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THE NEANDERTHALS AND THE HUMAN CAPACITY FOR SYMBOLIC THOUGHT: COGNITIVE AND PROBLEM-SOLVING ASPECTS OF MOUSTERIAN SYMBOL

by

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"There has been a growing interest in behavior or adaptive questions, questions that can be answered only by adding the results of functional anatomical studies and paleolithic archaeology to those accumulated by more strictly morphological, phylogenetically oriented research." (TRINKAUS, 1986: 194)

Recent discussions of modern human origins and the Middle/Upper Paleolithic transition have been based largely on certain classes of quantifiable data: a) morphological differences and similarities between regional groups of archaic *Homo sapiens* including the Neanderthals and evolving groups of anatomically modern humans (TRINKAUS, 1982, 1986; SMITH, 1985; WOLPOFF, 1986; STRINGER, 1982, 1985, 1987; VANDERMEERSCH, 1982); b) archaeological evidence concerning developmental, chronological shifts in subsistence strategies, technologies and home-site complexity (BINFORD, 1985; WHITE, 1982; MARKS, 1986 a, b; JELINEK *et al.*, 1986; MEIGNEN and BAR-YOSEF, 1986); c) and more recently genetic studies of mitochondrial differences and distributions among contemporary humans, suggesting the presence of an African, sub-Saharan origin for anatomically modern humans with subsequent dispersal (CANN *et al.*, 1987). TRINKAUS (1986), quoted above, does not include in his assessment of new inquiries to be added to a study of hominization the non-archaeological aspects of neurological, cognitive evolution. To the quantified data, therefore, one must add the rare and largely unquantifiable evidence for certain types of problem-solving, cognitive and symbolling behavior in Eurasia during the Mousterian and earlier periods, prior to the appearance of modern *Homo sapiens* in the region.

In recent years a number of comparisons have been made between the cognitive, symbolic data from the Mousterian period and that from the Upper Paleolithic (BLANC, 1961; S. BINFORD, 1968; HARROLD, 1980; CHASE and DIBBLE, 1987; WHITE, 1982, 1985, 1987). The different classes of data noted above (archaeological, paleontological, genetic and symbolic) have been used in various ways to address the problem of the relation or distance that may have existed between the Neanderthals and modern humans and to infer social, cultural and cognitive distance or relation between them.

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It should be noted in this regard that most of the rare and early examples of symbolic production available in the archaeological record, come from Eurasia and appear in that region **before** the appearance of anatomically modern humans. Very little archaeological evidence for complex forms of symbolic production occurs in the African areas of supposed *Homo sapiens sapiens* anatomical development during the period of the Eurasian Mousterian. It is significant as well that all of the data noted above and the inferences drawn from them are still, in large measure, in heated debate. It seems appropriate, therefore, that instead of again addressing these different classes of data and debating their relevance, some attention should be paid to what may be the fundamental problem in hominid evolution, i.e., the nature and content of the evolving set of human capacities. Capacity, in this sense, refers to the capacity for problem-solving, for learning productive skills and for modelling, abstracting and symbolling certain relevant aspects of reality. These are neurologically and psychologically separate capacities that are nevertheless used cojointly in mammalian cultural behavior. In such an inquiry the "Neanderthal problem" could be approached within a broad evolutionary frame rather than from within the confines of measurements made primarily within a Mousterian or a Mousterian/Upper Paleolithic frame.

In most comparisons of the two hominid groups made in the last century there has been an ethnocentric tendency to denigrate the Neanderthals as a regional, temporal, specialized subspecies with lesser capacity. The group was at first characterized as subhuman or a diseased form of humanity and more recently as an aberrant subspecies with lesser capacity. The group has been characterized as lacking in the ability to plan, to hunt large game, to maintain a complex culture and to speak or enunciate at a modern level (BINFORD, 1981, 1983, 1985; WHITE, 1982; JELINEK, 1977, 1982; LIEBERMAN, 1985). A recent survey of the Mousterian symbolic materials (DIBBLE, 1987) has concluded that, except for the numerous burials, symbolic traditions and symbolic thought were virtually non-existant among the Neanderthals.

There are a number of problems with such comparisons and studies. First, they do not deal adequately with the processes of incremental and historical development and with the changing rates of development that occur in human cultures, processes that in our era, for instance, are assumed to be separate from differences in cognitive capacity. One can, in this regard, mention the acquisition of Mousterian technology by anatomically modern humans and the subsequent historical development of new technologies from that Mousterian base. The apparent rate of cultural change evident at the transition cannot therefore be equated with any presumed genetic change in capacity, though there has been a tendency to do so. Of greater importance, such studies do not address the problem of **what**, apart from the much discussed changes in morphology, subsistence strategies, technology (and mammalian reproductive and nurturing behaviors [LOVEJOY, 1981]), evolved or developed during the three to five million year trajectory of hominization, beginning, apparently, with a stage of incipient bipedalism and proceeding through the stages of *A. afarensis, H. habilis, H. erectus*, and finally to the Neanderthals on the one hand, and anatomically modern humans on the other. If the Neanderthals were end-products of the same three to five million year process of hominization, then one must address the problem of **what** a developing "humanity" or the developed set of "human" capacities consisted.

If, as is common, we assume that hominization involved selection for a change in the capacity for culture and that one aspect of this process involved an increase in the capacity for two-handed, vision oriented, problem-solving – including the adaptive and "exaptive" effects that derive from that capacity (GOULD and VRBA, 1982) – then we must address the problem of hominization, in part at least, in terms of that capacity. One must attempt to explain the apparent regional and temporal specialization of the Neanderthals in terms of problem-solving capacities that were derived from a *H. erectus* base, and the subsequent development of a seemingly more complex *H. sapiens sapiens* capacity for culture and problem-solving, derived from a similar *H. erectus* base. As I have noted above, the problem cannot be adequately addressed by comparisons or measurements of behavioral end-products since by definition behavioral products describe aspects of historical, cultural context as much as they do aspects of cognitive capacity. I will discuss the problem at greater length below.

I have approached the theoretical problems involved by an inquiry into two areas within which significant evidence for diverse ranges of behavioral capacity have accumulated: a) by investigating the evolved primate capacity for certain types of problem-solving and symbolling and b) by investigating, as well, the Neanderthal and *H. sapiens sapiens* capacity for comparable but more advanced types of problem-solving and symbolling. For more than two decades I have engaged in a slow and careful, first-hand analysis of all the symbolling traditions of the European Upper Paleolithic, including a study of the Upper Paleolithic symbolling traditions made by a Mongoloid people, found at the site of Malta, Siberia. I have at the same time conducted a study of the rare, available symbolic materials from the Mousterian and the Acheulian. These studies have necessitated a major reevaluation of many traditional concepts concerning the origins, development and uses of early image and symbol and, at a more fundamental level, to a reevaluation of the capacities involved in these symbolling traditions.

THE PRIMATE BASE

In a number of recent papers (1984a, 1985, 1988a), I have discussed hominid evolution as a slow (though occasionally more rapid) mosaic process that involved selection for a unique set of cognitive, problem–solving capacities related to bipedalism and a developing two-handed, vision-oriented neurology.

Field observations of chimpanzees in the wild have shown that they use a range of materials and resources found within their territory and make a variety of tools to solve different types of problems. They acquire territorially and seasonally specialized tool-mediated strategies for the utilization of different resources. They strip twigs or stalks of their leaves to make probes for termite and ant fishing; they secure hammers of stone or wood of the proper weight or heft to break nuts of different size and hardness; they form sponges by chewing leaves that are then held in the hand to sop up water caught after the rains in tree notches. These are each seasonal, contextual skills that must be learned initially by observation and then by trial and error during maturation. They are cultural skills that are not practised by all chimpanzee groups, while individuals within a group differ in the capacity or motivation for use of these skills. Chimpanzees also learn to make nests for the night in trees, and to wipe their bottoms with leaves. The range of skills learned and utilized by chimpanzees in the wild requires that they evaluate materials, processes and contexts, but always in terms of the neurological, handed and conceptual capacities available to the species. Chimpanzees also opportunistically hunt a number of small mammals and occasionally have recourse to limited *ad hoc* group strategies organized for stalking an evasive prey. There are also organized efforts for territorial defense and aggression against diverse conspecifics. Within these situations there is contextual evaluation and problem-solving at a social or group level. Together, these potential capacities form a unique behavioral set that is in large measure dependent on a use of the hands and mediation by the eyes.

Selection near the beginning of hominization would probably have occurred for an increase in the range of these capacities and behaviors and would have occurred from within that pool of genetic variability already extant in a primate population, possibly under local or regional conditions of ecological, climatic or population change or stress. Under normal conditions, individual variation in the capacity to fish for termites, to successfully crack nuts, to sponge water, stalk small prey collectively or build a better nest, would not produce an adaptive or reproductive advantage. Individual variation in the neurology of these capacities assumes, of course, a general morphological species uniformity, though individual variations in morphology would have existed as well. Significant differences in individual capacity could not, however, be determined by morphological differences or measurement. Those differences in capacity that would, under certain conditions, have begun to be selected for as adaptive, would probably have existed at the level of functional neurology rather than at the level of observable or measurable morphology. At the point that significant morphological change begins to appear in the paleontological record, directional changes in capacity and behavior would already have begun to be established. Unfortunately, the archaeological, paleontological record begins only at this latter point.

We must add to the above set of capacities those **potential** capacities that are extant among the great apes but are never used in the wild.

Laboratory experiments to determine the capacity of the great apes for problem-solving, for "proto-language," and for inter and intra-specific communication have enormously broadened our knowledge of what I have termed the "potential variable capacity" (MARSHACK, 1984a, 1985), while documenting again the presence of wide individual variation in these capacities. Within the artificial culture and human context of the laboratory the great apes invent and learn a host of manipulative and conceptual problem-solving strategies that would never be attempted in the wild. The use of these capacities within the laboratory context does not, of course, affect the survival or reproductive success of the great apes being studied. But the presence of these "potential" capacities must be considered in any theory of hominization. In the wild the appearance of unusual circumstances or of new materials or resources will almost always result in individual or group adjustment to the changing context, often by devising innovative, vision-oriented strategies of handed manipulation. The documented instances of such innovative behavior provide a great part of the continuous fascination one finds in the literature on great ape behavior. None of these cognitive, problem-solving capacities can be determined either from studies of great ape morphology or, significantly, from the paleontological or archaeological record. This is not the place to discuss fully the biological and evolutionary ramifications of what I have termed the "potential variable capacity" of the great apes (MARSHACK, 1984a, 1985, 1988b). I will, however, touch on a few aspects of the problem that may have relevance for the processes of hominization and for our discussion of the Neanderthal/ *H. sapiens sapiens* problem.

