Virtual Dig is based on the French Middle Paleolithic site of Combe-Capelle and uses data generated during recent excavations there. However, before we describe Combe-Capelle (see Chapter 3), it is useful first to summarize our understanding of the European Middle Paleolithic. As you read the text in this chapter and the next, you can look at slides of some of the topics on the CD-ROM. From the main menu, choose the Background/The Middle Paleolithic option and click on the slide names on the left-hand side of the screen to see different pictures.

THE MIDDLE PALEOLITHIC
The Middle Paleolithic dates from about 250,000 to 35,000 years ago and coincides with the latter part of the Pleistocene epoch, or Ice Age. The term Paleolithic means Old Stone Age, and, as the name implies, the principal kinds of artifacts recovered from Paleolithic sites are lithics (stone tools and the byproducts of their manufacture). The Middle Paleolithic has traditionally been defined as a flake tool industry, which was meant to differentiate it from earlier Acheulian industries (characterized by the presence of bifaces, or handaxes) and later Upper Paleolithic industries (characterized by blades and blade tools).

Our understanding of this time period is based on the excavation of a large number of caves and some open-air sites throughout the Old World, including Europe, Asia, Africa, and the Near East. In addition to the analysis of stone tools and bones recovered at these sites, geological studies and the analysis of prehistoric pollen play a key role in interpreting the Middle Paleolithic, as they provide information on what the climate was like when the sites were occupied.

DATING AND ENVIRONMENT
The Pleistocene, which lasted for about 2 million years, was characterized by cyclical variation in climate over periods of approximately 100,000 years. During the colder, or glacial, periods massive buildups of ice occurred,
primarily in the northern latitudes and higher elevations. During the warmer periods, or interglacials, the ice retreated and conditions became more temperate as in modern, or Holocene, times (which began around 10,000 years ago). Traditional frameworks for Pleistocene chronology were based on terrestrial evidence of glacial advance (and associated changes in flora, fauna, and sediments), whereas current chronology is based on fluctuations in two isotopes of oxygen ($O^{18}$ and $O^{16}$) found in shells taken from deep-sea cores. On this basis a numbered series of oxygen-isotope stages have been defined, with even-numbered stages representing cold periods and odd-numbered ones representing warm periods (see figure on page 11). At this point it appears that the underlying mechanism for these regular cycles of global climatic change relates to variation in solar energy that the earth receives. These variations in solar energy are brought about by cyclical variations in the earth's orbit.

During maximum glacial times, ice sheets, sometimes several miles thick, covered relatively large areas of the Northern Hemisphere. This was associated with a rather dramatic drop in temperature: In northern Europe, for example, average mid-summer temperatures may have been as low as $5^\circ$ C ($41^\circ$ F), and the temperature may have been below freezing for much of the year. These effects varied depending on latitude and elevation. Likewise, in direct response to the buildup of the ice sheets, global sea levels dropped considerably, as much as 130 m (425 ft) below the present level, which exposed large areas of previously submerged coastline.

As the climate changed during the various cold and warm cycles of the Pleistocene, many aspects of the environment changed, including the nature of the vegetation and faunal communities. When temperatures dropped, the forests of western and central Europe were replaced by more open vegetation communities, characterized as either tundra or steppe, although some localized stands of pine, birch, or willow remained. Coupled with this was a change in the faunal communities, as more open-habitat species moved in, including reindeer (caribou) and specialized cold-loving fauna such as the woolly mammoth, woolly rhi-
ncceros, arctic hare, and arctic fox. With a return to more temperate conditions there was a succession of tree colonizations, from birch, pine, and spruce to full deciduous forests of oak, hazel, and elm that are common today. Typical interglacial faunas were also similar to those occurring in various regions today. For example, in Europe these faunas include red deer (elk), deer, moose, bison, wild cattle, and pigs. In fact, some of the interglacial periods had climatic conditions that were even milder than today. During the last, or Eem, interglacial (oxygen-isotope Stage 5e), sea level rose to around 6–10 m (20–32 ft) higher than at present, and semitropical species such as hippopotamus inhabited northern Europe. We use the term paleoenvironment to refer to the past environment reconstructed using geological, pollen, and faunal studies.

