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THE UPPER PALEOLITHIC REVOLUTION

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■ **Abstract** The transition from the Middle Paleolithic to the Upper Paleolithic is considered one of the major revolutions in the prehistory of humankind. Explanations of the observable archaeological phenomena in Eurasia, or the lack of such evidence in other regions, include biological arguments (the role of Cro-Magnons and the demise of the Neanderthals), as well as cultural-technological, and environmental arguments. The paper discusses issues of terminological ambiguities, chronological and geographical aspects of change, the emergence of what is viewed as the arch-types of modern forager societies, and the hotly debated and loaded issue of modern behavior. Finally, the various causes for the Upper Paleolithic revolution are enumerated, from the biological through the technocultural that relies on the analogy with the Neolithic revolution.

OPENING REMARKS

Paleolithic archaeology primarily addresses issues of stratigraphy, chronology, object assemblage analysis for defining cultural entities and adaptive strategies, examination of faunal and vegetal components, and site formation processes. Investigations often culminate in a coarse-grained reconstruction of prehistoric lifeways within an evolutionary context. Modern research stresses the necessity of establishing regional sequences and their Pleistocene and Holocene paleo-ecological conditions. Radiometric dates facilitate chronological correlations and the integration of the findings into a continent-wide record. For the Upper Paleolithic, the period under discussion, the combination of radiocarbon, thermoluminescence, and electron spin resonance dating techniques (Wagner 1998) assisted investigators during the past decade in constructing a reasonably coherent global chronology. Large standard deviations in thermoluminescence and electron spin resonance readings, as well as ambiguities concerning the calibration of 14C dates at the range of 40–30 thousand years ago (Ka) (Beck et al. 2001), make it difficult to establish the precise onset of the Upper Paleolithic revolution. However, with the current rapid progress in the use of these techniques one expects much better resolutions in the next decade. The dates in this paper are quoted as B.P. uncalibrated unless otherwise specified.

The term Upper Paleolithic period was coined in Western Europe, the homeland of the discipline of prehistoric archaeology. Historically it designated the time when *Homo sapiens sapiens*, referred to as Cro-Magnons, replaced the European Neanderthals (Bocquet-Appel & Demars 2000). The cultural manifestations of blade-dominated lithic assemblages along with mobile and cave art were seen as the hallmarks of the achievements of the new people. However, even the pioneers of prehistoric research, when the geographic scope of their knowledge expanded beyond Europe, were in doubt, and their queries (Bricker 1976) continue to linger with us today. These are questions regarding (*a*) how long Neanderthals survived in the various regions of Eurasia; (*b*) the identity of the bearers of the prehistoric cultures such as the Chatelperronian, Aurignacian, Gravettian and others and; (*c*) whether prehistoric migrations or climatic changes were the main causes for the cultural changes. These and additional topics are at the forefront of current debates, such as (*a*) whether the transition to the Upper Paleolithic was a major evolutionary event of global dimensions or a gradual transition; (*b*) whether the impetus for the change was biological, cultural, or both; (*c*) whether Upper Paleolithic archaeological manifestations are the markers for the capacity for modern culture; and (*d*) the point in time at which one can interpret the archaeological documents to indicate the emergence of modern behavior.

There is no way to satisfy the entire community of investigators while responding to these queries, because interpretations of the same evidence vary. The following pages provide a survey of the particular traits of the Upper Paleolithic while at the same time examining possibilities for their earlier emergence. Subsequently I present an overview of the terminological jumble, comments on the geographic distribution of Upper Paleolithic entities, the arguments concerning the indications for the capacity for modern behavior, and the potential causes for the Upper Paleolithic revolution.

THE NATURE AND CHARACTERISTICS OF THE UPPER PALEOLITHIC REVOLUTION

The nature of the Upper Paleolithic revolution is at the center of current debates (e.g., White 1982, 1997; Mellars 1989, 1996a, 2000; Straus 1996; Gibson 1996; Bar-Yosef 1998; Zilhao & D'Errico 1999; Wadley 2001; Clark 1997a,b; Klein 1995, 1999; McBrearty & Brooks 2000; Churchill & Smith 2000; Hublin 2000). The variable mosaic of archaeological and human fossil data sets are open to different interpretations. It is generally agreed that the way to identify a revolution is to compare the overall cultural-behavioral and economic system before and after a given point in time. This means we need to compare the Middle Paleolithic (or Middle Stone Age as it is known in Africa) and the Upper Paleolithic (or Late Stone Age). These two archaeologically determined periods are not of equal duration. Whereas the latter is of ~30 Ka duration (~40,000–10,000 years ago), the former lasted from ~250,000 to 40,000 or 30,000 years ago. Hence, the comparison should

be limited to the same length of time. To facilitate the identification of the possible roots of Upper Paleolithic behavioral and material manifestations, only the last 30 Ka of the late Middle Paleolithic are taken into account. It is assumed that the period prior to the revolution may disclose silent indications that herald the ensuing changes.

Several scholars view the accumulation of markers for modern behavior as gradual during at least the Upper Pleistocene, if not since earlier times, and therefore conclude that there was no revolution (e.g., McBrearty & Brooks 2000; Clark 1997a,b; Straus 1996). Others view the new innovations and shifts in social structure as appearing first within the late Middle Paleolithic (e.g., Deacon & Deacon 1999; Straus 1996, 2001). However, most researchers agree that the observed cultural and technological traits, as well as the population increase during the Upper Paleolithic, were more rapid and had distinct global effects across Eurasia and Africa when compared with the slow pace of cultural changes during the Middle Paleolithic. Not the least of the human achievements of the Upper Paleolithic were the long-distance exchanges of raw materials and precious items, the occupation of the northern latitudes under periglacial conditions, the colonization of the Americas, and the first steps in coastal navigation and seafaring.

To test the hypothesis that recorded changes during the late Middle Paleolithic foretold the Upper Paleolithic, I proceed by presenting the attributes of the Upper Paleolithic revolution, as enumerated by archaeologists, with comments concerning their uniqueness or their earlier appearance during the Middle Paleolithic. However, most of the documented material components, as well as the inter- and intrasettlement patterns, are derived from Europe and western and northern Asia, whereas fewer cases are known from the sparsely explored east and south Asia or sub-Saharan Africa. Hence, the current picture contains inherent bias. In spite of this, one may notice within the vast continental area of the northern hemisphere that there is a mosaic of cultural expressions (mentioned below), and that the suite of elements often considered typical Upper Paleolithic markers as derived from Western Europe were not shared by all populations.

The list of Upper Paleolithic material components is briefly summarized here:

1. Upper Paleolithic assemblages are considered to present systematic production of prismatic blades, and only rarely is flake production dominant (e.g., Mellars 1989, 1996a; Kozlowski 2000; Kuhn & Bietti 2000; Rigaud 1997). An exception is southeast Asia, where the common late Pleistocene industry is the flake-dominated Hoabinian, and Tasmania, where human occupation began during the Upper Paleolithic. Earlier production of blades, mostly around 250–150 Ka and during the last Interglacial, was reported from Africa, Europe, and Asia (Conard 1990, Révillion & Tuffreau 1994, Bar-Yosef & Kuhn 1999). However, blade production in the Upper Paleolithic evolved into manufacturing bladelets and their shaping into microlithic stone tools of various forms.