Primate capacities, while incipient, are still far from those present in the hominid or the human. These primate capacities are important, however, since they were both selected for and changed during hominization. Tool-mediated, problem-solving behaviors by chimpanzees in the wild or in the laboratory tend to be essentially **one**-handed, visually mediated actions in which the primary, or preferred hand, either right or left, performs the specifying act, while the secondary hand, when it is used, serves a gripping or orienting function [1]. In making a fishing tool one hand holds the twig while the other strips the

[1] Studies of primate (monkey and great ape) handedness have attempted to address the problem of right/left hand preference in manipulation and possible asymmetric preference for "reaching" as an aspect right hemisphere visuospatial evaluation (MacNEILAGE *et al.*, 1987), but without reaching a consensus. Unfortunately, the sparse experimental data and the general lack of theoretical depth and procedural breadth in the experiments have constrained the value of the work for an understanding of the evolutionary problem. In adaptive two-handed problem solving at the hominid level, visual mediation and evaluation not only involve the orienting function of the secondary hand (an aspect of visuospatial evaluation), and the sequence of specifying actions performed by the primary hand, but a simultaneous evaluation of the materials being handled with an even broader evaluation of the context within which the action is occurring. Most primate studies of handedness are intended to measure single, discrete aspects of preference or competence in the belief that any evidence of asymmetrical behavior will inform about the complexity of the asymmetric two-handed capacity. Actually, the evolved human two-handed capacity functions within a neurological matrix involving complex hierarchical as well as asymmetric cortical and sub-cortical inputs and associations. The primate studies have generally not been concerned with the nature of speciation as an evolutionary process occurring from within parameters of both species and individual genetic variability.

leaves (though stripping can be done by the mouth as well). The act of fishing, however, is always done by **one** hand, the preferred hand. The more complex a manipulative problem becomes, however, the greater apparently is the tendency for one hand to perform and learn the full sequence of specifying problem-solving actions, while the secondary hand increasingly serves the changing sequence of grasping and orienting functions. Success in such manipulative problem-solving is, of course, both made possible and constrained by great ape morphology and neurology as well as by the nature and scale of the phenomenological reality being addressed. A chimpanzee, for instance, could not use both hands equally and jointly to peel a banana. One hand must peel while the other grasps and orients the fruit. These separate actions of the two hands (and sometimes of the mouth in peeling) are largely mediated visually. Hand/eye coordination and visual evaluation of the ongoing processes of manipulation and production are, in fact, among the central and crucial aspects of great ape capacity. During hominization, the ability to visually mediate and evaluate the increasingly complex cojoint actions of the two hands, and the developing and changing contents and contexts of handed production, would have increased.

As suggested above, under conditions of increasing ecological difficulty or complexity there would have been a tendency to select for an increasingly lateralized, **two**-handed neurology and capacity, with a necessary corollary increase in the capacity for **visual** evaluation of the materials and processes involved in actual or potential use of the hands. The mouth, while it is used as a grasping mechanism among chimpanzees (or for manipulative chewing, as in the making of a sponge from leaves) would probably not have become increasingly functional during hominization. A related problem apparently exists in the Mousterian where, the evidence indicates, Neanderthal teeth were used for powerful gripping or chewing functions, without apparently affecting the vision-mediated, **fully hominid** two-handed skills that had evolved and that probably accompanied most gripping actions by the teeth. The teeth, for instance, are used by Eskimos in one phase of the complex two-handed sequences involved in obtaining, preparing and softening skins. The teeth also act as a gripping device in one phase of eating, when a knife in the primary hand is used to slice pieces of meat held firmly by the teeth and the other hand. This is the last phase in the complex sequence of two-handed actions involved in the preparation of meat for consumption. The mouth is also used as a grasping mechanism to hold a skein of fibers among peasants who spin yarn, but it is used here merely as an adjunct to the highly skilled two-handed, vision mediated actions involved in the process. I stress this corollary, non-primary use of the teeth and mouth among the great apes and humans because there has been a tendency to take the evidence for Neanderthal and even *H. erectus* use of the teeth as a gripping device to be an indication of lesser skill in the manipulative use of the hands. Clearly, a use of the teeth for gripping in one aspect of manipulative problem-solving does not necessarily indicate a devaluation of handed skills in the culture or in the actions being performed. The problem of what the teeth were used for in the Mousterian period must therefore be separated from the central problem of the evolving two-handed capacity.

In a tentative model of hominid evolution (MARSHACK, 1984a, 1985, 1988b) I have suggested that the shift to full bipedalism would not only have made possible development of the two-handed manipulative capacity and a broader conceptual capacity, but that selection for an increase in these capacities would probably have begun, from within the genetic variability extant in a population, long before there was any significant measurable enlargement or restructuring of the brain, and long before there were significant changes in skeletal morphology or the production of an archaeologically observable stone tool kit. In my earlier discussions of hominization I indicated that the foot, for instance, underwent major morphological change, losing much of its manipulability and sensory acuity. The hands underwent comparatively minor morphological change, i.e., the length of the thumb increased in relation to the fingers. However, major neurological changes probably occurred in the capacity to use the hands. There should have been an increase not only in the capacity for two-handed production, with a greater degree of hand/eye acuity and coordination in small and large-scale handling, but a corollary increase in a broad range of cortical capacities for conceptualization.

What would probably have begun to be selected for early in hominization, then, was an increase in the generalized, two-handed capacity for problem-solving and the vision-oriented conceptual capacity for evaluating and categorizing the functional world or reality in terms of that two-handed capacity. The set of neurological capacities involved would probably, in large degree, have developed in tandem. What would have begun to be created, as a result, was an increasingly open-ended (if still somewhat limited) hominoid adaptive realm. This developing, open and variable adaptive realm was profoundly different from that of any other species.

The model suggests that under certain conditions of periodic or long-term ecological change or difficulty, or of short-term stress, those hominoids most apt in two-handed problem-solving and the **conceptual** skills useful for exploiting a variable or dispersed set of resources would have had an adaptive advantage. They would have had this advantage with or **without** a use of tools, though the capacities involved would also have increased the potential for tool use.

The capacities being discussed are neurologically complex and involved, as I have suggested, far more than the capacity for two-handed manipulation and the manufacture and use of simple tools. I touch briefly on certain aspects of the suggested development, each of which has relevance for the processes of hominization. The pongid capacity for a use of seasonal or context-specific handed skills dispersed in time and space would have increased. The capacity for evaluating the **potential** utility of resources dispersed in time and space, and to make decisions based on a visual evaluation of the state of the ecology or of changes in the season, would have become increasingly important, particularly in periods or areas of crisis or stress. It would have involved an increasing ability to categorize resources and processes, and to model or map the potentially useful territory in terms of the two-handed capacity. Neurologically, these conceptual, categorical, mapping and modelling capacities would not have been directly involved with those discrete manipulative capacities present in tool manufacture and tool use, but they would nevertheless have encompassed these capacities within the available conceptual frames and would have given those frames a great part of their relevance. These capacities for visual mediation and evaluation and for conceptual categorization would have been involved in most aspects of the developing hominid cultures. The set of capacities being discussed were to become important in the development of hominid communication and eventually of hominid language.

At another level, chimpanzees use their hands affectively, i.e., socially and relationally – in grooming, comforting, hugging, offering, with holding and in a range of agonistic and aggressive displays and behaviors. Goodall has documented their use in murder and infanticide as well as in territorial aggression and defense. Chimpanzees also hurl objects at intruders and shake branches and trees in agonistic and enactive displays of emotion. There are limits, however, to the affective use of hands by the pongids. A chimpanzee mother may carry a dead infant about for a considerable period without available behavioral or cultural knowledge concerning what to do, either with her hands or her vocalization. A filmed scene depicting a dead chimpanzee being poked by a member of the group with what seems to have been both curiosity and fear suggests again the limits to handed response at this stage. Nevertheless, the primate hands were available to the hominids at diverse, developing levels of potential function, both as generalized problem-solvers and as increasingly capable tools of expression, communication and social relation. In affective use of the hands, whether among the great apes or the hominids, neurological input must come from functionally different cortical and subcortical areas of the brain, with ultimate evaluation and mediation of any behavior being dependent again on the visual system. At a seemingly "simple," later stage, I note the highly evolved, affective, non-linguistic use of the hands by the Neanderthals in the communal or familial ritual, cultural burial of a conspecific. I will discuss the actual complexities of such burials shortly. During hominization, then, the range of affective, expressive, social and relational uses of the hands probably increased as brain and social complexity evolved. A use of the hands in gesture would have represented one aspect of this development. Gesture and vocalization [2] would probably have begun to be used concurrently at this time to mark and differentiate those categories that were becoming increasingly relevant, that is those related to the resources, materials and processes occurring in the territory and the conceptual models and maps. Gestures and vocalizations would probably also have marked and referred to the changing intra-group relations and behaviors that were being played out in the new adaptive realms.

The evolutionary changes entrained by a developing two-handed bipedalism were, therefore, neither simple nor apparent in the paleontological, archaeological record. The complexity of this speciating, hominizing process would have occurred at different levels of function and behavior and would have been greater than can be discussed in a simple outline. The model being proposed does, however, suggest that at one point in the hominizing process, the advantages of a larger brain capable of increasing the potential capacities that were being found increasingly adaptive would have become apparent. This may again have occurred in a region or period of ecological or population change or stress. The larger brain would have increased both memory and the categorical, associational, cross-modal capacities that were being found useful. The process would probably have also led to a longer period of experiential maturation, since these capacities are, in modern humans, subject to complex ontogenetic development.

Selection for such an increase in neurological capacity may have begun during the adaptive success of *A. afarensis*. The record indicates only that there was the apparent "sudden" appearance of a larger brain with *H. habilis*, and that this occurred with the presence of the primitive Oldowan pebble-tools, tools made of stones that often originated at least a day's walk from the site in which they were found. The larger brain had not only increased the capacity for two-handed problem-solving but also the corollary capacity for mapping a widening, functional realm in time and space. One must, of course, be careful in evaluating the archaeological behavioral evidence. The seemingly "simple" tools may have been used in a wide range of potential behaviors. Opportunistic scavenging, for instance, would have been **one** of the potential behaviors made possible, but scavenging the remnant bodies and bones of mid-sized or large animals (perhaps most often in certain seasons), would not support the year round energy needs of a hominid population, any more than the opportunistic hunting of small animals by chimpanzees can support a pongid population. The larger brain of an early hominid probably mapped and mediated a host of strategies and skills for exploiting different types of flora and fauna, at different times and in different places, again with or **without** a use of tools.

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[2] GOREN-INBAR (1985) has published the analysis of what appears to be an intentionally carved scoria pebble from the Acheulian of Israel. A deep horizontal groove was apparently carved around the top of the pebble to form the "head" of a figurine, vertical grooves seem to form the arms and there appears to be large carved breasts. Goren-Inbar states that "... based on this evidence we assume that the inhabitants of the Acheulian site were both physically and mentally capable of modifying pebbles to achieve a required form ... The Acheulian figurine might be considered the earliest manifestation of a work of art." Until the carving has been studied by others the suggestion remains merely tantalizing. FRIDRICH (1976) published a number of interesting stones of varied shape that he claimed were intentionally carved figures from the Acheulian of Beçov. My study of the weathered stones revealed no evidence of carving. They might easily have been collected because they looked like images. MANIA (1986) has claimed intentional symbolic engraving from this period at Bilzingsleben and Bordes has claimed it for the same period at Pech de l'Azé (BORDES, 1969). At some point a careful and critical comparative analysis of these artifacts should be conducted. The capacity for such intentional shaping was clearly present in the making of tools during the Acheulian and the capacity for symbolic "imaging" in the use of ochre. Whether the capacity was also used to create symbolic artifacts and was thus preparatory to those later examples discussed in this paper remains to be ascertained.