Dating Middle Paleolithic sites is difficult. Radiocarbon dating extends reliably to 30,000 years ago, but use of the tandem mass accelerator can push it as far back as 50,000 years ago. New techniques, such as thermoluminescence dating of burned flint and electron spin resonance dating of teeth, have the potential to date objects much older, but these techniques are still in the experimental stages. Much of the dating of Middle Paleolithic sites is thus based on geological and
other paleoenvironmental evidence, which can help indicate the stage of the Pleistocene that is represented.

**NEANDERTALS**

Neandertals are a group of hominids that were present throughout much of the Old World during the Middle Paleolithic. The Neandertals have very distinct physical features, including large brains, sloping foreheads, large brow ridges, large faces and noses, large front teeth (often with evidence of heavy wear indicating that the teeth were used as tools), and robust bones (suggesting that Neandertals were heavily muscled). Most specialists believe that Neandertals originated about 250,000 years ago from an ancestral hominid form known as *Homo erectus*.

For many years it was thought that the Middle Paleolithic was synonymous with Neandertals. More recently, however, it has been shown that this is not universally true. In Europe, virtually all of the hominids found in association with Middle Paleolithic stone tool industries are Neandertals. In southwestern Asia and Africa, however, both Neandertals and anatomically modern *Homo sapiens* have been found in Middle Paleolithic contexts, demonstrating that the present-day independence between human biological variability and behavior (as expressed in culture and technology) existed as far back as the Middle Paleolithic.

One of the biggest debates concerning this time period is the place of Neandertals within hominid evolution. Two schools of thought exist concerning this debate. The first, the multiregional continuity hypothesis, argues that Neandertals and other archaic *Homo sapiens* and their associated Middle Paleolithic tool assemblages evolved into modern *Homo sapiens* and Upper Paleolithic industries throughout the Old World at more or less the same time. Similarities in skeletal characteristics between archaic (including Neandertal) and modern fossil remains have been used to support this hypothesis. The second, the replacement hypothesis, argues that one population of modern humans, most likely residing in Africa, evolved and spread throughout the Old World, eventually replacing aboriginal Neandertal populations. Fossil remains from Africa and mitochondrial and nuclear DNA studies have been used to support this hypothesis.

A related question is whether Neandertals represent a different species, *Homo neanderthalensis*. This debate began with the first discovery of Neandertals in the middle of the nineteenth century and revolves around the significance of the morphological differences in the skeletons of Neandertals and moderns and the behavioral differences as interpreted on the basis of archaeological remains from Neandertal sites. These topics continue to cause considerable debate and are the focus of a great deal of ongoing research.

**MOUSTERIAN STONE TOOLS**

Several different Middle Paleolithic industries existed throughout the Old World, but in western Europe the Middle Paleolithic is represented by the Mousterian, named after the French site of Le Moustier, located not far from Combe-Capelle.

Typologically, that is, in terms of the types of stone tools represented, Middle Paleolithic assemblages are often composed of two major classes: scrapers, and notches and denticulates. Scrapers are tools that exhibit continuous and generally smooth retouching along one or more (usually lateral) edges. As we will learn later, many different types of scrapers are recognized in the typology of the
Lower and Middle Paleolithic developed by the French archaeologist François Bordes. Bordes identified 63 different tool types based on tool shape, the technique of manufacture, and edge modification. The scraper types are differentiated on the basis of how many and which edges are retouched and on the basis of the shape of the retouched edges.

Notches and denticulates make up the second most prevalent tool type. Notches are flakes that have a relatively deep concavity along an edge produced either by a single blow or a series of fine retouch removals. Denticulates are tools that have two or more adjacent notches along an edge.

The third, though much less common, tool type is bifaces. Bifaces (also called handaxes) are tools that are retouched on both surfaces. Although much rarer than scrapers or notches and denticulates, they are significant in terms of Middle Paleolithic industrial systematics.

A distinct flaking technology associated with many Middle Paleolithic industries is Levallois, a prepared core technique. Although the exact definition of Levallois has become the subject of intense debate, the idea behind the original concept is that the surface of a core is prepared in a special way in order to remove a flake with a desired shape. There are many varieties of Levallois that are differentiated on the basis of the steps involved in preparing the core surface and the kinds of shapes achieved (for example, flakes, blades or elongated flakes, or points).

