RECENT EXCAVATIONS AT THE MIDDLE EPIPALAEOLITHIC ENCAMPMENT OF 'UYŪN AL-ḤAMMĀM, NORTHERN JORDAN

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Recent survey and excavation by the Wādī Ziqlāp Project in northern Jordan have extended our knowledge of prehistoric settlement and land use in the area back to the Middle Epipalaeolithic (ca. 15000BP). In 2000, geomorphic survey of ancient river terraces revealed an eroded section on the modern road to the village of Tubna that contains extremely high densities of stone tools, debitage, and faunal remains (Maher 2001). Two test trenches were excavated into the section on the north side of the road. The lithics, preliminarily identified as Geometric Kebaran, and fauna occurred in a Pleistocene palaeosol. In 2001, we returned to the site to reopen one of our test trenches and excavate two additional test pits on the surface of the terrace to determine the depth of the Epipalaeolithic deposits and the horizontal extent of the site. Our findings from the season indicated over 1.5m of lithic and faunal material, some of it *in situ*, as well as the presence of human remains. In 2002, the Wādī Ziqlāp Project conducted excavations at the site to open up a larger horizontal area in an attempt to identify any spatial or temporal patterning in the distribution of artefacts and features. Here, I present the results of excavation at this site, named 'Uyūn al-Ḥammām, with emphasis on our most recent findings. I also discuss 'Uyūn al-Ḥammām in terms of its relationship to other nearby culturally contemporary sites.

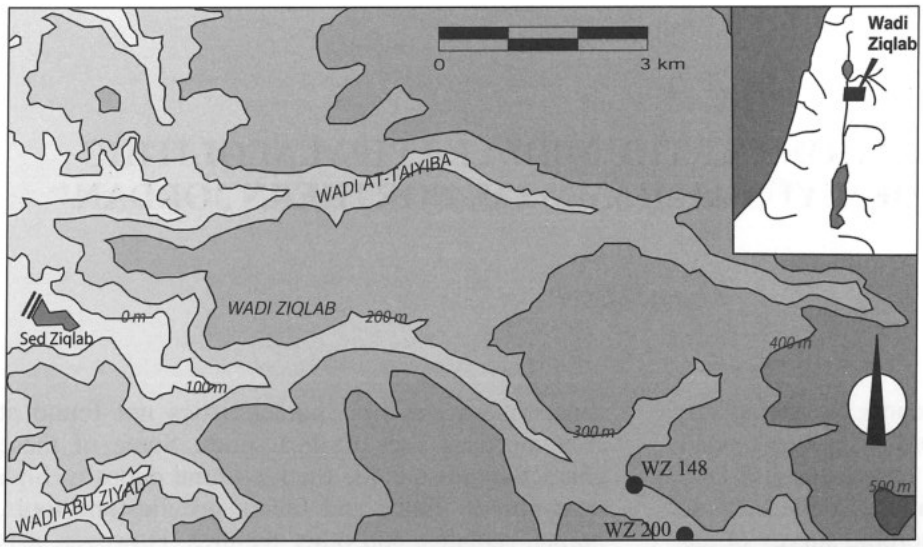
According to current cultural-chronological schemes for the Epipalaeolithic of the southern Levant (see Belfer-Cohen 2003), 'Uyūn al-Ḥammām is a classic Geometric Kebaran site. The lithic assemblage is dominated by trapeze/rectangles, produced in large numbers from single-platform, subpyramidal bladelet cores. Endscrapers on blades and burins are also common. Like other similar Geometric Kebaran sites in the Mediterranean core, such as Neve David (Kaufman 1987), Hefzibah (Ronan *et al.* 1975), Hayonim Terrace (Henry and Leroi-Gourhan 1976), 'Ayn Miri (Shimelmitz *et al.* 2001) and, to a much lesser degree, Fazael III and VIII (Goring-Morris 1980), 'Uyūn al-Ḥammām exhibits characteristics not found at contemporary sites further south. Some of these characteristics include thick cultural deposits, high densities of lithics and fauna, groundstone tools, human remains, and other features. However, it is notably different from nearby, contemporary sites in Jordan, such as those in Wādī al-Ḥimma, Wādī Ḥisbān (discussed below), and southern and eastern Jordan (Henry 1995). Although the site is found in the same Pleistocene palaeosol, it is also clearly different from the Late Kebaran/Geometric Kebaran transitional site of Ṭabaqat al-Būma, radiometrically dated to 15500 cal BC and located only 800m upstream (Maher 2002).

'Uyūn al-Ḥammām (WZ 148): The Site and its Environs

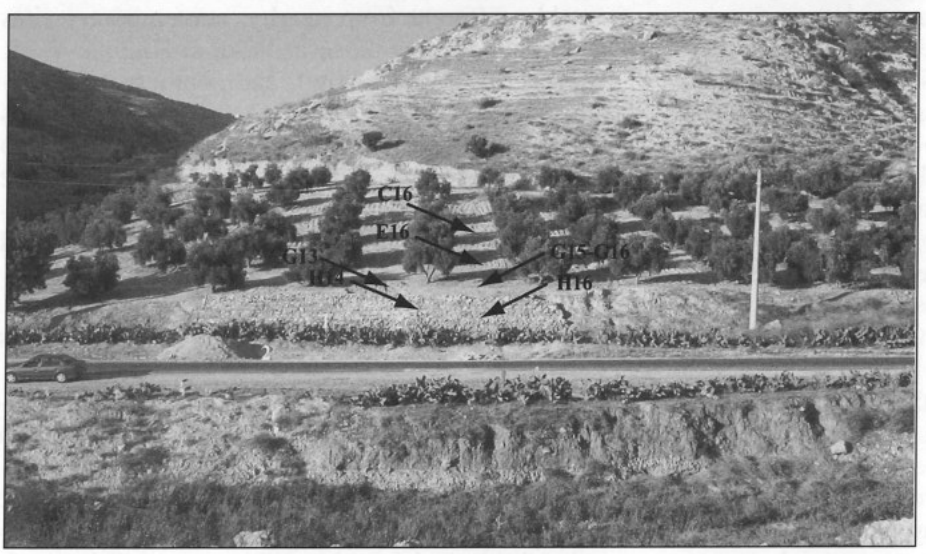
'Uyūn al-Ḥammām is named after a nearby permanent spring. It is located approximately 100m northwest of al-'Aqaba (WZ 310) where the project excavated Early Bronze and Late Neolithic material in 1990 and 1992, and 800m from the Epipalaeolithic and Late Neolithic site of Ṭabaqat al-Būma (WZ 200) (Banning *et al.* 1996, 1992) (**Fig. 1**). Situated on an ancient river terrace adjacent to the present-day Wādī bid (**Fig. 2**), it lies at an elevation of 210m a.s.l. Approximately one-third of the site has been destroyed by recent construction of a paved road to the village of Tubna, while incision of the wadi channel has also cut into the site from the south. An olive grove now occupies the remaining terrace.

'Uyūn al-Ḥammām is estimated to cover an area of approximately 1500m^2 based on the extent of artefacts. The site is also located near several outcrops of fine-quality, tan-coloured flint and is situated at the boundary between the oak-pistachio forest to the east and the steppe to the west. It is also less than 3km east of Lake Lisan's maximum palaeoshoreline (Bartov 2002), providing access to a wide range of food and non-food resources.