The archaeological record documents the presence in this period of a second hominoid line with morphological specialization for powerful mastication. The model suggests that these hominoids may have adapted to a generally more stable largely vegetal ecological niche, perhaps riverine or mainly forested, while the hominid line leading to *H. sapiens* may have been adapting to a more difficult, variable, dispersed and inherently more fragile seasonal ecology (VRBA, 1985). If so, then at some point and in some region, further selection would have occurred within a *habilis* group under conditions, once again, of ecological change, population pressure or seasonal crisis, selecting for an increase in the set of capacities already entrained on the hominid line. The process would have continued the tendency to increase both the size and the integrative, mediating capacity of the brain.

With *H. erectus* the hominids at last began a major dispersal, carrying their larger brain and increased set of capacities into diverse latitudes and ecologies. These areas often contained sharper seasonal differences, and a greater and more variable dispersal of resources. Clearly, the capacity to model and map such diversity, and to exploit the more variable range, had become increasingly "human." There is a tendency to see in the archaeological record of this period a conservative stone-tool kit, without major changes in "style" occurring over time. The model being proposed, however, suggests that the developing complexity would probably have taken place in the diversity of uses and problem-solving strategies that were now possible within the constraints of that lithic technology. Changes in "style" would continuously have occurred at the level of skill and usage rather than primarily at the level of lithic typology and production. Cultural change and "style" would probably, therefore, be measured at this time largely in terms of differences in ecological context and in the adaptive responses made to periodic shifts in climate and environment. Adaptation and innovation would always have occurred at the level of the extant potential capacity.

It is at this point that questions concerning the level of "humanity" attained by *H. erectus*, and the nature of the subsequent branching of subspecies or types of *Homo* that occurred, with capacities derived from *erectus*, become relevant.

THE LATER HOMINIDS

More than a decade ago (MARSHACK, 1976) I suggested that the rare examples of Neanderthal symbolic carving found in the European record evidenced a fully developed, neurologically lateralized, two-handed, vision-oriented productive and symbolling capacity, comparable to, if not equal to, that found in modern *H. sapiens*. Later (MARSHACK, 1984a, 1985) I elaborated on the suggestion with a discussion of the evolutionary development of the two-handed, vision-oriented hominid capacity and its relevance for different aspects of later paleolithic problem-solving and symbolic culture. Bits of confirming data have gradually begun to accumulate from other sources.

For almost a dozen years, for instance, I had suggested to researchers manufacturing tools in paleolithic styles and attempting to use them in different tasks to perform analytical studies of the complexity of right and left hand actions and skills in the production and use of these tools. In response, P.R. Jones sent me his studies (JONES, 1979, 1980) describing the sequence of visually- mediated evaluations of materials and the two-handed skills and strategies apparently involved in the manufacture and use of stone tools for butchering and skinning by *H. erectus* at Olduvai Gorge (see also SUSSMAN, 1986). At that time, while I was on a lecture tour for the L.S.B. Leakey Foundation with Nicholas Toth, a skilled tool knapper, I discussed with him the need for a study of right hand/left hand actions and strategies in early paleolithic tool manufacture and use. Some years later, TOTH (1985) did publish a paper documenting experiments which indicated a "preferential right handedness" among the stone artifacts found in Lower Paleolithic sites in Kenya and Middle Pleistocene horizons in Spain. Toth's experiments in tool manufacture and preferential right-handedness suggested that there was a genetic basis for such preference by 1.4 to 1.9 million years ago, and that there may have already been a profound lateralization in the hominid brain with the right and left hemispheres specialized for different functions. These studies confirmed the suggestions and model I had published earlier.

Recently SHEA (1987) conducted a comparative study of Mousterian-Levallois tools and the microwear evidence for different types of tool use at the roughly contemporaneous Neanderthal site of Kebara and the modern *H. sapiens* site of Qafzeh, 70-50 kya.[3] Not only was there significant similarity in the strategies for obtaining and transporting stone resources and manufacturing tools, but there was a similarity also in the subsequent use of these tools for cutting meat, skins, wood and occasionally softer plant materials. Shea concluded that "little distinguishes the tool using behavior of anatomically archaic populations from their modern counterparts in the Middle Paleolithic of Israel." The relevance of this finding is increased by the far earlier evidence for wood-working in the late Acheulian of Europe, before the Mousterian and long before the advent of modern *H. sapiens* to that area. At Clacton-on-Sea in England and at Lehringen in Germany, c. 300,000-250,000 B.P., spears of yew wood have been excavated (Fig. 1). The carefully shaped point of the spear from Lehringen had been hardened in a fire. In making these spears there had been a clear choice of the best possible hard wood, probably chosen in the proper season; and their presence provided evidence for the use of stone tools to make secondary, specialized tools. From this same period in Europe there is evidence for a use of color. At Terra Amata, along the Mediterranean coast in France, LUMLEY (1966) found ochre crayons of different color in the remains of a temporary, seasonal habitation site. From the same period, c. 250,000 B.P., FRIDRICH (1976) found in the Central European rock shelter of Beçov, Czechoslovakia, a quartzite rubbing stone with evidence of abrasive wear, a striated and worked piece of red ochre and a huge quantity of dispersed red ochre powder (MARSHACK, 1981). Raw materials were therefore being secured and processed for "non-subsistence," perhaps symbolic purposes long before the Mousterian [2].

In Germany there is the rare but definitive evidence for the shaping of bone points in the Mousterian (ALBRECHT *et al.*, 1972; TODE, 1982; WAGNER, 1983), long before the explosion in bone manufacture that was later initiated in the Aurignacian. From the Mousterian sites of the Hohle Bocksteinschmiede and Konigsaue (Lonetal), Germany, the presence of resin on stone tools indicates a tradition of hafting into wood or bone (BOSINSKI, 1985: 68). At the site of Vaufrey in the Dordogne a "digging stick" made of a mammoth rib and dated a c. 250,000 was excavated (RIGAUD, personal communication) suggesting an even earlier use of bone. At Bilzingsleben in East Germany, from roughly the same period, MANIA (1986) has excavated a huge body of apparently worked or utilized bone. At the site of Molodova in the Ukraine there is evidence in the Mousterian for the construction of a hut or windbreack made of mammoth bones. These data do not document traditions of bone use comparable in their complexity or development to the regional styles of bone use that came later in the Upper Paleolithic, but they do evidence an early presence of comparable capacities and of incipient or preparatory cultural traditions for the use of bone and other materials in Europe, long before the so-called Mousterian/Upper Paleolithic transition.

Of equal importance, at the Mousterian type site of La Quina there is evidence that the Neanderthals were driving herd animals over a cliff (JELINEK *et al.*, this colloquium), a strategy that would have required group cooperation and planning. In a broad evaluation of all the studies that have been made of Mousterian hunting strategies, CHASE (1987a) indicates that "it would seem that Middle Paleolithic subsistence differed little in its overall nature from that of the earlier Upper Paleolithic ... by the Middle Paleolithic, hominids were

[3] Since presenting this paper, Qafzeh has been tentatively dated at c. 92.000 B.P. The similarity in tool types and subsistence strategies remains a matter for discussion and explanation.

competent and efficient hunters of large game, and ... in their exploitation of these animals there were involved a degree of foresight and probably of cooperation which, archaeologically, is indistinguish-able from those involved in modern hunting systems" (see also CHASE, 1987b). GENESTE (1986, this colloquium) has indicated that Neanderthals in the Dordogne region of France had cognitive "maps" of dispersed lithic resources in their territory comparable if not equal to later Upper Paleolithic "maps" of the same territory. MARKS (1986 a, b, this colloquium) has indicated similar mapping and modelling capacities for resources and activities among Neanderthals in the Near East, with subsequent *in situ* shifts to more sophisticated strategies and technologies coming, in part, as a result of adaptation to changes in climate and environment. GÁBORI-CSÁNK (1987) has reported the discovery of a Mousterian flint mine in Budapest, Hungary, that had been dug by a use of antler picks. It is probable that this flint mining was done, not in an *ad hoc* manner, but at particular times or seasons, with the materials being transported and cached. The capacity to form cognitive models and maps and therefore to think in time and space, to categorize objects and processes within these frames and to obtain, evaluate, and use different materials within the territory in different ways, was now "human" and went far beyond the capacities that were incipient and somewhat comparable among the pongids.

If we add to the subsistence activities noted above, the evidence for early uses of symbol, the truly relevant questions concerning the late stages of hominization become, not those concerned with time and place of origin, but those concerned with the nature of the hominization process itself, the nature and range of the developing hominid capacity, and the nature of the evolutionary changes that may have occurred in these capacities among different groups during late stages of the process. These questions cannot be addressed by traditional reference to the paleontological and archaeological data.

THE SYMBOLIC EVIDENCE

CHASE and DIBBLE (1987) declare that there is very little evidence for a Mousterian capacity for symbolling, based on the scarcity of symbolic data. In these terms, the rare evidence for Acheulian wood work documented by the spears at Clacton-on-Sea and Lehringen would argue for a **lack** of woodworking capacity rather than for the presence of such capacity. There is always a danger in arguing about capacity in terms of quantitative and statistical data. In an analytical and statistical study of Mousterian tool reduction DIBBLE (1986, this colloquium and 1987b) has stated that the evidence for sequences of reduction argues for a lack of "stylistic" variability and, inferentially, for a lack of cultural capacity. "... The assumption that these and many other lithic types reflect any kind of mental templates can be seriously called into question. In turn, this raises doubt as to the reconstruction of mental abilities involved in the manufacture of these pieces ..." (DIBBLE, 1987b: 42).

Actually, Mousterian technology and the frames within which it operated were quite complex. Merely at the productive level, the two-handed, vision-mediated capacities involved in tool-making and tool reduction required rather complex evaluations of the resources or materials and high skill in working the materials within the parameters of the learned contemporary cultural "style." This represents only one level of the complexity. If increased reduction also depended on resource availability at the time and place of reduction, then the reduction occurred within the context of the territorial "maps" discussed earlier (see papers of GENESTE and MARKS, this colloquium). Judgment also had to be made of the task for which the reduction at that moment was required, and so an evaluation of tool function would have been involved and this, too, would have been part of the cultural "stylistic" package. The complexity of reduction, therefore, lay in the cultural context of which it was a part. Complexity and "style" cannot be understood merely in terms of the product (see MARSHACK, 1986c for a discussion of how this relates to image and symbol). There is clearly a need for a proper inquiry into the many levels of reference, internal and external, at which Mousterian technology functioned. TOTH's (1985) analysis of right handedness in early tool manufacture, JONES' (1980) analysis of the judgments and skills in *H. erectus* tool manufacture and use and SHEA's (1987) microwear studies of tool use in the Mousterian suggest some of the levels at which such a broader, integrative inquiry might be conducted. Problems also exist at different levels in the study of early symbol.

