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THE LAST NEANDERTHALS

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Introduction

This volume, like it's parent conference, focuses on the "firsts" - the oldest this or that hominid taxon somewhere in space. Although such a focus has great antiquity in our field - it is also one which addresses the least interesting and most static question about the past: the "when". This chapter looks not at the "oldest" but at the "youngest" or "last" archaic humans in Eurasia. I do so because, as Mellars (l996) has pointed out, questions about demographic histories and spatial distributions of Pleistocene hominids have received little attention in the literature. Yet, as Howell (l994) notes, in order to understand human evolution we must consider such factors as group size, spatial and temporal continuity of occupation, isolation, and extinction. These are basic biological concepts that affect evolution through such processes as the founders effect, gene flow, and genetic drift. Without considering them we are doomed to putting "dots on maps" and generating static scenarios that offer few answers to the most interesting questions about the past - why was there change? why did evolution occur?

Change in geologic or archaeological time, be it evolution or extinction, does not happen to individuals - it happens to populations. All populations, including Pleistocene hominid populations, have histories: periods of success when they expand and colonize new habitats as well as periods of stress when they contract into refugia. Sometimes refuging is temporary and populations rebound. When no rebounding is possible, local extinctions follow. Research on the extinction of mammoths has shown that it is serial local extinctions that ultimately bring about the extinction of the taxon (Sher *et al*., l995; Soffer, l993). The young dates for the last mammoths on Wrangel Island, where they existed until some 4,000 years ago, reveal just how slow a sequence of serial local population extinctions can be before the demise of the last representatives of the taxon occurs (Vartayan, l998; Vartnyan *et al*., l993).

The young Wrangel mammoths also inform us about the relationship between refugia and lifeways. Specifically, refugia are locations which provide a species with a suitable niche - offering stable environmental conditions for its way of life - which permit populations to survive and compete successfully.

Neanderthals and archaic lifeways

Recent research on prehistoric human populations, from both the Pleistocene and the Holocene documents that pre-Neolithic populations were not stable in space or though time. Instead, from initial colonization onward, all continents witnessed settlement discontinuities including local population extinctions (Lahr, l996, l997). Thus, human history is comprised of multiple dispersals and regional demographic instabilities.

The Pleistocene archaeological records from the occupied Old World amply confirm this. During the Last Glacial Maximum (LGM) some 20,000 - 18,000 years ago, for example, southwestern France and the East European Plain served as refugia for European populations (Housley *et al.*, l997; Soffer and Gamble, l990). Likewise, both Africa and Australia saw populations contract into optimal habitats (Burzer, l991; Lahr, l997).

We see the same refuging phenomenon when we look at the youngest Neanderthals and the last of Middle Paleolithic lifeways. Specifically, I argue that the adaptations developed by these archaic hominids over many millennia gave them competitive advantages in very specific regions of Eurasia where they persisted until as late as some 27,000 years ago.

I underscore that in this discussion I neither assume a 1:1 relationship between this taxon and a particular technology. Nor do I assume that in the last Neanderthals we see a taxon before extinction. These are not Wrangel mammoths. These are hominids with behavioral flexibility which could allow for significant behavioral changes - for new lifeways. That is exactly what we see happening outside these refugia at such places as St. Cesaire and Arcy (Harrold, l989; D'Errico *et al*., l998). Thus, rather than discussing species extinction, this chapter examines an end to a particular way of life.

