ANTHROPOLOGY

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SAMPLE CHAPTER

The pages of this Sample Chapter may have slight variations in final published form.
A human head carved in mammoth ivory, called the Venus of Brassempouy, is 3.6 centimeters high (an inch and a half). Found in France, it is dated roughly between 30,000–26,000 years ago. Its stratigraphic position was not carefully documented at the time of its discovery. Because of the lack of details about its discovery and its lack of surface corrosion, some archaeologists question its authenticity. (Source: © Réunion des Musées Nationaux/Art Resource, NY)
Music, a universal feature of contemporary human cultures, has deep prehistoric roots. Like many other human behaviors that evolved during prehistory, music must predate the first archaeological evidence of it. Singing or humming can be musical, for example, but like vocal communication, they leave no traces in the archaeological record.

Bone flutes in Europe are the earliest archaeological evidence of musical instruments. The oldest bone flutes are from Isturitz cave, France (d’Errico et al. 2003). Discovered in 1921, the flutes are dated to around 25,000 years ago. Two complete flutes made of bird bone were found, along with more than twenty fragments.

These ancient flutes continue to attract the interest of archaeologists as well as of professional musicologists because of their design. The pipes have three to four finger holes. They also display marks that may have been used as notational codes. The end where the player’s mouth would be placed has no sharp edge to blow against, suggesting the use of a vibrating reed. This is a sophisticated feature because the form and tensile strength of the reed would have affected the frequency of the sound made by the player. Bone flutes are just one of the many aspects of the cultural revolution in Europe during the Upper Paleolithic.

The species discussed in Chapter 7 belong to the genus Homo, but none of them belongs to the category of modern humans, or Homo sapiens. This chapter first considers the characteristics—morphological and cultural—of modern humans, the major theories about the origins of modern humans, and the fossil and archaeological evidence about early modern human origins in Africa. The second section follows the dispersal of modern humans into the Old and New Worlds. The last section provides examples of changes in modern human life during the Holocene era, when new ways of providing food and new social arrangements began to emerge.

This chapter’s time span extends from 300,000 years ago to just a few thousand years ago. In terms of the human skeleton, it is the last period during which there is any evidence of significant change. After this time, human biological evolution consists mainly of changes in gene frequencies. Culture, in contrast, continues to become more elaborate and complex, as people alter how they interact with nature and with each other. In this relatively short period, modern humans changed from being a rare and insignificant creature to being the only form of human life on the earth. For the first time, the number of human species is reduced to one: Homo sapiens, modern humans.

THE ORIGINS OF MODERN HUMANS

This section begins with a discussion of what anthropologists mean by modern human, first in terms of morphological and genetic criteria and then in terms of the cultural features that archaeologists consider to be signs of modernity. It then presents a major debate about how to interpret the fossil, archaeological and genetic evidence for the origin of modern humans. Finally, it reviews fossil, genetic, and archaeological evidence about the earliest modern humans.

Modern Human Biology and Culture

Biological anthropologists use the term anatomically modern humans (AMH) to refer to Homo sapiens, the species to which modern humans belong; this chapter uses the short version, modern humans. Modern humans differ morphologically from archaic Homo species in several ways. For example, compared to the Neanderthals (see Figure 8.1), they have a steeper forehead with smaller brow ridges, a smaller face, smaller incisor teeth, thinner limb bones, smaller limb joints, and a shorter, thicker, pubic
bone. Changes in the shape of the cranium may reflect enhanced abilities to think creatively and innovatively. The less robust and smaller body of anatomically modern humans may reflect increasing reliance on culture rather than on physical strength. Reduced body size means less demand for food, thus freeing modern humans for activities other than food gathering and resting.

**Human culture**, defined in Chapter 1 and discussed further in Chapter 2, consists of learned and shared behaviors and beliefs. It is thus distinguished from nonhuman primate culture, discussed in Chapter 5, which consists of shared behavior but not, as far as we know, shared beliefs. Chapter 6 and Chapter 7 present evidence that early hominin culture was becoming more complex and varied. For example, indications of advanced cognition (thinking) appear in complex tool-making, such as the Levallois technique of the Neanderthals.

Modern human culture consists of even more complex systems of symbols and meaning. Modern humans have highly elaborate, learned forms of communication that are both vocal and visual, and they have seemingly infinite ways of creating new culture. Archaeologists see evidence of such cultural modernity and complexity in new tool types and materials, different diets, new forms of social organization, and the increasing importance of symbolism in language, religious beliefs, art, and music.

## Two Opposing Models for Modern Human Origins and a Middle Position

No one has a good explanation “why” modern humans evolved. Anthropologists are on somewhat firmer ground in responding to the questions about “where” and “when” modern humans appeared, but even these questions can inspire vigorous debate. New fossil discoveries and improved dating methods continue to prompt anthropologists to adjust their thinking about where and when modern human originated. And new finds and methods will continue to provide opportunities for further debate and rethinking about the “why” question.

Since the 1980s, three models have been proposed in an attempt to explain the origins of modern humans (see Figure 8.2 on p. 226). The first model is associated with American biological anthropologist Milford Wolpoff. Called the *Multiregional Model*, it proposes that modern humans evolved from local archaic *Homo* populations in several regions of the Old World (Wolpoff et al. 1984). This model says that the most recent common ancestor of modern humans was an early form of *H. erectus* that emerged in Africa around 2 million years ago. Regional transformations in the Old World to modern humans did not take place in complete isolation from each other, however. Social contact among regional groups meant that genes were

<table>
<thead>
<tr>
<th>Main anatomical differences between Neanderthals and modern humans.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Neanderthals</strong></td>
</tr>
<tr>
<td>Brain size</td>
</tr>
<tr>
<td>Brow ridges</td>
</tr>
<tr>
<td>Nose and mid-face</td>
</tr>
<tr>
<td>Incisor teeth</td>
</tr>
<tr>
<td>Rib cage</td>
</tr>
<tr>
<td>Pelvis</td>
</tr>
<tr>
<td>Limb bones</td>
</tr>
<tr>
<td>Joints</td>
</tr>
<tr>
<td>Thumb</td>
</tr>
</tbody>
</table>
exchanged across the boundaries between different regional populations to the extent that after the evolution from *Homo erectus*, our ancestors always belonged to a single species (review the definition of a species in Chapter 3). Because that species is seen as continuous with contemporary modern humans, Wolpoff proposes that it should be called *Homo sapiens*. Thus the Multiregional Model lumps most of the species of archaic *Homo* covered in Chapter 7 into *Homo sapiens*. Yet, according to the Multiregional Model, regional groups of *Homo sapiens* kept enough of their own characteristic morphology to make contemporary regional populations of modern humans physically distinctive.

The second approach is associated mainly with British biological anthropologists Chris Stringer and Peter Andrews (Stringer and Andrews 1988). The Recent African Replacement Model proposes that modern humans evolved from archaic *Homo* in Africa around 200,000 years ago. This model argues that Africa has always generated morphological and behavioral novelties. The dispersal of *H. ergaster* was just the first of many hominin migrations that originated in Africa (Templeton 2002). According to the Recent African Replacement Model, modern humans began to migrate out of Africa between 200,000 and 100,000 years ago. Throughout the Old World, they so thoroughly replaced local populations of archaic *Homo*, including Neanderthals, that there are no traces of the genomes of any of the regional archaic populations in the genome of modern humans. In this model, morphological differences among contemporary regional modern human populations are recent, most having evolved in the last 50,000 years or so.

A third model incorporates some features from each of the first two models. The Diffusion Wave Model recognizes the recent origin of modern humans in Africa and the probability that there were biological and cultural interactions between modern humans and regional archaic *Homo* populations (Eswaran 2002). The authors of this book favor the third model. We agree with the Recent African Replacement Model that modern humans migrated out of Africa to the rest of the Old World and then the New World. We diverge from it, however, when it discounts possible interactions and significant interbreeding among modern humans and surviving regional populations of later *H. erectus*, *H. heidelbergensis*, and Neanderthals. We think that social contact, such as exchange, between modern humans and local groups was probable and that such contact must inevitably have involved the transfer of genes and ideas.
One highly contentious area of dispute between the Multiregional Model and the Recent African Replacement Model concerns the relationship between later Neanderthals and modern humans. The Multiregional Model considers the morphological differences between the Neanderthals and modern Europeans to be trivial. It argues that, over 50,000 to 10,000 years of coexistence in Europe, interbreeding between Neanderthals and modern humans occurred to such an extent that Neanderthals made a genetic contribution to the modern human lineage. The Recent African Replacement Model says that the Neanderthals were morphologically distinct and made no significant contribution to the modern human gene pool (Stringer 2002). Those scientists who take the first position favor including Neanderthals in *H. sapiens*. Those who take the second position favor classifying Neanderthals and modern humans in two separate species. The authors of this book consider that despite probable biological and cultural interchange between modern humans and Neanderthals, the latter are distinctive enough to be considered a separate species.

