

Eat What is There: Hunting and Gathering in the World of Neanderthals and their Neighbours

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ABSTRACT The current state of our knowledge of Neanderthal hunting and gathering is reviewed, with particular emphasis on the 'transition' from the Middle to the Upper Palaeolithic. It is argued that the zooarchaeological data do not support any general change in strategy during this transition, and that Middle and Upper Palaeolithic hunting and gathering was largely determined by what was available seasonally in the local environment. Copyright © 2004 John Wiley & Sons, Ltd.

Key words: Neanderthal; subsistence; Middle Palaeolithic; Upper Palaeolithic

Introduction

In the following pages I discuss the issue of hunting and gathering by Neandertals and some of their contemporaries as reflected in the papers in this volume as well as in previously published ones. A brief review of the Middle to Upper Palaeolithic 'transition' is also included, because until recently this major change was seen in both the material culture and supposed differences in hunting strategies between Neandertals and early Upper Palaeolithic humans (also known as Cro-Magnons). However, I have chosen to present this discussion within a broader context. Instead of launching directly into the issue of hunting, which is the main topic of this volume, I thought that it would be useful to begin with a more general reconstruction of Middle and Upper Palaeolithic societies using schematic ethnographic analogies and inferred past diets as proposed in the literature. In my review of the

literature I found out that certain key ways that modern foragers use to obtain protein and fat probably were not incorporated to any significant degree into subsistence strategies until the Holocene, thus distorting our view of Middle Palaeolithic and most Upper Palaeolithic economies. In addition, I stress the paucity of our knowledge concerning the vegetal aspect of prehistoric diets by briefly providing the relevant information from Kebara cave. All these issues are dealt with as far as space allows in a short paper, taking into account the overall geography and stressing the differences between those regions that were deeply affected by climatic changes and those that were only mildly influenced. It is against this background that I summarise the three current hypotheses (gradual cultural evolution; genetic mutation; technological transformation) that aim to explain the Middle to Upper Palaeolithic transition (Bar-Yosef, 2002). Each of these hypotheses is grounded in a particular geographical context, whether large or small. A continental scale is relevant to the hypothesis of gradual cultural evolution, which is thought by McBrearty & Brooks (2000) to have taken place in Africa.

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The biological mutation that supposedly led to major changes in human cognitive capacities is thought to have transpired somewhere in a sub-Saharan region (Klein, 1995, 1999). Finally, the location of the 'core area' where the technological transition occurred first is considered to be located either in the Nile Valley or in East Africa (Bar-Yosef, 1998). Only when each of these topics is briefly treated do I return to the issue of hunting to conclude, like others, that humans hunted, and sometimes even scavenged, those animals that were available in their own region, and that shifts in their strategies and prey species were probably determined more by local conditions, hunting techniques and intentional selection.

Limitations imposed by the archaeological data-sets

Basic rules of economics tell us that our survival depends on supply and demand. Demand (or necessity) can be low or high depending on the number of mouths one has to feed. If the most basic requirements cannot be met, from either fresh or stored supplies, then humans either die of hunger or move to another region where they can obtain their needs in either a peaceful manner, or through conflict with others. In using the term 'supply' or 'food supplies' within a Pleistocene context we mean the distribution, accessibility and predictability of resources, whether vegetal (and therefore stationary) or animal, hence mobile (like most mammals, reptiles and birds). Gathering, trapping and hunting give humans the ability to provide themselves reliably with adequate amounts of calories without over-spending their energy. This process relies on acquisition techniques and tools, among which we include baskets or other containers, nets, spears, bows and arrows, constructed traps, and the like (e.g. Oswalt, 1972). In addition, the invention of storage facilities would permit 'delayed returns' (Woodburn, 1982), prolonging or maximising the capacity to survive through seasonal shortfalls or bad years. Finally, no less important for the survival of the group is food sharing, a behaviour that recently regained recognition as an essential strategy of all social foragers (Hawkes *et al.*, 1997; Winterhalder, 2001). Without delving into the

issue of variable modes of organisation of foragers, most authorities agree that the boundaries of each Pleistocene social unit are not always known. The geography of societies becomes clearer with the increasing amount of archaeological data being gathered concerning Holocene foragers, farmers and pastoralists (Stark, 1998, and papers therein).