Using his typology, Bordes divided Mousterian assemblages from French Paleolithic sites into different kinds of Mousterian based on his observation that certain tool types were consistently found together within deposits:

- **Charentian Mousterian** is characterized by a high percentage of scrapers. Bordes identified two subvariants of the Charentian based on the presence or absence of Levallois flakes: (1) The Quina Mousterian, named after the site of La Quina, exhibits a low percentage of Levallois; and (2) the Ferrassie Mousterian, named after the site of La Ferrassie, has a higher percentage of Levallois. Some other differences exist between the Quina and Ferrassie Mousterian in terms of the types of scrapers typically associated with each.
Steps involved in the manufacture of a Levallois flake (After Bordaz 1970)

- **Denticulate Mousterian** is characterized by a high percentage of notched tools (notches and denticulates) and a low percentage of scrapers, but with varying amounts of Levallois flakes.

- **Typical Mousterian** is characterized by a moderate amount of notched tools and scrapers and varying amounts of Levallois flakes.

- **Mousterian of Acheulian Tradition (MTA)** is distinguished from the other groups by having bifaces, in which it resembles an earlier industry, the Acheulian, which was prevalent throughout the middle part of the Pleistocene. Two sub-variants of the MTA exist. MTA Type A assemblages are much like Typical Mousterian assemblages but with the addition of bifaces, whereas MTA Type B assemblages are more like Denticulate Mousterian but with bifaces. Either kind of MTA assemblage can contain varying amounts of Levallois technique.

Beginning in the 1960s, the meaning of this variation in Mousterian assemblages developed into one of the most hotly contested issues in Paleolithic research. Bordes viewed these variants as representing distinct, though contemporary, cultural groups that interacted throughout the long duration of the Middle Paleolithic (Bordes 1961a, 1973). In 1966, American archaeologists Lewis Binford and Sally Binford suggested that these variants reflected different activities that were being performed (for example, Denticulate Mousterian was thought to be associated
with bone- and woodworking). This led to what is generally referred to as the “Bordes-Binford Debate,” which became famous within archaeology circles because it represented a classic dilemma in archaeological interpretation: Are differences in contemporary archaeological assemblages due to style or function?

At about the same time, the English archaeologist Paul Mellars (1965, 1969) proposed that some of the different Mousterian assemblages were temporally distinct, that is, they occurred at different times. Citing the stratigraphic patterning seen at several sites, he noted that MTA is most often on top of a sequence, and that within the Charentian, Quina Mousterian assemblages are almost always located above (that is, later in time than) Ferrassie ones.

Recent work, in part based on ethnographic accounts of existing peoples who still use stone tools, has suggested that these assemblage differences relate to something completely different. Nicolas Rolland and Harold Dibble (1990) have proposed that many of the tool types identified by Bordes are the result of differences in tool reduction due to resharpening rather than predefined tool types. For example, one type of scraper can be turned into another type just by resharpening it. Likewise, a notch can be converted into a denticulate by adding a second notch next to the first. These differences in the degree of reduction can be the result of a range of factors including how far and how often groups were moving, how long they were staying at a site, and how much raw material was available in the area around the site. Rolland and Dibble suggest that the more intensely utilized industries are often represented by the Quina and Ferrassie Mousterian groups, whereas the least intensely utilized are, for example, the Denticulate Mousterian. Thus these groups are not discrete entities but rather are somewhat arbitrary points along a continuum reflecting intensity of utilization, as reflected in the degree of core reduction, tool production, and tool reduction.

LIFE IN THE MIDDLE PALEOLITHIC

The Middle Paleolithic is characterized by sites that represent an accumulation of artifacts that were, in many cases, deposited over long periods of time. Traditionally there has been a heavy bias on the part of Middle Paleolithic researchers in
favor of excavating cave sites, largely because they were believed to have better preserved and longer sequences of cultural deposits. It is now clear, however, that Middle Paleolithic sites occur in a variety of settings. Cave and rockshelter deposits are numerous, but many open-air sites have been found and may be more typical of the period. In general, most western European Middle Paleolithic sites appear to be habitation sites represented by a wide range of tool types and faunal remains; however, some sites may represent more specialized economic activities. Among these more specialized sites are those where animals were killed and butchered for food or those related to obtaining raw material or manufacturing stone tools. Middle Paleolithic sites are generally small, usually less than 1,000 sq m. In cave or rockshelter sites, the size may be related directly to the constraints of the shelter, but even open-air sites are generally small. Based on ethnographic analogy and site size, researchers believe that Middle Paleolithic peoples were organized in small bands of perhaps 15–20 individuals.