2. It was assumed that a high degree of standardization and morphological variability prevails among tool types and differentiates the Upper Paleolithic from the Middle Paleolithic (e.g., Mellars 1989). This observation was often based on the number of types shown on the type lists of Bordes (1961) for the Middle Paleolithic compared with the one composed by de Sonneville-Bordes & Perrot (1953) for the Upper Paleolithic. It should be noted that the two lists were composed on the basis of traditional morphological observations, developed mainly during the first half of the twentieth century in Europe for reporting local assemblages. Numerous types of the Bordesian type list were later shown to be the results of resharpening or consecutive reduction (Dibble 1995, Bisson 2000). In addition, the contention that Mousterian assemblages are poorer in tool types than the Aurignacian in France was recently tested by Grayson & Cole (1998). These authors concluded that the Aurignacian industries are somewhat richer than the Mousterian, but this statement could be due to the differences in the classification systems. Even if this is not the case, there is still no theoretical framework that would enable us to evaluate and explore the meaning of such differences.

   Marks and associates (2001) tackled the issue of standardization among the lithic tool groups, often seen to a higher degree in the Upper than Middle Paleolithic industries. Their analysis, although limited to burins, demonstrated that there is a common level of standardization between both Middle and Upper Paleolithic samples.

   However, in spite of these observations, there is no doubt that relatively rapid shifts (within several centuries or a few thousand years) in core reduction strategies as well as bone and antler tool design occurred during the Upper Paleolithic in various regions. These shifts are interpreted as reflecting changes in style (i.e., transmitting cultural information) and rarely are related to functional needs (e.g., Barton 1997; Close 1989; Sackett 1983, 1991; Conkey & Hastorf 1990; Wobst 1999; Wiessner 1989; Goring-Morris et al. 1998; Jensen 1988; Geneste & Plisson 1993; Guilbaud 1996).

3. The exploitation of bone and antler as raw materials for the production of daily or ritual tools and objects became a common practice in the Upper Paleolithic (Mellars 1989). Whereas these raw materials were common in Middle Paleolithic sites they were generally not exploited. Some proposals to view pre–Upper Paleolithic bone objects as well-made artifacts were dismissed (Villa & D'Errico 2001). The exception is the assemblages of the Howiesons Poort in Klasies River Mouth cave and in particular in Bloombos cave (Singer & Wymer 1982, Henshilwood & Sealy 1997, Henshilwood et al. 2001). The Howiesons Poort entity is generally dated to 80–60 Ka and is undoubtedly a unique and isolated cultural phenomenon, stratigraphically and chronologically intercalated between two Middle Stone Age industries without bone tools.

   Another case, with a different evolutionary implication, is the Chatelperronian bone and antler assemblage from Arcy sur Cure (Farizy 1990, 1994;

Mellars et al. 1999; Mellars 2000). Human relics indicate that this assemblage was originally designed by Neanderthals. However, the dates around 38–36 Ka correlate with the early entry of Cro-Magnons into Europe. Hence, this surprising Chatelperronian assemblage may have been the result of transmitted ideas, not necessarily face-to-face acculturation as sometimes proposed.

4. Systematic use of grinding and pounding stone tools began during the Upper Paleolithic. This is best documented where plant food played a major role in the diet such as in the Mediterranean region and Africa (Wright 1992). None of these tools were found in Middle Paleolithic contexts, although the consumption of vegetal substances during the Middle Paleolithic is known, for example, from Levantine sites (Bar-Yosef 2000).
5. Systematic use of body decorations—beads and pendants—made from marine shells, teeth, ivory, and ostrich egg shells are recorded from both Europe and the Levant (e.g., Taborin 1993; White 1993, 1997; Kuhn et al. 2001). These are considered to communicate the self-awareness and identity of the individual as well as the social group. No similar objects, and therefore no clear signs for the identity of the social units, were recorded in Middle Paleolithic contexts. The sole element, which may reflect shared transmission among individuals, was in lithic manufacturing indicated by the *chaînes opératoires*. Similar operational sequences may have delineated human interaction over relatively large geographic territories. These could have been the markers of mating systems, but such a determination requires supportive evidence.
6. Long-distance exchange networks in lithics, raw materials, and marine shells during the Upper Paleolithic reach the order of several hundred kilometers (Gamble 1993, Taborin 1993, Smith 1999, Johnson & Earle 2000). They consistently differ from the much shorter ranges of raw material procurement during the Middle Paleolithic (Conard 2001, Hovers 2001, Marks & Chabai 2001, Richter 2001, Geneste 1988, Féblot-Augustins 1993). Perhaps one of the exceptions is again the Howiesons Poort in South Africa (Deacon & Wurz 1996) because raw material was transported to the site from a long distance.
7. The Upper Paleolithic witnessed the invention of improved hunting tools such as spear throwers, and later bows and arrows and boomerangs (Mulvaney & Kaminga 1999). These devices facilitated targeting animals from longer distances and could have brought higher rates of hunting success. However, hafted spears with Levallois or other Mousterian points were recorded in more than a few instances (Shea 1988; Boëda et al. 1999).
8. Human and animal figurines, decorated and carved bone, antler, ivory and stone objects, and representational abstract and realistic images, either painted or engraved, began to appear in caves, rockshelters, and exposed rocky surfaces by 36 Ka (e.g., Marshack 1972, 1997; Clottes 1997; Conkey et al. 1997; Lewis-Williams 1997; Bahn 1997; Zilhão 1995; Soffer et al. 2000). We

must wonder why western Europe and, in particular, the Franco-Cantabrian region is so different from the rest of the Upper Paleolithic world. It is not the lack of limestone caves or suitable rock surfaces that prevented other social groups or their shamans from leaving behind similar paintings and engravings. Possibly this local flourish had to do with the vagaries and pressures faced by foragers in two major refugia regions at the ends of the inhabited world—Western Europe and Australia—where there are claims for rock art of the same general age. If this explanation has any foundation, we should look for the details of the common behavioral denominators (e.g., Davidson 1997, Lewis-Williams 1991).