When examining the world of the Middle and Upper Palaeolithic and attempting to understand the similarities and differences in hunting strategies reflected in the bone assemblages from roughly contemporary sites, it is useful to think about the social units that produced these assemblages as composed of a number of smaller groups of people. In spite of the fragmentary evidence, for our purposes the fundamental social unit can be defined, in demographic terms, as a band of 'classical hunter-gatherers', without also assuming *a priori* that they were egalitarian, or had a division of labour, or bilateral kinship, or other such common social traits of modern foragers (e.g. Birdsell, 1973; Kelly, 1995). The only assumption I would make is that for reproductive purposes a reasonably large mating system was maintained that included several hundred people (Wobst, 1974). Given the ambiguities involved in the spatial and diachronic resolution of the archaeological data, we should refer to the basic mating system as a 'social unit' composed of 'groups'. Hence, if we assume that in each site at any given time there were some 20–50 humans of all ages (comprising a 'group'), we need to find out where the other groups were, what the main area exploited by the entire 'large social unit' was, and the average size in square kilometres of this territory. We should also take into account the relative degree of mobility that was determined by the seasonal availability of food resources, and their spatial distribution. Thus, if we assume that during the Middle and early Upper Pleistocene the basic social entity incorporated some 250 to 800 people (e.g. Birdsell, 1973; Wobst, 1974), we should be able, by reconstructing the distribution of resources, to estimate the potential size of their territories.

Employing the information in the papers in this volume and additional sources (e.g. Burke, 2000, and papers therein; Speth & Tchernov, 2001; Stiner, 2002), it is obvious that endeavours

to estimate the full range of subsistence strategies of Middle and Upper Palaeolithic societies and their food acquisition techniques face a major obstacle. I believe that the critical missing data from the excavated contexts are the plant food remains, which reflect the amount and spatial distribution of gathering activities during the Middle Palaeolithic. This lack of data is a result of poor preservation in most sites, which prevents us from obtaining a clear idea about the vegetal diets of humans during the late Middle through most of the Upper Pleistocene. It also limits our ability to estimate the degree of group mobility. Survival based on migratory species requires residential movements over large distances. Stationary species provide the opportunity for decreased residential mobility and for task teams to operate within short ranges. Thus, if abundant and predictable supplies of vegetal food are available within short distances from camp, we may expect a reduction in mobility and, under the right conditions, perhaps even a semi-sedentary strategy. In all these cases information concerning the location and mobility of other groups

in the area is important, in particular if group composition is fluid.

Among all foragers except those in northern latitudes who must subsist mainly on hunting, the role of plant foods in the diet cannot be overstated. The records from historical and recent groups of foragers indicate that the relative amounts of food obtained by gathering, hunting and fishing reflect the particular local environments (Kelly, 1995; Cordain *et al.*, 2000; Binford, 2001; but see Figure 1). However, we must remember that the data-sets in Murdock's well-known *Ethnographic Atlas* contain almost no living foragers in the temperate climatic belt, including the Mediterranean zone. The bias stemming from our reliance on data from modern hunter-gatherers is even greater when considered in terms of the zooarchaeological evidence for fishing in prehistory—the use of fish in the Middle Palaeolithic was, at best, very scanty. The chronological disparity is clear along the coast of South Africa where fish are either rare or absent in Middle Stone Age sites, but are abundant in Late Stone Age occupations (Klein, 1999). It seems that the