Although there is a tendency among some archaeologists to interpret their sites as so-called living floors, most sites have suffered a significant degree of post-depositional disturbance; in fact, some “sites” have been shown to be the result of redeposition by stream action rather than human occupation. This is why taphonomy, the study of site formation and its effects on the artifacts and other remains found in sites, is becoming a major part of Paleolithic research.

Because of the age of the deposits, most Middle Paleolithic sites preserve little in the way of subsistence information other than animal bones. It is almost certain that wild plant products composed a significant portion of the hominid diet, but determining the exact proportion is largely guesswork. Some progress has been made on the basis of analyses of trace elements in hominid bones, however. Although cooking utensils have not been found, the fact that hearths are known from this period suggests that some cooking of meat was done.

One of the major debates since the mid-1970s concerns the extent to which Middle Paleolithic hominids relied on hunting versus scavenging to obtain meat (there is no evidence of domesticated animals). Animal remains are often abundant in Middle Paleolithic sites, and traditionally it has been assumed that they represent prey acquired through purposeful hunting. This assumption has been called into question, not only for the Middle Paleolithic but also for the Lower Paleolithic. However, most specialists now agree that hunting played a major, if not exclusive, role in Middle Paleolithic meat acquisition. The principal game exploited during the Middle Paleolithic differed in relation to both climate and the local environment. Archaeological evidence indicates that Middle Paleolithic peoples depended on a range of small- to large-sized herbivores, including bison, horses, and reindeer. No evidence has been found indicating that they regularly exploited fish, shellfish, and birds.

Probably no aspect of Middle Paleolithic behavior has received more attention in the recent literature than the extent to which groups used symbolic expression and whether that expression took the form of language, religion, symbolic rituals, or art. The general lack of evidence of symbolic expression could be due either to poor preservation or to our lack of recognition of symbolic expression. Most evidence argued to represent symbolic behavior is later shown to be the result of natural agencies or simply an overly romantic interpretation. This then raises the question of whether Middle Paleolithic “culture” was fully modern, and on this subject a great deal of debate exists. Likewise, the question of whether Middle Paleolithic peoples had language has been addressed from a number of
lines of evidence, including primate ethology, animal psychology, and analyses of fossil hominid bones and stone tools. The question remains open.

To date, there is no unambiguous evidence that Middle Paleolithic peoples had specific religious beliefs or practiced any kind of religious or ritualistic ceremonies. Virtually all of the artifacts found in Middle Paleolithic contexts are utilitarian in nature, and the lack of any kind of representational art prevents us from reconstructing specific belief systems. Although there has been much speculation about a "Cave Bear Cult" during the Middle Paleolithic, research has shown that the evidence used to support this notion is the result of natural agencies. Some evidence, primarily from Europe, indicates that cannibalism was practiced. The evidence consists of human bones that exhibit either what have been interpreted as cutmarks or signs of burning.

The question of Middle Paleolithic burials has been debated since the middle of the twentieth century, and consensus is still lacking as to whether burial was practiced. In Europe relatively few sites have provided clear evidence of purposeful burial, and this evidence has been questioned primarily on the basis of the lack of rigor in presentation. In contrast, the relatively high degree of preservation of some hominid skeletons has been used as an argument for deliberate burial. In the Near East a relatively larger number of convincing burials exists. Even if it is accepted that there are Middle Paleolithic burials, the question remains as to whether they reflect a religious belief or ceremony. Primarily at issue has been the lack of associated items that could be interpreted as grave goods; Middle Paleolithic burials typically contain the same mundane items found throughout the site.

