

BONES OF CONTENTION: ASSORTED HYPOTHESES ON  
THE FATE OF THE NEANDERTHALS

by

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ABSTRACT

The disappearance of Homo sapiens neanderthalensis at the end of the Middle Paleolithic has evoked a plethora of explanations, ranging from carefully supported theories to bizarre or romantic speculation. The processes by which the Neanderthals were replaced by anatomically modern humans occurred in a relatively short interval of time, and have been obscured by a wide variety of disturbances. A review of some of the inferences drawn by various researchers tentatively suggests a combination of in situ technological and morphological evolution in the Near East with movement of Upper Paleolithic genes and technology into Europe.

RESUME

La disparition de l'Homo sapiens neanderthalensis à la fin du mi-Paléolithique a suscité un grand nombre d'explications, certaines étant des théories bien documentées, d'autres des spéculations romantiques. Les processus par lesquels les Neandertaux furent remplacés par les humains contemporains eurent lieu en une période de temps relativement brève, et ils ont été obscurés par une grande variété de phénomènes. L'auteur examine quelques hypothèses développées par plusieurs scientifiques et suggère une combinaison d'évolution technologique et morphologique in situ dans le Proche Orient ainsi qu'une diffusion de gènes et de technologie en Europe au tout début du Paléolithique Supérieur.

## INTRODUCTION

The purpose of this article is to review the recent literature addressing the fate of the Neanderthal population of Eurasia. The disappearance of Homo sapiens neanderthalensis ("Neanderthal humans") from western Europe in a mere five thousand years (see Figure 1) has constituted a problem of abiding fascination and intractability. The idea of a Neanderthal phase in human evolution, proposed in the 1920s, was still generating lively controversy thirty years later (Howell 1957: 331). For example, Weidenreich (1940), after examining various Neanderthal and Homo erectus specimens discovered in the thirties, proposed that the subspecies were produced by different branches of hominids evolving at different rates. Seven years later he took the opposite view that all hominids belonged to a single, linearly evolving species (Weidenreich 1947). Weckler's (1954) theory is interesting in comparison to more recent ones. He argues that Neanderthal humans in the Far East and anatomically modern humans (Homo sapiens sapiens) in Europe, Asia, and India were cut off from one another by the complex of lakes, seas, and mountains that stretches from the Black Sea to western China. During the Middle Pleistocene interglacials, modern humans evolved, culturally and morphologically, in three separate areas -- Europe, central and southern Africa, and India. In the glacial periods, which drove them out of Europe but made Africa, India, and the Arabian Peninsula a single hospitable zone, they shared the new developments. Neanderthal humans evolved from hominids who had filtered into eastern Asia before the onset of glaciation and, unable to discover a return route, were forced to adapt to an intensely cold environment. Eventually, during the Eem inter-glacial, they moved eastward and interbred with the modern humans in the Near East. There the Neanderthal genetic traits were either diluted or selected out, but those hybrids who came into Europe were able to occupy it during the Wurm glaciation. From them, modern humans learned how to function effectively in cold climates, and proceeded to expand into both the Old and the New Worlds (Weckler 1954: 1004-16). Weckler applies a biogeographic rather than purely paleontological approach to roughly the same set of specimens as modern researchers have, but produces a theory quite different from the ones currently in favour. This is not as surprising as it may seem, because of the many problems researchers must face when investigating the Transition. (The term "Transition" is used herein to refer to the time during which Neanderthal humans were replaced by modern humans. This replacement is characterized both by biological and technological changes which occur nearly simultaneously but are not necessarily connected). First, however, a brief discussion of the Neanderthals themselves is necessary.