Beyond mobile and stationary material elements there are additional components, such as intrasite features including burials, and subsistence strategies, and the extent to which they reflect modern behavior is often debated. These include

- Storage facilities, generally known from northern latitudes where underground freezing kept food edible (Soffer 1985, 1989; Grigor'ev 1993). Storage occurs in Upper Paleolithic sites after the initial phase. None of these structures was recorded in Middle Paleolithic contexts.
- Structured hearths with or without the use of rocks for warmth banking and parching activities were recorded in Upper Paleolithic sites. Variable types of hearths are known from both Middle and Upper Paleolithic contexts, although the use of rocks is almost exclusively documented from contexts of the latter period (Bar-Yosef et al. 1992, Meignen et al. 1989, Rigaud et al. 1999, Pastó et al. 2000).
- Distinct functional spatial organization within habitations and hunting stations such as kitchen areas, butchering space, sleeping grounds, discard zones, and the like are relatively common in Upper Paleolithic sites. Such features are better preserved in the later phases (after 20 Ka), but even the very early Upper Paleolithic sites produced good examples. Among others are Aurignacian contexts in Western and Central Europe (e.g., Svoboda & Siman 1989, Oliva 1993, Harrold 1989, Kuhn 1998, Kozlowski 1999, Otte & Derevianko 2001). These features may reflect the social structure or a particular combination of members of the band, such as a male task group (Binford 1983; Deacon 1992, 1995). This kind of information is rarely available from Middle Paleolithic sites. Among the known examples are Klasies River Mouth and Rose Cottage (South Africa), Kebara, Tor Faraj (Levant), Gibraltar, Abric Romani (Spain), Grotte XVI (France), and others (e.g., Deacon & Wurz 1996, Bar-Yosef et al. 1992, Meignen et al. 1998, Rigaud et al. 1999, Wadely 2001, Barton 2000, Pastó et al. 2000).
- Burials are already known from Middle Paleolithic contexts, and their presence has led to debates concerning two issues. The first was a proposal to view all Middle Paleolithic burials as the result of various natural processes and not as intentional mortuary practices (Gargett 1999). This was shown

not to be the case, especially if data from the Upper Paleolithic (including the later phase known as Epi-Paleolithic) is taken into account (Belfer-Cohen & Hovers 1992, Hovers et al. 2000). The second issue, raised by Chase & Dibble (1987), concerns the symbolic behavior one may expect as part of the funerary acts. The evidence for some grave goods incorporated into Middle Paleolithic burials such as Skhul V, where a wild boar jaw was placed under the arm of the dead, hints at numerous details that we still lack. In addition this and other burials in this site and Qafzeh are all related to the archaic modern humans and thus cannot be taken as the rule for all their contemporaries.

- Potential differences in subsistence activities were also taken into account as differentiating the Middle from the Upper Paleolithic (e.g., Marean 1998, Marean & Assefa 1999). As our knowledge concerning the exploitation of plants is poor, most of the discussions center on the issue of hunting versus scavenging. Briefly, the current evidence clearly demonstrates that both Middle Paleolithic and Upper Paleolithic humans were hunters. There are regional differences between South Africa, the Levant, and Western Europe in the selection of game animals, as well as the techniques employed to hunt, transport whole or partial carcasses, and the like (Klein 1998). In addition, alterations to diet breadth does not necessarily require a change in hunting techniques, as shown by the analysis of late Mousterian contexts in Italy and Israel (Speth in Bar-Yosef et al. 1992, Meignen et al. 1998, Stiner et al. 1999) or in Early Upper Paleolithic contexts in southwest France (Grayson & Delpech 1998). In certain cases it reflects population increases, and in others a change in the environmental conditions that favored one species over another.

In sum, most of the components discussed above are seen as evidence for rapid technological changes, emergence of self-awareness and group identity, increased social diversification, formation of long-distance alliances, the ability to symbolically record information and that these are being the most typical expressions for the capacity of Upper Paleolithic humans for modern culture. The latter term means that the creators and bearers of these cultural traits were most probably the forerunners of historically recorded societies of hunter-gatherers. This also implies that they had modern cognitive capacities, although scholars who study cognitive evolution warn against such a simple conclusion.

THE TERMINOLOGICAL AMBIGUITIES

The history of research provides insight into the current terminological ambiguities. In 1913 Breuil formulated the first synthesis of the Western European Upper Paleolithic. Breuil's scheme, which left an indelible terminological impact, was based on the differences in tool types among stratified assemblages of the rockshelters of southwest France (Breuil 1912, Bricker 1976, Harrold 1991). The earliest entity, overlying the Mousterian, was named the Lower Aurignacian and contained

the Chatelperronian-backed curved knives or points. Next was the Middle Aurignacian with carinated and nosed scrapers and rich bone and antler industries, as well as beads and pendants. The last in this sequence was labeled the Upper Aurignacian and contained Gravette points, straight-backed elements made on blades. Younger entities were the Solutrean and the Magdalenian.

In the 1930s Peyrony suggested renaming the Lower Aurignacian through the Upper Aurignacian as Perigordian I–V, because they were all blade-dominated assemblages with backed points. In Peyrony's view one could demonstrate regional continuity. The English literature reserved the term Chatelperronian for the Lower Aurignacian, known today also as Castelperronian (Bordes 1968, Mellars 1989, Djindjian et al. 1999, Gamble 1999). The Middle Aurignacian retained the appellation of Aurignacian culture, and the Late Aurignacian (called Perigordian IV by Peyrony) is better known today as the Gravettian, with its extension into Eastern Europe (e.g., Gamble 1986, Collins 1986, Djindjian et al. 1999).

The focus here is that the Chatelperronian—within which blade production is a distinct phenomenon—was viewed as marking the onset of the Upper Paleolithic. Recognizing the evolutionary meaning of this designation came later. First, the detailed lithic analysis demonstrated its origin in the Late Mousterian of the Acheulian Tradition industry. Second, the discovery of Neanderthal remains in a Chatelperronian layer at St. Cesaire provided the hard evidence for biological continuity concurrent with cultural change within a single population (Lévêque & Vandermeersch 1981). Indeed, the Upper Paleolithic traits of the Chatelperronian, such as the production of curved-backed blades documented in the study of the operational sequence (Pelegrin 1990a,b; Lévêque et al. 1993), the presence of body decorations, and a bone tool assemblage in Arcy sur Cure, are instructive (Farizy 1994). This raises two important issues. First, that the term "transitional industry" can have both biological and cultural implications. Second, when other entities in Europe and Africa are taken into account, Upper Paleolithic industries, identified on the basis of cultural attributes, could have been produced by different populations. Therefore, identifying biologically the people who manufactured the lithic assemblages that form the basis for the cultural definition depends on the discovery of human relics. Without human fossils the correlation between the industries and a particular biological population is tenuous. The case of the Chatelperronian indicates a potential archaeological resolution for other European entities. Owing to the biological and cultural continuity represented by the Chatelperronian, one may suggest that a similar techno-typological continuity between a given Mousterian industry—which on that continent was produced everywhere by Neanderthals—and an industry contemporary with other Upper Paleolithic entities, may be viewed as indicating biological continuity.