1. Regional Distributions

Figure 1 plots the distribution of the last

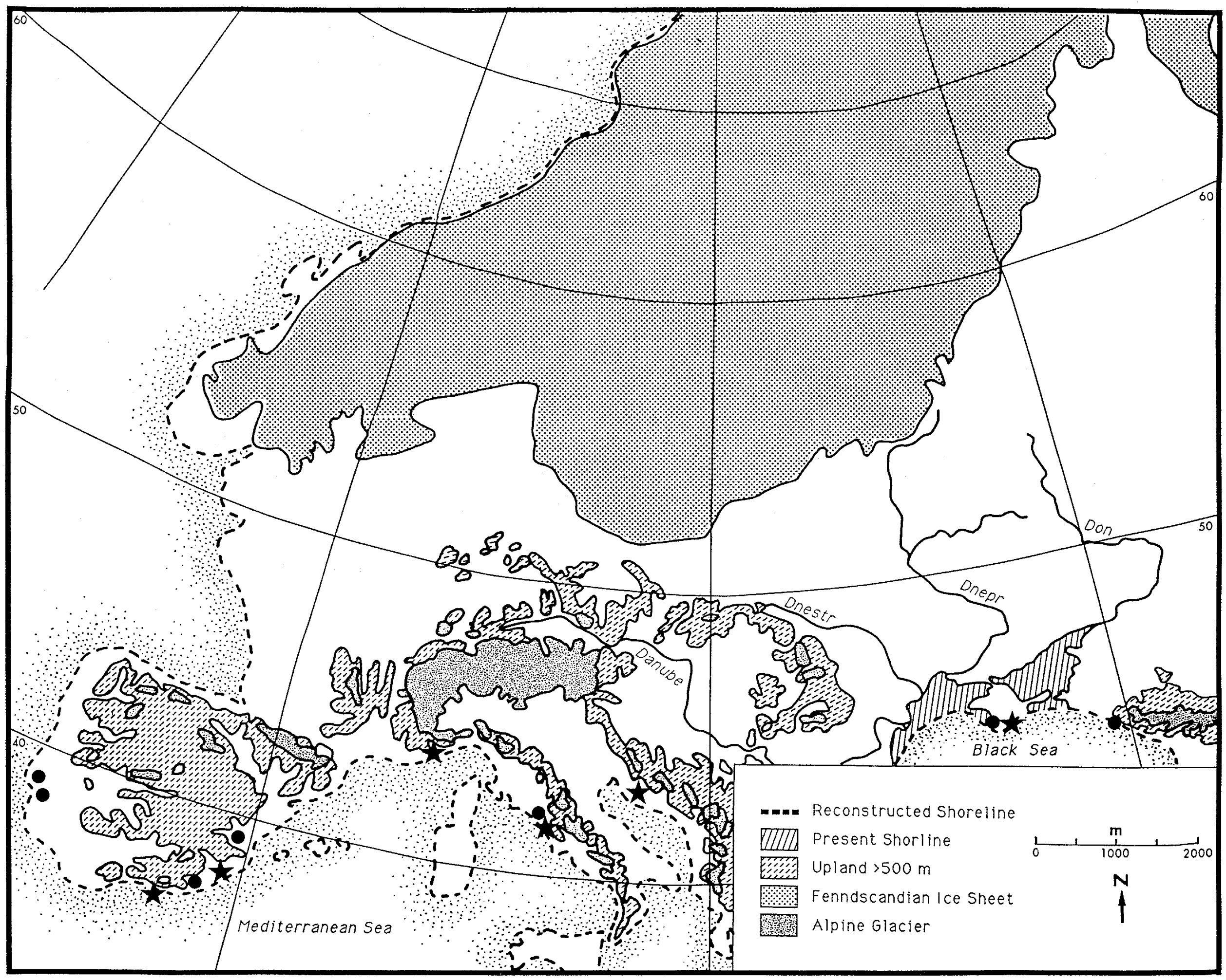

Figure 1. The distribution of the Neanderthal skeletal remains and Middle Paleolithic inventories dating < 35,000 BP in Europe. ★ hominid remains; ● archaeological remains.

chronometrically dated Neanderthal and Middle Paleolithic sites in Europe. All date between some 35,000 and 27,000 years ago. The utilized radiocarbon dates are uncalibrated - meaning that with calibrations they would date from 2 - 4,000 years older in calendar years (Van Andel, 1998 with references). Beginning in the west, they include sites along the Portuguese littoral (e.g. Gruta Nova, Figueira Brava), southern Spain, Gibraltar, and the Spanish Levant (e.g. Gorham's Cave, Zafarrya) (Barton *et al.*, in press; D'Errico *et al.*, 1998; Straus, 1997), possibly southern France (e.g. Hortus) (Wolpoff, 1996), central Italy (e.g. Grotta Breuil) (Bietti, 1997), southwestern Balkans (e.g. Vindija) (Kozlowski, 1996; Wolpoff, 1996) and Crimea (e.g. Buran-Kaya III, Kabazi II, Starosel'e) (Marks and Chabai, 1998; Pettit, in press). Similarly young ages are reported from Western Georgia (e.g. Akhshtyrskaia, Malaia Voronovitsa) (Boriskovskij, 1982, 1989; Liubin, 1993), as well as from the eastern Eurasian sites in the Altai and the Saian (e.g. Denisova and Okladnikov Caves) (Derev'anko, 1997; Kuzmin and Orlova, 1998).

