Handaxe, a tool characteristic of the Acheulean

opposing, relatively sharp edges (Fig. 4.4). Its shape varies widely, from oval to pointed to triangular (Callow and Cornford 1986), as did its function. Traces of polish and battering on the tools suggest their use in cutting meat as well as chopping or hammering (Keeley 1980). In addition, they may have served as *cores*, or sources of flakes, to be used for other purposes. At least some handaxes, therefore, may have served as “Swiss Army knives,” carried and used for a variety of purposes.

The frequency of handaxes in assemblages also varies widely (Villa 1983), but in general, they appear to be scarcer in occupation sites than in collections of naturally transported artifacts (along with river gravel) or as isolated finds, and also scarcer in cave sites than in open-air situations, at least in western Europe. Many factors probably contribute to creating these patterns. Compared to most other tools, handaxes are large and obviously manufactured by humans. Hence, they are more likely to be found and kept by collectors and archaeologists. If many of them were indeed multipurpose tools, then they may have been carried (and lost) more frequently away from campsites, on trips where the needs for specific tools would have been uncertain. In addition, caves may have been only a small class of camp types used by particular groups, camps where the suite of activities involving handaxes were less important than at other locations.

Assemblages with handaxes have been grouped together into the *Acheulean* culture, or technocomplex, named after a locale in northern France. Along with handaxes, Acheulean assemblages contain other sorts of large tools (picks, choppers, cleavers) together with more numerous flake tools (scrapers, denticulated, and notched pieces). Most notable about the flake tools is their lack of standardization compared to later forms. What seems most important about these tools is their edges, not their overall shape, that were variously used to cut, scrape, and saw. Physical characteristics of the flakes indicate that a variety of techniques were used in their manufacture (Villa 1983:7). Sometimes blocks of stone were struck against fixed “anvil” stones, producing rather thick and crud flakes. Other flakes were created by striking the stone with hammers, either hard (other stones) or soft (bone or wood). The cores with successive flake removals might be rather informal and amorphous, discoidal, or heavily prepared by a variety of techniques (including the Levallois technique discussed later).

Acheulean assemblages were once thought to be found solely in western and southern Europe, over as far as India. This distribution, however, is now known to be not quite so exclusive, with some handaxes appearing in parts of central and eastern Europe and east and southeast Asia as well. Nevertheless, they are by far much more common in Spain, France, England, and Italy than in other parts of the continent.

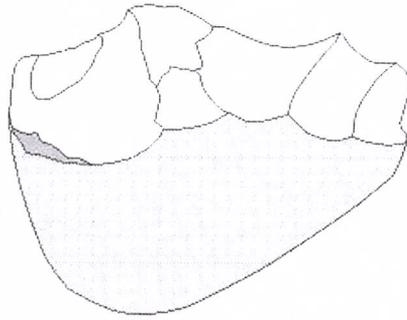


Fig. 4.5 Chopper, a common form of pebble tool

The dominant industries in central and eastern Europe lack handaxes and are characterized by a variety of flake tools, often together with crude larger tools that are minimally shaped to create choppers and chopping tools (Fig. 4.5). Often these were made on rounded pebbles, but they were made on more blocky debris as well. In some cases, such as the site of Vértesszöllös in Hungary, both flake tools and choppers are extremely small, less than 3 centimeters in maximum dimension (Kretzoi and Dobosi 1990). These small-tool assemblages appear to be especially common in forested regions during warmer periods, and their size may be related both to the size of available stone and to restricted functional needs when wood was a more important raw material (Svoboda 1989). Their small size may also have required hafting in wooden handles, a significant technological development.

