

The Middle Paleolithic

Spotlight on Two Sites

La Borde

In 1971 in the rolling limestone hills of southwestern France, a farmer was having a pumping station installed on his land. Figure 4.6 as the foundation was being mechanically excavated in an area of roughly 100 square meters, a large number of bones were revealed. The work was temporarily halted so that archaeologists could check these materials, salvage what they could, and excavate remaining areas. This site of La Borde has added one more piece to the Neanderthal puzzle (Jaubert et al. 1990).

The site is located on a gentle hillslope in a small sinkhole dissolved into the limestone (Fig. 4.7). Several meters of natural fill covered the remains of a Neanderthal encampment dating either to the last interglacial (OIS 5) or, more likely, to an earlier interstadial in OIS 7. The archaeological materials found within a homogeneous level 55 centimeters in thickness embedded within gravel, consisted of a rich stone and bone assemblage. Pollen samples were taken from the archaeological level and indicate that the environment at the time consisted of an open parkland of herbs and grasses, with scattered pine, juniper, and birch.

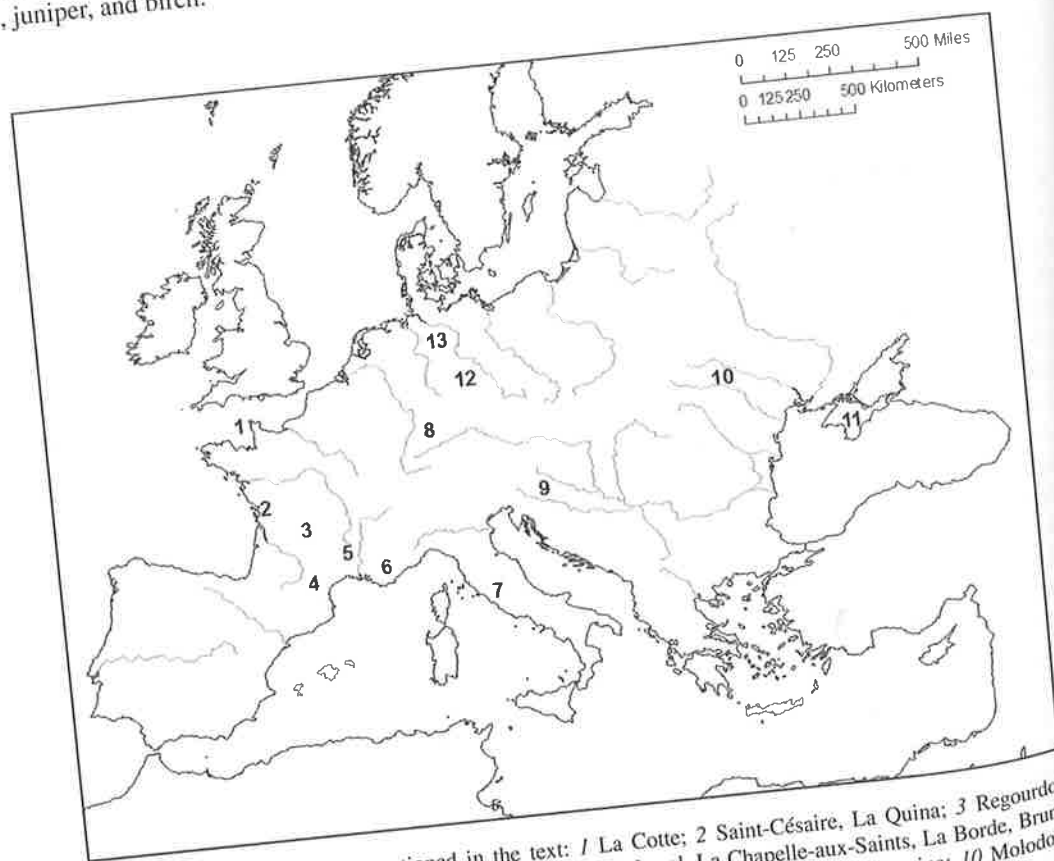


Fig. 4.6 Middle Paleolithic sites mentioned in the text: 1 La Cotte; 2 Saint-Césaire, La Quina; 3 Regourdou, La Ferrassie, Pech de l'Aze, Le Moustier, Combe-Grenal, Roc de Marsal, La Chapelle-aux-Saints, La Borde, Bruniquet; 4 Mauran; 5 Moula-Guercy; 6 La Baume Bonne; 7 Grotta Guattari; 8 Grosse Grotte; 9 Krapina; 10 Molodova; 11 Kiik-Koba, Starosel'e; 12 Königsau; 13 Salzgitter-Lebenstedt, Lehringen

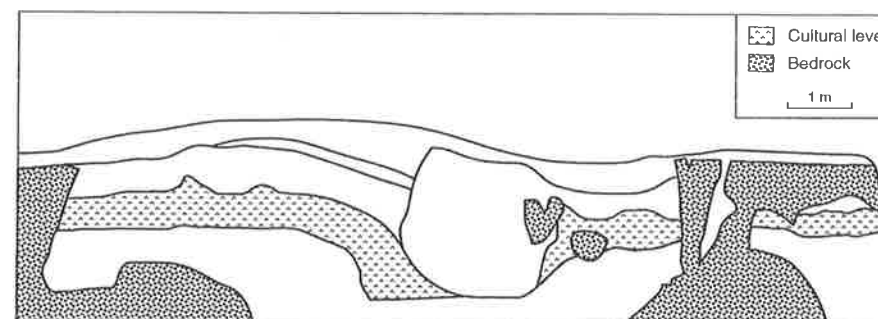


Fig. 4.7 Profile of the site of La Borde (after Jaubert et al. 1990)

Of the thousands of bones found, most could not be identified, as they were too highly fragmented. For only 440 bones could the species be identified, and these present a remarkable picture of specialization:

410	Aurochs
3	Red Deer
15	Wild Horse
2	Wild Ass
10	Wolf

Over 93% of the bones came from a single species, aurochs or wild cattle, and represent at least 40 different individuals of this species. All age groups are represented among the kills, with an emphasis on female adults and young. Study of the animals' tooth eruption and wear indicates that kills were made virtually year-round. Some of the bones are burned, and most long bones were broken open for their marrow.

Over 2,800 stone artifacts were found, the vast majority of which (96.5%) were made of quartz, which is available in the local gravel on the plateau. The remaining artifacts were made of flint and other material from sources about 50 kilometers away. The quartz was worked at the site using a simple flake technology, as witnessed by the many cores in a variety of shapes, including polyhedral, discoid, and informal. The flint appears to have been largely worked elsewhere, in part using a more elaborate technology called Levallois, and brought to the site as finished tools. The tools of both materials include a relatively large number of rather crude denticulated and notched flakes, along with various scrapers with steeper edges and coarse chopping tools.

