

RESCUE EXCAVATIONS AT EPIPALAEOLITHIC 'AYN QASSIYYA: REPORT ON THE 2005 SEASON

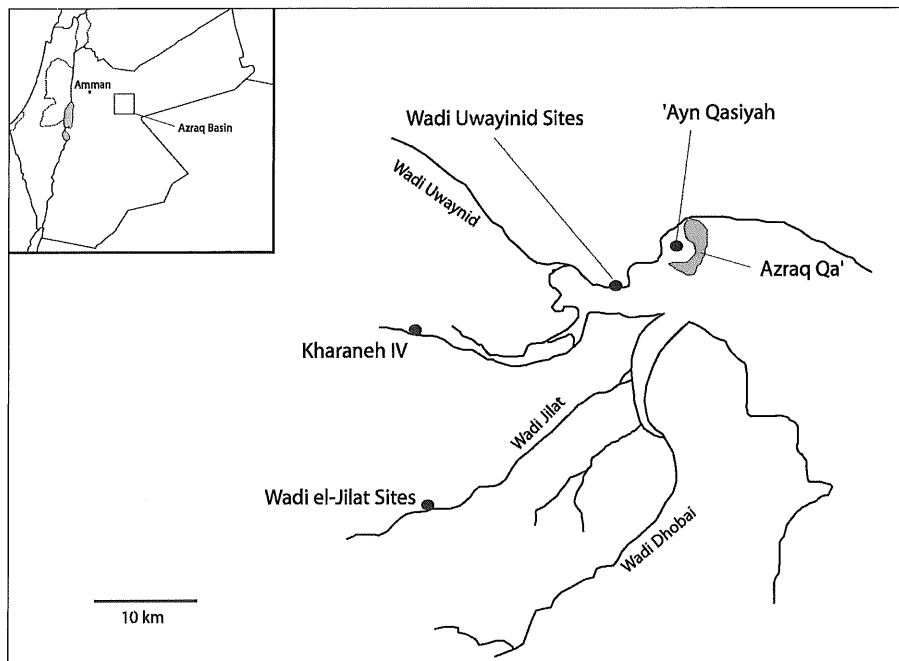
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Introduction

This report presents the results of the 2005 excavation season at the early Epipalaeolithic site of 'Ayn Qaṣiyya, which is situated in the Azraq Wetlands Reserve in eastern Jordan (Fig. 1). The site was first described by Gary Rollefson, Leslie Quintero and Philip Wilke (Rollefson 2001). It features rare organic preservation conditions, which can potentially provide important insights into subsistence and settlement patterns, palaeoclimatic conditions around the last glacial maximum in the al-Azraq Basin and the nature and speed of socio-cultural changes during the early Epipalaeolithic period.

Prehistoric research in the al-Azraq Basin has a long history, beginning with Waechter's expeditions to the Wādī Dhubbāyy (Waechter 1938), which was followed by more cursory investigations later on by Zeuner (Zeuner 1957)

and Field (Field 1960). Since the late 1970s and early 1980s a number of key research projects have investigated a range of prehistoric sites in and around the al-Azraq Oasis (Byrd 1988; Copeland and Hours 1989; Garrard 1998, Garrard *et al.* 1988, 1994, 1996; Garrard and Byrd 1992; Rollefson 1983; Rollefson *et al.* 1997, 2001), as well as in the Wādī Kharrāna (Muheisen 1988a, 1988b) and further east in the basalt desert (Betts 1988, 1991, 1998). This work demonstrated that the al-Azraq Basin was an attractive location for human groups throughout the Pleistocene. The late Pleistocene in particular is represented by a fairly high density of larger and smaller Epipalaeolithic sites; some of which are unusual in comparison to Epipalaeolithic occupations elsewhere in southwest Asia (Byrd 1988; Garrard and Byrd 1992; Muheisen 1988a, 1988b). Some of these, such as Kharrāna IV (Muheisen



1. The al-Azraq Basin with associated Epipalaeolithic sites.

1988a, b) and Wādī Jilāt 6 (Byrd 1988; Garrard 1991, 1998; Garrard *et al.* 1988, 1994) are large, open-air occupations which, although deflated, have been recognized as particularly important Epipalaeolithic camps representing localities in the late Pleistocene landscape that were repeatedly revisited. A number of smaller Epipalaeolithic sites were also documented in the Wādī 'Uwaynid ('Uwaynid 14, 'Uwaynid 18) and the al-Azraq Oasis (Azraq 17, Azraq 18, Azraq 32; Garrard 1991, 1998; Garrard *et al.* 1988, 1994, 1998), while sites further east along the Basin periphery date to the late Epipalaeolithic (Betts 1991, 1998). The chronological range and relative wealth of Epipalaeolithic sites in the al-Azraq Basin has produced a long and almost continuous history of the use of this landscape owing to the geographical importance and centrality of the al-Azraq Oasis. Although climatic conditions in the late Pleistocene, and particularly around the last glacial maximum, differed significantly from the modern day situation (Garrard 1998; Garrard *et al.* 1985, 1988), the al-Azraq Oasis's permanent supply of water and the lush micro-environmental situation seem to have provided an important focus point for human settlement in eastern Jordan. This special ecological situation provides an interesting area for prehistorians to test theories regarding the evolution from hunter-gatherer to farming communities in southwest Asia (Garrard *et al.* 1988: 311), in particular the long durée of socio-cultural changes in 'marginal' or special ecological situations.

Since the last major research into the Epipalaeolithic in the al-Azraq Basin was undertaken, our understanding of the role of early Epipalaeolithic communities in the evolution of food procurement practices in southwest Asia has significantly altered by the discovery and investigation of Ohalo II (Kislev 1992; Nadel 2002; Piperno 2004). This terminal upper Palaeolithic/ early Epipalaeolithic gatherer-fisher-hunter open-air site, on the western shore of Lake Tiberius, demonstrated that certain traits, which were previously thought to emerge with the late Epipalaeolithic (Natufian), were already to some degree present just after the last glacial maximum. Due to extended periods of water logging a rich prehistoric plant record was preserved at Ohalo II, which demonstrated the exploitation

of a wide range of cereal and fruit species by early Epipalaeolithic groups at the site (Kislev *et al.* 1992; Nadel 2002). In turn, this showed that unilineal models of cultural evolution, were difficult to maintain. Archaeologists had suggested a progression from early Epipalaeolithic hunter-gatherers with an immediate return economy, to late Epipalaeolithic (Natufian) gatherer-hunters with a delayed return economy, needed to begin to think differently about the nature and speed of socio-cultural changes during the late Pleistocene.