Assemblages without handaxes are also found in England and France although less commonly. Depending upon other characteristics, including the technology of manufacturing flakes and the types of flake tools, these have been considered to be Acheulean without handaxes, or a different industry entirely, such as the *Clactonian* in England, characterized by large flakes made with the anvil technique. It should be emphasized, however, that so-called Clactonian flakes and tools can occur in Acheulean assemblages, leading some researchers to deny their cultural distinctiveness: “the Clactonian can no longer be regarded as a typological, technological, and hence cultural entity distinct from the wider Acheulean” (Gamble 1999:128). Crude choppers and chopping tools, although thought to be more characteristic of sites in central and eastern Europe, also appear in Acheulean assemblages in the west. A few sites scattered across the continent even contain elongated flakes with roughly parallel edges that may be termed *blades*, manufactured by prepared-core techniques and considered typical of later Upper Paleolithic industries. The earliest human tools known anywhere are found in Africa and date back to around 2.6 million years. They are characterized by crudely shaped flakes together with larger pebbles that have had a few flakes removed to create sharp-edged choppers and chopping tools. Assemblages with these traits are usually grouped together into the *Oldowan*, or Pebble-Tool complex. Not until about 1.6 million years ago does the handaxe appear there, along with more finely made flake tools.

Handaxes do not appear in Europe until much later, around 500,000 years ago, and apparently earlier sites contain only pebble tools and crude flake tools, mirroring the sequence seen in Africa. But as mentioned above, pebble tools continue to be found long after the first appearance of handaxes, and are not by themselves an indication of age or primitiveness. Nevertheless, it seems clear that the stone toolkits of the earliest Europeans consisted solely of pebble tools and crude flake tools, and this has caused some of the problems of determining just when the first Europeans appeared. Many naturally broken rocks can resemble these tools; thus determining human workmanship is difficult.

A number of "sites" have been put forward as evidence of an early occupation of Europe. Gamble (1999) lists 20, all of which contain purported pebble and flake tools, and most of which lack human skeletal remains. These sites are found in Spain, France, Italy, Belgium, Germany, the Czech Republic, and Russia. In some cases it seems that the supposed artifacts are, after all, naturally broken rocks. In most, however, the artifacts appear real, but the dating is ambiguous. The major dating techniques involve analysis of the stratigraphic sequence (including determining the environmental conditions of deposition and/or measuring the polarity of the magnetic field) or identifying associated animal remains. In rare cases, an absolute dating technique such as thermoluminescence has been applied to sediments. In many cases the dating of particular sites using these approaches is either coarse-grained or ambiguous. The site of Isernia in Italy, for example, has been dated to a period earlier than the last magnetic reversal at 780,000 years ago on the basis of measurement of the polarity retained in the sediments, but to much later on the basis of faunal remains. Thus, there is considerable room for debate and alternative interpretations (Carbonell et al. 1996). The finds of pebble tools and flakes both at Dmanisi in Georgia (ca. 1.7 million years ago) and Atapuerca, Gran Dolina in Spain (800,000 years ago) do provide strong support for a human presence in Europe during the Lower Pleistocene.

### *Use of Other Materials in the Lower Paleolithic*

Evidence for the use of materials other than stone is scant for the Lower Paleolithic. At Bilzingsleben, Terra Amata, and a few other sites, some large bones appear to have been crudely worked by chipping to form usable edges or ends for use as knives, scrapers, and picks. Evidence for the use of wood is largely more indirect, consisting of possible postholes at sites like Terra Amata suggesting construction of windbreaks or huts. Wood was also certainly used as fuel, to judge from finds of wood charcoal associated with hearths at various sites. The best evidence for wood use, however, consists of the recent remarkable discoveries at the site of Schöningen in northern Germany, where strip-mining of brown coal has cut down into Middle Pleistocene sediments (Thieme 1997). Archaeologists working in advance of the destruction of these sediments have discovered a number of impressive sites in which preservation of organic remains has been favored by mud and peat. Dating to approximately 400,000 years ago, these sites have had a profound impact on thinking about the lifeways of *Homo erectus*.

At one location on an ancient lakeshore, numerous bones of elephant, rhinoceros, red deer, horse, bear, smaller mammals, birds, fish, and reptiles were found together with stone tools and wooden artifacts. Many of the bones show cut marks from butchering. All three wooden implements made of fir have grooves cut into one end and have been interpreted as handles for stone tools. If this is the case, it is the earliest evidence in existence for a composite technology.