An emerging body of DNA evidence taken from Neanderthal fossils supports a species-level distinction between Neanderthals and modern humans. Scientists first extracted short fragments of mitochondrial DNA (mtDNA) from the humerus recovered from the original Neanderthal site in Germany (Krings et al. 1997, 1999). The analysis indicated that the fossil mtDNA sequence was outside the range of variation of a diverse sample of modern humans, suggesting that it belonged to a separate species from modern humans. Subsequently, Neanderthal mtDNA was recovered from the fossil of a second individual found at the same site (Schmitz et al. 2002), from another fossil found in Russia (Ovchinnikov et al. 2000), and from another from Croatia (Krings et al. 2000). The differences between the four Neanderthal fossil samples of mtDNA and living modern human mtDNA are substantial and significant (Knight 2003). Analysis of mtDNA from four more Neanderthals and five modern human fossils from Europe confirms that Neanderthals and modern humans should be in two separate species (Serre et al. 2004). Admittedly, the DNA recovered from the Neanderthal fossils consists only of short fragments of mtDNA. Future studies using more substantial fragments or nuclear DNA will provide further insights.

**Fossil and Genetic Evidence for Modern Human Origins in Africa**

Fossil discoveries in Africa during the 1960s startled the world with the idea that Africa, not Europe or Asia, was where modern humans originated. These new finds were of modern human-like fossils from sites at Klasies River Mouth, South Africa (Rightmire 1979), and in the Omo Valley, Ethiopia (Day 1969) (see the map and Figure 8.3 on p. 228). Although none of the remains were in circumstances that allowed for absolute dating methods, researchers felt sure they were substantially older than the fossil evidence for modern humans in other parts of the world.

Subsequent fossil finds in Africa added further support for the new idea. At Herto, Ethiopia, the discovery of well-preserved crania dated to 160,000 years ago left little doubt that there were populations of hominins in East Africa during the Middle Stone Age whose remains are difficult to distinguish from modern humans (White et al. 2003, Stringer 2003). They have physical features seen in all living modern humans, such as rounded brain cases and small faces tucked beneath the brain case (Lieberman et al. 2002).

Support for the African origin of modern humans also comes from reconstructing human evolutionary history through analysis of modern human genes. The genetic evidence indicates that all modern humans are descended from a common ancestral population that lived in Africa between 200,000 and 100,000 years ago (Cann, Stoneking and Wilson 1987, Quintana-Murci et al. 1999, Ingman et al. 2000). Many novel versions of genes have their origin in African populations and then appear to have spread into the Middle East, Asia, and Europe (Pääbo 2003). There are more
Sites in Africa and the Middle East mentioned in this chapter.

### FIGURE 8.3
Middle Stone Age sites in Africa with evidence of modern humans

<table>
<thead>
<tr>
<th>Site Name and Location</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kaphthurin, Kenya</td>
<td>300,000 years ago</td>
</tr>
<tr>
<td>Twin Rivers, Zambia</td>
<td>300,000 years ago</td>
</tr>
<tr>
<td>Omo (Kibish), Ethiopia</td>
<td>130,000 years ago</td>
</tr>
<tr>
<td>Katanda, Democratic Republic of Congo</td>
<td>90,000 years ago</td>
</tr>
<tr>
<td>Blombos Cave, South Africa</td>
<td>75,000 years ago</td>
</tr>
</tbody>
</table>
different versions of genes in contemporary modern human populations in Africa than in all the rest of the world put together (Tishkoff and Verrelli 2003). This finding is consistent with the view that Africa has been the dominant source of the novel genes and gene combinations of modern humans.

Archaeological Evidence for Modern Human Origins in Africa

A growing number of archaeological discoveries also support the view that modern humans originated in Africa. This evidence comes from the Middle Stone Age (MSA), a period of time in Africa between 300,000 and 40,000 years ago (review Figure 6.2, p. 178).

The Middle Stone Age

The MSA is characterized by blade technology. A blade is a long, parallel-sided flake made from hard stone such as flint or obsidian. In order to be termed a blade, the flake must be at least twice as long as it is wide. Blade manufacture involves several steps, beginning with selecting the right shape core, shaping the core, and then striking the core at precisely the right places to produce a blade of the desired size.

This description may not sound so different from that of the Levallois technique (Chapter 7), but it involves distinctive features that are further evidence of the complex thinking associated with modern humans. First, during the MSA there is increased standardization in the size and shape of the blades, which implies more intentionality and control on the part of the tool-maker. Second, some blades, called projectile points, are specially shaped for use on the tips of spears or arrows. MSA projectile points are the first evidence of a composite tool—a tool made by combining separate pieces of stone, bone, or any other suitable material into a single tool. Spears and arrows, made of stone tips attached to a shaft, are early examples of composite tools. The making of composite tools involves complex stepwise planning and a sophisticated sense of design.

Blades from Kapthurin, Kenya, dated at 300,000 years ago. Many archaeologists say that these blades, and other early tools, indicate that humans had features of modern behavior far in advance of modern anatomy.

Speculate on the possible uses of these blades. (Source: Sally McBrearty)
Some evidence of modern tool-making is dated to 300,000 years ago. This evidence includes blades found at Kaphurin, Kenya (McBrearty and Brooks 2000) and components of composite tools found at Twin Rivers, Zambia (Barham 2002). The date of 300,000 years ago creates a puzzle because it is at least 100,000 years earlier than the fossil evidence for anatomical modernity. This apparent time gap has led some anthropologists to subscribe to the “brains before body” view of modern human evolution.

Several other features of modernity make an appearance during the MSA. Evidence of modern behavior comes from several sites in the Democratic Republic of Congo (Yellen et al. 1995). For example, bone harpoons found at Katanda, tentatively dated to 90,000 years ago, substantially predate the use of similar harpoons by European populations. Regionally distinctive styles of stone tool production appear for the first time, implying creativity, originality, a sense of style, and identity expressed through objects.

An important site of early modern humans, Blombos Cave in South Africa, dated to about 75,000 years ago, provides the earliest evidence of abstract imagery and personal ornamentation. The evidence consists of carved pieces of ochre (earth that contains iron and is pale yellow to red in color) and shell beads (Henshilwood et al. 2002, 2004). The use of ochre, at an earlier date in Africa than in Europe, places it as the first instance of ritual body decoration (see the Crossing the Fields section in Chapter 18). Use wear on the shell beads indicates that they were probably strung on some kind of thread and worn as ornaments. They are the earliest ornamental beads.

The MSA also provides the earliest archaeological evidence of behavioral modernity in the form of more complex economic strategies such as adaptations to seasonal changes. In Egypt, for example, people harvested Nile catfish and tilapia stranded in ponds left by the annual flooding (Wendorf, Close, and Schild 1994). Food-getting practices indicate modernity in tool use, as evidenced by the acquisition of very large animals and fish. As early as 90,000 years ago, people at Katanda were using the oldest known harpoons to catch catfish up to 6 feet long (Yellen et al. 1995). Catching fish of this size probably involved group coordination and knowledge that was passed down over generations. Given that the catch was so large, its consumption probably involved group sharing and perhaps some form of preservation (drying) and means of storage. Food storage, another important marker of behavioral modernity, implies that people have evolved beyond a basic concern with the “here and now.” It implies planning. Coordinated group behavior involved in catching the fish and dividing it up, by extension, suggests the existence of complex verbal language.

Exchange, the transfer of goods or services between two or more people, was probably occurring within groups occupying campsites as well as among different regional groups. Ethnographic analogy suggests that such exchanges probably were balanced and egalitarian. Within groups, all members would have received equal shares of food and other resources. In addition to shedding light on possible exchange patterns, ethnographic analogy also helps expand our understanding of possible food consumption and preparation practices during the MSA (see the Methods Close-Up box).

The question of what kinds of humans lived during the MSA has not been fully answered. The archaeological evidence suggests the existence of technological and social modernity 300,000 years ago. But is the archaeological evidence the product
Cultural Clues from South Africa about Modern Human Diet

ARCHAEOLOGY AND CULTURAL anthropology join forces in the area of ethnoarchaeology (defined in Chapter 4) to shed light on important questions in human evolution, including issues relating to diet and tool use. This example shows how ethnoarchaeology provides insights about particular features of early modern humans’ diet in southern Africa. It concerns the use of fire and a creature called the Cape dune mole-rat.

Fossil evidence of the Cape dune mole-rat is common in many prehistoric sites along the southwestern coast of South Africa (Henshilwood 1997). At some sites, mole-rats are the most common faunal species, constituting up to 90 percent of the faunal remains. This concentration of mole-rats suggests to some researchers that our human ancestors collected them and brought them back to their base, where they ate them. Other researchers claim that predators, probably eagle owls, accumulated the mole-rat fossils. A third view attributes the concentration of dune mole-rats to a combination of human and eagle owl activity.

The way in which contemporary people catch, cook, and consume mole-rats offers insights into the role that the prehistoric mole-rats may have played in prehistoric diets in southern Africa. Mole-rats are large rodents, males averaging about 900 grams (2 pounds) and females about 670 grams (1½ pounds). They excavate deep burrows, digging with their large, strong, clawed forefeet. Common predators of mole-rats these days include snakes, various birds, and carnivores, including wildcats, jackals, and hyenas. In addition, some people today consider mole-rat meat a delicacy, and families are known to consume four to five weekly.

In order to learn more about how contemporary modern humans who live near Blombos Cave (see the map on p. 228) collect and consume mole-rats, Christopher Henshilwood conducted ethnographic research with several South African farm workers. He learned that the method they use to capture mole-rats is to scoop away the sandy mound formed by the mole-rat in order to open up its burrow. Then one person sits at the entrance and waits. The mole-rat senses that its burrow has been opened and attempts to close the entrance. When the animal’s head appears at the burrow opening, it is “hooked out of the hole using a fishing gaff and its throat slit” (Henshilwood 1997:661). The mole-rat is cooked by placing it, on its back, in a bed of coals. It is baked for about 30 minutes. The thick fur protects the meat except at the front of the upper and lower jaws, where charring around the mouth occurs.