Although research in the al-Azraq Basin has demonstrated that 'marginal' (from a modern perspective) areas of the southern Levant featured more prominently in the cultural landscape of the late Pleistocene, the Epipalaeolithic evidence has so far rarely been contextualized with respect to the findings from Ohalo II. This is partially due to the generally poor preservation conditions prevalent in this now semi-arid and arid region. Micro- and macro botanical plant remains are almost totally absent from the archaeological record of the early Epipalaeolithic in the al-Azraq Basin. Only the early Epipalaeolithic levels of the upper phase of Wādī Jilāt 6 (dated between 16,700 to 15,470BP, Garrard *et al.* 1994) have produced the fragmented remains of chenopods, sedges and grasses (Colledge 2001; Garrard 1998; Garrard *et al.* 1988, 1994). Our current understanding of the plant exploitation strategies, during the early Epipalaeolithic phase in the al-Azraq Basin, is therefore still somewhat limited. It is therefore difficult to assess the nature of plant economies during the last glacial maximum in the region. This situation, in turn, makes it uncertain how similar or dissimilar procurement strategies, settlement patterns and socio-cultural developments in the al-Azraq Basin were to other parts of the southern Levant. Although it seems obvious that Wādī Jilāt 6 and Kharrāna IV, as well as other early Epipalaeolithic sites, are the result of short-term, perhaps seasonal, occupations — which probably relate to seasonal cycles on annual rounds — it is not clear how long, how specialized and how related these occupational events were. Therefore, much more research can be done in the al-Azraq Basin, particularly if undisturbed Epipalaeolithic sites are discovered, with better preservation conditions, favorable to the preservation of mi-

cro-botanical plant remains.

During a survey of the Azraq Wetlands Reserve in 2000 (Rollefson *et al.* 2001), a substantial prehistoric occupation was encountered along the northern wall of 'Ayn Qaṣiyya, one of the former artisan springs in the Azraq ash-Shishān area (Fig. 2). The site was contained in a dark carbonaceous palaeosol, which was very rich in organic matter, mainly made up of decayed plant remains, as well as high concentrations of material culture and animal bone. Rollefson *et al.* (2001) recognized the site in two localities where it was exposed in section. Chipped stone artifacts collected from the eastern part of the site suggested a likely date of ca. 19-16,000BP, while the western part of the site produced materials dating ca. 22-19,000BP. The carbonaceous nature of the deposits at 'Ayn Qaṣiyya as well as the preservation of abundant animal bones, including small avifaunal remains, suggested that the site had a high potential for the preservation of organic remains, such as seeds, phytoliths and organic material culture. These observations led Rollefson to conclude that " 'Ayn Qaṣiyah offers a lucid understanding of the exploitation patterns of the el-Azraq marshes by Epipalaeolithic groups" (Rollefson *et al.* 2001: 79).

In 2004 the directors of the Azraq Wetlands Survey project, Gary Rollefson, Leslie Quintero and Philip Wilke, revisited 'Ayn Qaṣiyya and found that the sections where the site was ex-

posed were partially eroded and dried out. Ongoing water extraction from al-Azraq area had increased rates of desertification, contributing to accelerated erosion. 'Ayn Qaṣiyya's naturally protected organic preservation conditions, as well as the integrity of the archaeological deposits were now threatened. Meaning that the opportunity to understand more about the exploitation of the Azraq marshes by Epipalaeolithic groups, through the study of preserved organic remains was endangered. The project, that is the subject of the present report, was set up as a research driven rescue excavation, to understand the use of the al-Azraq Oasis landscape by early Epipalaeolithic hunter-gatherers in more detail before this information is lost. In October 2005 the first stage of this project began its investigations at 'Ayn Qaṣiyya, undertaking recording work and some small-scale rescue excavations. The chance to recover micro-botanical plant remains, small mammal and avifaunal remains, a wealth of associated environmental data and perhaps organic material culture, in conjunction with abundant chipped stone artifacts, other faunal remains and abundant materials for radiometric dating from an *in situ* early Epipalaeolithic site situated in the Oasis, represents a unique opportunity in the context of late Pleistocene research in Jordan and across the southwest Asia. The findings of the 2005 season have strengthened the belief that the site does have a high potential for providing these sets of data.



2. 'Ayn Qaṣiyya looking Northwest across the site. To the left is the pool of the extinct 'Ayn Qaṣiyya spring.

Aims of the 2005 Field Season

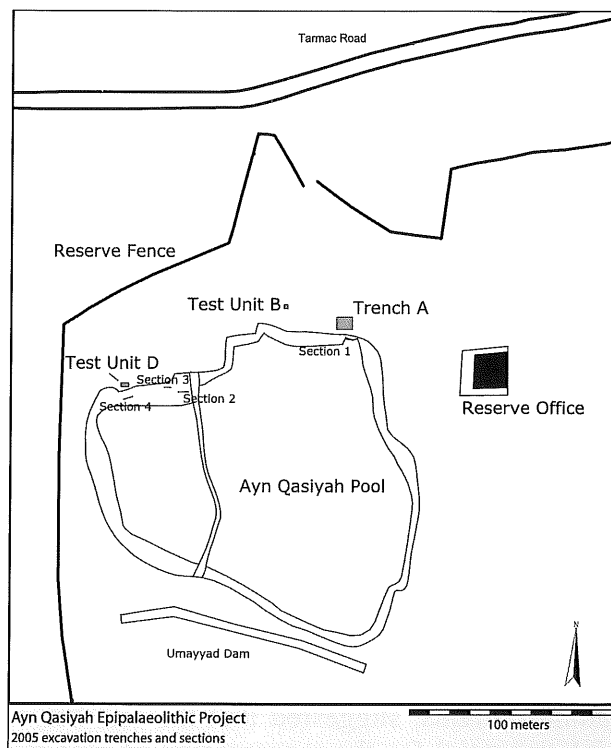
The 2005 field season was designed as a preliminary test season, aiming to assess the site's preservation conditions, which would enable us to plan further fieldwork seasons. While previous fieldwork had preliminarily documented and described the areas in which the site was already exposed, detailed drawings and photographs of these exposures had yet to be made. In addition, an effort was to be made in the 2005 season to record further areas in which the site may be visible along the northern edge of the 'Ayn Qasiyya pool.

Due to the previously described disintegration of the archaeological deposits at the site, a further aim of the 2005 season was to understand the current state of the organic preservation of the site and to verify the horizontal extent of the archaeological deposits. Although the site had been recognized by surface finds that had eroded from the exposed sections, the understanding of the horizontal extent of the Epipalaeolithic occupation could only be estimated based on other sites in the al-Azraq Basin. The anticipated good preservation conditions also offered a chance to recover organic remains suitable for an initial radiometric dating of the site.

