Field Reports
Abbès, Wadi Tumbaq 1
Fujii, Petroglyphs from Wadi Abu Tulayha
Gebel, ‘Ain Jamam Pre-1993 Field Research History

Contributions
Coşkunsu, Hole-making Tools of Mezraa Teleilat
Bernbeck, Pollock & Fazeli Nashli, Rahmatabad

Workshops, Conferences

New Publications

NEO-LITHICS 1/08

The Newsletter of Southwest Asian Neolithic Research

Contents

Field Reports

Frédéric Abbès

Wadi Tumbaq 1: A Khiamian Occupation in the Bal'as Mountains 3

Sumio Fujii

Two Petroglyphs from Wadi Abu Tulayha, a PPNB Agro-pastoral Outpost in the Jafr Basin 9

Hans Georg K. Gebel

Neolithic 'Ain Jamam near Ras an-Naqb: The Pre-1993 Field Research History 16

Contributions

Güner Coşkunsu

Hole-making Tools of Mezraa Teleilat with Special Attention to Micro-borers and Cylindrical Polished Drills and Bead Production 25

Reinhard Bernbeck, Susan Pollock and Hassan Fazeli Nashli

Rahmatabad: Dating the Aceramic Neolithic in Fars Province 37

Workshops, Conferences, Call for Papers

BANEA 2008 Conference, Liverpool, February-March 2008 39

6th PPN Conference, Manchester, March 2008 40

Basta Final Symposium, Berlin, April 2008 42

Bead Technology Workshop, Liverpool, January 2009 44

The Late Neolithic of Upper Mesopotamia, March 2009 44

New Publications 45

New Website 47

Masthead 47

Editorial

This issue again is a testimony for ever-flourishing research in the Near Eastern Neolithic. The off-field research activities and gatherings are developing a productivity beyond all expectations. Within this cycle of field and lab work, many of us tend to ignore a third task we have: to transfer our research into information suitable to be launched into the public knowledge. If one peers into current text books and tourist guides treating the Near Eastern Neolithic, one will notice what we mean. We invite you to present in future *Neo-Lithics* issues your experiences or suggestions in raising public awareness and knowledge about the Neolithic of the Near East. For example, efforts are now underway in South Jordan to establish a Neolithic Heritage Trail from Faynan to Basta.

We would like to inform that the special issue on Water Domestication of *Neo-Lithics* is postponed until Issue 1/09 (no other contributions accepted for this issue). Commentators to the keynotes will have time to submit their contributions between December 1, 2008, through February 28, 2009.

Gary O. Rollefson and Hans Georg K. Gebel

Wadi Tumbaq 1: A Khiamian Occupation in the Bal'as Mountains

Frédéric Abbès

Archéorient, Maison de l'Orient et de la Méditerranée, Lyon <frederic.abbes@mom.fr>

The Neolithisation of the northern Levant is known in particular from the excavations of the Euphrates valley and the basin of El Kowm. Between these vast geographic entities are large areas, often arid today, which have been little explored. The survey work carried out for the *"Marges Arides du Croissant Fertile"*[1] research program has enabled a preliminary reconnaissance of the Bal'as mountains and revealed wide occupation there during prehistory. Our surveys and excavations in these mountains and in the Amur mountains north of Palmyra are integral parts of the research into the nature of Neolithic occupations in these environments: types of habitation, degree of sedentarism, economy... It is also the relation of these settlements with the great centres which are already known (Euphrates valley, El Kowm basin, Damascene and southern Levant) and their place in the process of Neolithisation which is the subject of our research as part of the El Kowm-Mureybet mission[2].

The Bal'as mountains are situated in the interior of Syria, 44 km east of the town of Salamiyeh (Fig. 1). The mountain chain extends about 25 km from north to south and 15 km from east to west, and rises to about 1100 m. It is part of a larger mountainous area that stretches between the city of Homs and Palmyra farther to the south.

Very wide wadis run through the mountains, and are natural means of access which facilitate crossing the range. These large channels are joined by smaller secondary wadis which are either secondary routes or *culs-de-sac* which are often favourable to human settlement. This is the case for Wadi Tumbaq, situated in a little valley which is deep and narrow. The wadi begins at the point at which three hills meet, runs for 200 m and flows in the rainy season (autumn/winter) into a wadi of larger size. Many caves and rock shelters occupy the higher slopes of the little valley. Methodical surveying has shown that Wadi Tumbaq was extensively occupied from the Lower Palaeolithic up to the historical period, its occupants taking advantage of the rocky cavities as well as the alluvial zones in the valley bottom. Neolithic occupations are present throughout the wadi, with however a clear preference for the higher zones in the case of the earliest villages. This is true of Wadi Tumbaq 1.

