Preliminary Results from Recent Excavations at the Epipalaeolithic Site of Kharaneh IV

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Published in:
Jordan's Prehistory

Publication date:
2014

Document version
Peer reviewed version

THE EARLY AND MIDDLE EPIPALEOLITHIC IN THE AZRAQ OASIS: FIELDWORK AT 'Ayn QAYSIYYA AND AWS-48

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Introduction

The Azraq Basin in eastern Jordan has been widely recognised as a crucial location for the study of Final Pleistocene hunter-gatherer groups. Previous fieldwork in the region has revealed a wide range of Epipalaeolithic occupations, suggesting that there was a high density of settlement and a continuous occupation during the Final Pleistocene in this region (Byrd 1988; Byrd and Garrard 19898; Garrard 1991, 1998; Garrard *et al.* 1977, 1988, 1994; Garrard and Byrd 1992; Muheisen 1983b, 1988b). In the context of Southwest Asia, this contrasts with other semi-arid to arid zones, where occupation appears to have been interrupted by climatic and environmental oscillations, as for example in the Negev and Sinai, (Goring-Morris 1987; Marks 1977). One likely key factor for this was the availability of a substantial and permanent source of fresh water in the Azraq Oasis, which must have been an attractive feature for human groups. Yet, despite previous excavations at Azraq 17 (Garrard *et al.*, 1994, Garrard *et al.*, 1988), relatively little was known about the Early and Middle Epipalaeolithic in the oasis area itself.

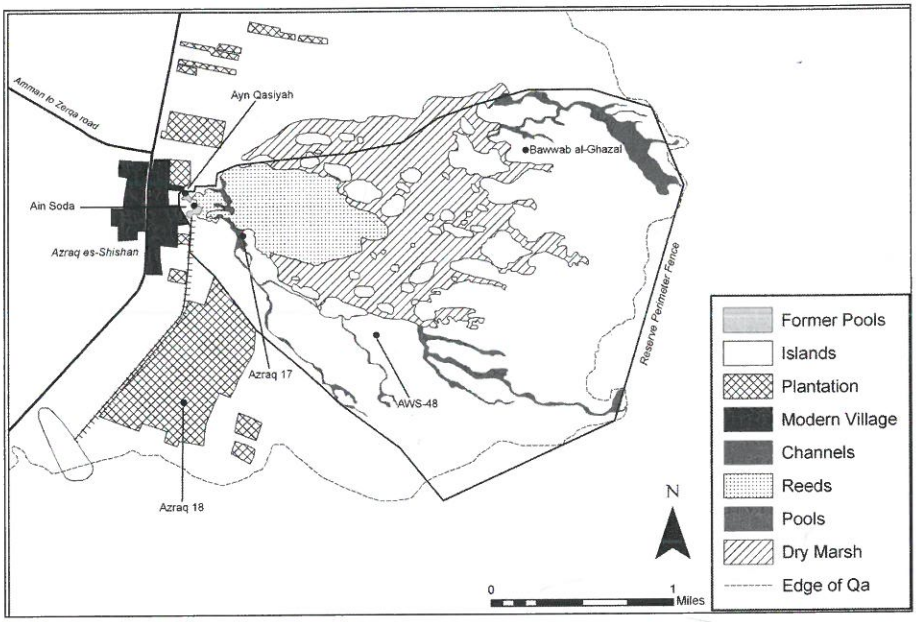
In 2000 Rollefson, Quintero, and Wilke (2001) carried out an intensive pedestrian survey of the Azraq Wetlands Reserve, which resulted in the documentation of more than 80 suspected and confirmed Epipalaeolithic sites and find spots. These include two localities of particular interest. AWS-122 was notable because it represented a stratified site with dense concentrations of lithic artefacts and faunal remains situated to the immediate north of the 'Ayn Qasiyya pool. The other location, AWS-48, was a dense surface scatter of lithics at the southeastern edge of the reserve. Initial artefact collections suggested that 'Ayn Qasiyya dated to the Early Epipalaeolithic, and AWS-48 to the Middle Epipalaeolithic (Rollefson *et al.* 2001). Both sites therefore promised to provide new insights into settlement and subsistence patterns of Final Pleistocene hunter-gatherer groups in the Azraq Oasis and, in a broader context, to provide us with a better understanding of the regional Epipalaeolithic settlement patterns by relating these occupations to other sites in the oasis' hinterland. In addition, they could enhance our understanding of the variability of Final Pleistocene settlement and subsistence practices across Southwest Asia, which we now understand to be much more complex than previously thought (Weiss 2005; Weiss *et al.* 2004; Nadel 2004; Kislev *et al.* 1992).

'Ayn Qasiyya

The Epipalaeolithic site of 'Ayn Qasiyya (AWS 122) is situated to the immediate north of one of the two principal springs of the southern Azraq marshlands **(Figs. 1 and 2).** It was recognised in section in two locations along the northern bank of a pool excavated for water extraction around the spring (Rollefson *et al.* 2001). Until at least the early 1990s this pool was filled with water from the spring, which explains why this site had gone unnoticed previously.

Stratigraphy and Paleoenvironment

These exposed sections provided an initial insight into the stratigraphy of the site and guided our excavation approach **(Fig. 3)**. Areas A and C were placed to the immediate north of Section 1 and Section 3 to target dense concentrations of finds documented in sections. Areas B and D were placed to clarify the further extent of the site. The stratigraphies of Areas A, B, and D are

