EPIPALAEOLITHIC SOCIAL INTERACTION: A VIEW FROM THE AZRAQ BASIN

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ABSTRACT

This paper discusses social interaction in the Epipalaeolithic in southwest Asia. Discussions of contact, social relationships and social organization have primarily focussed on the Pre-Pottery Neolithic and appear to represent typical hallmarks of emergent farming societies. The hunter-gatherers of the final Pleistocene, in particular those of the Early and Middle Epipalaeolithic, have more rarely been the focus of such discussions. In this paper we consider evidence for interaction from the Azraq Basin of eastern Jordan, where multiple research projects have excavated several late Pleistocene sites during the past twenty years. Based on this evidence we argue that interaction between differently-constituted groups can be traced within the Early Epipalaeolithic of the southern Levant. This leads us to question whether the kinds of social interactions observed in the Neolithic are something essentially new.

INTRODUCTION

In the prehistory of the Levant, discussions of social interaction continue to focus primarily on the Neolithic and later periods (Belfer-Cohen & Bar-Yosef 2000; Belfer-Cohen & Goring-Morris 2002, 2005; although see Watkins 2008), despite some debate about interactions (social or otherwise) of anatomically modern humans and Neanderthals during the Middle Palaeolithic (e.g. Bar-Yosef 1988; Henry 1994; e.g. Kaufman 1999; Kaufman 2001; Rak 1993; Shea 2003). Indeed, some authors have suggested that during the Pre-Pottery Neolithic B (PPNB) new, more complex forms of social interaction arose, which in themselves define the Neolithic as a new and significantly cultural phenomenon (e.g. Bar-Yosef 2001, 2002; Bar-Yosef & Belfer-Cohen 1989; Cauvin 1994, 2000; Simmons 2007; Watkins 2003, 2008). In this sense, the complexity of interactions is inversely related to the inferred complexity of social organization in early village societies. Similarities in various cultural expressions – architecture, burial customs, artefacts, trade and exchange of exotic items – have been used to track these interactions and to discuss the nature of social organization. While Bar-Yosef (2001; 2002; 2008; Bar-Yosef & Belfer-Cohen 1989) has described this from the perspective of the 'PPNB interaction sphere', Watkins (2003; 2008) has preferred to discuss it from the perspective of peer-polity interaction. Asouti (2006) recently criticized both approaches as being too overtly associated with the concepts of diffusionism and regionalism. She argued that interaction spheres are too easily confused with ethnic or cultural macro-scale forms of social organization (Asouti 2006: 118-119). However, using the example of the late PPNB mega-sites she also points to the inferred definitive character of these new forms of social organization. All of these discussions of social interaction and social organization seem to rely on the same broad assumption: that social interaction during the PPNB was more complex, differently organized, intensive and commonplace than in preceding periods. Prior to the PPNB, social interaction is considered to have been more sporadic – due to lower population numbers – and primarily based on kinship. Henry (1989: 208), for example, proposed a model of social interaction in the Late Epipalaeolithic (Natufian) based on a matrilineal social organization and exchange of marriage partners between groups. The character of PPNB social interaction is seen to exist on more numerous and diverse levels than that of preceding periods. Evidence for such interactions is derived from the exchange of material culture (e.g. the 'obsidian trade' or green stone beads), common themes in symbolic expressions (such as figurines), related types of architecture, artefact types and the spread of domesticated plants and animals. These aspects are widely considered to apply at the inter-group scale, whereas intra-group social interaction is often considered evident on the basis of settlement layout, burial practices or the existence of 'special purpose' buildings, such as the Jericho tower or various buildings interpreted as 'shrines' or communal buildings (e.g. Hole 2002; Kuijt 2000a, b, 2002; Rollefson 2004).

Likewise, Hodder (2007: 108) has argued that the emergence of agricultural production and sedentism would have been impossible without "a changed relation to time and history" He argues that hunter-gatherer social relations were short-term and immediate, and attributes changes in how people conceptualized social relationships in time and space to have emerged during the Late Epipalaeolithic Natufian in the southern Levant. For him, this development is evident in an ever-increasing dependency on 'things' and the social relations in which objects were interdependently involved. This dependency, in turn, triggered a changed perception of time, memory and history that facilitated the emergence of Neolithic settlements, economies and cosmologies (Hodder 2007: 108). This cursory overview shows that qualitatively or quantitatively more complex social interactions within and between communities are considered a defining factor of how the Neolithic operated as a socio-cultural system. These interactions define the Neolithic as a new and radically different era, distinguishing it from the lives of hunter-gatherers before. Furthermore, the increasing level of interaction is considered to be directly related to fundamentally altered forms of social organization, including the emergence of social inequalities and hierarchical, stratified societies.

When we compare the preceding Epipalaeolithic period (*c* 23,000 – 12,000 cal BP) to this rich discussion of social interaction in the Neolithic, we are tempted to ask whether there was any meaningful social interaction between and within social groups at all? At least this would be suggested by the scant attention paid to such questions in the literature of the Epipalaeolithic period. The near total lack of a debate on this issue reflects an almost stigmatic contradiction between how the Neolithic and the Epipalaeolithic are viewed and interpreted. Whereas in the former, scholars routinely discuss evidence for inter- and intra-group social interaction, the nature and extent of group interaction during the final Pleistocene is explicitly considered much more rarely (see e.g. Bar-Yosef 1989). If addressed at all, researchers focus primarily on the Late Epipalaeolithic (Natufian) in its role as a direct economic and cultural precursor to the Neolithic (Bar-Yosef 1998; Bar-Yosef 2004; Bar-Yosef & Belfer-Cohen 1992; Bar-Yosef & Belfer-Cohen 2000; Bar-Yosef & Meadow 1995; Belfer-Cohen 1991; Goring-Morris & Belfer-Cohen 1998; Perrot 1966; Valla 1975, 1995). Because the Natufian is seen as a complex hunting and gathering society discussions of social interaction are considered more applicable here. Indeed, the comparatively abundant and varied inventory of portable figurative art objects known from the Natufian, as well as a rich record of graves that include elaborate grave goods and burial practices, have facilitated such discussions of social organization and hierarchies (Belfer-Cohen 1995; Boyd 2001; Byrd & Monahan 1995; Wright 1978). Nevertheless, one could argue that the disparity where the Early and Middle Epipalaeolithic is concerned reflects a dichotomy between how archaeologists have dealt with hunting and gathering societies, on the one hand, and farmers on the other (Barnard 2004; Boyd 2002, 2004; Ingold 1992;

Pluciennik 2002, 2004). It seems that only the more 'advanced' farming communities of the Neolithic were involved in the creation of elaborate forms of interaction. Facing a similarly dichotomous perspective in the context of the Mesolithic and Neolithic in Britain, Richard Bradley was led to comment that "successful farmers have social relations with one another, while hunter-gatherers have ecological relations with hazelnuts" (1984: 11). One only needs to replace 'hazelnuts' with 'cereal grasses' to make this statement applicable to southwest Asia. Whereas social relations amongst farmers are more often considered, hunter-gatherer interactions is more commonly framed within ecological or economic perspectives especially during the Palaeolithic (Gamble 2004).

In this paper, we argue that a look at inter-group interaction in the Epipalaeolithic of the Azraq Basin in eastern Jordan allows us to move beyond this dichotomy. This region has been a key area for research on final Pleistocene cultural transformations and provides a wide range of evidence for discussion (Betts 1991, 1998; Garrard 1991; Garrard 1998; Garrard, Baird & Byrd 1994; Garrard et al. 1988; Garrard & Byrd 1992; Garrard, Colledge & Martin 1996; Muheisen 1983, 1988a). We argue that existing and new data from a number of research projects in the region provide ample evidence for social interaction between different communities of late Pleistocene hunting and gathering groups, which holds implications for how we consider their emergence.

For the purpose of this paper we follow the conventional definition of the Epipalaeolithic in southwest Asia. Beginning at around 23,000 cal BP and lasting until ca. 12,000 cal BP, the period is characterised by the increase in microliths amongst the retouched chipped stone tool component throughout the Levant, accompanied by a shift towards intensive bladelet production. Microliths gradually change from non-geometric types toward standardized geometric forms toward the Middle and Late Epipalaeolithic (Bar-Yosef 1970, 1981, 1987, 1989; Byrd 1998; Byrd 1994; Goring-Morris 1995; Goring-Morris & Belfer-Cohen 1998; Goring-Morris 1987; Henry 1989; Olszewski 2001b). Ground stone tools also become more ubiquitous with the beginning of the Epipalaeolithic, becoming more common over time (Wright 1991, 1994). It has long been understood that the changing lifeways of Epipalaeolithic groups played a pivotal role in the later adoption of agriculture and emergence of sedentary villages. The Late Epipalaeolithic (Natufian) plays a prominent part in debates surrounding these issues (Bar-Yosef 1998; Bar-Yosef 2002, 2004, 2008; Bar-Yosef & Belfer-Cohen 1989, 1991, 1992; Bar-Yosef & Belfer-Cohen 2000; Bar-Yosef & Meadow 1995; Henry 1989; Valla 1995), although recent research at the Early Epipalaeolithic site of Ohalo II has shown that certain economic aspects and the re-use of particular settlement locations occurred as early as 23,000 cal BP (Kislev et al. 1992; Nadel 2002, 2004a; Nadel 2004b; Nadel 2006; Weiss 2005; Weiss et al. 2005).

Here we offer no specific definition of 'interaction', beyond its literal meaning. Social interaction between individuals and groups can take many diverse forms, from exchange, trade, armed or violent conflict, exchange of marriage partners, co-operation in subsistence practices, or group aggregations relating to political negotiations or ceremonial and ritual activities. These are more often than not difficult to pin down with much precision in deep prehistory. Nevertheless we will highlight the scope and character of these interactions in as much detail as we feel is empirically possible. Keeping the term social interaction assures a 'useful ambiguity' for the argument we seek to develop here. In tracing interactions we are dependant on the material record of human action in our study region. Needless to say that this is a fragmented and incomplete palimpsest of human occupations and is therefore biased. While we acknowledge the limitations of this data we hope to show that by considering a wide range of evidence and comparing it against each other that it is possible to interpret the material traces with a view to interaction. Here we rely on not just a single source of evidence, but a combination of groups of materials, traits and characteristics.

THE STUDY AREA

The Azraq Basin occupies ca. 12,000 km^2 of the eastern steppe and desert of the Transjordanian plateau. Stretching from the Jebel Druze region in southern Syria to northern Saudi Arabia, it occupies the majority of the semi-arid to arid region of modern-day eastern Jordan (Figure 1). At the heart of the basin lies the Azraq Oasis, formerly a unique wetland area populated by a wide range of plants and animals, which was fed by a series of copious springs (Nelson 1973). Excavations at several sites throughout the basin since the late 1970s and examination of sedimentary sequences suggest that local conditions in the basin during the latter part of the Last Glacial Maximum and the subsequent final Pleistocene were amenable, with localized marshlands existing at several locales (Byrd & Garrard 1989; Garrard 1998; Garrard et al. 1988; Macumber 2001). Research on the prehistory in the Azraq Basin began in earnest during the late 1970s and continued throughout the 1980s and early 1990s (Betts 1988, 1991, 1998; Byrd 1988; Byrd & Garrard 1989; Copeland & Hours 1989; Garrard 1991, 1998; Garrard, Baird et al. 1994a, 1994b; Garrard, Betts et al. 1987,1988 ; Garrard & Byrd 1992, in prep.; Garrard, Byrd et al. 1985, 1986; Garrard, Colledge & Martin 1996; Garrard, Stanley Price & Copeland 1977; Muheisen 1983, 1988a, b, c; Rollefson et al. 1997; Rollefson 1983). More recent field research has begun to expand on this existing picture by adding new sites and inventories and by re-investigating previously excavated sites (Maher 2007; Richter et al. 2010; Richter et al. 2007; Richter & Röhl 2006; Rollefson et al. 1999; Rollefson et al. 2001; Wasse & Rollefson 2005).