The period in question falls in the second half of Oxygen Isotope Stage (OIS) 3 - a stage from some 59 - 24 ky characterized by numerous very brief sharp climatic oscillations including a well marked warm episode at about 40,000 and a cold one at 30,000 years ago in the calendar year chronology of ice and deep sea core data (Van Andel and Tsedakis, 1996, 1998). Figure 2 depicts reconstructions of biotic zones during an OIS 3 warm around 40,000 ky and a preceding cold intervals. This cold interval, although preceding the one at 30,000, can be used as its proxy. These reconstructions shows that regions occupied by late Middle Paleolithic populations were covered by nemoral vegetation - a mix of broadleaf and conifer arboreal growth which remained in these areas, although somewhat reduced in extent, throughout the cold stadials (Grichuk, 1992). Van Andel and Tzedakis' (1998) reconstructions clearly show that it is precisely these regions that served as refuges for both deciduous and coniferous species as well as for some Mediterranean evergreens. It is important to underscore that arboreal refugia existed here not only during this

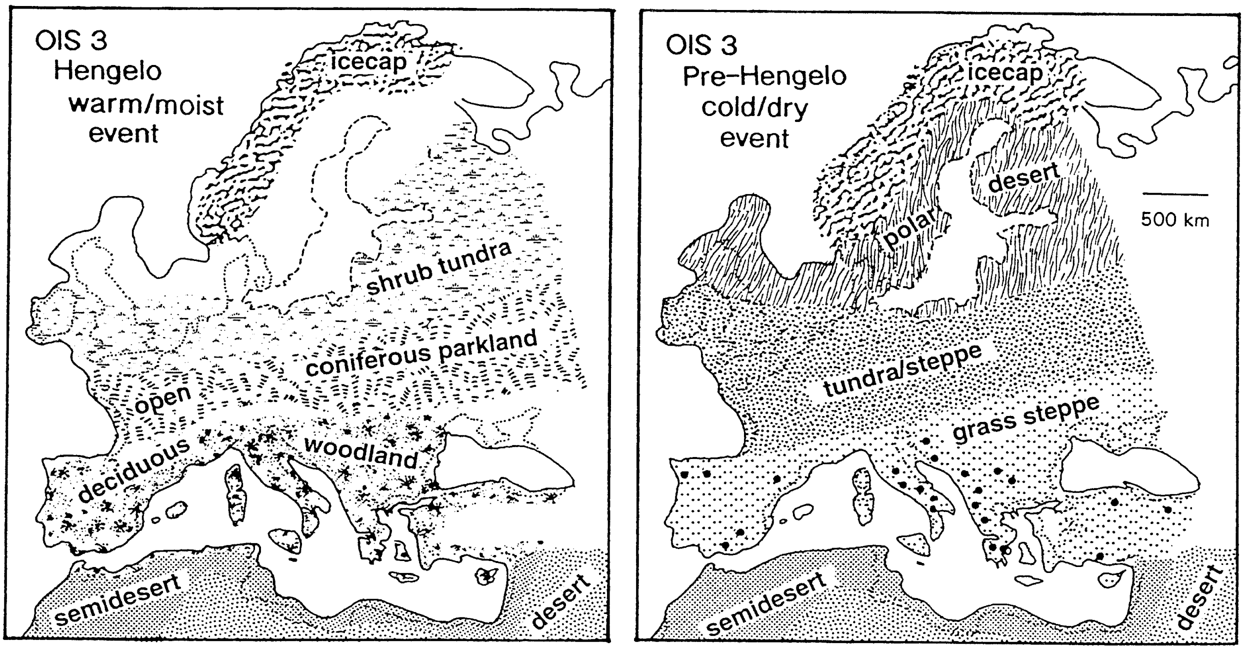

Figure 2. European paleoenvironments at OIS 3 warm/moist interstade, ca. 40 ky, and at the preceding cold/dry stade, ca. 45 ky (after Van Andel and Tsedakis 1998: fig. 6.6). ● tree refugia.

OIS but also in the next one, throughout the maximal cold and arid times of the LGM (Grichuk, l992).

Although these illustrations focus on western and central Europe, research on Late Pleistocene Eurasian faunal communities repeatedly shows that these regions, namely southwestern France and adjacent Iberian peninsula, peninsular Italy, western Balkans, Crimea, and the western Caucasus, featured the mildest climates during the last glaciation and served as refuges for a number of relict species (Gabunia *et al.*, in press; Lordkipanidze, l997, this volume; Markova *et al.*, l995; Musil, l985).

While it is tempting to correlate the distribution of the Last Neanderthals with warm Mediterranean climates - their absence from the Levant in southwestern Asia and presence in the Altai and Saian - suggests a more complex scenario. To unravel it we need to consider pertinent morphological, demographic, physiogeographic, and archaeological data.