There have been suggestions that the presence of "personal decoration" in the Aurignacian (beads, pendants, bracelets, headbands, etc.) represents the earliest evidence for an awareness of self, for cultural and stylistic complexity, group differentiation, the possible presence of trade and exchange and, inferentially, the beginnings of language. These concepts began to form early in the history of Upper Paleolithic archaeology, in 1868, at the time of the discovery of Aurignacian beads made of shells, some from distant sea coasts, in the burials of anatomically modern humans at Cro-Magnon, Les Eyzies. Since then thousands of such items from the Aurignacian and later periods of the dispersed European Upper Paleolithic have been found. Significantly, no comparable tradition or body of artifacts of personal decoration have been found for this period in other areas of anatomically modern *H. sapiens* habitation (see BELFER-COHEN, 1989).

The earliest known "Aurignacian" beads are the two animal tooth pendants with bored holes found by J. Kozlowski at Bacho Kiro, Bulgaria. Bacho Kiro stands on a possible route to the Near East, yet there are no beads known from this period in the Upper Paleolithic of the Near East. There is some evidence, however, for a local transition from the Mousterian to the Upper Paleolithic within Central Europe, both morphologically (SMITH, 1985; WOLPOFF, 1986) and technologically (OLIVA, 1986 and SVOBODA, 1986, this colloquium). There is also evidence for symbolic traditions in Europe, including the working of bone, long before the appearance of the Aurignacian beads at Bacho Kiro. In Central Europe, for instance, in the early Mousterian at Tata, Hungary, dated at U/Th 100,000 B.P. by SCHWARCZ (personal communication), there is a carved symbolic plaque made from a mammoth tooth (MARSHACK, 1976). At Bacho Kiro itself, in a Mousterian level, Kozlowski excavated a bone fragment with an intentionally engraved accumulation of zigzag motifs (MARSHACK, 1976). There is, in addition, apparent evidence of Micoquian beads from Germany at approximately the same period as the Tata plaque, c. 100,000 B.P., at Bocksteinschmiede (WETZEL and BOSINSKI, 1969: see below Fig. 8). There is a possibility, therefore, that symbolic traditions initiated by the Neanderthals in Europe were preparatory to traditions that were to be later developed "explosively" in the European Upper Paleolithic.

Early in the 20th century MARTIN (1907-1910) published two small beads or pendants that had been found at the classic Neanderthal site of La Quina (Charente): a reindeer phalange with a hole bored through both sides at the top and the canine of a young fox with a hole that had begun to be bored when the tooth apparently cracked and was left unfinished (Fig. 2 a, b). These pieces were not often referred to again in the literature dealing with Mousterian symbol. One reason, perhaps, is that the early excavation did not adequately establish the level from which the beads had come. A more important reason was that it was believed that personal decoration could not possibly have existed in the Mousterian period. As important perhaps in the neglect of the La Quina beads was the series of dramatic Neanderthal burials that began early in the 20th century to be uncovered in Europe and the Near East. It was at once assumed that these burials represented the incipient primitive beginnings of symbolic thought, of religion and of a belief in life after death. Significantly, no beads were found in these burials. Since it was assumed that personal decoration would have been found as grave goods if they had existed, their absence was taken as an indication that the Neanderthals lacked personal decoration. In addition, the broken skulls and bones of Neanderthals were found at some sites, suggesting a practice of cannibalism, a more acceptable supposedly "primitive" mode of "savage" behavior than personal decoration. It was this set of concepts that, until recently, was the basis of most discussions concerning the Neanderthal capacity for symbolism.

Today, three-quarters of a century after the La Quina beads were found, it would seem that a profound change has begun in our thinking about the Neanderthals, their cognitive capacity and their symbolic culture, even though the precise place of the Neanderthals in the evolution leading to anatomically modern man is still being heatedly debated. As a result, the La Quina beads, though still not of certain provenience, have again become a subject of interest. One reason is that in mid-century Arl. and A. Leroi-Gourhan published a number of beads excavated in Chatelperronian levels at the Grotte du Renne, Arcy-sur-Cure (Yonne) (Fig. 3 a, b, c). There were beads or pendants made of exotic fossil materials, including sea creatures (a crinoid and a fossil shell), as well as beads of carved bone and animal teeth. The techniques of manufacture included boring a hole and incising a horizontal groove around the top of a tooth to make, in each case, a hanging bead or pendant (see however GAUTIER, 1986). The discovery of a Neanderthal tooth in a Chatelperronian level at Arcy and the more recent discovery of a Neanderthal skull in a Chatelperronian level at Saint-Césaire (LEVEQUE and VANDERMEERSCH, 1980) have raised a question as to whether these objects were made by the late and terminal Neanderthals or by anatomically modern humans who were apparently, for a short period, in contemporaneous contact. The Chatelperronian has been termed Upper Paleolithic with the presence of tools of Mousterian type by HARROLD (1986, 1987). Whether the beads were **also** of Mousterian derivation, i.e., made by Neanderthals or influenced by Neanderthal tradition, is still open to question. It was the original opinion of Leroi-Gourhan and Leroi-Gourhan that the Arcy beads represented the earliest known examples of personal decoration and that they were therefore made by anatomically modern humans.

BORDES (1969), however, found an intentionally carved fragment of bone in a Mousterian level at Pech de l'Azé which he declared to be part of a pendant (Fig. 4). HARROLD (1987) has suggested that the carved fragment might be part of a working tool, a suggestion that raises questions, as we shall see, of a different kind. Significantly, a fragmented pendant of the Pech de l'Azé type, with a similarly carved wide hole, was found in a Chatelperronian level at Arcy (Fig. 5). LEROI-GOURHAN and LEROI-GOURHAN have declared that "Plusieurs exemplaires fragmentés ou entiers de telles pendeloques ont été trouvés dans le Châtelperronien et dans l'Aurignacien d'Arcy" (1965: 41). A much published Aurignacian pendant found at Arcy was made by carving this type of wide hole (Fig. 6). This mode of carving wide holes became common in the Aurignacian and occurs, as we shall see, in other classes of production.

The use of fossil materials for symbolic purposes at Arcy apparently resulted from the discovery of fossil-bearing rock in the territory, but the fossils could as easily have been acquired in exchange or barter. HARROLD (1987) notes the presence of such exotic materials both in the Mousterian and the Chatelperronian, but he does not deal with them as materials that could be worked and used. At Tata, Hungary, a fossil creature, a nummalite (Fig. 7), was found in a Mousterian level, together with the well-known plaque carved from a mammoth tooth. Microscopic examination indicated that the nummalite had a natural fracture running through it, forming a nearly straight line on the surface. A Neanderthal had then apparently carefully incised a fine line at a right angle to the fracture to make a perfect cross, an act of delicate and accurate engraving that would be difficult for a modern human since it required a steady grip and orientation of the tiny fossil between two fingers while the other hand used an engraving tool. The two-handed competence and manipulative capacity required for such an act in the Mousterian is significant because the animal tooth pendants made in the Aurignacian were often begun at this scale of fine engraving and difficulty, with a multiple crossing of engraved lines until a central core hole was established, after which there was a gouging and widening of the hole. This process is clearly evident on the early Aurignacian beads from Bacho Kiro.

It is important, therefore, to note that pendant beads with bored holes were found in an early, pre-Mousterian, Micoquian level, c. 110,000 B.P., at the site of Bocksteinschmiede, Lonetal, Germany (WETZEL and BOSINSKI, 1969). The beads consist of a wolf-tail vertebra and a wolf foot-bone (metapodium). A close up photograph of the intentionally bored hole of the tiny vertebra (Fig. 8) clearly indicates the gouging and funnel-like widening that is found on many later Upper Paleolithic pendants and beads. The presence of these rare artifacts from Bocksteinschmiede, Pech de l'Azé, Arcy-sur-Cure and La Quina raises a number of questions at different levels. A pendant or bead requires a string for hanging or attachment, whether by strands of hair, gut or strips of hide. The bead or pendant, therefore, required a second technology and a knowledge of different classes of materials and resources as well as different sets of skills. I noted this type of productive complexity in the making of the early Acheulian wooden spears and the Mousterian hafting of stone tools to bone or wood handles with pitch. This type of multi-level problem-solving and resource acquisition and planning is, of course, evident in the later Upper Paleolithic symbolic and subsistence traditions. It is important to note that it is present, as well, in many of the Mousterian traditions.

From the Mousterian site of Tata, Hungary, there comes the well-known, beautifully shaped non-utilitarian oval plaque (Fig. 9 a, b) that was carved from a single lamelle that had been separated from a compound mammoth molar. The rear of the plaque was bevelled back to remove the soft material that would have broken under persistent handling. The edge of the plaque shows the high polish of long-term handling, perhaps at times of ritual or ceremony, while the main face indicates that it had been covered with red ochre. The use of ochre, of course, is documented in Europe as far back as the Acheulian at both Terra Amata and Beçov, it is more common in the Mousterian and is plentiful in the Chatelperronian. It is interesting that mines to secure specularite, a red coloring material rich in hematite, has been documented as well for the Middle Stone Age in Swaziland, South Africa (BOSHIER and BEAUMONT, 1972).

Apart from being carved of an exotic material and being covered with ochre, the Tata plaque was apparently made to be used over a period of time, and probably at the proper place and time. Not only was there planning involved in securing and carving the lamelle, but there was a higher order of planning involved in knowledge of the ritual or social contexts for which the plaque was intended. It is one of the significant findings of the research that has been conducted with Upper Paleolithic symbol systems that many of the images, signs and symbols were often intended for long-term, continuous or repeated use (MARSHACK, 1975, 1984b, 1986 a, b). These symbols and images helped to structure and maintain the cultural fabric. It can be assumed that the more complex a culture becomes, the more complex the set of symbolic markers and referrents becomes. The accumulating, rare evidence for Mousterian symbol is, therefore, an indication of developing cultural complexity. Complexity develops not only within artifact types, modes of production, and inter and intra-group relations. It disseminates also as knowledge and analogy throughout a culture.

HARROLD (1987), for instance, suggests that the fragment of bone with a carved hole from Pech de l'Azé may have been a practical tool rather than a pendant with symbolic function. The suggestion is probably related to the tendency to deny symbolic capacity to the Neanderthals. Nevertheless, the suggestion raises a number of interesting questions. For a century there have been discussions concerning the hominid use of tools for cutting and hammering. What has not been adequately discussed is the developing use of a far more ephemeral "tool" and concept, the **hole**. The hole, which was crucial, for instance, to the concept of hafting and perhaps the making of beads in the Mousterian, becomes increasingly important in the Aurignacian and the later Upper Paleolithic. In the Dordogne region around Les Eyzies where the Cro-Magnon skeletons were found, one finds numerous holes ("anneaux") intentionally carved into limestone blocks (Fig. 10) and the walls and ceilings of shelters (DELLUC and DELLUC, 1981). Some of the holes apparently served functionally as anchoring places to secure tents or hang goods, but at least one anneau from Blanchard in the Vallon des Roches served symbolically as a "vulvar" hole, since it is in direct contact with an incised phallus and vulva.