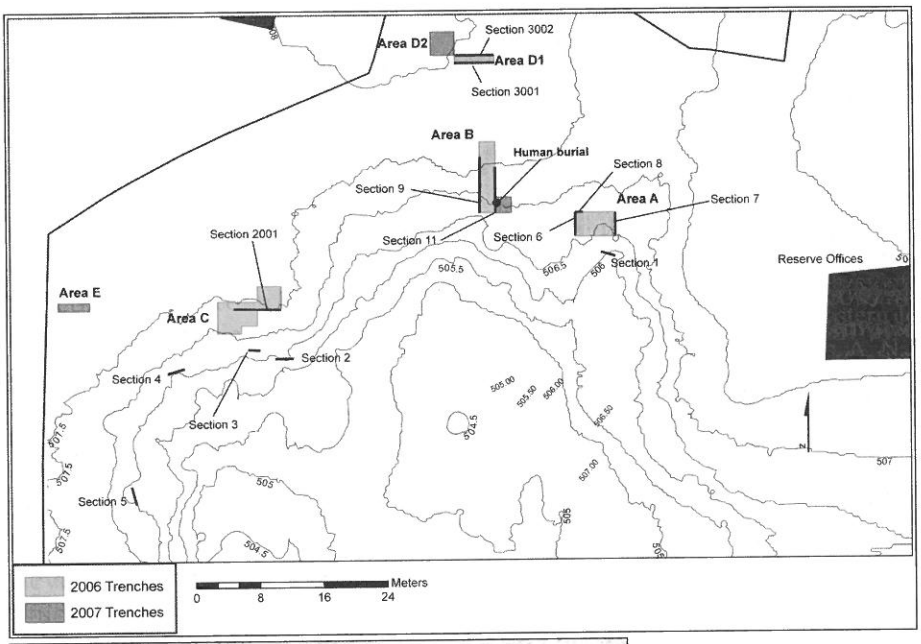


1. The Azraq ash-Shishan area showing the location of principal Epipalaeolithic sites.

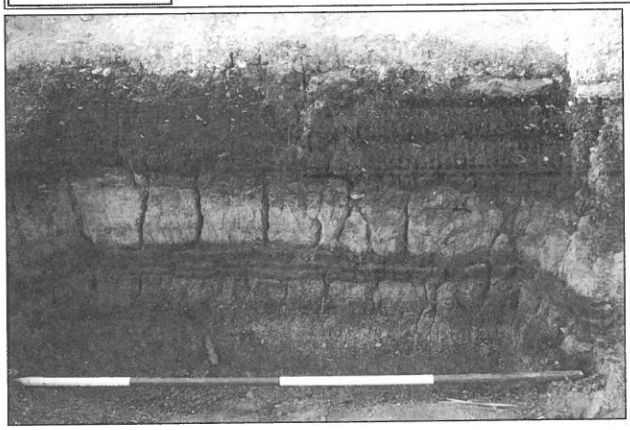
2. The site of 'Ayn Qasiyya looking northwest. The site is situated to the right of the 'Ayn Qasiyya pool.

fairly straightforward and can be traced across the three excavation trenches **(Fig. 4)**. In all these areas the lowermost deposit consists of greenish-grey clayey silt, which is of a lacustrine origin.

In the western part of Area A and the eastern part of Area B, this is overlain by a very firm, carbonate-concreted horizon that represents a former stable land surface adjacent to the shore of a standing body of water. Both the carbonate-enriched horizon, as well as the underlying lacustrine deposit, are archaeologically sterile. These deposits are overlain by a 20-60 cm-thick dark-brown to black, highly organic deposit that represents a former marsh and reed bed. It is analogous to marsh deposit formation in the wetlands today. This deposit stratigraphically overlies the lacustrine deposit and carbonates, but it formed discontinuously within pre-existing inlets and channels containing shallow standing water. It is within this deposit that the bulk of the Early Epipalaeolithic material at 'Ayn Qasiyya was found. The material is distributed throughout the buried marsh and shows no apparent pattern where density, orientation, or inclination is concerned. This suggests that distinct occupation surfaces are not present. Instead, the pattern of deposition of the archaeological material represents a mixture of discard, bioturbation, and par-



3. Location of excavation areas at 'Ayn Qasiyya



4. 'Ayn Qasiyya section 1, showing the principal stratigraphic sequence at the site.

tial erosion. It seems likely that the original occupation may have been situated on the raised areas of carbonates and washed into the channels and inlets where they became incorporated into the formation of the marsh. Nevertheless, the condition and composition of the lithic assemblage suggests little lateral movement or disturbance of the material based on the sharpness of edges, lack of patination, size representation, and presence of an expected range of technological elements.

The stratigraphy of Area C is somewhat different. Here dense concentrations of lithic artefacts and faunal remains were found above a chalky cemented lower channel fill that had cut into softer lacustrine sediments. Finds were situated within a matrix of light-brown silty material that represents the upper fill of a channel. The material is clearly erosional since it contains diagnostic Early Epipalaeolithic, Late Epipalaeolithic (Natufian), and Pre-Pottery Neolithic B (PPNB) chipped stone artefacts in the same deposit. This erosion therefore post-dates the formation of the marsh in Areas A, B, and D. Above it our excavations encountered yet another episode of marsh formation. In contrast to Areas A, B, and D, this marsh deposit has a much higher sand content and almost no finds. It is therefore a very different accumulation than that found in Areas A, B, and D.

The 'Ayn Qasiyya sedimentary sequence is now reasonably well-dated by nine ASMM dates. Four dates derive from the buried marsh deposit in Area A, one date each from the buried marsh deposit in Areas B and D, and three dates from an erosional channel fill in Area C (see Table 1). They show a remarkably well-aligned correspondence across Areas A, B, and D, as well as internal stratigraphic conformity in Area C. In Area A the three dates obtained so far also conform to the stratigraphic succession. The dates indicate that the buried marsh deposit in Areas A, B, and D began to form sometime between c. 22,900-24,000 calBP, which situates the formation of the marsh well inside the cold and dry conditions of the Last Glacial Maximum (LGM). During this time, paleoclimate reconstructions suggest that the Azraq Basin was characterised by hyper-arid and cold conditions. Evidence that the marsh – which must have formed in wetter conditions – came into existence during the supposedly harsh

period of the LGM would suggest that the region may not have been as arid and cold as previously thought. The main Early Epipalaeolithic occupation at the site is dated by these AMS samples to c. 19,800-21,300 calBP. It is important to point out that the date of Area D appears to be somewhat later than those from Areas A and B, which is significant considering the differences in the lithic assemblages from Areas A/B and D.

In Area C, three dates indicate that incision by channels began shortly after the beginning of the Holocene, with the lowermost sample having produced a date of 10,247-10,438 calBP. This clearly matches current data for the beginning of the Holocene, which indicate warmer and wetter conditions at this time in the region.

The overall sedimentary sequence at 'Ayn Qasiyya represents a rare glimpse into the formation of the Azraq es-Shishan marshes. Although this sequence is interrupted, it spans the time frame from the end of the LGM to the beginning of the Holocene, providing crucial data on the paleoenvironmental regime in the oasis at various points in time during the Final Pleistocene-Holocene transition. Although full details of this sequence will be published elsewhere, the evidence indicates that during the Early Epipalaeolithic the Azraq Oasis provided an amenable environment for human settlement. This suggests, in turn, that the environment was likely much wetter than assumed in regional climatic reconstructions and models for the LGM (Bar-Yosef 1989, 1995; Goring-Morris and Belfer-Cohen 1998; Henry, 1995, 1998; Rosen 2007).