The Azraq Basin is notable for preserving evidence for two of the most substantial open-air Epipalaeolithic sites known in southwest Asia. Jilat 6 (Byrd & Garrard 1989; Garrard 1998; Garrard, Baird & Byrd 1994; Garrard et al. 1988; Garrard & Byrd 1992) and Kharaneh IV (Maher 2007; Muheisen 1983, 1988a, b, c) comprise total surface areas of ca. 19,000 m^2 and 22,000 m^2, respectively (Figure 2). Excavations have demonstrated the considerable intensity of occupation showing multiple stratified occupation surfaces and producing lithic artifacts in the hundreds-of-thousands. Stratigraphy, radiometric dating and artefact typologies show that these two 'mega-sites' were repeatedly re-occupied for at least 6000-8000 years, displaying a unique recurrence of human occupancy at a single location. Apart from these two sites, which appear to be related to spring/early summer, and autumn/winter in the case of Kharaneh IV, occupations (Jones 2009; Martin 1994), other Epipalaeolithic sites in the Azraq Basin are significantly smaller and characterized by more shallow accumulations of cultural deposits (Garrard, Baird & Byrd 1994; Richter et al. 2010). Although many are surface scatters of lithic artefacts, most contain sub-surface cultural deposits and also have relatively dense accumulations of material culture. This inventory of final Pleistocene sites provides a rich and diverse body of evidence which can be used to examine interaction. To do so, we will draw on a variety of primary sources of evidence: settlement patterns, chipped stone artefact industries and their spatial distribution, the procurement of raw materials for ground stone tools and their transportation, as well as data from marine molluscs and their distribution at different sites in the Azraq Basin and beyond.

LITHIC INDUSTRIES

The Early and Middle Epipalaeolithic in the Azraq Basin is characterized by a unique array of lithic industries, and their patterened spatial distribution. Research into the final Pleistocene of southwest Asia over the last 70 years or so has led to the definition of a number of lithic industries based on differences both in lithic typology as well as technology (e.g. Byrd 1994, Bar-Yosef 1970, Bar-Yosef and Vogel 1987; Goring-Morris 1987, 1995). During the Early Epipalaeolithic we can broadly distinguish two major groups of assemblages in the Azraq Basin (Figure 3). Those from Kharaneh IV Phase B, and the assemblage from Ayn Qasiyya Area A and B, show clear similarities (Richter in print; Richter et al. 2010; Richter et al. 2007). In both, microliths were produced without the use of the microburin techniques (Henry 1974; Tixier 1963; Tixier & Newcomer 1974), with microlith types ranging from micrograveттes and bladelets with fine or partial retouch at Kharaneh IV Phase A, to a predominance of obliquely truncated and backed bladelets at Ayn Qasiyya Area A and B, and Kharaneh IV Phase B (Muheisen 1983, 1988a; Richter in print; Richter et al. 2010; Richter et al. 2007). By contrast, other Early Epipalaeolithic

sites (Jilat 6 lower, Uwaynid 14 lower and upper, Uwaynid 18 upper phase, and Ayn Qasiyya Area D) have microburins, and are dominated by narrow, finely-made, arched-backed bladelets, and narrow, double-truncated and backed bladelets (Byrd 1988; Byrd & Garrard 1989; Garrard, Baird & Byrd 1994). Comparing these assemblages on a wider, inter-regional scale, they can be assigned to the Kebaran (Kharaneh IV A&B, Ayn Qasiyya A&B) and Nebekian (Jilat 6 lower, Uwaynid 14 lower and upper, Uwaynid 18 upper, Ayn Qasiyya Area D) industries (Bar-Yosef 1989; Byrd 1998; Byrd 1994; Goring-Morris 1995; Goring-Morris & Belfer-Cohen 1998; Olszewski 2001b, 2006). The middle phase of Jilat 6 contains large La Mouillah and Qalkhan points. While some Qalkhan and La Mouillah points also occur at Ayn Qasiyya Area D, proximal microburins far outnumber other microburin waste at this site. The only other site with a clear Qalkhan assemblage is Azraq 32 (Garrard & Byrd in prep.). Olszewski (2006: 24) has recently argued that the Nebekian from Yabrud as originally described by Rust (1950) is very similar to Henry's (1995) Qalkhan industry. She points out that Qalkhan points exist in layer 5 at Yabrud and that therefore the Nebekian at Yabrud displays subtle temporal variation over time. In favour of cutting down on existing names for lithic industrial complexes, Olszewski (2006: 25) suggests to abandon the term Qalkhan in favour of Nebekian, or to treat the Qalkhan as a sub-facies of the Nebekian. The lithic assemblage from the middle phase of Jilat 6 has produced a strong Qalkhan signature, however, containing many robust La Mouillah and Qalkhan points (Byrd 1998; Byrd & Garrard 1989; Garrard, Baird & Byrd 1994; Garrard & Byrd 1992), suggesting that this is a rather distinct assemblage. The dating of these assemblages is generally confirmed by a series of C14 dates as well as the stratigraphic succession, principally at Jilat 6 and Kharaneh IV.

Stratigraphically later assemblages are characterised by backed and truncated bladelets with abrupt retouch, and truncated bladelets at Kharaneh IV Phase C (Muheisen 1988a: 358), and asymmetric triangles and lunates at Jilat 6 upper phase and Azraq 17 Trench 1 (Byrd 1988: 262, figure 2). These assemblages fall into the specifications of the Nizzanian industry (Goring-Morris 1995: 154-155, figure 8). In the case of Kharaneh IV Phase C it has to be pointed out that the published material from this phase is as yet limited, and that this occupation horizon consists of intensely deflated deposits (Maher and Richter personal observation June 2008). The integrity of the Kharaneh IV Phase C assemblage as a sample therefore requires further evaluation. While bearing in mind the limitations of conventional typological systematics (Olszewski 2001a), subtle differences in the microlith tool types between both sites can be recognised. While minute triangles are present at Jilat 6 upper phase and Azraq 17 Trench 1, these are not well represented in the Kharaneh IV Phase C assemblage (Muheisen 1983, 1988a). Post-Nizzanian industries of the more fully developed Middle Epipalaeolithic are known from a number of sites in the Azraq Basin (Garrard, Baird & Byrd 1994). However, only three of these can be

straightforwardly assigned to the Geometric Kebaran, while the status of other assemblage is more ambiguous. Wide trapeze-rectangles with a large variety of shapes characterize the last phase of occupation at Kharaneh IV in Phase D (Muheisen 1983, 1988a, c; Muheisen & Wada 1995) and the assemblage from Wadi Jilat 28 (Garrard & Byrd in prep). Trapezes and rectangles show a high degree of diversity with various differences and combinations of shape and type of backing and distal and proximal truncations. The assemblage from the relatively shallow surface site of AWS 48 is characterised by a more standard Geometric Kebaran repertoire with a very high number of standardized trapeze-rectangles (Richter forthcoming). Other sites ostensibly dating to the Middle Epipalaeolithic contain more ambiguous lithic artefact inventories. Jilat 8 and 22 Upper phase contain many microliths including trapeze-rectangles, La Mouillah points, triangles, lunates and arch-backed bladelets (Byrd 1988; Garrard et al. 1994: 191-192; Garrard & Byrd 1992). At Jilat 22 early and middle phase examples of a tanged knife were found, which has as yet no parallels with other Epipalaeolithic sites in the southern Levant. The assemblage from Jilat 10 has rare microliths and is instead dominated by macrolithic elements. In contrast to Jilat 8 and 22 this site also has no evidence for the habitual use of the microburin technique. The mixture of diagnostic microliths in some of these assemblages as well as the addition of a unique tanged knife to the inventory does not sit comfortably with any previously defined specific industry or technological complex. However, Jilat 8 and Jilat 22 upper phase can be more clearly associated with the Mushabian industry (Garrard & Byrd in prep.). A series of C14 dates from many of these sites places them firmly in the Middle Epipalaeolithic time frame (Garrard, Baird & Byrd. 1994).

Representative Late Epipalaeolithic lithic assemblages are known from three locations in the southern Azraq Oasis, as well as a number of surface collections elsewhere in the Azraq Basin. The sites from which inventories have been reported – Azraq 18, Mugharet al-Jawa, Khallat Anaza, Jebel Subhi, Shubayqa and Bawabah (Bawwab al-Ghazal) – all have broadly comparable lithic artefact inventories (Betts 1998; Rollefson et al. 1999), except for Azraq 18. Helwan lunates appear to be reasonably common at Azraq 18, which suggests a potentially Early Natufian date (Garrard 1991). At all other sites abruptly backed and bipolar lunates outnumber Helwan lunates, suggesting Late Natufian dates (Betts 1998). This would be consistent with current ideas which advocate a Late Natufian expansion into the semi-arid and arid 'peripheries' of the southern Levant by the onset of the Younger Dryas (Bar-Yosef 1998; Bar-Yosef 2004; Bar-Yosef & Belfer-Cohen 2000; Bar-Yosef & Meadow 1995; Goring-Morris & Belfer-Cohen 1998). The microburin technique was used at some, but not all Natufian sites in the Azraq Basin, and there appears to be little apparent patterning reflected in its use (Betts 1991, 1998; Garrard 1991; Rollefson et al. 1999). Unfortunately, so far no C14 dates have been obtained from any Natufian sites in

the Azraq Basin. This makes it difficult at present to place these artefact inventories in an absolute chronological framework.

This brief survey of Epipalaeolithic lithic artefact inventories from sites excavated in the Azraq Basin reveals a remarkable degree of diversity in microlith composition and to some extent manufacturing techniques. More detailed information regarding technological variability beyond the presence or absence of the microburin technique is not yet available from all sites. A comparative study of the lithic assemblages from Ayn Qasiyya Areas A & B, and Area D, suggests that subtle differences in core reduction and blade/bladelet production, in addition to blade/bladelet sectioning, exist (Richter forthcoming). What is noticeable about the evident variability in lithic inventories in the Azraq Basin is – with exception – that there is not just technological variation, but that this variation is also spatially patterned. The lithic industries of Early Epipalaeolithic phases in the Wadi el-Jilat and Wadi Uwaynid fall within the spectrum of the Nebekian industry found within the eastern Levant (Goring-Morris 1995; Goring-Morris and Belfer-Cohen 1998; Henry 1989, 1995; Olszewski 2001b, 2006). Kharaneh IV, on the other hand, only contains assemblages of a Kebaran affinity. Ayn Qasiyya is the only site in the Azraq Basin, and apparently in the whole of the southern Levant, which has produced both Nebekian and Kebaran inventories (Richter et al. 2010; Richter in print). Stratigraphically later assemblages (Jilat 6 upper phase, Kharaneh IV Phase C, Azraq 17 Trench 1), show superficial similarities, yet further studies are required – particularly on the Kharaneh IV assemblage – to verify their exact commonalities. During the subsequent Middle Epipalaeolithic, sites that can be broadly considered to belong to the Geometric Kebaran can be found in the oasis at AWS 48 (Richter et al. 2010) and at Kharaneh IV Phase D (Muheisen 1988a, c). The Middle Epipalaeolithic assemblages from the Wadi el-Jilat, on the other hand, show a more diverse range of microliths with the addition of a previously unseen tool type – the Jilat knife (Garrard & Byrd 1992). During the late Epipalaeolithic, lithic inventories are more directly comparable across the Azraq Basin, and can all be broadly identified with the Natufian, although these sites are as yet not dated radiometrically (Betts 1991, 1998; Garrard 1991). Considering the technological and typological variability of these assemblages, their spatial distribution in the region, and change in these factors over time we argue that these characteristics allow us to trace interaction between different communities of final Pleistocene hunter-gatherers.

Tracing social interaction on the basis of chipped stone artefacts is of course a tricky business. There has been considerable debate amongst prehistorians working in the Epipalaeolithic of the Levant – as elsewhere – about the interpretation of variability in lithic artefact industries (Bar-Yosef 1991; Barton & Neeley 1996; Clark 1996; Fellner 1995b; Goring-Morris 1996; Henry 1995; Kaufman 1995; Neeley & Barton 1994; Phillips 1996). The technological and corresponding spatial patterns identified in the Azraq

Basin are interesting since they match other spatial-technological arrangements during the Epipalaeolithic. During the Early Epipalaeolithic, Kebaran assemblages (lacking the microburin technique) are found predominantly along the Mediterranean coastal plain and in the central Rift Valley, extending into the Beqaa' Valley to the north (Bar-Yosef 1981, 1987, 1989; Fellner 1995a; Goring-Morris 1995; Goring-Morris & Belfer-Cohen 1998; Hours 1992). Largely contemporary Nebekian inventories are predominantly found in the eastern Levant, stretching from southern Jordan all the way into central Syria (Byrd 1998; Byrd 1994; Goring-Morris 1995; Goring-Morris & Belfer-Cohen 1998; Goring-Morris et al. 2009; Henry 1995; Olszewski 2001b, 2006; Rust 1950; Stutz & Estabrook 2004). From the Nizzanian onwards, however, there appears to be less spatial differentiation. Nizzanian sites occur across the southern Levant in diverse ecological settings, including the arid zones of the Negev/Sinai and the Azraq Basin, as well as the coastal plain (Goring-Morris 1995). The Geometric Kebaran is also a pan-Levantine entity, although Henry (1989) has suggested some internal variation based primarily on the composition of major tool groups. Localized Middle Epipalaeolithic industries exist and the assemblages from Jilat 8 and Jilat 22 upper phase have been associated with the Mushabian industry (Garrard & Byrd in prep., Goring-Morris 1995; Goring-Morris & Belfer-Cohen 1998; Goring-Morris 1987). The Late Epipalaeolithic sites in the Azraq Basin fall under the pan-Levantine phenomenon of the Natufian.