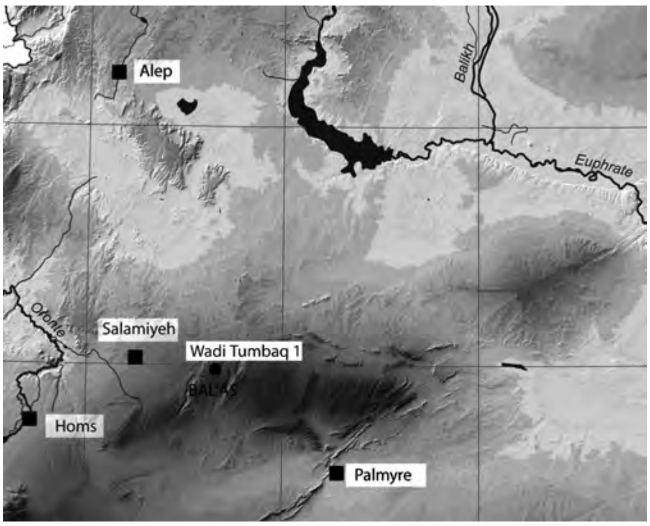


Fig. 1. Geographic situation of the Bal'as range and the site of Wadi Tumbaq 1.

The Khiamian

A survey of flint deposits and prehistoric occupations revealed 14 Khiamian sites in a radius of 4 km around Wadi Tumbaq 1. Of these 14 sites, 13 present the same occupation profile: a rock cavity or shelter situated at a height dominating a deep and narrow wadi, an artificial terrace in front of the cavity, a small surface area well-demarcated from the constructed space (about 200 m^2). Only one site situated 350 m to the north of Wadi Tumbaq 1 presents different characteristics. It is very wide and situated on a natural low terrace along the edge of a wide wadi. Circular architectural forms are visible on the surface and an adze of "Mureybet" type knapped from Euphrates flint was discovered.

Wadi Tumbaq 1

The site consists of an adapted terrace of 143 m^2 on the slope of the hill in front of the opening of a small cave. Three phases were revealed. From top to bottom, the first belongs to the middle/late PPNB. It is especially characterised by the presence of arrowheads and a naviform debitage of which some are of the *"one on one"* type (Borrell Tena 2006, vol. 1: 296; Nishiaki 2000: 57ff, fig. 4-12, 69). The second phase belongs to the very end of the PPNA or to the early PPNB. It is situated directly under the PPNB occupation. It contains two habitations with straight walls and rounded angles. The lithic industry is not large and includes predetermined blades which were found in rough form. The third phase belongs to the Khiamian. It is subdivided into three architectural levels.