Chipped Stone Artefacts

Excavations at 'Ayn Qasiyya produced a sizeable chipped stone collection. While the material from Area C represents a highly mixed assemblage, which includes diagnostic Early and Late Epipalaeolithic as well PPNB artefacts, the assemblages from Areas A, B, and D are characterised by diagnostic Early Epipalaeolithic non-geometric microliths. They are accompanied by almost equal amounts of other non-microlithic retouched pieces, including scrapers, burins, retouched flakes/blades, and notches/denticulates. The assemblages from Areas A, B, and D exceed 35,000 individual pieces, of which a sample of cores, debitage and retouched pieces has been studied in greater technological and typological detail **(Tables 1 and 2)**. The principal finding is that there are significant differences between the assemblages from Areas A and B on the one hand

Table 1: Composition of the 'Ayn Qasiyya chipped stone assemblage

Count									
	Cores	**Primary**	**CTE**	**Flakes**	**Blades**	**Bladelets**	**Flakelets**	**Retouched**	**Total**
Area A	25	36	40	1,105	183	352	1,031	286	3,058
Area B	29	48	89	1,601	170	949	1,301	373	4,560
Area D	38	69	319	4,106	343	2,021	1,091	978	8,965
Total	92	153	448	6,812	696	3,322	3,423	1,637	16,583
Percentile									
	Cores	**Primary**	**CTE**	**Flakes**	**Blades**	**Bladelets**	**Flakelets**	**Retouched**	**Total**
Area A	0.82	1.18	1.31	36.13	5.98	11.51	33.71	9.35	100.00
Area B	0.64	1.05	1.95	35.11	3.73	20.81	28.53	8.18	100.00
Area D	0.42	0.77	3.56	45.80	3.83	22.54	12.17	10.91	100.00

	Tool : Core	**Debitage: Core**	**Debitage: Tool**	**CTE : Core**	**Flake: blade/bladelet**
Area A	11.44	108.88	9.52	1.6	2.07
Area B	12.86	211.59	16.45	3.07	1.43
Area D	25.74	208.34	8.1	8.39	1.74

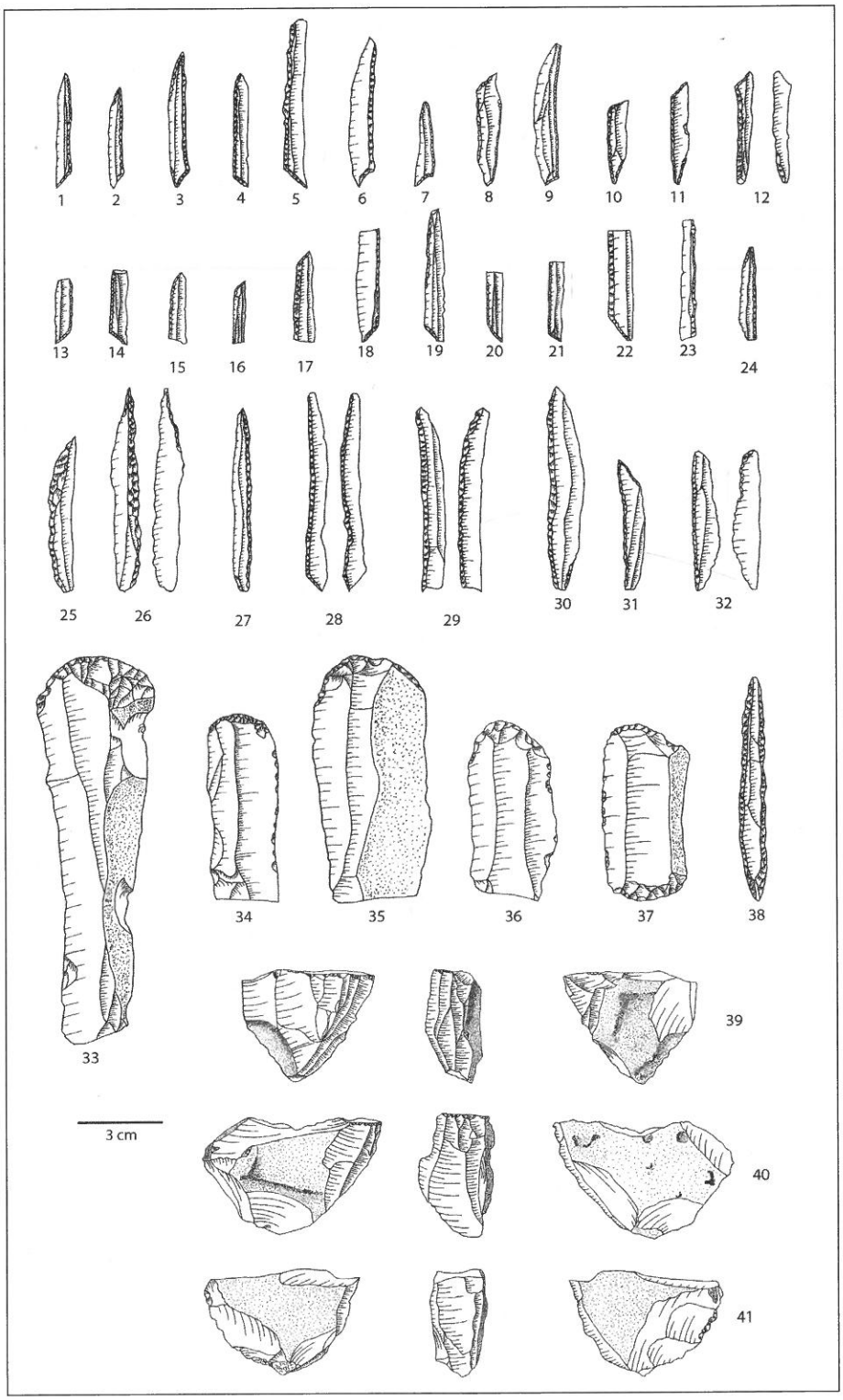
Table 2. 'Ayn Qasiyya retouched chipped stone tools.

	Count			Percentile		
	Area A	**Area B**	**Area D**	**Area A**	**Area B**	**Area D**
Microliths	165	234	598	55.18	66.48	76.86
Burins	13	11	37	4.35	3.13	4.76
Mixed/ multiple	0	1	2	0.00	0.28	0.26
Scraper	35	30	21	11.71	8.52	2.70
Notches & Denticulates	25	21	25	8.36	5.97	3.21
Truncations	5	4	9	1.67	1.14	1.16
Points	4	2	0	1.34	0.57	0.00
Simple retouched	50	41	78	16.72	11.65	10.03
Utilised	2	4	5	0.67	1.14	0.64
Perforator	0	2	1	0.00	0.57	0.13
Varia	0	2	2	0.00	0.57	0.26
Total	299	352	778	100	100	100

and Area D on the other. While non-geometric microliths are common in all three assemblages, subtle differences in both technology and typology exist **(Figs. 5 and 6)**. The raw material used in Areas A and B is very similar and is dominated by a dark grey to black flint. In Area D, however, a yellowish brown flint was used almost exclusively. Although the cores in all three assemblages also have a similar form, differences exist in the reduction sequences. In Area D crested blades are rare, while core maintenance and face rejuvenation pieces are common. The opposite is found in Areas A and B. Cortical elements are rare in all three assemblages, suggesting that initial core reduction did not take place at the site. The presence of non-microlithic tools, such as scrapers and notches/denticulates, suggests that a multitude of activities were carried out at 'Ayn Qasiyya.

