

Nine Millennia by Lake Lisan: The Epipalaeolithic in the East Jordan Valley Between 20,000 and 11,000 Years Ago

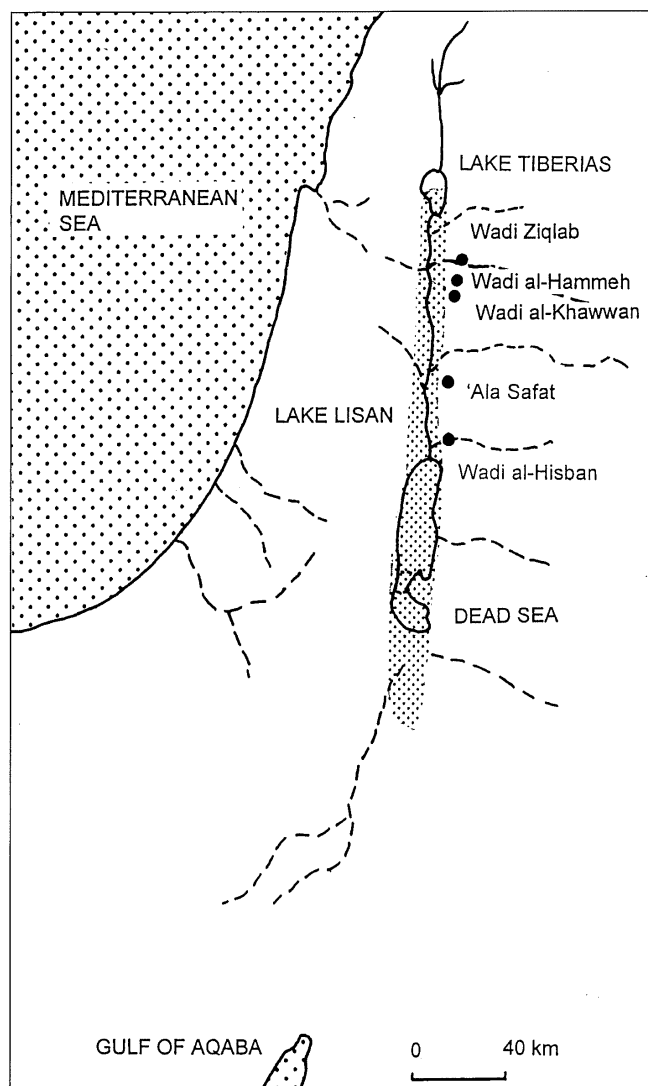
Introduction: The Lakesiders

The Jordan Valley is a major physiographic feature which forms the distinctive western border to Jordan, impressive to all travellers from whichever direction it is approached. During the Late Pleistocene epoch the Valley was filled with a long, narrow lake which stretched between Lake Tiberias in the north and the Dead Sea in the south, and so formed an even more conspicuous boundary. Therefore, the sites which bordered the lake in the Epipalaeolithic period, probably up till about 11,000 b.p. (Begin *et al.* 1985; Macumber and Head 1991; Neev and Hall 1977) were in a sense some of the more isolated in Jordan, being located at a remote 'end' of the country separated from the west by a significant barrier.

Lake Lisan, as it is named, is thought to have been variously saline to brackish throughout its lifespan (Horowitz 1979:149-150). It probably did not of itself hold a special allure for human settlement, at least in the southern reaches. The principal attraction to its eastern margin lay rather in the chain of springs that rise in Late Cretaceous to Eocene limestones along the foot of the eastern Valley (Bender 1974). In several of the tributary wadis which flow into the eastern valley, aquifer systems deposited thick bodies of alluvial sediment which in turn have preserved sites and vestiges of the ancient people attracted to the water resources.

Over the past two decades the researches of Phillip Macumber, John Head and myself have uncovered a series of Epipalaeolithic sites spanning the period 20,000 to 11,000 b.p. in three of these spring zones: Wādī al-Ḥammeh, Wādī al-Khawwān, and Wādī Ḥisbān (FIG. 1). Together with a number of additional sites such as Ṭabaqat al-Būma in Wādī Ziqḻāb (Banning *et al.* 1990) and the Natufian site of 'Ala Safat (Waechter 1948), a rockshelter overlooking the valley situated near the Ardha Triangle, they form the principal body of evidence for the Epipalaeolithic period in the central-eastern Jordan Valley.