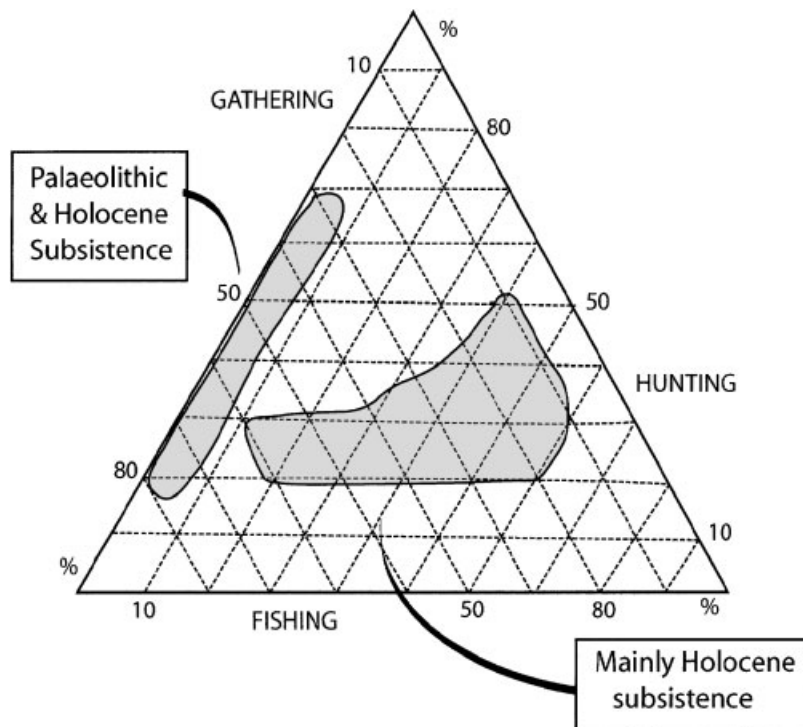


Figure 1. Triangular plot indicating relative proportions of food acquisition methods among prehistoric societies.

exploitation of marine resources became a major activity only during the Upper Palaeolithic, mainly towards the Terminal Pleistocene and early Holocene. This is not a surprising observation. World population increased after OIS 2, including the dispersal of humans into the New World. Therefore, rapid population growth, as documented archaeologically in many areas during the period of deglaciation, resulted in local and/or regional demographic pressures. The intensification of marine fish and shellfish exploitation was most probably motivated by the decrease in hunting options for coastal groups and the need for alternative sources of protein and calories. Comparisons between certain ethnographic and archaeological examples in marginal areas such as Tierra del Fuego tend to support this contention (e.g. Yessner *et al.*, 2003).

In sum, fishing as a source of protein and fat was generally not practised during the Middle Palaeolithic but was introduced later as a necessity caused by demographic pressure accompanied by the development of suitable acquisition techniques. It could still mean that a relatively high percentage of energy was derived from mammal protein and fat (Cordain *et al.*, 2000). The amount of available and consumed plant food is expected to have been variable within each climatic belt and at different elevations in the northern hemisphere as well as in Africa south of the equator. Given the broad geographical distribution of Middle Palaeolithic social entities, including a portion of the Neanderthal population, it seems clear that many groups occupied regions where plant gathering was probably an essential component of their diet.

It is unfortunate that only a few prehistoric sites provide insights into the vegetal menu of Middle Palaeolithic and Upper Palaeolithic groups. The special conditions that facilitate good preservation of archaeobotanical remains seldom occur in sites of these periods. Kebara cave (Mt. Carmel) is one of those rare cases where carbonised seeds, acorns and nuts survived the vagaries of time and diagenesis (Bar-Yosef *et al.*, 1992; Lev & Kislev, 1993). However, in spite of the good preservation of the plant remains, we can only make a rough estimate of the ratio of gathering to hunting at Kebara. The tentative conclusions concerning the nature of the Mousterian occupations