Most of the fossilized mole-rat bones found at Blombos have charred bone on the face that is similar to that on the contemporary mole-rat bones. This indirect evidence suggests that early humans collected, cooked, and ate the mole-rats at Blombos Cave. Without the ethnographic data, researchers would have found it much more difficult, if not impossible, to solve the problem of who, or what, accumulated the Blombos Cave mole-rats.

FOOD FOR THOUGHT

Given that mole-rats were an important food in prehistory, what other small animals might also have been important food sources then?

of modern humans, Homo sapiens? This question cannot yet be answered because the earliest fossil evidence of anatomically modern humans, from Herto, Ethiopia, is dated at 160,000 years ago. The archaeological evidence thus challenges the fossil hunters to fill the gap in the fossil evidence.

Given the thinness of the evidence for human modernity in Africa between 300,000 and 160,000 years ago, it is not surprising that not all researchers accept it. One critic is Richard Klein, an archaeologist at Stanford University (Klein 2000). He rejects the examples of human modernity before that time, such as the Katanda harpoons and Blombos Cave ochre use, by saying that, first, they are not much different from examples from the same time period in Europe, which are not classified as modern, and second, are too rare to constitute definite evidence of modernity. According to Klein, a major turning point toward modernity occurred in Africa but much later, around 40,000 years ago, when there is evidence of the sudden appearance of small, specialized bone tools such as arrow points, needles, and fish hooks. Klein suggests that this radical change corresponds to the fossil evidence for the emergence of a more
slender skeleton. He also speculates that the toolkit changes coincided with the acquisition of the ability to communicate complex ideas through spoken language.

The authors of this book accept the examples of harpoon use, ochre use, and other evidence from the Middle Stone Age as important enough to be counted as evidence for cultural modernity in Africa that substantially predates similar evidence elsewhere in the Old World. We also accept the possibility that aspects of cultural modernity occurred before anatomical modernity.

The Later Stone Age

The Later Stone Age, or LSA, is a time period in Africa that begins between 40,000 and 20,000 years ago and is characterized by microliths, very small stone tools whose edges have been retouched, and by increasing standardization of stone tools (Brooks and Robertshaw 1990). Microliths are usually less than 5 centimeters (2 inches) long and have geometric shapes such as triangles and trapezoids. They are made from blades that are snapped and broken into smaller pieces, which are then retouched (that is, small flakes on the surface and edges are removed). Microliths were used on spear and arrow tips, or several microliths were set in rows, like the teeth on a saw, to make composite tools for cutting. Marked regional differences in LSA toolkits suggest that LSA stone tool-makers were creative and had a sense of identity and style.

LSA sites are found in a wide range of African environments, including savannas, woodlands, and rainforests (Mercader and Brooks 2001). The earliest LSA sites (such as Enkapune ya Muto, Kenya, dated around 40,000 years ago, and Shum Laka, a rock shelter site in Cameroon, dated at 30,000 years ago) are located in tropical latitudes. Most LSA sites beyond the tropical regions, in southern and North Africa, date to 18,000 years ago or later. Archaeologists are puzzled as to why the earliest evidence for the LSA is found in the tropics rather than in the temperate zones. A possible explanation is that population size was greater in tropical Africa, which led to more social interaction, which in turn promoted more creativity and innovation.

The diets of LSA people varied according to the environmental context. Scavenging meat was probably important for many LSA groups, along with gathering smaller food sources such as eggs and insects. Some LSA coastal sites reveal continuity of the MSA tradition of exploiting the rich resources of shellfish. For example, at Klasies River Mouth, shell middens (piles of discarded shells) are evidence of the importance of shellfish consumption. Evidence at other LSA sites of the remains of large fish and of large and dangerous terrestrial animals suggests that social changes involving increased cooperation occurred along with the development of new kinds of tools.

The time of the end of the LSA varies across Africa. In parts of sub-Saharan Africa, the LSA persisted into recent times, and some anthropologists argue that twentieth-century African foraging lifestyles are directly descended from prehistoric LSA lifestyles. Thus they consider contemporary African foraging groups relevant ethno-graphic analogies for prehistoric peoples. On the basis of such analogies, the lifestyle of the early LSA people would have been characterized by the features listed in Figure 8.4. Ethnographic analogy, complemented by archaeological evidence, suggests that social organization within local groups was egalitarian, characterized by an even distribution of material goods, status, and quality of life. In resource-rich areas, it is possible that some degree of social ranking and inequality was beginning to develop as food surpluses and luxury goods accumulated.

Other anthropologists are more cautious about the use of analogies based on recent and contemporary foragers for interpreting the lifestyles of prehistoric populations. They say that, first, modern-day foragers’ territories are smaller than those in pre-
FIGURE 8.4
Later Stone Age cultural features.

<table>
<thead>
<tr>
<th>Diet: Varying food sources depending on environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low altitudes: more seeds, nuts</td>
</tr>
<tr>
<td>Middle altitudes, steppes: more game</td>
</tr>
<tr>
<td>Emergence of fishing and fowling</td>
</tr>
</tbody>
</table>

| Technology: More innovations at a faster pace        |
| Innovations for cold environments (clothing, shelter)|
| Wide variety of bone points                         |
| Harpoons, some with barbs                           |
| Bow and arrow                                       |
| Fire-hardened clay pottery                          |

| Social organization (indirect evidence)              |
| Increased social contact among distant groups through trade |
| Generally egalitarian within groups                  |
| Possibility of social ranking in resource-rich areas |

| Ideology (indirect evidence)                         |
| Modern symbolic thinking: body ornaments             |
| Wall art                                             |
| Portable art                                        |
| Group burials, many with elaborate grave goods      |

| Health and population                                |
| Longer lifespan                                      |
| Rare evidence of pathology                           |
| No evidence of infectious disease                    |
| Rare evidence of interpersonal violence              |
| Increased proportion of aged people                 |

historic times. Second, even though contemporary foragers use some tools that are similar to those of the LSA, other aspects of their lifestyle have changed. Note that these anthropologists do not reject the use of analogies, but they instead urge caution.

MODERN HUMANS DURING THE UPPER PALEOLITHIC

This section follows the migrations of modern humans out of Africa in roughly chronological order, starting with the Middle East, then moving toward Asia, then Europe, and finally the New World. The fossil and archaeological records for modern humans are uneven, with rich evidence and reliable dating in some places but sparse evidence and insecure dates in others. Generally, the data are better for Europe and the Middle East than for East Asia. Some regions have been more intensively studied than others, for various reasons. More sites have been found close to cities, simply because most researchers work at universities in cities and tend to conduct fieldwork in nearby areas. As anthropologists openly admit, the preponderance of sites in southwest France may have as much to do with the excellent fieldwork conditions as with the scientific value of sites in the region compared to elsewhere. Increasingly, paleoanthropologists and archaeologists are studying sites in more physically challenging places such as Siberia and tropical rainforests, filling gaps in knowledge of this period of humanity’s prehistory.
The Upper Paleolithic, or UP, is the period of modern human occupation in the Old World (other than Africa) from approximately 45,000–40,000 years ago to around 12,000 years ago, during which microliths and other small, finely made stone and bone tools are the defining elements of technology. During this period, modern humans also increased their ability to make and use tools made of organic materials such as nets and baskets. In many places, they created impressive works of art.

Migrations into the Old World
Following the model that modern humans originated in Africa, their first migration destination out of Africa would have been the Middle East, given its proximity. The most logical path was from northeast Africa to the Levant, a narrow coastal region running along the eastern edge of the Mediterranean Sea from the Sinai Peninsula in the south to Turkey in the north. Evidence of probable occupation by modern humans is found in stone tools at the Abdur Reef Limestone, an emerged reef terrace on the Red Sea coast of Eritrea, dated to 125,000 years ago (Walter et al. 2000). The stone tools are a mixture of MSA-style blades and flakes and more modern-looking bifacial tools. This transitional assemblage fits with the time frame of modern human migrations out of Africa.

Transitions in the Levant
The oldest modern human fossils outside Africa, found in the Levant, are dated at around 100,000 years ago (Hublin 2000). Levant sites indicate that both modern humans and Neanderthals lived there for some time. Modern human fossils from sites such as Qafzeh are substantially older than Neanderthal fossils from nearby sites, such as Tabun and Kebara. Thus modern humans arrived in the Levant before the Neanderthals (Lieberman and Shea 1994). Increasing aridity in Africa may have prompted modern human groups to move north, whereas increasing cold in Europe may have prompted Neanderthals to move south. An intriguing feature of the early modern humans in the Levant is that their toolkits closely resemble Mousterian toolkits found at many Neanderthal sites in Europe. Thus, although the early modern humans in the Levant were anatomically modern, and probably culturally modern in some ways, their stone toolkit was not modern. Modern humans in the Levant developed a distinct stone tool-making technique called recurrent Levallois reduction, which was an efficient way of producing many flakes from the same core.

Major research questions about the Levant during this period concern its simultaneous occupation by modern humans and Neanderthals. There was probably a geographic demarcation between Neanderthals and modern humans in the Levant, modern humans being concentrated in the coastal lowlands and Neanderthals in the uplands of the interior. The two populations appear to have used the landscape differently. Modern human groups moved to different locations as the seasons changed. Neanderthals were mainly stationary. When they traveled, they moved out in a spoke-like fashion, later returning to the same location (Lieberman and Shea 1994).