These eastern valley sites are buried deep within wadi terrace sediments, a situation which differs from the con-



1. East Jordan Valley Epipalaeolithic sites.

text of many Jordanian Epipalaeolithic sites, and confers on the eastern valley sites particular characteristics. For

example, sites tend to be strewn on buried land surfaces, often approachable only in the cliff sections of wadis. In certain cases terrace aggradation has been relatively fast compared to sedimentation in many areas on the Jordanian Plateau, allowing the preservation of cultural materials representing relatively short occupations, though possibly representing repeated visits made over decades or centuries.

The dozen excavated Epipalaeolithic sites now available allow us to begin to discern an archaeological signature for the eastern valley Epipalaeolithic. Technologically, the flaked stone industries were fashioned along wadi courses choked with abundant cobbles of alluvial chert, producing a profligate attitude to raw material, involving minimal use of materials and little effort expended in core rejuvenation. Typologically, the group proves distinctive compared to surrounding sites at all points of the compass. And structurally, the sites are instructive with respect to regional trends towards earliest sedentism at the end of the Pleistocene. The Early and Middle Epipalaeolithic sites represent a highly mobile settlement system, with little effort directed to architectural construction, ground stone tools for cereal processing, and a general lack of elaborate cultural inventories including art pieces or imported resources. The Early Natufian period represents a dramatic intensification of all of these aspects. Taken together with evidence from the western side of the Jordan Valley, the east valley evidence stands distinct from the group of sites to the north, bordering Lake Tiberias, and in the Western Galilee. There, the moister environment saw some pre-Natufian settlement intensification, evident in such sites as Ohalo II (Nadel 1990), Ein Gev I (Bar-Yosef 1970: 109-111) and Neve David (Kaufman 1987). Since the supply of freshwater was not itself a limiting factor at the eastern valley spring sites, it may be that the more mesic northern habitat supported a richer and more broadly accessible suite of botanical and faunal resources than the eastern flank to the south, more conducive to early attempts at food storage, and a more circumscribed settlement pattern.

The following sections précis the major sites of concern under the headings of Early, Middle and Late Epipalaeolithic periods. These parts in turn comprise sections summarising, where applicable, data on site location, palaeoenvironment, chronology, subsistence and cultural affinities.

The Early Epipalaeolithic (ca. 20,000 - 15,000 b.p.)

Site Characteristics and Contexts

The five early Epipalaeolithic sites are all located in Wādī al-Ḥammeh where they were deposited in a marginal flood plain adjacent to the edge of Lake Lisan, deposited

by the antecedents of the present hot-water spring in Wādī al-Ḥammeh (Edwards *et al.* 1996; Macumber and Head 1991).

Wādī al-Ḥammeh 26 (dated 19,500 ± 600 b.p., TABLE 1) is contained in a dark clay band preserved in cliff section. Clusters of lithics, bone fragments and charcoal fragments coincide to form a peak cluster approximately two metres long and thirty centimetres thick (Edwards 1990: Fig. 5.4), indicating the remnants of a hearth and its associated debris. Prey species included a wide variety of terrestrial fauna.

Excavations at Wādī al-Ḥammeh 33 (19,500 ± 600 b.p.) were limited to a 'spade test', located fifty metres down-valley from Wādī al-Ḥammeh 26, in the same Black Clay deposit. A small amount of matrix was extracted and sieved, yielding a high density sample of lithics and establishing the presence of faunal remains, including a *Cervus elaphus* (Red Deer) phalanx (Edwards 1987: 104-107). The material here appears to be a lateral extension of the artefact layer intercepted by the WH 26 excavations.

Wādī al-Ḥammeh 52 (dated 19,480 ± 500 b.p.) is located immediately adjacent to the al-Lisān beach deposit at the mouth of Wādī al-Ḥammeh. Small numbers of flaked chert pieces were dispersed in approximately equal numbers through all excavated spots, in addition to hundreds of burnt limestone pebbles and fragments and several bone fragments.

Wādī al-Ḥammeh 31, sealed by a *Melanopsis* shell band dated to 16,740 b.p., stratigraphically overlies Wādī al-Ḥammeh 52. Here a dense cluster of unabraded lithics was excavated, restricted to a band no more than a metre wide. Wādī al-Ḥammeh 51 (dated 16,820 ± 340 b.p.) is located directly opposite the previous two sites, in cliff section on the north bank of Wādī al-Ḥammeh. Like Wādī al-Ḥammeh 31, the site consisted of a dense, circumscribed cluster of flaked stone, occurring in a narrow band no more than a metre long.