Lastly, while surface collections had produced chipped stone artifacts in rich quantities, an increased sample size, derived from controlled excavations, would further allow the site to be placed into a relative chronological horizon based on a comparison with the lithic material from other early Epipalaeolithic sites in the area.

Fieldwork Strategy and Methods

The fieldwork strategy had a double emphasis, focusing on the one hand on the already exposed stratigraphic sequence, as well as the excavation of small areas to the north of these exposures (Fig. 3). Two sections found during the 2000 survey were carefully cleaned, photographed, drawn and described to gain a full record of the exposed stratigraphy (Figs. 4 and 5). The use of water sprayers dramatically increased the visibility of the deposits and allowed us to delineate various archaeological and natural deposits in better detail. In addition to the two identified exposures two further sections were cleaned and recorded between what were



3. Plan of the 2005 excavations and recorded sections.

termed by Rollefson *et al.* (2001) locality I and locality II (Fig. 3). Although not continuous, the four recorded sections provided a fairly good cross-section through the geo-archaeological situation at 'Ayn Qasiyya.

In addition to the recording of these four sections three areas of excavation were opened. Trench A was placed immediately to the north of section 1 (locality I) and was the largest excavation area of the 2005 season, measuring 3x4 meters. This excavation trench targeted an area where particularly high concentrations of animal bone and material culture were noted in section 1.

Two further test units (Test Unit B and Test Unit D) were opened to the west of trench A. Test unit B was a small sounding of 1x1 meters, while test unit D measured 2x1 meters. Test unit D was placed close to section 4 (locality II) to verify the depth of the overburden and test the nature of the archaeological deposits in this part of the site. Both test units were also used to verify the extent of the Epipalaeolithic site and to understand the conditions of the deposits lying under the topsoil. It was hoped that the exposure of the underlying carbonaceous paleosol could verify the condition and state of organic



4. Section 1, camera looking north.



5. Section 3, camera looking north.

preservation in these deposits.

Following the removal of the topsoil, excavations proceeded using a 1x1 square meter grid system as the basis for plotting finds distribution and controlling micro-stratigraphic excavation units in arbitrary spits. The recoding of definable archaeological layers and features and their description relied on the conventional system of single context recording, following the system established by the Museum of London Archaeology Service (Westman 1994), using minor alterations. A total station was used for a more

thorough plotting of the distribution of finds, as well as the general mapping of the site and the excavated areas. All excavated soil from deposits below the topsoil was wet sieved using 5mm and 2mm screens. Soil samples were taken from every square meter for flotation, micro-stratigraphic and chemical analysis.

Geoarchaeological Sequence

From our observations of the deposits visible in sections #1-4 a basic stratigraphic sequence could be delineated, which provides us with an

initial understanding of the establishment of the Epipalaeolithic site and the nature of the prehistoric occupations (Figs. 4, 5, and 6). The simplified, basic stratigraphic sequence, based on individual stratigraphic units (summarized in Table 1), at 'Ayn Qasiyya as visible in sections #'s 1-4 can be outlined as follows:

Topsoil

Either composed of a very cemented breccia deposit or an aeolian silty sand deposit. In both cases material culture indicates a fairly recent deposition. Modern glass and metal is mixed with classical pottery fragments and prehistoric chipped stone artifacts. This horizon is between 20 and 40cm strong.

Carbonaceous Paleosol/ Peat

Below the topsoil follows a dark brownish-black deposit which is rich in organic matter,

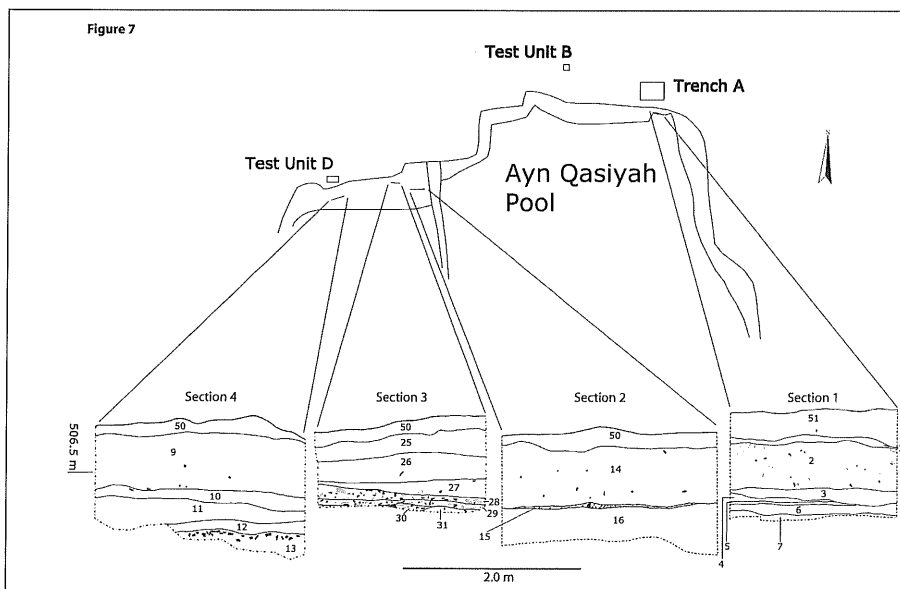
composed of decayed plant remains. Both the colour and character of this deposit, as well as modern conditions in the rejuvenated wetlands area, suggest that this deposit was waterlogged for extended periods of time. This deposit is between 40 and 50cm thick and is present in all of the section.

In section 1 this layer contains numerous chipped stone artifacts and fragments of animal bone, but in sections 2, 3 and 4 this layer displays much lower concentrations of finds; to the extent that it can be described as almost sterile. In sections 2 and 3 in particular the absence of finds in relation to the underlying deposits (unit 3) is very characteristic. The materials recognized in this layer in section 1 do not display any clear order or sorting, but appear to be fairly 'jumbled up'.

This deposit is a highly valuable resource for the collection of abundant palaeoenvironmen-

Table 1: Summary table of the stratigraphic contexts into major stratigraphic blocks.

Major stratigraphic unit	Stratigraphic Unit Type	Context No.
1	Topsoil	50, 51, 1
2	Carbonaceous paleosol/ peat	2, 14, 25, 26, 27, 9
3	Surface horizon/ occupation areas	15, 28, 29, 30, 31
4	Marsh/ standing water deposit	3, 4, 5, 6, 16, 10, 11
5	Basin marls	7, 12
6	Shore deposit	13



6. The section drawings leveled at 506.5 meters and correlated with the site plan. Fig. 3: 'Ayn Qasiyya section locations and section drawings. Sections levelled at 506.5 meters.

tal information ranging from carbonized seeds, pollen, and phytoliths, to micro-faunal and sedimentological data.