In 2000 and 2001 we conducted soundings in several areas in an attempt to determine the site's



1. Topographic map of Wādī Ziqlāb's main drainage basin, showing the location of 'Uyūn al-Ḥammām (WZ 148) and Ṭabaqat al-Būma (WZ 200) discussed in the text.



2. Photograph of the terrace of 'Uyūn al-Ḥammām (WZ 148) showing the location of our excavation areas. Small soundings were excavated in areas C16, E16, H14 and H16 in 2000 and 2001. These areas were reopened in 2002 and excavated along with the larger areas of G13, G15, and G16. The road cuts through the site and Epipalaeolithic material was found throughout the section of the large terrace between the car (left) and past the telephone pole (right), on both shoulders of the road, and in the section leading down to the modern wadi bottom (foreground).

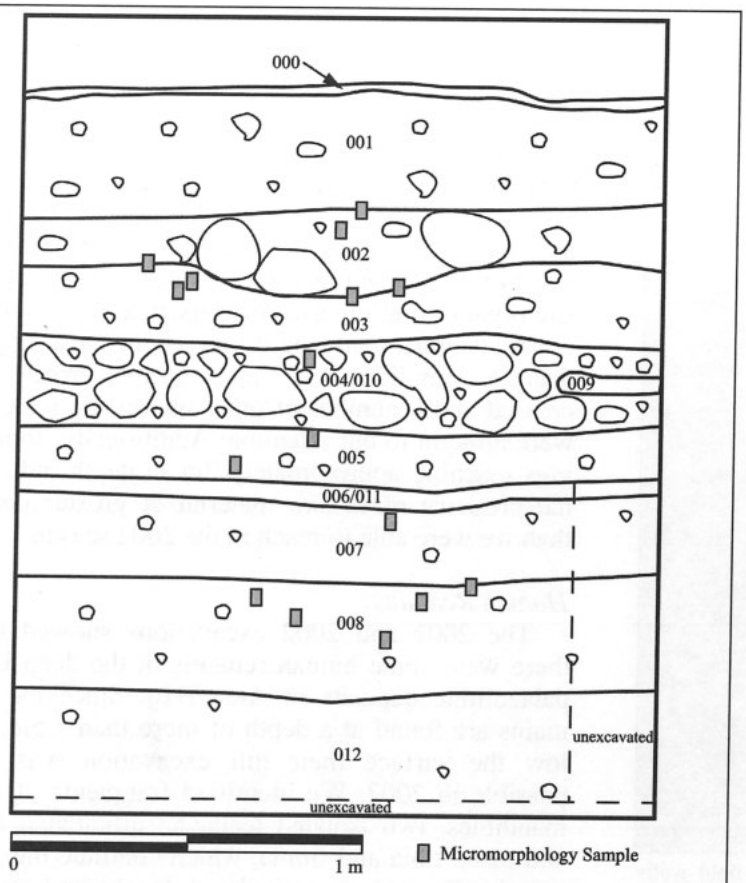
horizontal and vertical extent (**Fig. 3**). Our tests indicate that, underlying approximately 70cm of light-brown colluvium that contains Byzantine artefacts, a distinctive dark, red palaeosol contains high densities of Geometric Kebaran artefacts. The uppermost portions of the palaeosol have been redeposited from upslope but the lower portions are intact and contain *in situ* lithic, faunal, and human remains (Maher 2003). The discovery of this site is important because contemporary sites of this size with such a high density of artefacts and wide diversity of features, especially burials, are uncommon in the southern Levant. Excavation of this site allows investigation of both the nature of Middle Epipalaeolithic occupations in northern Jordan and its relationships with other contemporary sites.

In 2002, we excavated a total area of 38m^2 over the southern portion of the remaining terrace to expose a fairly large contiguous area of the Geometric Kebaran deposits. Our goal was to detect any spatial organization of the material culture and determine the depositional history of the deposits. Although we could discern no activity areas, hearths, or architecture in these upper deposits, the excavation greatly increased our lithic and faunal sample and brought a number of other interesting features to our attention.

Excavation Methods

In 2000 and 2001 the Wādī Ziqlāp Project conducted limited test excavations at the site in four areas (C16, E16, H14, and H16 in **Fig. 2**). Here, we excavated to a depth of 2.5m below the surface, uncovering approximately 1.75m of Middle Epipalaeolithic material (Maher 2001, 2002). This underlay 0.75m of recent (Holocene) plough-zone soil containing Roman/Byzantine and, possibly, Late Neolithic artefacts.

The 2002 excavations employed a nominal 3 x 3m grid, subdivided into smaller units of 50 x



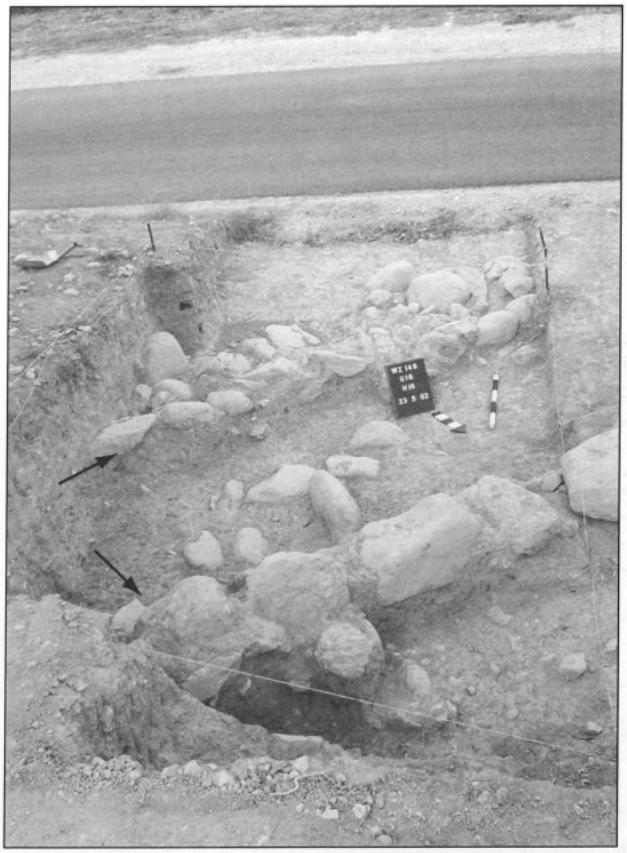
3. Stratigraphic profile for the north section of area H16, 'Uyūn al-Ḥammām, showing all excavated loci (labeled 000-012). The location of thin-section samples collected from 2000-2002 are marked by grey boxes. The human remains were discovered in locus 006/011.

50cm. Vertical subdivisions of stratigraphic layers by 10cm spits were used wherever there were no lithological grounds for changing locus. We screened 100% of excavated deposits through two sizes of overlapping mesh. Lithics, bone, shell, seeds and other artefacts were collected from the upper 3.5mm mesh, while all material in the lower 2mm mesh was collected and wet-sieved in the field laboratory. This material was later sorted in Toronto, by volunteers of the Wādī Ziqlāp Project, for micro-artefacts into the same artefact categories as the 3.5mm size fraction. Additionally, we systematically collected samples for flotation and micromorphological analysis.