La Borde appears to represent a location that was repeatedly visited by small groups of Neanderthals at various times of the year. They used the sinkhole as a natural trap, into which they drove wild cattle, targeting particularly the less dangerous nursery herds of females and young. This kill site served also as a short-term camp, where they butchered the prey and consumed the meat and marrow, and represents a persistent, focused part of their economy.

Salzgitter-Lebenstedt

The site of Salzgitter-Lebenstedt in northern Germany was discovered accidentally in 1952, also during construction of a pumping station. It is located on the edge of a former small pond located at the confluence of two valleys. Archaeological materials were found embedded in gravel throughout a thick level measuring about 1.5 meters, but most were vertically more concentrated in a layer of approximately 40 centimeters. The excavation of about 180 square meters followed over the next few months. Pollen evidence from the level bearing artifacts indicates that the environment of the time,

dating to early in the last glacial period, was a cool subarctic steppe-tundra with numerous herbs and grasses, and only a few pine, birch, willow, spruce, and alder trees.

Most of the numerous bones were highly fragmented, but a number could be identified to give the following picture:

72%	Reindeer
14%	Woolly Mammoth
5%	Bison
5%	Horse
2%	Woolly Rhinoceros

Plus a few remains of wolf, swan, duck, perch, and pike. The reindeer bones derive from at least 80 different individuals, the mammoth from 16, the bison from 6 to 7, the horse from 4 to 6, and the rhinoceros from at least 2. Most of these bones occur in the pond sediments and appear to have been discarded there after butchering.

At the edge of the pond were several concentrations of stone artifacts as well as a ring of large stones. The stones, which measured up to 50 centimeters in diameter, formed a circle roughly 5 meters across that may have been weights for a tent. Around 2,000 stone artifacts were found, made from flint that is abundant in the local gravel. Many of the flakes were manufactured using the Levallois technique and fashioned into scrapers and points. Other stone tools included bifacially retouched handaxes and long, linear blades. In addition, some bones were used to make tools, including one spear point and a number of mammoth ribs 60–70 centimeters long sharpened to serve as daggers or thrusting spears.

This site was both a camp and a kill location. It offered the advantages of a good view, access to game routes, and fresh water, and seems to have been visited repeatedly for seasonal hunting focused particularly on migrating reindeer and mammoth.

Middle Paleolithic Stone Tools and Technology

The most common industry of the Middle Paleolithic in Europe is called the *Mousterian*, named after the rockshelter of Le Moustier in southwestern France. It is essentially an industry based on the production, shaping, and use of flakes, although handaxes, generally smaller than those of earlier times, continue to be made. These flakes are manufactured in various ways, two of the most common being the use of disc-shaped cores and use of the Levallois technique. In the former, flakes are struck from a core from its edge, moving radially around the circumference to remove successive flakes. The end result is that cores do resemble semi-flattened oval or round discs with scars of flake removals projecting in from the edge on both faces. This is a relatively simple technique that requires little shaping of the core to allow flake removal and is applicable to both large and small stone nodules. The flakes that are produced in this way can vary considerably in size and shape.

The Levallois technique, on the other hand, is more complex. Essentially, this is a process that allows the flintknapper to predetermine the shape of flakes to a much greater degree than other techniques, but at the expense of additional work to prepare the core. Several steps are necessary to shape the nodule around its edge and to shape the broad surface to guide the force of the blow so that ultimately a flake may be removed that corresponds to the desired shape. Many such Levallois flakes are pointed and may have been used, without the need for further retouching, as spear points. Because of the extensive working of the core before flake removal, this technique requires larger stone nodules, and there is a tendency (but not exclusively so) for the Levallois technique to be most common in regions where large flint nodules are available. Many of the flakes, both Levallois and other, are further shaped by retouch, and it is these that have received the most archaeological attention (Fig. 4.8).

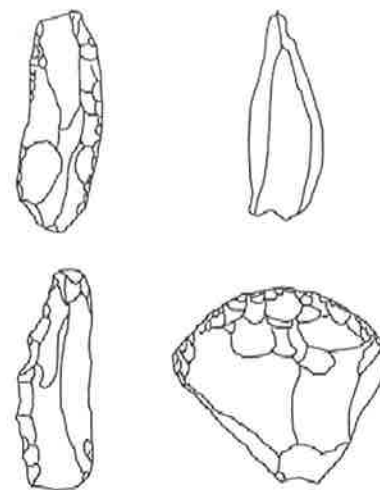


Fig. 4.8 Some Mousterian flake tools (from upper left: side-scraper on Levallois flake; naturally backed knife; denticulate; Quina side scraper)

The French archaeologist François Bordes (1961) developed an elaborate typology for the Mousterian artifacts, with 63 different types of flake tools recognized, based largely on their shape and location of retouch, with some attention to the appearance or kind of the retouch scars as well. He established large categories, such as points, side scrapers, and denticulated or notched pieces, and further subdivided these into recurring types.

One of the most intriguing and heavily debated observations he derived from this typology was that entire assemblages could also be classified on the basis of the relative proportions of the different tool types. He argued that these tools did not occur in all possible combinations of relative frequency at various sites, but rather, that there were recurring patterns in these combinations. Some assemblages are heavily dominated by denticulated and notched flakes, others by side scrapers, others by handaxes or backed knives, and still others show a roughly equal proportion of all categories. These four kinds of assemblage he called *Denticulate Mousterian* (dominated by denticulates and notches), *Charentian Mousterian* (dominated by side scrapers), *Mousterian of Acheulean Tradition* (with many handaxes or backed knives), and *Typical Mousterian* (with more or less equal proportions of all tool types). He further subdivided the Charentian Mousterian into two groups using a different set of criteria: the technique of core preparation. The *Ferrassie Mousterian* is characterized by much use of the Levallois technique, whereas the *Quina Mousterian* is not. In addition, the Quina contains a number of a particular type of side scrapers with overlapping retouch scars that resemble fish scales.

These observations are not simply a sterile, classificatory exercise because of the interpretations Bordes offered for these patterns and the ensuing debates and analyses they provoked. On the basis of presumed contemporaneity of these five different kinds of assemblage in southwestern France over thousands of years (inferred largely from correlations of the stratigraphy at different sites), Bordes argued that they represented five different social groups – or tribes – of Neanderthals (Bordes 1961, Bordes and de Sonneville-Bordes 1970). In other words, he gave social and stylistic meaning to the differences in the assemblages: different groups had different ways of making tools, cultural traditions that were conservatively passed on through the generations. If correct, this interpretation would tell us something important about the cultural capacities of Neanderthals and about the nature of their social organization.