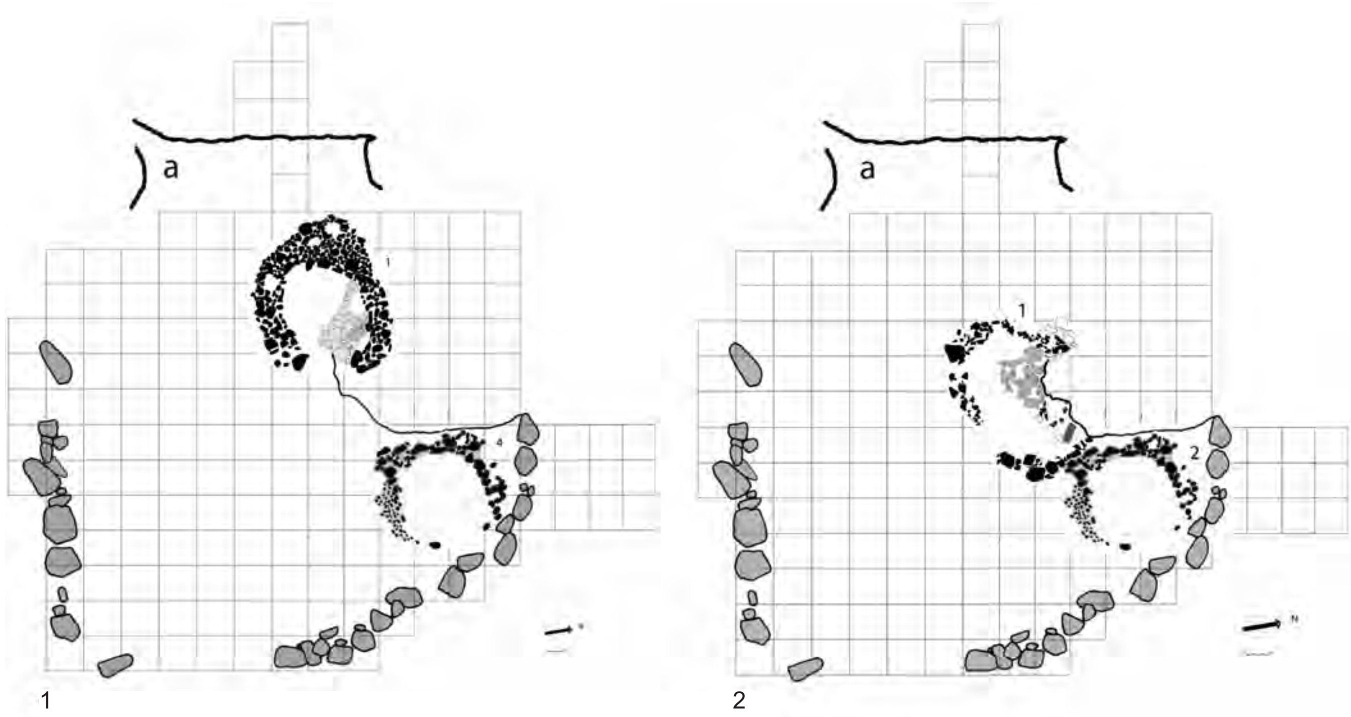


Fig. 2. Wadi Tumbaq 1: first level of architecture (1); second level of architecture (2); opening of the cave (a).

The Khiamian Phase

The great majority of the Khiamian sites surveyed in the environment of Wadi Tumbaq possess a semi-circular terrace surrounded by rock. The constructed space is thus clearly defined. The terrace of Wadi Tumbaq 1 as it is visible today consists of a construction or rearrangement of space constructed when the village was already in existence (Fig. 2). The rearrangement corresponds to Level 2 of the Khiamian phase. Thus it is not a construction related to the foundation of the settlement. No earth or stones brought from elsewhere were detected within the space circumscribed by the terrace. The earth and the stones present in the perimeter come from the accumulation of the archaeological levels. Many rocks come from collapse of the cave vault. Surveys were made outside the stone circle. So far no construction in hard materials contemporary to Level 2 has been found.

The Constructions

The three Khiamians levels have produced several houses, including three complete ones which are slightly different morphologically but based on the same principles of construction - they are built against a natural or artificial wall or against the wall of a pit. Two curved walls encircle a central space and leave an opening at their place of junction. The superstructure of the buildings is organised around three main posts placed to form a triangle (Fig. 3). The walls are in earth and stone. The interior space has a tamped earth floor, benches and small coffers constructed in the same way as the walls.

Habitation n° 1. This construction is in a "horseshoe" shape and measures 4 x 3.5 m (Fig. 4: 1). Its opening is oriented towards the east in the direction of the slope of the terrace. The walls, of which several courses are in evidence, were built in stone. Large stones (about 40 cm) which were sometimes set on edge constitute the facing of these walls, while the fill consists of smaller stones. The foundations are always constructed with the largest blocks. The house rests against a stone supporting wall set against a rock face to the west and north. It is preserved in this zone up to a height of 50 cm. Within the habitable space, and near the entrance, a bench of about 1 x 1 m was covered by an earth coating. It is completed by a small pit 30 cm deep with a maximum diameter of 60 cm. This pit was also coated with earth and corresponds to a small installation of domestic nature. The bench was also provided with a second small cavity corresponding to a post wedge. Like the other constructions, the house has three

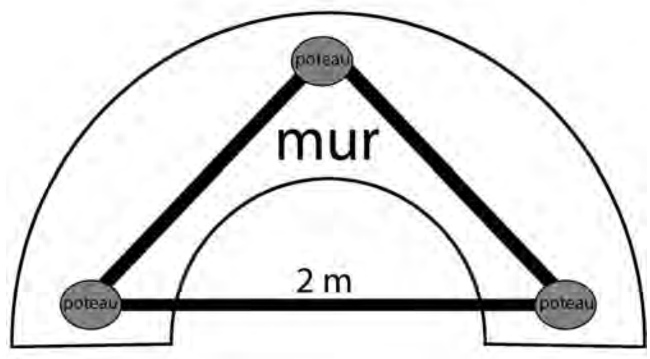


Fig. 3. Wadi Tumbaq 1: principle of post placement in Khiamian constructions.