There has been considerable debate regarding the meaning and interpretation of this spatial, technological and temporal variability. Partially grounded in ambiguity over the clarity and applicability of tool typologies (Olszewski 2001a), most scholars rejected Neeley and Barton's (1994; Barton & Neeley 1996) assertion that the variability in Epipalaeolithic lithic industries most likely reflects functional rather than cultural differences (Clark 1996; Fellner 1995b; Goring-Morris 1996; Henry 1996; Kaufman 1995; Phillips 1996). Most scholars agree that this technological variability, recognized from its spatial and temporal patterning, is in one way or another related to past 'social groups'. Some have suggested that these social groups should be thought of as groups based on kinship and that the lithic inventories can therefore be taken to reflect ethnic communities (Bar-Yosef 1991: 381-384; Henry 1989: 170-175; 1995: 420). Beyond ethnographic analogies there is however, little evidence to independently verify this interpretation. It is probably most appropriate to consider the shared technological and typological characteristics between lithic assemblages to be related to past 'traditions' in the very broadest sense of the term. Although it is clearly difficult to avoid the normative, primordial connotations of this term (Hodder 1982, 1986; Jones 1997; Shanks & Tilley 1987: 80-82), tradition does not necessarily have to imply a concept of static 'mental templates' of manufacturing procedures and tool forms. Instead, they can be considered in a more reciprocal manner, being situated between the actions of individuals and

social structures as material expressions of the process of structuration between these two, interdependent poles (Barrett 2001; Barrett & Fewster 1999; Bourdieu 1977, 1990; Dobres 2000; Giddens 1979, 1984; Hodder 1986; Ingold 2000; Lemonnier 1989, 1990, 1992; Pfaffenberger 1992; Shanks & Tilley 1987). In other words, they reflect habitual yet dynamic, learned gestures and techniques mediated within social structures and relationships (Mauss 1935). On the basis of the characteristics of the chipped stone artefact inventories, their technological variability and spatial patterning, we are able to pick up elements of practical knowledge shared between members of a community. Such a community can be defined through these shared practices, gestures, knowledge and material culture that are propagated through learning and socialization within the community so that they are reproduced again and again over time (Richter in print; Wenger 1998). One could therefore employ the term 'tradition' to describe this phenomenon. However, by focusing on learning and interaction we seek here to avoid a too normative and static conceptualization. We argue that through the similarities and differences in technology and typology, paired with their spatial distribution, we are able to pick up fragmented residues of knowledge and histories of learning that characterised the socio-technical milieu of these communities. This characterization is, however, not necessarily equal to an ethnically-bound, cultural definition of these groups.

On this basis, we argue that the spatial patterning of lithic assemblages does reflect the presence of different knowledge and learning communities in the Azraq Basin. Although both Nebekian and Kebaran lithic inventories occur at the same site in the case of Ayn Qasiyya, they nevertheless occur in two separate excavation areas and do not overlap (Richter in print; Richter et al. 2010; Richter et al. 2007). These can therefore be considered largely contemporary occurrences of different traditions of lithic manufacture. Again, we want to stress that in our view this does not mean they constitute ethnic groups or even 'cultural groups' as such. All that is represented in lithic manufacturing techniques and toolkits are peoples shared (or differing) histories of learning (Wenger 1998). This differentiation in tool kits continues into the Middle Epipalaeolithic in the Azraq Basin. While Nizzanian toolkits are present at three sites, they are subtly different in microlith form and application of the microburin technique. In the Middle Epipalaeolithic, Geometric Kebaran sites are known from AWS 48, Kharaneh IV and Wadi Jilat 28. However, while they can be broadly identified with the Geometric Kebaran, they differ in tool form composition from classic Geometric Kebaran assemblages and from each other. While both lack the microburin technique, trapeze-rectangles at Kharaneh IV are far more diverse and the toolkit in general is more varied (Muheisen 1988a, c; Muheisen & Wada 1995). But in comparison to the Middle Epipalaeolithic sites such as Jilat 22 lower and middle phases, and Jilat 10 (Byrd 1988; Byrd & Garrard 1989; Garrard, Baird & Byrd 1994; Garrard & Byrd 1992), which do not readily resemble any current

lithic industry label, they nevertheless represent a coherent group of assemblages. The distinction between inventories and their spatial distribution is a pattern that is maintained into the Middle Epipalaeolithic. While Late Epipalaeolithic industries are known from less thoroughly explored sites and generally represent much smaller samples, they can all be assigned to the Natufian (Betts 1991, 1998; Garrard 1991). It appears that by the Late Epipalaeolithic a coherent technological lithic repertoire had emerged in the Azraq Basin, which is akin to other assemblages throughout the Levant.

The spatial patterns exhibited by Epipalaeolithic lithic industries in the Azraq Basin are considered here as representing hunter-gatherer knowledge and skills. These were taught and learnt within particular social communities. We necessarily have to draw on some broad assumptions in this argument in order to interpret these patterns. The time period under discussion comprises ca. 10,000 years and there is therefore plenty of scope for diachronic and idiosyncratic change and variability. Current chronological data from Azraq does not yet provide us with a finer resolution to demonstrate contemporaneity of occupations or lithic assemblages. Broadly speaking, we consider many of the industries discussed here to be at least partly contemporary and at least in one way or another related to differences in people's practical knowledge and technological intentionality. By focusing not on the identification of archaeological patterns with ethnic or cultural dimensions (modern distinctions whose existence are far from clear in prehistory), but by insisting on the gestural politics and learned habits of personssituated within social structures we aim to highlight one element of social organization in the final Pleistocene of the Azraq Basin. We would emphasize that this is in line with the way in which many other scholars have discussed variability in the lithic industries of the final Pleistocene (Bar-Yosef 1991; Byrd 1998; Byrd 1994; Goring-Morris 1995; Goring-Morris & Belfer-Cohen 1998; Goring-Morris et al. 2009; Henry 1989, 1995; Stutz & Estabrook 2004). Lithic artefact inventories and their spatial patterning as outlined above are therefore used as a basis for considering and identifying interactions.

SHELL BEADS

While lithic artefact assemblages, spatial distributions and their association with broader lithic industries establish a basis on which to consider interaction, other material culture can be recruited to trace interactions between these socio-cultural entities. At the same time, these other materials provide further evidence that we are indeed dealing with distinct communities who are engaged in the exchange of objects. Marine shells have been reported from a number of Epipalaeolithic sites in the Levant, both in the Azraq Basin and elsewhere (Bar-Yosef Mayer 1989, 1991, 2005; Goring-Morris 1989; Reese 1991,

1995). Bar-Yosef Mayer (2005) has documented transport of Mediterranean sea shells over distances of 280 km in the Sinai, while Goring-Morris (1989) has described the exchange of marine shells in the Sinai and Negev. Reese (1991; 1995) discussed the use and transport of marine shells at a number of sites throughout the Levant, including the Hisma sites of southern Jordan, where Red Sea species dominate and only few Mediterranean type shells occurs.

In the Azraq Basin marine shells have been found at Jilat 6, 8, 10, 22, Uwaynid 18 and Azraq 17, 18, 32, (Garrard, Baird & Byrd 1994; Reese 1991) and Kharaneh IV (Allcock 2009; Muheisen 1983, 1988a, c; Reese 1991, Figure 5). Piercing on a large number of these shells strongly suggest that they were probably used as beads or pendants. Species identification carried out by Reese (Reese 1991) on material from the Jilat, Uwaynid and Azraq sites showed that *Dentalium, Nassarius, Pyrene, Columbella, Nerita, Ancilla and Cerastoderma* shells are present at several of the above-mentioned sites (Figure 6). While *Dentalium, Nassarius, Pyrene and Columbella* species occur both in the Red Sea and the Mediterranean, *Nerita* and *Ancilla* are native to the Red Sea only, and *Cerastoderma* are found only in the Mediterranean. Recent study of marine and land gastropod shells from the renewed excavations at Kharaneh IV shows that *Antalis sp, Nerita sanguinolenta* (a species native to the Red Sea) and *Mitrella scripta* (native to the Mediterranean) are the most common species (Allcock 2009, Figure 7). *Nerita sanguinolenta* are present in small numbers from the Early Epipalaeolithic levels onwards, but increase in frequency toward the Middle Epipalaeolithic (Phase D). Another Red Sea specific species is *Cypraea erosa nebrites* which occurs in very small numbers in the Early Epipalaeolithic occupations.

Bearing in mind that the lithic industries common to both Jilat 6 and Uwaynid 14/18 can be considered to be very similar to those of Southern Jordan in close proximity to the Red Sea, and that the lithic assemblages of Kharaneh IV are related to those of the western, Mediterranean Levant, it is intriguing to note that Jilat 6 produced shells of Mediterranean origin, and Kharaneh IV Red Sea shells (Allcock 2009; Reese 1991, Figures 6 & 7). At Jilat 6, a majority of the sea shells are associated with the last phase of occupation at the site, rather than the earlier levels (Garrard, Baird & Byrd 1994). Nevertheless, some sea shells were evident also in the lower strata. An interesting tendency begins to emerge here; Mediterranean Sea shells are found on sites that are associated with an otherwise exclusively East Levantine lithic industry (whose distribution extends south towards the Red Sea). At the same time Red Sea shells are found on sites associated with a western Levantine lithic industry (whose distribution extends to the Mediterranean. Certain species, including *Nassarius* and *Columbella*, occur in both the Mediterranean and Red Sea, and could thus indicate connections to either sea shore. What is critical here, however, is that we can link the origins of these sea shells with the spatial distribution of lithic assemblages in the southern Levant, especially during the Early Epipalaeolithic. In the Azraq Basin, sites that have lithic

assemblages associated with practically exclusive East or West Levantine distributions contain sea shells that originate from *both* the Red Sea and the Mediterranean Sea. While there are very few diagnostic Red Sea shells at the Jilat sites, a number of the species recovered here originate derive from both oceans, while a significant number are actually Mediterranean species.

The presence of both Mediterranean and Red Sea shells at sites in the Azraq Basin clearly implies long distance transport and/or exchange (Allcock 2009; Reese 1991). It seems evident that the Azraq Basin was linked into a wider network of movement and material exchange throughout the Southern Levant, although whether that took the form of people or objects, or both, remains to be seen. It seems unlikely that groups occupying the Azraq Basin directly procured sea shells themselves. Instead, it seems more probable to assume that these objects arrived in Azraq by the means of a chain of distribution that linked a wide array of groups toward the south and west. We can also not be certain whether exchange only occurred in the Azraq Basin. Red and Mediterranean sea shells may well have been exchanged outside the Azraq Basin and only brought to the region afterwards. However, it is fair to point out that the Azraq Basin is the only region in which the pattern of Red and Mediterranean sea shell distribution versus the patterned distribution of distinct lithic industries exists, at least during the Early Epipalaeolithic. During the middle Epipalaeolithic, lithic techno-complexes display a far broader distribution, which is less patterened between east and west, so that during this point in time exchange may have also occurred outside the Azraq Basin. Nevertheless, taking into account the nature of the lithic assemblages and the pattern of site distribution in Azraq, it seems also not implausible to assume that groups met and exchanged objects locally. Generally speaking, the process of material exchange of shells appears to have become more and more pronounced from the Early to the Middle Epipalaeolithic, as is demonstrated by the increase in shell numbers during the latter phases of Jilat 6 and Kharaneh IV. The exotic nature of the sea shells derived from hundreds of kilometres away (290 km to the Red Sea and 170 km to the Mediterranean) indicates that they were likely considered to be of some value. They represent a significant effort on behalf of the communities that collected and transported them. Evidence for this kind of exchange gradually increases toward the Middle Epipalaeolithic. While the pattern observed in the Nebekian and Kebaran levels at Kharaneh IV and Jilat 6 is maintained, the number of shell beads increases through time. More shells of both Red Sea and Mediterranean origins were found at Jilat 6 upper phase and at Kharaneh IV Phase D. This indicates an intensification of shell bead import, exchange and use in the Azraq Basin. At Kharaneh IV beads are three times as abundant in the Geometric Kebaran phase (Phase D) than during the earlier phases. The Middle Epipalaeolithic sites in the Wadi el-Jilat (Jilat 8, Jilat 10 and Jilat 22) also contain shell beads, with Jilat 10 having several *Nerita* shells of Red Sea origin (Garrard, Baird & Byrd 1994: 191-192). The Late Epipalaeolithic Natufian sites at Azraq 18 and

Khallat Anaza also contained imported sea shell, although the majority are Dentalium beads that could have originated from either the Mediterranean or the Red Sea.