Disagreement and alternative interpretations soon followed, and focused attention on the fact that we really understood very little about the determinants of stone tool shape or assemblage composition.

The debates continue today, but as a consequence of considerable work involving ethnoarchaeological studies of living hunter-gatherers, microscopic analysis of stone tools, experimental replication of tool manufacture and use, and analysis of stone raw material sources, archaeologists can evaluate assemblage variation in a much more informed manner.

Bordes's interpretation prompted a number of questions from other archaeologists. Is it likely that people of one social group would distinguish themselves from others largely by making and using more scrapers? Among modern people it is more common that the kinds of objects (shoes or hats, for example), rather than their amount, vary from group to group. Moreover, how probable is it that different social groups could remain distinct over such a long period in the same small region, especially given observations of modern hunter-gatherers who show considerable mobility, interaction, and flexibility across large areas? Lewis and Sally Binford, American anthropological archaeologists, not only posed such questions, but offered an alternative interpretation of the different assemblage groups (Binford and Binford 1966). In their view, the differences were more likely to have a functional meaning, rather than a social one. That is, assemblages dominated by scrapers suggest that more scraping (of hides, wood, etc.) occurred at these sites, whereas those dominated by denticulates or wood. In other words, they suggested that the Neanderthals had different functional toolkits for different activities, and that functionally different site types (winter vs. summer, base camp vs. hunting camp) would contain different mixes of these activities and their toolkits in recurring patterns. In this case, the stone tools would tell us little about the social affiliation of their makers.

The British archaeologist Paul Mellars (1969, 1970, 1988) posed a different sort of question: how certain are we that these different types of Mousterian were, indeed, contemporary? Because the stratigraphic correlations among sites upon which the assumption of contemporaneity were based are imprecise, he examined the sequence of Mousterian assemblages in multilevel sites. If different groups were contemporary over long periods in the same area, he argued, then they might occupy particular caves or rockshelters at any time, and the resulting stratigraphic sequences could differ from site to site. Instead, he found a strong tendency for particular patterns through time: the Ferrassie variant tends to be followed by the Quina at many sites, and the Quina, in turn, tends to be followed by the Mousterian of Acheulean tradition. There was, he argued, demonstrable and patterned change through time in assemblage structure, a pattern that has to be taken into account in interpretations. If correct, then one argument against the social interpretation (the unlikely long contemporaneity of five different groups) is weakened. Moreover, the more functional interpretation would have to account for the changing frequency of different toolkits through time.

Subsequent research into Mousterian variability has been prompted largely by this debate. A major focus of this research has been the function of the different stone tools, with microscopic analysis of use-wear playing an important role. Different patterns of wear and abrasion on tool edges and faces can reliably be linked to such actions as cutting or scraping of meat, hides, wood, or bone. These analyses have reached a number of conclusions that are relevant to the disputed interpretations and shed light on Neanderthal behavior. First, many of the unretouched flakes were used as tools, particularly as knives for cutting meat or hide. Consequently, any attempt to infer the activities that occurred at a site solely from the retouched tools will miss a major class of evidence. Second, different retouched tool types were used in the same activities, and many types were used for several activities: there is no one-to-one correlation between recognized tool type and specific activity (Anderson-Gerfaud 1990). As a result, the varying proportions of different types cannot be easily translated into varying proportions of different activities. Third, although archaeologists have usually assumed that retouching was done in order to shape the edge of a tool, in some cases this may not be the case. A study of Quina scrapers with the rather unique, overlapping scalar retouch suggests that it was the retouched surface, rather than the edge of the tool, that was used, in this case on mineral pigments like red ochre (Beyries and Walter 1996). Fourth, a good number of tools that have been examined show evidence that they

were hafted or attached to wooden handles with tree resins. It may well be, then, that some of the shaping done to tools was aimed, not at creating functional edges, but at facilitating their attachment.

Other work has examined the suitability of the classification system developed for the flake tools as the basis for inferring anything about function or social identity. How real are the tool types, and what do they represent? It has been long recognized that there is some ambiguity in the definition of types, so that it may be difficult, for example, to differentiate a retouched point from a convergent scraper (in which the two retouched edges converge to a point). More recently archaeologists have suggested that the purpose of retouch in many cases may have been to resharpen an edge, rather than to shape it initially (Dibble 1987, Barton 1990). If this is the case, then many of the supposedly different types may represent nothing more than different stages in the lifetime of a category of tool that undergoes progressive resharpening to prolong its use. Scrapers are the category most implicated in this interpretation, as resharpening of a cutting or scraping edge would create tools of this category. In this view, the frequency of resharpening is a major determinant of both the proportion of scrapers and the proportion of all retouched tools in an assemblage (Rolland 1990, Rolland and Dibble 1990). The frequency of resharpening, in turn, may be related to the kind and abundance of stone raw material. If high quality stone is locally scarce, then tool users may more often resort to resharpening old tools rather than making new ones, whereas if good stone is easily available, old tools may be discarded and new ones quickly made. Determinants of stone availability include both natural factors such as the distribution and accessibility of stones of differing quality and behavioral factors including the degree and extent of mobility. People who normally range over large areas may more easily find and make use of good stone sources, while more spatially restricted or seasonally sedentary people may have to make do with whatever stone is locally available and may resort more often to resharpening.

In seeking to explain the patterns of variation of stone tools and assemblages, therefore, archaeologists have increasingly turned attention to the organization of technology on the landscape (e.g. Kuhn 1991). Where and when are tools made, used, and discarded in relation to the availability of stone and other resources? Many technological decisions may have been situational, varying with the context. In some cases, resharpening an old tool may have been easier than manufacturing a new one; in other cases the reverse may have been true. The remains that archaeologists find ultimately represent the end result of a variety of activities using tools with different use-lives.

What can we say about Mousterian variability, then? First and foremost, it is unlikely that any single factor can explain differences among tools or assemblages. Second, among the important determinants of tool and assemblage appearances are

- function (a knife must be relatively sharp),
- style and cultural tradition (there were certainly different possible ways of initially fashioning a spear point),
- raw material availability (as it influenced the use of the Levallois technique and the frequency of resharpening),
- mobility (as it affected the accessibility of stone material),
- subsistence activities (gathering would require different tools from hunting),
- environment (as it influenced subsistence, mobility, and the availability of wood or other materials).