One important difference between the assemblages is the production of microliths. In Areas A and B there is very little evidence for the use of the microburin technique (with a restricted microburin index of 1.69 and 2.73 for Areas A and B respectively). However, microburins are abundant in the assemblage from Area D (restricted microburin index of 28.21). This subtle difference is important since it has often been used to differentiate two principal Early Epipalaeolithic lithic industries in the Levant. Nebekian sites, commonly associated with the use of the microburin technique, are found largely east of the Rift Valley. Kebaran sites, by contrast, show little use of the microburin technique, and are commonly found further west (Bar-Yosef 1981, 1987; Byrd 1994; Goring-Morris 1995; Goring-Morris and Belfer-Cohen 1998; Henry 1974, 1995; Olszewski 2001, 2006; Stutz and Estabrook 2004).

Although this difference may be seen as simply an idiosyncratic difference, at 'Ayn Qasiyya as well as at other sites, it is also corresponds to differences in the typology of non-geometric microliths. In Areas A and B obliquely truncated and backed bladelets are common, although broken microliths far outnumber any other type. However, a large proportion of the latter can be interpreted as obliquely truncated and backed bladelets since many show their characteristic backing and truncations. In Area D this repertoire is joined by narrow arched-backed bladelets, often with very fine retouch. The Area D assemblage is similar to many Nebekian assemblages from the Azraq Basin and elsewhere. Locally, it is similar to material from Wadi el-Jilat 6 lower phase, and Uwaynid 14 middle phase (Byrd 1988, 1994; Byrd and Garrard 1989; Garrard *et al.*1988, 1994). Outside the Azraq Basin it shares similarities with sites in the Wadi el-Hasa (Olszewski, 2000, Olszewski, 2004) and the Hisma region of southern Jordan (Henry 1988,

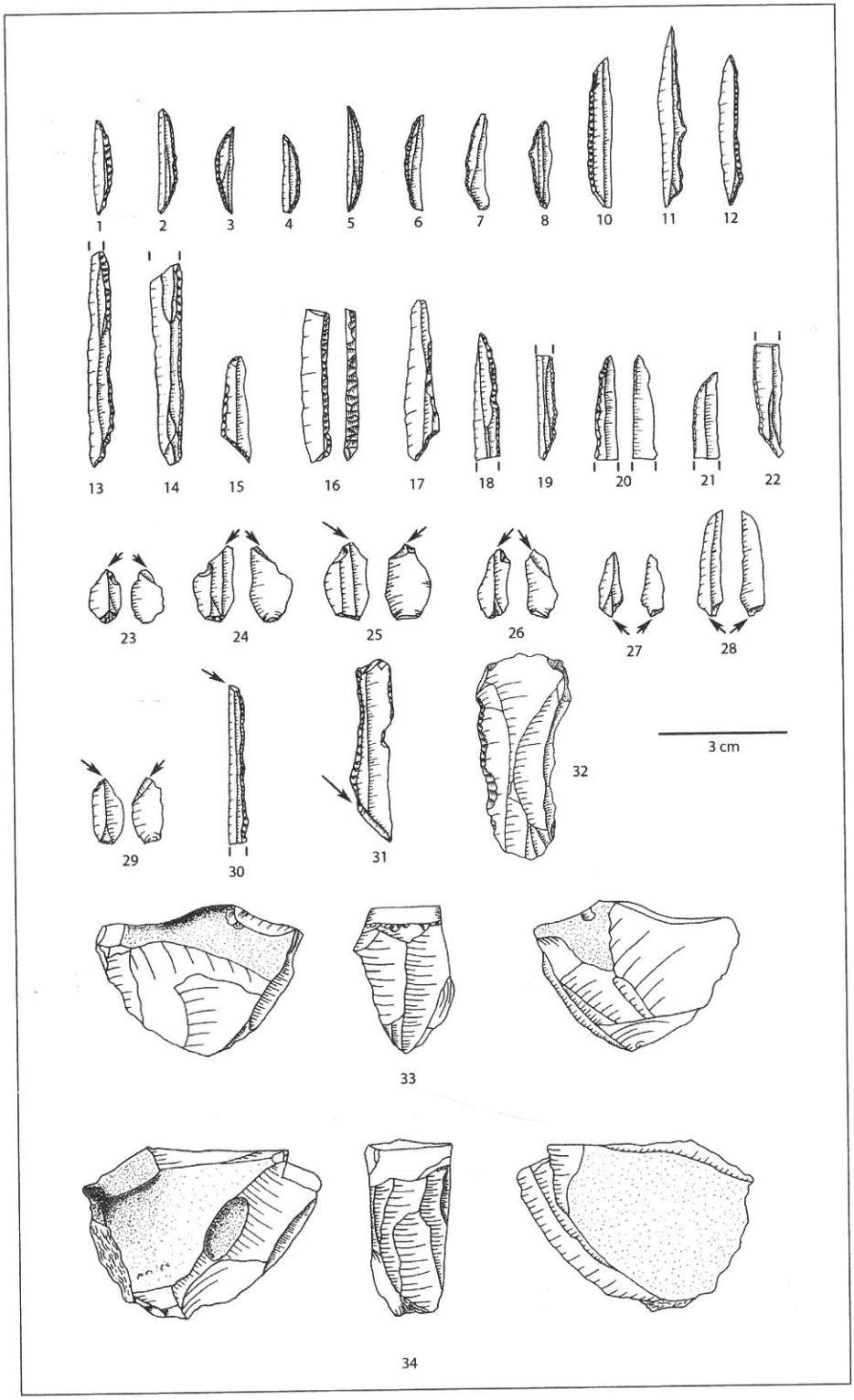


5. Chipped stone from 'Ayn Qasiyya Area A and B

1995, 1998. The assemblages from Area A/B, by contrast, are more similar to the assemblage from Kharaneh IV Phase B (Muheisen 1983, 1988a; see also Maher *et al.* this volume) and Wadi Hemmeh 26 (Edwards 1989; Edwards *et al.* 1996) and other sites west of the Rift Valley (Goring-Morris 1995).

