

INVESTIGATING HUMAN ADAPTATIONS IN THE EARLY UPPER PALEOLITHIC

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ABSTRACT

The early Upper Paleolithic remains in an ambiguous position in the current state of archaeological research. The fundamental issue appears to be one of continuity vs. replacement. Both physical anthropologists and archaeologists have applied themselves to this question, each with equivocal results. Neither molecular biology nor osteological anatomy can definitively determine the phylogenetic relationships among archaic and modern populations. The associations of typological or technological analyses with either of these populations are also unclear in their meanings. The question here might best be how we are to proceed in the most unambiguous manner to understand the nature of early Upper Paleolithic adaptations and the role of those adaptation in evolution from the Middle Paleolithic and on into the later Upper Paleolithic.

HOMINIDS OF THE MIDDLE AND UPPER PALEOLITHIC

A basic question regards the hominids themselves. Are simple differences in hominid taxonomy sufficient to explain differences in human intellectual capacity and evolutionary success? Physical anthropologists are working with new discoveries, dating techniques and analytical procedures to try to understand the evolutionary position of Neanderthals vis a vis anatomically modern humans. Were the Neanderthals part of modern human ancestry, or were they reproductively isolated from contemporaneous modern populations, an evolutionary side branch or dead end? Recent studies of Neanderthal DNA at Feldhofer (Krings et al. 1999) and Mesmaiskaya (Ovchinnikov et al. 2000) suggest fundamental differences in the genetic make-up between those archaic hominids and modern populations. This has been used to strengthen arguments that the Neanderthals were an evolutionary dead end, not contributing to our gene pool. It helps distance them from us, and emphasizes inherent differences. In evaluating potential differences between Neanderthal populations and supposedly incoming anatomically modern human populations, it might be more appropriate to compare the Neanderthal DNA with that of the early moderns rather than today's moderns. Since early anatomically modern populations are well-dated in Western Asia, ca. 92,000 years ago, and antedate local populations considered to be Neanderthals, ca. 50,000 years ago, hypotheses have arisen that consider them either as parts of a single, highly variable population or as distinct populations. Holliday (2000) examined postcranial morphology of the varied Levantine hominids from Qafzeh and Skhul (anatomically modern) and from Amud, Kebara and Tabun (Neanderthal). He determined that they were morphologically distinct; the anatomically moderns had tropically adapted body proportions, suggesting African origins, while the Neanderthals had cold adapted body proportions, suggesting European origins. Neither of these studies fully address the question of whether Neanderthals were at least some part of modern human ancestry.

The discovery of a child's burial at Lagar Velho, Portugal, dating to ca. 24,500 BP, presenting a mosaic of early modern and Neanderthal features, has led the investigators to interpret it as a hybrid of archaic and modern populations (Duarte et al. 1999). This would emphasize continuity in human occupation of Western Europe. What these paleoanthropological studies all seem to lack is an integration of anatomical and genetic information from hominid fossils with archaeological evidence of behavior.

What accounts for the sudden success of anatomically modern humans in Western Europe? They had arguably originated over 100,000 years ago in Africa, and were occupying the Near East by 92,000 years ago. We do not, however, see much evidence for incursion into colder glacial climates of Europe prior to 40,000 or 50,000 years ago. The fossil record clearly shows at least 10,000 years of contemporaneous Neanderthals and anatomically modern humans in Western Europe. Were new behavioral capacities inherent and explicit in anatomically modern *Homo sapiens sapiens* or were they acquired sometime after the origin of these modern fossil forms? There appears to be some divergence of opinion about the correlation of intellectual capacity with its expression in behavior.

On one side of this issue, Tattersall (2000:15) stated that "Given the fact that externally modern human brains had been around for 60 kyr or more before we have unequivocal evidence for the exercise of modern human cognition, it seems most reasonable to conclude that a behavioral potential was born with modern human anatomy that was only exploited much later in time." On the other side, Klein (1998, 1999, 2000) suggested that, while anatomically modern *Homo sapiens sapiens* had evolved in Africa some 200,000 to 100,000 years ago, behaviorally modern humans did not spread out of Africa until some 50,000 years ago. The early anatomically modern humans, such as the populations at Skhul and Qafzeh, produced Middle Paleolithic tool industries and apparently practiced a Middle Paleolithic life style. Later populations (another out-of-Africa emission?) possessed some neurological change, undetectable in preserved

fossil materials, which allowed language enhancement for more efficient communication, with greater and more successful dependence on culture for adaptation. Unfortunately for the prehistorians and paleoanthropologists investigating this question, an undetectable change is a moot point. As students of evolution, we must understand that selective pressures and principles operate on the phenotype, not the genotype. Unexpressed potential is epiphenomenal for our purposes of understanding important evolutionary changes in human adaptation. How might we best go about investigating pertinent, observable information? What do we need to know?