Surface Horizons

In sections 2 and 3 further layers are distinguishable underlying the paleosol (unit 2). In section 2 a thin, straight band of chipped stone artifacts runs through the section directly overlying the marsh/ standing water deposit below (unit 4). This appears to be a surface horizon, which indicates an *in situ* situation of the Epipalaeolithic site. In section three a series of overlapping layers with high concentrations of chipped stone artifacts and animal bones were recognized, which seem to represent a number of different occupational events, as well as episodes of erosion. The surface in section 2 averages 3-4cm in thickness, while the concentrations of material culture and animal bones have a maximum thickness of about 30cm in total.

Marsh/ Standing Water Deposit

Below layer #3 in section 2 and 3, as well as below the palaeosol in section 1 and 4, follows a mid-greenish grey fine silty clay which results from standing water formation. It indicates the presence of marshy, wet conditions on top of which the Epipalaeolithic occupations were established. A gradual incline of this deposit, visible in the sections, suggests a recession of the marsh from west to east, which probably reflects contractions of the pool/ marsh in prehistory. It is likely that micro-stratigraphic analysis of this deposit will reveal a series of micro-scale depositional processes, which will also provide vital environmental information regarding the depositional history and prevailing climatic conditions. It is likely that these deposits also contain other microscopic and macroscopic remains, such as molluscs, pollen or phytoliths, which may provide further sets of palaeoenvironmental data.

Basin Marls

Most recognizable in section 1 and 4 this medium brown fine sandy silt lies below the marsh deposit. It consists of a series of bands, which would have been deposited as part of a low-energy, slow aggregational process, typical of lake/ pool bottom situations. The fine sub-divi-

sion of this deposit can provide vital information about rates of deposition and rates of precipitation, providing vital sets of climatic data. The thickness of this deposit reaches about 30cm in section 4, but is probably much thicker further east.

Shore Deposit

This deposit was only recognized in section 4. It consists of a series of thickly packed medium and small sized rocks, which are of an angular and sub-angular nature. The deposit reaches ca. 20cm in depth. Given the nature of the overlying deposit, which was interpreted as a basin accumulation horizon, it seems reasonable to suggest this layer represents a shore deposit where higher energy erosion has contributed to the deposition of fairly large clasts and rocks. This layer is mixed with Middle Palaeolithic Levallois artifacts, which are residual.

The differences noted between the composition of the carbonaceous paleosol in section 1 and those in section 2 and 3 suggests that the presence of material culture and animal bones in the peat deposit in section 1 is the result of erosion. This is supported by the unstructured appearance of the material culture in section 1. In sections 2 and 3 the situation is somewhat different, as it seems that *in situ* surfaces and areas are present, although erosion events can also be recognized in section 3. It is unclear at present where the materials in section 1 have been eroded from, but the fresh (sharp) nature of the chipped stone artifacts suggests that lateral movement has been minimal. A correlation of the four recorded sections indicates a fairly clear and continuous geo-archaeological sequence. Several Epipalaeolithic occupations were established on top of a wet, marshy ground that succeeded a prehistoric standing body of water, which was probably analogous to the modern deposition processes encountered in the wetlands reserve today. An incline of the deposits can be noted, with a gentle slope falling from the west towards the east, which suggests a gradual lateral movement of the marsh edge from west to east. Although the typology of the chipped stone artifacts from section 1 (locality I) and section 4 (locality II) and their suggested time range from 19-16,000BP uncal. and 22,-19,000BP uncal. (Rollefson *et al.* 2001), is only a coarse dat-

ing indicator, they nevertheless seem to support this view. The vertical stratigraphic sequence is therefore further informed by a horizontal stratigraphy.

Excavations

Trench A

Excavations in trench A exposed the top of the Epipalaeolithic site across a 12m² area (**Fig. 7**). Following the removal of a very firm, concreted breccia deposit, the underlying dark brown carbonaceous paleosol was encountered 30-40cm below the modern surface. This peat horizon produced rich quantities of chipped stone artifacts and animal bone, but no modern material culture, suggesting that the Epipalaeolithic deposits have remained more or less sealed. Again, no clear structure or orientation could be noted in the finds distribution; mirroring the situation observed in section 1. It seems therefore even more likely that finds in this area are eroded from a different part of the site. However, the chipped stone artifacts are fresh with sharp edges suggesting limited lateral movement. No features such as hearths, post-holes or pits could be recognized in the excavated area. It was recognized during excavation that the exposed paleosol remained fairly firm and was difficult to excavate. The clay content of this deposit appeared to be fairly high, and it seems plausible that the exposed area is a transitional horizon between the topsoil and further layers of peat below. It appears that the overlying breccia deposit may have leached out into the underlying deposits resulting in a fairly cemented and firm compaction. A much softer and loose de-

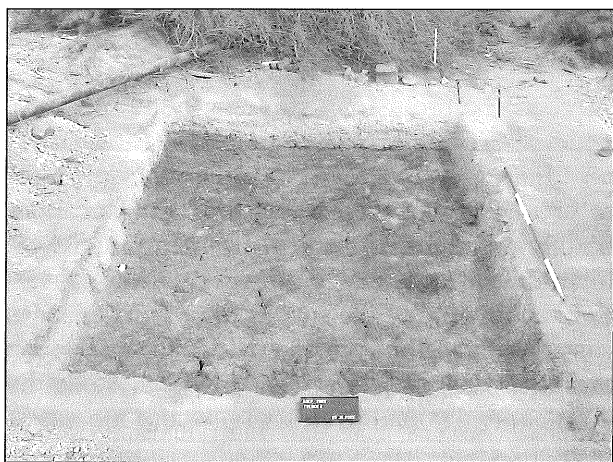
posit was recognized in squares E984/ N1004 and E985/ N1005, which was more reminiscent of the deposits found in section 1. Crucially, in these square meters the topsoil was not a breccia deposits, but by an Aeolian sand-silt deposit, which may be responsible for the softer composition of the paleosol in this area.