From the Levant, modern humans migrated toward Asia, probably taking a coastal route around the Arabian peninsula and then traveling along the coastline of India and on to Southeast Asia and the Pacific (Stringer 2000). Others dispersed north to Anatolia (present-day Turkey). From there, some modern humans migrated into Eastern and Central Europe, and others moved into Central Asia and beyond to Siberia and eventually the New World. The oldest fossil evidence is in Southeast Asia and Australia.

Southeast Asia, Australia, and the South Pacific Region
There is evidence of modern humans in Southeast Asia by 40,000 years ago and some evidence in Papua New Guinea and Australia well before that (O’Connell and Allen 2004; Thorne et al. 1999). During the last glacial period, when water from the ocean was locked up in the polar ice caps and in glaciers that covered the higher latitudes of the Old and New Worlds, many areas that are now submerged were above water
level. Land bridges connected areas now separated by water. Two paleoregions relevant to this section are

- **Sunda:** the geographic platform supporting the present-day islands of Southeast Asia, such as those in the Indonesian archipelago.
- **Sahul:** the geographic platform supporting present-day Papua New Guinea, Australia, Tasmania, and nearby islands.

It seems logical that early humans would have arrived in Sunda before Sahul, but the dates for sites in Sahul are, thus far, earlier than those for sites in Sunda. Controversial findings of flake-based stone technology from the cave site of Song Terus, Java, point to a modern human presence there between 185,000 and 80,000 years ago (Semah et al. 2003). If dates as early as 185,000 years ago are confirmed, they will raise new questions about how modern humans arrived in Sunda so early.

It is unclear whether, or how much, modern humans overlapped and interacted with archaic *Homo* in this region. As noted in Chapter 7, the dates of the last *H. erectus* fossils in this region, from Ngandong, Java, are not firm (Swisher et al. 1996). The later dates from Ngandong, if correct, would make temporal overlap between the two populations highly likely. Temporal overlap, as in the Levant, does not necessarily mean physical contact. The recently discovered “dwarf” form of *H. erectus* that lived until 18,000 years ago on the relatively isolated island of Flores is an example of how separate species may have existed simultaneously in the region without any contact with each other (Brown et al. 2004).

Another conceptual challenge concerning modern humans in this region is that most of the stone tools associated with early modern humans in Sunda and Sahul are, by African standards, not modern. Most are pebble and flake toolkits, with little or no signs of core preparation and little standardization (Bulbeck 2003). Blades and microliths are rare. Yet the humans who made these tools were anatomically modern humans. Further, these modern humans with simple stone tools successfully met complex behavioral challenges. Like archaic *Homo* before them, they were able to travel long distances over water and to navigate difficult sea passages. They must have had rafts or boats capable of maintaining buoyancy for several days in order to cross the open water between Sunda and Sahul. Like those of their archaic *Homo* predecessors, the boats or rafts made by modern humans have not been preserved. The places where they lived and built their watercraft are now submerged under water. Their boats, and their tools and dwellings, were probably constructed of bamboo or wood, materials that would rarely be preserved in the archaeological record.

By 35,000 to 30,000 years ago, modern humans in Southeast Asia and the Pacific region were skilled enough as seafarers to reach many islands, including Timor, the Moluccas, New Britain, and New Ireland. Archaeological evidence of stone tools is limited in these island sites, with assemblages often containing between 15 and 30
Sites in Southeast Asia and Australia mentioned in this chapter.

stone objects (Pavlides and Gosden 1994). Fish bones are prominent, suggesting the dietary importance of fish.

Sahul was occupied by modern humans perhaps as early as 50,000 years ago (O’Connell and Allen 2004) and certainly by 40,000 to 35,000 years ago. Most evidence indicates that modern humans were the first hominins to enter this region, so there is no question of overlap with earlier groups. In Papua New Guinea, the earliest evidence of modern humans comes from the coastal lowlands of the Huon peninsula, dating between 50,000 and 40,000 years ago (Groube et al. 1986). From the lowlands, modern humans expanded into the highlands, beginning around 30,000 years ago. A special kind of axe called a waisted axe has been found at two highland sites in Papua New Guinea: Nombe and Kosipe. These axe-shaped flakes are large, about 30 cm (12 inches) across and 25 cm (10 inches) long. They are grooved in their middle sections, or waisted (just as the middle part of the human body is narrower than the rest), which may have facilitated mounting them on wooden handles. Waisted axes are partially flaked and partially polished. They are the earliest polished stone tools, preceding similar examples elsewhere in the world by thousands of years.
When modern humans arrived in Australia, the climate was wetter than it is today. Regions that are now parched and dry were then green and lush, full of plant and animal life. Fossils of early modern human populations in Australia exhibit wide anatomical variation. People living at sites around Lake Mungo had steep foreheads, taller brain cases, and flat faces, whereas those at Kow Swamp and Coobool Creek had more sloping foreheads, lower brain cases, and projecting faces. This variation may be evidence of successive waves of immigration by distinctly different groups of people, possibly including archaic Homo. Or the variation may be due to the effects of a single species moving into a large land mass. Population density would have been low and breeding groups isolated, leading to the emergence of distinctive morphologies that persisted until they were erased by later gene flow.

The diet of modern humans living at sites around Lake Mungo included mussels, crayfish, frogs, kangaroos, wallaby, wombats, and emus. This mixed-game diet is probably typical of people living elsewhere on the continent. Using ethnographic analogies based on twentieth-century Australian foragers, anthropologists suggest that the gender division of labor included overlapping male and female roles for procuring small game and other everyday food items, and men being more responsible for hunting large game. Large-game hunting, not prominent as a food-procuring method, was probably resorted to when more accessible food sources were scarce, just as is the case among early-twentieth-century foraging groups (Hiatt 1970).

An important question is whether the growth and expansion of modern human populations had negative effects on the survival of megafauna (large animals) such as giant kangaroos, wombats, and flightless birds. Around 46,000 years ago in Sahul, many large marsupials and reptiles disappeared abruptly (Roberts et al. 2001). Between 40,000 and 15,000 years ago, another fifty species became extinct. These extinctions cannot be attributed to climate change, and there were few natural predators before the arrival of humans. Therefore, one theory argues that human hunting caused the extinctions. At this point, there is not enough evidence about the timing of the extinctions in relation to the timing of human settlement to prove or disprove this theory (Barnosky et al. 2004). It is possible that human hunting was implicated in the extinctions in some places but not in others. For example, megafauna in Tasmania appear to have gone extinct before humans arrived. At some Australian sites, however, evidence of overlap between modern humans and now-extinct megafauna points to a possible human impact (Field et al. 2001).

As in Sunda, the archaeological evidence associated with modern humans in Sahul is mixed. Crude stone tools are found along with bone tools, art, and burials. Lake Mungo has yielded the earliest evidence of ritual cremation and the application of pigment to corpses. Modern humans in Sahul were prolific artists. A rock painting dated to about 25,000 years ago at the site of Laura, northern Australia, is as old as many of the world-famous Paleolithic cave paintings of Europe. Prehistoric art in Sunda is found in a variety of forms. At Koonalda, linear engravings were made by applying finger pressure on soft clayey walls. At the Early Man Shelter, schematic designs were painted and engraved on large stone panels. Naturalistic representations are found at caves sites in Tasmania such as Kutikina.

Today, many Aboriginal Australian groups are reaffirming their connections to these artistic sites, some of which have become important tourist destinations and archaeological research sites. A recent conflict that erupted over a gallery of cave painting in the Kimberley region involved a museum anthropologist (see the Lessons Applied box on p. 238).
Helping to Resolve Conflicts about Repainting Australian Indigenous Cave Art

NEWSPAPER HEADLINES across Australia announced “Ancient Rock Defaced” (Bowdler 1988). The rock art in question was paintings on the walls of rock shelters in the Kimberley area, in northwest Australia. The accused defacers were Aboriginal people of the region. The case was first raised by a White Australian rancher who owns property on which the paintings are located. Other elements add to the complexity of this case. The repainting was done with funding from an Australian Commonwealth agency under a program called the Commonwealth Employment Programme. The statutory authority responsible for the sites is the Aboriginal Sites Department of the Western Australian Museum.

One of the major issues underlying the accusations was whether “defacement” or “desecration” of “age-old” paintings had occurred. Another concerned whose heritage was involved—that of the Aboriginal people or “humanity” more widely. Archaeologists from the museum became involved in trying to address these questions.

The Kimberley region is noted for its rich rock art. Of the many examples of art in the area, the most famous are the Wandjina, large anthropomorphic figures, round-eyed and mouthless, with radiating headaddresses. The term Wandjina refers to ancestral spirits who control the weather. A series of myths about the Wandjina are part of the living tradition of the Wanang Ngari people of Kimberley. Ethnographic research from the first half of the twentieth century documents that, on certain occasions, some individuals had the right and obligation to repaint the figures. Aboriginal elders retain the knowledge about appropriate forms of repainting, which can include the addition of new motifs. Repainting often involves superimposition (painting over) and even obliteration of older motifs.

The Wanang Ngari people say that they inherited the Wandjina paintings from the spirits themselves. Archaeological evidence indicates that the paintings date from some time earlier than 3000 years ago. They have been continuously repainted since then.

