Human subsistence change in the Late Pleistocene Mediterranean Basin: the status of research on faunal intensification, diversification & specialisation

Natalie D Munro
Department of Anthropology, Unit 2176, 354 Mansfield Road, University of Connecticut, Storrs, CT, 06269, United States
Natalie.Munro@uconn.edu

Levent Atici
Department of Anthropology & Ethnic Studies, University of Nevada, Las Vegas, 4505 S Maryland Pkwy, Las Vegas, Nevada, 89154-5003, United States
Levent.Atici@unlv.edu

Keywords
Intensification, specialisation, diversification, Upper Palaeolithic, Epipalaeolithic, Mediterranean

1 Introduction
Researchers have long identified the Late Pleistocene as a period of substantial change in human resource exploitation strategies. In the Mediterranean Basin, the timing and nature of these changes are of special importance given their occurrence between the appearance of the first behaviourally modern humans and the origins of agriculture. Understanding dietary change is thus relevant for differentiating the adaptation of anatomically modern humans from earlier hominin species. Likewise, it has proven to be an effective measure of human demographic change that is of particular importance for understanding human adaptations leading up to the transition to agriculture.

The shifts in the Late Pleistocene faunal record that have received the most attention include a narrowing of the dietary spectrum to focus on one or two large game species (specialisation) and at the opposite end of the continuum, an expansion in dietary breadth to include less cost-effective resources (diversification). Specialisation has most often been used to describe the early Upper Palaeolithic focus on reindeer and ibex hunting in western Europe (Mellars 1973; Phoca-Cosmetatou 2004; Straus 1977, 1987, 1995; see also Costamagno 2003, 2004; Grayson & Delpech 2002 for contra argument), but has been reported from other spatial and temporal contexts as well (Atici, this series). The specialisation and diversification of human diets have both been connected to subsistence intensification and to patterns of demographic growth, technological change and site occupation intensity that characterise the period between ca 50,000 and 10,000 BP in the Mediterranean region.

In the 50 years since Late Pleistocene subsistence change (‘hunting specialisation’ and the ‘broad spectrum revolution’) was described (Binford 1968; Flannery 1969), extensive data collection in the Mediterranean Basin has extensively documented this phenomenon in the faunal record. In particular, recent studies reveal substantial variation in the timing and nature of faunal change across the region. We therefore believed it appropriate to convene a group of scholars working across the Mediterranean Basin both to describe variation in the timing and the expression of subsistence change across the region and to determine the robusticity of these patterns on a regional scale. In March 2008 fourteen papers evaluating the zooarchaeological record from Upper Palaeolithic and Epipalaeolithic sites across the Mediterranean Basin were presented in a symposium at the 73rd annual meeting of the Society for American Archaeology (SAA) in Vancouver, Canada. Expanded versions of twelve of these papers describing faunal assemblages from seven Mediterranean countries are presented in this and succeeding issues of Before Farming.
Discussions of changing relative faunal abundance in the Late Pleistocene of Eurasia invariably focus on three particular themes describing the human meat diet. These include intensification, diversification and specialisation. Intensification, in faunal studies, generally refers to a decrease in the cost/benefit ratio invested in the human procurement of game — in ecological terms this means a reduction in foraging efficiency (see Binford 2001; Stephens & Krebs 1986). Intensification is most often investigated using diversity or prey indices that reflect the number or relative abundance of faunal resources in a given diet. Most often, prey indices evaluate changes in the relative abundance of resources with different cost/benefit ratios. Since the late 1980s studies of dietary intensification became more formalised with the application of principles from optimal foraging theory (OFT) as a measure of human hunting efficiency (Lupo 2007). OFT ranks prey taxa according to their relative cost-benefits and assumes that foragers will preferentially hunt the highest ranked animals. If the highest-ranked animals are not sufficiently abundant to meet demands, the hunter will add animals to the diet in order of rank (Stephens & Krebs 1986). In zooarchaeological studies, animals are usually ranked in terms of their cost/benefits — those that provide the most caloric returns for the amount of energy invested are ranked highest. Body size (as an estimate of caloric returns) is most often used to determine rank (Broughton 1994), but escape strategy (cost of capture) may also be integrated into prey ranking systems, especially when comparing animals of similar body size (Stiner et al 2000). Fast-moving small game animals are thus ranked lower than slow-moving types due to increased capture costs. The addition of low-ranked resources to human diets equals an expansion of dietary breadth. As diet breadth expands, foraging efficiency declines and the hunting strategy is intensified. Diversification of the human meat diet is thus an effective measure of intensification.