Test Unit B

This 1x1 meter test trench was situated ca. 10 meters to the west of trench A (see **Figs. 3, 8**). It was excavated down for a depth of 0.5 meters until the paleosol was encountered. Numerous chipped stone artifacts as well as animal bone fragments were recovered from this excavation. In this test unit the peat/ paleosol was iron stained and in a very fresh condition. The patchy iron-staining, which was dark reddish brown in colour, suggested a high lepidocrocite content in this deposit, indicating anaerobic conditions. However, this assessment is awaiting further chemical testing for verification

Test Unit D

Test unit D was situated at the western edge of the site, atop section 4 (see **Fig. 3**). It targeted the area that was labeled 'locality II' by Rollefson (Rollefson *et al.* 2001), to verify the nature of the peat horizon here. The unit measured 2x1 meters and was excavated to a depth of ca. 0.4 meters. Concentrations of chipped stone artifacts and animal bone were much lower compared to trench A and test unit B. A fairly loose version of the paleosol was encountered at a depth of 0.4 meters. The much lower artifact concentrations in this location and the nature of the sub-surface



7. Trench A after the removal of the topsoil.



8. Detail of the carbonaceous paleosol in Test Unit B.

deposits suggested that the site was either buried deeper here or that the site did not extend this far west. Root disturbance in this unit was substantial.

The three small-scale excavations at 'Ayn Qaşıyya demonstrated that the site has a width of at least 10 meters extending north of the 'Ayn Qaşıyya pool and that the nature of the sub-surface deposits generally displayed a rich organic and humic content indicating anaerobic conditions. Given this assessment it appears that the preservation conditions at the site are exceptional, although dryness does appear to begin to affect the buried paleosol. Chipped stone artifacts appeared almost exclusively fresh and not rolled, suggesting that they were either *in situ* or at least redeposited very close to their original place of deposition. Although no features such as hearths, pits or post-holes were encountered during excavation, it seems that the presence of a number of surfaces in section suggests that in other locations such features are likely.

Finds

Section cleaning and the excavations produced an assemblage of material culture which is dominated by chipped stone artifacts. Below we provide a brief summary of an initial assessment of the assemblage.

Chipped Stone Artefacts

A total of 5,259 artefacts were recovered from the excavations. The vast majority (4,778, 90.8%) were recovered from Trench A. As the materials from trench A represent the most abundant sample and are therefore the most diagnostic assemblage they will be the focus with in this report. **Table 2** indicates the subdivision

Table 2: Basic categorization of chipped stone artifacts from trench A.

Debitage Category	No.
Flakes	3645
Blades	147
Bladelets	212
Core Trimming Elements	21
Cores	6
Chunks	386
Retouched Pieces	391

of the Trench A assemblage according to basic debitage classes.

Knappers at 'Ayn Qaşıyya appear to have relied on a fairly restricted range of locally available flint sources, which are all of very good quality. The most abundant raw material is a black flint with a white cortex, which is very fine-grained and of very good quality. The dark colour of this raw material is, however, altered due to chemical weathering, which is the result of long-term deposition in water logged conditions. Grey and brown flint varieties also exist in the spectrum and are also frequently used. They also have good or even very good knapping qualities.

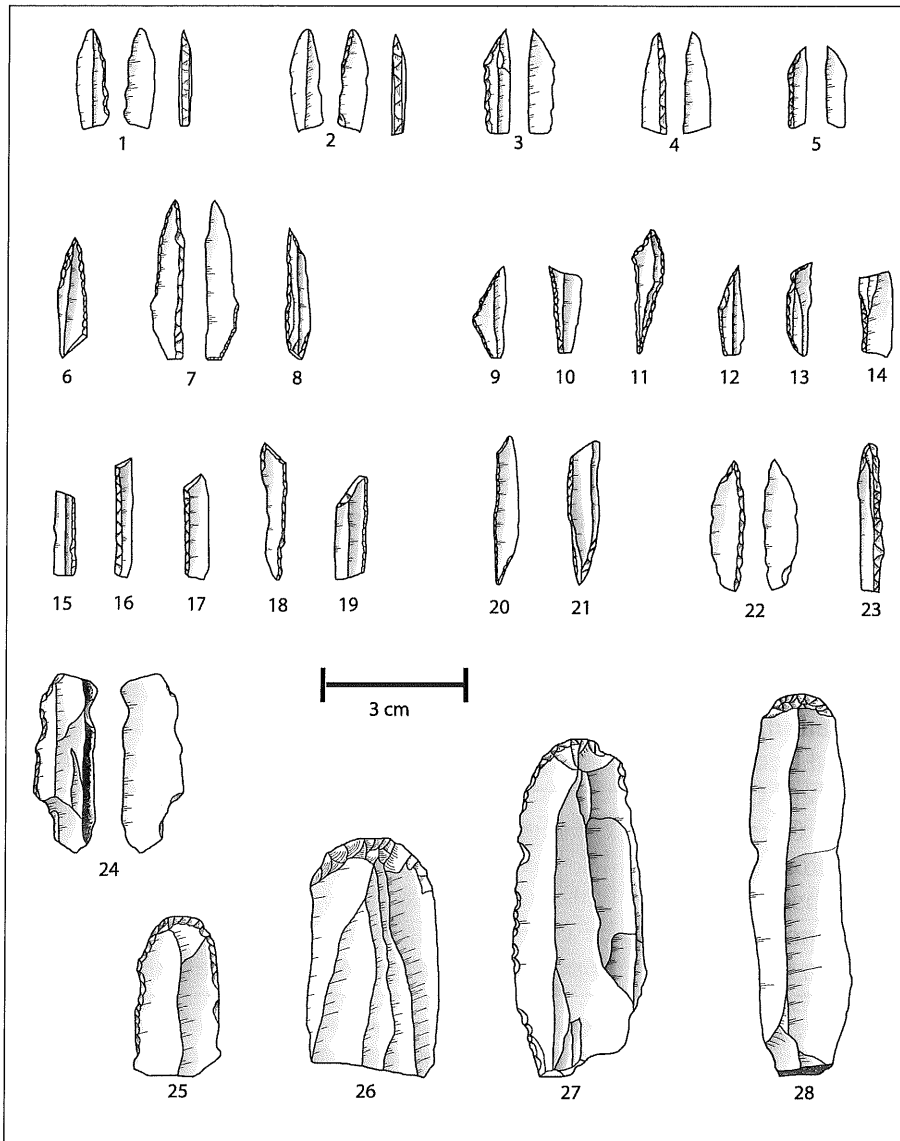
Although a high number of flakes were recorded in the 'Ayn Qaşıyya trench A assemblage, most of these were micro-debitage (**Table 2**). They are likely to relate to core maintenance procedures, preparation strikes, debris from grinding and shattering during the knapping process, rather than being an intentional product. From the presence of blades and bladelets it is clear that in most cases the reduction strategy was geared towards the production of small blades and bladelets. This is further supported by the intentional selection of blades and bladelets for retouched tools. Different reduction sequences for different types of tools have been described on other upper Palaeolithic and Epipalaeolithic sites in Jordan (Coinman 2004; Goring-Morris 1995: 151; Olszewski 2004). Some of these reduction sequences also produced discreet flake debitage relating to these core reduction procedures. It is therefore not unreasonable to assume that some of the larger flake debitage present in the 'Ayn Qaşıyya assemblage may relate to the production of non-microlithic artifacts. In general this precursory view of the technology of the 'Ayn Qaşıyya assemblage suggests that it is very similar to other early Epipalaeolithic industries found elsewhere in the Levant (Byrd 1988, 1994; Goring-Morris 1995), on a general level. Variations in the knapping procedures need to be considered in more detail once more secure deposits and larger samples are available.