Chronology

All of the Wādī al-Ḥammeh sites were radiocarbon-dated conventionally, Wādī al-Ḥammeh 26 on wood charcoal, and the others on the *Melanopsis praemorsa* molluscs that inhabit the springs. All dates are in good agreement with the stratigraphic position of the sites (Macumber and Head 1991). The earliest two sites are Wādī al-Ḥammeh 26 and 52 at 19,500 b.p., near the Late Glacial Maximum, which are among the earliest dated Kebaran sites and so their cultural affinities are of considerable importance. Wādī al-Ḥammeh 31 and Wādī al-Ḥammeh 51 both date to ca. 16,750 b.p.

Fellner (1995: 21-23, 46) rejects the Wādī al-Ḥammeh 26 date because it is a single determination, and because his analysis of retouched tool type frequencies grouped Wādī al-Ḥammeh 26 with the Central Jordan Valley Late

TABLE 1. Radiocarbon determinations for East Jordan Valley Epipalaeolithic sites. Questionable dates are indicated in italics followed by '?'.

Site	Date (b.p. uncalibrated)	Laboratory Code	Sample type
Early Epipalaeolithic			
Wadi Hammeh 26	19,500 ± 600	SUA-2101	Charcoal
Wadi Hammeh 52	19,480 ± 500	ANU-4653	Melanopsis
Wadi Hammeh 51	16,820 ± 3 40	ANU-8471	Melanopsis
Wadi Hammeh 31	>16,740 ± 220	ANU-4654	Melanopsis
Middle Epipalaeolithic			
Wadi Hammeh 50,			
Spot 1: 1-3	14,500 ± 100	ANU-8472	Melanopsis
Spot 1: 8-9	15,390 ± 180	ANU-8473	Melanopsis
Spot 1: 12-14	15,180 ± 140	ANU-8474	Melanopsis
Spot 3: 5-8	14,490 ± 120	ANU-8475	Melanopsis
Spot 3: 12-15	15,340 ± 170	ANU-8476	Melanopsis
Wadi Hisban 2	14,052 ± 94	Wk-7005	Charcoal (AMS)
Wadi Hisban 2	<i>11,560 ± 250?</i>	ANU-8469b	Burnt bone (apatite)
Wadi Hisban 2	<i>9,490 ± 220?</i>	ANU-8469a	Burnt bone (collagen)
Wadi Hisban 5,			
Spot 1: 1.7	693 ± 58?	Wk-7006	Charcoal (AMS)
Spot 1: 1.9	9,196 ± 77?	Wk-7007	Charcoal (AMS)
Spot 1: 1.10	12,890 ± 95	Wk-7008	Charcoal (AMS)
Spot 1: 1.11	<i>9,200 ± 350 ?</i>	ANU-9404	Burnt bone (apatite)
Tabaqat al-Buma			
Area B, Locus 7	14,850 ± 160	TO-991	Bone (collagen)
Area B, Locus 7	13,110 ± 130	TO-989	Bone (collagen)
Area E34, Locus 15	12,660 ± 430	TO-2116	Bone (collagen)
Area B, Locus 7	11,170 ± 100	TO-987	Bone (collagen)
Late Epipalaeolithic			
Wadi Hammeh 27			
XX D 8.1	11,920 ± 150	OxA-393	Humic acids from seeds (AN
XX D 8.1	11,950 ± 160	OxA-507	Charred seeds (AMS)
XX D 8.1	12,200 ± 160	OxA-394	Charred seeds (AMS)
Plateau top,			
1 metre above site	11,100 ± 120-	ANU-5818	Melanopsis
XX F	<i>9,350 ± 380?</i>	ANU-6550	Charcoal
Wadi Hisban 6			
Square A: 2.1	<i>Modern?</i>	Wk-7009	Charcoal (AMS)
Square B: 4.1	<i>Modern?</i>	Wk-7010	Charcoal (AMS)
Square A: 4.3	<i>5,740 ± 220?</i>	ANU-9406	Burnt bone (collagen)
Square A: 4.3	12,950 ± 140	ANU-9407	Xeropicta vestalis
Wadi Khawwan 2	11,620 ± 240	ANU-8470	Melanopsis