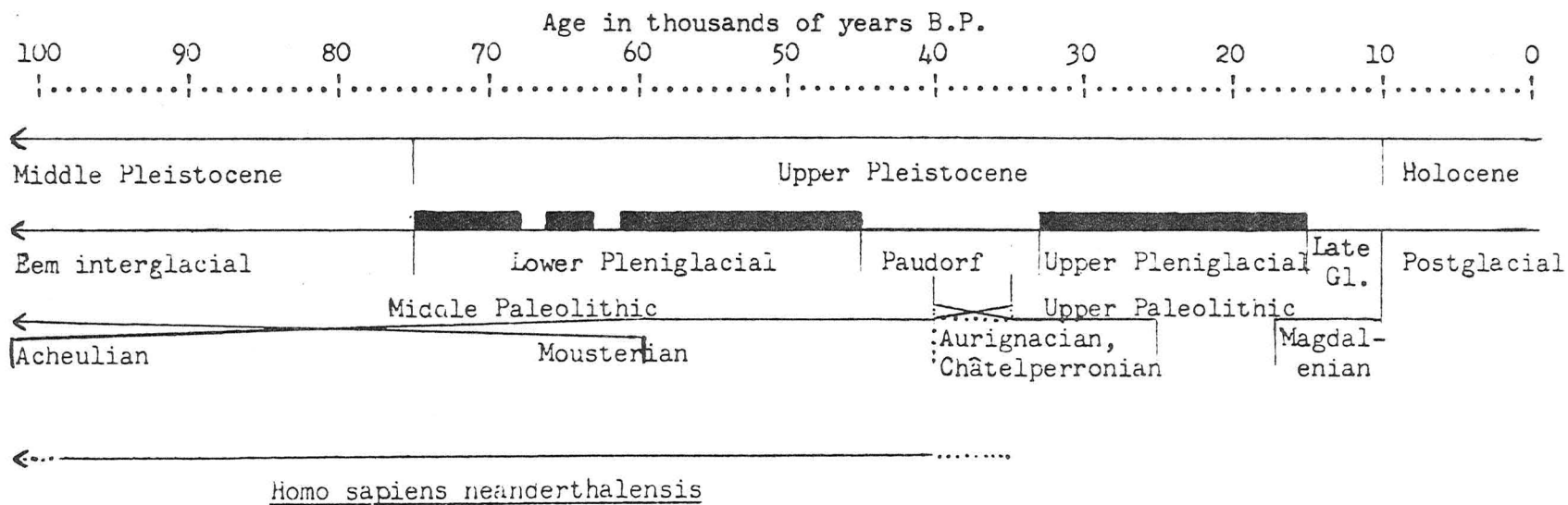
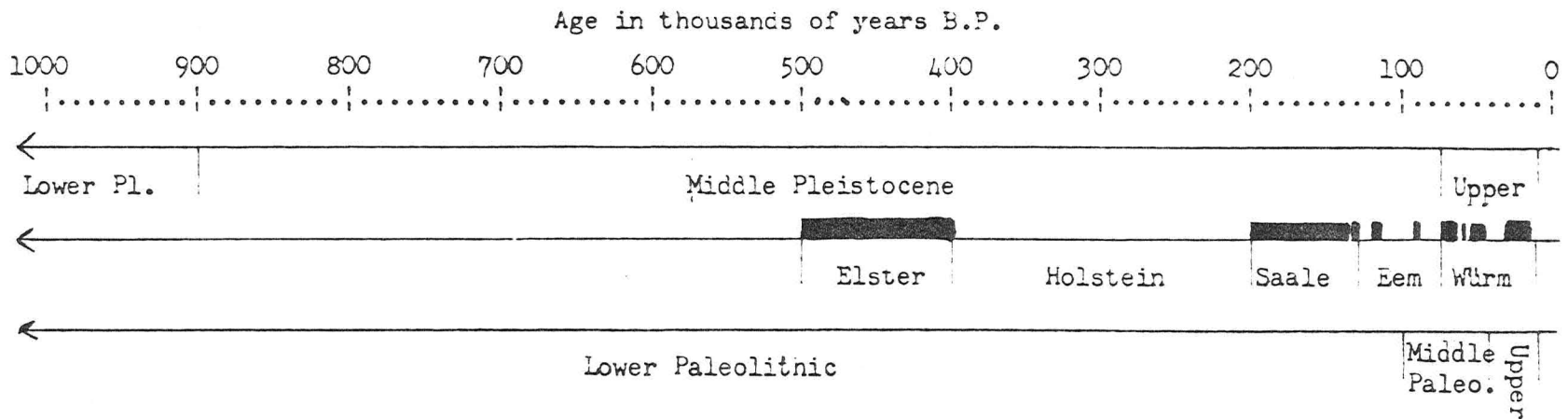


Figure 1

Division of the Pleistocene into geological, glacial, and cultural periods

(Sources: Fagan 1983:43,46-49,88,94,101,104,120; Imbrie and Imbrie 1980:948; Chappell 1974:201.)