Faunal Remains

So far, only a sample of the faunal material from Area A has been analysed and only mammalian taxa have been studied, although bird and reptile remains have also been found (Thorne 2008). Due to 100% wet-sieving of all excavated sediment, retrieval rates of the faunal



6. Chipped stone from 'Ayn Qasiyya Area D

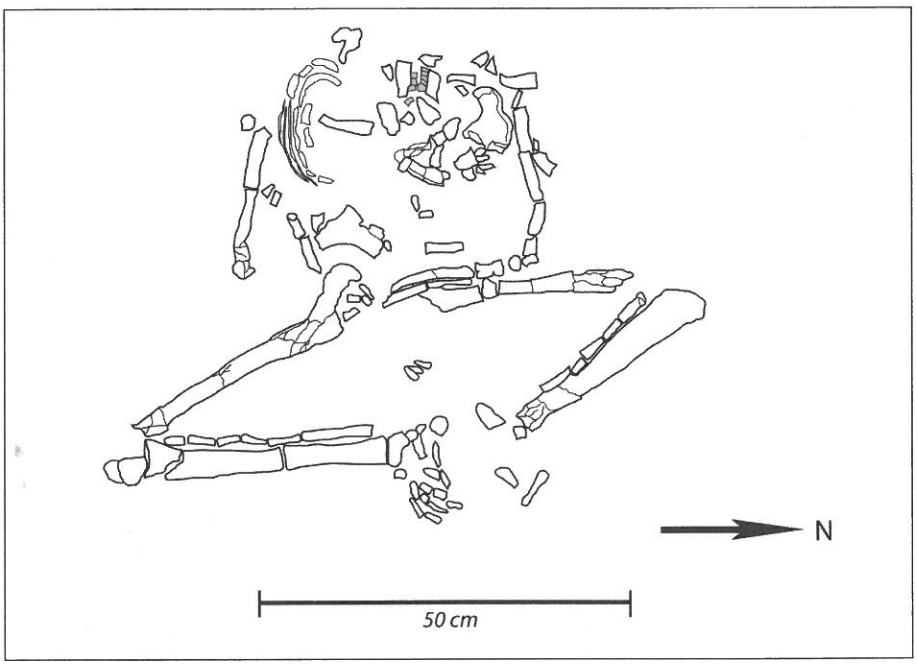
material were excellent. The spectrum of taxa includes gazelle, equids, cattle, and boar, as well as small mammals such as hare and canids. Gazelles dominate the large mammal faunal material, as is common on many Epipalaeolithic sites of this period and region (Martin 1994; Bar-Oz 2004). In comparison with other Early Epipalaeolithic sites in the Azraq Basin, however, the 'Ayn Qasiyya sample appears to contain higher than expected numbers of boar and cattle. It is interesting to note that the Late Epipalaeolithic Natufian site of Azraq 18, situated c. 2.5 km south of 'Ayn Qasiyya, was similar in this regard (Garrard, 1991, Garrard *et al.*,

1994). This is probably related to the site's proximity to the wetlands and fresh water sources, which afforded a wider range of procurement opportunities to Epipalaeolithic hunters. A more intensive examination of the gazelle specimens from the site suggests that many were culled as juveniles, which also contrasts with other Epipalaeolithic sites in the region. This could either be related to specific selection of juveniles by hunters or to a higher juvenile population in the oasis. However, it is likely that this pattern is more related to the local environmental conditions than to actual selection.

Body part representation in the sample indicates that whole gazelle carcasses were brought to the site and butchered. This is indicated by the presence of non-meat-bearing parts as well as a variety of butchering marks on the bone. By contrast, boar, equids, and cattle were more commonly represented by head and feet parts, which would point more towards primary dismemberment and skinning of animals; this requires further testing on the basis of a larger faunal sample.

Human Remains

Perhaps the most enigmatic find from 'Ayn Qasiyya is the discovery of a complete human burial with an unusual interment posture **(Fig. 7)**. The burial was found in Area B within the buried marsh deposit (now dated by one AMS date – see above) immediately beneath the carbonate-concreted horizon. The skeleton was found in supine position with its legs tightly flexed and spread wide apart. The upper torso appeared collapsed into itself with the skull dislocated and redeposited on the ribcage facing up and away from the lower body. The skeleton is reasonably complete, with elements of the ribs, cranium, and arm long bones reasonably well intact. The lower long bones were well preserved, while the pelvis and spinal column were very barely present. No grave cut was discernable, and it would appear that the body may have been simply inserted into what was at the time a permeable, soft marsh or reed bed. The position of the lower limbs, the collapsed appearance of the torso, as well as the position of the disarticulated skull may suggest that the body was originally in an upright sitting arrangement, with the legs upright and the head resting on the knees. As decomposition set in the legs fell apart into a splayed position, and the skull fell forward onto the collapsed chest. We suggest that this position could only have been achieved if the body was contained as, for example, in some kind of cloth or bound by cordage or ropes. We have outlined this argument in detail elsewhere (Richter *et al.* 2010), suggesting that this is akin to the practice of excarnation of human bodies. Given the noted rarity of human burials in the Early Epipalaeolithic of the Levant, evidence for



7. A complete human burial with an unusual interment posture.

excarnation such as the 'Ayn Qasiyya burial may help to explain why human remains have proven difficult to locate at other contemporary sites. In any case, 'Ayn Qasiyya 1 represents the earliest set of human remains yet dated from Jordan, and due to its unusual burial position provides a rare glimpse into the treatment of the dead during the Early Epipalaeolithic in the region.

AWS 48

About 2 km southeast of 'Ayn Qasiyya Rollefson *et al.* (Rollefson *et al.*, 2001) documented an extensive flint scatter during their original survey of the wetlands. Initial surface collection and study of the lithic artefacts from the site suggested that it dated to the Middle Epipalaeolithic. To document the use of the Azraq Wetlands across a range of different localities and to better understand the preservation and dating of this site, AWS 48 was subjected to an intense surface survey, collection, and small scale excavation to determine site function and to provide an indicator of whether the site could be dated more accurately.