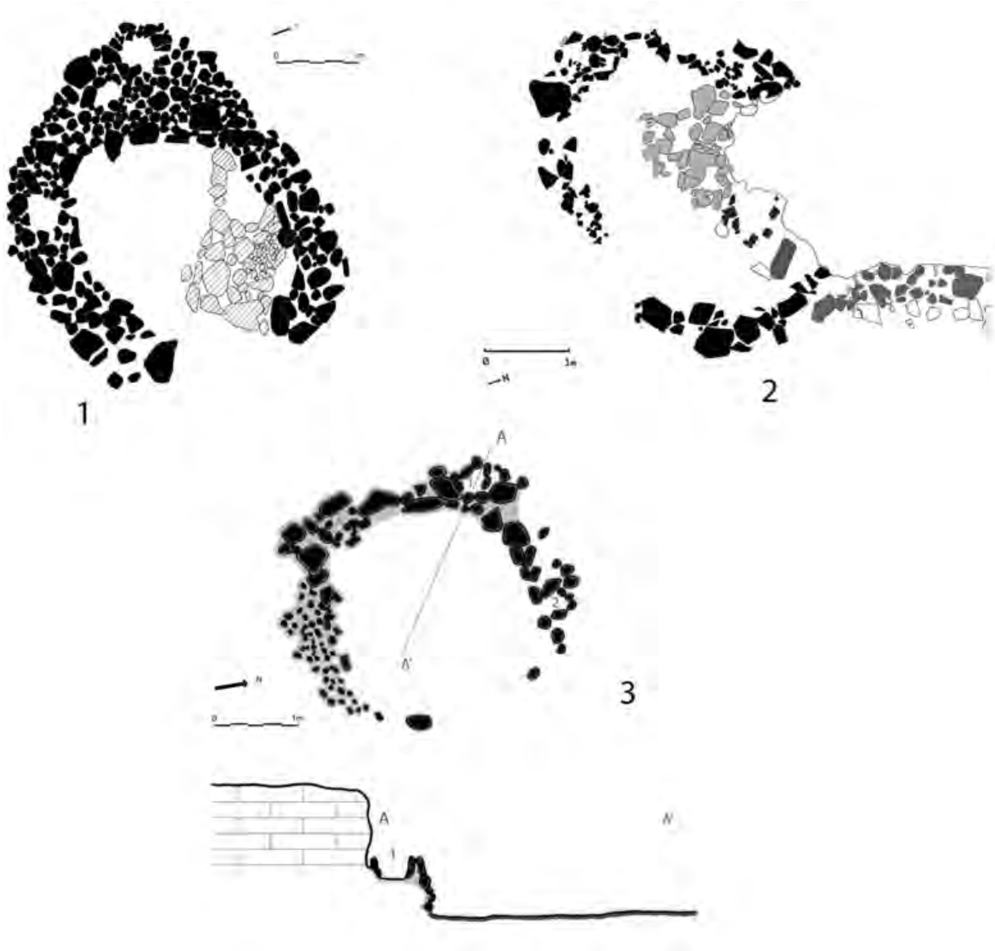


Fig. 4. Wadi Tumbaq 1: construction of Level 1 (1); constructions of Level 2 (2-3).

post wedges forming a triangle. The erections in earth and wood were built upon this triangular structure. Finally, the house rests on one of the rocky slabs of the terrace which constitutes in part the interior floor. An earth floor rests on a bed of stones at the same level as the rocky slab which completes it.

Habitation n° 2. This is composed of a curved wall constructed in elevation and resting against a rocky face partitioning a space (Fig. 4: 2). Although a different morphology, this is the conception: a wall constructed in elevation and a wall consisting of a natural face, similar to the other habitations of the site. The interior space consists of a bench along the rocky face, a coffer of stone and building earth constructed in elevation. Contiguous to this structure, a grindstone with its hand stone placed in the centre of its active surface rests on a base made of building earth and stone.