2. Insights from Neanderthal Morphology

Neanderthals are seen as much more robust than anatomically modern humans, adapted to significantly greater physical exertion (e.g. Trinkaus, 1984; Wolpoff, l996). Inter- populational comparisons note a greater gracility of Near Eastern Neanderthals inhabiting lower latitudes when compared to European populations in higher ones - with the more robust Neanderthals reflecting morphological adaptations to life in more stressed northern environments. Neanderthal morphology, in fact, has been characterized as “hyperpolar” - reflecting adaptations to glacial cold in highly physical ways, little relaxed by culture (Holiday, l997; Wolpoff, l996). This characterization is true for both male and female Neanderthals (Frayer, l986). Recent studies of Neanderthal bone chemistry suggest that they were hyper-carnivorous (Boherens *et al.*, l991, in press; Fizet *et al.*, l995; Toussaint *et al.*, l998). This, in turn, implies that to survive, like all other carnivores in northern latitudes, they needed to exploit either very large day ranges or highly diverse environments - a prediction made by Geist (l978) over 20 years ago on theoretical grounds.

3. Archaeological Data and Archaic Demography

Research on the distribution of Middle Paleolithic sites across Europe suggests regional differences in the intensity of occupation with the lower warmer provinces witnessing a continuous human presence throughout the late Pleistocene while the northern areas were not permanently occupied before the Upper Paleolithic (Gamble, l986, l994). These differences were not about latitude, however - but about the distribution of resources. Specifically, I have argued elsewhere that Neanderthals occupied permanently only those regions where the proximity of the plains, foothills, and mountain ranges created a number of ecotones with more complex, diverse, and productive biotic communities during both stadial and interstadial times (Soffer, l994). Such areas featured the greatest vertical and biotic diversification - niche stacking in Steele and Gamble's (l998) terminology - and it is they that saw more continuous occupation while other more homogeneous loessic parts of Europe witnessed a pattern of sporadic and discontinuous colonization and abandonment.

The occupation record of eastern Eurasia mirrors this pattern also. The western Caucuses has numerous stratified Middle Paleolithic sites (Liubin, l993; Lordkipanidze, l997; Minusakas, l992) in fact, like Crimea (Bibikov, l971; Chabai, l998), it has considerably more Middle than Upper Paleolithic ones. The same regionalization is in evidence in Central Asia, while the Siberian record shows multi-layered Middle Paleolithic sites clustering in the southern most diversified landscapes around the Altai and Saian ranges (Derev'anko, l997).

In sum, data from Eurasia, suggest that the continents were not fully packed with Middle Paleolithic groups from the Atlantic to the Pacific, but that they were localized in discrete regional patches and continuously present only in regions with vertical differentiation and proximal resource diversification (Butzer, l991; Soffer, l994).

A regional rather than a site specific focus on faunal data from the European Middle Paleolithic sites indicates regionally circumscribed opportunistic subsistence strategies - something that Farizy (1994) has termed locational fidelity during the Middle Paleolithic rather than cultural geography evident in the Upper Paleolithic (Binford, l987; Soffer, l994).

This is supported by evidence for raw material procurement and use and for the utilization of space at the Middle Paleolithic sites. The lithic inventories show a redundant use of lithic raw materials regardless of their quality, suggesting a very localized and a highly mobile settlement system - something Steele and Gamble (l998) characterize as having large home ranges in relatively small core areas.

Relatively small concentrations of cultural remains which often at least partially over-lap one another, are characteristic of the known Middle Paleolithic sites and likely reflect repeated palimpsest occupations (Soffer, l994 with references).

The small site size we see in the Middle Paleolithic, coupled with the use of local raw materials, opportunistic exploitation of biotic resources, a general absence of clear cut site types, and a regionalization of the sites, suggests the existence of small, stable, co-residential units who moved often but within very restricted geographic space.

I have argued elsewhere that these data, together with evidence for muscle hypertrophy in both sexes, an inherited pattern of dimorphic feeding ranges postulated for the sexes during the early and middle Pleistocene, and very equivocal evidence for division of labor and extensive food sharing, suggest that adult members of these small sized co-residential units all provisioned themselves (Soffer, l994). The dimorphism between the sexes in feeding behavior documented for a number of primate species, including human foragers, further implies that Neanderthal females and their young likely had more restricted day ranges than did the males.