Kebaran group. I disagree with this assessment on several grounds. Firstly, the Wādī al-Ḥammeh 26 date was obtained from a sample comprising over 100 grams of wood and shrub charcoal fragments which were the remnants of a hearth, interwoven with a great mass of flaked stone and fauna. The site is clearly well-stratified, and separated from overlying and underlying sites by several metres of sediments. Secondly, the 19,500 b.p. date is one of a regular progression of dates in the Plateau sequence located directly underneath Wādī al-Ḥammeh 26 (Edwards and Macumber 1995), beginning with 35,300 b.p. at altitude 102.3 metres below sea level (b.s.l.), continuing with five dates between 30,000 and 28,000 at altitude 96.1 metres b.s.l., then Wādī al-Ḥammeh 26 with 19,500 b.p. at 89.2 metres b.s.l., followed by 12,000 -11,900 b.p. for Wādī al-Ḥammeh 27 at altitude 83.5 metres b.s.l., and capped by an 11,000 b.p. date directly above the Natufian site. Moreover, the base of the sterile travertine cap overlying Wādī al-Ḥammeh 26 and below Wādī al-Ḥammeh 27 is dated at 14,970 b.p. at its eastern end within the very period to which, according to Fellner, Wādī al-Ḥammeh 26 should date; and a date from a point several metres east of Wādī al-Ḥammeh 26 at nearly the same level is dated $20,870 \pm 280$ b.p. (Macumber and Head 1991). Further, Wādī al-Ḥammeh 50 is securely dated between 15,500-14,500 b.p. (TABLE 1) and looks nothing like Wādī al-Ḥammeh 26 typologically. When we consider that the typological scheme for the development of the Kebaran has been based overwhelmingly on undated and even unstratified sites, and remember the typological variability that recent, dated Epipalaeolithic sites have exhibited, it behoves us to give precedence to dated and stratified local sequences above monolithic, unilinear typological schemes proposed for the same local regions.

Palaeoenvironment

The Late Glacial Maximum was a relatively cold and arid period in the southern Levant (Baruch and Bottema 1991: 16), highlighting the importance of Mediterranean forest refugia in the spring-fed valleys such as Wādī al-Ḥammeh, draining into Lake Lisan at the arid peak. The suite of botanical remains from Wādī al-Ḥammeh 26 (Willcox 1992: 254) includes the trees and shrubs oak, almond, pistachio, hawthorn, buckthorn and hackberry (Edwards 1990).

Subsistence

Besides the possibility that edible fruits and nuts from the previously mentioned trees were utilized, subsistence data come from the suite of faunal remains in Wādī al-Ḥammeh 26. These include a diversified diet with a preponderance of gazelle and sheep/ goat, pig, fox, cat, hare, quail, partridge, tortoise and crab. Wādī al-Ḥammeh 33 also produced Red deer remains.

Assemblage Characteristics

The Early Epipalaeolithic sites exhibit technological and typological cohesiveness and continuity, although considerable functional variability in terms of tool-type frequencies. The plentiful chert cobbles littering the wadis were used as cores. The technique was to detach a cortical flake to form the platform, then to spall a few blades from the face, leaving much of the core's original cortex present. Few cores were intensively utilised and there are correspondingly few core rejuvenation products. Typologically the period is characterised by very gracile, straight backed bladelets. They are mostly obliquely truncated in the case of Wādī al-Ḥammeh 26. Wādī al-Ḥammeh 52 however, located just over 600 metres away has no microliths at all, only a few scrapers and burins. Wādī al-Ḥammeh 31 has a small number of straight backed bladelets, and includes a couple of elongate proto-trapezes.

The Middle Epipalaeolithic (ca. 15,000 - 13,000 b.p.)

Site Characteristics and Contexts

Two sites in Wādī Ḥisbān (Edwards *et al.* 1999), one in Wādī al-Ḥammeh (Wādī al-Ḥammeh 50), and perhaps one in Wādī Ziqlāb (Ṭabaqat al-Būma) constitute the Middle Epipalaeolithic series. The Wādī Ḥisbān trio are located as a sequence of superimposed sites along the wadi's north bank (FIG. 1), in a broad alluvial fan deposit on the Jordan Valley[†] floor. During their occupation, the sites would have overlooked Lake Lisan, lying about two kilometres to the west. The lowermost site Wādī Ḥisbān 2 consists of a rich band, some 30 centimetres thick, extending in outcrop ten metres laterally along the wadi terrace. Lithics and burnt animal bone are present at densities of 135,000 lithic fragments/ m³.

Wādī Ḥisbān 5, which overlies Wādī Ḥisbān 2, is visible as a thin, distinct band of material outcropping in the wadi bank over 45 m in length. Two excavation pits were positioned twenty metres apart in order to intercept this rich horizon, in which chert artefacts and burnt animal bone fragments reach a peak of abundance. Several rebuilt versions of a stone hearth were found both above and below this layer.