To this list one might add *time*; any of the factors mentioned above may have changed through time, and apparent differences among assemblages may result from comparisons of materials of different ages.

Outside of southwestern France, different patterns of variation are evident. In adjacent portions of France, for example, often only a single one of Bordes' Mousterian variants may dominate the archaeological record. The Charentian is found at most Middle Paleolithic sites in Charente to the east and in coastal southeastern France, while the Mousterian of Acheulean tradition dominates in

central and northern France. It is difficult to see how a strict, narrow functional interpretation could account for these distributions.

Central Europe shows the persistence of the Acheulean into the last glacial period, as well as an industry called the Micoquian, characterized by non-Levallois flake technology, many side scrapers, as well as bifacial tools and handaxes with elongated points. Assemblages similar to the Charentian Mousterian are also common in much of central and eastern Europe.

In a number of sites in northwestern Europe dating largely to early in the last glacial period, long, linear blades form an important part of assemblages alongside the predominant flake technology. Similar finds occur in parts of Russia as well. The production of blades has been normally associated with the Upper Paleolithic, when they do, indeed, constitute the dominant flake technology, but their sporadic presence indicates that we cannot explain them simply as the result of greater technological sophistication or development. As Conard (1990) argues, their production was probably situational, appearing in certain functional, raw material, and social contexts.

Another striking feature of some Middle Paleolithic assemblages is the appearance of beautifully made leaf-shaped points with bifacial, flat surface retouch. Although these artifacts occur in a variety of areas, there are particular concentrations in south and central Germany, Belgium, and perhaps England (Otte 1981). Dating to the last glacial period, they appear late in the Middle Paleolithic and are frequently associated with a moderate number of blades in addition to the more common flakes. Again, it is unlikely that a purely functional or technological explanation of their occurrence is adequate, and many authors view them largely as stylistic markers of some kind of social grouping (Keefer 1993, Otte 1981).

In summary, Middle Paleolithic stone technology was quite variable within small regions and across the continent. Flakes could be produced through a variety of techniques, some involving advanced planning. Tools could be carefully manufactured or maintained by resharpening or they could be casually made and discarded. Many technological decisions were situational: contingent upon features of the environment, the subsistence economy, and the patterns of settlement. At the same time, some stylistic factors deriving from patterns of social interaction and affiliation do seem to have played a role in stone technology as well; the leaf-shaped points may, indeed, reflect certain culture areas of the Middle Paleolithic landscape. It is probably unrealistic, however, to expect stone tools to be primarily cultural markers; their functional constraints may be so high, and their visibility so low, that they are poorly suited to this role. Whatever cultural identity was expressed may have utilized other media – clothing, body decoration, etc., – that are much less likely to have been preserved in the archaeological record.

Use of Other Materials in the Middle Paleolithic

Largely because of problems of preservation, few artifacts of materials other than stone are known. Nevertheless, it is certain that many activities entailed the use of other materials. The only wooden artifact to have survived is a spear, over 2 meters in length, with a fire-hardened tip, from the north German site of Lehringen (Thieme and Veil 1985). However, in a number of microscopic wear analyses of stone tools in France (Anderson-Gerfaud 1990, Beyries 1990), woodworking was the most common activity identified, appearing on over 70% of the artifacts examined. This was true both in southwestern France, where trees were present throughout all climatic periods, and in northern France, where trees were scarce or absent in the colder phases. The prevalence of woodworking among the wear traces may be partly due to the fact that this activity more readily creates recognizable polish and abrasions than do some other activities using softer materials, but there is no doubt that wood was an important element of Neanderthal technology. This observation, together with the evidence

for the hafting of many stone tools, indicates that the manufacture of wooden handles, among other implements, was an important endeavor. An implication of this fact is that woodworking easily dulls the edges of stone tools and would encourage frequent resharpening in some situations, thereby influencing the appearance of stone tool assemblages. In addition, wood was also important as fuel, as evidenced by numerous finds of wood charcoal in hearths.

Bone is another material that was used in technology, but the nature and extent of its use has been much debated. Several smooth polished bone points have been found, but most apparent tools were not nearly so formally shaped. Rather, bones (and antlers) seem often to have been roughly flaked (like stone) to create working ends and edges for use as scrapers, heavy-duty knives, or possible retouchers (Gaudzinsky 1999). With this sort of technology, it is difficult to distinguish intentionally worked bones from those that have been naturally fractured (Binford 1983, Freeman 1983). Bones also served as fuel for fires, particularly in the colder regions and periods.

Other materials were certainly part of Neanderthal technology, but are even more elusive in the archaeological record. Hide-working is another important activity identified through microscopic use-wear analysis, and presumably contributed to the manufacture of clothing and housing. The use of furs is suggested by the high number of skeletal remains of small furbearers in faunal assemblages. Plant products were presumably utilized, as indicated by scant traces of plant polish on some stone tools and by the necessity for some sort of adhesive to attach stone tools to their hafts. Pieces of tree resin with the imprint of stone tools have been found at the site of Königsau in Germany (Mania and Toepfer 1973). Mineral pigments, especially hematite or red ochre, were also used; abraded lumps have been found in sites, some artifacts (such as Quina scrapers) carry traces of the pigment on their faces, and even an apparent quarry for hematite has been found in Hungary (Patou-Mathis 2000). The uses of these pigments are unknown, but may have included hide preparation or dyeing, body painting, or ritual use. Finally, finds of lignite at the site of Les Canalettes in southern France suggest that this form of coal was occasionally used as fuel, perhaps when wood was scarce (Thery 1996).

Middle Paleolithic Subsistence

Research into Middle Paleolithic subsistence has been guided, not only by the straightforward aims of determining what Neanderthals ate and how they procured their food, but also by the fundamental underlying question of how “modern” they were in this respect. The reasons for this focus are many. As our closest hominid relatives, they are likely to have been most similar to us in their behavior. Yet they *are* different in appearance; does this reflect significant behavioral differences as well? Explanations of the emergence of modern humans require attention to this question, particularly if modern humans are thought to have had some selective advantage, perhaps in the realm of the effectiveness or efficiency of their subsistence economy.

One striking feature of the economies is their diversity: although the remains of larger animals certainly dominate the record of most sites, smaller mammals are common in many sites as well, and some birds, fish, and shellfish appear in the assemblages of certain sites. Moreover, within these gross categories, a number of different species appear to have been regularly taken: mammoth and woolly rhinoceros among the now extinct megafauna, horse, bison, aurochs, wild ass, red deer, reindeer, ibex, and saiga antelope (and more rarely, roe deer, wild boar) among the smaller herbivores, hare and marmot among other small game. The available animals varied across Europe, both through time as the climate changed and through space according to local habitat conditions, and Neanderthal groups were able to adjust their foraging behavior accordingly. Within local regions, there seems to be a pattern of using several habitats, so that commonly, site assemblages contain representatives of open grassland (such as horse and bison) as well as more forested regions (red deer), or mountainous areas (ibex).