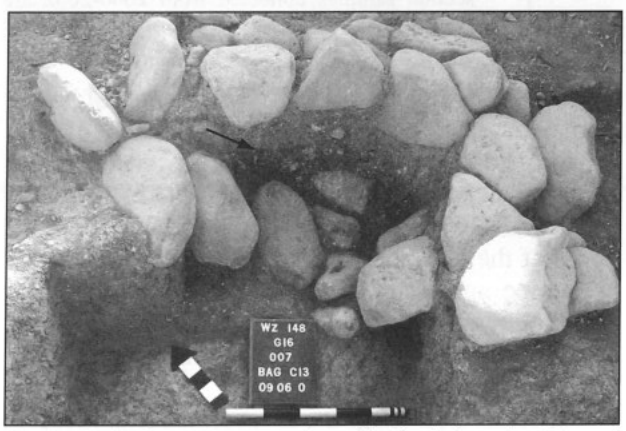
Late Neolithic and Roman/Byzantine Occupations

The terrace surface is covered by 50-75cm of Holocene sediment, exposed by our trenches stepped into the deep section created by road construction. It consists of a light-brown, silty colluvium with a very low density of Roman/Byzantine artefacts (mainly fragments of glass containers and beads) and the remnants of two small field walls whose foundations sit upon the uppermost Epipalaeolithic deposits (**Fig. 4**). The field walls were constructed parallel to the contours of the terrace edge and presumably stabilised the slope against erosion. Prior to road construction, the terrace was almost twice as large as today and provided an extensive flat surface suitable for farming.

In Area G16 (**Fig. 2**), a large, circular feature constructed of water-rounded cobbles appears to have been cut into the uppermost surface of the underlying Pleistocene palaeosol (**Fig. 5**). One Late Neolithic sherd was found lying directly on top of the stone feature and another possible Late Neolithic sherd was found below the first layer of stones. The feature was excavated in section to a depth of 15cm below the lowest stone and only a few Epipalaeolithic lithics and some fauna were recovered from within the feature. However, securely placing the feature within the Late Neolithic or



4. Photograph of two parallel Roman/Byzantine field walls (arrows) in areas G15 and G16. The base of these walls lies within Holocene colluvium evidencing ongoing mass movements and they likely represent an attempt to stabilize the terrace slope for agricultural purposes.



5. The rock feature was stratigraphically below the Roman/ Byzantine field walls but its foundation was dug into the uppermost portions of the Epipalaeolithic-bearing palaeosol. The abrupt transition between these two deposits is highlighted by the arrow. Two possible Late Neolithic potsherds and microliths are the only artifacts associated with the feature.

Epipalaeolithic must await future excavation in 2005.

The Geometric Kebaran Occupation

Directly below the light-colluvium with Late Neolithic and Roman/Byzantine artefacts is an abrupt stratigraphic change to the Epipalaeolithic deposit (**Fig. 3**), marked by a distinctive change in colour, texture, and structure, as well as a dramatic increase in microliths and faunal remains. Upon removal of the light colluvium, the surface of the Epipalaeolithic deposit was mapped, photographed and subdivided into 50 x 50cm subunits for excavation to a depth of 30cm. Although no internal site organisation in terms of activity areas, hearths, or architecture could be discerned in these upper deposits, our lithic and faunal sample greatly increased and a number of other interesting features were brought to our attention. Additionally, soundings reaching approximately 2m in depth indicate the presence of *in situ* material at greater depth than we were able to reach in the 2002 season.

Human Remains

The 2001 and 2002 excavations showed that there were some human remains in the deep Epipalaeolithic deposits in Area H16. Since the remains are found at a depth of more than 1.5m below the surface their full excavation was not possible in 2002. We identified fragments of two mandibles, two isolated teeth, an articulated foot and distal tibia and fibula, which continue into the unit baulk, and an articulated femur and pelvis (**Fig. 6**). The mandibles and pelvis were removed to prevent their impending destruction from erosion and construction of a terrace wall to stabilise

6. Human remains recovered from Area H16 at 'Uyūn al-Ḥammām include an articulated foot (1) and the fragmented remains of two mandibles and several isolated teeth (found under the sign board), confirming the presence of at least two individuals. In 2002, an articulated femur and pelvis (2) were found approximately 30cm away from the foot and mandibular fragments eroding out of the terrace section that cuts through the site. A large unretouched blade was discovered immediately beside the femur (arrow). The remains were conserved in the field and reburied for future excavation and analysis. In addition, isolated teeth and another mandibular fragment were also found eroding out of the section about 8m to the west of the remains shown here.

the site. One mandible is very large and robust (adult male) with substantial wear on the lower teeth, while the other is smaller and shows even more extensive tooth wear down to the crown. The foot, which continues into the baulk has been conserved *in situ* and reburied for future excavation in 2005. Our excavations of the remains indicate they represent the burial of two or three individuals, probably in flexed position. However, the road cut and subsequent erosion have disturbed portions of each skeleton. The remains were also associated with four large rocks found in a semi-circular position around the articulated foot. A broken basalt mortar, two trapeze/rectangles, and one well-made endscraper on a blade were found nearby, although their exact association with the human remains is uncertain.

In addition, we found isolated traces of human remains again eroding out of the slope about 8m farther west, at about the same elevation as those in Area H16. However, these constitute only one isolated tooth and another fragmented mandible and we could not trace the remains any farther into the section, so labelling these as a burial is tenuous at best.

In general, the bones are in good condition with some fragmentation and damage related to exposure from erosion. Attempts to date the human remains by radiocarbon dating (one sample of a mandible fragment and one sample of a tooth) at Isotrace Laboratories in Toronto failed, however, because of insufficient datable material.

Human remains from this period are extremely rare and previous examples are known from only a few sites in Jordan (al-Kharrāna, Muheisen 1988b) and Israel (Neve David, Kaufman 1987, 1989). Given the significant social and ideological importance that interment of the deceased may have had in this and subsequent periods, further investigation of these remains is of great importance.

Faunal Remains

A large quantity of faunal material was recovered from three seasons of excavation. The majority of it comes from locus 004 of Area H16 (**Fig. 3**) where a total of 2,171 bone fragments were excavated from 0.26m^3. Of these, only 187 (8.6%) have been identified to Genus or species because of the extremely fragmentary and carbonate-encrusted nature of the material. In many cases, carbonate deposits were virtually impossible to dissolve or remove without destroying the bone. Despite sample size and preservation issues, the proportions and types of identified material are much like those in other Geometric Kebaran assemblages (e.g., Bar-Oz and Dayan 1999, 2002).

Preliminary analysis of identifiable species from all excavation areas indicates a relatively wide species breadth, but with some focus on deer, gazelle, and hartebeest (Maher 2002). Our analysis identified 15 vertebrate and invertebrate taxa (Humphrey 2003), with *Gazella sp.*, *Cervus elaphus* and *Cervidae* sp. exhibiting the highest NISP values. Hartebeest (*Alcephalus*) and *Avies* are also abundant (Maher 2002). The presence and abundance of *Avies* sp. are significant because the preservation of these delicate bones (Humphrey 2003) is consistent with rapid burial by sediment.