The precise nature of interactions during which shell beads were exchanged remains elusive. The shells could have been directly exchanged as part of establishing social ties, taken as loot during conflict situations, or exchanged for other exotic items or materials of which we are unaware. The idea of reciprocity is, however, of some importance here (Gregory 1994). What might these shells have been exchanged for? Perhaps they were traded for other types of shells, or for other valued items, services or social benefits (e.g., secure alliances, territorial access, safe passage, show power or wealth). Equally, exchange could have als been based on gaining non-material returns. Given the evidence for intentional piercing and stringing of the shells from Kharaneh IV (Allcock 2009), they were likely used as pendants or beads, sown onto clothing, or some other form of personal ornamentation that relates to ways in which the human body was adorned and consequently understood and socially constructed by these communities (Entwistle 2000; Joyce 2005; Meskell 1999; Yates 1993). Indeed, their meaning and assigned value may have been closely related to their importance in these instances of the construction of body politics. Of course other uses are also possible (counting aides, game pieces, etc.).

Here we highlight that on the one hand interaction is demonstrated by the presence of these objects and on the other what general direction this exchange took. Although we do not know the mechanisms by which these shells made it to Azraq – exchange with other groups or travel of people directly to the seas to get them – we emphasize that either of these two mechanisms mean that the individuals inhabiting the sites in Azraq would have had the opportunity to be in contact with others. This interaction may have been friendly, or not, but in either case, it could have resulted in the borrowing/taking/exchanging of ideas and objects, of which shell and stone tool types (if not microliths themselves, then at least the idea of what shapes to make them) were two examples. Regardless of the specifics of this exchange mechanism, the presence of non-local shells indicates that some form of social interaction took place between these communities, and that these interactions appear to have become more intense or more common toward the Middle Epipalaeolithic. However, the marine shell evidence is not only fascinating as a record of exchange and interaction. The reciprocity of these exchanges is related to a much wider underlying social structure, which incorporated understandings of wealth and commodity, rules for exchange, cosmologies and the creation and negotiation of social relationships.

GROUND STONE TOOLS

Ground stone tool raw material procurement and distribution can be considered an additional, if more oblique, indicator for interaction in the Azraq Basin. Ground stone is rare at most Early and Middle Epipalaeolithic sites, with a notable increase in presence during the Late Epipalaeolithic Natufian (Peterson 1999; Wright 1991; Wright 1992a, 1992b; Wright 1994). In the Azraq Basin ground stone tools were found in the Early Epipalaeolithic levels at Azraq 17, Uwaynid 18, Jilat 6 (Wright 1991, 1992b), Kharaneh IV (Muheisen 1983, 1988a, b), as well as in the Middle Epipalaeolithic deposits at Jilat 8, 22 (Wright 1991, 1992b) and Kharaneh IV (Muheisen 1983, 1988a, b, c). Portable ground stone and bedrock mortars are known from virtually all major Late Epipalaeolithic sites in the basin (Betts 1991, 1998; Garrard 1991). Basalt was the preferred raw material for the production of these tools during the Epipalaeolithic period. Natural basalts are widespread throughout the northern and eastern reaches of the Azraq Basin, where they form massive boulder fields and outcrops (Bender 1974). While basalt outcrops in close proximity to some sites (Uwaynid 14 and 18, Azraq 17, and most of the Late Epipalaeolithic sites), it is some distance from the sites in the Wadi el-Jilat (ca. 45 km) and Kharaneh IV (ca. 25 km). There is therefore unequivocal evidence for the transportation of either finished tools or raw material for tool production to these sites. The provenance of basalt tools from these sites cannot, at present, be demonstrated due to a lack of sourcing studies. It should be noted that there are also basalt sources in the west Jordanian highlands, but they are at greater distances than those in the north and east Azraq Basin (the Wadi el-Mujib source is ca. 60 km west of Wadi el-Jilat and much further from the other sites being discussed). Given that sites with very comparable chipped stone inventories are known from the Azraq Basin, and since these are assumed to have been part of a regional settlement pattern, it seems more straightforward to think of intra-regional, Azraq-specific networks of material procurement and transportation. The movement of materials consequently implies the movement of people through the Azraq landscape. While the discovery of basalt ground stone objects is not a clear-cut case of exchange, it nevertheless heightens the possibility of interactions. Source locations for suitable raw materials were part of the common knowledge of groups and access to these may have been regulated or restricted in certain ways. While moving through the landscape or extracting material at these sources people likely encountered other groups, which created the setting for interaction. But raw material extraction and transport are naturally not the only instances in which such opportunities for interaction could have arisen.

SETTLEMENT PATTERNS

The current distribution and nature of Epipalaeolithic sites in the Azraq Basin, seems to suggest a hierarchical settlement pattern. Although our knowledge is necessarily limited due to the uneven survey coverage of the region, it is possible to see that the distribution and character of archaeological sites fits the expectations for a logistical settlement pattern (Binford 1980). Kharaneh IV and Jilat 6 can be considered akin to 'base-camps' and their size, thickness of deposits and density of archaeological finds strongly suggests both the agglomeration of large groups of people and prolonged periods of occupation (Garrard & Byrd 1992). These sites are associated with distinct lithic inventories (see above) and could be considered to have been occupied by groups with distinct technological and practical histories of learning. The spatial distribution of these sites highlights that agglomeration sites are found at some distance from the central oasis. Nearer to the oasis, however, there are no known sites of comparable size during the Early or Middle Epipalaeolithic. It is possible that large sites are not found near the oasis because agglomeration sites were not needed in locales where aquatic and related wetland resources were available year-round. The migration of seasonal birds into the oasis may, however, have provided a seasonal incentive to use the oasis at particular times throughout the year. Sites with both Kebaran and Nebekian inventories (Uwaynid 14 and 18, Ayn Qasiyya), as well as a Geometric Kebaran site (AWS 48) and other potentially Early/Middle Epipalaeolithic sites (Azraq 17 Trench 1, Azraq 32) are known from within the oasis. The more dispersed settlement pattern near and in the oasis evident during Early and Middle Epipalaeolithic suggests that multiple groups exploited its resources and potentially shared the opportunities arising from the perennial water supply, game and plants available here. One of the recurrent questions in the study of the Epipalaeolithic of the Azraq Basin is why large sites such as Kharaneh IV and Jilat 6 were not established in the oasis itself? Since the oasis has been subjected to intensive survey, the lack of such sites cannot be attributed to a gap in research coverage. The oasis would have provided ideal conditions for such large settlements, with water, game and plants being very abundant. While it is possible that the oasis was unattractive for this type of settlement for other reasons, it is also possible that social mechanisms existed to mitigate human impact and over-exploitation of the oasis. Faunal evidence indicates that visits likely occurred on a seasonal basis during the Early and Middle Epipalaeolithic (Martin 1994; Richter et al. 2010). If we accept that different kinds of social groups – however defined – drew on the oasis at particular points throughout the year shared the resources in this rich area, there is a high potential for interactions to have occurred. Of course, these interactions must not necessarily have been friendly. Rather than sharing resources, people may have competed over them, which could have involved conflict or violence. However, there is no direct

evidence for one over the other, and peoples' engagement with each other is likely to have involved both at different points in time. The transport of basalt raw material for ground stone production and settlement patterns in the Azraq Basin indicate the potential for interaction to have occurred, especially during the Early and Middle Epipalaeolithic. The enormous agglomeration sites of Jilat 6 and Kharaneh IV were not re-occupied during the Late Epipalaeolithic, and settlement patterns and raw material exploitation appears to have changed considerably during the Natufian.

DISCUSSION

So far we have discussed four related lines of evidence that provide some insight into potential social interactions that occurred in the Azraq Basin during the final Pleistocene. We based this on data from chipped stone inventories found at numerous Epipalaeolithic sites, and compared the distribution of these inventories to the presence (and sources) of shell beads. Additional information was obtained from the distribution of basalt ground stone tools and settlement patterns in order to discuss the potential opportunities for interaction in the Azraq Basin. There are, of course, limitations to our available evidence. For example, we have no direct evidence yet of the nature of these interactions. In addition, the sites and lithic industries discussed here cover long spans of time, and it is difficult to ascertain whether any of these sites were occupied at roughly the same time. Most scholars do consider these lithic industries to be broadly contemporary, although in terms of generations, there could still be temporal gaps in site occupations. Yet, in case of the shell beads direct exchange between contemporary groups seems like the most parsimonious explanation for the patterns in their distribution. During the Early Epipalaeolithic shell beads are still quite rare at Jilat 6 and Kharaneh IV. This is important because the lithic inventories found at these two sites conform to industries not found uniformly throughout the Levant. The Kebaran at Kharaneh IV is a predominantly a western Levantine entity, and the Nebekian and the Qalkhan predominantly eastern Levantine entities (Byrd 1998; Byrd 1994; Goring-Morris 1995; Goring-Morris & Belfer-Cohen 1998; Olszewski 2001b, 2006; Stutz & Estabrook 2004). Shells from the Mediterranean are more common at sites occupied by groups using a Kebaran lithic tradition, whereas shells from the Red Sea are more common at sites with microburins and arched-backed bladelets, both hallmarks of the Nebekian. So far, no Kebaran sites are found near the Red Sea in southern Jordan or Israel (Goring-Morris 1995; Goring-Morris 1987; Henry 1982, 1995, 1998; Olszewski 2001b), and vice-versa. Because of the spatially patterned distribution of lithic industries across the southern Levant and the traceable origins of certain shell beads from either the Mediterranean or the Red Sea, there is strong evidence in the case of the Azraq Basin that exchanges took place between corporate groups. At the same

time that the amount of shell beads from Mediterranean and Red Seas increases in the Azraq Basin, lithic technology and typology toward the Middle Epipalaeolithic becomes more standardized and more widely shared. Perhaps this regional standardization results from increased interactions between groups within the region. Geometric Kebaran lithic industries occur throughout the Levant, albeit with spatial variation, and are accompanied by the emergence of distinct, contemporary industries (e.g. the Mushabian). It is only during the Natufian that a more homogenous picture emerges as part of a wider pan-Levantine process. By this time the Azraq Basin formed part of a broader and perhaps differently connected cultural sphere.

Marcel Mauss described exchange as a "total social phenomenon" (Mauss 1990 [1925]: 3). In our view, the evidence described above provides a strong indicator for the exchange of Mediterranean and Red Sea shell beads in the Azraq Basin during the Early and Middle Epipalaeolithic. This kind of 'exchange system' provides new insights into the long-supposed social interaction between final Pleistocene hunter-gatherer groups. That sea shells were transported and exchanged in the Epipalaeolithic Levant is not in itself a radically new finding (Bar-Yosef Mayer 1989, 2005). However, in the Azraq Basin it provides evidence for interaction between corporate groups that poses interesting questions to our understanding of the social, cultural and economic patterns that dominated the Epipalaeolithic and how these patterns were altered, adjusted and channelled into different directions later on. Above, we alluded to the wider social system within which these forms of exchange and interaction between groups were related to. Unfortunately, it is difficult to offer more definitive interpretations given our available evidence.

During the Pre-Pottery Neolithic B interaction has been thoroughly discussed and highlighted as a social phenomenon that seemed specific to the emergence of food production and village life. Here, we have discussed evidence for social interaction amongst Epipalaeolithic groups which, we argue, can be traced through the exchange of marine shells, other material goods (ground stone) and developments in the traditions of lithic production. How can we situate these observations before the background of the critical social, economic and cultural changes of the transition from hunting and gathering to agriculture and village life? The evidence outlined above suggests that we can understand the Azraq Basin as a central location, in which human interaction occurred and where social dynamics accelerated over time. Settlement patterns and lithic industries allow us to situate this interaction between groups that maintained distinct fields of knowledge in lithic artefact technology, occupying largely separate campsites throughout the basin.