This proposal is exemplified by the case of central Europe, where the Szeletian emerges from the Mousterian industries with foliates, while the Bohunician lacks a relationship with all earlier Mousterian industries in the region (e.g., Svoboda & Skrdla 1995, Tostevin 2000). The origins of the Szeletian are not agreed upon by all (Kozlowski 2000), but the possibility that it represents a later adaptation

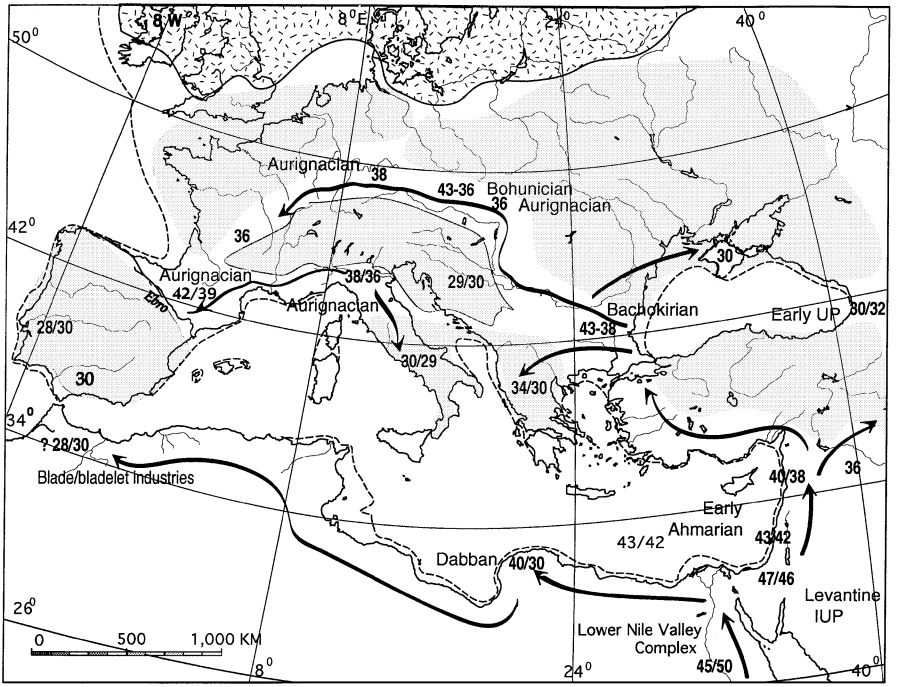

Figure 1 Suggested diffusion/migration of modern humans into Europe and North Africa. The dates (uncalibrated) indicate the early manifestations of Upper Paleolithic industries.

of the Mousterian—at the time when Cro-Magnons were present at the gates of Europe—is probable (Figure 1). The documented penetration of the Szeletian into the extreme north of Europe (Pavlov et al. 2001) may support this view by suggesting that certain innovations, such as improved clothing and means of communication that allowed this incursion into a new environment, were adopted owing to cultural contacts. Similar interpretations may apply to the entities of Jermanowician, Bryndzenian, and Streletskian, all of which are dated to after the first colonization by Initial Upper Paleolithic entities from the east such as the Bachokirian (Kozlowski 2000, Allsworth-Jones 2000). It is therefore best to abandon the term transitional industry, which was extensively employed over the past five decades, and refer to the Early or Initial Upper Paleolithic (Marks 1990) dated entities by local names.

A major ambiguity results from the mixture of lithic assemblage–based definitions and chronological determination with what was probably a new social structure or a new social landscape as represented by certain Upper Paleolithic entities (Gamble 1999). As is shown below, the Upper Paleolithic revolution is a

process that most likely began in a core area and expanded by demic-diffusion, migration over long distances, and the transmission of technologies. Hence, in certain regions the Initial Upper Paleolithic assemblages were earlier than in others, and how the people or the technology spread across Africa and Eurasia (except for southeast Asia), is debatable. As mentioned above, gradualists view regional continuities and environmental adaptations as the forces behind the changes, and others employ the molecular, nuclear genetic evidence as well as the currently available radiometric chronology to suggest that migration, contact, and acculturation determined the course of history around 45,000–30,000 years ago (e.g., Cavalli-Sforza et al. 1993, Hublin 2000).

The use and the definition of the term Aurignacian (Kozlowski & Otte 2000, Otte & Kozlowski 2001) is ambiguous. Here again, the impact of the history of the prehistoric research plays a major role. Western European scholars generally agree that the Aurignacian was the first culture of the Cro-Magnons (Gambier 1989, Churchill & Smith 2000). Although the interpretations of the radiometric dates vary (Zilhao & D'Errico 1999), a date of 38 or 36 Ka for the earliest Aurignacian in temperate Europe would mean that the first cultural manifestation of local *H. sapiens sapiens* was a few thousand years later than the onset of the Upper Paleolithic in the Levant (Figure 1). By 36 Ka the Levant had already witnessed the shift from the Emiran (transitional industry) to the Early Ahmarian (Bar-Yosef 2000). This means the Upper Paleolithic began earlier in the eastern Mediterranean and later in Western Europe. A somewhat similar time and geographic trajectory can be drawn eastward across the region of central Asia beyond the Caspian Sea and into northern Asia. If the dates of Kara Bom, a site in the Altai mountains, are accepted at face value, although there are unresolved issues concerning the effects of site-formation processes in this locale, then the shift to Upper Paleolithic was faster in this part of Asia than in Europe (Derevianko 1998, Derevianko et al. 2000, Vasil'ev 1993). In conclusion, the notion that the Aurignacian was the first culture of the Cro-Magnons is therefore false.

The second ambiguity concerning the term Aurignacian relates to the naming of assemblages as Aurignacian on the basis of an insufficient number of attributes. As the definition of this entity was based on a particular suite of stone tools in France, it is expected that not all types will be available wherever the bearers of this industry went. The question is, what are the minimal number of types required to label an assemblage as Aurignacian? The current literature does not provide a detailed definition. The use of one morpho-type, such as the carinated, narrow cores from which bladelets were removed (also known as *rabot* in the French Aurignacian), hardly justifies calling assemblages Aurignacian. This kind of core reduction strategy is known from various geographically and temporally isolated sites such as the 20 Ka Upper Paleolithic layers in the Caucasus and 17–15 Ka Kebaran assemblages in the Levant. However, the presence of the Levantine Aurignacian along the eastern Mediterranean coastal ranges is based on the assemblages that contain carinated nosed scrapers, Dufour bladelets, bone and antler objects (with split based points), and deer-teeth pendants.

In conclusion, whereas the use of traditional classification systems, together with attribute analysis and in particular the study of *chaînes opératoires*, are essential for documenting and reporting the results of excavations and surveys, the naming of the industries should be done carefully. We must avoid hasty, unfounded long-distance correlations that without justification suggest expansions of prehistoric cultures or migrations. Even the alternative view, which advocates that the assemblages are solely expressions of adaptive strategies within a given environment, does not forego the naming of the industries. Once named, we tend to combine those industries that bear the same label in order to create a more complete regional picture of prehistoric lifeways.

A BRIEF SURVEY OF THE GEOGRAPHY OF UPPER PALEOLITHIC ENTITIES

Even a cursory survey of Upper Paleolithic entities in the Old World would reveal their particular characteristics. I do not reiterate the list of early Upper Paleolithic European cultures, which are well described in a rich body of literature (see Gamble 1999 and references therein for an updated survey in English; Djinjian et al. 1999, Straus 1996). Only a few points should be made.