A recent analysis of the faunal remains by E. Humphrey (2003) focussed on taphonomic and other information that the large quantity of unidentifiable remains could provide. Humphrey found that long-bone shafts were the most commonly represented body part, comprising 69.5% of the entire sample of unidentified fragments and suggests that the body parts represented by the unidentified fragments are consistent with what one would expect in a midden deposit, namely a high proportion of high-utility items, perhaps produced as a result of intensive processing for marrow extraction (Maher 2002).

The faunal material exhibits no evidence of carnivore gnawing (Humphrey 2003), although carbonate encrustation may have obscured it in some cases. We account for the high degree of fragmentation as a result of both food-processing activities, such as meat roasting and marrow and grease extraction, and some trampling that has created an assemblage of highly fragmented, largely unidentifiable pieces (Humphrey 2003; Maher 2002). A combination of food-processing activities and highly alkali soil conditions probably also accounts for the lack of collagen, hindering dating of bone samples. Several radiocarbon samples consisting of bone (TO-8850, TO-8851, TO-8852, and TO-8853) yielded insufficient collagen for dates. We are currently attempting to obtain dates from additional samples.

Burning or charring is relatively common and is found on 15.2% of mammalian long-bone fragments (Humphrey 2003; Maher 2002). Evidence for *in situ* hearths is lacking in these deposits, yet ash, charcoal fragments, and burnt flint occur in significant quantities in these deposits (see micromorphology below) and they likely represent refuse dumps or midden contexts. Large pieces of meat may have been cooked in an open pit or bones discarded in a fire and, later, redeposited in the midden.

Only three bone fragments showed any cultural

modification. The fragments all belong to the cervid family and show macroscopic evidence of cutting from skinning or disarticulation processes (Humphrey 2003).

The possibility that ʿUyūn al-Ḥammām is a specialised hunting or kill site is ruled out by the diversity of tool types, evidence for both on-site and off-site core reduction (see below), the abundance and diversity of animal species, and the presence of other artefacts (like groundstone) and substantial thickness of the deposits. Both high-utility and low-utility items are present in the faunal assemblage, indicating that sometimes entire carcasses, rather than just high-utility parts, were transported to the site (Humphrey 2003).

According to existing reconstructions of the distribution of mammals throughout the southern Levant (Tchernov 1998; Uerpmann 1981) and reconstruction of the forest-steppe boundary in Wādī Ziqlāp (Banning *et al.* 1987) all of the identified species were available within the immediate vicinity of the site. Much as with the acquisition of lithic raw material (see below), subsistence resources were readily available and occupants of the site did not have to travel far to acquire the species represented in the faunal assemblage. Consistent with palaeoenvironmental reconstructions for this region during the Middle Epipalaeolithic (Banning *et al.* 1987; Maher 2005), a broad spectrum of resources was available to the site's inhabitants. Resultantly, the faunal evidence suggests a relatively diverse subsistence base.

The Chipped Stone Assemblage

The 2002 excavations recovered far fewer lithics than previous seasons because we excavated only the top portion of the Epipalaeolithic deposit, where our previous soundings indicate that artefact densities are noticeably lower. However, the lithic material from this season is similar to that recovered previously (Maher 2002). Microliths of various forms dominate the tools (**Table 1**). Although both complete and incomplete trapeze/rectangles make up almost 50% of the identified tools, other common microliths include asymmetrical trapezes, obliquely truncated and backed bladelets, partially and completely backed bladelets, and fragments of backed pieces.

Most of the tools are made on a fine-quality, light brown or tan-coloured flint containing small, white inclusions, from a source in the flint-rich limestone hills east of the site. Generally, however, the lithic raw material is variable in quality and appearance. In almost all cases where cortex is pre-

Table 1: A preliminary count of tool classes from ʿUyūn al-Ḥammām (* excluding cores, core fragments, and core trimming elements) for the 2000-2002 seasons.

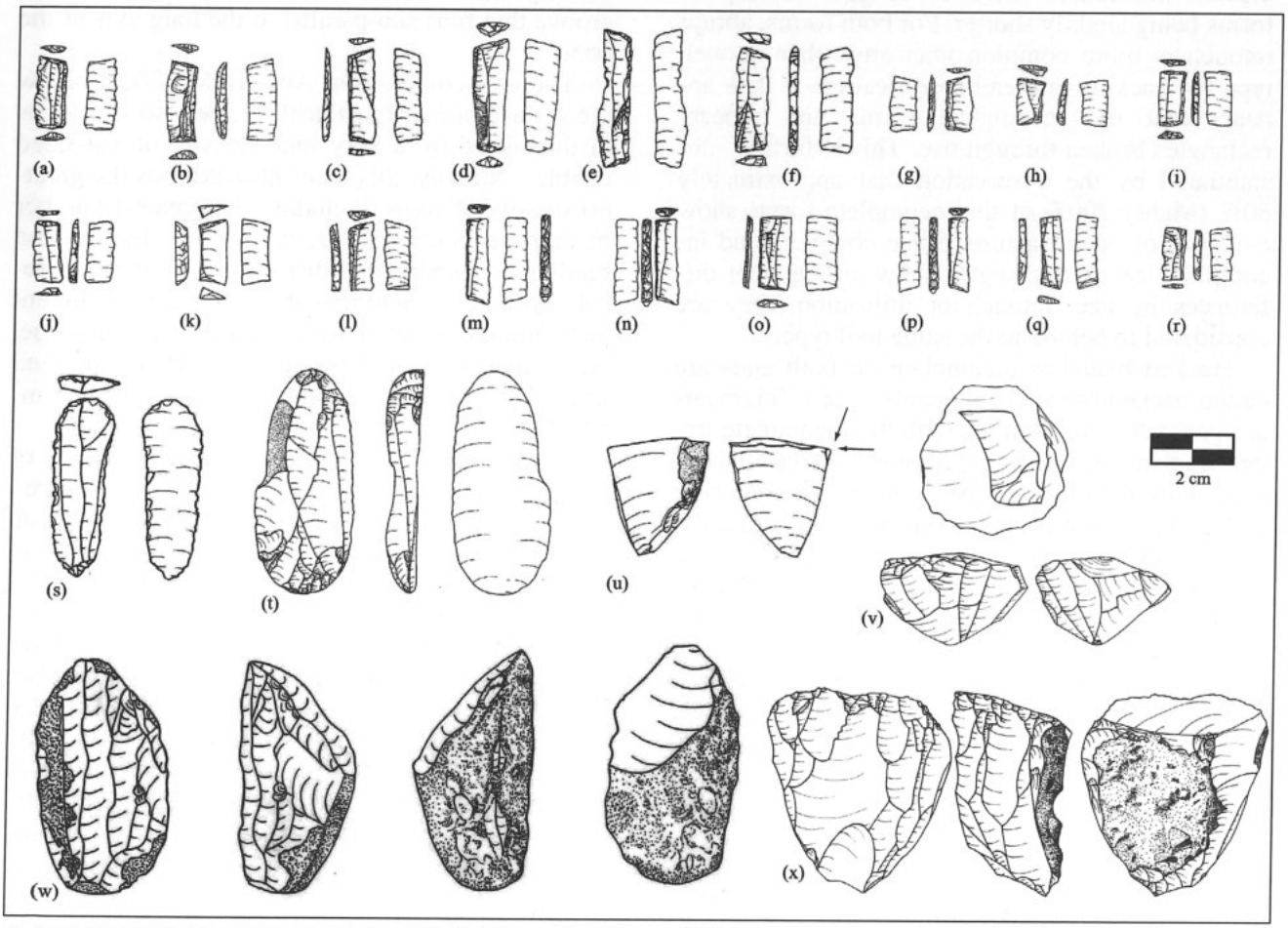
Artefact Class		**Total Number (n)**	**Percentage of all Tools***
Retouched Tools		225	15.8
Microliths	Non-Geometric	174	12.3
	Geometric	734	51.7
	(trapeze/rectangles)	(706)	(49.7)
	(asymmetrical trapezes)	(21)	(14.8)
	(lunates)	(4)	(0.3)
	(triangles)	(3)	(0.2)
Scrapers		121	8.5
Burins		64	4.5
Multiple Tools		16	1.1
Utilised Tools		64	4.5
Microburins		4	0.3
Notches and Denticulates		10	0.7
Perforators		5	0.3
Heavy Duty Core Tools		3	0.2
Cores, Core Fragments, Core Trimming Elements		153	-
Total		1573	100