█ = glacial period (approximate)

## THE NEANDERTHAL HUMANS AND THEIR SUCCESSORS

The Neanderthal population spanned the Old World from Gibraltar to central Asia between 100,000 and 40,000-35,000 BP (Trinkaus and Howells 1979: 125). Those who showed the Neanderthal morphological characteristics most clearly are found in central and southern Europe and are often called "Classic Neanderthals". The Classic Neanderthal skull is longer and narrower than that of modern humans; it is extended rearward by the "occipital bun", presumably to provide the neck muscles with a longer lever arm to counteract the forward projection of the nose and jaws. It has relatively large nasal passages, eye sockets, and sinuses; the forehead slopes back from prominent brow ridges. The jaws and teeth are massive, filling out the area above each upper canine where the modern skull has a concavity (called the canine fossa). The average cranial capacity is slightly larger, reflecting the greater size of the Neanderthal body. The limb bones are slightly curved and have particularly large articular ends; correspondingly powerful muscles were attached to them, making the Neanderthal humans significantly stronger than modern ones (Brose and Wolpoff 1971: 1177-9, 1185; Trinkaus and Howells 1979: 125-7; Weiss and Mann 1985: 366). Variability both within and between Neanderthal populations was as equally high then as now, as Brose and Wolpoff (1971: 1168-70) found when they compared the coefficients of variation of ten skull measurements in Classic Neanderthals, and in all Neanderthal specimens, to chimpanzees, gorillas, and eleven different modern human groups.

The Neanderthal humans' Mousterian industry was a radical departure from previous toolmaking traditions. Using new techniques based on prepared flint cores and combinations of materials, they produced a great diversity of tools. A prepared-core technique is one in which the toolmaker chips a lump of flint into a shape that defines the tool, so that the tool can be knocked out with a single carefully aimed blow. In the Levallois technique, for example, the toolmaker gives the flint core a slightly convex top surface with a trimmed edge, trims the edge straight at one point, and strikes the core at that point; the flake that is removed from the top is called a Levallois flake. It is then shaped into a specific tool, and may be combined with other materials to produce a composite tool. Bordes' division of Mousterian tools into five "traditions" or "facies" has been variously interpreted as reflecting the work of five different bands, stages in technological evolution, or seasonally appropriate toolkits of the same culture (Fagan 1983: 105-7).

This Middle Paleolithic culture is said to have been replaced by an Upper Paleolithic one, but Upper Paleolithic tools appear to a significant extent in Mousterian assemblages, and the

technological Transition appears to have been more a shift in tool type frequencies than a replacement of one set of tool types with another (Brose and Wolpoff 1971: 1161). The new tradition was distinguished by the innovation of punchstruck blades, the prominence of blade and composite tools (culminating in the bow and arrow), and a greatly increased variety of toolmaking materials, particularly animal products (Fagan 1983: 117-8). A blade is a particular type of flake, long and thin (at least twice as long as it is wide) with parallel edges (Brose and Wolpoff 1971; 1161). The Upper Paleolithic toolmaker usually struck blades lengthwise from a prepared core, using a short rod of wood or bone to transmit the force of impact or pressure to a carefully chosen location at the rim of the core -- hence the term "punch-struck" (Fagan 1983: 118).

#### PROBLEMS AND PRESCRIPTIONS

It was once believed that there was a relatively long gap between the disappearance of Neanderthal humans and the appearance of modern humans in the archaeological record (ApSimon 1980: 271); but recent work has shown that the chronology of the Transition is much tighter than supposed. It is generally accepted that the Châtelperronian had developed from the Mousterian culture, and that the Aurignacian in western Europe (first appearing 34,000 B.P.) was an intrusive culture from central Europe where it first appeared 40,000 B.P. or earlier. The origin of the Aurignacian has not yet been spatially located in Europe (Spencer and Smith 1981: 446). The Châtelperronian is temporally quite close to the Mousterian -- perhaps only 5,000 years away (Dibble 1983: 55; Harrold 1982: 132) -- and interstratifies with the Archaic Aurignacian (Harrold 1982: 132) (see Figure 1). Similarly, the Neanderthal specimen of Saint-Cesaire is only about 5,000 years older than the modern Cro-Magnon one (Harrold 1982: 135)! This indicates the brevity of the population change which a plausible model of the Transition must explain.