In the interval of 40,000–30,000 radiocarbon years Europe underwent numerous changes. It is still possible that the earliest Aurignacian can be dated to ~42–39 Ka in the sites of El Castillo and Abrerda in northern Spain (Cabrera et al. 1997, Carbonell et al. 2000) and perhaps even in northern Italy (Kuhn & Bietti 2000). Whether or not the earliest dates of the Western European Aurignacian are ~40 Ka or only 38–36 Ka, it seems that this culture was created locally by the Cro-Magnons and later expanded into neighboring regions including the northeast corner of the Mediterranean coastal ranges.

Evidence of the Uluzzian, a derivative of the local Mousterian in southern Italy, and thus a phenomenon similar to the Chatelperronian, was recently found in southern Greece. The latest dates for this entity are around 30 Ka (Kuhn & Bietti 2000, Koumouzelis et al. 2001), indicating contemporaneity with the Aurignacian. However, the Mediterranean Levant (Goring-Morris & Belfer-Cohen 2002) presents an older, complex Upper Paleolithic sequence, which may bear upon the question of where the Upper Paleolithic revolution began. The earliest entity, often referred to as a transitional industry is known from two sites—Ksar 'Akil (Lebanon) and Boker Tachtit (Israel)—and its brief description follows.

The lower levels at Ksar 'Akil (XXIV through XXI/XX) contained a variety of flakes and blades, including a number of elongated Levallois points, obtained by knapping from convergent unidirectional cores. From the early to later levels these gradually shift to a design with parallel edges. Most of the products were obtained by soft rather than by hard hammer (Ohnuma 1988). The typical tool forms were scrapers, chamfered pieces, and burins. The upper levels (XX/XIX through XVI) were characterized by the appearance of blades and bladelets that

had been removed from crested bipolar cores with linear and punctiform striking platforms. The tool categories show high frequencies of end scrapers followed by backed pieces. Although not dated directly, by comparing the assemblages with those dated in Kebara (Bar-Yosef et al. 1996), the early phase at Ksar 'Akil is probably around 45–43 Ka.

In the second site, Boker Tachtit (Marks 1993), the refitted nodules uncovered in the lower layers (dated to 47–46 Ka) demonstrate how Levallois points were obtained from bidirectional blade cores. Among the tools, Emireh points (with the bifacial trimming of the butt) suggest that earlier observations by Garrod and Neuville (Garrod & Bate 1937, Neuville 1951) concerning the chrono-stratigraphic position of this point as demarcating the Initial Upper Paleolithic, was correct. In the uppermost layer at Boker Tachtit the core reduction strategy produced regular blades.

The next phase in the Levant, sometimes called Early Ahmarian, dates to ~43–38 Ka (Henry 1995, Bar-Yosef 2000, Bar-Yosef et al. 1996, Goring-Morris & Belfer-Cohen 2002 and references therein). Blank reduction was performed by manipulating cores with one or two platforms, and the major tool groups consist of retouched and backed blades and bladelets that include the El-Wad points. End scrapers are quite common, but burins are rare. Body decorations from that time were discovered in both Ksar 'Akil and Üçagizli (Kuhn et al. 2000).

The early radiometric dates in the Levant and the possible autochtonic shift in the core reduction strategies from the latest Mousterian (such as in Ksar 'Akil) to the Emiran (or the transitional industry) shows that this may have been the first phase of the Upper Paleolithic revolution (Copeland 1975). Although the genetic evidence indicates that the origin of modern humans was in sub-Saharan Africa, it does not tell us where the techno-cultural revolution took place. It could have been in South Africa, East Africa (Ambrose 1998a,b), the Nile Valley (van Peer 1998), or the Levant.

In South Africa, according to current chronologies, the capacity for modern culture appears and disappears in the Howiesons Poort (Deacon & Deacon 1999). Rarely do archaeologists consider population extinctions, but they may have occurred. The next phase, when the combination of traits among the stone tools and the site spatial arrangement indicate modernization is in the late Middle Stone Age ~30 Ka (Wadley 2001). In addition, the shift to the Late Stone Age occurred only around 20 Ka.

In the case of the Kenyan site (Ambrose 1998a,b), whereas the evidence may show early manifestations of body decorations around 40 Ka, the available data do not indicate a primacy over the earlier sites in Eurasia. This could have been the result of ambiguities in dating and the calibration of the dates earlier than 30 Ka (Klein 2001a,b).

In the Levant human fossils from this period are lacking, but it is assumed that the two early entities were the creation of modern humans, as their contexts contain decorative elements crafted from sea shells (Kuhn et al. 2001). The near-modern human skeleton was discovered in Egypt. The quarry site of Taramsa 1, in the

mid–Nile Valley, produced a skeleton buried in a sandy deposit, and Middle Paleolithic industry dated it to ~80–50 Ka (Vermeersch et al. 1998). However, the lithics of a later exploitation of the site, dated to 38–37 Ka, demonstrated transitional characteristics similar to the Levantine Initial Upper Paleolithic. These finds may indicate that the shift from the Middle to the Upper Paleolithic in this region—as expected from the genetic evidence and the entire suite of African fossils (Deacon & Deacon 1999; McBrearty & Brooks 2000; Stringer 1998, 2001; Howell 1998)—was produced by modern humans, who originally emerged some 300–100,000 years ago (Harpending et al. 1998).

In most of central and northern Asia, from the Ural Mountains to Mongolia, Upper Paleolithic sites occur (Vasil'ev 1993, Derev'anko 1998). Analysis of the available radiocarbon dates (Kuzmin & Orlova 1998) indicates that the same time trajectory of the expansion of the Upper Paleolithic is recognizable. It first appeared in the western part (Altai mountains) and later in the eastern sector. The typical blade industry had seen a shift toward the production of bladelets from microblade cores around 20–18 Ka. The bearers of this type of industry also exploited the environments of Mongolia and northern China and moved across Beringia to colonize North America (West 1996 and references therein; Goebel et al. 2000).

Information on Upper Paleolithic contexts in southern Asia is relatively flimsy. There are blade-dominated Upper Paleolithic assemblages and they stratigraphically follow the Middle Paleolithic (Murty 1979, Ghosh 1993).

The vast region of Southeast Asia did not witness the shift in knapping techniques. The Hoabinian is generally a flake dominated industry (Allchin 1966; Anderson 1990, 1997). Similar flake industry was uncovered in most sites in southern China that are dated to the time of the Upper Paleolithic. With current knowledge, one can separate the Middle from the Upper Paleolithic only when bone tools are present. The production of blades, and later of microliths, characterizes the very late Pleistocene prior to the emergence of agriculture.

WHAT CONSTITUTES MODERN BEHAVIOR?