Wādī al-Ḥammeh 50 (dated c. 15,500 - 14,500 b.p.) is embedded in a residual dome of calcareous silts about 250 m downstream from Wādī al-Ḥammeh 26. Abundant burnt limestone cobbles and trace amounts of fauna were retrieved throughout the deposits in addition to flaked chert artefacts. Cultural material was concentrated within a broad band c. 2.5 m thick, and extending 5 m horizontally between pits.

Ṭabaqat al-Būma is an apparently mixed site, located in colluvial sediments on the southwestern terrace of a small tributary of Wādī Ziqlāb (Banning *et al.* 1990; 1996).

Chronology

Apart from Wādī al-Ḥammeh 50, well-dated from date sequences in two pits at 15,400 - 14,500 b.p., the business of obtaining a reliable radiocarbon chronology for the eastern valley Middle Epipalaeolithic has proved difficult. At this stage, the best estimate for Wādī Ḥisbān 2 is the date of $14,052 \pm 94$ b.p. (TABLE 1) obtained from charcoal fragments sorted and retrieved from a flotation sample by archaeobotanist Susan Colledge. The two dates obtained from burnt bone: $11,560 \pm 250$ (on apatite) and $9,490 \pm 220$ b.p. (on collagen) are too recent, indicating that the bone has become remineralised. In fact, all bone dates we have obtained, including those from Wādī Ḥisbān 5 and Wādī al-Ḥammeh 27 (below) have been aberrantly late. It is worth noting that the dates from Unit 3 of Ṭabaqat al-Būma which range between 15,000 and 12,000 b.p. were also derived from bone collagen. Wādī Jilat 6, Upper Phase, located near al-'Azraq, is so far the best-dated Triangle industry site at ca. 16-15,000 b.p. (Garrard and Byrd 1992). It is possible that the Triangle Phase lasted until 14,000 b.p. in Wādī Ḥisbān, although the odds of the overlying Wādī Ḥisbān 5 dating somewhere in the 14-13,000 interval, renders it desirable to obtain additional dates before this possibility is accepted.

The earliest date for Wādī Ḥisbān 5, however ($12,890 \pm 95$), dates after 13,000 b.p. This may be accurate, though the date overlaps with the earliest ones for the Natufian site Wādī Ḥisbān 6, and with the earliest dates for the Natufian in general. Other dates run on the minute charcoal fragments retrieved from the flotation tank charcoal ($9,196 \pm 77$, 693 ± 58), and stratified a few centimetres above the 12,890 date, are clearly too late. Wādī Ḥisbān 5 is eroding from the top of the terrace, and the problem seems to be the vertical movement of small charcoal particles. Perhaps some later charcoal was also present in the earliest Wādī Ḥisbān 2 and Wādī Ḥisbān 5 charcoal samples. The burnt bone sample ($9,200 \pm 350$ b.p.) has also suffered remineralisation. *Melanopsis* samples await dating, which may resolve the uncertainty, as described below.

Palaeoenvironment and Subsistence

The Middle Epipalaeolithic sites have yielded little direct evidence for reconstructing palaeoenvironment, except from sedimentological evidence, which indicates the continuation from the Early Epipalaeolithic of local moist environments, for example in the case of Wādī al-Ḥammeh 50 embedded in spring-deposited calcareous silts. Few diagnostic faunal elements occur in these sites also. In Wādī Ḥisbān 2 and 5 there are a great many broken, burnt unidentifiable fragments, but few diagnostic bone elements, which include those of gazelle and Freshwater crab (*Potamon potamon*).

Assemblage Characteristics

Wādī Ḥisbān 5 is similar to Wādī Ḥisbān 2 with regard to core production. The few larger tools, consisting mainly of endscrapers and burins, are also similar. However the microlithic component signals a major departure, featuring long, gracile backed bladelets with either one or both ends obliquely truncated. The 'tiny triangles' have now disappeared, along with any substantial use of microburin technique. In the cases where both ends are truncated—a long, gracile trapeze, or 'proto-trapeze' (Bar-Yosef 1970: 218) is formed. In addition to the flaked stone, a small incised pebble with a grooved waist was discovered. No shift to geometric production occurs in Wādī al-Ḥammeh 50. Instead, this site takes a different turn. Apart from one fragmentary backed bladelet, the other retouched bladelets are all points, formed by bilateral backing and semi-steep retouch. Apparently sites like Wādī al-Ḥammeh 50 dating c. 15,000 b.p. are unknown.

Ṭabaqat al-Būma is difficult to assess, given its mixed nature. Obliquely-truncated backed bladelets predominate, but the assemblage also contains lesser numbers of micropoints and various retouched bladelets (Banning *et al.* 1990: 62). Straight-backed types are represented in illustration.