A partial list of the problems that beset the archaeological investigation of the Transition are compiled in Table 1. Such a compilation helps one to appreciate just how little is really known about Neanderthal humans, and how frail the foundation for theories on their post-Mousterian history is. The results, not surprisingly, reflect circular logic and unresolved differences of opinion (Stringer 1982: 435). Various authors suggest a variety of curative measures, including: detailed studies of Transition phenomena at the regional as well as the local level (Harrold 1982: 124); an evolutionary perspective (Dibble 1982:

54); more precise dating (White 1982a: 119); evidence to distinguish among parallelism between Neanderthal and Modern evolution, gene flow from Middle Paleolithic populations outside Europe, and genuine phylogenetic continuity of Neanderthal humans with the earliest modern Europeans (Stringer 1982: 435); greater skill at reconstructing sites from the current remains (White 1982a: 119); and examination of the variability within each taxonomic period (Dibble 1982: 54).

#### LINES OF ARGUMENT

In their regional study of the relationship between the Neanderthal and Modern human populations, Spencer and Smith (1981) found a trend in the morphology of the Saint-Cesaire Neanderthal (western Europe, 33,000-31,000 B.P.) toward Homo sapiens sapiens, and a marked resemblance between the Neanderthal and earliest modern specimens. They also found that the central European Neanderthals have the same morphological pattern as the classic specimens of Western Europe, and in this area as well, the later Neanderthal humans resemble the earliest moderns (as shown by the Vindija specimen (Spencer and Smith 1981: 450)). They conclude that most aspects of their postcranial morphology are within the range of variability of modern humans, that the morphological breaks during the Transition are not as extensive as one would expect from the replacement of an indigenous by a foreign population, and that, most probably, at least some Neanderthal populations evolved into modern European humans. They see the Aurignacians as intruding into western Europe from a still undiscovered base in central Europe (Spencer and Smith 1981: 451-2).

It has been noted that the Saint-Cesaire Neanderthals used Upper Paleolithic tools, and that the modern humans of Skhul and Qafzeh used Mousterian tools (Spencer and Smith 1981: 447); Harrold 1982: 136), contrary to the general association of Neanderthal humans with Mousterian flake technologies and of modern humans with Upper Paleolithic blades (Marks and Volkman 1982: 15). Indeed, according to Brose and Wolpoff (1971), each of Bordes' Mousterian facies contains many "Upper Paleolithic" tool types. The Middle Paleolithic-Upper Paleolithic distinction is artificially imposed on a set of assemblages with varying relative tool-type frequencies. Further the Shanidar Neanderthals display some of the characteristics of earlier hominids, some modern characteristics, and some trends which might be evolutionary (Stringer 1982: 435).

Table 1, Summary of the problems involved in Neanderthal archaeology, classified (after White 1982a) as natural, cultural, and archaeological.

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Natural problems

1. Removal of the Perigord Transition deposits by erosion by the Wurm II/III interglacial (Harrold 1982: 131).
2. In many sites the sediments were mixed after deposition (Dibble 1982: 56).
3. The Transition is near the limit of accurate  $^{14}\text{C}$  dating (Trinkaus and Howells 1979: 124).
4. Lack of chronologically diagnostic artifacts (White 1982a: 117).
5. Incomplete preservation (Stringer 1982: 435).
6. Masking of rock shelters by the accumulation of collapsed rock (White 1982a: 117).
7. Surviving Transition deposits show the Châtelperronian as immediately succeeding the Mousterian, and give us little indication of the time-span separating them (Harrold 1982: 131).
8. The Transition occurred at different times in different sites (Dibble 1982: 56).

Cultural problems

1. Cycle of deforestation, cultivation, erosion, and reforestation in Europe.
2. Destruction of information by a careless early excavation.
3. Burial of sites under modern architecture.
4. Collection of artifacts by unsupervised persons who are not professional archaeologists.
5. Deep plowing.

Archaeological problems

1. Necessary or misapplied assumptions (Stringer 1982: 434):
  - (a) a given sample of human remains is in some sense the descendant of the sample immediately preceding it;
  - (b) evolution is by unilinear gradualism only;
  - (c) cultural polarities can be clearly established (for example, four sites in the Perigord region of France

are taken as typical of the Mousterian -- although, as deeply stratified cave sites, they are in the minority (White 1982a: 115).