The debate concerning the nature of the Upper Paleolithic revolution, which changed the evolutionary course of prehistoric foragers forever, centers on the issue of modern behavior. This is a fuzzy definition, and almost every researcher who has written about the subject arrives at a slightly different list or combination of behavioral attributes. The question is also phrased as, can we see Upper Paleolithic hunting and gathering societies as the ancestors of those known to us from ethno-history?

The list of cultural attributes, features in sites, and intersite relations either as part of one social system or as part of an interaction sphere are all taken into account. However, if one introduces the genetic evidence as Renfrew (1996) did, then from at least 60,000 to 30,000 B.P. our species expanded across the entire Old World and was on its way to the Americas. There are no other subspecies involved,

and even if the issue of hybridization with the Neanderthals or any other unnamed groups is not fully resolved, the conclusion is that the Upper Paleolithic revolution reduced the number of human species to one. By comparison to 2.5 million years of evolution, the changes during the Upper Paleolithic had ensuing dramatic effects on world prehistory. All scholars agree that language plays a major role and that it probably evolved in time (Wynn 1991, Trask et al. 1998). Communication facilitated everything from transfer of technologies to long-distance exchange. This in turn had effects on subsistence economy and therefore led to population growth.

Indeed, most researchers agree that the larger the number of archaeological attributes that can be assembled to designate an Upper Paleolithic context, the clearer will be the markers of this human revolution. If we reexamine the list above, we may end up with only a few traits such as distinct intrasite spatial organization, the presence of beads and pendants, and the production of bone and antler tools and objects. Others would only reflect regional variability, important by itself, such as grinding stones and mobile and rock art, but can hardly be employed on a global scale. We should also be ready to accept that the capacity for the modern culture of *H. sapiens sapiens* could have been adopted, even if not for long, by others such as certain groups of Neanderthals in Arcy sur Cure. In the same flexible interpretation of cultural evolution and population demise, we may view the case of the Howeisons Poort as a historically accidental appearance of a somewhat similar combination of material elements to those of the Upper Paleolithic, but it ultimately had no impact on the general trend of human evolution. Only around 50,000–45,000 years ago did the Upper Paleolithic revolution begin. The cause remains a highly debatable subject.

CAUSES OF THE UPPER PALEOLITHIC REVOLUTION

There are primarily three approaches to the study of the causes and the early course of the transition from the Middle to the Upper Paleolithic. There is a wide range of variability among researchers, and this summary is rather schematic.

The first approach suggests that there were gradual cultural changes from the late Middle and the Upper Pleistocene—an accumulation of material and behavioral traits finally leading to the formation of Upper Paleolithic social and cultural constructs. In short, these scholars see no revolution in either Eurasia or in Africa (e.g., Lindly & Clark 1990; Clark 1997a,b; McBrearty & Brooks 2000).

The second approach considers the shift from the Middle to the Upper Paleolithic as taking place more or less contemporaneously in most of the regions of North Asia, the Near East, and Europe. Supporters of this approach are split between those who see the change as accomplished by local populations (i.e., in Europe by the Neanderthals) (Straus 1996, Derev'anko 1998, Otte & Kozlowski 2001) and others who view the final establishment of the Upper Paleolithic as solely an *H. sapiens sapiens* achievement.

The third view stresses the origin of this revolution in a core area and its dispersal by human groups who share the same social system and means of communication and who carry the essential components of the new technology into new territories. Proponents of this model view the cultural revolution as triggered either by a biological change or by techno-typological and socio-economic circumstances. As this approach is currently at the center of heated debates, I begin with the review of the biological aspects.

The main proponent of the need for an additional mutation, a neurological change in the human brain to explain the capacity for modern behavior, is Klein (1995, 1999, 2001a,b). In his view only this change brought about the socio-economic restructuring that is documented in the archaeological records across the continents. His explanation takes into account what was earlier called "Out of Africa 2" (Stringer & Gamble 1993), which posits that modern humans dispersed from Africa some 60,000–50,000 years ago. Hence, according to Klein it was only after 50,000 years ago that humans possessed and expressed the markers of modern behavior.

While colonizing Eurasia and Australia, modern humans most likely gradually replaced the local nonmodern populations such as the Neanderthals. The latter, based on only three ancient DNA samples (Feldhofer cave in Germany, Vindja in Croatia, and Mezmaskaya in the Caucasus, Russia), are known to differ from modern humans (Krings et al. 1997, 2000; Ovchininkov et al. 2000). In addition, current genetic evidence for the modern-day European population indicates that there may not have been mixing between the entering Cro-Magnons and the local population (Semino at al. 2000).

Therefore, although brain volume of 1200–1700 cc was measured among Neanderthal skulls, which is within the range of *H. sapiens sapiens*, it seems that neither the volume nor the calculation of the neocortical ratio (Aiello & Dunbar 1993, Dunbar 1993) disclose the nature of the differences between both human morpho-types. Nor could the limited evolution of the frontal lobe or the role of the location of the sphenoid (D.E. Lieberman 1998). In addition, the definition of Neanderthal fossils outside the classical region of western Europe, such as the Levant, is open to disagreement (Arensburg & Belfer-Cohen 1998, Trinkaus et al. 1998, Rak 1998, Stefan & Trinkaus 1998, Akazawa et al. 1999).

Earlier views on the importance of the position of the larynx in relation to the base of the skull were modified following the realization that archaic modern humans such as those found in the Qafzeh and Skhul caves in Israel could have had the ability to speak like moderns (P. Lieberman 1998).

By reference to contemporary studies of general trends in human brain evolution it was proposed that a complex internal circuitry evolved between the separate sections of the brain, mainly in order to increase efficiency in the social information processing that was essential for survival in variable environments under fluctuating climatic conditions. Among the most effective means would be language, and not surprisingly the emergence of language is seen as a determinant factor. Whether following Chomsky or Pinker in their views of genetically programmed "universal

grammar" or "language instinct," the question that remains open is whether it was a one-time biological change or a long building process (Pinker 2000).

This brings us to the issue of the creation of the storage of symbols as suggested by Donald (1991) that leads to the emergence of modernity. In this proposal, as in others, the imagery from the west European Upper Paleolithic arena and the body decorations play a major role. However, as mentioned above, this region differs considerably in its artistic expressions from most other provinces of the Upper Paleolithic world. A similar view is held by Deacon (1997), who sees the appearance of such symbols as occurring within a social system, but not necessarily as the crucial evidence for claiming its correlations with the sudden emergence of language. Along a somewhat similar line of thought, Gibson (1996) suggested that the Upper Paleolithic was a cultural revolution triggered by technological changes among people who long possessed modern neurological and cognitive capacities. However, for Mellars (1989, 1996b), judging from the shift in material components as described above and the appearance of imagery as well as beads and pendants, fully modern language and symbolic expressions emerged at or slightly prior to the Upper Paleolithic.

The efforts to explain the differences between the Middle and Upper Paleolithic manifestations as biologically determined continue with proposals concerning the brain's modularity structure. Mithen (1994, 1996) suggested that Neanderthals had domain-specific intelligence. According to this model, the Neanderthals' domains of intelligence—in which information concerning nature, social interaction, and technology were processed—shared little between them, as opposed to modern human brains, in which all fields of information are coordinated. This modern domain-sharing intelligence could have happened only if the additional neurological change in the brain took place as suggested by Klein (1995, 2001a,b).