(from bottom to top) are as follows (Speth & Tchernov, *in press*). Early in the sequence there occurred ephemeral seasonal hunting during late spring–summer. Then, a shift is observed to intensive winter to early spring hunting, and then, in the latest occupations, there is a return back to more ephemeral late spring–summer hunting. Plant foods appear to have been gathered during the autumn (October–December) and early spring (March–April) and remained more or less constant throughout the sequence. In addition, the great paucity of microfaunal remains indicates a very sporadic use of the cave by barn owls, testifying to the importance of human presence. This means that during a major part of the depositional sequence, the Middle Palaeolithic inhabitants of Kebara, camped frequently inside the cave. Thus, the presence of archaeobotanical remains compliments the seasonal information obtained from the analysis of the fauna and allows us to suggest a somewhat different mobility pattern from the one that might have been proposed solely based on animal bones.

Over the last two decades scientists have relied increasingly on analyses of stable carbon, nitrogen and oxygen, as well as strontium and other trace elements, in bone, tooth enamel and dentine in order to determine the role of plants, animal tissues and fish in past human diets. Various studies indicate that one can differentiate between the consumption of C3 and C4 plants, and trace the exploitation of terrestrial and marine mammals and fish (e.g. van der Merwe *et al.*, 2003; Schoeninger *et al.*, 2003; Lee-Thorp & Sponheimer, 2003). Even with the use of these laboratory techniques we still cannot determine the ratios of animal tissues versus plant foods. However, testing the correlation between ethnographic information and stable isotopes has demonstrated good agreement (Harrison & Katzenberg, 2003); consumption of fish and shellfish, hunted game and cultivated products were identified both in the archaeological and ethnographic records as well as in the stable isotopes. In addition, hierarchical social differences among farming communities can be detected (Ambrose *et al.*, 2003).

By employing current research on modern hunter-gatherer nutrition (Cordain *et al.*, 2000),

I expect that Palaeolithic foragers in environments rich in vegetal foods, such as the tropical, subtropical and Mediterranean ecozones, zones that are somewhat poorly represented among ethnographically documented foragers, derive >60% of their energy from gathered plants and 40% or less from hunting. In addition, these environments were less affected by the impact of glacial conditions, and therefore permitted long-term biological continuity of both humans and faunal associations. Among the richer regions we may count the coastal areas of southern Iberia, southern Italy, southern Greece, coastal Anatolia, the area west of the Black Sea, the coastal Levant and most parts of North Africa such as Cyrenaica and the Maghreb. Additional areas included river valleys in Africa, equatorial belts away from the rain forest, and the coastal region of southern Africa. The thicknesses of anthropogenic deposits in various cave and rock-shelter excavations in these areas indicate that humans were able to survive continuously.

In sum, my commentary on Middle and early Upper Palaeolithic 'economics of necessity' must be limited to the discussion of hunting as reflected in the assemblages of animal bones, although, as expressed above, I feel that even with the best faunal analyses we still see only part of the total set of procurement activities. In doing so, we trace changes in the composition of hunted game that reflect the location of the sites in relation to latitude and elevation in the different regions. But any examination of the late Middle Palaeolithic is entangled with the issue of the so-called 'transition' to the Upper Palaeolithic. There are three basic models that try to explicate this cultural shift, or the lack of it, and the appearance of what most scholars view as archaeological signs for 'modern behaviour', that is, behaviour resembling the variable cultural and economic patterns of modern foragers. It has been suggested that cultural changes during the transition entailed shifts in hunting strategies to incorporate as many different species as were available, and an increasing specialisation by concentrating on one or two species or incorporating dangerous ones. Greater rates of success in hunting forays could be attributed to technological improvements and better means of communication among the hunters who monitor their territory. It is arguable whether the

observed changes occurred gradually or abruptly some 55–40 ka BP, and whether they support any of the main models for the emergence of Upper Palaeolithic societies, which we often consider as the prototypes of historical foragers. These three models are, in brief:

- (a) gradual cultural and behavioural change during the Middle and the Upper Pleistocene resulted in the archaeological expressions of the Upper Palaeolithic or the Late Stone Age in Africa (e.g. McBrearty & Brooks, 2000);
- (b) the appearance of complex cultural behaviour represents an adaptive technological response to specific environmental conditions and demographic shifts that occurred in a particular region ('core area'). The technological and cultural revolution, including improved inter-group communication, led to behavioural, organisational and economic changes that facilitated the dispersal of *Homo sapiens sapiens*, often referred to as Cro-Magnons, and their impact on neighbouring populations (e.g. Bar-Yosef, 2002);
- (c) a fundamental neurological change allowed humans to express greater behavioural flexibility and cultural complexity, defining the archaeology of the Upper Palaeolithic period (e.g. Klein, 1999).

Testing each of these hypotheses in depth is beyond the scope of this paper, but they are commented upon in the concluding remarks.

Middle and Upper Palaeolithic hunting

Research history tells us that the image of Neandertals has evolved from 'big game hunters' to 'mainly scavengers' (for a brief survey see Burke, 2000; Speth & Tchernov, 2001; Grayson & Delpech, 2003). Efficient hunting of large and medium-size game was solely attributed to Modern humans (e.g. Binford, 1984). However, systematic faunal studies that have been conducted in different countries during the last two decades have rejected both images (Burke, 2000, and papers therein; Stiner & Kuhn, 1992; Speth & Tchernov, 2001; Stiner, 2002; Grayson & Delpech, 2002). A similar conclusion is collectively expressed in this issue. The analysis of patterns of

intentional fracturing, exploitation of marrow, cut marks, gnaw marks and the like have become standard procedure in faunal studies as a means of identifying hunting and scavenging activities. Moreover, the issue of bone preservation in open-air and in cave sites in particular now receives more scientific, less impressionistic analysis (e.g. Weiner *et al.*, 1993; Stiner *et al.*, 1995).

During the last two decades, in addition to caves, open-air sites have been excavated in Western Europe, enlarging the range of Middle and early Upper Palaeolithic contexts from which bone samples have been recovered (e.g. Grayson & Delpech, 2003). From a pan-European perspective, information from open-air sites is also available from several localities in Poland and the Russian plains (e.g. Patou-Mathis, 2000; Hoffecker, 2002). Hence, past biases that may have been caused by a focus on cave assemblages need no longer be a major concern. A wealth of information is currently available from sites situated in variable, open environments. These include steppic plains with isolated forest stands, and galley forests along the rivers which were favoured by large and medium-size body mammals. Woolly mammoth, woolly rhinoceros, bison and horses were among the commonly hunted game, but in particular environments so were red deer, the giant deer and the elk (moose) (Hoffecker, 2002, and references therein). We thus have a full range of Neandertal hunting activities. Similarly, one can compare the few Mousterian open-air sites in the Levant to cave assemblages (e.g. Gilead & Grigson, 1984; Davis *et al.*, 1988; Speth & Tchernov, 1998, 2001). In general, the open-air localities are dominated by large and medium-size mammals, whereas caves usually contain very few large mammals. Thermoluminescence (TL) and Electron Spin Resonance (ESR) dates seem to indicate that the open-air sites are generally contemporary with the cave sites, and therefore differences between their faunal assemblages would suggest their use in different seasons of the year.

In summary, most current studies of faunal assemblages from Middle and Upper Palaeolithic sites briefly report the geographical location of the site or sites and their chronology, and pay little attention to climatic changes and the impact of humans on their resources. The overall tendency is

to stress that the hunted game (sometimes including scavenging) reflects the animal communities of each region, even if humans, as shown in several cases, preferred to hunt only a certain suite of species (e.g. Grayson & Delpech, 2003).