A nearby location contained a hearth, thousands of butchered animal bones, hundreds of stone artifacts, and four implements made of spruce wood. One is a stick 78 centimeters long that has been sharpened at both ends. This has been interpreted as either a throwing stick or a short thrusting spear. The other three wooden tools are spears, ranging in length from 1.82 to 2.30 meters. All three have finely sharpened points and similar proportions, with the maximum thickness and weight at the front, similar to modern javelins. These tools, interpreted as throwing spears, suggest, as the excavator states, that "well-balanced, sophisticated hunting weapons were common from an early period of the Middle Pleistocene onwards" (Thieme 1997:810). These finds supplement and amplify the discovery of fragmentary sharpened wooden implements at the English site of Clacton (dating to roughly the same period) and at the German site of Cannstatt (dating to around 300,000 years ago), and testify to a high degree of planning and skill in tool manufacture quite early in the Middle Pleistocene.

## *Lower Paleolithic Subsistence and Behavior*

The successful expansion of *Homo erectus* out of tropical Africa is usually credited to a combination of biological and cultural changes: a larger brain, the mastery of fire, and the development of big game hunting. Their brains were certainly bigger than those of their predecessors, although the implications of this are unclear. Hearths and burned bones are indeed a feature of many Middle Pleistocene sites, but the evidence from the Lower Pleistocene is rarer and more ambiguous. And whether active hunting of big game was the foundation of Lower Paleolithic economies is debated.

There is no denying the frequent association of stone tools with the bones of large animals. Remains of elephant, rhinoceros, aurochs, horse, and red deer occur together with flakes, choppers, and other artifacts not only at Bilzingsleben and Terra Amata, but at many other Lower Paleolithic sites. The English site of Boxgrove contained bones of horse, rhinoceros, and red deer. In the French site of Tautavel were remains of two species of rhinoceros, three species of deer, horse, bison, reindeer, and many other large herbivores. Vértesszöllös in Hungary contained bones of rhinoceros, horse, deer, bison, and bear. Among the most remarkable Lower Paleolithic sites are Torralba and Ambrona in north-central Spain (Freeman and Butzer 1966). Here, the remains of over 30 elephants were found together with a large number of handaxes, scrapers, and other flake tools.

The debates concern the reasons for these associations. One interpretation, of course, is that these large animals were actively hunted, butchered, and sometimes transported, and eaten. The various sites therefore represent kill/butchery sites or base camps to which meat was carried. This interpretation gives the human an active role in a complex economy that probably required considerable planning and cooperation.

Other interpretations, however, are also possible. One is that the bones and stones are accidentally associated due to natural processes. Flowing streams are known to transport materials over considerable distances, often redepositing them in different locations according to their size. Large rocks become concentrated as gravel deposits, while smaller stones tend to accumulate on sandbars. Both larger stone artifacts and large animal bones might easily be eroded out of separate river-edge locations, transported downstream, and deposited together with natural gravel. Lakes, ponds, and marshes could also be the locale for a natural mixing of bones and stones. Bodies of water attract both human and animal use; the bones of animals dying naturally near waterholes could easily be mixed with earlier stone tools left behind by humans, especially if there was little natural deposition of sediments between the abandonment by humans and the animal deaths. Finally, the natural shelters of caves might be used alternately by both humans and large carnivores like cave lions; the bones of their prey might easily become mixed with the tools and bones left behind by humans.

Many Lower Paleolithic sites are found in just these types of situations: river gravel, lake edges, and caves. Indications of a natural cause for the association of bones and stones would include a lack of evidence of butchery, which includes disarticulation, cut marks, and fragmentation of bones. The lakeside sites of Cannstatt-Lauster and Kärlich Seeufer in Germany, for example, show precisely this pattern; the bones associated with the stone artifacts contain no indications of butchering. There is no concrete evidence that the people who made the tools even ate, much less killed, the animals represented.