ARCHAEOLOGICAL METHODS FOR EXAMINING THE TRANSITION

Traditional paradigms in archaeology relied on typological analyses of stone tool industries to monitor past human behavior. We have already noted the use of Middle Paleolithic tool industries by purportedly anatomically modern humans at Skhul and Qafzeh; the clear associations of Upper Paleolithic tool industries with Neanderthal fossil material at St. Cèsaire and Arcy-sur-Cure reinforce the difficulty of using either lithic typology or hominid fossils for answering questions about the Middle to Upper Paleolithic transition. More recently, Kuhn et al. (1999) noted that the earliest Upper Paleolithic of the Near East exhibits combinations of elements from the Middle Paleolithic Levallois and Upper Paleolithic blade technologies. This choice of artifactual material to examine, while based on the abundance of artifactual remains, nonetheless leaves us in a quandary when it comes to assigning meaning to variability. The classic debates of Bordes (1961) and Binford (Binford and Binford 1969) have been rendered somewhat moot by Dibble's (1987) demonstration that the typological units of observation may be in and of themselves misleading. Bisson contended that "research on Neanderthal and other Middle Paleolithic hominid behavior is now becoming stalled... (because) the fundamental units used to describe the Middle Paleolithic assemblages, the tool type definitions of François Bordes, are seriously flawed" (2000:2). Kuhn (1995) looks askance at the relevance of studies of lithic artifacts, and particularly of typology, for understanding Middle Paleolithic adaptive behavior.

Where are we to turn? Perhaps the most direct way of investigating of adaptation and evolution is to look at subsistence. Bisson looked beyond lithic typological analysis to "evidence for subsistence practices derived from faunal and floral as well as technological data" (2000:42). As I have noted elsewhere, "Subsistence is the basic adaptive mechanism that combines behavior with technology" (Enloe 1993:102). This deals with the results of behavior that are materially evident in the archaeological record. Faunal analysis deals with the ecological base for adaptation. It is arguably a more soundly based methodology for attaching meaning to variability in the archaeological record than are stone tool typologies. We do not have to make unwarranted or untestable assumptions about innate intellectual capacity or neural organization that is not preserved in cranial endocasts.

A number of programmatic statements have been asserted about the nature of the early Upper Paleolithic, but rarely have convincing data been used to substantiate the claims of that

fundamental essence of the culture and evolutionary success of those early modern humans in Europe. In the 1970's and early 1980's, the Great Transition was seen as occurring between the Middle and Upper Paleolithic (S. Binford 1968; Mellars 1973, 1979; L. Binford 1982; White 1982, 1983), with clear contrasts between the intellectual capacities and evolutionary success of Neanderthals and those of modern humans. Some authors (e.g., Simek 1987) have tried to link those differences to models derived from modern hunter/gatherers (Binford 1980), contrasting foragers with logistical collectors by using many of the criteria Mellars (1973) put forth to contrast the behavior of Middle and Upper Paleolithic humans.

A countercurrent in the early 1980's emphasized greater continuity between the Middle Paleolithic and early Upper Paleolithic (Trinkaus 1983). New fossils and new dates on archaeological sites have emphasized that not only was there great continuity from the Middle to early Upper Paleolithic, but there was indeed substantial chronological overlap in the occupation of Europe by Neanderthals and modern humans. Straus (1983) contended that most of the great contrasts indicated by Mellars in his classic 1973 article were more appropriate for contrasting the Mousterian with the Magdalenian, the chronological poles of the Transition. The differences between the late Middle Paleolithic and the early Upper Paleolithic were nowhere as marked as Mellars or White had suggested (Enloe 1993; Straus 1983).

Much of that intellectual legacy remains with us still. Mellars argued that, while late Middle Paleolithic people were hunting large animals, their "pattern of exploitation was in at least certain respects significantly less systematic, less intensive and less 'logistically organized' than that practiced by many of the later, Upper Palaeolithic communities in the same region" (1989:357). He contrasted the late Middle Paleolithic with early Aurignacian sites, dating around 34,000 to 32,000 BP, with exceptionally high reindeer frequencies (95-99%), concluding that there was a significant shift toward a more specialized pattern of exploitation of animal resources coinciding with the transition. This would imply that the major transition, in subsistence as well as in lithic typology and technology, occurred between the Middle and Upper Paleolithic.