The Commonwealth Employment Programme initiated a repainting project to train Wanang Ngari youth to continue the repainting process and to participate in other projects such as the recording of oral histories and conservation of the site. Part of the impetus for the project was from older Aborigines who thought the younger people were losing touch with their traditional heritage. Young people of both genders were involved and received training from a technical specialist associated with a museum and from a group of elders.

In June 1987, a White Australian rancher lodged a complaint about “desecration” and “irreparable damage” to “age-old” paintings. The complaint noted that the paintings had been “trivialized” by the addition of inappropriate graffiti and

LESSONS APPLIED

Europe

The arrival of modern humans in Europe marks the beginning of a period of rapidly increasing cultural complexity that is often referred to as a cultural revolution or “Golden Age” (Roebroeks et al. 2000, Bar-Yosef 2002a). Cultural changes during the European Upper Paleolithic include increased economic specialization, more complex social relations, technological innovations, probable verbal language, and a leap forward in symbolic thinking.

When modern humans arrived in Europe, the Neanderthals had already been living there for many thousands of years, although their population was sparse and scattered (Huvelin 1998). The transitional phase, during which Neanderthals and modern humans both occupied the same region, lasted 10,000 years or less, depending on the location. The most recent evidence for Neanderthals comes from sites such as St. Césaire in France, Zafarraya in Spain, and Vindija in Croatia, all dated to just less than 30,000 years ago. As noted earlier, anthropologists disagree on several issues related to the Neanderthals, including why they died out, whether they contributed to the modern human line, and how advanced their culture was (see the Critical Thinking box on p. 240).

During the European Upper Paleolithic, a more varied diet among modern humans is evident at many sites (Richards et al. 2001). Compared to the Neanderthal populations, who obtained most of their protein from large animals such as deer, modern

THINKING


What is Hublin’s position in the debate about Neanderthal extinction or continuity?
that including young people of both genders was an offense to “traditional Aboriginal culture.” As a result of this letter, the grant was suspended with no discussion with the Aboriginal people involved.

The Museum's Department of Aboriginal Sites decided to investigate the case. An anthropologist consulted with all individuals whose views were relevant. The conclusions were the following: There was no evidence of desecration, because repainting is a traditional practice. There is evidence that women have traditionally been involved in repainting. With regard to the presence of young people, an elder was always present at the site during the repainting. In sum, the complaint lacked substance.

In spite of these findings, this case did not have a happy conclusion. The Wanang Ngari returned the money to the Commonwealth Employment Programme. They explained that they felt “abused” and that decisions about their site should not have been made by outsiders, including the anthropologist.

**FOOD FOR THOUGHT**
- What difference might it have made if the anthropologist that the department sent to investigate had been a member of the indigenous people of the Kimberley region?

Humans ate significant amounts of birds, small game such as hares, and aquatic animals such as fish and mollusks (Stiner et al. 2000). This pattern of wider diversity in food items is referred to as a **broad-spectrum diet**. Archaeologists think it emerged in the Upper Paleolithic as a response to increased population density. At several sites, however, especially in southwestern France during a time called the Magdalenian period (discussed below), modern humans ate mainly one animal species: reindeer (Grayson et al. 2001). To explain this pattern, archaeologists propose that, in response to climate changes that promoted the increase of reindeer in the region, modern humans had developed more effective ways of capturing reindeer. The fact that modern humans had dietary breadth in some regions and relied on a single species in others suggests flexible economic strategies.

If sophisticated blade technology is used as an indication of modernity, the first evidence of modern humans in Europe comes from sites in Central Europe, around 40,000 years ago. By around 36,000 years ago, modern humans reached Western Europe. Archaeologists first discovered fossil evidence for modern humans at Cro-Magnon, a rock shelter site in Les Eyzies, France. This site provides the type name for the first modern humans in Europe, the **Cro-Magnon** people.

For several thousands of years after the arrival of modern humans in Europe, the archaeological record displays a complex array of tool assemblages that have been
Unfair to Neanderthals?

Paleoanthropologists have been conducting research on Neanderthals since the mid-1800s, and for most of that time the interpretation of Neanderthals has been that they are distinctly subhuman and definitely not a direct part of our human ancestry. The consensus about Neanderthals has its roots in the work of prominent experts. They contrast the Neanderthals’ archaeological record, called the Mousterian, with that of the later archaeological period, called the Aurignacian, that replaced the Mousterian in Europe and Central Asia. They point to the presence in the Aurignacian of art (the application of imagination, skill, and style to matter, movement, and sound in a manner that goes beyond the purely utilitarian) and to a complex tool inventory that includes fine, specialized artifacts such as carved bone needles. They assert that the Mousterian tool inventory is markedly more limited and that almost no art is associated with the Neanderthals. Finally, although they credit Neanderthals with some minimal language ability (vowels but not consonants), they believe that the full complexity of verbal language came later with modern human language.

In sum, they see the culture of the Aurignacian people as sophisticated and that of the Neanderthals as unsophisticated. On these grounds, they argue for a wide and deep gulf between the culture and mind of the so-called “ancients” of the Mousterian and the “moderns” of the Aurignacian (Mellars 1996).

Other researchers come to different conclusions. Some argue that the contrasts between the two periods have been exaggerated. They point out that there is evidence of “advanced” behavior and culture at many Neanderthal sites, especially later ones. At a site in Gibraltar, Neanderthals exploited marine resources, an economic strategy usually associated with modernity (Stringer 2002). At Arcy-sur-Cure, France, Neanderthals are found with Aurignacian-like personal ornaments (Hublin et al. 1996). Some Neanderthals carved bone and ivory with designs that appear to have symbolic content. Variation in modern humans’ Aurignacian technology, these anthropologists point out, should also be taken into account. Many modern human sites lack key features of modernity, such as fine bone tools, thus bringing them closer to the Neanderthals in cultural evolution (Clark 2002).

Others say that if the criteria used to reject the Neanderthals as modern were applied to some contemporary modern human populations, they might not qualify. For example, how would the Turkana people of Northern Kenya fare? The Turkana make an adequate, though basic, livelihood around the shores of Lake Turkana. They fish, hunt crocodiles, and herd goats. The environment is harsh: temperatures are high and relieved only by a strong wind. The lake water is not drinkable, and people have to get fresh water by digging water holes. Infectious diseases are common. The Turkana have no art in the sense that the term is used when Neanderthals are found lacking, and the stone tools they make conform to relatively simple designs. The Turkana, however, are undoubtedly modern humans.

Thus the criteria used to dismiss the Neanderthals as modern may also be inappropriate, biased, and even unfair. The Neanderthals survived for tens of thousands of years in cold and harsh environments, in conditions that would be challenging to most humans living today. Their ability to do so was the result of sophisticated biological and cultural adaptations.

Critical Thinking Questions

■ What criteria should be used to determine whether populations are modern?
■ How important was the physical environment in shaping early modern human culture?
■ Think of characteristics of cultural modernity that Neanderthals might have possessed but that might not appear in the fossil record.

given several stylistic names (see Figure 8.5). This rapid and regionally varied diversification in tool styles is probably related to the introduction of the blade, from which many varieties of tools can be crafted. The early part of the Upper Paleolithic associated with modern humans in Europe, beginning around 40,000 years ago, is referred to as the Aurignacian period. Aurignacian stone tools, made using blades as blanks, included scrapers and burins (a burin is a chisel-like stone tool used to make other tools from wood or bone). Aurignacian tools have a distinctive style of retouching around the edges. Another characteristic aspect of the Aurignacian period is the increased use of bone for tools including points and awls. Most archaeologists agree that Aurignacian tools were produced solely by modern humans.
The Gravettian period, beginning around 28,000 years ago, is characterized by small, narrow, stone blades sometimes with tanged (pronged) points. The Gravettian stone tool tradition was centered in France and Germany, but it extended eastward into Central Europe and parts of Russia and southward into Italy and Spain. An important site in Central Europe is Dolni Věstonice, in the Czech Republic, dated at 26,000 years ago. A distinctive feature of this site is the numerous small female figurines made of terracotta (baked clay), many of which were intentionally placed in the hottest part of the fire and thus cracked during the process. No one knows the purpose of such intentional breakage. During the Gravettian period, modern humans made tools made of material other than stone and bone, including perishable nets woven from plant fiber probably used to capture hares, foxes, and other small mammals (Soffer et al. 2001). By extension, these people’s ability to knot fibers into nets for capturing small animals may mean they were also able to weave larger nets and trap bigger animals.

The third phase of the European Upper Paleolithic is the Solutrean period, found mainly in France and Spain and beginning around 21,000 years ago. It is characterized by finely made, leaf-shaped stone points. While many of these delicate points were used for hunting, some may have been objects of beauty and exchange.

The fourth major cultural phase of the European Upper Paleolithic, beginning around 18,000 years ago, is the Magdalenian period. During this time, there is a major development of composite, hafted stone tools, harpoons made from bone and antler, borers, and fine bone needles and beads. Some German and Russian sites offer evidence of domesticated dogs, with the earliest evidence for this innovation from sites in Russia (Vilà et al. 1997). The first domesticated dogs were probably used for hunting.