Another interpretation of the associated bones and stones gives a somewhat more active role to the humans, but as scavengers, not hunters. In this interpretation, the animals died as a result of old age, accidents, or carnivore kills and the carcasses subsequently attracted humans, who salvaged what meat they could. In this case there could well be signs of butchery, but animal gnawing would usually also be evident and the body parts with butchering marks might be skewed toward those portions less preferred by non-human carnivores. Scavenging is an activity observed among modern hunter-gatherers, but it

rarely makes up the bulk of the subsistence and may be unreliable as a regular source of meat. Its role in human evolution has been much discussed, not only for the Lower Paleolithic, but for the Middle Paleolithic as well. Conservative archaeological interpretations, in fact, are reluctant to recognize active hunting of large animals as a dominant activity until the appearance of fully modern humans in the Upper Paleolithic.

Reevaluations of sites like Torralba and Ambrona have suggested that they represent locations of repeated scavenging of elephants trapped in the valley marshes rather than sites of coordinated kills (Shipman and Rose 1983). In a number of Lower Paleolithic sites, the bones do, in fact, show considerable evidence of animal gnawing, but determining when this occurred in relation to the prey's death and butchering is problematic. Furthermore, many of the faunal collections contain only partial animal skeletons, biased often toward heads and lower limbs, which are portions low in meat. But differential preservation and human transport of different body parts can also cause such biases.

Although the relative importance of natural factors and scavenging in the creation of the archaeological record is unknown, it appears that active hunting of big game was also practiced during the Lower Paleolithic. The evidence of throwing and thrusting spears and possibly clubs and throwing sticks all suggest planned, active hunting. Finds such as a rhinoceros shoulder blade with a circular perforation at Boxgrove may indicate an active kill with a spear rather than scavenging (Dennell 1997). The fact that many sites, such as Bilzingsleben, show a differing condition of different types of prey – only meaty body parts of the largest animals, entire skeletons for the smaller – suggests that a single factor of natural accumulation or scavenging could not be responsible, whereas differing human transport decisions based on prey size could. Differential representation of various animals among levels of stratified sites also argues for human selection. At the site of Vértesszöllös, for example, small mammal remains were found throughout the thickness of the site, whereas both stone tools and bones of large herbivores were concentrated only in certain levels, those with stone artifacts. In this case, the small mammals may well represent natural deaths and/or the prey of carnivores, but it is difficult to avoid inferring a true connection between the tools and the big game.

It appears to be an inescapable conclusion that active big game hunting was a component of Lower Paleolithic economies, perhaps along with scavenging. It does not seem to be the case, however, that this hunting was highly specialized. Except for a few cases like Torralba and Ambrona, faunal assemblages usually contain a high diversity of species, not only big- and medium-sized herbivores, but also a number of smaller animals as well, including rabbit and marmot. In most faunal collections of any size, the number of species taken is quite large, and one species rarely dominates overwhelmingly. The impression this creates is one of a flexible and rather opportunistic hunting economy, geared to the availability and chances of encountering different prey. Birds, fish, and shellfish do appear in some sites, but in very small amounts, and seem to have played a limited role in the economy. Except for a few chance finds of preserved cherry pits and hazelnuts in some travertine sites, evidence for plant foods is nonexistent.

Most known sites of the Lower Paleolithic seem to be residential camps or kill/butchery sites, many of which were reoccupied numerous times. There appear to have been particular spots on the landscape that drew repeated use due to their access to game and water. Open-air camps predominate, and caves and rockshelters apparently become more important later, perhaps related to progressive climatic deterioration and the greater need for shelter during the Middle Paleolithic. At least two Lower Paleolithic sites – Wallendorf and Markleeberg in northern Germany – may have had a special function as stone extraction camps. Both are located by sources of good flint and are characterized by abundant evidence for the shaping of flint nodules into cores, much waste debris, and very few retouched tools.