The contention that there was essentially no difference between Middle and Upper Palaeolithic humans, except for very rare cases, resembles our daily behaviour in the modern world. We shop for food in the nearest supermarket. With modern means of transportation, whether we live in town or a suburb, special commodities can be obtained from particular shops (and often these products represent the results of the exchange of plants and animals between the Old and the new World). Obtaining resources from distant localities seems not to have been an option in the world of Middle Palaeolithic humans. Sourcing of lithics from Mousterian and other Middle Palaeolithic sites often demonstrates that they were obtained from sources located only a short distance away, although there are cases indicating curation of pieces over more than 50 km. Upper Palaeolithic humans behaved in the same way, although there are examples of the use of good quality lithic raw material from distances over 100 km (Rensink *et al.*, 1991). I wonder if detailed studies of faunal assemblages will not show a somewhat similar phenomenon among both Middle and Upper Palaeolithic bone assemblages—where a portion of a mammal, reptile or a bird, not locally available, was imported from a large distance or brought as a gift.

Chronology is an important issue when comparing Middle and Upper Palaeolithic human behaviour. As understood today, the time range of the Middle Palaeolithic is from ca. 250 ka BP through 45–35 ka BP, while the Upper Palaeolithic lasted generally from 45 ka until the end of the Pleistocene. The difference in the duration of each period, when they are compared as two units, could be a source for error. When testing any of the above-mentioned hypotheses (potential neurological change, or either gradual or rapid technological and social revolution) there is no point in grouping the information from ca. 250 through to 50 ka and comparing it with data from a period that lasted only 35–25 ka. By clustering all the Middle Palaeolithic assemblages into one unit we risk ignoring important changes

that took place during this time and could have disappeared due to population extinctions or simply shifts in adaptations. For example, the observation that Neanderthal populations in north-west Europe made plenty of blades during the Last Interglacial is meaningless when one considers that most Mousterian populations across Europe between 65–50 ka BP did not practise the same knapping technique. I believe that in order to test whether a relatively abrupt cultural change occurred, we should limit our comparisons to similar time spans and, given the range of common standard deviations of TL, OSL, ESR and radiocarbon techniques, I suggest that 10 ka should be the basic time unit.

In the same vein, we can assume that Neandertals during OIS 4 and early OIS 3, just before encountering the incoming Cro-Magnons, would have been technologically better equipped than their ancestors during OIS 7 and OIS 6. Sequences of isolated sites, or stratified ones dating from ca. 60 ka to 25 ka BP, have provided several of the authors in this book (e.g. Burke, Stewart, Estevez, Gaudzinski, this issue) with an opportunity to discuss the correlation between faunal assemblages and climatic conditions, although the chronological resolution of the archaeological sequences is not as detailed as those derived from pollen cores in temperate Europe, deep sea cores, speleothems and ice cores. It is clear that the regions considered by these authors were affected by fluctuating climatic conditions, particularly those that were close to periglacial conditions. Hence, fluctuations in hunted game can be considered to reflect the local environment. In addition, climate is an important factor in the demise of Neandertals according to some authors (e.g. d'Errico & Sánchez Goñi, 2003). Yet the success of the local population in surviving previous cooler, colder and fluctuating climatic conditions in the same temperate region is hardly taken into account. Moreover, the issue of extinction as a result of competition by other hunters is rarely considered (but see Stewart, and Estevez, this issue).

Identifying the economic potentials of each region will facilitate the formation of a distribution map of human populations. Concentrations of sites in a particular area are not solely a reflection of archaeological visibility or intensity of