Given the intensity of settlement in the Azraq Basin, as well as the apparent high intensity of interaction evident between sites (measurable in the high densities of marine shell at some sites), that the Azraq

Basin was a social hub central to people's lives, and that accompanying any one groups' lithic traditions was a tradition of interaction with other groups far and wide. In the basin, relationships were forged through material exchange and interaction, where people spent considerable effort associating places with certain activities, resources, and memories of events. While the Azraq Basin may appear marginal from an ecological perspective today, it was likely the centre of people's social lives in the past – a centre that had very close economic and/or social ties to the west and south. This is also partially demonstrated by the presence of two enormous, and extremely dense, occupation sites, Jilat 6 and Kharaneh IV. These interactions, which we have argued centred around the movement of marine shell, appear to have intensified over time and may have created obligations or dependencies between disparate communities. Whatever the meaning or value of the shells, we can be assured that people considered them valuable enough to transport them over large distances (>250 km, in some cases). There is no reason to believe that they were collected and transported exclusively for exchange, but they were clearly considered valuable enough to be meaningful in such contexts. It is possible that this interaction is an indicator for co-operation – rather than competition – between communities. While it is clearly possible to consider these items as related to conflict or theft, the continuity in this pattern and increase in frequency over time suggests that this was more of a mutual, reciprocal relationship. The tentative beginnings of an exchange network as early as 22,000 cal BP and maintained for at least 7,000 years. While the beginnings were certainly modest, material exchange appears to have intensified over time. With the onset of the Natufian other networks of interaction and exchange replaced those of the Early and Middle Epipalaeolithic in the Azraq Basin. Differences between groups in this particular region in terms of lithic artefact inventories and technologies became blurred. The success of the Natufian and its very wide distribution in its later phase may be a result of the history of contact, interaction and material exchanges that were established well beforehand. The obligations and co-operations facilitated by the exchange of shell may have been a crucial factor in the establishment of later Epipalaeolithic social dynamics. Interactions between groups fostered not just material exchange, but also the exchange of ideas and knowledge. We may therefore consider shell exchange as one driving force underlying the socio-cultural changes of the Epipalaeolithic in this region, which further highlights the Azraq Basin as a key region for inter-community interaction.

Conclusion

In light of the evidence outlined in this paper it seems to us that 'interaction spheres', material exchange and the intricate and complex social dynamics associated with these concepts were not new or unique to the PPNB, as has often been argued (e.g. e.g. Bar-Yosef 2001, 2002; Bar-Yosef & Belfer-Cohen 1989;

Cauvin 1994, 2000; Simmons 2007; Watkins 2003, 2008). The material exchanges evident in the Azraq Basin compel us to consider interaction during the Epipalaeolithic as significant foundational influences to the, albeit far-reaching and more intensive, interactions of the Neolithic. Material exchanges in Azraq are abundantly evident in the archaeological record. These exchanges were intensive, required effort and planning by the communities involved, and they lasted for long periods of time, gradually increasing in intensity from the Early to the Middle Epipalaeolithic. We therefore ought to reconsider whether the appearance of PPNB 'interaction spheres' was something *essentially* new or unique to the Neolithic. Rather, it seems that it was the nature and scope of these interactions that changed in the PPNB. While PPNB interaction spheres were undoubtedly different than during the Epipalaeolithic, in terms of organization, ideology, and the materials involved, they did not emerge out of the blue. Evidence for widespread social interaction has an ancestry going back at least to the Early Epipalaeolithic (and likely much earlier). If we consider the longevity of the patterns of Epipalaeolithic interaction their long-lasting stability is remarkable. Clearly, Epipalaeolithic communities had a very strong sense of the history of these interactions, their importance to create community cohesion and maintain links with a wide array of different groups. While we have concentrated here on the Epipalaeolithic in the Azraq Basin, this is not necessarily the only region in which such interactions may have taken place. It only means that this is one region in which there is growing evidence to elucidate these processes, which has hitherto not been discussed in detail.

Figures

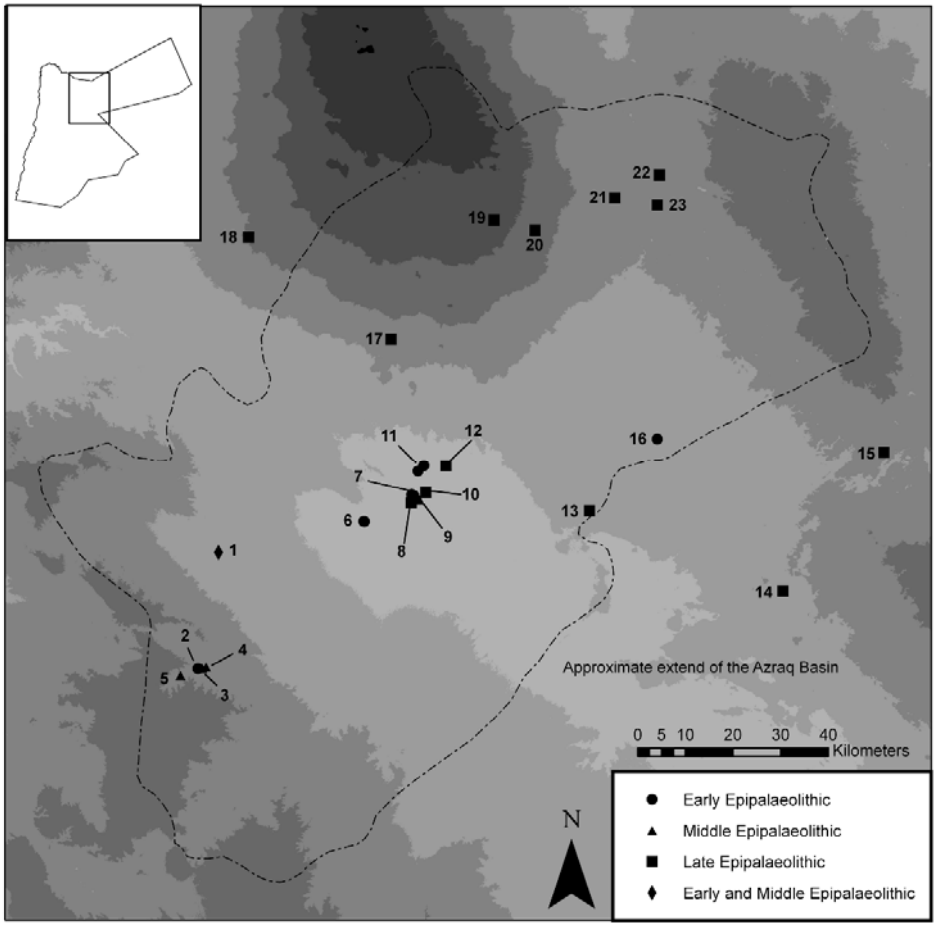

Figure 1: Distribution of principal Epipalaeolithic sites in the Azraq Basin, eastern Jordan (1: Kharaneh IV, 2: Jilat 6, 3: Jilat 8, 4: Jilat 22, 5: Jilat 10, 6: Uwaynid 14 & 18, 7: 'Ayn Qa iyya & Azraq 17, 8: Azraq 18, 9: AWS48, 10: Bawabah, 11: Azraq ed-Druze sites, 12: Ayn al-Beidha, 13: Jebel Qurma, 14: Jebel Tharwa 15: Jebel Subhi, 16: Qa' Mejalla 17: Huwaynit, 18: Wadi 'Ajib, 19: Mughr al-Jawa, 20: Khallat Anaza, 21: Shubayqa I, 22: Shubayqa II, 23: Shubayqa III).

Figure 2: The Early and Middle Epipalaeolithic 'mega'-site Kharaneh IV in the middle distance between the concrete fence posts (the 8th century Islamic Qasr Kharaneh is visible in the background).

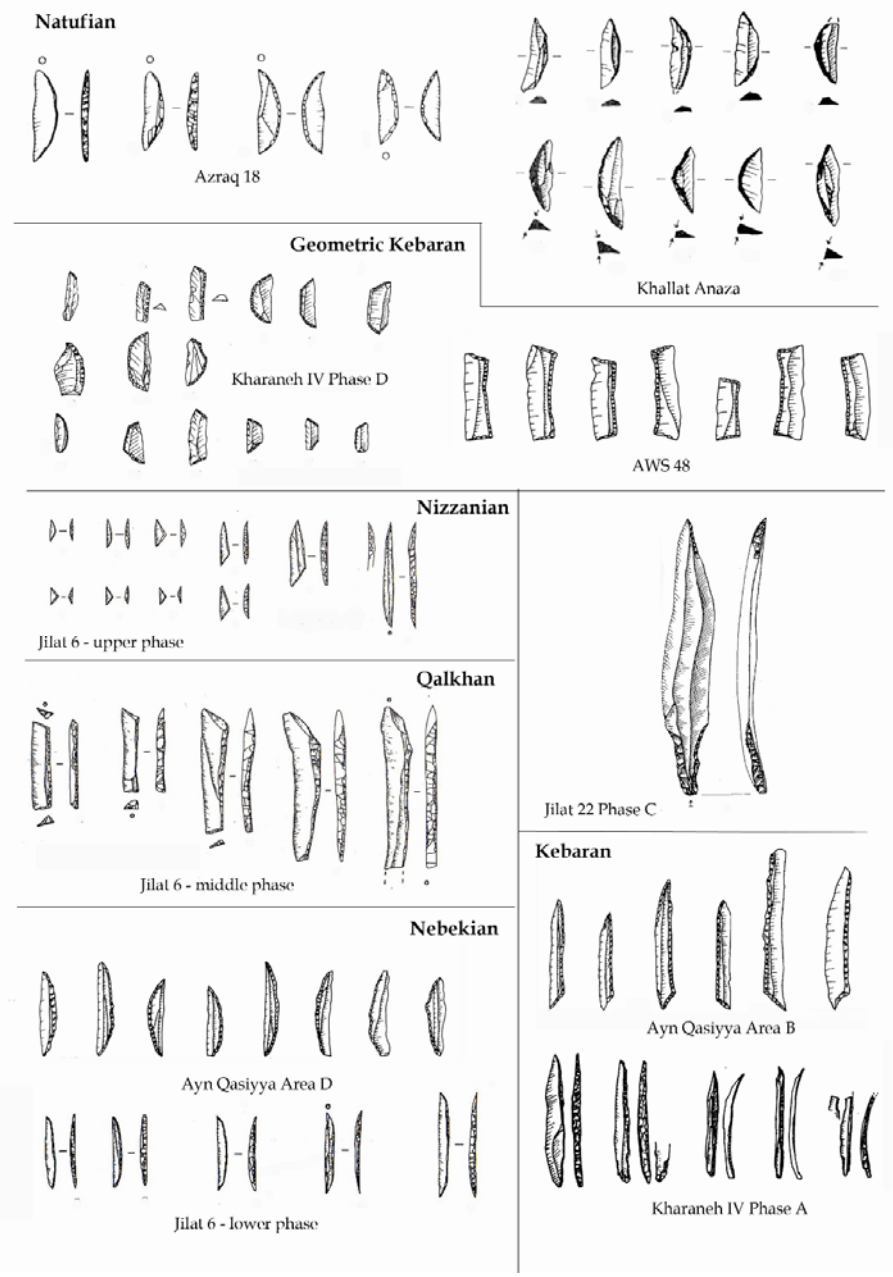

Figure 3: Diagnostic chipped stone tools from Epipalaeolithic sites in the Azraq Basin (not to scale; illustrations adapted from Byrd 1988, Garrard and Byrd 1992, Muheisen 1988b, Garrard 1991, Betts 1998).