Survey and Stratigraphy

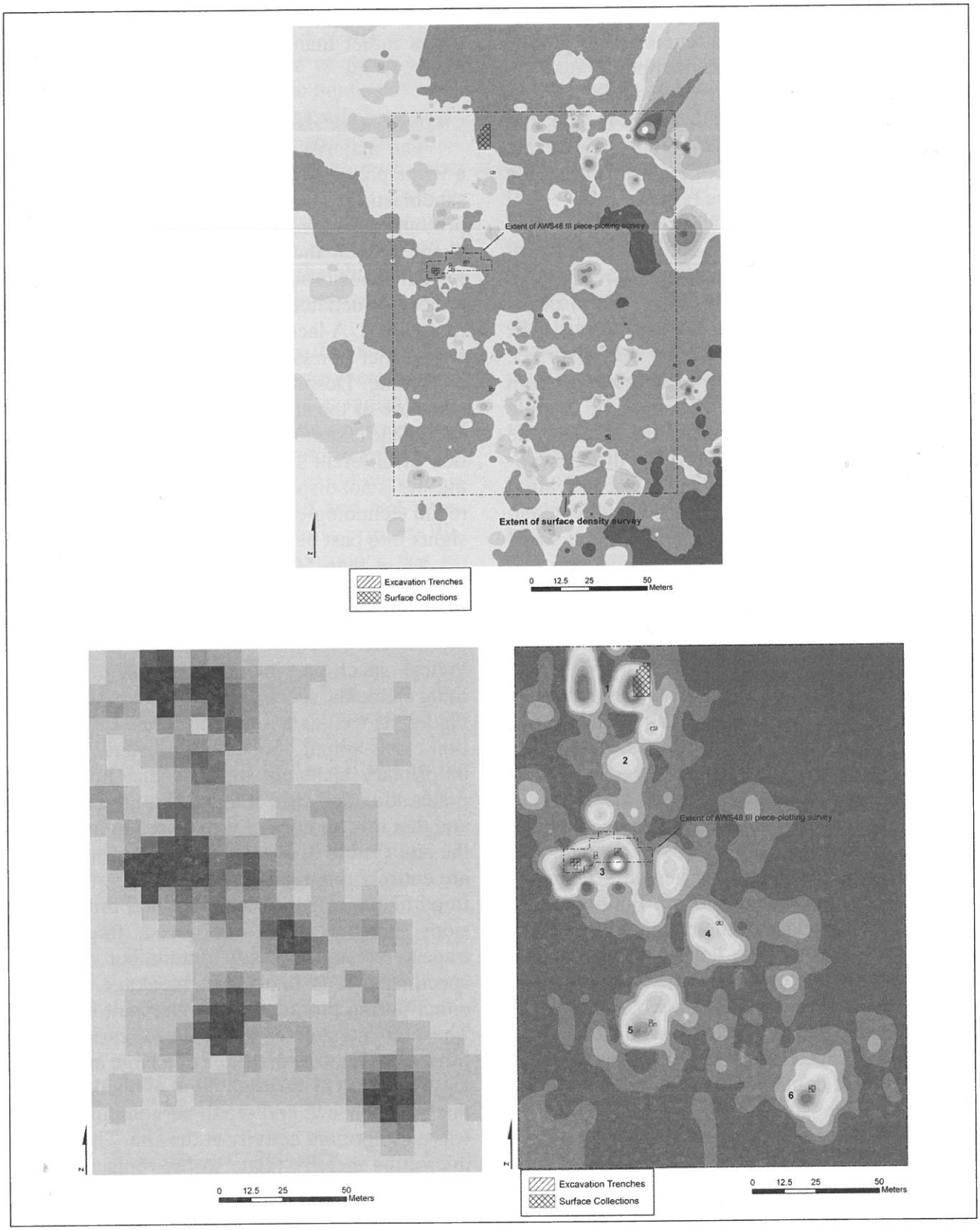
In an arbitrarily defined survey area measuring 140 x 100 m, we carried out an intensive topographic survey accompanied by a surface count of artefacts larger than 5cm within a 5x5 m grid laid out across the survey area. We identified six dense clusters of lithic artefacts, some of which contained more than 600 pieces in a single 5x5 m area **(Fig. 8)**. Clusters varied in size, ranging between c. 80 m^2 to 500 m^2. Following the counting of material extant on the surface across the entire survey area, a collection was undertaken at every one of the six clusters, while test excavations were carried out at two. A total of 11 m^2 were excavated at Cluster 3, while 2 m^2 were excavated at Cluster 1. Excavations showed that all lithics were contained within the topsoil, and sub-surface deposits were archaeologically sterile. Thus, the distribution of the various clusters may well be disturbed by surface erosional processes. Nevertheless, we were able to show one instance where a lithic scatter was overlain by a Holocene silt dune. The adjacent dunes may therefore cover up and preserve a much more extensive spread of artefacts. The mapped distribution is therefore a result of the natural topography of the area and the shifting of the silt dunes rather than being directly related to human activity.

Chipped Stone Assemblage

The majority of the lithics was covered by a white patina and displayed pits resulting from sandblasting. These are common indications of prolonged surface exposure and site deflation. Coupled with the shallowness of the archaeological deposits at AWS 48, it seems that the site is heavily deflated and unlikely to preserve activity areas. A lack of faunal preservation at the site further points to the long-term degradation of the site. Despite this evidence for long-term exposure of the site, the technological composition of the assemblage, as well as the representation of different sizes of material, indicates that the site is not displaced and that the assemblages retain technological integrity and can provide insights into past behavior.

More than 50,000 lithic artefacts were recovered from surface collections and excavations at AWS 48. Apart from primary cortical pieces, the collection contains the full technological spectrum, including cores, core trimming elements, secondary and tertiary flakes and blades, as well as retouched pieces. Little variation exists among the various clusters. The lack of primary elements suggests that initial core preparation and core shaping did not take place and that raw nodules of flint were not brought to the site **(Table 3, Fig. 9).** The retouched pieces are entirely dominated by geometric microliths, in particular trapeze-rectangles and broken versions thereof **(Table 4)**. Indeed, fragmentary trapeze-rectangles vastly outnumber complete specimens. It is likely that breakage occurred either during production or as a result from use. The high number of broken geometric microliths, as well as the presence of a large amount of waste relating to the production of blanks, shows that maintenance and repair of composite tools was an important activity at the site. The broken microliths thereby relate to the replacement of broken pieces in hafts and the manufacture and –accidental– breakage of trapeze-rectangles. This is accompanied by a general lack of other retouched artefact classes.

Despite small numbers of scrapers, retouched flakes and blades, and burins, more



8. AWS 48. Top: Extent of surface survey, topography and location of surface collections/ excavations. Bottom left: Density of chipped stone artefacts on the surface counted in a 5x5 m grid, counting all pieces larger than 5 cm. Bottom right: Inverse distance weighted surface analysis of chipped stone densities at AWS 48, showing the presence of six distinct clusters of chipped stone artefacts.

Table 3: Composition of the assemblages from Clusters I-V at AWS 48.