served, it is well-rolled and water-worn. Its abraded nature and survey of the flint available today in the wadi suggest that most of the raw material at the site comes from small nodules from the adjacent wadi bottom. However, the presence of a very fine, translucent, dark brown flint that outcrops only downstream in the chalky bedrock near the mouth of Wādī Ziqlāp indicates that the occupants did intentionally search out this raw material.

Debitage from the excavations indicates that all stages of lithic manufacture occurred on-site. The abundance of complete and fragmented blades and bladelets demonstrates the importance of their production, presumably for microliths. However, most cores are too small, even in their original form as reconstructed from the percentage of preserved cortex, to have produced many of the large blade tools. This suggests not all tools were manufactured on-site.

Of the cores analysed, over 60% of them are single-platform, pyramidal or sub-pyramidal cores focussed on the production of uniformly-shaped bladelets (**Fig. 7**). Other core types include a few carinated core scrapers, punch cores, and amorphous flake cores. The bladelet cores are generally small in size and are fairly extensively covered in bladelet removal scars, suggesting relatively exhaustive use. In fact, we recovered one extremely small bladelet core that measured less than 3cm in its maximum dimension. For single-platform cores, an average of 270° of the platform circumference is utilised, with the remainder exhibiting water-rolled cortex.

Microlithic tools are twice as abundant as non-microlithic ones, making up 64% of all tools analysed (**Table 1**). Among non-microlithic tools, the most common types are endscrapers and burins. Over 69% of all identified scrapers are single or double endscrapers on blades. Notably, many of them are made on dark brown or reddish-brown flint of very fine quality. The assemblage also includes a substantial number of burins on natural surfaces and multiple tools, the burin on a re-



7. Tools from 'Uyūn al-Ḥammām assigned to the Geometric Kebaran include complete trapeze/rectangles, (a-k) incomplete trapeze/rectangles (l-r), endscrapers (s-t), burins (u), a single-platform carinated core scraper (v), and broad-faced, single-platform bladelet cores (w-x) (drawn by N. Tataric and R. Stebelsky).

touched blade being the most common.

The microlithic tool component is dominated by geometrics, which form 81% of this tool category. These consist of complete and incomplete forms of the trapeze/rectangle (**Fig. 7**), the asymmetrical trapeze B, backed bladelet fragments, a single abnormal scalene triangle, and two possible lunates. However, the abundance of trapeze/rectangles throughout all excavation areas and loci is notable. The clear dominance of, and uniformity within, this tool class is consistent with a typical Geometric Kebaran assemblage (Bar-Yosef 1970; Fellner 1995; Goring-Morris 1987). Within this tool class, both complete trapeze/rectangles and incomplete or "proto" forms are combined because, among backed tools with only one end retouched (the other truncated/snapped), it was impossible to tell the difference between tools that were "proto" forms not yet completely retouched into finished tools and ones broken on one end from use. However, comparison of the average length, width, and thickness of incomplete and complete forms indicates differences only in length, incomplete forms being slightly shorter. For both forms, abrupt retouch is more common than any other retouch type for backing and end modification. It thus appears that the incomplete forms are trapeze/rectangles broken through use. This is further substantiated by the observation that approximately 80% (Maher 2005) of the incomplete forms show evidence of edge fracture. Since complete and incomplete trapeze/rectangles show no apparent differences in size, retouch or utilisation, they are considered to belong to the same tool type.

Backed bladelets incomplete on both ends are called backed bladelet fragments. These fragments are generally short but, as with the incomplete trapeze/rectangles, they are otherwise similar to complete ones in width, thickness and location and type of backing. Most fragments also exhibit some degree of edge damage. Arguably, they represent trapeze/rectangles that have been broken on both ends through use or during manufacture, and are not a distinct class of tools.

Only four unambiguous microburins have been identified in the entire assemblage. Based upon the number of microburins (n=4) in relation to geometric microliths (n=734), it is clear that the microburin technique was not consistently or intentionally used.

Many of the blades and flakes display extensive pot-lids and fracturing from exposure to heat. Heating seems to be common for the unretouched debitage and some of the utilised pieces, but rare among retouched tools, where only 0.6% displays any evidence of burning.

Groundstone Tools

Groundstone tools from all three seasons at ʿUyūn al-Ḥammām include one broken and two complete cylindrical pestles, fragments of two basalt vessels, a complete limestone hand stone, and a small amorphous fragment of basalt. All three pestles were found eroding out of the terrace section. A limestone pestle (**Fig. 8**) and a large hand stone were eroding out of the section in Area H16, just above the level of the human remains. It may be significant that two of the three complete pieces of groundstone found to-date, both of which are made from limestone, were found only a few centimetres above the human remains.