2. Unconscious manipulation of data (Stringer 1982: 435).
  3. Tendency to romanticize the Neanderthals (Tappen 1985: 49) - for example, Solecki (1973: 880) sees the presence of flowers in a Neanderthal grave as evidence that they had a "soul".
  4. Site mismanagement (White 1982a: 118-9).
    - (a) unsystematic survey of sites;
    - (b) bias of site search in favour of cliff faces;
    - (c) apathy toward surface sites;
    - (d) bias in artifact recovery in favour of tools;
    - (e) failure to publish excavations of sites of short-term occupation.
  5. De Sonneville-Bordes and Perrot's Upper Paleolithic tool typology is set up to reflect the changes and subdivisions of types over time; Bordes' Lower and Middle Paleolithic typology is set up to reflect the absence of directed morphological change (White 1982b: 169).
  6. The classification approach encourages the comparison of large spans of time as units (which is not very informative about the process of transition between them), and confuses process of in situ origin with those induced from outside (Dibble 1982:54).
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It is therefore not surprising that Spencer and Smith agree with the consensus that modern European humans were descended from at least some Neanderthal populations (Dibble 1982: 53). However, there are some difficulties with this hypothesis; Stringer (1982: 53) points out that the Saint-Cesaire and Vindija specimens cannot be firmly dated and thus cannot be used to support either gradual evolution or morphological stasis in Neanderthal humans, depending on where one fits them into the chronology. (For example, Harrold (1982: 136) agrees that the Saint-Cesaire specimen seems to show some "progressive" traits, and therefore resembles the Vindija specimen, but he puts the Vindija far before the Saint-Cesaire.) Trying to test the descent hypothesis, Stringer (1982) searched for a modern population which had characteristics derived only from Neanderthals living previously on the same site. To him, Shanidar supports the conclusion that the Neanderthal humans of south-west Asia as well as those of Europe are distinct from Eurasian modern humans. A comparison of European and southwest Asian Neanderthal and modern populations showed that the closest resemblances are not between Neanderthal humans and their local modern successors, but rather within each subspecies -- that is, between European and southwest Asian samples (Stringer 1982: 436). Dibble (1982: 63) adds that the best evidence for



evolution in situ -- a firmly-dated transitional form -- has not yet been found. Also, if the accepted dates are correct, the time available for evolutionary change is very short.

According to Stringer, there is very good evidence that Modern Eurasian humans evolved from a Mousterian culture (1982: 437). On the other hand, there are definite differences between the artifacts left by the Moderns and by their predecessors in Europe. New forms of bone, antler, and ivory tools developed rapidly after the Transition, with a greater emphasis on formal standards, although the retouch technique was still the same as that used on Middle Paleolithic stone tools. The variation between assemblages had also changed, with alteration in form through time, and regional morphological differences, being added to the Middle Paleolithic inter-assemblage pattern (White 1982b).

Straus (1982) jumps from the Mousterian to the Magdalenian to examine longer-term changes. He notes that the Magdalenian tools were generally small, made from blades produced efficiently from prepared cores, in contrast to the large Mousterian flake tools. The Magdalenians had true projectile points and a highly developed technology of bone, antler, ivory and tooth, whereas these do not appear in the Mousterian. He states that the Mousterian objects claimed to be bone tools are generally ecofacts (Straus 1982: 87). Whereas Mousterian sites are usually in lowlands and valleys, the Magdalenians lived successfully in the mountain country, often camping on potential migration routes or near natural traps (Straus 1982: 87, 90, 91). Furthermore, there is a difference in temporal patterning. Mousterian facies, adaptive but kept stable, could last for tens of millennia, in contrast to the rapid turnover of Upper Paleolithic industries, the average lifetime of which was 2,500 years. This indicates a fundamentally different cultural dynamism (Butzer 1981: 134, 179-80).

Clark (1982) attaches less significance to the morphology of the Upper Paleolithic tools than to the strategies in which they were used, because the various modern populations of the world had their own traditions, contemporaneous with and as efficient as the punched-blade tradition in Europe. He mentions evidence for the hafting of tools, the cooking, pounding, and grinding of food, the drying of meat, and the use of seafoods. These techniques would have made the massive power of the Neanderthal body unnecessary. The hominids who used them, he postulates, were thereby able to exploit the environment much more efficiently than before. Unfortunately he does not make clear which model of the European Transition he prefers, but it is apparent that in his opinion the African Neanderthal humans began to use these techniques and consequently evolved into Moderns at least 40,000 years ago, and he affirms the plausibility of population replacement in Europe (Clark 1982: 7).