Count									
Cluster	**Cores**	**Primary**	**CTE**	**Flakes**	**Blades**	**Bladelets**	**Flakelets**	**Retouched**	**Total**
I	55	51	262	696	724	2,265	7,415	724	12,192
II	46	9	46	418	127	593	2,854	655	4,748
III	21	0	52	39	140	176	526	168	1,122
IV	4	5	30	121	49	212	1,249	167	1,837
V	14	1	36	10	112	172	604	63	1,012
Percentile									
I	0.45	0.42	2.15	5.71	5.94	18.58	60.82	5.94	100
II	0.97	0.19	0.97	8.80	2.67	12.49	60.11	13.80	100
III	1.87	0.00	4.63	3.48	12.48	15.69	46.88	14.97	100
IV	0.22	0.27	1.63	6.59	2.67	11.54	67.99	9.09	100
V	1.38	0.10	3.56	0.99	11.07	17.00	59.68	6.23	100

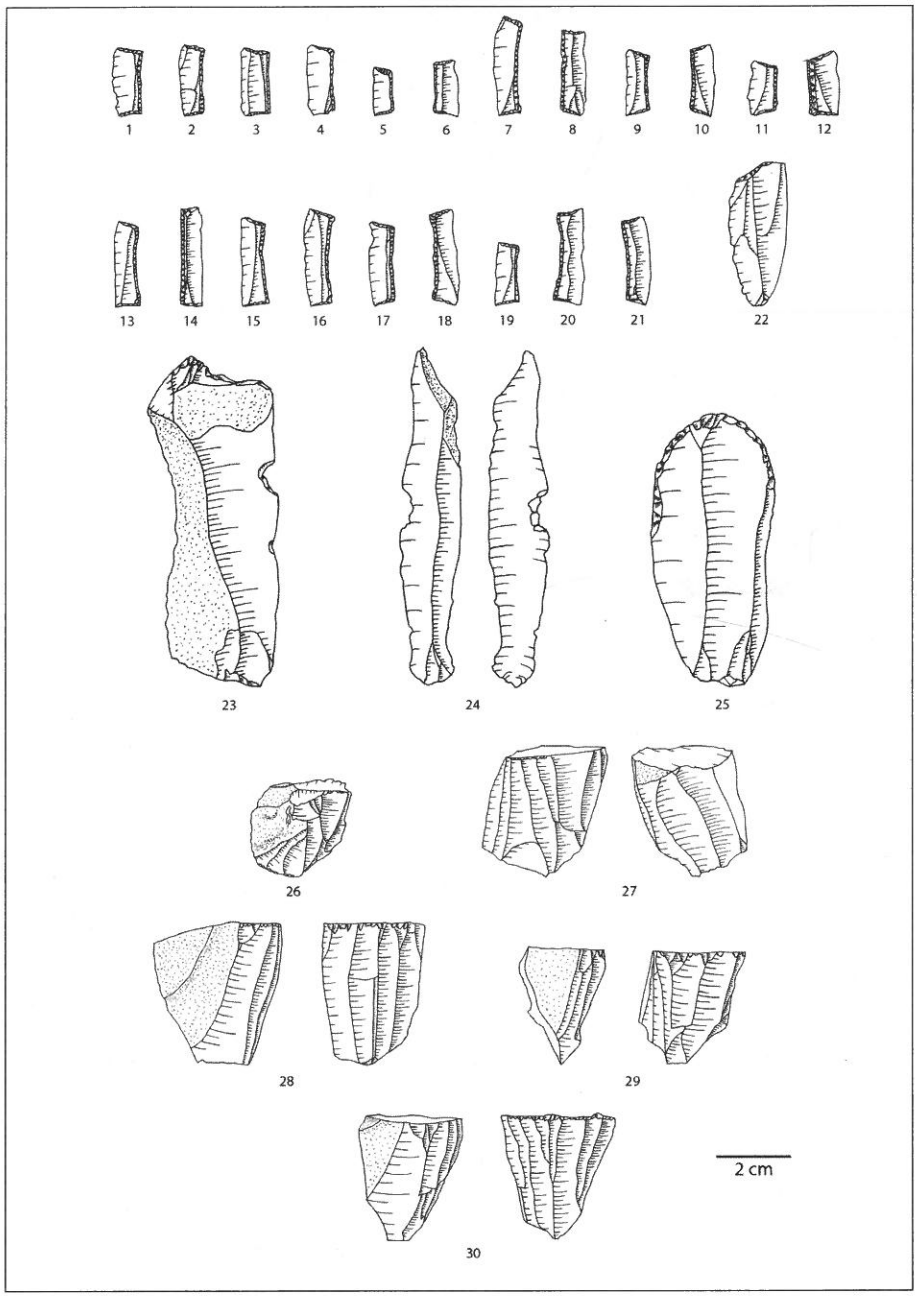
	Tool : core	**Debitage : core**	**Debitage : tool**	**CTE : Core**	**Flake : blade/ bladelet**
I	13.16	203.02	15.4	4.76	2.48
III	14.24	87.22	6.13	1	3.96
IV	8	44.67	5.58	2.48	1.66
V	41.75	416.75	9.98	7.5	4.79
VI	4.5	67.14	14.9	2.57	2.13

Table 4: The retouched chipped stone assemblage from AWS 48 Cluster III

Type	**Count**	**%**
Microliths	591	91.20
Burins	4	0.62
Scraper	6	0.93
Notches & Denticulates	17	2.62
Truncations	8	1.23
Simple retouched	22	3.40
Total	648	100.00

than 90% of the retouched material consists of complete or broken geometric microliths. The low frequency of other than microlithic tools reveals that other activities (e.g., butchering/ dismembering of animal carcasses) were low in priority. This profile makes it tempting to think of 'Ayn Qasiyya as a camp where hunting gear maintenance or repairing took place on a short-term basis. Although the link between geometric microliths and their use as hunting weapons is not straightforward (Richter 2007; Anderson-Gerfaud 1983; Tomenchuk 1983), the low density of non-microlithic tools in the assemblages nevertheless indicates a quite one-sided spectrum of activities.

The dominance of trapeze-rectangles among the geometric microliths is a strong indicator for a Middle Epipalaeolithic date for AWS 48. In any case, the material can be assigned to the Geometric Kebaran industry. In composition it is very similar to many other Geometric Kebaran assemblages, especially those situated in semi-arid to arid zones of the Levant, which all contain high indices of trapeze-rectangles (Bar-Yosef 1970). However, the complete dominance of trapeze/rectangles over and above all other tool types may relate to the intensive sieving regime we used that ensured a high recovery rate of even small artefact fragments or reflect on-site activities.



9. Chipped stone from AWS 48

Lithic evidence suggesting tool maintenance and repair, coupled with the shallow archaeological deposits of AWS 48 as well as the dispersed appearance of the lithic clusters, implies that we are looking at a site characterized by multiple short term occupations. This in turn suggests that during the Middle Epipalaeolithic the southeastern part of the southern Azraq marshes was used as a temporary camp at which preparations for hunting forays may have been made. This contrasts somewhat with the more multi-spectrum of activities and thickness of archaeological deposits present in the 'Ayn Qasiyya sample. We can therefore detect subtle changes in the way in which Epipalaeolithic groups used the Azraq Oasis from the Early to the Middle Epipalaeolithic.