In contrast, specialisation refers to the narrowing of diets to the point that they are dominated by only one or two species (see also Phoca-Cosmetatou this series). The term ‘specialised hunting’ was introduced to Palaeolithic archaeology to describe the strategy used by early Upper Palaeolithic reindeer hunters in southwestern France (Binford 1968; Braidwood & Reed 1957; Grayson & Delpech 2002). Since then, investigations of specialised hunting have expanded well beyond the French Palaeolithic (Cannon & Meltzer 2004 and references therein). Nevertheless, the definition of what constitutes a specialised assemblage remains arbitrary. Mellars (1973) defined a specialised assemblage as one in which the dominant species comprises at least 90% of the assemblage, but the term is usually applied more broadly to assemblages dominated by one or two taxa.

An important, but elusive aspect of the definition of specialisation is the intention of the hunters who accumulated assemblages dominated by one or two taxa. In particular, was the assemblage produced as the result of a planned strategy to capture a particular prey type, or as a product of resource availability? A specialised pattern can also occur when ecological factors restrict the number of resources on the landscape or when a high-ranked resource is sufficiently abundant to meet human needs. In addition, as inter-related aspects of mobility and settlement patterns, it is essential that seasonality and site function be factored into discussions of taxonomic abundance. A site with restricted seasonal use, as opposed to unrestricted multi-seasonal use, may generate assemblages dominated by one or two taxa due to their seasonal abundance. The term specialised hunting should refer to a deliberate attempt by humans to capture a specific prey type sometimes at the exclusion of other higher-ranked taxa (see also Grayson & Delpech 2002; Mellars 1996, 2004), but more often it is used to describe a pattern in the archaeological record—an assemblage dominated by only one to two species (see also Phoca-Cosmetatou this series). Unravelling the behaviour behind specialised assemblages is essential for building larger models of Palaeolithic hunting adaptations. Unfortunately, the behaviour is often more difficult to establish than the archaeological pattern.

Understanding the conditions under which specialised assemblages were collected is important when relating the concept of specialisation to intensification. A strategy in which hunters intentionally specialise on a specific prey type may represent an intensification strategy if it compels hunters to ignore higher-ranked prey types, and/or adopt costly technologies and hunting strategies. In contrast, if a specialised
assemblage simply reflects high availability of high-ranked taxa or low species diversity in the environment, then this phenomenon may represent an opportunistic, non-intensive strategy.

3 Interpretive and methodological frameworks

Most of the papers assembled here follow a behavioural ecological approach to investigating Late Pleistocene dietary change or, at minimum, informally apply the tenet that humans seek to maximise cost/benefits when foraging. Many of the authors ascribe climatic/environmental and demographic factors with prime mover roles in subsistence change. A notable exception is the paper by Hockett and Haws which adopts a nutritional ecology framework that views dietary diversification as an optimal dietary strategy that increases human survivorship. Dietary diversification is thus seen as an adaptive strategy that may have given anatomically modern humans a reproductive advantage over Neanderthals, rather than an outcome of human demographic pressure.

