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Intensification and sedentism in the terminal Pleistocene Natufian sequence of el-Wad Terrace (Israel)

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ABSTRACT

Measuring subsistence intensification in the archaeofaunal record has provided strong evidence for socioeconomic shifts related to sedentarization in the terminal Pleistocene Mediterranean Basin, but the precise timing and scale of the intensification trend and its place in the evolution of settled societies remain contentious. New archaeofaunal data from the key Natufian sequence of el-Wad Terrace (Mount Carmel, Israel, ca. 15.0–11.7 ka [thousands of years ago]) is used here to clarify and contextualize paleoeconomy and mobility trends in the latest Pleistocene Levant, representing the culmination of Epipaleolithic subsistence strategies. Taphonomic variables serve as supplementary indicators of habitation function and occupation intensity along the sequence. At el-Wad, a very broad range of animals, mostly small to medium in size, were captured and consumed. Consumption leftovers were discarded in intensively occupied domestic spaces and suffered moderate attrition. The Early (ca. 15.0–13.7/13.0 ka) and Late (ca. 13.7/13.0–11.7 ka) Natufian phases display some differences in prey exploitation and taphonomic markers of occupation intensity, corresponding with other archaeological signals. We further set the intra-Natufian taxonomic and demographic trends in perspective by considering the earlier Epipaleolithic sequence of the same region, the Israeli coastal plain. Consequently, we show that the Early Natufian record constituted an important dietary shift related to greater occupation intensity and sedentarization, rather than a gradual development, and that the Late Natufian record appears to be maintaining, if not amplifying, many of these novel signals. These conclusions are important for understanding the mode and tempo of the transition to settled life in human evolution.

Introduction

The process of settling down by hunter-gatherer groups in the terminal Pleistocene (ca. 20,000–11,700 years cal. BP [calibrated before present]) was an important milestone in human evolution, entailing a series of changes in mobility, economy and society. Sedentary or semi-sedentary groups were emerging in the Mediterranean Basin in the millennia following the Last Glacial Maximum (LGM), displaying novel adaptations and the roots of social complexity. Specifically in the Levant region, the cultural period bridging the LGM and the end of the Pleistocene, the Epipaleolithic, has been a major subject of investigation concerning the formation of complex foraging societies, which eventually laid the foundations for the subsequent Neolithic Period (e.g., Kaufman, 1992; Bar-Yosef and Meadow, 1995; Henry, 1995; Stiner and Kuhn, 2006; Watkins, 2010; Belfer-Cohen and Goring-Morris, 2011; Maher et al., 2012a). Some of the earliest and most conspicuous manifestations of the pre-agricultural shift to sedentary living appear ca. 15,000–11,700 years cal. BP, in the Late Epipaleolithic Natufian culture of the Levant. These include stone structures and terraces, large cemeteries, diverse groundstone assemblages and hewn bedrock features, plus numerous personal adornments and art items, as well as remains of commensal animals. These traits are much better represented, quantitatively and qualitatively, relative to the earlier Epipaleolithic record, indicating increased permanence of occupation and probably increasingly complex societies and greater human impact on their surroundings (e.g., Garrod, 1957; Henry, 1991; Tchernov, 1993a,b; Valla, 1995; Bar-Yosef, 1998; Belfer-Cohen and Bar-Yosef, 2000; Munro, 2004, 2009; Byrd, 2005; Goring-Morris and Belfer-Cohen, 2008).

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Changes in subsistence go hand in hand with sedentarization in the Mediterranean Basin. While most pre-LGM groups habitually hunted ungulates and paid less attention to small game species, thereby continuing earlier Paleolithic traditions of big-game hunting as the main source of animal food, it is generally accepted that Epipaleolithic, and particularly Natufian groups, intensified their resource base, habitually exploiting juvenile, small or non-terrestrial animals as important dietary components (Davis, 1991, 2005; Tchernov, 1993a,b,c; Stiner et al., 1999, 2000; Bar-El and Tchernov, 2000; Stiner, 2001; Hockett and Haws, 2002; Bar-Oz, 2004; Munro, 2004; Atici, 2009; Munro and Atici, 2009; Stutz et al., 2009; Bar-Yosef Mayer and Zohar, 2010; Stiner and Munro, 2011; Starkovich, 2012; Zeder, 2012). The addition of a suite of animal taxa, many of which are small-bodied or non-terrestrial, to the regular human diet in the millennia just preceding the onset of food production is commonly referred to as the Broad Spectrum Revolution (BSR) (Flannery, 1969).

Subsistence intensification and the BSR are important in the wider context of human evolution because of their bearing on site-occupation intensity in the Epipaleolithic. A strong link exists between increasing sedentism and intensifying subsistence. It is often conceptualized using a behavioral ecology approach, where game taxa may be ranked according to their dietary gains versus search and handling costs. Foragers are likely to habitually procure lower-ranked game only when higher-ranked resources become less available (Winterhalder and Smith, 2000; Stiner and Munro, 2002; Munro, 2004, 2009). Economic intensification means that lower-ranked prey is regularly included in the diet, presumably because encounter rates with higher-rank prey decrease or because demand for prey increases. During the Epipaleolithic, the ability to reside in a site for longer periods would have meant relying on such intensification, i.e., extracting more nutrients from the environment (Munro, 2009), all the more so if the number of people inhabiting a settlement was higher than before, or if they maintained smaller territories (Rosenberg, 1998). In the Levantine context, low-ranked prey include small and fast-escaping mammals and birds, which provide small quantities of edible material for a high capture cost, as well as juvenile ungulates, which provide less meat and fat than adults (Stiner, 2001; Munro, 2004). Hence, economic intensification can be related to increases in human population in a given territory (Stiner et al., 1999, 2000), but the precise timing and scale of the post-LGM intensification process and its place in the evolution of sedentary societies remain contentious (see below).