Conclusion

Fieldwork in the Azraq Oasis has provided new insights into the Final Pleistocene occupation of the eastern Jordanian desert, adding to an emerging picture of the Epipalaeolithic in this region. Our data confirm and corroborate many findings from previous projects, in particular Garrard's work. Similar to other parts of the Azraq Basin the oasis appears to have been

occupied more or less continuously during the Epipalaeolithic. This shows that the Azraq Basin as a whole was a region amenable for human settlement during the Final Pleistocene, and the oasis in particular proved to be a focus for human exploitation of multiple economic opportunities by hunter-gatherer groups.

One interesting aspect is the apparent shift in both settlement location and pattern of occupation evident in our excavations in the oasis. While during the Early Epipalaeolithic the area around the two copious springs of 'Ayn Qasiyya and 'Ayn as-sawda were intensively occupied, in the Middle Epipalaeolithic settlement appears to have shifted away from the springs. The signature of settlement also appears to be somewhat different at AWS 48. Whereas at 'Ayn Qasiyya there was a gradual accumulation of cultural material in the marsh that likely relates to a more continuous re-use of the same location over multiple occupational episodes, at AWS 48 the re-use of the same area was more dispersed. This is reflected not only in the spatial distribution of settlement, but also when we compare the composition of the lithic toolkit at AWS 48 and 'Ayn Qasiyya. The former has a much more restricted range of tools and is dominated by geometric microliths, whereas 'Ayn Qasiyya contains a greater variety of tools, including scrapers, burins, denticulates/notches and retouched blades and flakes. This shows that AWS 48 may have been a more specialized, short-term activity zone that was probably focused on making and repairing hunting gear.

Comparing the Epipalaeolithic sites in the oasis with those in the Azraq Basin as a whole, it is puzzling to note that the lush and rich environment of the oasis did not lead to the kind of intensive occupation we see elsewhere in the basin at Kharaneh IV (Muheisen, 1983, 1988a, 1988b; see also Maher *et al.* this volume) and Wadi Jilat 6 (Byrd 1988; Byrd and Garrard 1989; Garrard *et al.* 1988, 1994). The reasons for this are as yet not understood. The rich environment of the oasis would have undoubtedly supported settlements of this size, yet groups chose a very different part of the landscape to reuse as a settlement location over multiple generations.

The human remains discovered at 'Ayn Qasiyya provide a remarkable insight into the spiritual and ritual lives of Epipalaeolithic communities. As we have argued elsewhere (Richter *et al.* 2010), the burial might reflect a practice of disposing of human bodies in natural, unaltered settings. The position and taphonomy of the skeletal remains suggests that the body may have been buried sitting upright with the legs tightly flexed to the torso. This is only possible if the body was contained in cloth or bound by cloth or ropes (for a more complete description see Richter *et al.* 2010). The absence of a burial pit suggests that the body was simply inserted in this bound state into the soft and permeable marsh of the Azraq wetlands, hence the argument that this practice was closely related to excarnation. This provides evidence for a hitherto undocumented degree of variability in Final Pleistocene burial practices during the Early Epipalaeolithic, and a potential explanation for the rarity of Early Epipalaeolithic graves. Together with the remains from the Early Epipalaeolithic phases of Kharaneh IV, the 'Ayn Qasiyya specimen is only the third burial from this time period in Jordan. If anything, it shows that 'Ayn Qasiyya was likely an important locality for people in the landscape, which was considered special enough to act as a place of human burial.

The chipped stone from 'Ayn Qasiyya shows interesting differences between the assemblages from Areas A and B, on the one hand, and Area D on the other. Technological and typological differences suggest that we can group the assemblages from Areas A and B with the Kebaran complex, while the assemblage from Area D can be considered part of the Nebekian complex. Their co-occurrence at 'Ayn Qasiyya is a new twist on our understanding of these techno-complexes. The available AMS dates from 'Ayn Qasiyya show that they can be considered roughly contemporary. Because they occur together at the same site situated within the same ecological zone, it is difficult to put the differences between the toolkits down to idiosyncratic or purely adaptive factors (for discussion of these issues see Fellner 1995; Phillips 1996; Goring-Morris 1995, 1996, Neeley and Barton, 1994; Barton and Neeley 1996; Henry 1996; Kaufman 1995). Instead, we must consider that they are the result of different cultural trajectories, relating to traditions and techniques.

The lithic assemblages from AWS 48 indicate a highly specialized set of activities centered around tool manufacture, repair, and main-

tenance. The assemblages at AWS 48 are dissimilar to many others in the Azraq Basin, but in typological appearance and composition comparable to many found in other semi-arid to arid environments in the southern Levant (Goring-Morris 1988, 1995; Goring-Morris and Belfer-Cohen 1998; Henry 1989).

Lastly, geomorphological data from 'Ayn Qasiyya in conjunction with the available AMS dates show that the marsh in southern Azraq formed as early as 24,000 calBP, firmly within the harshest part of the LGM, which indicates that there was a substantial lake in Azraq prior to 24,000 calBP. Evidence for the early marsh formation matches data available from elsewhere in the Azraq Basin, such as the Wadi el-Jilat, Wadi Uwaynid (Byrd and Garrard 1989; Garrard 1998; Garrard *et al.* 1988, 1994) and Kharaneh IV (see Maher *et al.* this volume). The site is closely associated with the copious springs which made it very rich and amenable for human settlement. It would have provided multiple opportunities for human exploitation. This further highlights the crucial importance of the Azraq oasis as a central settlement location. This was not, as has often been argued, a 'marginal zone' due to LGM hyper-aridity. Instead, it was a crucial settlement location for Epipalaeolithic communities.

Acknowledgements

The 2005-2007 excavations at 'Ayn Qasiyya have been funded through a Doctoral Award from the Arts and Humanities Research Council, the University of London Central Research Fund, the Institute of Archaeology Awards, University College London Graduate School, and the Epipalaeolithic Foragers in Azraq Project, funded by the AHRC UK. We are grateful to the Department of Antiquities Director-General Dr Fawwaz al-Kharaysheh for his permission to carry out this work, as well as the Royal Society for the Conservation of Nature for allowing us to excavate in the Azraq Wetlands Reserve. The local staff of the Department of Antiquities and RSCN have provided crucial local support and infrastructure, and we are particularly grateful for Ahmed Lash, Sami Tarabieh, Anwar el-Halal, and Sharif Tarabieh for their help. We are also grateful for the support and advice from Andrew Garrard, Leslie Quintero, Gary Rollefson, Philip Wilke, Louise Martin and Bill Finlayson in carrying out this research.

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