The methods used to investigate subsistence change in the data-oriented studies collected in this series fall largely within the energy maximisation framework described above. Although most of the papers focus on the intensification or diversification of human diets, a few also consider dietary specialisation (Atici; Phoca-Cosmetatou). These papers measure specialisation using the number and/or proportion of taxa represented in their assemblages. Diversification was measured similarly using number of species, relative species abundance and indices comparing the abundance of high- versus low-ranked game. These include analyses in which prey were differentiated based on their returns (body size), in particular the relative abundance of small versus large-bodied prey types and cost of capture (eg, fast versus slow small game; Manne & Bicho; Munro; Phoca-Cosmetatou; Starkovich; Stiner). Finally, some researchers went beyond taxonomic representation to investigate subsistence intensification using prey age profiles (Aura et al; Munro) and/or carcass processing strategies (Aura et al; Manne & Bicho). These analyses also operate from a cost/benefit perspective by ranking age groups (eg, adults, juveniles) or carcass products (eg, meat, marrow and grease) and examining evidence for the exploitation or relative abundance of each.

4 Temporal and spatial variability in the faunal data

The twelve papers published in this volume encapsulate substantial temporal depth extending from the late Middle Palaeolithic to the earliest Neolithic (ca 50,000 – 8000 BP). The papers also cover a broad geographic area extending across the northern and eastern reaches of the Mediterranean (Portugal, Spain, Italy, Greece, Turkey, Cyprus and Israel)—though unfortunately, the North African coast is absent from this collection. For the most part, the papers are data-rich and provide a site-specific or regional record of the timing and nature of species change in several locations across the Mediterranean.

Although a few authors refer to patterns of specialised hunting in their region (Atici, Marin Arroyo), only Phoca-Cosmetatou specifically investigates this issue. She evaluates specialisation by looking at the percentage dominance of the most common species in assemblages from Late Glacial Italy. She finds that only a few assemblages were dominated by a single species and that the sites where they originated could not be characterised as specialised hunting camps because of the broad range of activities that were practiced there. Instead she views single species dominated assemblages as representing the narrow end of a widening range of human hunting strategies that characterises the Late Glacial in Italy.

Several of the remaining authors focus on increased dietary breadth enabling us to make some general observations about dietary diversification. Of particular interest is the variability in both the taxonomic composition and the timing of the diversification trend across the Mediterranean basin. First, the prey taxa added to human diets during the Late Pleistocene demonstrate regional differentiation. For example, in Greece the expansion of dietary breadth is first expressed as the addition of ground birds (Starkovich), while rabbits figure prominently in Portugal and Spain (Aura et al; Hockett & Haws; Manne & Bicho), and hares and partridges first appear in Israel (Munro). Nevertheless, all of these taxa fall within Stiner’s (2001; Stiner et al 1999, 2000) fast small game category. They share similar ecological and physical characteristics such as small body-size, fast rate of population turnover and rapid predator evasion strategies. Their appearance thus reflects similar shifts in human subsistence strategies including increased
dietary breadth, a decline in foraging efficiency, increased prey population resilience to human hunting, and often the need for special technology.

When Binford (1968) and Flannery (1969) first described the broad spectrum revolution in the late 1960s, they attributed it to the Terminal Pleistocene immediately preceding the transition to agriculture. The expanding zooarchaeological record now indicates that dietary expansion actually began much earlier. In particular, recent work by Stiner (2001; Stiner et al 1999) in the eastern Mediterranean indicates that dietary expansion begins in the Early Upper Palaeolithic or potentially even the Late Middle Palaeolithic period. New work at Klissoura Cave from the Peloponnese region of Greece (Starkovich) substantiates this assertion as does Stiner’s work at Üçagizli Cave in Turkey. The papers collected here show that an early date for dietary expansion is also increasingly apparent in the western Mediterranean, in particular Spain and Portugal, where fast small game taxa (rabbits) are exceedingly common as early as 30,000 years ago (Aura et al; Hockett & Haws; Manne & Bicho). This first shift in dietary breadth corresponds to the appearance of anatomically modern humans in Europe and may reflect density-dependent effects related to early population growth.