Scavenging or Hunting

One of the ongoing debates about Middle Paleolithic subsistence, as in the Lower Paleolithic, concerns the role of scavenging as opposed to purposeful hunting. In comparison to hunting, scavenging is an activity that largely entails extensive searching for animal carcasses on the landscape, rather than the more elaborate search, pursuit, and capture characteristic of hunting. In this sense, scavenging has been seen as a less demanding activity, one that would accord well with a view of Neanderthals as substantially different from us in organizational capabilities. A number of features of faunal assemblages would be expected if scavenging played a significant role in their formation:

- a diversity of species represented, as scavengers must take what they can find;
- a preponderance of very young or very old individual animals, as these form the majority of carnivore prey;
- a dominance of bones representing body parts with relatively little meat, because the meatiest portions would have likely been consumed by the original carnivores;
- the presence of animal tooth-marks on the bones.

The diversity of assemblages discussed earlier might seem generally to support interpretations of an important role for scavenging by Neanderthals. However, a second general feature of Middle Paleolithic subsistence, unlike that of the Lower Paleolithic, is a tendency for some degree of specialization of one or a few species, only supplemented by a large number of others (Patou-Mathis 2000). So, for example, site assemblages in western Europe are often dominated by horse, bison, aurochs, red deer, reindeer, or mammoth, and sites in southern Russia by wild ass or bison. In some cases this specialization is extreme: in the French open-air site of La Borde, over 90% of the bones are of aurochs (Jaubert et al. 1990); in some levels of the French cave of Combe-Grenal, over 90% of the bones come from reindeer (Bordes and Prat 1965); bison comprise over 98% of the bones at the French site of Mauran (Farizy et al. 1994). To many archaeologists (e.g. Chase 1989), this degree of specialization indicates a selectivity based on preference, not just availability, and is indicative of a Neanderthal capacity for focused and well-planned hunting.

Studies of age distributions among prey populations have produced mixed results. A number of studies of horse, reindeer, and aurochs indicate that prey of all ages, including prime-age adults, are represented among the bones (such as the aurochs of La Borde). Certain larger species, on the other hand, such as woolly rhinoceros, are often represented primarily by very young and very old individuals. It may well be that the largest prey were more often scavenged than hunted. Nevertheless, the predominance of prime-age adults and scarcity of very young and very old among the mammoth bones from the site of La Cotte on the Isle of Jersey suggests that even these large prey could be actively hunted (Scott 1980). Steele's (2004) analysis of red deer remains from Gabasa 1, Combe Grenal, and Lazaret, indicates that Neanderthals hunted prime-aged animals.

The representation of animal body parts shows considerable variation among sites. At a good many sites, such as Grotta Guattari in Italy, particular species show a relatively higher proportion of heads and lower limbs – portions that are relatively poor in meat (e.g. Stiner 1991). This pattern *may* indicate that these species were scavenged, but at least two alternative factors must be considered as well. Hunting may have been organized in such a way that killed animals were butchered at kill sites and only the portions relatively rich in meat were carried away, leaving low-quality parts behind. In such a case, kill/butchery locations would be characterized by the predominance of body parts poor in meat. Moreover, bones from different parts of the body show differing thickness and density, and hence are preserved to differing degrees in the archaeological record. As lower limb bones and teeth are among the most durable portions of the mammalian skeleton, their dominance in some assemblages might simply reflect differential preservation.

The presence of tooth marks on bones is, by itself, an inadequate basis for inferring scavenging of carnivore prey, as such evidence might well reflect visits of animals to sites after they were abandoned by humans. Many faunal collections, in fact, contain evidence of both gnawing by animals and cutting by humans. Detailed microscopic analysis must be done in order to determine which appeared first on the bones, whether the tooth marks are superimposed on the cut marks, or vice versa.

Scavenging certainly may have played a role in Neanderthal subsistence, but it is clear from many studies that active hunting was carried out and probably was the main contributor of food. Moreover, the apparent bias in archaeological evidence for meat consumption over plants may reflect reality. Although living hunter-gatherers utilize plant foods to a great degree, recent chemical isotope studies of Neanderthal skeletons in Croatia suggest a strongly carnivorous diet, similar to that of wolves. At least in the steppe-tundras of much of glacial age Europe, there may have been few available plant foods.

Food Procurement and Processing

Active hunting, particularly of larger animals, requires suitable technology, planning, and often some degree of cooperation. From the available evidence, it appears that the major hunting tool used by Neanderthals was the spear, either made solely of fire-hardened wood (the find at Lehringen) or tipped with a stone point. Studies of Mousterian points have demonstrated that many of these flake tools have fractures on the tips, consistent with their use on spears. It seems likely that these spears were used at close quarters, for stabbing rather than throwing. If so, then hunting of the larger animals probably posed great risks to the hunters, exposing them to attacks by the intended prey. The high frequency of injuries – fractured ribs, elbows, arms, and skulls – identified in Neanderthal skeletons suggests how dangerous their lives were.

Although hunting of solitary prey, perhaps by individual hunters, played an important role in the economy, a more organized and cooperative form of hunting is documented as well. Many of the major prey, such as reindeer, horse, and bison, congregate at least seasonally in substantial herds, and Neanderthals often targeted such seasons for their hunting (Patou-Mathis 2000). A few sites in both eastern and western Europe even document what appear to be true communal kills of a number of animals by driving them over cliff edges (Rolland 1990); the prey include mammoth and rhinoceros at the site of La Cotte de Saint-Brelade on the Isle of Jersey (Scott 1980) and bison at Mauran in the Pyrenees (Farizy et al. 1994). This is likely to have been an organized endeavor, involving advanced planning and coordination.

Because most hunting, whether communal or solitary, seems to have targeted particular prey in specific seasons (Patou-Mathis 2000), Neanderthal subsistence activities probably varied significantly during the year. This would have been especially true in the highly seasonal environments of more northern latitudes and more glacial periods. Longer-term fluctuations of subsistence activities apparently occurred as well. As the forested habitats of the last interglacial gave way gradually and episodically to more open steppe-tundras, animal communities changed as well. The French cave of Combe-Grenal documents a shift in hunting emphasis from red deer at the beginning of the last glacial period to reindeer as the climate cooled (Bordes and Prat 1965). Climate, however, was not the only determinant of subsistence change. As Stiner et al. (1999) have documented for Italian sites, local population growth seems to have been a factor as well. Early in the Middle Paleolithic, economies at these sites included a heavy reliance on small game, particularly easily captured tortoises and shellfish; through time, this emphasis shifted to rabbits, hares, and birds, all of which are more difficult to catch but, because they reproduce more rapidly, represent a more productive food base. The size of shellfish and tortoises decreases at the same time, suggesting overexploitation. Their inference is that growing populations were forced, not only to go after generally more expensive small game, but also increasingly to focus on relatively costly species and to overuse the most easily obtained foods.