		Microburin technique		Lithic Industry
Period	**Site/ phase**	**Yes**	**No**	
Early Epipalaeolithic	Kharaneh IV Phase A		X	Final Ahmarian/ Masraqian
	Kharaneh IV Phase B		X	Kebaran
	Jilat 6 Lower Phase	X		Nebekian
	Jilat 6 Middle Phase	X		Qalkhan
	Uwaynid 14 Lower & Upper Phases	X		Nebekian
	Uwaynid 18 Upper Phase	X		Nebekian
	Azraq 32	X		Qalkhan (?)
	Ayn Qasiyya Area A/B		X	Kebaran
	Ayn Qasiyya Area D	X		Nebekian
	Kharaneh IV Phase C		X	Nizzanian (?)
	Jilat 6 Upper Phase	X		Nizzanian
	Azraq 17 Trench 1	X		Nizzanian
Middle Epipalaeolithic	Jilat 22 Lower & Middle phases	X		"Tanged knives"
	Jilat 22 Upper phase	X		Mushabian (?)
	Jilat 8	X		Mushabian (?)
	Jilat 10		X	"Blade dominated"
	Kharaneh IV Phase D		X	Geometric Kebaran
	AWS 48		X	Geometric Kebaran
	Jilat 28		X	Geometric Kebaran
Late Epipalaeolithic	Azraq 18	X		Natufian
	Bawabah (Bawwab al-Ghazal)	?	?	Natufian
	Khallat Anaza	X		Natufian
	Mugharet el-Jawa		X	Natufian
	Shubayqa I		X	Natufian
	Jebel Subhi	X		Natufian

Figure 4: Overview of the Azraq Basin lithic industries.

Figure 5: Holed marine shells from Kharaneh IV (courtesy of the *Epipalaeolithic Foragers in Azraq Project*).

	Uwaynid 18 Upper	Uwaynid 18 Lower	Jilat 6 Surface	Jilat 6 upper	Jilat 6 middle	Jilat 22 surface	Jilat 22 upper	Jilat 22 middle	Jilat 10	Jilat 8	Azraq 17 Trench 2	Azraq 32	Azraq 18
Dentalium [1]	6	5	0	52	1	2	7	2	5	7	4	1	24
Nassarius [1]	0	0	1	5	1	0	0	0	0	0	0	0	0
Pyrene [1]	0	0	0	24	0	0	8	0	4	2	0	0	0
Ancilla [2]	0	0	1	4	0	0	0	0	0	0	0	0	0
Unidentified Gastropod	0	0	0	4	1	1	2	0	1	0	0	0	0
Cerastoderma [3]	0	0	0	5	0	0	1	0	0	0	0	0	1
Columbella [1]	0	0	0	0	0	1	1	1	0	1	0	0	0
Cerithium [1]	0	0	0	0	0	0	1	0	0	0	0	0	0
Nerita [2]	0	0	0	0	0	0	0	0	7	0	0	0	0
Total	6	5	2	94	3	4	20	3	17	10	4	1	25
							%						
Dentalium [1]	100.00	100.00	0.00	55.32	33.33	50.00	35.00	66.67	29.41	70.00	100.00	100.00	96.00
Nassarius [1]	0.00	0.00	50.00	5.32	33.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pyrene [1]	0.00	0.00	0.00	25.53	0.00	0.00	40.00	0.00	23.53	20.00	0.00	0.00	0.00
Ancilla [2]	0.00	0.00	50.00	4.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Unidentified Gastropod	0.00	0.00	0.00	4.26	33.33	25.00	10.00	0.00	5.88	0.00	0.00	0.00	0.00
Cerastoderma [3]	0.00	0.00	0.00	5.32	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00	4.00
Columbella [1]	0.00	0.00	0.00	0.00	0.00	25.00	5.00	33.33	0.00	10.00	0.00	0.00	0.00
Cerithium [1]	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00
Nerita [2]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.18	0.00	0.00	0.00	0.00
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Notes:
1) Native to both the Mediterranean and Red Sea; 2) Native to the Red Sea; 3) Native to the Mediterranean Sea

Figure 6: Absolute and percentile frequencies of marine shells from Early, Middle and Late Epipalaeolithic sites investigated as part of the Azraq Basin Early Prehistory Project. Data compiled by David Reese.

Species	Kharaneh IV - Early Epipalaeolithic		Kharaneh IV - Middle Epipalaeolithic	
	#	%	#	%
Columbella rustica[3]	47	19.42	16	2.02
Trivia monacha[3]	0	0.00	1	0.13
Cantharus pictus[3]	1	0.41	0	0.00
Nerita sanguinolenta[2]	8	3.31	139	17.53
Mitrella scripta[3]	86	35.54	145	18.28
Cerithium scabridum[1]	1	0.41	0	0.00
Conus mediterraneus[3]	43	17.77	3	0.38
Nassarius gibbosulus[3]	0	0.00	2	0.25
Euplica turturina[4]	3	1.24	8	1.01
Turritella[1]	2	0.83	1	0.13
Nassarius edwardsi[3]	0	0.00	1	0.13
Cypraea erosa nebrites[2]	4	1.65	0	0.00
Pinctada radiata[1]	7	2.89	3	0.38
Cerastoderma glaucum[1]	3	1.24	12	1.51
Antalis sp[3] *(Dentalium)*	25	10.33	417	52.59
Unidentifiable	12	4.96	45	5.67
Total	242	100.00	793	100.00

Notes: 1) Native to both the Mediterranean and Red Sea; 2) Native to the Red Sea; 3) Native to the Mediterranean Sea; 4) Native to the Indo-Pacific

Figure 7: Marine shells from the Early and Middle Epipalaeolithic phases at Kharaneh IV (after Allcock 2009).

BIBLIOGRAPHY

Allcock, S., (2009). *Beyond trade and subsistence: the use of shell ornaments to infer social interaction and increasing complexity during the Early and Middle Epipalaeolithic, Jordan*, MSc Dissertation, Institute of Archaeology London: University College London.

Asouti, E., (2006). Beyond the Pre-Pottery Neolithic B interaction sphere. *Journal of World Prehistory*, 20, 87-126.

Bar-Yosef Mayer, D. E., (1989). Late Palaeolithic and Neolithic Marine Shells in the southern Levant as Cultural Markers in *Proceedings of the 1986 Shell Bead Conference*, ed. C. F. Hayes. Rochester: Rochester Museum and Science Center (Research Records 20), 169-74.

Bar-Yosef Mayer, D. E., (1991). Changes in the Selection of Marine Shells During the Transition from the Natufian to the Neolithic in *The Natufian Culture in the Levant*, eds. O. Bar-Yosef & F. R. Valla. Ann Arbor. Michigan: Monographs in Prehistory, 629-36.

Bar-Yosef Mayer, D. E., (2005). The Exploitation of Shells as Beads in the Palaeolithic and Neolithic of the Levant. *Paléorient*, 31(1), 176-85.

Bar-Yosef, O., (1970). The Epipalaeolithic Culture of Palestine, Jerusalem: Hebrew University.

Bar-Yosef, O., (1981). The Epipalaeolithic Complexes in the Southern Levant, in *Préhistoire du Levant. Chronologie et Organisation de L'espace Depuis les Origins Jusqu'au a VI Millénaire*, eds. J. Cauvin & P. Sanlaville. Paris: CNRS, 389-409.

Bar-Yosef, O., (1987). Late Pleistocene Adaptations in the Levant, in *The Pleistocene Old World. Regional perspectives.*, ed. O. Soffer. New York: Plenum Publishers, 219-36.

Bar-Yosef, O., (1988). The date of Southwest Asian Neanderthals, in *L'Homme de Neandertal*, ed. M. Otte. Liege, Belgium: ERAUL: Université de Liege, 31-8.

Bar-Yosef, O., (1989). The Last Glacial Maximum in the Mediterranean Levant, in *The world at 18,000 BP*, eds. O. Soffer & C. Gamble. London: Unwin Hyman, 58-77.

Bar-Yosef, O., (1991). Stone tools and social context in Levantine prehistory, in *Perspectives on the Past: Theoretical Biases in Mediterranean Hunter-Gatherer Research*, ed. G. A. Clark. Philadelphia: University of Philadelphia Press, 353-70.

Bar-Yosef, O., (1998). The Natufian Culture in the Levant. Threshold to the origins of agriculture. *Evolutionary Anthropology*, 6(5), 159-77.

Bar-Yosef, O., (2001). Lithics and the social geographical configurations identifying Neolithic tribes in the Levant, in *Beyond tools. Redefining PPN Lithic assemblages of the Levant*, eds. I. Caneva, C. Lemorini, D. Zampetti & P. Biagi. Berlin: ex oriente, 437-48.

Bar-Yosef, O., (2002). The Natufian culture and the Early Neolithic: Social and economic trends in Southwest Asia, in *Examining the farming/language dispersal hypothesis*, eds. P. Bellwood & C. Renfrew. Cambridge: McDonald Institute for Archaeological Research, 113-26.

Bar-Yosef, O., (2004). The Natufian: a complex society of foragers, in *Beyond Foraging and Collecting. Evolutionary Change in Hunter-Gatherer Settlement Systems*, eds. B. Fitzhugh & J. Habu. New York: Kluwer Academic Press/ Plenum Publishers, 91-152.

Bar-Yosef, O., (2008). Farming, Herding, and the Transformation of human landscapes in southwestern Asia, in *Handbook of landscape archaeology*, eds. B. David & J. Thomas. Walnut Creek, CA: Left Coast Press, 315-27.

Bar-Yosef, O. & A. Belfer-Cohen, (1989). The origins of sedentism and farming communities in the Levant. *Journal of World Prehistory*, 3(4), 447-98.

Bar-Yosef, O. & A. Belfer-Cohen, (1991). From sedentary hunter-gatherers to territorial farmers in the Levant, in *Between bands and states*, ed. S. A. Gregg. Carbondale, Illinois: Southern Illinois University, 181-202.

Bar-Yosef, O. & A. Belfer-Cohen, (1992). From foraging to farming in the Mediterranean Levant., in *Transitions to agriculture in prehistory*, eds. A. B. Gebauer & T. D. Price. Madison, Wisconsin: Prehistory Pres, 21-48.

Bar-Yosef, O. & A. Belfer-Cohen, (2000). Early sedentism in the Near East: a bumby ride to village life, in *Life in Neolithic farming communities. Social organization, identity, and differentiation*, ed. I. Kujit. New York: Kluwer Academic, 19-62.

Bar-Yosef, O. & R. H. Meadow, (1995). The origins of agriculture in the Near East, in *Last hunters-first farmers: New perspectives on the prehistoric transition to agriculture*, eds. T. D. Price & A. B. Gebauer. Santa Fe: School of American Research Press, 39-94.

Bar-Yosef, O. & J.C. Vogel, (1987). Relative and Absolute Chronology of the Epipalaeolithic in the southern Levant, in *Chronology of the Near East*, eds. Aurenche, O., J. Evin and F. Hours, 219-246, Oxford: British Archaeological Reports 379.

Barnard, A., (2004). Hunting-and-gathering society: an eighteenth-century Scottish invention, in *Hunter-gatherers in history, archaeology, and anthropology*, ed. A. Barnard. Oxford/ New York: Berg Publishers.

Barrett, J. C., (2001). Agency, the duality of structure and the problem of the archaeological record, in *Archaeological Theory Today*, ed. I. Hodder Cambridge: Cambridge University Press, 141-64.

Barrett, J. C. & K. F. Fewster, (1999). Intimacy and Structural Tranformation: Giddens and Archaeology, in *Philosophy and Archaeological Practice. Perspectives for the 21st century.*, eds. C. Holtorf & H. Karlsson. Goeteborg: Bricoleur Press, 25-58.

Barton, M. C. & M. P. Neeley, (1996). Phantom cultures of the Levantine Epipalaeolithic. *Antiquity*, 70(267), 139-47.

Belfer-Cohen, A., (1991). The Natufian in the Levant. *Annual Review of Anthropology*, 20, 167-86.

Belfer-Cohen, A., (1995). Rethinking social stratification in the Natufian culture: the evidence from burials, in *The Archaeology of Death in the Ancient Near East*, ed. S. Campbell. London: Oxbow, 9-16.

Bender, F., (1974). *Geology of Jordan; Supplementary edition with minor corrections in English*, Berlin: Gebr.Borntraegger.

Betts, A. V. G., (1988). The Black Desert Survey. Prehistoric Sites and Subsistence Strategies in Eastern Jordan, in *The prehistory of Jordan. The state of research in 1986*, ed. A. N. Garrard & H. G. Gebel Oxford: British Archaeological Reports International Series 396, 369-91.

Betts, A. V. G., (1991). The late Epipalaeolithic in the Black Desert, eastern Jordan., in *The Natufian Culture in the Levant*, eds. O. Bar-Yosef & F. R. Valla. Ann Arbor, 217-34.

Betts, A. V. G., (1998). *The Harra and the Hamad. Excavations and Surveys in Eastern Jordan, Volume 1*, Sheffield: Sheffield Academic Press.

Binford, L. R., (1980). Willow smoke and dog's tails: hunter-gatherer settlement systems and archaeological site formation. *American Antiquity*, 45, 4-20.