Both the second and third approaches above address issues of behavior. Most scholars agree that the material elements (stone, bone, antler technology, exchange, site structure, etc.) and symbolic components (red ochre, mobile imagery, burials) reflect a change in behavior. Some of these tools, techniques, and inferred behaviors, which characterize *H. sapiens sapiens*, are also known from various sites of Middle Paleolithic age, as mentioned above. For example, bone tools are known from the Middle Stone Age Bloombos cave in South Africa and the Chatelperronian contexts of Arcy sur Cure, and intentional burials were practiced both in Europe and the Levant in Mousterian contexts. However, the point to be stressed is that these and other traits such as blade production and the collection of marine shells appear as sporadic phenomena during the late Lower and Middle Paleolithic but become regular cultural components after the Initial Upper Paleolithic from about 45 Ka and during the course of the ensuing millennia.

Using a Marxist approach, Gilman (1984), following a summary of the available evidence at the time of writing, proposed this view: Starting with the stylistic manifestations in the Upper Paleolithic contexts, he stressed that such innovations could only reflect social changes. Gilman accepted the earlier suggestions by Wobst (1976), Conkey (1978), and White (1982) that changes increased corporate

solidarity, the development of closed mating systems, and the overall appearance of prehistoric ethnicity (i.e., cultures in the traditional sense). Incorporating these aspects within alliance theory, he proposed that the changes resulted from the developing forces of production. The environmental conditions and cultural processes during the Upper Pleistocene led to a population increase and, hence, further competition between social groups. Restricting the scope of the alliances and increasing group cohesion through ceremonies resulted in more sharing, storage, and technological innovations, and therefore a decrease in subsistence failures. This process would result in further population increase. The pace of the change would be slow, and therefore the Upper Paleolithic revolution occurred over a relatively long period but ended with "significantly qualitative changes" (Gilman 1984, p. 235). Egalitarian foragers, in the course of the changes in the social forces of production, in this model, develop complex social systems. The merit of Gilman's approach is the importance he places on social organization as a demographic pressure that leads to revolution.

The demographic aspects are currently favored by numerous researchers who see a population increase during the late Mousterian. For example, in Europe the impact of the harsh glacial conditions of Oxygen Isotope Stage 4 (OIS 4) on confined territories was probably the cause for a population bottle neck (Richter 2000, Shennan 2001). The ameliorated environmental conditions during OIS 3 (~65–24 Ka) indicate an alternation of warmer and colder periods (van Andel & Tzedakis 1996). This climatic scenario may explain the population growth among Eurasian Mousterian groups as evidence for greater techno-typological variability among the lithic industries as expressing the increase of social intensification (Shennan 2001) as well as the need for widening the diet breadth (e.g., Stiner & Kuhn 1992, Stiner et al. 1999); hence, the authors emphasize the role of climatic fluctuations in what has generally tended to be a socioeconomic model. However, whether the environmental changes in Eurasia caused the onset of the Upper Paleolithic revolution depends on what each investigator views as the course of the social and cultural changes.

In partial accordance with the approach that mixes climatic conditions and the history of social structures, I have suggested elsewhere (Bar-Yosef 1992, 1998) that the models available for explaining the Neolithic revolution could be used in constructing hypotheses for the Upper Paleolithic revolution. One of the main advantages in employing the agricultural revolution is the direct relationship between the Near East and Europe, resembling the geographic spread of the Upper Paleolithic across Europe (Figure 1). In addition, the improved data sets for the transition to the Neolithic, collected from a well-defined region, demonstrate temporal and spatial trajectories. The main points to be learned from the Neolithic revolution are the following:

1. The Neolithic revolution was set in motion by *H. sapiens sapiens*, a single human species, and does not coincide with any biological change. The major shifts in technology—tools (forms and function), tilling the land, food

preparation techniques, domestication of goat, sheep, cattle and pig—that led to major changes in diet as well as living conditions resulted in impacts on human body size, health, and the ability to digest dairy products (Cohen 1989, Durham 1991).

2. Prior to the Neolithic revolution a major increase in population after the Last Glacial Maximum was recorded from numerous regions, as well as shifts in settlement patterns including the emergence of sedentism [~14,500 cal. B.P., a cyclical phenomenon known from earlier Upper Paleolithic sites (Bar-Yosef 2001)]. It seems that the climatic crisis of the Younger Dryas (12,900–11,600 cal. B.P.) affected basic subsistence strategies of the sedentary Natufian population in the Levant (Belfer-Cohen & Bar-Yosef 2000).
3. Alternative food acquisition strategies, such as increased mobility, forced a change in social structure among the Late Natufian people. For example, in the marginal semiarid Sinai Late Natufian groups improved their hunting techniques through the invention of the Harif point, a more efficient arrowhead (Goring-Morris 1991). Hunting, as well as gathering plant food, is reflected in the animal bone assemblages, grinding stones, mortars, and cup-holes. Large collections of marine shells testify to long-range exchanges with both the Red Sea and Mediterranean shores (Bar-Yosef 1991), probably in order to support group alliances.

   The main onset of agricultural activities occurred in the northern Levant. There, people started to cultivate the wild cereals and legumes (Hillman 2000), which were already their basic staple food, along with other seeds, fruits, roots, and game animals in the region since at least 21 Ka cal. B.P. (Kislev et al. 1992). Hence, early farming communities, labeled as Pre-Pottery Neolithic A (PPNA) (~11,600–10,500 cal. B.P.) were established within the Levantine Corridor (Bar-Yosef & Meadow 1995; Cauvin 2000).
4. Population growth is documented in the size of the early (PPNA) villages. It was the consequence of enhanced sedentism, predictable supplies of weaning foodstuffs from cereals, and reliable food resources ensured by storage. Therefore, a longer period of fertility for the better-fed women is expected (e.g., Bentley 1996). Large villages became viable biological units and reduced the need to travel substantial distances to find a mate. The sense of territoriality and ownership grew, sustaining the more complex social alliances and leading to redesigned cosmologies as described by Cauvin (2000).
5. The ongoing process of change once intentional cultivation began continued with the domestication of goat, sheep, cattle, and pig that took place during the Pre-Pottery Neolithic B period (PPNB) in the context of sedentary and semisedentary farmer-hunter villages. Corralling and tending wild animals was initiated in the hilly flanks of the Taurus/Zagros (e.g., Legge 1996, Martin 1999, Hole 1996, Zeder & Hesse 2000), where these animals had been hunted for many millennia by local foragers. It was before the completion of the biological changes, expressed in morphological traits, that goats, cattle, and

other animals were transported by seacrafts to islands such as Cyprus (Vigne et al. 1999).