Animals were generally butchered – using heavy-duty choppers as well as finer flakes – at the location of kills. Butchering involved slicing off meat and tendons as well as breaking bones to obtain marrow. Portions or entire carcasses of smaller prey were often carried away, presumably to residential camps, whereas large animal kills frequently caused people to move camps to their location. As mentioned earlier, many faunal assemblages show a biased representation of animal body parts; many archaeologists interpret these as reflections of the differential transport of various portions of meat away from the kill. Cooking was surely important in food preparation, as attested by the hearths found at many sites.

The picture that emerges of Middle Paleolithic subsistence is one of considerable variety, sophistication, and flexibility. Hunting, supplemented to an unknown (but possibly small) degree by scavenging and gathering, was a dangerous but productive activity. Its success reflects not only a detailed knowledge of the environment and of animal behavior, but also a significant amount of advanced planning and cooperation. As we have little evidence of food storage, it must have been a constant preoccupation and focus of life.

The Question of Cannibalism

One of the persistent, intriguing questions about Neanderthal behavior has concerned the practice of cannibalism. Fragmentary human skeletal remains are fairly common components of site assemblages; their broken condition, together with the occasional occurrence of cut marks, has led to much speculation about their meaning. Particularly for some sites where such evidence is relatively abundant, such as Krapina in Croatia or Combe Grenal in France, it has been suggested that cannibalism was the cause. The consumption of human flesh was, in turn, thought to be either one more element in the food economy or, more often, a ritual activity.

Critics of these interpretations for the most part argued that the same patterns could have been caused by natural factors, including weathering, frost-cracking, crushing by rock falls, and disturbance by animals. In addition, human activity, but only in the form of cleaning the bones for burial, has also been invoked. As is true of so many other kinds of issues about the Middle Paleolithic, the evidence was ambiguous.

Recent finds at the southern French site of Moula-Guercy, however, seem clearly to indicate that cannibalism was, indeed, a part of Neanderthal behavior (DeFleur et al. 1999). In this site, 78 Neanderthal bones were found and carefully analyzed. Evidence in favor of an interpretation of cannibalism includes the following:

- the human bones were found scattered among the bones of other animals, in generally the same location
- the bones bore cut marks in locations appropriate for the removal of meat or tendons
- the pattern of cut-mark location mirrored that found on deer bones
- many of the bones, both human and deer, were broken in such a way that the marrow or brains were exposed
- there was evidence of impact points at many of the breaks, indicating single, sharp blows rather than diffuse crushing pressure.

In this case, it seems clear that the human bones were treated in a manner similar to that of deer, as a source of meat and marrow. The broader meaning of this behavior, however, is not clear. Whether as a source of food (during periods of nutritional stress?) or as a more social or ritual activity, cannibalism was one component of Neanderthal behavior (just as it has been for modern humans).

Middle Paleolithic Site Organization and Settlement Patterns

As discussed earlier, Middle Paleolithic sites occur in caves, under rockshelters, and in the open. Given their huge variety in age, location, and habitat, their appearance varies widely. A few generalizations, however, are possible. Although detailed measurements of site area are precluded by the lack of complete excavations, occupation areas are rather small, often less than 25 meters in diameter in southwestern France (Mellars 1973), and with little variability in size (White 1982). Even larger cave deposits and open-air scatters of artifacts may represent the superimposition of several periods of occupation (Binford 1982). Neanderthal groups may have been quite small, rarely forming the larger seasonal aggregations that are characteristic of many modern hunter-gatherers. Furthermore, although many sites show some sort of internal patterning, they rarely contain much evidence for substantial modification of the living space. The most common “built” features at sites are hearths, virtually all of which are simply concentrations of wood and bone charcoal and ash. A few have been reported to be more elaborate, with a platform of stone slabs, a circle of rocks, or at least a small depression, but most of these are dubious and could represent natural features of rockfalls and uneven ground surface. A few sites have been reported to have “pavements” of stones laid down, presumably to create a raised, dry occupation surface, but again, the natural distribution of rock debris in caves and shelters might appear to be purposeful. Only in a few cases (e.g. La Baume Bonne in southern France), where smooth river cobbles appear in caves or on plateaux far from the river, is it clear that human activity is responsible. A few sites contain pits that have been interpreted as evidence of food storage, but these are rare.

Some exceptional sites do contain more evidence for modifications, even for the possible construction of housing. Several sites, including the German cave of Grosse Grotte (Keefer 1993) and the French cave of Moula-Guercy (DeFleur et al. 1999), contain drystone walls built of rock that partially close off the cave mouths. Deep in the French cave of Bruniquel is an apparent structure foundation built of fragments of stalactites and stalagmites and measuring roughly 4 × 5 meters (Berkowitz 1996). The most well-known (and debated) constructions are huts at the Moldavian sites of Molodova I and V (Klein 1973). At Molodova I, this consisted of an arrangement of large mammoth bones forming an oval measuring 5 × 8 meters. Inside the oval were 15 hearths and large amounts of stone and bone debris. The hut at Molodova V was similar, with mammoth bones defining a space of 7 × 9 meters that contained much debris and five hearths. Both have been interpreted as tents made of hides, presumably supported by wood or bone posts and weighted down by the large bones. Their large size alone casts doubt on this interpretation, as it would have been difficult to construct and support roofed tents of these dimensions. Moreover, the distribution patterns of bones and other debris are not as clear as these reconstructions suggest, and a more recent interpretation is that these constructions represent a series of overlapping windbreaks (Soffer 1989).

Most Middle Paleolithic sites, however, show no structural modifications. Instead, they consist of scatters of debris, sometimes in several concentrations, some of which are adjacent to informal hearths. Larger debris is often more peripheral in these distributions than are small bone fragments and stone waste, consistent perhaps with the discard of these larger materials by tossing away from the primary living space. This lack of structure, together with the generally small size of sites, suggests to many that Neanderthals were highly mobile and lacked complex social arrangements that would require or facilitate large group aggregation.