During the Upper Paleolithic, two main categories of art appear and become widespread (Bahn and Vertut 1997). The first is portable art—small, movable objects that are engraved or sculpted. Portable art includes sculptures of animals, humans, and creatures that are part animal and part human, such as a standing lion–man figure from Germany. A tradition of sculpting small female figurines begins in the Aurignacian period and is prominent during the Gravettian phase. These statues, of which

![Upper Paleolithic sites in Europe mentioned in this chapter.](image-url)
the earliest date to 30,000 years ago, are found across Europe, from the Pyrenees mountains in southern France to as far east as Siberia (Nelson 1997). Nearly 200 statues have been found so far, ranging from those that are quite realistic to those that are so abstract that they are difficult to identify as human figures. Most theories about who made these statues and their use suggest a possible connection to fertility magic or rituals, because many have exaggerated breasts and enlarged abdomens. If so, it is still not known whether the statues were more important to women or to men or both. More imaginative theories propose that the statues were the first erotic art made by men, or were self-portraits of women, possibly even pregnant women.

The second type of art is cave art, which includes painting and engraving on cave walls. Painting is the main form of cave art in Upper Paleolithic Europe. The oldest examples of cave painting are found deep in caves at Chauvet and Cosquer, southern France. The paintings depict horses, bears, and other large mammals. They were created between 32,000 and 27,000 years ago (Clottes 2000). Somewhat later, the region of southern France and northern Spain was home to a sophisticated cave art tradition, especially during the Magdalenian period (Clottes 2001). The major subjects painted were large mammals, such as mammoths and bison. The important cave art sites of this era include Lascaux, painted between 15,000 and 10,000 years ago, and Altamira, painted between 16,000 and 11,000 years ago.

Archaeologists have proposed many theories to explain why Upper Paleolithic people created these cave paintings and what the images and motifs meant. One of the earliest theories proposed is that the drawings were imitative magic, in which a likeness of something has a connection to the real object. For example, if a person drew an arrow shooting a painted image of a bison, this artistic act would magically ensure that a real arrow during a hunt would strike its real target. Another functional interpretation says that the paintings marked places of community ritual. However, many of the painted areas are difficult to reach and too small to allow many people to congregate, so this explanation cannot apply to all cave paintings.

Other interpretations attempt to find social meanings in the images and symbols. For example, wide or rounded designs might symbolize females while long or pointed designs might symbolize males. Most contemporary anthropologists consider such a view too simplistic. More fruitful directions of interpretation might come from considering why European cave art does not include recognizable images of human females, whereas they do include figures that appear to be human males.

Another interpretation is that the functions and meanings of the images may have changed over time. Thus it would be wrong to attribute one single meaning or function to all of them. Like the Australian rock paintings mentioned earlier, many European cave paintings were overpainted several times, over many thousands of years.

Central Asia and Siberia

Survival in cold and barren areas requires cultural innovations such as long-term planning for food security and shelter and clothing (Davis and Ranov 1999). The modern humans who settled in these regions did not have a morphology adapted to extreme cold as the Neanderthals did (Hoffecker 2002). Thus modern culture, not biology, must have been the adaptive mechanism that made modern human occupation of cold regions possible. The lack of plant food and the scarcity of wood and other fuel sources were additional challenges (Rhode et al. 2003).

At the time of modern human migrations into Europe and Western Asia, Neanderthals may still have been there, so some overlap between the two populations may have occurred. Several Siberian sites provide archaeological evidence of a transition from the Middle to the Upper Paleolithic, with mixed assemblages of bifacial stone points, stone blades, and bone tools (Pavlov et al. 2001).
Evidence for modern human occupation in southern Siberia is followed by evidence for modern human settlement farther north, within the Arctic Circle, by 27,000 years ago (Pitulko et al. 2004). Between 17,000 and 11,000 years ago, there is evidence of long-term occupation by modern humans in this cold and harsh environment. Tools at Arctic Circle sites include microliths and microblades (Goebel 1999). Adaptations included the ability to hunt large animals, such as mammoths. During this period, the so-called mammoth steppe extended across Eurasia into the New World. Most anthropologists agree that modern humans migrated into the New World from Siberia, on foot, through the paleoregion of Beringia, the land bridge that linked Asia with the New World at that time. It is possible that modern humans followed migrating herds of mammoths from the Old World to the New.

**Migrations into the New World**

The fossil and archaeological evidence from Siberia establishes that modern humans were in position to migrate into present-day Alaska and then the Americas as early as 30,000 years ago. Early Siberian–Alaska peoples had similar toolkits dominated by microblades, which are used as insets on points, producing a hunting weapon that is both strong and lethal (Elston and Brantingham 2002). An innovation of Alaskan people, in contrast to Siberian peoples, is the exploitation of sea mammals and fish.

How did these people make their way from Alaska into the rest of the New World? The most widely accepted scenario of settlement of the Americas says that from Beringia, they migrated south through the ice-free corridor in Alaska and western Canada. People populated all of North, Central, and South America in quite a brief time period. This scenario makes sense because people in Siberia were always on the move, and, logically, they would follow bison herds east into Alaska and then down through the ice-free corridor.
Anthropologists may have overlooked an important Upper Paleolithic fuel source by concentrating on the fuels we now use to keep warm and cook food. Consider this scenario: You are living in a mammoth-bone house, near herds of megafauna. Trees are few and far between. What can you use for fuel? If you are stumped, go to the Internet and find an article by David Rhode and others entitled “Human Occupation in the Beringian ‘Mammoth Steppe’: Starved for Fuel, or Dung-Burner’s Paradise?”

An example of a Clovis point. Do research on the Internet to learn about a museum exhibit in which you would be able to learn about Clovis culture. (Source: © Jacka Photography)

Most of the archaeological evidence indicates that the first settlers arrived in the New World sometime after 17,000 years ago. The major body of archaeological evidence about the first modern humans in the New World is that of the Clovis culture, characterized by the Clovis point (Haynes 2002). First discovered in New Mexico, a Clovis point is distinct in that it is bifacial and fluted, meaning that it has a long, vertical flake chipped from its base. This kind of fluting is found only in the New World. The oldest Clovis sites are dated to slightly before 11,000 years ago, and shortly thereafter there is evidence of Clovis people and their fluted points over most of the unglaciated regions of North America. So far, around 12,000 fluted points have been found, some of them in caches (intentionally placed clusters) far from the source of the stone.

Clovis people made similar artifacts and left similar settlement patterns all across the continent (Haynes 2002). The consistency of Clovis culture across such a wide area is an indication of social interactions among the regional groups. It is likely that the Clovis people had a flexible gender division of labor in which both men and women gathered and hunted, including joint participation in the communal hunting of megamammals.

In contrast to its wide range, Clovis culture lasted only a short while. No one has a good explanation for the sudden rise, rapid spread, and sudden demise of Clovis culture. Another mystery about the Clovis people is their possible relationships with megafaunal extinctions and changes in the natural environment. Perhaps their success as hunters contributed to the extinction of megafauna such as mammoths and saber-tooth tigers. Or they may have been altering the environment in ways that indirectly led to megafauna extinction, such as using fire to clear brush to enhance hunting and preferentially cutting certain kinds of trees for bows (Haynes 2002:270ff).

For a long time, archaeologists accepted Clovis sites as the earliest human sites in the New World. Recently, however, several claims for pre-Clovis sites have been made. In North America, they include Meadowcroft, Pennsylvania; Cactus Hill, Virginia; and Topper, South Carolina. In South America, they include Taima-Taima, Venezuela; Pedra Furada, Brazil; and Monte Verde, Chile. Most are problematic because of imprecise and unreliable dating and stratigraphic disturbance. In North America, Meadowcroft is the strongest contender as a pre-Clovis site. Monte Verde, in South America, has established pre-Clovis dates.

The rock shelter site of Meadowcroft, in southwest Pennsylvania, has been excavated over many years (Adovasio and Page 2002). Radiocarbon dates provided by the Smithsonian Institution indicate that it was inhabited by modern humans at least 14,000 years ago. Fragments of a basket, if the dating is verified, would push that date back to around 20,000 years ago, making Meadowcroft the oldest human site in the United States. Meadowcroft thus poses a strong challenge to the Clovis First theory that the Clovis people were the first inhabitants of the New World.

Monte Verde is the most convincing pre-Clovis site in the New World. It suggests a human presence in South America 12,500 years ago and thus also poses a conflict with the Clovis First theory (Dillehay 2000). Located in Chile between the Pacific coast and the Andean highlands, Monte Verde was an open-air site near a river, and the boggy conditions promoted excellent preservation of a wide range of remains. Even the cords used to tie hides to poles have been preserved, as have the remains of a dwelling which may have housed 20 to 30 people. The people at Monte Verde used stone tools, including unifacial and bifacial stone points, and bone tools. Cooking pits, mortars, and grinding stones have also been recovered, as well as spilled seeds, nuts, and berries. In one location, what appear to be medicinal herbs have been found. Monte Verde was occupied year-round and thus is the earliest known site of semi-permanent (or semisedentary) occupation in the New World.

Ongoing research elsewhere in South America is providing evidence of other possible pre-Clovis sites (Scheinsohn 2003). If, as Monte Verde and other sites indicate, South America was settled 12,500 years ago, and if settlers came to the Americas via Beringia as is generally assumed to be the case, then the occupation of North America must have taken place several thousand years earlier.
Another problem with the Clovis First model is that many of the important Clovis sites are in the eastern part of the United States and Canada. How, researchers ask, if Clovis people came from the northwest, can one explain this pattern? An archaeologist and a biologist have proposed that circumpolar navigation along the north Atlantic ice cap brought Solutrean groups from Spain to the North American eastern seaboard (Stanford and Bradley 2002). They point to similarities in Solutrean and Clovis toolkits as supporting an “Iberian” rather than a “Siberian” source for modern human settlement of North America. This theory, though intriguing, is not widely accepted. Most archaeologists do not see a strong similarity between Clovis and Solutrean tools.