The 391 retouched chipped stone artifacts (7.4% of the total AQ assemblage) recovered from trench A were categorized according to basic tool types (see **Table 3**). The most abundant types of artifacts were retouched flakes and non-

Table 3: List of basic tool categories in the chipped stone assemblage from trench A.

Tool Category	No.	%
Scrapers	21	5.3
Burins	16	4.1
Notches and Denticulates	10	2.5
Retouched Flakes	130	33.2
Retouched Blades	76	19.4
Truncations	6	1.5
Geometric Microliths	13	3.3
Non-Geometric Microliths	113	28.9
Varia	5	1.2
Total	391	100%

geometric microliths. Because the retouched flakes category included items that were not formally retouched but showed traces of utilization retouch, the non-geometric microlith class is more indicative of the purposeful shaping of flint into tools. Amongst the non-geometric microliths pointed bladelets with fine backing (Fig. 9, No. 1-8) and La Mouillah points dominate (Fig. 9, No. 15-19). There is some degree of variation amongst the pointed, backed bladelets and La Mouillah points, as pieces with basal modification and other minor variations exist. The vast majority of pointed bladelets and La Mouillah points correspond to the 'robust type' described by Byrd (1988, see also Garrard *et al.* 1994), which appears to relate to a slightly later phase in the early Epipalaeolithic.



9. Chipped stone artifacts from trench A. 1-2: backed bladelet, 3-6: pointed, backed bladelet, 7-8: pointed, backed bladelet with basal modification, 9: atypical triangle, 10: asymmetrical trapeze, 11: scalene bladelet with basal modification, 12-13: irregular lunates, 14: asymmetrical trapeze, 15-19: La Mouillah point, 20-21: La Mouillah point with basal modification, 22: curved, pointed bladelet, 23: backed bladelet, 24: notch, 25-26: endscrapers on blades.

Comparisons to the non-geometric microliths recovered from trench A can be found in the materials from Kharrāna IV phase B (Muheisen 1988), Wādī Jilāt 6 middle phase (B), and 'Uwaynid 14 upper phase (Byrd 1988; Garrard *et al.* 1994). Double truncated bladelets, present in the assemblages from 'Uwaynid14 upper phase and Wādī Jilāt 6 middle phase, appear to be much less common at 'Ayn Qaṣiyya, whereas burins are more common at 'Ayn Qaṣiyya than at 'Uwaynid14 upper phase or Wādī Jilāt 6 middle phase ('Ayn Qaṣiyya: 4.1%, Wādī Jilāt 6 middle phase: 2.7%, 'Uwaynid14 upper phase: 2.5%, see Byrd 1988). The higher ratio of burins at 'Ayn Qaṣiyya may at this stage simply be regarded as a sampling issue, although the higher level of their abundance could potentially relate to a more intense reutilization of waste materials as cores for the production of microlithic burin spalls. One AMS date from Wādī 'Uwaynid14 upper phase dates this assemblage to 18,900 \pm 250 BP (OxA-865), and generally confirms Rollefson *et al.*'s (2001), estimation of the age of locality I as falling between 19-16,000BP uncal.

Amongst the other tool classes scrapers are quite common (5.3%), with end-scrapers made on blades or bladelets being particularly evident. Many are distinctive Epipalaeolithic end-scraper forms, often made on long blades with very regular abrupt scraper retouch.

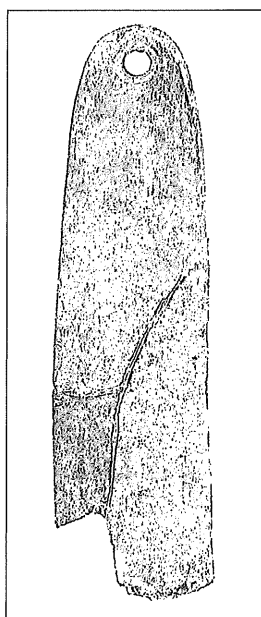
The presence of some geometric microliths is not generally surprising. Almost all are 'proto-geometric' forms (Bar-Yosef 1972). Although we cannot at this stage exclude the possibility that some of the geometric forms may be intrusive, from later phases of occupation at or near the site. It seems highly probable that the geometric microliths found in trench A are part of a more continuous fluidity between microlith forms, perhaps reflecting the limits of our typological classification schemes (Neeley and Barton 1994; Olszewski 2001).

Altogether the chipped stone assemblage from 'Ayn Qaṣiyya is similar to many other early Epipalaeolithic occurrences documented across the al-Azraq Basin, although the assemblage probably does not date to the final upper Palaeolithic/ early Epipalaeolithic phase in the region; at least not in the case of Trench A. Unfortunately, insufficient samples of materials, in

particular microliths, were obtained from Test Unit D and sections 2-4, to confirm the date of the western part of the site as terminal Upper Palaeolithic/ early Epipalaeolithic as suggested by Rollefson (Rollefson *et al.* 2001). Differences between 'Ayn Qaṣiyya and other al-Azraq Basin sites can be noted in the slightly less common occurrence of microliths in the assemblage, although the vast majority of the assemblage is microlithic (truncations and many retouched flakes are very small). Before assuming that the relative absence of microliths at 'Ayn Qaṣiyya is evidence that hunting was of less importance than at other sites adjacent to the Oasis (Byrd 1988), micro-wear analysis of a sample from the assemblage should first be undertaken.

Bone Artefacts

Bone artifacts are fairly rare on early Epipalaeolithic site across southwest Asia. Considering that the excavated area at 'Ayn Qaṣiyya is comparatively small the recovery of two bone artifacts in the 2005 season has to be seen as an indicator of the well-preserved nature of this site. One bone 'spatula' was recovered from the surface horizon (context 15) in section 2 during cleaning (Fig. 10). A broken bone point was found in square E985/ N1004 in trench A, deriving from the carbonaceous paleosol. The date of the bone 'spatula' cannot at present be confirmed as early Epipalaeolithic, as the context from which it derives has not been excavated but only documented in section; nevertheless it



10. Bone 'spatula' found during the cleaning of section 2.

appears that this a fairly rare item for an early Epipalaeolithic site. Bone spatulae are known from the late Epipalaeolithic (Natufian) at Kebara cave layer B (Phillips 1998) and from 'Ayn Mallaha (Valla). Should the date of the surface in section 2 be confirmed as early Epipalaeolithic by excavations, the 'Ayn Qaṣiyya bone spatula would be an unparalleled example of early Epipalaeolithic bone manufacture. The bone point on the other hand is a fairly conventional, if stubby, specimen, which has parallels at many other early Epipalaeolithic sites.