If groups were indeed quite mobile, and varied their hunting activities with the seasons, it should be possible to determine seasonal changes in settlement, to put together yearly patterns of the seasonal round. So far this has not been possible in any one region of the continent. Instead, interpretations of settlement behavior depend on sparse samples of sites scattered over large areas. As Svoboda et al. (1996:88) observe, “... small groups have left their ‘visiting cards’ (sites, bones, and artifacts) all over Central Europe.” The same could be said for the rest of the continent as well. A notable feature

of site distributions is a location that provides access to several different habitats, a feature that agrees with the relative diversity of the subsistence economy. Proximity to good sources of flint or other stone also seems to be important. In many mountainous areas, such as northern Spain, Italy, Greece, and Moravia, most sites are in the lowlands, with little evidence of settlement at higher elevations (Freeman 1973, Rolland 1990, Svoboda et al. 1996). Throughout the continent, the edges and slopes of river valleys are a favored location, although a good number of open-air sites are known on the plateaux between valleys in southwestern France (White 1982). In addition to providing access to a variety of vegetational communities, such valley-edge locations probably offered shelter from wind and perhaps proximity to animal herds moving through the valleys.

Differences among sites in location and contents have been used to infer differing site functions within larger systems of settlement, but in many cases the interpretations are not obvious. Many sites are characterized by stone tool assemblages that are very diverse, suggesting that a wide range of activities occurred. This would be consistent with a residential function, in contrast to specialized assemblages that would indicate more special-purpose hunting camps. The diversity of artifacts at a site, however, could be the result of many different occupations, each consisting of a different mix of activities. This may be particularly true of deeply stratified caves such as Combe Grenal, where over 60 different levels have been identified, each of which might derive from a number of different occupations. A clearer interpretation is provided by sites such as Lehringen in north Germany, which consists of a few stone artifacts associated with an elephant carcass and a wooden spear. In this case, an interpretation as a kill site appears reasonable. Other types of specialized sites that have been identified include the previously mentioned ochre mine and a flint-mining site, both in Hungary (Rolland 1990).

Over a much larger area, some changes in site type and number are evident. Cave sites are much more common during the colder, early last glacial period than during the preceding warm interglacial (Patou-Mathis 2000). This shift – together with the observation that many of the selected caves, at least in southern France, face south and receive maximum solar exposure – suggests that protection from the cold was a major consideration in site location as conditions changed. Moreover, despite the many vagaries of dating sites, there seems to be a clear pattern of changes in site distribution as climatic conditions varied. In Russia and Ukraine, for example, sites of the early Middle Paleolithic are quite widespread, whereas those of the later Middle Paleolithic are restricted to just the southerly regions, concentrated especially in the most topographically varied portions of the Crimea and the Dnestr Valley (Soffer 1989). These latter areas may have offered the most abundant and predictable food resources in an increasingly cold and hostile environment. Southern Germany and other parts of north and central Europe also contain more evidence for occupation during warmer periods of interstadials than during the colder stadial periods, while to the south, France, Italy, and Spain appear to show greater stability of site numbers through time (Gamble 1983). Runnels (1989) has suggested that much of the Greek Middle Paleolithic is relatively late, dating largely to early in the last glacial around 60,000 BP, and represents an influx of Neanderthals from more northern regions as the climate became cooler. Somewhat later, toward the very end of the Middle Paleolithic, between 40,000 and 37,500 BP, large areas, including Britain, northeast Europe, and northern Italy, were abandoned, coinciding with the progressive development of increasingly cool and arid conditions (Bocquet-Appel and Demars 2000). It would appear that the distribution of Neanderthal settlement varied considerably through time, heavily dependent upon local conditions of climate and food availability.

Middle Paleolithic Movement and Exchange

Virtually *no* materials from sources farther than 20 kilometers away appear in Middle Paleolithic sites in all regions, including Spain (Straus 1992), France (Febloot-Augustins 1993), Moravia (Svoboda et al.

1996), and Russia (Soffer 1989). Neanderthals apparently procured most needed materials within a small radius of their camps, and carried little with them when they left.

In southwestern French sites, for example, Febloot-Augustins (1993) documents that most stone (60–95%) comes from within 5 kilometers of each site; that another 5–20% derives from sources up to 20 kilometers away; and that only up to 5% comes from sources farther than 20 kilometers. The greatest distance a material was transported in this region was 100 kilometers. He suggests that these short transport distances reflect the direct procurement of stone by the Neanderthals during their normal seasonal movements. By tracking the distribution of various stones among different sites, he further suggests that group mobility was normally confined within areas of about 13,000 square kilometers. This would correspond to an idealized, perfect circular territory with a radius of approximately 65 kilometers. These territories, he noted, contained regions of considerable ecological diversity and may have encompassed the normal seasonal ranges of major prey animals during the year.

The patterns observed in Poland, Moravia, Slovakia, and Hungary are similar. Most material comes from sources within 5 kilometers away, and only up to 3% was transported more than 20 kilometers. The defined areas of raw material distribution are similar as well, measuring roughly 10,000 square kilometers and corresponding to circular territories with a radius of about 56 kilometers. One difference between this region and southwestern France is the maximum distance that material was transported – 300 kilometers in central Europe – but such materials are quite rare.

These studies also document a concern for economy in the use and transport of raw materials and a differential treatment according to how far they were transported. In both areas, very locally available stone was brought to the sites largely as nodules or coarsely worked blocks. Material from more distant sources, by contrast, frequently appears in sites mainly in the form of smaller flakes or retouched tools. Often these tools are heavily resharpened, reflecting an effort to prolong their useful lives.

The resulting picture of Neanderthal mobility is one of frequent, short moves within fairly small territories. Little material was transported over great distances and what little was brought from previous camps was conserved by resharpening. No evidence of systematic exchange with neighboring groups exists.

Burials, Rituals, and Art in the Middle Paleolithic

No aspect of the archaeology of Neanderthals has excited scientific and public imaginations more than the possible appearance of the first practice of intentionally burying the dead, perhaps with accompanying rituals. If any behavior separates us from the rest of the animal kingdom, it is this. From such evidence, many have argued for the birth of religion, the belief in an afterlife, and other “modern” cognitive abilities.