Bourdieu, P., (1977). *Outline of a theory of practice*, Cambridge: Cambridge University Press.

Bourdieu, P., (1990). *The logic of practice*, Cambridge: Polity Press.

Boyd, B., (2001). The Natufian Burials from el-Wad, Mt. Carmel: Beyond Issues of Social Differentiation. *Journal of the Israel Prehistoric Society*, 31(185-200).

Boyd, B., (2002). Ways of Eating/Ways of Being in the Later Epipalaeolithic (Natufian) Levant, in *Thinking through the Body:Archaeologies of Corporeality*, eds. Y. Hamilakis, M. Pluciennik & S. Tarlow. New York: Kluwer/Plenum, 137-52.

Boyd, B., (2004). Agency and landscape: abandoning the 'nature/culture' dichotomy in interpretations of the Natufian and the transition to the Neolithic, in *The last hunter-gatherer societies in the Near East*, ed. C. Delage. Oxford: John ad Erica Hedges.

Bradley, R., (1984). *The Social Foundations of Prehistoric Britain*, London: Longman.

Byrd, B., (1988). Late Pleistocene Settlement Diversity in the Azraq Basin. *Paléorient*, 14(2), 257-64.

Byrd, B. F., (1994). Late Quaternary hunter-gatherer complexes in the Levant between 20,000 and 10,000 B.P., in *Late Quaternary chronology and paleoclimates of the eastern Mediterranean*, eds. O. Bar-Yosef & R. S. Kra. Ann Arbor: Radiocarbon, 205-26.

Byrd, B., (1998). Spanning the gap from the Upper Palaeolithic to the Natufian: the early and middle Epipalaeolithic., in *The Prehistory of Jordan*, ed. D. O. Henry. Oxford: British Archaeological Reports International Series 705, 64-82.

Byrd, B. F. & A. N. Garrard, (1989). The Last Glacial Maximum in the Jordanian desert, in *The world at 18,000 BP*, eds. O. Soffer & C. Gamble. London: Unwin Hyman, 78-96.

Byrd, B. & C. M. Monahan, (1995). Death, mortuary ritual and Natufian social structure. *Journal of Anthropological Archaeology*, 14, 251-87.

Cauvin, J., (1994). *Naissance des divinités, naissance de l'agriculture : la Révolution des symboles au Néolithique*, Paris: CNRS.

Cauvin, J., (2000). *The birth of the gods and the origins of agriculture*, Cambridge: Cambridge University Press.

Clark, G. A., (1996). Plus français que les Français. *Antiquity*, 70(267), 138-9.

Copeland, L. & F. Hours, (1989). *The hammer on the rock. Studies in the early Palaeolithic of Azraq, Jordan*, Oxford: British Archaeological Reports International Series 540.

Dobres, M.-A., (2000). *Technology and Social Agency: Outlining a practice framework for archaeology.*, Oxford: Blackwell.

Entwistle, J., (2000). *The Fashioned Body: Fashion, Dress, and Modern Social Theory*, Cambridge: Cambridge University Press.

Fellner, R., (1995a). *Cultural Change and the Epipalaeolithic of Palestine.* , Oxford: British Archaeological Reports International Series 599.

Fellner, R., (1995b). Technology or typology: a response to Neeley and Barton. *Antiquity*, 69(263), 381-3.

Gamble, C., (2004). Social archaeology and the unfinished business of the Palaeolithic, in *Explaining social change: studies in honour of Colin Renfrew*, eds. J. F. Cherry, C. Scarre & S. Shennan. Cambridge: McDonald Institute Monographs, 17-26.

Garrard, A. N., (1991). Natufian settlement in the Azraq Basin, eastern Jordan, in *The Natufian culture in the Levant*, eds. O. Bar-Yosef & F. R. Valla. Ann Arbor, 235-44.

Garrard, A. N., (1998). Environment and cultural adaptations in the Azraq Basin: 24,000 - 7,000 B.P., in *The Prehistory of Jordan*, ed. D. O. Henry. Oxford: British Archaeological Reports International Series 705, 139-48.

Garrard, A. N., D. Baird & B. F. Byrd, (1994). The chronological basis and significance of the late Palaeolithic and Neolithic sequence in the Azraq Basin, Jordan, in *Late Quaternary Chronology and Paleoclimates of the Eastern Mediterranean*, eds. O. Bar-Yosef & R. S. Kra. Ann Arbor: Radiocarbon, 177-99.

Garrard, A. N., D. Baird, S. Colledge, L. Martin & K. Wright, (1994). Prehistoric Environment and Settlement in the Azraq Basin: an interim report on the 1987 and 1988 Excavation Season. *Levant,* 26, 73-109.

Garrard, A. N., A. Betts, B. Byrd & C. Hunt, (1987). Prehistoric Environment and Settlement in the Azraq Basin: an interim report on the 1985 Excavation Season. *Levant,* 19, 5-25.

Garrard, A. N., A. Betts, B. F. Byrd & C. Hunt, (1988). Summary of the palaeoenvironmental and prehistoric investigations in the Azraq Basin, in *The Prehistory of Jordan. The State of Research in 1986*, eds. A. N. Garrard & H. G. Gebel. Oxford: British Archaeological Reports, International Series 396, 311-37.

Garrard, A. N. & B. F. Byrd, (1992). New Dimensions to the Epipalaeolithic of the Wadi el-Jilat in central Jordan. *Paléorient,* 18(1), 47-62.

Garrard, A. N. & B. F. Byrd (in prep.) *Beyond the Fertile Crescent: Late Palaeolithic and Neolithic Communities of the Jordanian Steppe. Volume 1*. Oxford: Oxbow, CBRL monograph.

Garrard, A. N., B. Byrd & A.Betts, (1986). Prehistoric Environment and Settlement in the Azraq Basin: an interim report on the 1984 Excavation Season. *Levant,* 18, 5-24.

Garrard, A. N., B. Byrd, P. Harvey & F. Hivernel, (1985). Prehistoric environment and settlement in the Azraq Basin. A report on the 1982 survey season. *Levant,* 17, 1-28.

Garrard, A. N., S. Colledge & L. Martin, (1996). The emergence of crop cultivation and caprine herding in the 'marginal zone' of the southern Levant, in *The origins and spread of agriculture and pastoralism in Eurasia*, ed. D. Harris. London: University College London Press, 204-26.

Garrard, A. N., N.P. Stanley Price & L. Copeland, (1977). A survey of Prehistoric Sites in the Azraq Basin of eastern Jordan. . *Paléorient,* 3, 109-26.

Giddens, A., (1979). *Central Problems in Social Theory. Action, structure and contradiction in social analysis.* , London: Macmillan.

Giddens, A., (1984). *The Constitution of Society. Outline of the theory of structuration,* Cambridge: Polity Press.

Goring-Morris, A. N., (1989). Sociocultural Aspects of Marine Mollusc Use in the Terminal Pleistocene in the Negev and Sinai Regions of the Southern Levant, in *Proceedings of the 1986 Shell Bead Conference*, ed. C. F. Hayes. Rochester: Rochester Museum and Research Center (Research Records 20), 175-87.

Goring-Morris, A. N., (1995). Complex hunter/gatherers at the end of the Paleolithic, in *The archaeology of society in the Holy Land*, ed. T. Levy. London: Leicester University Press, 141-67.

Goring-Morris, A. N., (1996). Square pegs into round holes: a critique of Neeley and Barton. *Antiquity,* 70(267), 130-5.

Goring-Morris, A. N. & A. Belfer-Cohen, (1998). The articulation of cultural processes and late Quaternary environmental changes in Cisjordan. *Paléorient,* 23(2), 71-93.

Goring-Morris, A. N., E. Hovers & A. Belfer-Cohen, (2009). The Dynamics of Pleistocene and Early Holocene Settlement Patterns and Human Adaptations in the Levant – An Overview, in *Transitions in Prehistory: Essays in honor of Ofer Bar-Yosef*, eds. J. J. Shea & D. E. Lieberman. Oxford: Oxbow Books, tbc.

Goring-Morris, N. A., (1987). *At the edge. Terminal Pleistocene hunter-gatherers in the Negev and Sinai,* Oxford: British Archaeological Reports International Series 361.

Gregory, C.A., (1994). Exchange and reciprocity, in *Companion Encyclopedia of Anthropology*, ed. T. Ingold, 911-939, London: Routledge

Henry, D. O., (1974). The utilization of the microburin technique in the Levant. *Paléorient,* 2(2), 389-98.

Henry, D. O., (1982). The prehistory of southern Jordan and relationships with the Levant. *Journal of Field Archaeology,* 9, 417-44.

Henry, D. O., (1989). *From foraging to agriculture: the Levant at the end of the Ice Age*, Philadelphia: Philadelphia University Press.

Henry, D. O., (1994). Late Levantine Mousterian patterns of adaptation and cognition, in *Prehistoric Cultural Ecology and Evolution: Insights From Southern Jordan*, ed. D. O. Henry. New York: Plenum, 107-32.

Henry, D. O. (ed.) (1995). *Prehistoric cultural ecology and evolution. Insights from southern Jordan.*, New York: Plenum Press.

Henry, D. O., (1996). Functional minimalism versus ethnicity in explaining lithic patterns in the Levantine Epipalaeolithic. *Antiquity*, 70(267), 135-6.

Henry, D. O., (1998). Prehistoric human ecology in the southern Levant east of the rift valley from 20,000 - 6,000 BP. *Paléorient*, 23(2), 107-19.

Hodder, I., (1982). *Symbols in action. Ethnoarchaeological studies of material culture*, Cambridge: Cambridge University Press.

Hodder, I., (1986). *Reading the past. Current approaches to interpretation in archaeology*, Cambridge: Cambridge University Press.

Hodder, I., (2007). Catalhoyuk in the Context of the Middle Eastern Neolithic. *Annual Review of Anthropology*, 36, 105-20.

Hole, F., (2002). Is size important? Function and Hierarchy in Neolithic Settlements., in *Life in Neolithic Farming Societies. Social organization, identity and differentiation* ed. I. Kuijt. New York: Kluwer Academic, 137-64.

Hours, F., (1992). *Le Paleolithique et L'Epipaleolithique de la Syrie et du Liban*, Beirut: Dar el-Machreq Sarl.

Ingold, T., (1992). Foraging for data, camping with theories: hunter-gatherers and nomadic pastoralists in archaeology and anthropology. *Antiquity*, 66, 790-803.

Ingold, T., (2000). *The perception of the environment: essays on livelihood, dwelling and skill*, London and New York: Routledge.

Jones, J. (2009). *Developing a Tool for Using Dental Cementum to Explore Seasonality of the Early-Middle Epipalaeolithic Azraq Basin, Jordan.* MSc Dissertation, Institute of Archaeology. London: University College London.

Jones, S., (1997). *The Archaeology of Ethnicity*, London: Routledge.

Joyce, R. A., (2005). Archaeology of the Body. *Annual Review of Anthropology*, 34, 139-58.

Kaufman, D., (1995). Microburins and microliths of the Levantine Epipalaeolithic: a comment on the paper by Neeley and Barton. *Antiquity*, 69(263), 375-81.

Kaufman, D., (1999). *Archaeological Perspectives on the Origins of Modern Humans: A View from the Levant*, Westport, CT: Bergin & Garvey.

Kaufman, D., (2001). Comparisons and the case for interaction among Neanderthals and early modern humans in the Levant. *Oxford Journal of archaeology*, 20(219-240).

Kislev, M. E., D. Nadel & I. Carmi, (1992). Epipalaeolithic (19,000 B.P.) cereal and fruit diet at Ohalo II, Sea of Galilee, Israel. *Review of Paleobotany and Palynology*, 73, 161-6.

Kuijt, I., (2000a). Keeping the peace: Ritual, skull caching and community integration in the Levantine Neolithic, in *Life in Neolithic farming communities. Social organization, identity and differentiation*, ed. I. Kuijt. London: Kluwer Academic/ Plenum, 137-64.

Kuijt, I., (2000b). People and space in early agricultural villages: exploring daily lives, community size and architecture in the late Pre-Pottery Neolithic. *Journal of Anthropological Archaeology*, 19, 75-102.

Kuijt, I., (2002). Reflections on ritual and the transmission of authority in the Pre-Pottery Neolithic of the southern Levant, in *Magic practices and ritual in the near Eastern Neolithic*, eds. H. G. K. Gebel, B. D. Hermansen & C. H. Jensen. Berlin: ex oriente, 81-90.