Other Objects

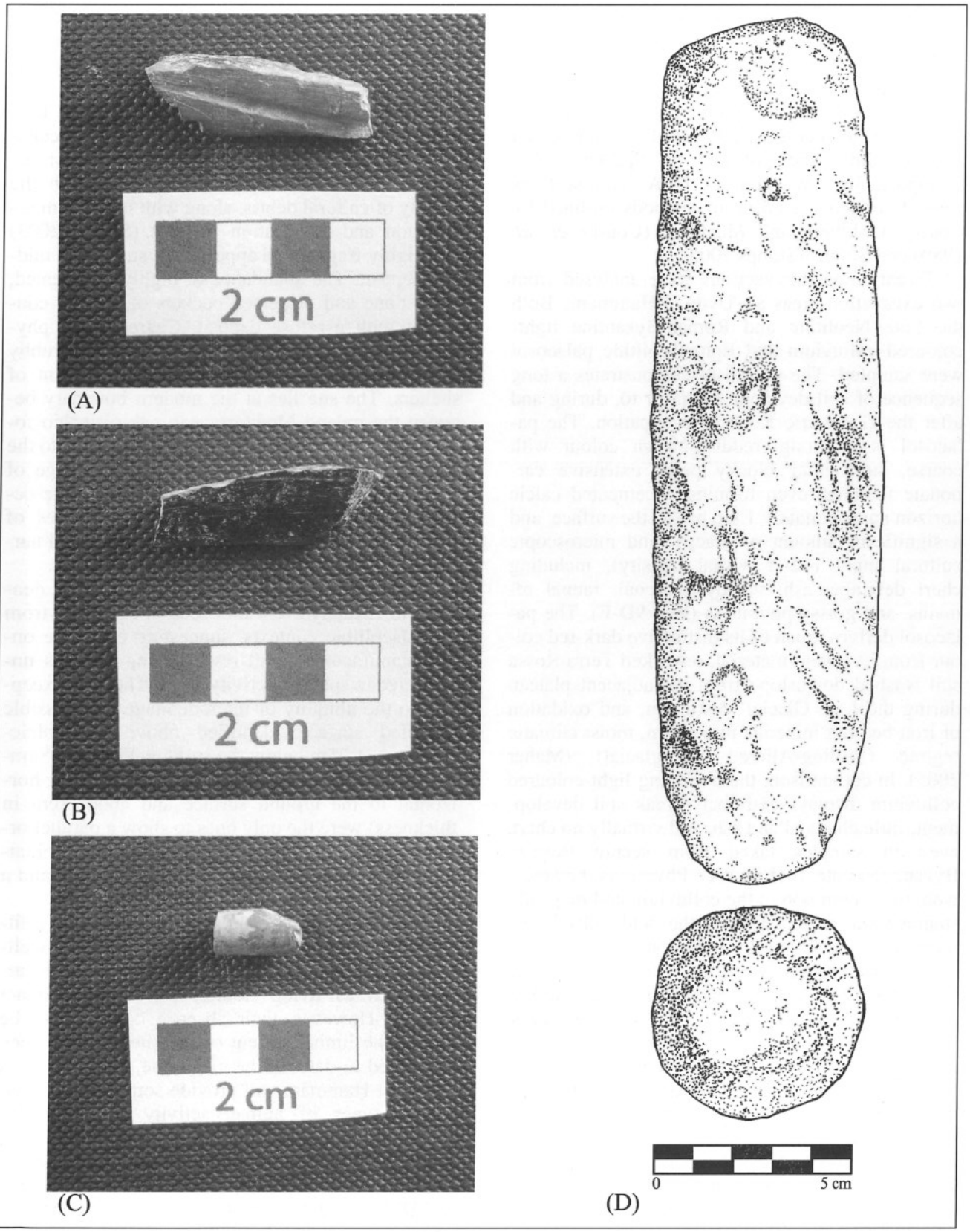
One unambiguous bone tool fragment was recovered from Area H16 (**Fig. 8**). It is a fragment of a mammalian long bone, probably a rib, with both surfaces highly polished. One surface is black from burning, while the other has a deeply incised groove that runs sub-parallel to the long axis of the bone.

The tool comes from Area H16, ~30cm below the surface of the Epipalaeolithic deposit in a locus distinguished by a very high density of fist-sized cobbles. Notably, this locus also exhibits the greatest density of tools, including the greatest number of trapeze/rectangles. However, the density and random orientation and distribution of artefacts results from slope activities that have input sediment and cultural material from on-site areas upslope. All remaining faunal material has been examined in the lab and no other bone tools have been identified.

Prior to 2002, only a few very small pieces of unidentifiable mollusc shell had been recovered from the site. In 2002, we excavated only the top 30cm of the Epipalaeolithic horizon, yet we recovered several pieces of shell, a fragment of a bone bead, a fossilized bivalve, and several fossilized fish teeth. The fossils do not appear to have been modified, although it is possible they were brought to the site as decorative objects. We also recovered two small tubular beads or bead fragments, one of shell (*Dentalium sp.*) and the other of bone (**Fig. 8**); both were poorly preserved. Finally, we found a few small fragments of both red and yellow ochre, neither of which occur naturally on-site.

Micromorphology

Samples of *in situ* blocks of sediment were col-



8. Objects from ʻUyūn al-Ḥammām include: (A-B) a bone tool with a deeply incised groove running subparallel to the long axis of the long bone on one surface (A), while the other surface of the tool is extensively burned and polished (B); (C) a bone bead fragment displaying a highly polished surface and, (D) a limestone pestle found eroding out of the section of the terrace close to the human remains in area H16 (drawn by R. Stebelsky).

lected from several Epipalaeolithic contexts (**Fig. 3**) in 2001 and 2002 for micromorphological analysis with the aim of identifying possible living surfaces, activity areas, and site-formation processes. Consolidated blocks were impregnated with a clear polyester resin, cut to a thickness of 30µm, glued to a glass slide, and polished by Spectrum Petrographics Inc., Washington, USA. Thin-sections were described according to methods outlined by Courty, Goldberg and MacPhail (Courty *et al.* 1989) and Stoops (Stoops 2003).

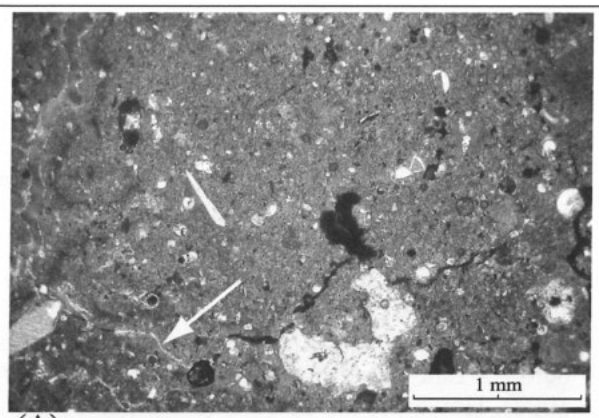
Twenty-nine thin-sections were analysed from two excavation areas at ʿUyūn al-Ḥammām. Both the Late Neolithic and Roman/Byzantine light-coloured colluvium and Epipalaeolithic palaeosol were sampled. The palaeosol demonstrates a long sequence of soil development prior to, during and after the Geometric Kebaran occupation. The palaeosol is a strong, reddish-brown colour with coarse, subangular blocky peds, extensive carbonate features, even forming a cemented calcic horizon approximately 1.8m below the surface, and a significant amount of macro- and microscopic cultural input (~2-% visual density), including chert debitage, ash, woody charcoal, faunal remains, and grassy phytoliths (**Fig. 9D-F**). The palaeosol derives much of its distinctive dark-red colour from its parent material, reworked Terra Rossa soil washed downslope from the adjacent plateau during the Late Glacial Maximum, and oxidation of iron-bearing minerals in a warm, moist climatic regime (Bølling-Allerød interglacial) (Maher 2005). In comparison, the overlying light-coloured colluvium displays extremely weak soil development, little charcoal and ash, and virtually no chert, even in samples taken from secure Roman/Byzantine contexts (**Fig. 9A**). Phytoliths, however, were more common in the colluvium and may substantiate our interpretation of the field walls as elements of an agricultural installation.

The boundary between the well-developed palaeosol and the light-coloured colluvium exhibits an erosional unconformity. Two Late Neolithic body sherds associated with a circular stone feature (see above) found at the base of the colluvium suggest a duration of up to 4000 years (12 500-8000BP) for erosion during which an unknown thickness of the palaeosol and, perhaps, other sediments, were washed away. During or after this erosional phase and prior to burial by light colluvium (Holocene), portions of the palaeosol were eroded from upslope and redeposited at the edge of the terrace. They are similar appearance and composition, yet accompanied by derived soil aggregates, Geometric Kebaran artefacts, a high density of cobbles, and a more fragmented, crumbly microstructure. This suggests that it derived from the same parent material (reworked Terra Rossa) and its source was immediately upslope.