FAUNAL ANALYSIS

But if we are to examine the organization of subsistence systems, productive faunal analysis must go beyond looking at species lists or even single-species domination. Stiner (1993:66) raised the question of whether predatory adaptations can be consistently distinguished on the bases of species eaten. We need to examine how prey species were taken, processed and consumed. Considerable recent archaeological research has been focused upon the late Magdalenian sites to elucidate the nature of potentially more complex subsistence behavior (e.g., Straus 1995; Audouze and Enloe 1997; Enloe 1997, 1998; Costamagno 1999), but relatively little has investigated the organizational complexity of the Upper Paleolithic during and prior to the late glacial maximum. If we are to understand the nature of the early Upper Paleolithic, we must address those issues of patterns of exploitation for various species. Are there

specialized treatments of certain species, particularly of reindeer, as Mellars suggests are indicative of specialized, logistical subsistence organization? A number of faunal analyses from southwestern Europe will be used as examples of how this question might be treated.

Pike-Tay et al. (1999) focused on the seasonality of kills and age group mortality profiles in Middle and Upper Paleolithic occupation levels at the sites of El Castillo, El Pendo and Cueva Morin in Cantabrian Spain. Similar sets of species were exploited in Mousterian and early Upper Paleolithic levels, including red deer, bovids, horse, roe deer, boar, chamois and ibex. They argue that the similarity of mortality patterns of prey animals in Mousterian and early Upper Paleolithic faunal assemblages indicates not that early Upper Paleolithic hunters were continuing basic Middle Paleolithic hunting strategies, but rather that Mousterians had already begun practicing modern patterns of effective hunting. They concluded that no abrupt transition is indicated by the faunal data, but that there was a gradual trend through time toward increasingly logistical economic strategies.

Faunal assemblages at the early Upper Paleolithic site of Abri Pataud in the Périgord were examined by Spiess (1979). He noted a numerical predominance of reindeer in almost all of the occupation levels covering some 15,000 years from Aurignacian to Proto-Magdalenian. The well-documented seasonality of the occupations was overwhelmingly winter, when few, scattered prey individuals were available to be hunted. Spiess concluded that cold season hunting at the Abri Pataud was practiced by small microbands. This is again consistent with unspecialized hunting.

Enloe (1993) examined the faunal assemblage an early Upper Paleolithic level of the Abri du Flageolet I in the Périgord . Level V is a Gravettian occupation, dominated by 95% reindeer. It overlies an early Gravettian level VII with 50% red deer, 36% reindeer, 8% bovid and several other minor species. Despite the overwhelming preponderance of reindeer, evidence for seasonality, age profile, sex ratios, skeletal element representation, cut mark location and bone breakage patterns indicate successive procurement of individual kills spaced throughout the winter and immediate consumption of the prey. The predominance of the reindeer in the faunal assemblage is most likely due to species availability in the vicinity of the site rather than to hunting and subsistence strategies. This non-logistical pattern strengthens the probability of continuity of late Middle Paleolithic subsistence organization into the Upper Paleolithic.

Grayson and Delpech (1998) further examined the variety of faunal taxa through the long accumulation of Aurignacian and Gravettian levels at le Flageolet I. They determined that there were basically two patterns of ungulate species representation, reflecting two distinctly different maximum diet breadths under different environmental conditions. While they did not examine differential patterns of carcass exploitation for the various species within these two diet breadth situations, they suggest that they do not reflect technological innovations. Grayson et al. (2000) extended this viewpoint throughout the duration of the Upper Paleolithic, using data from Grotte XVI. While the

Magdalenian assemblage consists of 94% reindeer, that is seen as the endpoint in a steadily increasing progression of reindeer dominance. This is contrasted, or caused by, a steadily decreasing progression of ungulate assemblage evenness. Both of these correspond to steady declines in summer temperature in southern France. While Grayson et al. did not suggest that human behavior innovations played no role in relative species abundance at Grotte XVI, they concluded that the numerical patterns can be explained by climatic changes alone. These are intriguing data and deserve a more zooarchaeological investigation of aspects of carcass treatment to determine if the occupants of the site merely incorporated relatively greater numbers of reindeer into their diet through the course of the Upper Paleolithic. The seasonality of occupations may be quite enlightening in that respect.