4. Neanderthal Niches

I have previously argued that the structure of the resource base in northern environments in Eurasia presented hominids with a set of specific problems solved one way by the Neanderthals and another by early anatomically modern humans (Soffer, 1994). The latitudinal increase in the patchiness and unpredictability of the food resources - their season-specific availability - as well a decrease in vegetal resources, confronted human omnivores with the need to exploit much larger territories than in lower latitudes. The Neanderthal solution may have been hypercarnivory. Ecological realities in these territories made animal resources more predictable, yet the hypercarnivory apparently adopted by Neanderthals, exacerbated the need for even greater territories. The structural need for carnivores to exploit huge territories and be residentially highly mobile, would have been extraordinarily stressful to the females, especially pregnant and lactating ones, as well as to the young. It is not surprising, therefore, that Neanderthal solution was to permanently occupy those regions with stacked niches where female day ranges could be minimized. The physiogeographic realities of Eurasia relegated these to just some areas of the continent.

Neanderthal refugia

These insights help us understand the demographic clustering and patchy distribution of the last Neanderthals (fig. 1). A cursory look at their loci shows them in their optimal niches, which in the terminology of evolutionary biology can be termed refugia - places where their adaptations were successful and permitted them, for a time, to continue traditional ways of life.

Using insights from evolutionary biology, Lahr (l997) has recently pointed out that population refuges can take one of two forms: either geographic refugia which new groups do not reach because of insurmountable geographical barriers, or they can be ecological refugia - where relict populations with well honed adaptations occupy stable niches and remain competitive. D'Errico and colleagues (l998) have recently hypothesized that late Middle Paleolithic lifeways persisted south of the Erbo in Iberia because the specific evironments there - namely more wooded landscapes. While agreeing with them that specific environments were indeed more favorable for Middle Paleolithic lifeways, I argue here that these lifeways persisted in these refugia for so long not because of arboreal vegetation, but because of the highly specific ways in which archaic hominids exploited the Eurasian environments.

Since by some 25,000 years ago we have no Middle Paleolithic sites left in Eurasia, apparently this time there was no rebound for this adaptive strategy and it went extinct.

Discussion, conclusions, implications

The existence of these refugia partially support hypotheses that the distribution of Neanderthals was environmentally determined (e.g. Butzer, l991; Stringer and Gamble, l993). The support is partial because of the disjunction between anatomy and culture - the fact that we find Neanderthals with Upper Paleolithic inventories and the reverse. Furthermore, parts of Eurasia show changes in adaptations deep in the Middle Paleolithic. Thus, for example, Stiner (1994) and Kuhn (1995) document changes in subsistence practices and raw material exploitation in Lantium at some 55,000 B.P., well before any other humans are present on the continent. Data from the East European Plain, on the other hand, show the probably coterminous presence of two distinct adaptations systems during the Early Upper Paleolithic - one more Middle Paleolithic and the other more Upper Paleolithic in nature (Soffer, l989). These data suggest that we are not dealing with innate differences in the capacity for particular behavior between the Neanderthals and their successors, but rather just with the habitual practice of that behavior - a practice which may have begun in the late Middle but became entrenched in the Upper Paleolithic.

What became extinct, then, is not necessarily a taxon but a good part of its behavioral repertoire. How this occurred is hotly debated, but the multivocality of the record suggests multiplex causes.

The last Neanderthals offer a number of insights for both our understanding of what happened to them in the different regions in particular as well as for our understanding of the behavior and the distribution of their predecessors.

First, I suggest that we need to embrace evolutionary biology and focus on the distribution of populations through time and space. Such distributions tell us not only about climate, but about behavioral repertoires of taxons and the degree of their plasticity.

Second, when looking at the histories of populations, we clearly need to remember that populations do not consist of identical clones, but of different age and sex groups who bear different energetic costs throughout their life cycles. Since all populations contain such disparate constituencies, they will all incorporate this diversity in need in their adaptive practices and structure their ways of life to satisfy them.

Finally, since this record indicates that the last Neanderthals appear to be associated with mixed woodland rather than with open cold environments, it raises questions about the "hyperpolarity" of their morphology. Precursors of distinctive Neanderthal morphology appears to be present on the Iberian peninsula by some 300,000 years ago (e.g. Atapuerca). It persists and intensifies through the last interglacial. It is present in the Levant where conditions at all times were far from glacial and where Neanderthals lived long enough to lose all "hyperpolar" traits. All this raises issues about the appropriateness of using exclusively Eskimo analogies for the deciphering Neanderthal morphology.

Answers to why the Neanderthals looked the way they did and lived where they lived are to be found in Darwinian insights that consider both natural and sexual selection, and thus couple not only climate, but more importantly, behavior with morphology - and that behavior is revealed through population demographies.

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