The European finds (there are also a number in the Near East), as originally reported by the excavators, are truly impressive. Complete or nearly complete skeletons have been found in the French caves and rockshelters of La Chapelle-aux-Saints (one individual), Roc de Marsal (one), Regourdou (one), Pech de l’Aze (one), Le Moustier (two), La Ferrassie (seven), La Quina (one), and Saint-Césaire (one), in Belgium at the site of Spy (two), and in the Crimea at the sites of Kiik-Koba (two), and Starosel’e (one). The situation of the finds varies considerably (Gargett 1989). At La Chapelle, for example, the body of an adult man was found in a nearly rectangular pit covered with stone slabs; an animal’s foot was placed on his chest and the body accompanied by pieces of jasper, quartz, and ochre. At Starosel’e, a child was buried in a pit and covered with stone slabs, but without any accompanying goods. At La Ferrassie the bodies were found toward the back of the shelter. Two adults, a man and a woman, were placed head-to-head on the former ground surface, not in pits. The man’s head was encircled by three stone slabs and he was accompanied by a number of stone tools. The remaining

bodies, found in pits, were children and infants, some of whom also had grave goods in the form of stone tools. Along with the bodies were nine conical earthen mounds, measuring roughly 1 meter in diameter, one of which surmounted one of the graves.

In addition to a burial ritual involving nearly complete skeletons, the existence of a "skull cult" has been suggested by finds of isolated skulls, suggesting that the head was separated from the body and given special treatment. In Europe the most striking of such finds was made at the Italian cave of Grotta Guattari at Monte Circeo. Here a man's skull was found surrounded by a circle of stones accompanied by bones of boar, aurochs, and deer. The skull showed evidence of both a blow to the head (ritual murder?) and an enlarged foramen magnum (cannibalistic removal of the brain?).

A third aspect of Neanderthal ritual behavior is the presumed existence of a "bear cult." This derives from finds that suggest special treatment given to the remains of brown bear or cave bear. At several Swiss caves, for example, cave bear bones were found in stone cysts or boxes, in some cases with long bones shoved into the skull's eye sockets. At the French cave of Regourdou, the excavator reported the burial of a complete bear in a pit, together with the construction of mounds and other pits.

To judge from these reports, Neanderthals had a rich ceremonial life, including a burial cult, a skull cult, and a bear cult. Comparative studies of the burials have added further elaboration. In an examination of 36 Middle Paleolithic burials from both Europe and the Near East, for example, Harrold (1980) found that most bodies were placed in a flexed position on their sides, that both men and women were likely to be buried, but that men tended to have more accompanying grave goods and greater elaboration of the graves in the form of rock slabs or other modifications. This conclusion might be indicative of the relationship between the sexes and their relative status, important aspects of social organization.

Such sweeping inferences about Neanderthal ritual and social life, however, have prompted a critical reexamination of the finds. Many of the assertions about ritual have been severely criticized, if not discarded, in this revisionist critique. Disagreements about the evidence still exist, focusing primarily on the role of natural processes as opposed to human behavior in forming the deposits. Gargett (1989) questions the existence of any burials at all. Instead, for at least four of the French examples, he argues that a variety of natural factors could account for the condition of the skeletons. These include erosion by water to create depressions or "pits," rock falls to create coverings of slabs, and slopewash to move sediments into depressions to fill the "pits." He also suggests that the supposed grave goods are simply portions of the normal archaeological deposits that have come to rest in or on the graves through natural disturbance processes. In a reevaluation of the child burial from the Crimean site of Starosel'e, Marks et al. (1997) suggest that it is not Middle Paleolithic at all, but rather represents an intrusive medieval burial similar to others found in the cave.

The existence of the skull and bear cults has been questioned as well. Careful reexamination of the skull at Grotta Guattari, for example, showed no evidence of human modification, but rather gnawing by hyenas (White and Toth 1991) and the supposed stone ring may be just part of the stone rubble on the cave floor. The peculiar arrangement of bear bones in the Swiss and French sites is now also considered to be the result of natural rock falls and disturbance of the remains by animals.

Although many of these arguments have proven convincing, most archaeologists still believe that Neanderthals buried some of their dead, albeit not necessarily with any accompanying goods or ritual (e.g. Chase and Dibble 1987). The reason for this view is not simply a preference for seeing Neanderthals in this way, but rather a particular set of factors that are difficult to explain by natural processes alone. One of these is the occurrence of nearly complete skeletons. Neanderthal remains are relatively common throughout Europe, but usually as scattered, individual bones or fragments. This is probably the normal fate of skeletons left abandoned, in light of the destructive effects of weathering and carnivores. Something special – either purposeful burial or extremely rapid soil or rock deposition – may have been necessary for virtually intact skeletons to survive. Furthermore, many of the excavators noted that a number of the pits had flat bottoms or squared sides, features that are rarely

the outcome of natural processes. In addition, the repeated position of the bodies on their sides, tightly flexed, seems unlikely if they represent independent, random cases of accidental preservation.

So while there may be little definite evidence of elaborate cults or ritual among Neanderthals, it does seem reasonably clear that they did, in fact, bury some of their dead. These included men and women, children, and infants. It is possible that the act of burial had special significance, but in light of the current evidence, it may represent simply one means of disposal of a dead relative, with no necessary implications about a belief in the afterlife. Nevertheless, it is a new feature in the European archaeological record and a new feature of human behavior, one that will assume greater visibility and meaning in later periods.

One other category of finds that has been much debated consists of supposed evidence for artistic or symbolic activity. Here again the importance of the debates hinges on its link to the emergence of fully "modern" cognitive abilities. Because what we call "art" is so common in the subsequent Upper Paleolithic, associated with biologically modern humans, the question of its existence among Neanderthals is a natural focus of research.

Excluding one exceptional group of artifacts from the site of Arcy-sur-Cure, which is discussed in the next chapter, the number of non-utilitarian objects that seem to indicate some artistic or esthetic sense is extremely low. Most definite among these are a section of mammoth tooth from the Hungarian site of Tata that has been shaped and highly polished and that bears traces of red ochre pigment, perforated or engraved bone fragments from a handful of sites in France, Belgium, and Bulgaria, a block of limestone with small, artificially made depressions from La Ferrassie in France, and a number of pieces of red ochre from various sites, some of which bear striations from apparent rubbing (Chase and Dibble 1987, Duff et al. 1992). Other purported objects, such as pierced bone whistles, a flute, and an engraved shell, appear to represent simply the result of natural agents such as animal gnawing.

Not only are such objects rare, but each is unique. Nowhere in the archaeological record is there evidence of repeated patterns of design that would suggest that they express a coherent system of symbolic meaning. As summarized by Mellars, "Everything that's ever claimed to be Neanderthal is so amorphous, so lacking in crisp representation . . . There's always this massive question of whether it's just someone doodling" (Appenzeller 1998:1452). The few objects that do exist suggest at most a capacity for abstract manipulation of materials, a capacity that is realized to any degree only at the very end of the Middle Paleolithic.

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