In the al-Azraq Basin bone artifacts have been recovered from the middle Epipalaeolithic levels at Kharrāna IV and at from the middle and lower occupational phase at Wādī Jilāt 6. The recovery of bone artifacts from 'Ayn Qaṣiyya suggests that further excavations may recover a fairly rich and perhaps diverse collection of bone artifacts in the future.

Ground Stone Tools

Two pieces of ground stone were found in association with the site, but none were recovered from deposits that would situate them securely within the Epipalaeolithic. The first piece was found in front of section 1 and perhaps fell there from the dark-brown site deposits further up in the section. It is a flat, small basalt slab with a slight hollow on the top. The other piece of ground stone derives from topsoil deposits in trench A and therefore can also be judged to be insufficiently stratified to allow it to be placed into the Epipalaeolithic time-frame. This piece consists of a small cupped piece of basalt.

Animal Bone

Numerous animal bone remains were recovered during the excavations and from the section cleaning. The vast majority of the bone is fragmented and was collected from the wet sieve. The fragmented nature of animal bone on the Epipalaeolithic sites in the al-Azraq Basin has been noted during the al-Azraq Basin Early Prehistory Project (pers. com. Louise Martin). At the time of writing, the analysis of the animal bones has not yet begun, but will be taken up in due course.

Botanical Remains

Extensive flotation of the excavated deposits

was conducted during the season, whenever deposits were deemed sufficiently secure. A number of samples were collected from the flotation, which will be analyzed by Sue Colledge in the course of 2006. Given the well-preserved nature of the animal bone and other finds at the site, as well as the anaerobic nature of the deposits, it seems likely that at least some micro-botanical remains can be extracted. It is likely, however, that the 2005 excavations did not reach a sufficient depth of deposit to ensure that uncontaminated deposits were reached.

No sizable quantities of carbonized seeds or charcoal were noted during the excavations, which also accounts for the lack of radiometric dates for 'Ayn Qaṣiyya at this stage.

Summary, Conclusions and Future Prospects

The 2005 rescue excavations at 'Ayn Qaṣiyya have shown that this Epipalaeolithic site consists of a series of overlapping occupations, which were probably a fairly short term affair, situated on the edge of a marsh and/or pool. The study of the exposed sections at the site appears to indicate that the occupations followed the lateral recession of the al-Azraq marshes, occupying a position relatively close to the edge of the marsh. Such a position in the marsh landscape would ensure access to a variety of resources, being situated perhaps at a transitional habitation zone. Reeds, water and waterfowl may have been procured from the nearby marsh and lake edge, while abundant game, wood and a variety of other plants occupied the shore-zone and those areas behind. In any case, it is clear that the wetlands would have provided a lush and rich environment for gatherer-hunters to exist in. It can be anticipated, however, that further studies of the geo-morphological situation will reveal a slightly more complex settlement history.

Judged by the nature of the documented deposits, the freshness of the lithic artifacts and the presence of two well preserved bone artifacts, it seems reasonable to suggest that the preservation conditions at 'Ayn Qaṣiyya are exceptional in the context of early Epipalaeolithic sites in southwest Asia. Although micro-botanical plant preservation at the site remains to be studied in detail, it seems probable that micro-botanical plant remains can be recovered from the 'Ayn

Qaşıyya sequence. Marsh deposits and lake marls found below the paleosol in some of the sections provide ample opportunities to study the environmental record of the al-Azraq Wetlands in more detail and to further the understanding of the climatic and ecological context of human settlement in the al-Azraq marshes.

Although no suitable samples for radiocarbon dating could be obtained during this season, some occupations of the site can be provisionally dated based on the recovered chipped stone artifact assemblage. The microlithic component suggests a likely date of the assemblage from trench A as around the 19-18th millennium BP. Detailed technological and functional studies of the chipped stone artifacts in the future will produce further evidence regarding the use and making of stone tools in the al-Azraq Basin during the early Epipalaeolithic. The organic preservation at 'Ayn Qaşıyya raises the potential of tying such studies in with fairly tight radiometric dating cluster, providing more insights into the evolution of late Pleistocene lithic and organic technologies.

Future work at 'Ayn Qaşıyya has to concentrate on exposing the site in large open-area excavations to understand the spatial set-up of this hunter-gatherer camp in more detail. Such excavations will ideally target areas where *in situ* deposits were recognized in the recorded sections. This will be supplemented by more detailed palaeoenvironmental work which can reconstruct past ecological and climatic conditions, as well as the exploitation of plants and animals in the Oasis. Overall, further work at 'Ayn Qaşıyya will be able to produce many important insights into the evolution of late Pleistocene hunter-gatherer groups in southwest Asia. Due to the good organic preservation at the site it may be possible to reveal a rich and distinguished micro-botanical assemblage, which can help us to explore the gradual evolution of plant economies in southwest Asia in a much more nuanced way.

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References

- Bar-Yosef, O.
1972 *The Epipalaeolithic Culture of Palestine*. Jerusalem, Hebrew University. Unpublished Ph.D. thesis
- Betts, A. V. G.
1988 The Black Desert Survey. Prehistoric Sites and Subsistence Strategies in Eastern Jordan. Pp. 369-391 in H.G. Gebel and A.N. Garrard (eds.),