The Aurignacian "batons" of antler, bone and ivory contain large, wide holes like those carved on the Pech de l'Azé and Arcy pendant fragments. The batons with holes were apparently at first undecorated objects made for utilitarian purposes, as suggested by Harrold for the Pech de l'Azé fragment. But they develop in complexity and use over time. At the early Aurignacian site of Geissenklösterle in Germany there is a broken "baton" made of mammoth ivory with at least four holes. A reindeer antler baton from the Magdalenian of Le Souci, in the Dordogne, has seven holes. It is interesting from the point of view of cultural development that the baton, as a long-term, curated object, eventually becomes in the Franco-Cantabrian Magdalenian an available surface for different types of engraved and carved symbolic marking, including animals, signs, symbols, notations and compositions that are often as complex as the tableaus found in the sanctuary caves. The hole itself sometimes becomes the eye of an animal on some batons. This use of the hole begins to develop in the Mousterian, expands in the Aurignacian and Gravettian and literally explodes in the Magdalenian. In the Upper Paleolithic it is used to make rings, bracelets, beads, pendants, buttons, batons, etc. It is probably from these traditions of making and using the hole and, at times, of preparing strings and cords for their use, that the needle, one of the major "inventions" of the later Upper Paleolithic, derives.

The most intriguing use of the hole in the Upper Paleolithic, technologically and conceptually, is in the development of the many-holed flute, a "non-utilitarian" object that was probably used in ritual and ceremony. It apparently first appears in France in the late Aurignacian and Perigordian (SAINT-PERIER, 1950; DALEAU, 1963) and persists to the Magdalenian.

The most beautifully made of the Upper Paleolithic flutes, with four holes above and two underneath, comes from the Magdalenian of Pas du Miroir, La Roque, in the Dordogne. A flute with similarly positioned holes was excavated in a late Upper Paleolithic level at Molodova, in the Ukraine. The flute as an object derived from the two-handed capacity to make and use the hole in a diverse range of functions and forms is important in the history of culture because there is an indication that a flute of this type was in the process of being made at Haua Fteah, Cyrenaica, North Africa, c. 45,000 B.P. (McBURNEY, 1967).

The flute is important, however, as more than an instance of developing cultural complexity. The neurological complexity involved in the two-handed manufacture of the instrument and then in coordination of the separate actions of the two hands and the breath while playing to produce a musical sequence that is evaluated in terms of acoustic rhythm, tone and pitch, is extraordinary. Playing the flute requires sequences of right and left hemisphere participation; it requires visual, manipulative, acoustic and breath coordination; it requires a recognition of the proper time and place for its cultural and ritual use. It is an end-product, then, of the same processes of mosaic evolution with exaptive effects that led to the possibility of symbolic image making and probably to aspects of language.

THE CONCEPT OF SELF AND THE OTHER

As noted above, except for a use of ochre, objects or materials of personal decoration do not appear in the paleolithic archaeological record outside of Europe. We cannot assume for this reason that there was an absence of the capacity for personal decoration, social display, social complexity, a lack of self-awareness or an absence of language, as has been suggested by recent studies of the Mousterian/Upper Paleolithic transition (WHITE, 1982, 1985, 1986, 1987) and Mousterian symbol (CHASE and DIBBLE, 1987).

The capacity for a recognition of "self," including even a use of the mirror and the application of powder and rouge, has been documented for the chimpanzee in a laboratory context. In the wild, the sense of self is incipient among the chimpanzees, if not consciously or artifactually defined, in the playing out of age, sex, and dominance roles within complex social contexts. Hominization would have increased these capacities at the same time as the generalized capacity for categorization and social differentiation developed. The use of ochre suggests that there may have been a capacity for the differentiation and marking of self as late as the Acheulian, even if only at ritual moments. The capacity itself apparently had deep and early genetic roots. In addition, for a hunter there was the continuous example of differential and developmental marking among animal species.

There is, in fact, a rare suggestion of Mousterian "personal decoration" that goes far beyond the much discussed categories of ochre or bead use. At the Mousterian site of Hortus (Valflaunes) the Lumleys (LUMLEY and LUMLEY, 1972) found evidence that the Neanderthals hunted and killed leopards and other felines, apparently for their hides. One leopard was represented by parts of the skull, footbones and tail, suggesting the presence of the full skin as a costume (Fig. 11). Ethnography documents hunter-gatherer and herder practices in Africa in which an individual who has killed a lion or leopard wears the skin and as a result achieves heightened social status. Among some peoples the skins of diverse "powerful" animals are worn in rituals. The skin, in such use, becomes a form of social differentiation and a form of marking of self. The hide, however, not only marks the individual, but also represents the "power," "spirit," or myth of the animal. At the time the Hortus materials were published, the concept of personal decoration in the Mousterian was widely considered to be impossible. The possibility has by now, I hope, been strengthened on evolutionary and artifactual grounds. It has been strengthened as well by a unique later find from the early Aurignacian.

The earliest animal carvings, c. 32,000 B.P., come from the Aurignacian site of Vogelherd (Lonetal) in Germany, not far from Bocksteinschmiede. The small mammoth ivory carvings depict felines (lion and leopard) and bear, as well as herd animals used as food, bison, horse, mammoth and reindeer. The images were at first considered to be examples of hunting magic made to assure success in the hunt. Lions and leopards, however, have never been regular items of diet. A microscopic examination of the Vogelherd carvings by the author (MARSHACK, 1984b, 1987) has revealed that the animal images, including the felines, were often overmarked as though they had been used in ritual. The carvings, therefore, seem to have been symbols that were curated in order to be used over a period of time. These analytical data assume added significance with the recent reconstruction of a carved therianthropic figure found more than a decade ago at Hohlenstein-Stadel (Lonetal), a site near Vogelherd (SEEWALD, 1983).

The carved mammoth ivory figure (Fig. 12) depicts a standing human, apparently male, with a feline head. The image looks like an animal-headed god from the late dynastic period of Egypt, but is clearly indigenous and far earlier. If, as the Lumleys suggested, the leopard bones from Hortus indicate the possibility that leopard skins were worn by Neanderthals, the Aurignacian carving may represent symbolic capture of the feline "power" and spirit in the more sophisticated form of a manufactured image. The carved image could perhaps now be used in rituals in a manner that was comparable to the use of a leopard skin in the earlier Mousterian. There is a range of data that suggests this possibility. There are images of "sorcerers" wearing animal skins, antlers and horns in the late Magdalenian, in what seem to be depictions of ritual performance or dance. It was for long believed that these images represented a late Magdalenian development. The Hohlenstein therianthrope suggests that the tradition may have been tens of thousands of years older. In addition, the feline headed therianthrope suggests that the ritually marked feline carvings from the nearby site of Vogelherd may have been part of a regional ritual and mythological tradition that involved a complex symbolic use of animals.

The Aurignacian introduced a new lithic technology and new skills for working bone. The Vogelherd and Hohlenstein carvings may, therefore, have represented a qualitative step forward, ultimately derived from an earlier tradition involving the symbolic use of animals, animal parts and animal images, rather than representing a sudden conceptual leap forward into the "invention" of animal imagery. As we have seen, there was apparently also a prior incipience or preparation for the use of beads and pendants. Animal parts, in fact, continued to play a major role throughout the West European Upper Paleolithic. In the Magdalenian there are carved and engraved amulets, pendants and engraved images that represent animal parts: a fish tail, a horse hoof, a horse skull, a bison foreleg, a reindeer antler, the rear flippers of a seal, an ibex head, the eye of a cervid, an animal jaw, etc. These animal parts were all apparently symbolically relevant images. The use of animal parts is, of course, profusely documented among hunter-gatherers in the historic period, particularly in shamanistic, healing and divinatory use.

The possibility of an early symbolic use of animals and animal parts is suggested, for instance, in an apparent Neanderthal "ritual" described by SOLECKI (1982). In the Mousterian shelter of Nahr Ibrahim in Lebanon the bones of a fallow deer (*Dama mesopotamia*) were gathered in a pile and topped by the skull cap. Many of the bones were unbroken and still articulated. Around the bone were bits of red ochre. While red ochre was common in the area and may have been introduced inadvertently, the arrangement of the largely unbroken bones in association with the red ochre suggests a ritual involving a use of parts of the animal. There is other evidence for a symbolic use of animal bones in the Mousterian. In the burial of two anatomically modern humans at the Israeli site of Qafzeh and Skuhl, the mandible of a wild boar was placed in the hands of one individual and the antler of a fallow deer in the hands of a child. The tradition may have come from the Neanderthal Mousterian culture. The possibility that the European Upper Paleolithic development of animal art is ultimately referrable to earlier symbolic usage opposes a century of theories concerning the *H. sapiens sapiens* origins of art. The use of animal bones, animal teeth, and sea shells and fossils as items of symbolic value or personal decoration may all have had preparatory incipience in these earlier periods.

The Abbé Breuil (BREUIL *et al.*, 1915) suggested that art probably began with simple meandering doodles within which images of animals were accidentally recognized. LEROI-GOURHAN (1965) later suggested that animal art in the Franco-Catabrian area, and human art in general, began with the simple crude animal outlines found in the Aurignacian. Both theories are contradicted by the Hohlenstein and Vogelherd materials. In this regard, it is important to note that the ivory carvings of the German Aurignacian are surprisingly sophisticated and seem to represent the end-product of an ancient tradition rather than the archaic and primitive beginnings of something new.

DEATH AND BURIAL: RITUALS FOR THE LIVING

Of the few symbol systems that have been discussed in comparisons of the Mousterian/Upper Paleolithic cultures, none has had longer or more intense scrutiny than burials and the treatment of the dead. In these studies it has been the lack of personal adornment and other grave goods in Mousterian burials that has most often been cited to argue for an absence of social complexity, status, rank and, by implication, of symbolic capacity and even language (S. BINFORD, 1968; HARROLD, 1980; CHASE and DIBBLE, 1987). SOFFER (1985), in a study of the Upper Paleolithic cultures of the Russian plain, notes that the early burials at Kostienki and Sungir are rich in grave goods, including personal decoration, but that the later Upper Paleolithic burials of the region lack such items. The highly developed symbolic complexity in these later Upper Paleolithic cultures was apparently played out in other modes (MARSHACK, 1979), not in grave goods. A large part of the argument concerning the "poverty" of the Neanderthal burials was initiated in 1868 when anatomically modern skeletons were found in the burial at Cro-Magnon, in conjunction with large numbers of shell beads. Since then many Upper Paleolithic burials have provided personal decoration and other forms of grave goods. It would seem, in light of the accumulating data, that the supposed symbolic "poverty" of the Neanderthal burials needs reevaluation.

Discussions in archaeology, as in other disciplines, usually have a historical bias, with periodic changes in the realms of contemporary concern. When Neanderthal capacity and behavior began to be discussed in mid-century, there was much made of the "savage" custom of cannibalism (BLANC, 1961), as apparently evidenced in the tool marks on the Neanderthal bones at Krapina, Yugoslavia, and by the Neanderthal skull at Monte Circeo, Italy, which has an enlarged foramen magnum and a circle of stones around it. In addition, a "cave bear cult," which supposedly involved ritual hunting of the cave bear, was much discussed, based on what seemed to be the intentional arrangement of bear skulls and bones in the cave of Drachenloch in the Swiss Alps (BÄCHLER, 1921, 1923). It was at that time believed that the Neanderthal burials and rituals represented the early, mute beginnings and glimmerings of religion and an awareness of life-after-death.