Lemonnier, P., (1989). Bark capes, arrowheads, and concorde: on social representations of technology, in *The Meaning of Things: Material Culture and Symbolic Expression*, ed. I. Hodder. London: Unwin Hyman, 156-71.

Lemonnier, P., (1990). Topsy turvy techniques: remarks on the social representation of techniques. *Archaeological Review from Cambridge*, 9, 27-39.

Lemonnier, P., (1992). *Elements for an Anthropology of Technology*, Michigan: University of Michigan.

Macumber, P. G., (2001). Evolving landscape and environment in Jordan, in *The Archaeology of Jordan*, ed. B. MacDonald, R. Adams and P. Bienkowski. Sheffield: Sheffield Academic Press, 1-30.

Maher, L., T. Richter and D. Jones, (2007). Archaeological Survey at the Epipalaeolithic site of Kharaneh IV. *Annual of the Department of Antiquities of Jordan*, 51, 257-62.

Martin, L., (1994). Hunting and Herding in a Semi-Arid Region, Sheffield: University of Sheffield.

Mauss, M., (1935). Les Techniques du Corps. *Journal de Psychologie*, 32(3-4), 271-93.

Meskell, L. M., (1999). Writing the body in archaeology, in *Reading the body: representations and remains in the archaeological record*, ed. A. E. Rautman. Philadelphia: University of Pennsylvania, 13-23.

Muheisen, M., (1983). *La Prehistoire en Jordanie. Recherches sur l'Epipaleolithic: L'exemple du Gisement de Kharaneh IV*, Bordeaux: Universite de Bordeaux.

Muheisen, M., (1988a). The Epipalaeolithic Phases of Kharaneh IV, in *The prehistory of Jordan. The state of research in 1986*, ed. A. N. Garrard & H. G. Gebel. Oxford: British Archaeological Reports International Series 396, 353-67.

Muheisen, M., (1988b). Le gisement de Kharaneh IV, note sommaire sur la phase D. *Paléorient*, 14(2), 265-82.

Muheisen, M., (1988c). *Le Paleolithique et l'Epipaleolithique en Jordanie: These pur Obtenir le Grad de Docteur d'Etat es Sciences. 2vols*. Bordeaux: Universite de Bordeaux.

Muheisen, M. & H. Wada, (1995). An analysis of the microliths at Kharaneh IV Phase D, Square A20/37. *Paléorient*, 21, 75-95.

Nadel, D., (2002). A camp on the shore of the lake, in *Ohalo II. A 23,000-year-old fisher-hunter-gatherers camp on the shore of the sea of Galilee*, ed. D. Nadel. Haifa: Reuben and Edith Hecht Museum, University of Haifa.

Nadel, D., (2004a). The Ohalo II and the Natufian dwelling structures (Jordan Valley, Israel), in *The Last Hunter-Gatherers in the Near East*, ed. C. Delage. Oxford: British Archaeological Reports International Series 1320, 137-51.

Nadel, D., (2004b). Wild barley harvesting, fishing, and year-round occupation at Ohalo II (19.5 KY, Jordan Valley, Israel), in *Section 6: The Upper Palaeolithic (General Sessions and Posters). Acts of the XIVth UISSP Congress, University of Liege (September 2001)*, ed. Le Secretariat du Congrès Oxford: British Archaeological Reports International Series 1240, 135-43.

Nadel, D., (2006). Residence ownership and continuity: from the Early Epipalaeolithic unto the Neolithic, in *Domesticating Space. Construction, Community, and Cosmology in the Late Prehistoric Near East*, ed. E. B. Banning & M. Chazan. Berlin: ex-oriente, 25-34.

Neeley, M. P. & C. M. Barton, (1994). A new approach to interpreting late Pleistocene microlith industries in southwest Asia. *Antiquity*, 68, 275-88.

Nelson, J. B., (1973). *Azraq : desert oasis*, London: Allen Lane the Penguin Press.

Olszewski, D. I., (2001a). My 'backed and truncated bladelet', your 'point': terminology and interpretation in Levantine Epipalaeolithic assemblages, in *Beyond Tools. Redefining the PPN Lithic Assemblages of the Levant*, ed. I. Caneva, C. Lemorini, D. Zampetti and P. Biagi. Berlin: ex oriente, 303-18.

Olszewski, D. I., (2001b). The Palaeolithic, including the Epipalaeolithic, in *The Archaeology of Jordan*, ed. B. MacDonald, R. Adams and P. Bienkowski. Sheffield: Sheffield Academic Press, 31-65.

Olszewski, D. I., (2006). Issues in the Levantine Epipalaeolithic: the Madamaghan, Nebekian and Qalkhan (Levant Epipalaeolithic). *Paléorient*, 32(1), 19-26.

Perrot, J., (1966). Le gisement natoufien de Mallaha (Eynan), Israël. *L'Anthropologie*, 70(437-484).

Peterson, J., (1999). Early Epipaleolithic settlement patterns : Insights from the study of ground stone tools from the southern Levant. *Levant*, 31, 1-17.

Pfaffenberger, B., (1992). Social Anthropology of Technology. *Annual Review of Anthropology*, 21, 491-516.

Phillips, J. L., (1996). The real nature of variability in Epipalaeolithic assemblages. *Antiquity*, 70(267), 137-8.

Pluciennik, M., (2002). The invention of hunter-gatherers in seventeenth century Europe. *Archaeological Dialogues*, 9(2), 98-151.

Pluciennik, M., (2004). The meaning of 'hunter-gatherers' and modes of subsistence: a comparative historical perspective., in *Hunter-gatherers in history, archaeology and anthropology*, ed. A. Barnard. Oxford: Berg, 17-29.

Rak, Y., (1993). Morphological variation in Homo neanderthalensis and Homo sapiens in the Levant: A biogeographic model, in *Species, Species Concepts, and Primate Evolution*, eds. W. H. Kimbel & L. B. Martin. New York: Plenum, 523-36.

Reese, D. S., (1991). Marine shells in the Levant: Upper Palaeolithic, Epipalaeolithic and Neolithic, in *The Natufian Culture in the Levant*, ed. O. Bar-Yosef & F. Valla. Ann Arbor: International Monographs in Prehistory, 613-28.

Reese, D. S., (1995). Shells from the Wadi Hisma Sites, in *Prehistoric Cultural Ecology and Evolution: Insights from Southern Jordan*, ed. D. O. Henry. New York: Plenum Press, 385-90.

Richter, T., (2009a). Marginal landscapes? The Azraq Oasis and the cultural landscapes of the final Pleistocene Levant, in *Papers of the Institute of Archaeology* London: University College London.

Richter, T., in print. Nebekian, Qalkhan and Kebaran: variability, classification and interaction. New insights from the Azraq Oasis, in *Proceedings of the 6th Conference on PPN Chipped and Ground Stone Industries of the Fertile Crescent, Manchester, March 3rd-6th 2008*, eds. E. Healey, M. Osamu & S. Campbell. Berlin: ex oriente, tbc.

Richter, T., S. Alcock, E. Asouti, S. Colledge, M. Jones, L. Maher, L. Martin, J. Stock & B. Thorne, (2010). New light on Final Pleistocene settlement diversity in the Azraq Basin: some preliminary results from Ayn Qasiyah and AWS 48. *Paléorient*, 35, tbc.

Richter, T., S. Colledge, S. Luddy, D. Jones, M. Jones, M. L. & R. Kelly, (2007). Preliminary report on the 2006 season at Epipalaeolithic 'Ayn Qasiyah, Azraq es-Shishan. *Annual of the Department of Antiquities of Jordan*, 51, 313-28.

Richter, T. & C. Röhl, (2006). Rescue Excavations at Epipalaeolithic ‘Ayn Qasiyah: Report on the 2005 season. *Annual of the Department of Antiquities of Jordan*, 50, 189-203.

Rollefson, G., (2004). The character of LPPNB social organization, in *Central Settlements in Neolithic Jordan*, eds. H. D. Bienert, H. G. Gebel & R. Neef. Berlin ex oriente, 145-53.

Rollefson, G., L. Quintero & P. Wilke, (1999). Bawwab al-Ghazal: Preliminary Report on the Testing Season 1998. *Neo-Lithics*, 1/99, 2-4.

Rollefson, G., L. Quintero & P. Wilke, (2001). Azraq Wetlands Survey 2000. Preliminary Report. *Annual of the Department of Antiquities of Jordan*, 45, 71-82.

Rollefson, G., D. Schnurrenberger, L. Quintero, R. P. Watson & R. Low, (1997). Ain Soda and 'Ayn Qasiya: New late pleistocene and early Holocene sites in the Azraq Shishan area, eastern Jordan., in *The prehistory of Jordan II. Perspectives from 1997*, ed. H. G. K. Gebel, Z. Kafafi and G.O. Rollefson. Berlin: ex oriente, 45-58.

Rollefson, G. O., (1983). Two seasons of excavation at Ain el-Assad, eastern Jordan, 1980-1981. *Bulletin of the American Schools of Oriental Research*, 252, 25-34.

Rust, A., (1950). *Die Höhlenfunde von Jabrud*, Neumünster: Karl Wacholtz Verlag.

Shanks, M. & C. Tilley, (1987). *Social Theory and Archaeology*, Cambridge: Cambridge University Press.

Shea, J. J., (2003). Close encounters: Neanderthals and modern humans in the Middle Palaeolithic Levant. *The Review of Archaeology*, 24, 32-55.

Simmons, A. H., (2007). *The Neolithic Revolution in the Near East: Transforming the Human Landscape*, Tuscon: University of Arizona Press.

Stutz, A. J. & G. F. Estabrook, (2004). Computationally intensive multivariate statistics and relative frequency distributions in archaeology (with an application to the Early Epipaleolithic of the Levant). *Journal of Archaeological Science*, 31, 1643-58.

Tixier, J., (1963). *Typologie de l'épipaléolithique du Maghreb*, Paris: Arts et Métiers Graphiques.

Tixier, J. & M. H. Newcomer, (1974). *Glossary for the description of stone tools with special reference to the Epipalaeolithic of the Maghreb*, Pullman WA, Washington State University, Newsletter of Lithic Technology.

Valla, F. R., (1975). *Le natoufien, une culture préhistorique en Palestine*, Paris: Gabalda.

Valla, F. R., (1995). The first settled societies - Natufian (12,500-10,200 BP), in *The Archaeology of the Holy Land*, ed. T. Levy. London: Leicester University Press, 169-90.

Wasse, A. & G. Rollefson, (2005). The Wadi Sirhan Project: Report on the 2002 Archaeological Reconnaissance of Wadi Hudruj and Jabal Thawra, Jordan. *Levant*, 37, 1-20.

Watkins, T., (2003). Developing socio-cultural networks. *Neo-Lithics*, 2/03, 36-7.

Watkins, T., (2008). Supra-regional networks in the Neolithic of Southwest Asia. *Journal of World Prehistory*, 21, 139-71.

Weiss, E., M.E. Kislev, O. Simchoni & D. Nadel, (2005). Small-grained wild grasses as staple food at the 23,000 year-old site of Ohalo II, Israel. *Economic Botany 588*, 125-34.

Weiss, E. M. E. K., O. Simchoni & D. Nadel, (2005). Small-grained wild grasses as staple food at the 23,000 year old site of Ohalo II, Israel. *Economic Botany 588*, 588, 125-34.

Wenger, E., (1998). *Communities of practice: learning, meaning, and identity*, Cambridge: Cambridge University Press.

Wright, G. A., (1978). Social differentiation in the early Natufian., in *Social Anthropology*, eds. C. L. Redman, M. J. Berman, E. V. Curtin, W. T. J. Langhorne, N. H. Versaggi & J. C. Wanser. New York: Academic Press, 210-24.

Wright, K., (1991). The origins and development of ground stone assemblages in late Pleistocene southwest Asia. *Paléorient*, 17(1), 19-45.

Wright, K. I., (1992a). A classification system for ground stone tools from the prehistoric Levant. *Paléorient*, 18(2), 53-81.

Wright, K.I., (1992b) *Ground Stone Assemblage Variations and Subsistence Strategies in the Levant, 22,000-5,500 B.P.* PhD dissertation, Yale University. (Ann Arbor: University Microfilms).

Wright, K. I., (1994). Ground Stone Tools and Hunter-gatherer Subsistence in Southwest Asia: Implications for the Transition to Farming. *American Antiquity*, 59(2), 238-63.

Yates, T., (1993). Frameworks for an archaeology of the body., in *Interpretative Archaeology*, ed. C. Tilley. Oxford: Berg, 31-72.