Marks and Volkman interpret the shift from a Levallois to a blade-producing technology as a reflection of extensive, rather than intensive, exploitation of territory (1982: 16). The shift from the latter to the former, in their view, was caused by a deterioration of the environment, which meant that humans would have to travel further to obtain all the resources that they needed. By reconstructing cores from tools and waste flakes from the four occupation levels of Boker Tachtit (Central Negev, Israel -- 45,000-38,000 B.P.), the authors document a movement, over four levels, away from a Levallois industry:

- Level 1 - standard Levallois point industry;
- Level 2 - a variety of Levallois methods and increased blade production;
- Level 3 - predominance of a variety of semi-Levallois methods;
- Level 4 - efficient, fairly uniform non-Levallois blade production.

Interestingly, while the technology changed, the change in form and typology of the products was remarkably small -- they are distinguished from Levallois points more on the basis of method and intent of production than on morphology.

Dibble (1982) compares the Transition in France with that in the Near East, and finds much greater typological and technological continuity in the Near East than in France. Also, there is directional change in the Near East Middle Paleolithic typology but not in its French counterpart (Dibble 1982: 57). To determine how much of this difference was due to an emphasis on typological variation in the literature on French artifacts, a multi-variate analysis was performed on measurements of Typical Levallois flakes from eleven assemblages from Pech de l'Aze, Combe Grenal, Corbiac, Le Tillet, and Tabun. The French industries were found to group themselves by site of origin, whereas the Tabun industries were in chronological order in a fairly straight line, confirming the previous observations (Dibble 1982: 61). Dibble concludes that the industrial and biological Transition in the Near East occurred in situ by an evolutionary process which had been operating throughout the Mousterian. In France, by contrast, the Transition is more like an event, apparently unconnected with previous processes-- probably acculturation and biological absorption following contact with modern human populations.

Harrold's (1982) approach to the Transition is a detailed study of its aspects at the regional and local level -- in this case, the Châtelperronian industry. This industry, though clearly Upper Paleolithic, is sometimes contaminated after deposition by Mousterian artifacts. Thus, it cannot be called transitional.

Moreover, the popular hypothesis that it developed from the Mousterian has several problems: it is untenable if the various Mousterian facies represent differences in human activities at different times and sites rather than in culture; the assemblages usually invoked in support of it are from the middle of "Wurm II", whereas the Transition is at the end of "Wurm II" (the lower Pleniglacial?). There is not much resemblance between the terminal Mousterian and Châtelperronian artifacts and there are no published accounts of sites showing genuine in situ evolution from one industry to the other (Harrold 1982: 126). Given these problems, and the very rapid change suggested by the stratigraphy and by the presence of the Châtelperronian Neanderthal specimen, Harrold argues against the hypothesis of in situ evolution. Nor, for the same reasons (and the lack of antecedent Aurignacian remains in the area) does he attribute the Châtelperronian to Aurignacian intrusion alone. Rather, he argues for both, suggesting that the Châtelperronian was a local response to the introduction of a foreign technology.

#### CONCLUSION

In view of the numerous problems with the data and the various conflicting opinions of researchers, I will go no further than to agree tentatively with Harrold. The case for direct in situ evolution throughout Eurasia simply is not upheld by the evidence, in particular, the chronology required. Moreover, it is not a notably better hypothesis than Clark's explanation in terms of tool-use strategies, or Marks and Volkman's in terms of adaptation to a deteriorating environment. On the other hand, a straight "modern-human walkover" hypothesis is clearly too simplistic for such a complex problem. Harrold's idea, which combines the mechanisms suggested by Stringer, Marks and Volkman, Clark, and Dibble -- in situ evolution of Upper Paleolithic technology in the Near East, some morphological modernization in both the Near East and Europe, and movement of genes and tool-use patterns westward into France -- seems much more plausible. Interestingly, this is similar to the model proposed by Howell, in which the Neanderthal and modern humans' common ancestors were "neanderthalized" in western and southern Europe and "sapiensized" in the Near East during the Eem interglacial, while the original stock persisted in eastern Europe. Toward the end of the Paudorf interglacial the anatomically modernized humans in the Near East moved into Europe (Howell 1957: 342). Since the technological development was already in progress at Boker Tachtit 12,000-5,000 years before the Châtelperronian, there might have been time for a combination of interbreeding and physical obsolescence to effect such a great change.

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