A reexamination of the bear bones from Drachenloch has revealed no evidence of human cutting or breakage (JEQUIER, 1975; CHASE and DIBBLE, 1987), and this finding has apparently terminated the concept of a "bear cult" involving the systematic hunting of the cave bear. It has been suggested, instead, that natural forces, including underground streams, could have arranged the bones. There are alternative possibilities that have not been discussed. In the late Magdalenian cave of Tuc d'Audoubert a cave bear skull is found on the clay floor; next to it are the knee prints of a paleolithic visitor who had kneeled to remove one of the bear canines. The canine after it was removed may have become a powerful amulet containing the spirit of the species that had once inhabited the caves but had long since disappeared. The presence of such remains in a cave can inspire awe. When I was working in Gargas with ultraviolet light, a bear canine, until then invisible, suddenly fluoresced at the bottom of a pool of water. Though I was in the cave to do research, I had a powerful feeling that the canine was a "symbol" of the original inhabitants or "owners" of the cave. There was even the possibility that this single tooth had been ritually tossed into the pool by a paleolithic visitor. I left the canine in the pool. One gets a similar sense of the presence or "spirit" of the cave bear from viewing the claw marks on limestone walls in caves, some, as those in Cougnac, high above one's head, suggesting an awesome, huge animal. The Neanderthals could have "honored" the original inhabitants of the caves by ritually arranging the skulls and bones without that act being an indication of a cult of hunting and killing. This would not preclude ritual bear killing or aspects of hunting. As in the suggestion from Hortus, such killing might have existed for many reasons. A Magdalenian engraving at Mas d'Azil seems to depict a ritual bear killing, and images of wounded and killed bears occur in the caves and among the Magdalenian mobiliary materials. The clay "body" of a bear on the floor of the Magdalenian cave of Montespan may have been struck through by spears. It had apparently had the skull of a bear cub in front of it and may have been covered with a bear cub skin. I note these facts merely to indicate that the tendency to symbolize or ritualize animals and to use animals and animal parts symbolically seems to have had a long human history. It did not begin in Europe or in the Upper Paleolithic. The absence or presence of tool marks on bones may at times have to be thought through carefully.

The question of possible cannibalism among the Neanderthals has been discussed at length throughout this century. It was at first assumed that the practice represented the primitive "savagery" of a species that was not yet fully modern or human. The problem of cannibalism, however, as evidenced in both the archaeological and the historical ethnographic record has in recent years been renewed and become the subject of intense discussion and debate (ROPER, 1969; ARENS, 1973; SAGAN, 1974). BINFORD (1981), in a study of the tool marks on the bone material discounted much of the evidence for cannibalism among the Neanderthals. It may be that this suggestion influenced other studies that also tended to discount the practice. TRINKAUS (1985) studied the broken bones at Krapina and decided that they had not been broken in order to extract marrow, as was believed, but had instead been crushed by the fall and pressure of overlying rock. RUSSELL (1987), apparently, continuing this sequence of investigation, reexamined the cranial and post-cranial bones from Krapina and suggested that the tool marks on the bones had been made long after death, not during an act of cannibalism, but in order to remove adhering bits of dried, remaining flesh, therefore suggesting a ritual secondary burial. The matter of possible cannibalism in the Mousterian was not, however, closed. WHITE (1985 a, b) suggested that cut marks on the Bodo cranium from the Middle Pleistocene or Acheulian in Ethiopia's Middle Awash Valley provided early solid evidence for the intentional defleshing of a human conspecific. The Bodo cranium antedates the Eurasian Neanderthals and therefore suggests the presence of an early practice involving defleshing of the deceased body, whether this was done for simple cannibalistic eating or for more complex symbolic, ritual purposes. WHITE (personal communication, 1988) has since that publication reexamined the human and faunal material from Krapina and determined that bone breakage intended to extract marrow and to secure fat was similar in both groups of bones, human and faunal, suggesting that cannibalism was, after all, present. Whether this represented an eating of flesh under local, temporal conditions of protein deficiency or symbolic, ritual behavior could not be determined. RUSSELL (RUSSELL *et al.*, 1988) has recently withdrawn the suggestion of secondary burial and acceded to the possibility of cannibalism. The problem of cannibalism in human cultures has been complicated by the recently published evidence (VILLA *et al.*, 1986) that it was practiced in Europe during the Neolithic at the cave of Fonbrégoua, in the hills of Provence, France. The mode of breaking human and animal bones to obtain marrow and fat was similar, and therefore comparable to the way in which animal and human bones were similarly broken at Krapina. Ritual killing and sacrifice, including diverse forms of preparation or disposal of the body, are, of course, well known from different cultures in the historic era. So too are examples of the ritual, symbolic eating of representations of ancestors, spirits or gods, or their body parts. These eating practices contrast with the presence of taboos against eating certain food animals because, symbolically, they represent totemic ancestors or harmful spirits. The ethnographic record is voluminous in documenting the enormous variability in such practices. Whatever the final decision, therefore, concerning the Neanderthals, the evidence for occasional or specialized cannibalism or for forms of ritual killing or ritual burial, instead of indicating a stage of primitive "savagery" would tend to confirm the near human range of behavioral, symbolic variability in Neanderthal mortuary practices.

The complexity of symbolic "killing" and of concepts concerning death in human cultures, particularly in the paleolithic cultures, has not till now been adequately explored. Recent attempts to read the evidence of social and cultural complexity, rank and status, in the absence or presence of grave goods touches on developmental, historical aspects of human burial practices, not on the presence of symboling capacity in the species or the semiotic complexity of such practices. In the Upper Paleolithic there are depictions of animals killed with darts, many of which have also been renewed or reused after the symbolic "killing" by the addition of specialized parts of the animal. There are also images in the Franco-Cantabrian caves of humans or anthropomorphs struck through or "killed" by darts, but whether these represent images of actual persons being symbolically killed, or "spirits" being chased and exorcised, cannot be determined. The complexity of this data, which is richly, almost profusely documented in the Upper Paleolithic, has not yet begun to be adequately addressed.

After an early belief in "hunting-magic," for instance, a mid-century statement by LEROI-GOURHAN (1965) that most images of animals were not "killed" helped to establish a consensus against "hunting-magic." The problem, however, is not simple. The relatively rare depictions of killing among the mobiliary materials and cave images represent one among the many uses to which animal images were put. The animal, as a **symbol**, had a wide range of meanings and uses. There is a tradition, for instance, of renewal of animal images, even of those that had been symbolically "killed" by an overmarking with darts or spears (MARSHACK, 1972 a, b; 1984b). Animal images could also be associated with a host of signs and symbols, each of which had its own meaning and modes of use.

The ritual killing of a food animal, which was not thereafter butchered for food, has been documented at the late paleolithic reindeer hunting site of Ahrensburg, Germany. A female reindeer was thrown into a lake after a large stone had been placed in the body cavity, as though an offering had been made for the fact that the herd and hunters had reached their summer feeding ground. Among the Upper Paleolithic images of animals killed there are many that indicate a seasonal killing, suggesting again a cognitive and possibly symbolic content beyond the mere act of killing.

The uses of death were complex in the Mousterian as well. There is a suggestion that the Monte Circeo skull, with its enlarged foramen magnum, may not indicate a practice of cannibalism. Analyses of the foramen magnum among other archaeological remains have indicated that it is a soft part of the human skull and may deteriorate more rapidly than other parts. Whether this applies to the Monte Circeo skull or not, the skull does document the specialized ritual treatment of one individual, who may have been killed in any of a number of ways – in a conflict with a neighboring group, in an accident, or ritually. The ultimate significance of the skull may reside in this evidence of specialized ritual treatment given to a single individual.

It is important in this regard to note that a large proportion of Neanderthal burials differ, despite their seeming simplicity. It is as though regional, individual and contextual variation was possible within the general tradition. These variations are probably as significant for an understanding of Neanderthal capacity and culture as the fact of burial itself. The most famous of the Neanderthal burials is that of a skeleton with an accidentally crushed skull found at the back of the Shanidar cave. Arl. LEROI-GOURHAN (1968, 1975) examined samples of soil taken from the burial and determined that the body had been placed on a bed of pine boughs and had been covered with flowers (see also SOLECKI, 1971, 1975). As a result of careful analysis, therefore, a seemingly simple burial had revealed the presence of a complex symbolic and participatory act. The flowers provided a clue to the season of burial, but the reason for the unique use of flowers remains unknown. Were they used because of the rank of the individual or the nature of his death? Did the flowers have symbolic healing powers, as suggested by Arl. Leroi-Gourhan? While such questions are interesting, they cannot be answered. However, it is the range and variability of Neanderthal burials, and the variation evident in the participatory ritual behaviors of the living, that will probably be of ultimate significance in the search for the complexity of the Neanderthal symbolling capacity.

At La Chapelle-aux-Saints (Corrèze) the leg of a bison was found with the skeleton. At Monte Circeo a ring of stones surrounded the skull. In a number of burials the skeletons were tightly flexed and sometimes bound, either to save space or to restrain the wandering "spirit," a practice known among historic cultures. In some burials the skeletons were apparently aligned east to west as though in recognition of the direction of the rising and setting sun, a practice also known historically. In one Mid-Eastern burial a simple stone was deposited. Among a number of Mid-Eastern peoples in historic time, there is a practice of placing simple stones on a grave as an act of remembrance that will last longer than flowers.

At the rock shelter of La Ferrassie, the Dordogne, a Neanderthal child was buried in an area containing five other burials. The child was covered with a huge limestone block that had cupules or dots gouged into the stone, often made in pairs in a random, non-decorative manner. These cupules have often been referred to as early examples of sign or symbol. They may have been something entirely different, yet equally important. I have indicated in a number of publications that a tradition of participatory ritual marking was present in Upper

Paleolithic homesites and caves. In the Aurignacian period in the Dordogne, for instance, there are limestone blocks on the floor of some shelters that have sequences of dots gouged into them, suggesting ritual marking. Some of these dots are associated with incised vulvas, as in an Aurignacian level at the site of La Ferrassie. Since the dots are "images," they have often been referred to as signs and symbols. If, however, in La Ferrassie, at the burial of the Neanderthal child, each of the participants had gouged a set of marks on the stone, the act may have been intended as a gesture of participation and the marks may have been intended to last as long as the burial itself. With the La Ferrassie example we are once again faced with the variability in Neanderthal symbolic behavior, despite the seeming simplicity and archaic nature of the evidence.

These data suggest that many of the practices and concepts found in Mousterian burials were in some ways comparable to those found later in the post-Mousterian human cultures. Though each instance of Neanderthal symbolic behavior is unique, they do, as a group, document a potential variable capacity that is clearly related to the range of symbolic capacity found among the anatomically modern humans who followed them. This raises again the evolutionary question posed earlier in this paper. It is possible that evolution in the late stages of hominization selected for an increase in the potential capacities I have been discussing. Clearly aspects of these capacities were present among both groups, the Neanderthals and anatomically modern humans. Was there selection for an increase in these capacities on the *H. sapiens sapiens* line? Did that increase, if it occurred, also include an increase in the capacity for mapping and modelling a territory, a culture and social relations in time and space? The questions have relevance for the problem of possible Neanderthal speech and language since language is essentially a referential mode and must be capable of marking the relevant aspects of a complex culture. I can do no more than touch briefly on the problem.