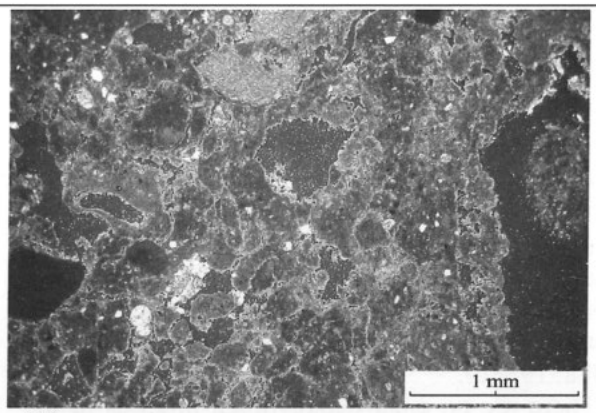
Further examination of the samples from Epipalaeolithic contexts allows us to discuss occupational differences between the two excavation areas. In Area H16, the dramatic increase in the density of cultural debris, along with its random orientation and distribution patterns (Stoops 2003) and highly fragmented appearance, suggests a midden deposit. The abundance of highly fragmented, burnt bone and dispersed pockets of ash are consistent with a refuse deposit. Charcoal and phytoliths attest to the use of woody and shrubby plants for fuel and, perhaps, the construction of shelters. The site lies at the modern boundary between the upland Mediterranean oak-pistachio forests to the east and the Irano-Turanan steppe to the west (Banning *et al.* 1987), and a wide range of plant species would have available to the site occupants. Further identification of the species of phytoliths represented in the thin-sections will narrow down the use of particular plant resources.

Flint microdebitage occurs in very high densities in virtually every thin-section examined from Epipalaeolithic contexts, suggesting extensive on-site manufacturing and resharpening of tools unrestricted to specific activity areas. The only exception to the ubiquity of microdebitage is a possible trampled surface identified above the calcic-horizon (~1.75m below the surface, Fig. 9C). Samples from this context (a linear feature running horizontal to the ground surface and about 1cm in thickness) were the only ones to show a parallel orientation of the coarse fraction, grain-size dominated by silts, lack of cultural debris except ash, and a highly compacted groundmass.

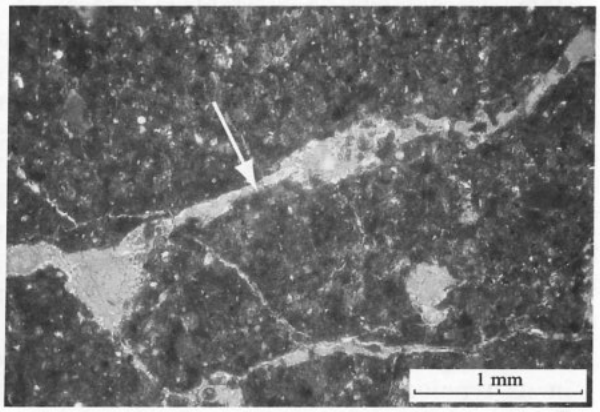
Reconstructing human activities on-site is a little more difficult because of the lack of well-defined occupational features in the excavated areas, such as living floors, structures, or intact hearths. However, their absence could easily be due to the limited extent of the site that has been excavated to-date. In the meantime, the deposits at ʿUyūn al-Ḥammām still provide some insights into certain types of human activity. Several thin-section samples show a dramatic increase in the density of cultural material, particularly microdebitage, large bone fragments, and charcoal (loci 005/007 and 008). These lower, *in situ* horizons show microstructures and combinations of constituents reminiscent of particular activities. Locus 005/007 resembles a midden or "unkept" living surface, with high densities of highly fragmented



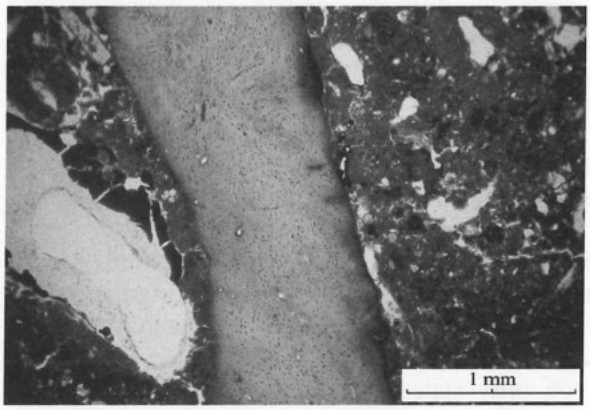
(A)



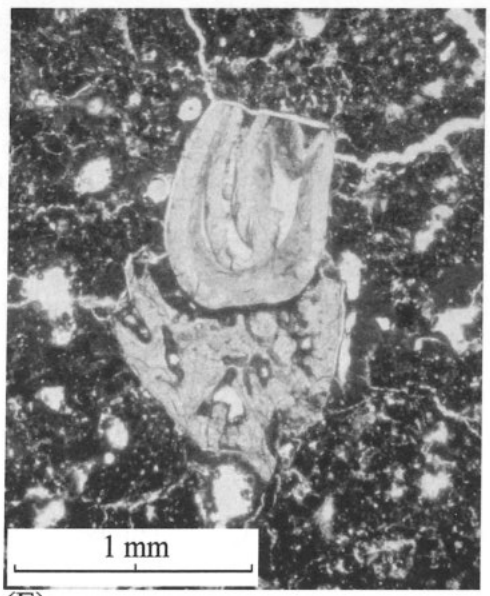
(B)



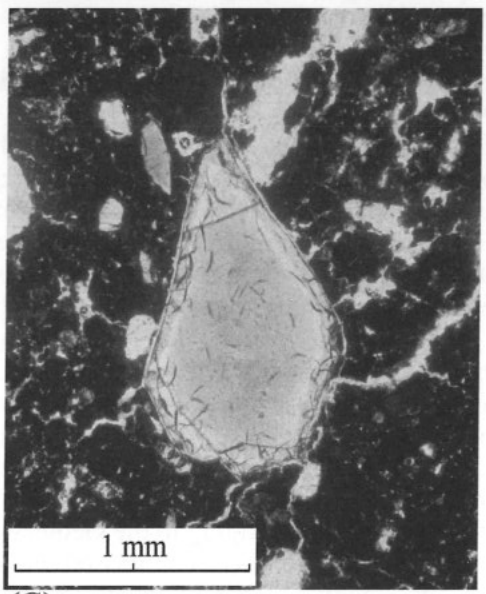
(C)



(D)



(E)



(G)

9. Photomicrographs of thin-section samples from ʻUyūn al-Ḥammām. (A) The abrupt transition between the Holocene colluvium (locus 002) and the reddish Epipalaeolithic palaeosol (locus 003) is marked by an arrow (XPL); (B) Extensive secondary carbonate development in locus 008 of the Epipalaeolithic-bearing palaeosol gives the groundmass a mottled and dense appearance and preserves and infills voids created by bioturbation. Pedogenic carbonate is found as calcite crystals lining void walls, hypocoatings, incipient nodules, and calcitic intergrowths (XPL); (C) A possible trampled surface at the base of locus 007 is marked by a horizontal, compacted, platy structure, as well as a notable lack of carbonate features and cultural debris from this ~1mm-thick feature (XPL), (D-F) Fragments of burned bone (PPL), a small carnivore molar (XPL), and chert microdebitage (XPL) from locus 008, respectively, all found in association with macroscopic charcoal, lithics and fauna.

bone, charcoal, and microdebitage all mixed together from continuous dumping of debris from adjacent hearths or other activity areas. The boundary between 007 and 008 shows a linear, horizontal, compacted feature, possibly part of a trampled floor. Furthermore, the one sample adjacent to the human remains showing evidence of heavy disturbance is overlain by intact deposits. It likely indicates an informal, shallow burial pit or depression, perhaps similar to those reported from Ohalo II (Nadel 1994) and Kharaneh IV (Muheisen 1988a, 1988b).