research. In regions where fieldwork has been carried out for a century or more, one can obtain a reasonable degree of resolution concerning sites, dates and fauna. When these data are combined with climatic evidence derived from pollen sequences and climate simulation models, they have facilitated the completion of the OIS 3 project (van Andel, 2002). A good example of a cluster of sites can be seen in the Franco-Cantabrian area or the Upper Palaeolithic homelands across Eastern Europe (e.g. Soffer, 1985). High densities of sites of similar age near the Atlantic front are already well known (e.g. Bocquet-Appel & Demars, 2000), as is the ebb and flow of human occupation in northwest Europe during warmer and colder periods such as OIS 5 and OIS 4 (e.g. Conard, 1990; Tuffreau, 1992; Conard *et al.*, 1998). Indeed, even without detailed chronologies a basic comparison between the richness and thickness of deposits across the investigated portions of the Middle and Upper Palaeolithic world would demonstrate where continuous human occupation was easier or more difficult to sustain. An additional measure of the intensity of human occupation would be ephemeral versus frequent presence of hyenas as recorded by the presence of their bones (Straus, 1982), and the evidence of gnaw marks, punctures, and so on, in the faunal assemblages (e.g. as in Hayonim and Kebara caves in Israel; Stiner, and Speth, personal communications). Greater frequency of hyena denning and episodic human occupations would indicate ephemeral human presence in a given region, unless there is evidence for densely inhabited open-air sites. This is a subject that needs further inter-site and inter-regional comparisons.

Conclusions

The current state of zooarchaeological research indicates that Middle and Upper Palaeolithic faunal assemblages are representative of what was available for hunters in the local environment, depending upon climatic conditions, the season of the hunt, and sometimes the requirement for animal tissues for a particular function (such as pelts). Models derived from optimal foraging can be employed to analyse hunting strategies with respect to the first two categories.

The cultural twist is expressed in those cases where the evidence points to human choices that reflect culturally determined food preferences or non-food needs such as the collection of shells for body decorations. Recognising the necessities of social entities for resources other than food for their survival, but without considering when hunting began to function in the context of communal feasting and prestige enhancement, special faunal assemblages should be discussed in detail. For example, the few Aurignacian assemblages considered outliers from the general pattern presented by Grayson & Delpech (2002) need to be examined for other kinds of archaeological information that may explain why they are different.

The issue of similarities and differences between Middle and Upper Palaeolithic faunal assemblages has, until recently, been treated within the context of a Eurocentric viewpoint. As noted by Burke (this issue), various reports, mostly dealing with European faunas, indicate that modern humans exploited a broader range of hunted animals (bigger and smaller ones) than the Neandertals. We should remind ourselves that Western Europe is only one region, and not the largest one, within which modern humans evolved. That the European model is not necessarily applicable everywhere is stressed by Cosgrove & Pike-Tay, for example (this issue), and also by the studies of other researchers (e.g. Speth & Tchernov, 2001; Stiner, 2002). It is certainly true that there is more archaeological information per square kilometre from excavated and dated sites in Europe for the Middle and Upper Palaeolithic than from any other region in the Old World. This is also a region which was affected by climatic changes and, therefore, sorting out what species were available from human choices is not an easy exercise. Examining other regions, even if they do not yet provide numerous excavated sites, may throw more light on the issue of choice versus availability. While this detailed task is beyond the scope of these comments, there are a few points that can be made. Klein (1998) saw a difference in the ability of Late Stone Age (LSA) groups in South Africa to feed significantly more people than Middle Stone Age groups, as demonstrated by the higher relative abundance of large ungulates in LSA assemblages, among other

things. On the other hand, in the Levant, Speth and Tchernov (2001) found that there was nothing in the hunting strategies of Levantine Neandertals that would set them apart from modern Upper Palaeolithic humans in the same area. Similar conclusions are expressed in the papers in this volume. Hence, the testing of the three different models concerning the transition from the Middle to the Upper Palaeolithic, as mentioned above, should probably take into account other aspects of the archaeological data, such as evidence for broadening of diets and intensifying food-processing techniques, as well as other cultural practices such as manufacturing ornaments, using bone and antler for making objects, improved means of inter-group communication, and the like.

Acknowledgements

I am grateful to Ariane Burke who asked me to write this commentary and made useful comments on the first draft of this paper. John D. Speth and Anna Belfer-Cohen contributed to the clarity of the text. Needless to say, I take full responsibility for all the mistakes and shortcomings of the final version.

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