The question of Middle Paleolithic personal ornamentation has also been debated for many years. Several examples of "curiosities" have been found in Middle Paleolithic sites, including fossil shells, marine shells, and minerals. Several examples of ochre (iron oxide and manganese) have been found in Middle Paleolithic contexts from both Europe and the Near East. In later periods ochre is often used in coloring and art, and it may have been used for that purpose in the Middle Paleolithic, although no direct evidence of such use is known. Some animal bones exhibit holes that have been interpreted as intentional piercing, either to serve as an attachment for cord or to produce musical sounds. Most of these examples have been shown to be the result of natural agents such as chewing by carnivores.

The Middle Paleolithic is thus a fascinating time period from a number of points of view. Clearly it represents an important stage in the history of human technology. As a period that took place just before the development of unquestioned modern anatomy and behavior, it serves as an important point of reference for understanding our evolutionary roots.

Suggested Readings

Binford 1973; Binford and Binford 1966; Bordes 1972; Chase and Dibble 1987; Dibble and Mellars 1992; Gargett 1989; Laville, Rigaud, and Sackett 1980; Mellars 1996; Stringer and Gamble 1993; Trinkaus and Shipman 1993
Combe-Capelle is located in the Couze River valley. Couze River is a small tributary of the Dordogne, in southwestern France. Combe-Capelle consists of at least four distinct sites located on a limestone cliff. On the plateau surface at the top of the cliff (called the Plateau de Ruffet), a large open-air site contains Lower, Middle, and Upper Paleolithic remains. At the base of the cliff just at the edge of the plateau are two sites. The Abri Peyrony is a rockshelter that contains primarily Middle Paleolithic material. The other site, the Roc de Combe-Capelle, contains primarily Upper Paleolithic remains, although some Mousterian is also present. This site is best known for the recovery of a modern *Homo sapiens* skeleton in the Upper Paleolithic deposits. The fourth site, Combe-Capelle Bas, is located at the base of the cliff and contains primarily Middle Paleolithic remains. Because we are concerned only with the fourth site in *Virtual Dig*, we will refer to it simply as Combe-Capelle.

Although Combe-Capelle was discovered in the late 1800s, the first major excavations were carried out in the 1920s by a French Canadian named Henri-Marc Ami. Ami’s excavations began in 1926 and over four years he dug a 35-m-long (115 ft) trench going uphill from the base of the slope. He defined a series of stratigraphic layers (Levels I–V) and collected tools from each level. Unfortunately, Ami died in 1931 before he was able to publish the results of his work. Twenty years later, Maurice Bourgon undertook the task of publishing Ami’s results, but he also died before his manuscript was published (Bourgon 1957). Nonetheless, what we knew about the Combe-Capelle Bas sequence came primarily from Bourgon’s work. Based primarily on the collection of tools saved by Ami, Bourgon suggested that the lower levels of Combe-Capelle (especially Level IV) represented a Quina Mousterian. He classified Level III as a Ferrassie Mousterian and Level I as an MTA industry rich in Levallois flakes.

The site was reexcavated beginning in 1987 under the direction of Harold Dibble (one of the authors of this text) and his French colleague, Michel Lenoir of the Université de Bordeaux. We conducted these excavations to answer several research questions. Because the original excavations occurred before modern methods of dating and geology were developed,
little was known about the geological and chronological context of the excavated assemblages. The industrial sequence of assemblages at Combe-Capelle did not match those observed at other Middle Paleolithic sites in the area, especially that the Quina Mousterian was beneath, and therefore earlier than, the Ferrassie. We therefore designed excavations to obtain a good stratigraphic sample of artifacts to determine the reasons for this apparent anomaly. In addition, Combe-Capelle sits on a source of high-quality flint, enabling us to examine the influence of raw material availability on the artifact assemblage composition. These research questions dictated our excavation strategy and the types of analysis we performed.

We obtained funding for these excavations from several sources. The National Science Foundation funded the major portion of the work, and we also obtained funding from the University of Pennsylvania and private donors.

Excavations began in 1987 following an initial season of mapping and surveying and continued to 1990, followed by a study season in 1991 to complete the lithic analysis. We excavated three sectors at Combe-Capelle to sample the full extent of Ami’s trench and to obtain a representative sample of the geological beds that he excavated and the tool assemblage from each bed.