THE NEANDERTHAL CAPACITY FOR LANGUAGE

The question as to whether the Neanderthals had "language" and could speak has been under discussion for almost a century. When it was assumed that they had a lesser capacity for symbolic thought, culture, social complexity and long-range planning, it was also assumed that they lacked the capacity for language. It was, of course, the European Upper Paleolithic symbolic materials that provided the cultural evidence for such comparison and, to a degree, still does (CHASE and DIBBLE, 1987). As I have indicated, however, the European Upper Paleolithic provides us with a skewed and unique regional, historical development.

Language is primarily a referential mode that operates in the vocal and auditory channels. It is, however, like many other human referential systems, largely dependent on integration and associations supplied by the visual system. These cross-modal functions are an aspect of the evolved human capacity for differentiating, categorizing and communicating information concerning those objects, species, processes, behaviors, relations and feelings that are of relevance and concern to human cultures. It is this set of observational and categorical capacities, and the ability to abstract and generalize from and about them, that is the true deep structure and foundation of language. Modern human symbol systems, whether supported by language, by imagery or by enactive forms of behavior, always mark and differentiate the diversity of the categories recognized as relevant in a culture [4]. The

[4] Recent studies of primate communication and neurology (STEKLIS, 1985) have indicated that vocalization is often referential, not only carrying information about the sender's sex, group membership, and social relationships, but that it can also volitionally refer to external objects or events. Some species also exhibit hemispheric asymmetries in auditory perception and perhaps in their vocalization. According to Steklis "these data suggest that the vocal-auditory machinery of the earliest hominids was far more ready to take on 'primordial' speech function than has been previously supposed." Selection may therefore have

question to be addressed, therefore, is whether the variability and complexity of the Neanderthal symbolic data, the developing evidence for Mousterian cooperative hunting and animal drives and for the functional mapping and modelling of a complex territory, means that there had to be language adequate to communicate information concerning the functional variability and complexity?

Was evolutionary selection during hominization involved in a process that tended to increase the hierarchical set of capacities involved in practical problem-solving, conceptual modelling, and the ability to map and differentiate a developing cultural complexity in time and space? If so, how were these concepts communicated and maintained? Chimpanzee communication, whether by gesture, vocalization or facial expression, deals primarily with the here and now. Even when a chimpanzee is taught a human sign language such as Amaslan (a language for the deaf and mute), its use is primarily concerned with face-to-face interpersonal relations or with other referents present at that moment. Human language, human concepts, and human art and image deal with referents that may or may not be present. Clearly, the Neanderthals were capable of referencing at this level. Did this require "fully modern" human speech?

The human capacity for symbolling and communication, as we have been, goes far beyond language and speech. Language, for instance, cannot adequately communicate the range of meanings or feelings involved in a death or burial. However, the structures of ritual and the uses of imagery do allow for expression and communication of the meaningful and relevant but linguistically "inexpressible." The full meaning and relevance of the lion-headed Aurignacian therianthrope from Hohlenstein, for instance, the wearing of a leopard skin as suggested for the Mousterian at Hortus, or the Mousterian use of the Tata plaque, could probably not be entirely explained in words, any more than rituals or ceremonies of our day can be fully explained. Yet in the Mousterian and Aurignacian these represented human symbolic products and behaviors. They would have represented, in addition, cultural products and traditions that would have helped to maintain the cultural and social fabric and the developing social and cultural complexity. It has often been suggested that the origins of human language derive from a developing social and cultural complexity. Would the ritual, symbolic behaviors documented and suggested in this paper, therefore, have required a corollary development of human speech?

If the Neanderthals had language despite indications of an apparent inadequate laryngeal morphology (LIEBERMAN, 1985) and the seeming "poverty" of the symbolic record, then some of the major problems in current heated discussions concerning sub-species differences, might approach a theoretical solution. The dissemination of Mousterian lithic technology in the period of Neanderthal contemporaneity with anatomically modern humans might have been accompanied by contact and interchange between the two peoples or cultures. This would probably have required some form of language, if only at the level of a pidgin *lingua franca*. An intermixture of genetic types in Central Europe (SMITH, 1985) might have been similarly accompanied by linguistic communication and an exchange of cultural traditions. The meeting of the late classic Neanderthals with the "Aurignacians" in France during the Chatelperronian might again have been accompanied by cultural contact and interchanges requiring some form of language. These suggestions do not address the question of cognitive "superiority" and they leave open the question as to why the Neanderthals disappeared, but it does offer suggestions for the presence of a historical process.

It is possible that the Neanderthals were morphologically and culturally specialized for a particular way of life and that this imposed a certain constraint on the level of potential cultural complexity, a level that precluded a higher population density and an impetus for the technological innovation and resource exploitation that would have been required to support

occurred quite early in hominization for an increase in these capacities in conjunction with the other two-handed problem solving and conceptual, symbolling capacities discussed in this paper.

a higher population density. The historic period provides us with numerous examples of successful cultures at such constrained levels of adaptation and development. The suggestion does not preclude the presence either of language or cognitive capacity, though the problems solved and the things talked about in these cultures would have been at the level of internal relevance.

If anatomically modern humans were impelled at some point in development to devise cultural and technological means for the exploitation of a more varied range of resources dispersed in time and space or were impelled to a more intense exploitation of the resources in their territory, they would probably have required technological, conceptual and cultural skills of a different order. Selection might again have increased the capacity to model and map concepts and behaviors in time and space and the linguistic capacity to mark that complexity. The model being proposed is, therefore, not merely biologic and genetic. The processes involved could have been largely cultural as well.

This suggestion does not preclude linguistic and cultural contact between Neanderthals and anatomically modern humans, the dissemination of cultural concepts or technologies, or even occasional interbreeding and genetic exchange. But it does suggest that anatomically modern humans may have been better able to exploit a larger territory and to maintain networks of interlocking, encompassing relations across this widening realm. Should this have occurred, the Neanderthals, under pressures of competition for resources and an increasing population, would have been faced with same forces tending to cultural disintegration that have been so voluminously documented in our era. Other contributing factors would probably have existed as well. In our era these have included the dissemination of diseases to which an indigenous population has no resistence, the expropriation of crucial cultural, symbolic places and the destruction of the networks of intergroup relations that had been established before the intrusion. I raise these many questions for discussion because they seem to address and encompass many of the questions and problems at present in heated debate. The suggestions do not propose a unitary or exclusionary solution to the problems in the debate and they do not contradict the diverse accumulating data. They do not exclude the possibility of evolutionary change among dispersed Neanderthaloids during the period of their presence, nor the possibility of evolutionary change among groups of dispersed anatomically modern humans. They do, however, place the Neanderthals at a late point on the trajectory of hominization, a point at which comparisons can begin to be made in terms of evolved "human" **capacities** rather than in terms of morphological, genetic or artifactual differences and similarities. The question of linguistic and symbolic capacity would then be addressed within an evolutionary frame, and as part of historical cultural process, rather than in terms basically of quantified measurements, typological comparisons and the search for points of origin.

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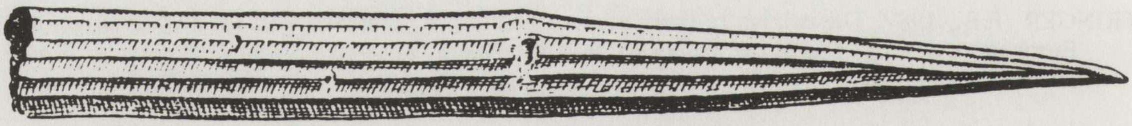
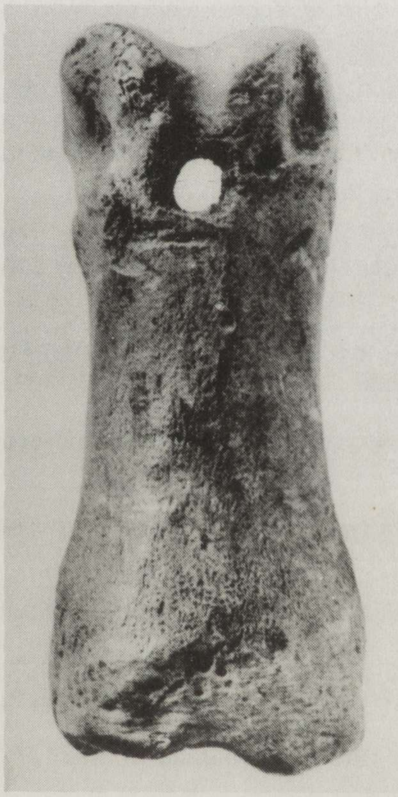


FIGURE 1

Point of carefully shaped spear of yew wood, Lehringen, Germany.
Acheulian, c. 250,000 B.P. (After JACOB-FRIESEN)



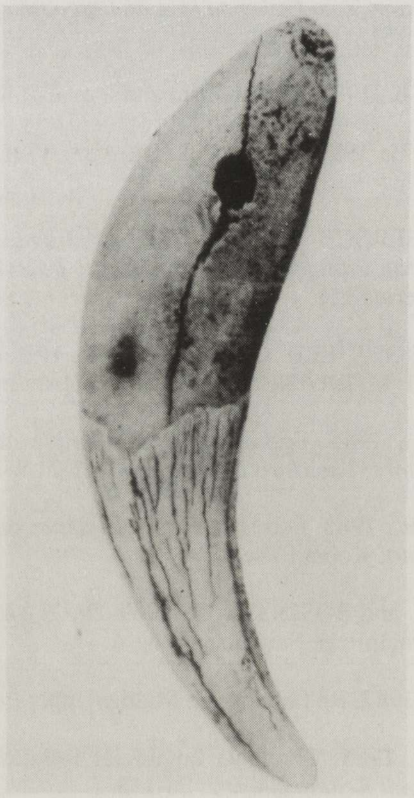


FIGURE 2 a, b

La Quina (Charente).
Reindeer phalange with a hole bored through both sides at the top and the canine of a young fox with a hole that was begun but was terminated when the tooth apparently split.
Mousterian period (After MARTIN)