6. Population increase resulted in active emigration into central Anatolia (9000–8000 cal. B.P.), Thessaly, and the islands of Cyprus (8,600 cal. B.P.), Crete, and others (Ammerman & Cavalli-Sforza 1984, Cavalli-Sforza et al. 1993, van Andel & Runnels 1995, Peltenberg et al. 2001). It is also conceivable that the Nile Delta was colonized by sea at a later date (~8000 cal. B.P.).
7. The dispersal of the new economy, either as a partial or complete "agricultural package," occurred in a few ways. The eastward transmission to the Zagros foothills, from Kurdistan in the north to Khuzistan in the south, probably occurred without major displacements of human communities, but rather by adoption. Evidently, in this area the same microlithic Late Paleolithic tradition lasted into Neolithic times, indicating that the flint knappers were not replaced (Hole 1989, Kozlowski 1999).
8. The spread of the Neolithic economy westward took two paths: one through the Balkans and the Danube river valley and the other through coastal navigation and colonization. It was a long and complicated process, and there are various opinions concerning who were the Near Eastern farmers and where local Mesolithic foragers adopted agriculture through acculturation and imitation (Cherry 1990, Ammerman & Cavalli-Sforza 1984, Renfrew 1987, Zvelebil & Lillie 2000). The eastward expansion of the agricultural package reached the Indus Valley within 2000–1500 years.

In conclusion, the current archaeological, archaeobotanical, and plant genetic evidence confirms that the core area of the Neolithic Revolution lay in the Levantine Corridor—the western wing of the Fertile Crescent. The advantage of this model of the Upper Paleolithic revolution is that it removes the biological factor from the debate and centers instead on a population in an unknown core area that for local reasons (either climatic, social, economic, or all together) generated the initial step in the techno-typological and social revolution. Probably, in contrast to cases such as the Howeisons Poort, this social entity was large, viable, and successful and started spreading relatively fast as colonizers and distributors of new techniques.

CONCLUSION

To avoid misunderstanding I begin with the terminology. Upper Paleolithic, like Neolithic, is a term that designates a time period and not an economy or social structure. These terms were coined before radiometric chronology was available. The Chatelperronian is Upper Paleolithic in age, but it did not result, as we might expect from a so-called transitional culture, in turning into a new socio-economic structure. The origins of the Aurignacian are not rooted in the Chatelperronian but in a different entity that inhabited a region outside western Europe. If we want

to retain the term Upper Paleolithic as synonym for the new regime, we should reserve it solely for contexts in which the archaeological sequence demonstrates the transition from the Mousterian or Middle Stone Age to the new entities—those that later evolved into the more recent cultural manifestations of the Upper Paleolithic period, including mobile and rock art, body decorations, and later the microlithic industries. The acceptance of such an approach would sideline discussions about whether Neanderthals had the capacity for modern behavior. Even if they had, most or all of them did not survive beyond 30–29 Ka. The same would be true for North Africa. The Aterian, although produced by some form of modern humans, did not survive, and there is no evidence for a transitional phase in this region. The bearers of the blade-dominated and microlithic industries in this region could have been the descendents of the local Aterian population, but given the genetic evidence, they more likely originated from the same sub-Saharan parent population of all *H. sapiens sapiens* (Wengler 1997).

Figure 1 shows a selection of radiometric dates that indicate an east-west "wave of advance" of the Upper Paleolithic revolution, a term borrowed from Neolithic studies (Ammerman & Cavali-Sforza 1984). As mentioned above, with the progress in field research in central and northern Asia one may expect a similar trajectory. The same accounts for improved dating. Once certain ambiguities concerning the calibration of the dates in the range of 40,000–30,000 years ago are satisfactorily resolved, better maps can be drawn.

Most scholars accept that modern humans came out of Africa. Ideas diverge about the meaning of this movement or movements. Evidently, Australia was colonized some 60,000 years ago, prior to the onset of the Upper Paleolithic revolution. There could be a variety of explanations for the early dispersals. One could suggest an expansion of modern humans from southern Asia into Australia, who were innovative—being on their way to a continent that was still separated from southeast Asia by a 100-km waterway. Hence, the idea that water crafts were constructed, either boats or some sort of raft, has been proposed (Davidson & Noble 1992). Another possible explanation is that modern humans who were already present in the Levant during the Last Interglacial made their way into Asia, and like their contemporaries in Africa and eastern Asia, initiated technological and social changes that enabled them to get to Australia. The lack of evidence from the vast portion of southern Asia hampers better resolutions to this issue.

As mentioned above, there are two views about what modern humans carried with them as they left the African continent. According to those who believe the Upper Paleolithic revolution took place in Africa, modern humans were already equipped with the essential techno-cultural elements that characterize the Upper Paleolithic. These investigators believe the exit was earlier and the increasing population in Eurasia was caused by the incoming moderns from Africa. Each of these hypotheses, whether implicit or explicit, points to a core area in Africa as the source and the cause of the change.

Demographic factors are accepted as the trigger for the change by scholars who interpret the evidence on the basis of regional sequences. According to this view, the

Late Middle Paleolithic incubated the upcoming changes. In Europe the increasing variability of the lithic industries immediately following the harsh conditions of OIS 4 (~75–65 Ka) considerably reduced the habitable areas, decreasing the size of the population and therefore triggering the need for social intensification (Richter 2000). Indeed, during OIS 3 (or the pleniglacial) Neanderthal populations grew. This process is represented by the increasing techno-typological variability among late Mousterian industries and expresses territorial competition that caused the need for change. The new socio-economic structure was achieved by the Upper Paleolithic revolution. This model is similar in its basic ingredients to the Neolithic model presented above. As much as the Neolithic model is not fully adopted by all researchers, neither is the proposal that the population increase in Europe was an independent factor. One thorny issue is why, with competing Neanderthal societies, is there no evidence for the use of some sort of body decoration for self-awareness and group identity?

Ecology plays a minor role in most of the debates. The realization that Neanderthals survived in Europe under various climatic fluctuations in both the temperate and the Mediterranean belts limits the discussion to particular regions, availability of food resources, hunting techniques, etc. In addition, numerous animal bone analyses indicate that the bearers of the Mousterian industries were reasonably successful hunters. The difference could have been between intercept hunting, which required getting close to the target, and the use of spear throwers or bows. It appears that time allocation among Upper Paleolithic hunters was either short by comparison to the Mousterian foragers or that the returns were higher owing to better communication and information storage, as well as improved hunting gear.

The issue of the capacity for modern behavior or modern culture, and the evolution of cognition, will continue to play a major role in the debates on the nature of the Upper Paleolithic revolution and the ensuing cultural changes. From a list of independent attributes it seems that researchers will be willing to settle for particular combinations. Among these the aspects of communication, symbolic expressions for information storage, self awareness and group identity, new hunting tools, and a clearer daily and seasonal spatial organization of activities that reflects an accepted social organization would be the prime components or antecedents to ethno-historically known foraging societies. These were the elementary achievements of the Upper Paleolithic revolution gleaned through the archaeological perspective.

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