These rather anecdotal summaries of faunal assemblages from southwestern Europe indicates that continuity, rather than replacement or radical change, characterized the inception of, and much of the duration of, the early Upper Paleolithic. Subsistence organization was generalized, unspecialized even when numerically dominated by single species. When and under what conditions, then, did the behavioral transition take place?

THE GLACIAL MAXIMUM: CATALYST FOR CHANGE?

If we are going to understand when subsistence organizational transitions took place, we must look not only at the inception of the Upper Paleolithic and the end of the Upper Paleolithic; it is vitally important that zooarchaeologists begin to examine sites from the Pleniglacial. That time period of the late glacial maximum, around 18,000 years ago, would have offered the most rigorous and challenging environments for human adaptation, and would have offered the most severe natural selection pressure for evolutionary changes in the organization of subsistence behavior. Jochim (1987) argued that the glacial maximum reduced human subsistence territory, and led to economic specialization and intensification of big game hunting. What information do we have to examine that proposition?

The recent thesis of Jean-Christophe Castel (1999) included the analysis of faunal remains from several levels of two important sites, Cuzoul de Vers (Lot) and Combe Saunière (Dordogne). Both of these sites are deeply stratified, multiple occupation sheltered locations with good preservation of faunal remains. Castel argued that zooarchaeological analysis contributes to a direct reconstitution of daily life most pertinent to the basic subsistence adaptation of the Solutrean and Badegoulian occupations of these two sites. A wide variety of medium size species, with reindeer the most frequent, were taken and transported to each of these sites. Little information is available about the seasonality of kills at Cuzoul de Vers, but sparse data from reindeer dentition indicate winter to early spring occupation of Combe Saunière. This recent and reasonably intensive zooarchaeological analysis dealt with carcass treatment in a more comprehensive way than many older analyses. Fragmentation of phalanges is very great at Cuzoul de Vers and at Combe Saunière. Binford (1978) considered that

this is an index of subsistence stress, the extraction of the ultimate, getting every last bit of nutrition from the carcass. This is a curious contrast to the fragmentation pattern for metapodials. Castel suggested (1999:395, 397-398) that unbroken specimens were reserved for bone tool making. If the seasonality determinations, predominantly winter, are correct, one would expect that the metapodial marrow would be a significant fat resource (Speth 1983). The variations in carcass treatment may well be due, as Castel indicated (1999: 444), to the palimpsest nature of the archaeological accumulations. He concluded that technical as well as alimentary uses of the prey fauna must be considered. This includes the fabrication of tools from metapodial fragments and the use of epiphyseal fragments as combustible fuel. Winter kills and complete exploitation of almost all parts of the carcasses, as in several of the cases presented thus far, suggest a subsistence organization characterized by an accumulation of individual kills by a small group of humans. Thus, these sites do not support Jochim's (1987) expectation of increasing resource specialization, at least not during the glacial maximum. I begin to suspect that if a major organizational transformation took place, these data suggest that it might have occurred after the late glacial maximum, as climatic amelioration stimulated population growth and expansion into regions that had been abandoned during the extreme rigor of the Pleniglacial. It is, however, extremely risky to generalize from the small sample drawn from Castel's thesis, particularly since the restricted geographic area of southwestern France should not be used to characterize environmental variability and potentially differing regional adaptive patterns for the rest of the Upper Paleolithic during the glacial maximum.

The problem may be in the relatively small sample of sites from this time period which have been excavated and analyzed with modern methods, particularly as concerns zooarchaeological perspectives. This aperture upon direct subsistence activities is a key element in understanding the ecology of past human behavior. But it is only one part of the pattern. As lithic typology studies have shown themselves to be inadequate for a proper evolutionary perspective, faunal studies must be integrated with analyses of other classes of data. Castel (1999) called for better examination of the treatment of various skeletal elements of prey carcasses across space within archaeological sites, and an integration of distributional studies of fauna with similar studies of all other classes of data from those sites. Such integrative research programs are illustrated by Stiner and Kuhn (1992), Rensink (1995), Castel et al. (1998), Fontana (1998), Kuhn (1998) and Meignen et al. (1998). This research direction is, I believe, the key to moving beyond mere descriptions of animal exploitation modes or of lithic debitage and tool typology toward a dynamic and adaptive understanding of how sites and societies functioned in the Paleolithic. It is only from that point that we can move to an understanding of evolutionary processes and products.

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