It is likely there were several migrant streams of modern humans into the New World. Different groups arrived and settled over different periods and each made its own contribution to the genetic and cultural diversity of New World populations. No matter when, where, and how modern humans arrived in the New World, they spread rapidly over a diverse range of environments.

The modern human populations in the New World were generalized foragers, exploiting a wide range of food that included plant materials, animals, and marine sources. As in Australia, extinctions of megafauna occurred around the time of human occupation, suggesting overhunting by humans. A lack of conclusive evidence about the possible human role in the extinctions means that this issue is still unresolved. Humans may have played an important role directly through hunting, indirectly through habitat alterations, or through a combination of these activities (McKee 2003). Such anthropogenic effects may have co-occurred with environmental changes during this period.
TRANSITIONS DURING THE HOLOCENE ERA

During the later phases at many LSA/UP sites, people began to move beyond foraging toward food production, an economic strategy in which people manage or control plants and animals in order to enhance the supply of these food sources. These first stages of food production became more marked during the Holocene era, a period of time beginning about 12,000 years ago, after the last glacial period ended (review Figure 6.2, p. 178). In Europe, this period is termed the Mesolithic, and it is characterized by the increasing importance and variety of microlithic stone and bone tools, a broad-spectrum diet, and a semisedentary (partially settled) life. Foraging is combined with food production techniques including the harvesting of wild foods with more efficient tools, the managing of animal herds, and new forms of plant food processing such as grinding and roasting.

In spite of all these important changes, this period is sometimes described as the Dark Age of prehistory because the artistic activity of the Upper Paleolithic declines markedly. No one is certain why the decline of both portable art and cave art occurred.

After the end of the last glaciation, environmental conditions changed dramatically worldwide. The massive glaciers melted and retreated in response to a warming trend. Land masses gained elevation as a result of being freed from the weight of the ice. Swelled with increased water from the melted glaciers, ocean and sea levels rose, submerging coastal and low-lying areas and reducing the land available for human and animal occupation. For example, what is now the Persian Gulf was above sea level before the glaciers melted and would have been a favored environment for humans, animals, plants, and riverine life (Tudge 1998:36). Paleogeographer Juris Zarins proposes that the flooding of the Persian Gulf and subsequent events underpin the biblical story of the Garden of Eden and its demise (Hamblin 1987). Other environmental changes included the growth of dense forests as a result of increasing moisture.

Old World Transitions

This section discusses examples of the earliest transition to managing wild plants and animals by people at the beginning of the Holocene era. It starts with the Levant region where the oldest archaeological evidence for food production has been found.

Eurasia: First Steps toward Managing Wild Foods

For about 5000 years following the end of the Magdalenian period, Eurasia provides many examples of transitions in food-providing strategies, social organization, shelter, treatment of the dead, and artistic expression. Climatic changes and increasing human populations probably both contributed to the extinction of megafauna. People began to turn to alternative food sources. At the same time, new food sources became available as changes in water temperatures led to increased marine resources such as fish and shellfish.

Natufian culture is the primary example of the Mesolithic transition (Bar-Yosef 2002b). Termed complex foragers, the Natufians are known from many Levantine sites, such as Shubakh Cave, El-Wad Cave, and El-Wad Terrace. Natufian culture emerged around 15,000 BCE and constitutes a major turning point in human prehistory because it provides the earliest signs of food production. Natufian sites range in size from small base camps to villages. The villages contain dwelling structures, stone tool industries including new tool types of picks and sickles, animal bone tools, and stone grinding tools. Graves are found in all the larger settlements. They often contain more than one individual and thus provide the first evidence of cemeteries (formalized group burials). Several burials with the skull removed have been found.
and many skeletons are decorated with shells, bones, and animal tooth pendants. This evidence indicates a social pattern of treatment of the dead, perhaps involving beliefs about an afterlife or supernatural realm.

At this time, the Levant was rich in plant species but not in maritime resources. The seasons would have been marked by alternating dry and cold periods, inflicting considerable stress on humans. One way of dealing with such environmental stress is the adoption of partial sedentariness, or semi-permanent residence in one place, with more substantial dwellings. Deliberate management of plant and animal food resources would have supported a sedentary lifestyle by providing more dependable, local food sources. Microscopic studies of the edges of Natufian sickles show that they were used to harvest wild cereals. The use of a sickle increases the yield of seeds from grain plants. Natufian people used large stone mortars to grind wild grains—the first evidence of cereal processing.

In the Zagros mountains in the northern Levant region, Mesolithic people began to manage animal populations through selective hunting practices (Zeder and Hesse 2000). Selective killing of adult male gazelles indicates that people were deliberately removing nonreproductive members of the herd to ensure that herd size and survival would not be jeopardized.

Beyond the Levant, in northwestern Europe, hazelnuts were one of the most important new food resources of the Mesolithic. With the warmer and moister conditions of the Holocene, dense woodlands with heavy concentrations of hazelnut trees emerged. Staosnaig, on the Isle of Colonsay, Scotland, provides evidence of the central role of hazelnuts in people’s diets (Mithen et al. 2001). Charring indicates that Mesolithic people roasted the hazelnuts. Similar to changes in the Levant, people had devised new forms of food processing that allowed for consumption of new kinds of plant foods.

Expressive culture and art were not entirely absent, as evidenced by many examples of rock paintings and engravings. The first form of monumental stone sculpture was created during the Mesolithic. Lepenski Vir, Serbia, is a site of complex foragers with a unique tradition of stone sculpture. Located on the banks of the Danube River, Lepenski Vir is now completely submerged because of a dam construction project. Around 8000 years ago, and for about 600 years, a cultural mosaic existed: a foraging economy combined with permanent settlement and monumental art—that is, large-scale, permanent art works (Srejović 1972). People at Lepenski Vir occupied a flat area by the river, living in trapezoidal huts that faced the river (see Figure 8.6 on p. 248). The huts had stone-paved floors and hearths with spits (devices for elevating food to be cooked above the fire), probably for grilling fish caught in the Danube. The monumental art consists of small boulders carved to look like fish-human heads. These sculpted boulders are usually found within the domestic structures and may have been memorials to an ancestor or representations of a fish-type deity.
Africa: Flexible Adaptations to Varied Environments

During the early Holocene in Africa, environmental conditions across the continent generally became drier and cooler. At least two patterns of adaptation to these changes emerged. In drier areas, people became more mobile in order to follow herds of large animals. In wetter areas, people became more sedentary, concentrating on plant and marine resources.

Many people migrated to areas with more dependable water and food supplies, such as the Nile River valley, where population density increased and settlements became more permanent (Kusimba 1999). From 10,000 to 7000 years ago, people across tropical Africa, from Senegal to Kenya, clustered near rivers and lake resources. The general term for people whose lives revolved around lakes and rivers is aqualithic. Aqualithic cultures are associated with bone harpoons, pottery (low-fired clay) vessels, and a diet of porridge (cooked wild grains) and fish stew (Sutton 1977).

Major population movements continued to occur throughout Africa during the late Holocene. Anthropologists use a variety of methods in their attempt to reconstruct such population movements and the changing regional distributions of various ethnic groups in order to provide insights into human cultural evolution during this era.
The phenomenon known as the *Bantu expansion* is the single most important factor that shaped the configuration of late prehistoric societies living in Africa south of the equator during the last 5000 years (Afolayan 2000). Today, Bantu culture provides a shared socioeconomic and linguistic context for over 100 million people in Africa.

The classic view of the Bantu expansion is that it involved a large population movement that encompassed most of sub-Saharan Africa. Because Bantu speakers were farmers and had advanced technology, archaeologists long assumed that they displaced Later Stone Age foragers and colonized their territory. New linguistic and archaeological data support a different and more complex view. According to this new perspective, although migrating Bantu people may have sometimes displaced the indigenous foragers, in other cases there were significant forager–farmer interactions and cultural interchange.

Linguistic anthropologists can trace some of the changes involved. Over 600 contemporary African languages are derived from an ancestral language called *proto-Bantu*, which means that the speakers of those 600 languages were once related and shared a common cultural ancestry. All languages are constantly changing, and the separation
and differentiation from a mother language is often affected by borrowing from other languages. By taking a set of related words and examining them within a known period, it is possible to calculate the fraction that have retained their original form and meaning and the fraction that have changed. This rate of divergence serves as a clock with which to estimate how much time has passed since the languages diverged from the mother language. Historical linguists call this method *glottochronology*. The formal analysis of *sound shift* is one aspect of glottochronology (Ehret 1998). According to this principle, changes in languages, such as from a *b* sound to a *p* sound in a word, occur in regular ways, following sound shift rules.

There are 2000 common linguistic roots in 28 zones of equatorial Africa, and from this information it is possible to trace 455 roots of proto-Bantu, aspects that all Bantu languages once shared (Guthrie 1967–1972). This core can still be found in the languages spoken by people in Cameroon and Nigeria, such as the Tiv, Efik, EkoI, and Duala. Thus, this region is presumed to be the homeland of proto-Bantu. Glottochronology indicates that 5000 years ago, Bantu culture began to spread east of this homeland. Around 2000 years ago, continued Bantu expansion went in two directions: a western branch moved along the Atlantic coast, and another moved eastward and then southward through the Great African Rift Valley.