The Late Epipalaeolithic: Natufian Sites Large and Small (ca. 12,000-11,000 b.p.)

Site Characteristics and Contexts

The Natufian period in the east Jordan Valley, represented by four sites, signals a major change in local settlement patterns. Larger sites with architectural elaboration and more variable artefact repertoires now emerge. Smaller open sites persist, but they differ from those of preceding periods in sharing additional elements of the more varied assemblages of the large 'base-camp' settlement, Wādī al-Ḥammeh 27 (Edwards 1991).

About 2,000 m² of Wādī al-Ḥammeh 27 is extant, but at least this quantity again has eroded from the top of the high ridge on which it lies, implying an original size of at least a half hectare. Wādī al-Ḥammeh 27 has several superimposed constructional phases featuring oval limestone huts, associated with various stone features such as hearths, platforms and post-holes, with human burials underlying these.

Only two kilometres away to the south-west lies the small site of Wādī Khawwan 1 (Edwards *et al.* 1998), buried near the top of a thick, spring-deposited travertine overlooking the Jordan Valley. Markedly different to Wādī al-Ḥammeh 27, this consists of only a thin band of artefacts, without architectural features.

Travelling south, the next site is the cave of 'Ala Safat, which holds the distinction of being the first Epipalaeolithic site excavated and reported in the east Jordan

Valley (Waechter 1948). Within the shelter a stone hearth associated with Natufian lithics was discovered.

The final site is Wādī Ḥisbān 6, the uppermost of the Wādī Ḥisbān trio of sites. Littering the top of the terrace, numerous burnt and multi-coloured pieces of chert debitage were found scattered within 600-800 square metres. Excavations uncovered three hearths consisting of groups of burnt pebbles (Edwards *et al.* 1999). Around and below these were distributed lithics of Natufian type animal bone fragments, and other artefacts.

Chronology

Wādī al-Ḥammeh 27 is securely dated within the Early Natufian, at ca.12,000 b.p., by three dates taken from charred seeds lying on the upper phase floor. However, an attempt to date charcoal from the lowermost levels of the site in Structure 1 resulted in the anomalously late date of 9,350 b.p. (TABLE 1). Wādī Khawwan 1 is not yet dated, though a sample of *Melanopsis* from a locality across a shallow gully in the same travertine cap gave a date of 11,620 b.p., which is at present the best approximation for the site.

A date from the terrestrial gastropod *Xeropicta vestalis* yielded a date of 12,950 ± 140 b.p. for the middle layers of Wādī Ḥisbān 6. This determination is early, even for an Early Natufian site, however determinations of a similar antiquity have been found from widely-spaced Natufian sites, for example 12,950 b.p. for the basal layer at Mughārat al-Wād (Weinstein-Evron 1991), 12,800 - 12,100 b.p. for the Wādī Judayid (J2) site (Henry 1995:321) and 12,900 - 12,100 b.p. for Bayḍa (Byrd 1989:26). A radiocarbon determination was run on the collagen fraction of burnt bone from Locus 4.3, yielding a determination of 5,740 ± 220 b.p. (ANU-9406), once again far too recent. Two AMS dates from charcoal are modern, probably having filtered down from recent hearths built over the site.

A series of *Melanopsis* samples from the Wādī Ḥisbān sites, Wādī Khawwan 2, and the deepest deposits of Wādī al-Ḥammeh 27 await analysis, and these should assist in resolving dating ambiguities. The freshwater gastropod *Melanopsis praemorsa* inhabits freshwater springs and slow-moving water bodies, and is therefore readily incorporated into the types of sediments that contain archaeological sites. The molluscs congregate in colonies and so die in large enough numbers to make their retrieval convenient. Because they exist in fluvial conditions only, their presence in the tops of the Wādī al-Ḥammeh and Wādī Ḥisbān terraces now perched high above the watertable, guarantees the samples' contemporaneity with the deposition of those sediments.

Palaeoenvironment and Subsistence

All the open-air Natufian sites are embedded in the up-

permost deposits of terraces, which were subsequently incised to a new base level after the fall in level of Lake Lisan. In Wādī al-Ḥammeh, this occurred at 11,000 b.p., when the erosion was profound enough to sculpt the landscape into a series of steep ridges and cliffs high above the deep, narrow wadis. In all the wadi systems described here, and several others along the eastern valley, the uppermost terrace sediments are terminal Pleistocene, marking the disappearance of Lake Lisan and the creation of a dramatically different, fertile and utilisable Jordan Valley floor.