During the initial excavations in 1987, we located the edges of Ami’s trench, which had been obliterated by vegetation and slumping of the backdirt left from his earlier excavation. Fortunately the contact with intact deposits was relatively easy to define because the backdirt was much looser than the intact soil. We dry screened the backdirt through 1/4-in mesh screen as it was excavated to get a sample of material that Ami threw out, as it was a common practice in the early 1900s to keep only complete tools or good examples of tools.

Once we identified the edges of Ami’s trench, we set up several excavation units next to it. We excavated two units in Sector I at the base of the limestone cliff and Ami’s trench. We excavated one deep unit, A1, to provide a sample of artifacts and profile of the geological beds in the lower portion of the site and to locate bedrock. We excavated an adjacent unit, A2, along the west side of Ami’s trench. In Sector II, a series of 1 x 1-m units were excavated perpendicular to Ami’s trench, running west from his trench edge. The goal of our excavations in
PART I Introduction and Background

Stratigraphy of Combe-Capelle as defined by Ami

this sector was to expose front and side profiles of the deposits to get a sample of industries and geological beds in the middle part of the trench. We excavated Sector III in the upper part of Ami’s trench adjacent to the east edge of the trench in an area where the Level I MTA deposits were found. There we excavated two units, C1 and D1.

We used trowels to excavate deposits and placed dirt in a bucket for screening. We mapped in and assigned a unique identification (ID) number to all artifacts and bones over 3 cm (1.2 in) in size. We also mapped the center of the area where the fill of each bucket was excavated, giving provenience information to the small flakes and bones recovered in it. We mapped all natural rocks larger than a fist to aid in interpreting site geology.

We used a laser theodolite and electronic distance meter for the mapping, which made it quick and accurate. The theodolite was linked to a portable laptop computer, and all provenience information was transferred directly to the laptop. At the end of the day, we transferred the data to the main computer at the lab, where data could be checked for accuracy and a map of the site was continually updated.

Descriptions of the geological deposits were made by the archaeologists working with the sediments and by the project geologists. Level changes were marked by changes in color, texture, and cobble content. The levels were given preliminary level designations in the field; these could be refined as they were completed and a profile was drawn, and any changes could be input directly into the computer database. A geologist also visited the site during the excavations to draw profile maps of the completed sectors and to describe the deposits in geological terms.

After we excavated the buckets and artifacts, they were taken to the field laboratory, located in a building approximately 2 km (1.2 mi) from the site. There the artifacts were washed and labeled. The bucket fill was screened through 1-cm
(4-in) mesh screen, and half of the buckets were also screened through 2.5-mm (.1-in) mesh. Two provenience tags for each bucket were printed in the field; one tag was marked “coarse” and was placed in a small plastic bag in a drying tray in which material from the 1-cm mesh screen was placed. The second tag was marked “fine,” and the same process was followed for material from the 2.5-mm mesh. This material was then dried and sorted.

Lithic analysis was conducted in the laboratory, and all data were entered into laptop computers and later transferred to the main database where statistical analysis was performed. The analysis focused on technological and typological aspects of the assemblage. Variables such as flake type, platform type, cortex, tool type, and metric measurements were recorded for each stone artifact. Small flakes recovered from the screens were not analyzed individually, but material from each bucket was weighed and counted to get information on the density of small finds in each level. Because bone preservation was extremely poor, detailed faunal analysis was not done.
The final analysis of the data was completed when we returned to the United States. The results of our work revealed that Ami's original assessment of the stratified deposits at Combe-Capelle was biased by his policy of collecting complete and "good" tools and discarding others. With a better understanding of the industries, we found that the sequence at Combe-Capelle was not reversed, and in fact, there was no true Quina, Ferrassie, or even MTA at the site. We will not tell you now what kind of Mousterian assemblage was present, because you will soon be able to determine that for yourself.

The abundance of raw material at Combe-Capelle resulted in the production of large blanks that could be transported. Paleolithic groups did not visit the site specifically to gather raw material, as many other tools were found indicating that other activities were taking place at the site. The use of the high-quality flint at Combe-Capelle appears to have been rather opportunistic—something that groups took advantage of during their movements through the area, most likely in pursuit of game.

Suggested Readings

Dibble and Lenoir 1995; Dibble and McPherron 1996