There are no clear occupational hiatuses or interruptions in deposition. The repeated use of certain areas for dumping garbage is evidenced by more than 20cm of midden-like material in locus 005 of Area H16. Samples taken near the human interments do not show evidence of distinct, intrusive pits. However, occupation of the site continued afterward and the deposits immediately overlying the human remains are intact. In summary, these deposits tell us that the site was occupied, continuously or not, as more than just a short-term, ephemeral campsite. Inferring the duration of occupation by rates of sedimentation and pedogenesis is virtually impossible here. Presently, we can only state that the lower portion of Epipalaeolithic-bearing material (loci 005-008) is ~ 1m thick and belongs to a single cultural phase — the Geometric Kebaran.

Relationship to Other Middle Epipalaeolithic Sites in Northern Jordan

The Epipalaeolithic sequence is based primarily on the analysis of lithic assemblages, and it is primarily through typological and technological comparisons of finished microliths that assemblages are assigned to different industries. However, assemblage composition varies considerably throughout the Levant. As a result, the Middle Epipalaeolithic is now characterised by a number of geographically-localised entities of roughly contemporaneous age (ca. 16 000-12 500BP), each defined largely on the basis of tool type frequencies and technological comparisons. An assemblage is generally considered as belonging to the Geometric Kebaran if the lithic technology is focussed on the production of relatively standardized trapeze/rectangles, such that they dominate the toolkit.

Survey and excavations in northern Jordan have revealed numerous sites of the Terminal Pleistocene. However, relatively little is known about the Middle Epipalaeolithic, specifically, as it is represented by only a few sites, including Ṭabaqat al-Būma and ʿUyūn al-Ḥammām in Wādī Ziqlāp (Maher 2002), WH 26, WH 31 and WH 50 in Wādī al-Ḥimma (Edwards 2001, 1996; Macumber and Head 1991), and two sites in Wādī Ḥisbān (Edwards 2001). However, the assemblages from these sites are significantly different from each other and other sites of contemporary age and so warrant some discussion.

Ṭabaqat al-Būma and ʿUyūn al-Ḥammām are located within 800m of each other in western Wādī Ziqlāp. Both are found in a distinct Pleistocene palaeosol and Ṭabaqat al-Būma is stratigraphically below a Late Neolithic occupation (Banning *et al.* 1992). However, the lithic assemblages of the two sites are quite different (Maher 2002). ʿUyūn al-Ḥammām exhibits an assemblage typical of the Geometric Kebaran, including an emphasis on the production of standardised trapeze/rectangles approximately 7mm in width. At Ṭabaqat al-Būma, lithic densities are much lower and there appears to be a focus on the production of extremely narrow bladelets truncated and retouched obliquely. Given that most of the tools were truncated at both ends to form narrow, elongated geometrics, the assemblage is somewhat similar to, but not typical of, the Geometric Kebaran.

Although ʿUyūn al-Ḥammām is unproblematic in its typological affinities, the assemblage from Ṭabaqat al-Būma exemplifies the confusion over how exactly to define the transition from Kebaran to Geometric Kebaran in the Mediterranean zone. It does not resemble a typical Geometric Kebaran assemblage, as there is no dominance of trapeze/rectangles. However, the assemblage is equally unlike a typical Kebaran assemblage, as there is considerable standardisation in the production of tools with both ends modified (i.e., both ends modified or snapped to resemble geometric shapes). Therefore, it can be argued that the material from Ṭabaqat al-Būma is transitional between the Kebaran and Geometric Kebaran, and this agrees well with existing radiocarbon dates placing occupation ~15 500 cal BC (Maher 2002).

In Wādī al-Ḥimma (WH), the assignment of Epipalaeolithic is in many cases based on radiocarbon dates, even though the lithics have few of the diagnostic features for specific Epipalaeolithic cultures (Edwards 1996). WH 26 and WH 31 are both tentatively assigned to the Middle Epipalaeolithic on the basis of a few "ad hoc" (Edwards 1996:123) geometric microliths. Also, WH 50 contains only a single backed bladelet fragment and, while microliths are the dominant tool type, they are primarily points formed by bilateral backing and abrupt retouch at the distal end, similar to early "El-Wad" points (Edwards 1996: 123). However, excavations

were limited at these small sites and the recovered tools may not be representative of the entire assemblages.

Therefore, the closest sites to ʿUyūn al-Ḥammām that are assigned to the Middle Epipalaeolithic and located in the Mediterranean woodlands are Ṭabaqat al-Būma and WH 50. Both are atypical sites, with none of the defining characteristics for this period. Neither resemble *ʿUyūn* al-Ḥammām in their lithic types or density, abundance of faunal remains, presence of burials, nor other features discussed above.

Conclusions

There are few classic Geometric Kebaran assemblages (those dominated by trapeze/rectangles and with groundstone and other site features discussed above) east of the Jordan Valley. The lithics from ʿUyūn al-Ḥammām are clearly Geometric Kebaran and comparable to many of the contemporary sites to the west and southeast (al-Azraq Basin). Despite the high degree of variability in Jordan in the Geometric Kebaran, northern Jordan no longer represents a gap in our knowledge for this period and can be related to other culturally contemporary sites in other parts of the southern Levant.

Although no architecture, hearths, or storage pits, features typically associated with multi-seasonal occupations have been discovered to-date, I suggest that this is due to the limited extent of excavation to date. We have only excavated the uppermost, partially disturbed, part of the Geometric Kebaran horizon. Our soundings indicate that the deeper deposits contain *in situ* material, including human remains. The rapid colluviation of the site has likely deeply buried any of these features so that, if they are present, we simply have not yet reached them.

In summary, I have attempted to outline our current understanding of this new assemblage from northern Jordan and place it within the region's cultural-chronological framework. Although *ʿUyūn* al-Ḥammām and Ṭabaqat al-Būma differ in their lithic assemblages, it is possible that the low density of artefacts from Ṭabaqat al-Būma, and its greater similarity to sites in the south and east of Jordan than to ones in the Mediterranean core, point to its use as a short-term hunting or gearing-up site (Maher 2002). The extremely high density of lithics from ʿUyūn al-Ḥammām and the appearance of "traditionally" Geometric Kebaran tools, the abundance of fauna, the traces of non-local shell and bone tools, the high occurrence of burning of the lithics and fauna, and the presence of at least three interments may indicate a more substantial site. If there are also architecture, storage pits, and other features, these must await further excavation.

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