This study investigates sedentism and economic intensification in the key Natufian base-camp of el-Wad Terrace (Mount Carmel, Israel). This is the classic Natufian sequence where the long-held view of this culture, as a complex and sedentary society at the threshold of farming, was first conceived (Garrod, 1932, 1957). We aim to clarify, refine and contextualize trends in Natufian economy and sedentism by employing detailed zooarchaeological data from our new excavations at the site. Taxonomic abundances, gazelle culling patterns and taphonomic indicators are used to evaluate habitation type, the magnitude of intensification and site occupation intensity. Our results are set in context by comparing the Natufian animal economy with the earlier, well-studied Epipaleolithic sequence of the same region (Fig. 1A). Ultimately, we aim to shed light on Epipaleolithic socioeconomic developments by pinpointing precisely when and how sedentism-related intensification occurred within the long process of settling down in the terminal Pleistocene of Southwest Asia.

Intensification and sedentarization processes in the Epipaleolithic

The Natufian record of the late Epipaleolithic Levant figures prominently in all discussions of pre-agricultural intensification and sedentarization. Scholarly opinions differ regarding the Natufian phenomenon. Since the early days of research, the large Early Natufian (EN) hamlets displaying architecture, cemeteries, art and abundant groundstone items caused the Natufian to be viewed as a major break from preceding Paleolithic cultures (Garrod, 1957; Valla, 1995; Bar-Yosef, 1998). Based on archaeological criteria such as changes in architecture, mortuary practices and art, an important intra-Natufian difference was noted by some, in that the EN phase (ca. 15.0–13.7/13.0 ka [thousands of years ago]) was considered the classic sedentary phase and the Late Natufian (LN) phase (ca. 13.7/13.0–11.7 ka) was interpreted as having a retreat to greater mobility (Garrod, 1957; Belfer-Cohen and Bar-Yosef, 2000; Bar-Yosef and Belfer-Cohen, 2002). Growing archaeological evidence in the last three decades has placed the Natufian culture in context, demonstrating its Epipaleolithic roots (Kaufman, 1989, 1992; Maher et al., 2012a,b). Recent data from Israel and Jordan indicate prolonged site habitation and the presence of defined huts that were rich in symbolic meaning, echoing the hallmark Natufian features, as early as 23–20 ka, and therefore the EN was viewed as gradually evolving from the preceding Epipaleolithic cultures (Nadel et al., 2004; Maher et al., 2012b).

Interpretations of Natufian zooarchaeological data are crucial for understanding the nature of Epipaleolithic sedentarization. However, the timing, mode and tempo of the terminal Pleistocene shift to intensified economy and BSR are often contested or loosely defined. Regarding the well-studied Levantine record, several scholars maintained that the Natufian is exceptional relative to the preceding cultures in the high proportion of small mammals and sometimes birds and fish in conjunction with diminishing proportions of medium and large ungulates (e.g., Davis et al., 1988; Davis, 1991; Pichon, 1991; Bar-Oz, 2004). In contrast, it has been suggested that diversification of Levantine animal economies occurred millennia before the terminal Pleistocene (Edwards, 1989), although this analysis was countered on the basis of inappropriate statistical methods, poor sampling quality and lack of taphonomic consideration (Neeley and Clark, 1993; Bar-Oz, 2004).

Several fine-grained archaeofaunal analyses pertaining to Epipaleolithic intensification have recently been published. Combined with multiple lines of archaeological evidence for increased sedentism, the Natufian subsistence trends were interpreted as evidence for intensification and diversification of animal exploitation due to greater permanence of site occupation (Bar-Oz, 2004; Munro, 2004, 2009; Davis, 2005; Stutz et al., 2009). The Natufians not only exploited small game in unprecedented proportions, they began in particular to exploit less cost-effective but resilient animals such as lagomorphs and birds, hinting at novel capture techniques, elevated pursuit costs and rising occupation intensity (Stiner et al., 1999, 2000; Stiner and Munro, 2002; Munro, 2004, 2009). The exploitation of the main ungulate prey, the mountain gazelle (*Gazella gazella*), was geared towards culling of lower-yield younger individuals, which was taken as another sign of foraging intensification (Munro, 2004, 2009; see also; Davis, 1983, 2005; Bar-Oz, 2004). In some of these studies, it was possible to investigate intra-Natufian trends, which showed that more fast small game was exploited in the EN phase, while in the LN phase slow small game was more dominant (Munro, 2004, 2009; Stutz et al., 2009). Zooarchaeological evidence suggesting Natufian economic intensification was recently viewed as the product of gradual trends throughout the Epipaleolithic, culminating in the Natufian (Munro, 2009; Stutz et al., 2009). Proponents of the 'gradual transition' downplayed the BSR hallmark of the Natufian, claiming similarity to earlier Epipaleolithic subsistence (Maher et al., 2012a), or altogether ignoring economic factors when comparing pre-Natufian and Natufian adaptations (Richter et al., 2011; Maher et al., 2012b).