Wādī al-Ḥammeh 27 yielded a broad suite of faunal remains, including aurochs, *Equus*, Red deer, Fallow deer, Roe deer, pig, sheep/ goat, wolf, cat, fox, tortoise, crab and a variety of birds. Plant remains comprised nineteen taxa, including wild barley (*Hordeum spontaneum*), a goat-face grass (*Aegilops*), pistachio, lentil and several 'weeds' which inhabit disturbed ground (Colledge 1994:160-161). Additionally, Frances McLaren (pers. comm. 1998) has recently discovered evidence for emmer residues on the ends of Wādī al-Ḥammeh 27 basalt pestles. The other sites are much more restricted in subsistence remains: Wādī Khawwan 1 yielded a small number of gazelle and crab remains.

Assemblage Characteristics

Wādī al-Ḥammeh 27 possesses a rich and varied repertoire of artefacts in chert, limestone, basalt, animal bone, ochre and shell. The flaked stone industry (over 421,000 pieces) features small cores, sometimes heat-treated, from which short flakes were produced, as well as larger cores used to produce tranche axes, picks, large scrapers, retouched flake and blades, and a great variety of burins: dihedral, on truncation, and on natural surfaces. The smaller bladelet tools are dominated by Helwan lunates and Helwan bladelets. Hundreds of the latter bear silica sheen on their working edges. Remains of 275 artefacts made from imported basalt occur, which include mortars, pestles, querns, grindstones, shaft straighteners, hammerstones, plates and bowls - some of the latter extremely diminutive in size (Edwards 1991). The locally abundant but less resistant limestone was used less frequently to perform these utilitarian functions (91 specimens). But limestone, and occasionally siltstone, was most important as the medium in which incised representations were carved. These range from the very large (three incised slabs installed as part of a wall) to small plaques and fragments, covered with a variety of geometric designs. Animal bone was utilised to fashion many tools: sickle hafts whittled into a variety of shapes and sizes (47 specimens), bone points (56), and a smaller number of needles and spatulas. Bone was also used to make a variety of pendants and beads (40 specimens). Gazelle phalanges were preferred to fashion perforated beads (also 40

cases). A small number of animal and bird representations were portrayed in all media: basalt, limestone and bone (Edwards n.d.).

The smaller sites lack the artefactual abundance and variety of Wādī al-Ḥammeh 27, yet they contain echoes of it. Wādī Khawwān 1 yielded, in addition to flaked stone and fauna, a few specimens of basalt, decorated limestone, ochre, imported *Dentalium* shells and a modified human tooth (Edwards *et al.* 1998).

Wādī Ḥisbān 6 knappers utilised a range of coloured cherts, and occasionally quartzite. As at Wādī al-Ḥammeh 27, there is evidence for heat-treatment of cores. Retouched artefacts include a single scraper, a few backed lunates, a triangle, a trapeze, backed and straight-truncated bladelets, and a few obliquely-truncated bladelets. There were additionally *Dentalium* shells, ochre, and a small, roughly-hewn limestone bowl. Noticeably, the large flaked stone tool kit comprising axes, picks, large scrapers and large burins are always absent at the smaller sites which lack architecture.

Is the East Jordan Valley Epipalaeolithic a Distinctive Cultural Variant?

The Early Epipalaeolithic in the east Jordan Valley resembles the northern Palestinian Epipalaeolithic more than it does the major Jordanian Epipalaeolithic regions of the al-'Azraq Basin and Rās an-Naqab, located to the east and south respectively. Even then it differs distinctly from the surrounding regions in its narrow conformity to assemblages of gracile, straight-backed and obliquely-truncated bladelets, the occasional proto-trapeze, and general lack of microburin technique. The Wādī al-Ḥammeh sites lack arched backed bladelets, micropoints, Falita Points, and La Mouillah points, which occur in surrounding sites such as Ohalo II (Nadel 1990: 53-56; Nadel and Hershkovitz 1991), Uwaynid 14 and 18 (Byrd 1988), Kharaneh IV (Muheisen 1983) the Wādī Fazeel group of sites (Goring-Morris 1980), Urkan-e-Rubb (Hovers and Marder 1991) and Ṭor aṭ-Ṭariq in Wādī al-Ḥasa (Neeley *et al.* 1998).