The archaeological evidence, however, does not match the narrative from glottochronology. Linguistic and archaeological data sometimes provide complementary, and sometimes contradictory, evidence about human cultural evolution. Changes in material culture studied by archaeologists are not as easily traced as linguistic changes. Technologies may remain unchanged for centuries, while language changes more rapidly. Furthermore, archaeologists and linguistic anthropologists measure time differently. Thus absolute ages obtained through $^{14}\text{C}$ testing often do not correspond with estimates from glottochronology. Archaeologists say it is possible that the Bantu expansion was simply an imported cultural package, without much actual Bantu population migration or genetic contribution.

**FOOD FOR THOUGHT**

- Consider a case where a language expands its territory without actual migration of its original speakers. What are the political and social consequences of such expansion?

Several North African sites exhibit an intensified pattern of wild plant collection and use. At Nabta Playa, in southern Egypt near Sudan, foragers as early as 8000 years ago collected a wide variety of wild plants, including millet, sorghum, legumes, tubers, and nuts. Some North African sites contain grinding stones used to process wild grains, and some have ceramic vessels.

**The Pacific Region: Landscape Management**

In what is now Papua New Guinea, by 9000 years ago, highland foraging groups manipulated important food species through selective digging, replanting, and relocation of plant species across the landscape (Latinis 2000, Denham et al. 2003). Some highland staples today, such as *taro* (a starchy root crop), originated in the lowlands and were transferred to the highlands during the Holocene. These initial steps toward food production supplemented generalized foraging.

In Australia, for thousands of years, foragers used fire to burn off dry vegetation, keep pathways open, and encourage the growth of favored food items such as seed-bearing grasses, yams, and cycads (plants in between ferns and palms). In this way, they created and maintained culturally modified landscapes in which specific plant species would thrive with human assistance (Hallam 1989). Such management practices improved the amount and quality of plant resources. Holocene foragers in Australia also began to concentrate on parts of the landscape where yams naturally
clustered. In such places, they extracted the tubers and then placed part of the reproductive tissue back into the ground. Regular revisiting of the same gathering grounds became part of a schedule of seasonal rounds for collecting food.

**New World Transitions**

Plant resources, like other organic remains, are extremely difficult to find in the archaeological record. In the New World as in the Old, evidence of plants as food resources, and of their use in making tools such as nets and baskets, increases. Given its environmental distinctiveness and separate evolution for many thousands of years, the New World offered some unique resources for modern humans.

Pine nuts (or pinyon), for example, played an important role in the emergence of settled life in the southeastern area of the United States in a region called the Great Basin (Zeanah 2002). The Great Basin covers the state of Nevada and extends into southern California, western Utah, and southern Oregon. Just as hazelnut trees proliferated in Europe, Holocene conditions in the New World led to the spread of pinyon woodlands. At the site of Danger Cave, on the border between Nevada and Utah, hulled pinyon nuts have been recovered that date to 6700 years ago. Small but nutritious, pinyons store well. They thus provided winter food and encouraged permanent settlements. Their widespread use also implies the development of food-processing tools to hull the nuts. Stone grinding tools are found at several base camps, while more mobile groups probably used wooden grinding tools.

The Andean region of South America offers insights about the transition to the management of animal herds (Aldenderfer 2002). Findings from three sites in southern Peru indicate that the transition from foraging to managing llama herds around 4500 years ago took place within just a few hundred years. During this short time, people's mobile foraging patterns changed to a semisedentary lifestyle. The rapidity of the transformation suggests that llama management practices were imported from elsewhere, rather than independently invented, reflecting the existence of extensive and strong regional social networks.

Throughout the Old and New Worlds, the changes during the Holocene foreshadow what comes next in the evolution of humanity. Instead of reacting and responding to environmental conditions and the varying availability of certain food sources, humans began to shape their environment and attempt to control and manage food sources. At the same time, social groups increased in size, and expressive culture became more important in establishing and maintaining connections between humans and nature, between humans and other humans, and between humans and the supernatural world.
THE BIG QUESTIONS REVISITED

WHAT are the origins of modern humans?

Anatomically modern humans, or Homo sapiens, differ morphologically and culturally from archaic Homo in several ways. Their crania are shaped differently, and their bodies are smaller and less robust. Culturally, they are distinguished by greater emphasis on blade technology, in their early stages, and later by an increasing trend toward microlithic technology. Two opposing models for the origin of modern humans, the Multiregional Model and the Recent African Replacement Model, differ in their view about when and where modern humans originated. A third perspective, the Diffusion Wave Model, incorporates some aspects of the first two models; it is the model accepted by the authors of this book. We accept evidence of modern human behavior in the form of stone blades and composite tools dated to 300,000 years ago. Other evidence of cultural modernity includes the catching of large fish, bone harpoons, the ritual use of ochre, and shell bead ornaments.

WHAT was modern human life like during the Upper Paleolithic?

The Upper Paleolithic is the period when modern humans migrated out of Africa into the rest of the Old World and then to the New World. Modern humans in Africa migrated first toward the Levant region. Later, modern humans probably followed a coastal route around India to the paleoregions of Sahul and Sunda, present-day island Southeast Asia and Australia. Modern humans occupied Sahul by 50,000 years ago, or earlier. The extinction of megafauna in Australia, starting around 40,000 years ago, may be related to anthropogenic causes. Stone toolkits in Sunda and Sahul are not modern by African standards. Other aspects of behavior, such as ritual cremation and a rich tradition of rock art, are clear markers of modernity.

Modern humans arrived in Europe around 40,000 years ago, thus overlapping with the Neanderthals, who, though sparsely distributed, continued to exist in Europe for another 10,000 years. Modern human dietary breadth increased, and population density rose. The first stone tool tradition of modern humans in Europe is the Aurignacian tradition. Archaeologists have named other regional traditions, all having type sites in France. Along with a trend toward microlithic tools of stone and bone, the European Upper Paleolithic was a time of artistic creativity, as seen in both portable art and cave art. Population movements into the cold and harsh environments to the east resulted in evidence of human occupation of Siberian sites by 36,000 years ago. Unlike the Neanderthals, modern humans lacked biological adaptations to the environment and relied on cultural innovations instead. Their technology emphasized microblades, and they hunted megafauna.

Modern human settlement of the New World is a contested topic. Most anthropologists accept that modern humans crossed over the land bridge, Beringia, quickly spread throughout the rest of the North America, and then into Central and South America. Evidence of the Clovis culture is widespread in North America, yet some sites show human occupation earlier than Clovis culture. It is likely that several waves of migrating people were involved. Megafauna extinctions in the New World following the arrival of humans suggest anthropogenic effects.

WHAT changes occurred during the Holocene era?

Throughout the Old and New Worlds, with the end of the last glacial age and the beginning of the Holocene, foraging people began to practice various forms of food production. In the Levant, people began to use new tools, such as sickles to harvest wild grain and stone mills to grind grain. These processes supported settled populations. People started to manage animal herds. In northwestern Europe, forest growth provided new food sources, particularly hazelnuts. The first evidence of monumental art comes from a mixed foraging community in Serbia, Lepenski Vir. In Africa, people responded to environmental variations across the continent by establishing settlements in water-rich areas such as the Nile River valley and around inland lakes. In the Pacific region, people began to manage forests by selectively protecting certain plants and transferring plant stocks from one region to another. In Australia, people used fire to burn off unwanted vegetation and promote the growth of favored plants. Resources important in the New World, such as pine nuts and llamas, became part of new economic strategies.
KEY CONCEPTS

anatomically modern humans (AMH), or modern humans or Homo sapiens, p. 224
art, p. 240
Aurignacian period, p. 240
blade, p. 229
broad-spectrum diet, p. 239
cave art, p. 242
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projectile point, p. 229
Recent African Replacement Model, p. 226
Solutrean period, p. 241
Upper Paleolithic, or UP, p. 234

SUGGESTED READINGS

Jean Clottes. Chauvet Cave: The Art of Earliest Times. Paul G. Bahn, trans. Salt Lake City: University of Utah Press, 2003. Chapters in this oversize volume cover the environmental context of the cave, traces of humans and animals in the cave, the cave drawings throughout several chambers, the techniques of cave art used, and a review of the animals and signs drawn. A conclusion provides an anthropological view. Over 200 color photographs are included.

Thomas Dillehay. The Settlement of the Americas: A New Prehistory. New York: Basic Books, 2000. This book focuses on efforts to determine who the first modern humans in the Americas were. It reviews dating, paleoenvironments, stone tools, and cultural and linguistic traditions from Paleoindian sites, with emphasis on South America and the site of Monte Verde, Chile.

S. Boyd Eaton, Marjorie Shostak, and Melvin Konner. The Paleolithic Prescription: A Program of Diet and Exercise and a Design for Living. New York: Harper & Row, 1988. The authors argue that modern human biology is adapted to a Paleolithic lifestyle, so our bodies today are not well suited to a Westernized, urban lifestyle and diet. According to the “Paleolithic prescription,” we should eat less fat and get more exercise.


John Mulvaney and Johan Kamminga. Prehistory of Australia. Washington, DC: Smithsonian Institution, 1999. This overview of Australian prehistory devotes over half its length to Pleistocene archaeology and the rest to findings from the Holocene.