Despite this early date, the broad spectrum revolution defined by Binford (1968) and Flannery (1969) can also be identified in a later wave of dietary expansion in many parts of the Mediterranean during the Terminal Pleistocene (extending into the Early Holocene in the west). This trend is especially apparent in parts of southwest Asia, in particular the southern Levant, though it is less clearly expressed at the Epipalaeolithic sites of Öküzini and Karain B in neighbouring Turkey (Atici). Although tortoise diminution and the addition of new avian taxa occur as early as the Early Upper Palaeolithic in the southern Levant (Stiner et al 1999, 2000), the primary expansion in dietary breadth occurs at the end of the Epipaleolithic when small game taxa including ground birds, hare and fox increase dramatically in abundance in comparison to slow moving game types (Munro, Yeshurun et al). Multiple lines of independent archaeological evidence from the southern Levant suggest that Epipalaeolithic intensification is linked to increased site occupation intensity, as well as increased demographic pressure on a regional scale (Munro 2004).

Terminal Pleistocene dietary expansion is also characteristic of other parts of the Mediterranean. Of special interest is the exploitation of fast-moving marine resources, in particular fish. Human exploitation of marine molluscs is well established in the Middle Palaeolithic (Klein et al 2004; Marean et al 2007; Stiner 1994; Stringer et al 2008). Although some fish bones have also been identified in Middle Palaeolithic contexts in the Mediterranean (Aura et al this series; Stringer et al 2008), their presence is sporadic and cannot be definitively attributed to human agency (see also Klein & Steele 2008). Marine fish and mammals make more regular appearances across the Mediterranean in the Upper Palaeolithic (Bicho & Haws 2008), but their contribution remains insubstantial until the Terminal Pleistocene that marine resources first appear in inland sites located a distance from the shore. Again, the addition of fast moving marine species is in marked contrast to Middle Palaeolithic use of marine taxa that was largely characterised by the exploitation of sessile shellfish taxa (Stiner 1994; Stiner this volume; Stringer et al 2008). In many areas the expansion of marine diets correspond to changes in site settlement pattern, in particular increased site use intensity potentially linked to increased territoriality and population packing on a regional scale.

5 This series of 12 papers

The collection of papers assembled here is divided among three issues of Before Farming. The papers are organised by geographic region: the Levant/Cyprus, the central/eastern Mediterranean and the western Mediterranean.

Papers from the southern Levant and Cyprus focus on the Late Pleistocene/Early Holocene. Munro summarises evidence for intensified human hunting across the Epipalaeolithic using prey indices and gazelle age profiles. She also emphasises the importance of intrasite faunal analyses for improving the resolution of studies of human prey choice. Yeshurun et al highlight the importance of the fox, a common, but often overlooked player in Epipalaeolithic assemblages. They argue that fox were probably captured for meat as well as furs using similar strategies to those used to capture other fast small species. Because of their commensal nature, the increase in foxes at the end of the Epipalaeolithic is interpreted
Palaeolithic populations were small, groups occupied sites for extended periods. In contrast, intensive occupation in the Upper Palaeolithic is accompanied by intensive resource use indicating increased demographic pressure. Atici argues that humans specialised in the hunting of wild sheep and goat and fallow deer throughout most of the Epipalaeolithic period at Oküzini and Karain B in the western Taurus Mountains of Turkey. It is not until the Bølling/Allerød climatic event toward the end of the Epipalaeolithic that humans slightly broadened their diets by adding new ungulate and small game taxa.

The western Mediterranean papers include Hockett & Haws’ presentation of early Upper Palaeolithic dietary diversification in Portugal, and its implications for competition between Neanderthals and anatomically modern humans. Manne & Bicho also present evidence (addition of small fast game animals and bone grease rendering) for an early date for dietary intensification at the Upper Palaeolithic site of Vale Boi in southwestern Portugal. In contrast, Aura et al argue that the appearance of rabbits at Upper Palaeolithic sites in Valencia and Andalusia does not signal intensification but reflects a shift to a seasonal strategy of territory use. They believe that intensification first occurs at the Pleistocene/Holocene boundary and emphasise the importance of marine resources in this diversification event. Marin Arroyo uses a simulation model to conclude that demographic pressure is the most parsimonious explanation for hunting intensification at the Pleistocene/Holocene boundary in Cantabrian Spain.

References