Byrd (1998:71) raises the important issue of whether Wādī al-Ḥammeh appears typologically restricted because of small assemblage sizes. Wādī al-Ḥammeh does exhibit considerable functional variability: one site possesses mostly backed bladelets, another scrapers and burins, and another pointed bladelets. The issue is more a question of the *sites* being small, not the samples, which are quite large in a proportional sense. This is because sample size is reckoned in relation to the target population under investigation, and in two cases (WH 31 and WH 51) almost the entire site was excavated, giving a sample approaching 100 %. Perhaps 50% of WH 26 was excavated, and in the case of Wādī al-Ḥammeh 50, four cubic metres were excavated from a site area totalling 25-50 m². A

profitable study could indeed be made of the relation between assemblage size and variability. Still, when we consider that eight Early and Middle Epipalaeolithic sites in Wādī al-Ḥammeh and Wādī Ḥisbān have been excavated, represented by tens of thousands of lithics, it seems likely that arched backed bladelets or other types are really absent, rather than present but never found.

With the onset of the Middle Epipalaeolithic, we see an intriguing enhancement of assemblage variability and typological instability. There are, for example, the pointed bladelets of Wādī al-Ḥammeh 50, and the approximately coeval Triangle industry of Wādī Ḥisbān 2, which is followed by the markedly different Geometric Kebaran of Wādī Ḥisbān 5. Wādī Ḥisbān 2 is similar to sites as widely separated as Jilat 6, Upper Phase (Byrd 1989) and Ein Gev IV (Bar-Yosef 1970: 126-130). Wādī Ḥisbān 5 may herald the appearance of an early facies of the Geometric Kebaran, given that a proto-trapeze phase is suspected to precede the sites with shorter, wider trapeze-rectangles. To distinguish whether this is a regional or temporal variation (Bar-Yosef 1981; Kaufman 1988) will await a more secure dating of Wādī Ḥisbān 5.

Steps Toward Sedentism: Settlement Patterns from 20,000 to 11,000 years ago

The Wādī al-Ḥammeh sites present a remarkable contrast to the 'mega-sites' of the al-'Azraq Basin. The former were deposited relatively quickly, and covered by sediment relatively quickly. Some of them may correspond to single visits and others to repeated occupations made over many years. On the other hand, the 'Azraq mega-sites accreted over millennia, with some intervening sediment likely deflated, resulting in packed concentrations of artefacts. Therefore, the rich assemblages which accrued reflect a conflation of long-term cultural activities, whereas the Valley terrace sites reflect comparatively short-term accumulations. A remarkable contrast then emerges between the pattern of small, ephemeral and widely-spread camp placement within a general locale in Wādī al-Ḥammeh, and the specific re-occupation of a series of specific points in the eastern desert.

The Wādī al-Ḥammeh pattern continues throughout the Middle Epipalaeolithic. In the Late Epipalaeolithic, it is replaced by a system of large Early Natufian base-camps exhibiting greatly increased architectural elaboration and site stability, as well as the small, ephemeral sites. The latter, however, now share in the novel artefactual richness of the larger Natufian sites, and also in their attestation of long-distance exchange links. The small sites may represent camps occupied in the course of radial foraging trips from the larger home bases, or alternatively occupied during periods of extended, seasonal absence from these larger sites.

Naturally, all the eastern valley sites are by definition

lowland ones. In light of several current models of Epipalaeolithic mobility and transhumance, a final issue requires attention: how far did the lakesiders roam, and where did they go? The logical thought is that they ascended the nearby Jordanian Plateau to the east. In summer the Jordan Valley is oppressively hot, and while the springs persist in flowing, the vegetational cover is largely burnt off. When we consider that the Mediterranean forest and its resources lay only a few kilometres away in temperatures up to 8 degrees cooler, the answer seems obvious. However, we are at this stage hampered in our efforts at reconstruction by an almost complete lacuna in evidence for the uplands, and the site-rich alluvial fans of the Jordan Valley are unlikely to be matched by corresponding sequences in the highlands. However, Ṭabaqat al-Būma, located at ca. 200 m a.s.l. on a natural route to the eastern plateau, and nestled in hills reaching 400 m, provides the confirmation that Epipalaeolithic groups did, as expected, forage into the highlands.

It seems significant though that, unlike other regions, not a single marine mollusc or imported item has been recovered from any of the eastern valley Early and Middle Epipalaeolithic sites, suggesting that Lake Lisan presented a barrier to western contacts. On the other hand, *Dentalium* shells suddenly occur in all the Natufian ones. These, together with the imported basalt, and a shared symbolic repertoire between Wādī al-Hammeh 27 and 'Ayn Mallāḥa, indicate expanded contacts in the Late Epipalaeolithic.

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