- The prehistory of Jordan. The state of research in 1986.* Oxford: British Archaeological Reports International Series 396
- 1991 The late Epipalaeolithic in the Black Desert, eastern Jordan. Pp. 217-234 in O. Bar-Yosef and F.R. Valla (eds.), *The Natufian Culture in the Levant*. Ann Arbor: 217-234.
- 1998 *The Harra and the Hamad. Excavations and Surveys in Eastern Jordan, Volume 1*. Sheffield: Sheffield Academic Press.
- Byrd, B.
- 1988 Late Pleistocene Settlement Diversity in the Azraq Basin. *Paléorient* 14(2): 257-264.
- 1994 Late Quarternary hunter-gatherer complexes in the Levant between 20,000 and 10,000 B.P. Pp. 205-226 in R.S. Kra and O. Bar-Yosef (eds.), *Late Quarternary chronology and paleoclimates of the eastern Mediterranean*. Ann Arbor, Radiocarbon: 205-226.
- Colledge, S.
- 2001 *Plant exploitation on epipalaeolithic and early neolithic sites in the Levant*. Oxford: British Archaeological Reports.
- Coinman, N. R.
- 2004 The upper Palaeolithic of Jordan: new data from the Wadi al-Hasa. Pp. 151-170 in A. N. Goring-Morris and A. Belfer-Cohen (eds.), *More than meets they eye: studies on upper Palaeolithic diversity in the Near East*. Oxford: Oxbow Books.
- Copeland, L.
- 1989 *The hammer on the rock. Studies in the early Palaeolithic of Azraq, Jordan*. Lyon: Maison de L'Orient Mediterranéen, CNRS.
- Field, H.
- 1960 North Arabian Desert Archaeological Survey, 1925-1950. *Papers of the Peabody Museum, Harvard, Cambridge, Massachusetts* 45(2).
- Garrard, A. N.
- 1998 Environment and cultural adaptations in the Azraq Basin: 24,000 - 7,000 B.P. Pp. 139-148. in D.O. Henry (ed.), *The Prehistory of Jordan*. Oxford: British Archaeological Reports International Series 705.
- Garrard, A. N., Betts, A., Byrd, B.F., Colledge, S. and Hunt, C.
- 1988 Summary of the palaeoenvironmental and prehistoric investigations in the Azraq Basin. Pp. 311-337 in H.G. Gebel and A.N. Garrard (eds.), *The Prehistory of Jordan. The State of Research in 1986*. Oxford: British Archaeological Reports, International Series 396.
- Garrard, A. N., Baird, D. and Byrd, B.F.
- 1994 The chronological basis and significance of the late Palaeolithic and Neolithic sequence in the Azraq Basin, Jordan. Pp. 177-199. in S. Kra and O. Bar-Yosef (eds.), *Late Quarternary Chronology and Paleoclimates of the Eastern Mediterranean*. Ann Arbor, Radiocarbon
- Garrard, A. N., Harvey, P. and Hivernel, F.
- 1985 Prehistoric environment and settlement in the Azraq Basin. A report on the 1982 survey season. *Levant* 17: 1-28.
- Garrard, A. N., Colledge S. and Martin, L.
- 1996 The emergence of crop cultivation and caprine herding in the 'marginal zone' of the southern Levant. Pp. 204-226 in D. Harris (ed.), *The origins and spread of agriculture and pastoralism in Eurasia*. London: University College London Press.
- Garrard, A. N. and Byrd, B.F.
- 1992 New Dimensions to the Epipalaeolithic of the Wadi el-Jilat in central Jordan. *Paléorient* 18(1): 47-62.
- Goring-Morris, A. N.
- 1995 Complex hunter/gatherers at the end of the Palaeolithic. Pp. 141-167 in T. Levy (ed.), *The archaeology of society in the Holy Land*. London: Leicester University Press.
- Kislev, M. E., Nadel, D. and Carmi I.
- 1992 Epipalaeolithic (19,000 B.P.) cereal and fruit diet at Ohalo II, Sea of Galilee, Israel. *Review of Paleobotany and Palynology* 73: 161-166.
- Muheisen, M.
- 1988 The Epipalaeolithic Phases of Kharaneh IV. Pp. 353-367. in H.G. Gebel and A.N. Garrard (eds.), *The prehistory of Jordan. The state of research in 1986*. Oxford: British Archaeological Reports International Series 396.
- 1988 Le gisement de Kharaneh IV, note sommaire sur la phase D. *Paléorient* 14(2): 265-282.
- Nadel, D.
- 2002 *Ohalo II. A 23,000 year old fisher-hunter-gatherers' camp on the shore of the Sea of Galilee*. Haifa, Haifa University Press.
- 2004 The Ohalo II flint assemblage and the beginning of the Epipalaeolithic in the Jordan Valley. Pp.: 216-229. In Goring-Morris, A.N. and Belfer-Cohen A. (eds.) *More than meets the eye. Studies on upper Palaeolithic diversity in the Near East*. Oxford: Oxbow Books: 216-229.
- Neeley, M. P. et al.
- 1994 A new approach to interpreting late Pleistocene microlith industries in southwest Asia. *Antiquity* 68: 275-288.
- Olszewski, D. I.
- 2001 My 'backed and truncated bladelet', your 'point': terminology and interpretation in Levantine Epipalaeolithic assemblages. Pp. 303-318 in I. Caneva, C. Lemorini, D. Zampetti and

- P. Biagi (eds.), *Beyond Tools. Redefining the PPN Lithic Assemblages of the Levant*. Berlin: ex oriente.
- 2004 The conundrum of the Levantine late upper Palaeolithic and early Epipalaeolithic: perspectives from the Wadi al-Hasa, Jordan. Pp. 151-170 in A.N Goring-Morris and A. Belfer-Cohen (eds.), *More than meets the eye: studies on upper Palaeolithic diversity in the Near East*. Oxford: Oxbow Books: 151-170.
- Phillips, J. L., Belfer-Cohen, A. and Saga, I. N.
- 1998 A collection of Natufian bone artefacts from old excavations at Kebara and el-Wad. *PEQ* 130:145-153.
- Piperno, D. R., Weiss, E., Holst, I. and Nadel, D.
- 2004 Processing of wild cereal grains in the upper Palaeolithic revealed by starch grain analysis. *Nature* 430: 670-673.
- Rollefson, G., Quintero, L. and Wilke, P.
- 2001 Azraq Wetlands Survey 2000. Preliminary Report. *ADAJ* 45: 71-82.
- Rollefson, G. O.
- 1983 Two seasons of excavation at Ain el-Assad, eastern Jordan, 1980-1981. *BASOR* 252: 25-34.
- Rollefson, G. O., Schnurrenberger, D., Quintero, L., Watson, R.P. and Low, R.
- 1997 'Ain Soda and 'Ayn Qasiya: New late pleistocene and early Holocene sites in the Azraq Shishan area, eastern Jordan. Pp. 45-58 in H.G.K. Gebel, Kafafi, Z. and Rollefson, G.O. (eds.), *The prehistory of Jordan II. Perspectives from 1997*. Berlin: ex oriente.
- Waechter, J., Seton-Williams, V., Bate, D.M. and Picard, L.
- 1938 The excavations at Wadi Dhobai 1937-1938 and the Dhobaiian industry. *Journal of the Palestine Oriental Society* 18: 172-186, 292-298.
- Westman, A.
- 1994 *Archaeological Site Manual*. London: Museum of London.
- Zeuner, F., Kirkbride, D. and Park, B.
- 1957 Stone Age exploitation in Jordan 1. *PEQ* 89: 17-44.