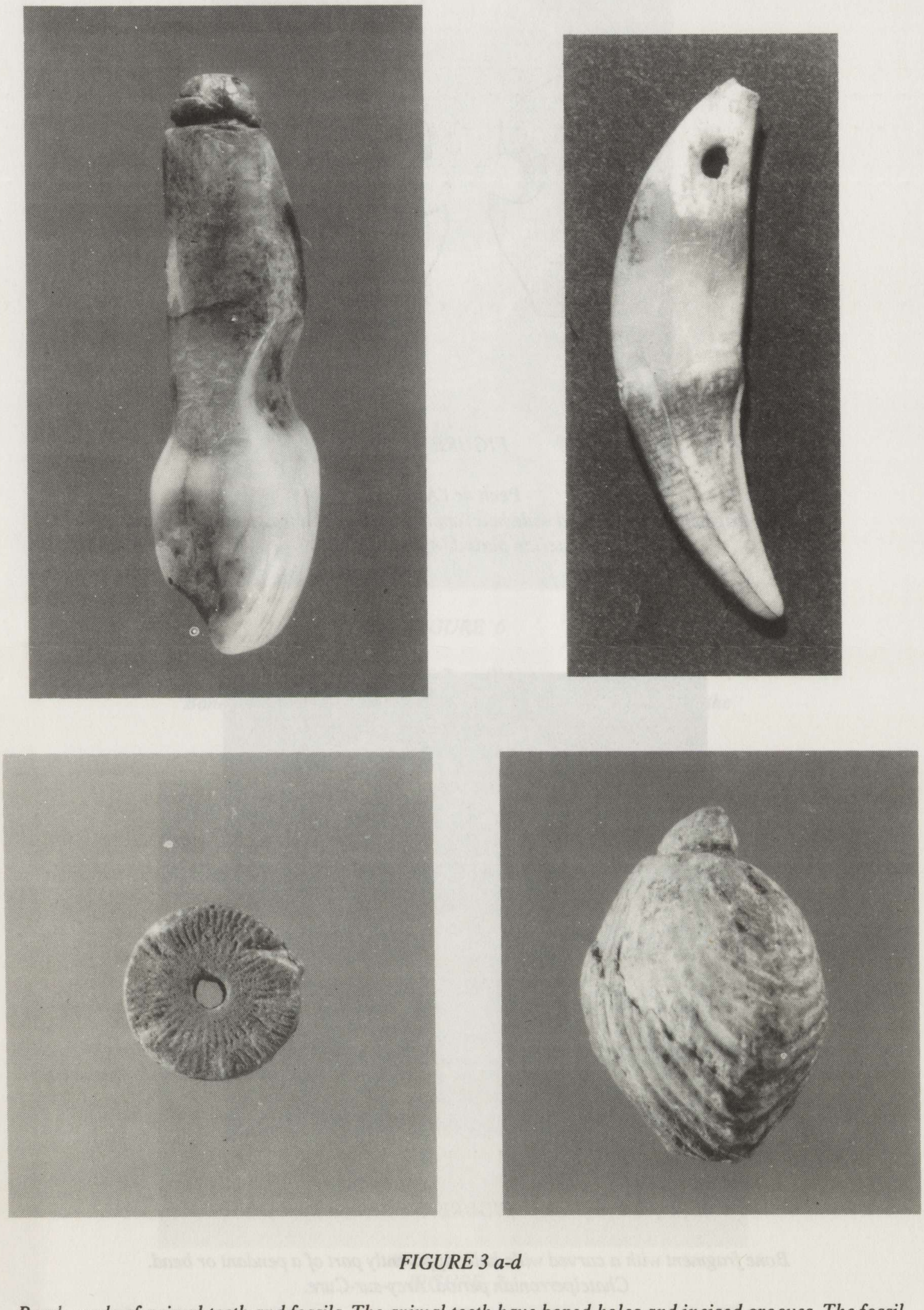


FIGURE 3 a-d

Beads made of animal teeth and fossils. The animal teeth have bored holes and incised grooves. The fossil crinoid has a hole bored through the center and the fossil sea shell has an incised groove across the top. Acry-sur-Cure, Chatelperronian period.

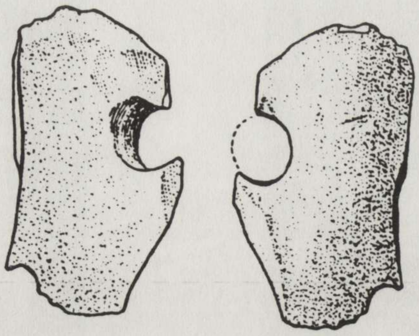


FIGURE 4

Pech de l'Azé.
Bone fragment with a carved wide hole, apparently part of a fragmented pendant.
Mousterian period (After BORDES)

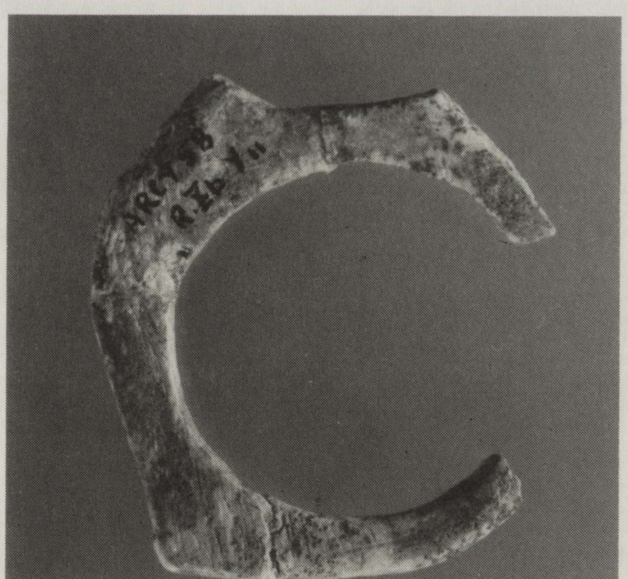


FIGURE 5

Bone fragment with a carved wide hole, apparently part of a pendant or bead.
Chatelperronian period. Arcy-sur-Cure.

FIGURE 6

Arcy-sur-Cure (Yonne).
Bone pendant with a wide carved hole made in the tradition of the earlier Pech de l'Azé and Arcy-sur-Cure pendants.
Aurignacian period.

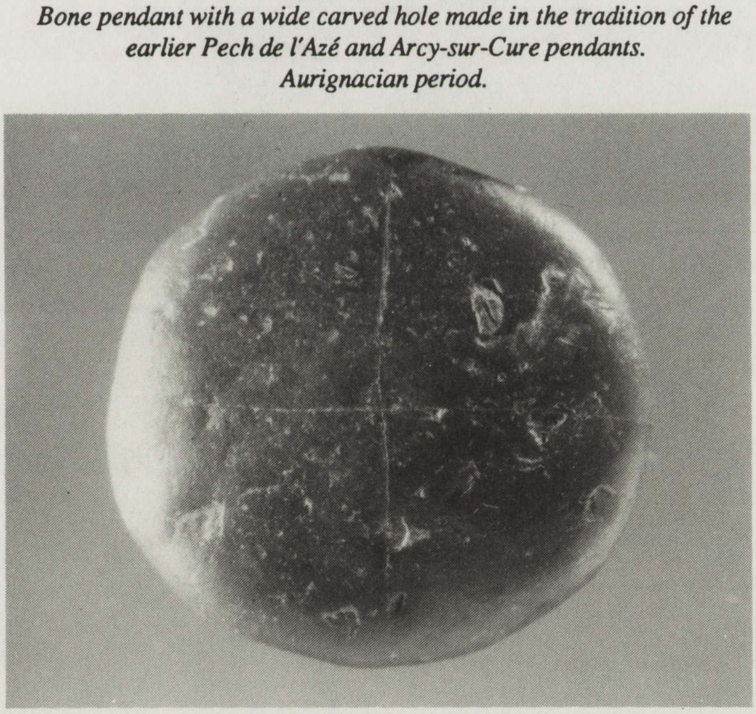


FIGURE 7

A fossil nummulite from Tata.
The vertical line is a natural crack that descends through the fossil.
The horizontal line was apparently engraved by a Neanderthal to make a "cross"
Mousterian period.

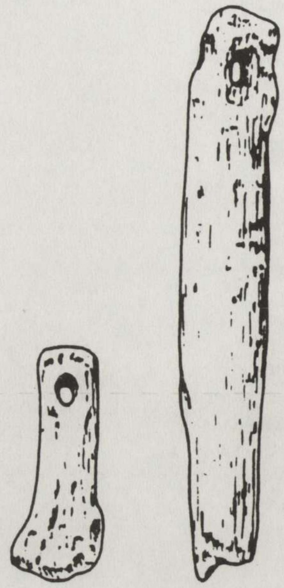


FIGURE 8

Bocksteinschmiede (Lonetal).
A small wolf-tail vertebra and a longer wolf foot bone (metapodium),
with holes bored through at the top to make beads or pendants. Micoquian period.
The close-up photograph shows the funnel like hole bored into both faces of the tiny vertebra
(After WETZEL)

FIGURE 9 a, b

Tata, Hungary.
The two faces of a carved oval plaque made from a lamelle of a compound mammoth molar. The surface of the front face contains evidence of red ochre, while the edges show the polish of long handling. The rear is bevelled along the edges. Tool striations can be seen by microscope in the bevelled area. Mousterian period.

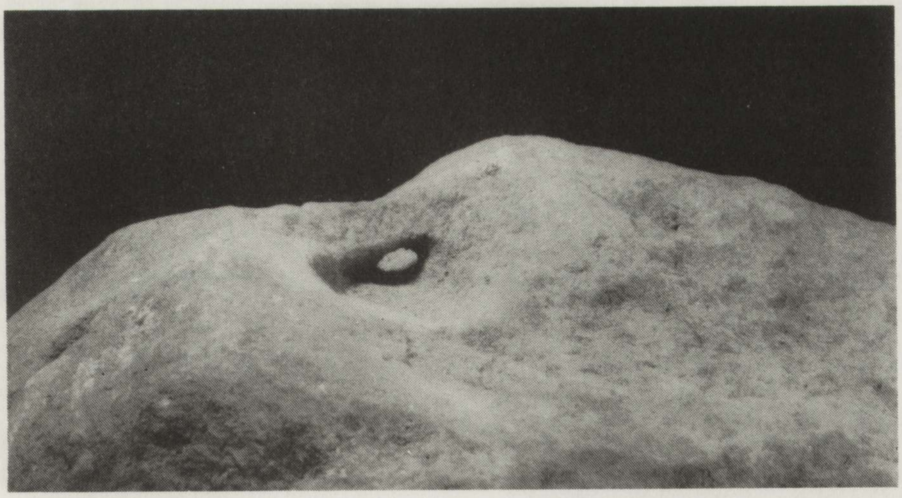


FIGURE 10

Carved and gouged "anneau" or hole in a huge limestone block found on the floor of the site of Blanchard (Sergeac), the Dordogne.
Aurignacian period.

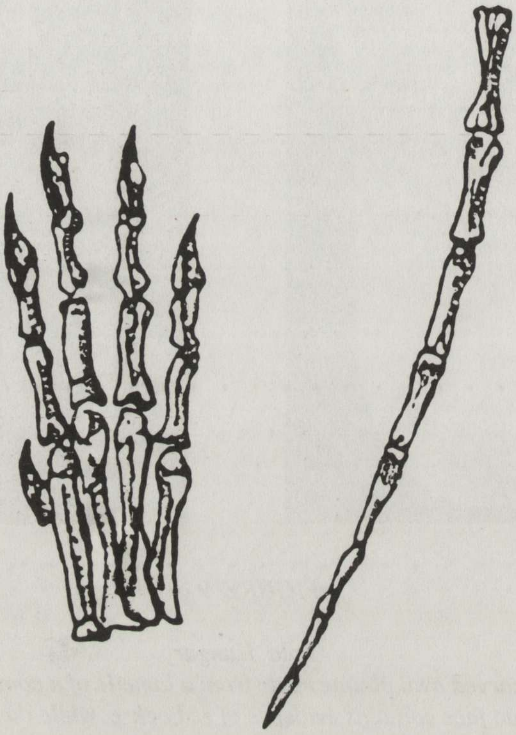


FIGURE 11

Hortus (Valflaunes).
Articulated bones of right paw and tail of a leopard, suggesting the presence of a full skin. Mousterian period
(After LUMLEY)

FIGURE 12

Hohlenstein-Stadel (Lonetal).
A mammoth ivory carving of a therianthropic figure with a lion head.
Aurignacian period