Habitation n° 3. Constructed a few centimetres east of the preceding house, it is semi-circular (3.5 x 3.5 m) with an interior diameter of about 2 m (Fig. 4: 3). Its opening is oriented towards the west, in the direction of the lower part of the terrace slope. Constructed of building earth and stone, the house partly runs along the rock face and the rocks defining the artificial terrace. In this location, two hypotheses of adaptation are possible. The rock face may have been used as a natural partition as it does for the preceding house. In this case, the walls of large calcareous rubble-stones found only in this location in the house demarcate a bench – a standard design for the houses of this period. Or, the rubble-stones in front of the rock face truly constitute the exterior wall of the house. In this case, the house would be perfectly circular and would not benefit at all from its proximity to the rock face. In their continuation towards the south and the west, the walls are constructed in building earth on a bed of small limestone blocks. Three posts whose stone wedges are 50 cm in diameter were incorporated in the walls (or in the interior bench). As for house n° 1, they ensure the support of the superstructure. The interior floor was composed of tamped earth, covering gravel which was orange in colour. The gravel was deposited intentionally and it was identical to the stones originating in the levels of the natural erosion of the neighbouring terraces.

The Flint Industry

The flint objects consist of 96% knapping waste (22,429 flakes and blades) most of which are associated directly with the Khiamian levels (Table 1). Three distinct *chaînes opératoires* could be determined. The first was intended for the production of bladelets, a second for the production of blades and the last for making flakes. The flint used came from a source situated at 800 m from the site (94% of the industry), in the steppe adjacent to the Bal'as mountains. The Khiamian populations thus obtained their raw material in the immediate environment of the site.

Procurement of materials from farther away was rare. Even more rare is the presence of obsidian on the site. No obsidian tool was found. However, all the obsidian pieces are knapping waste, evidence of working the material *in situ*.

Bladelet production. This was carried out on small unipolar nuclei and more rarely on bipolar nuclei, naviform or with postero-lateral ridge. The nuclei are prepared by one or two ridges (Fig. 5).

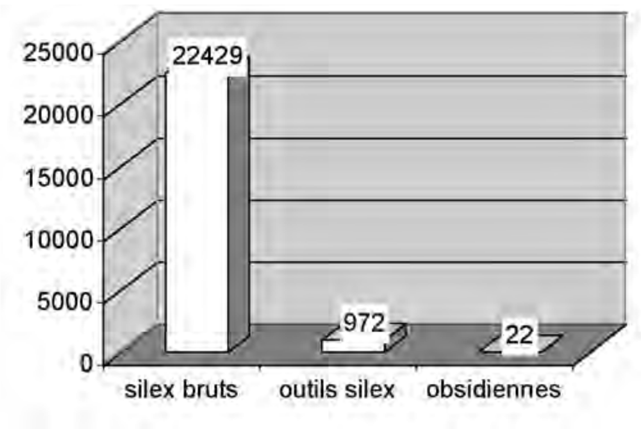
Whatever the type of nucleus, the blade productions are identical and the exploitation of bladelets is carried out on only one striking platform. For the bipolar nuclei, the second striking platform serves to maintain the debitage surface and to change the orientation of the production of bladelets when necessary (Fig. 6). This type of exploitation is similar to those already known on the sites of the northern Levant (Abbès in press).

The presence of nuclei which are naviform or with postero-lateral ridges, generally attributed to the PPNA and PPNB, is not in itself surprising. As has been demonstrated for the Euphrates sites (Abbès 1998), this is only a morphological resemblance to the nuclei of later periods. The manner of exploiting these nuclei, previously described, remains typical of the Khiamian.

Blade production. Some blade nuclei are present. They are always unipolar. The blades are produced usually without previous preparation of the flint blocks. Only the pursuit of robust blades seems to have guided this debitage which does not present any special characteristics. It is similar to the unipolar blade debitage used during the latest periods of the Neolithic.

Flake production. This was carried out on small blocks of flint, sometimes on old bladelet or blade nuclei. As is often the case with this more expeditious type of debitage, no particular characteristic was discerned.

Table 1. Lithic industry from the Khiamian levels.



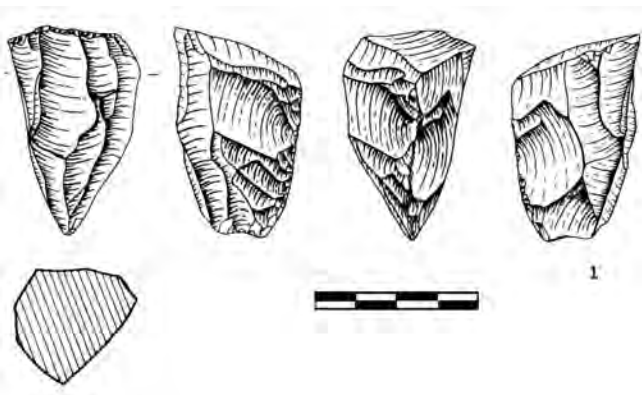


Fig. 5. Wadi Tumbaq 1: unipolar bladelet nucleus.

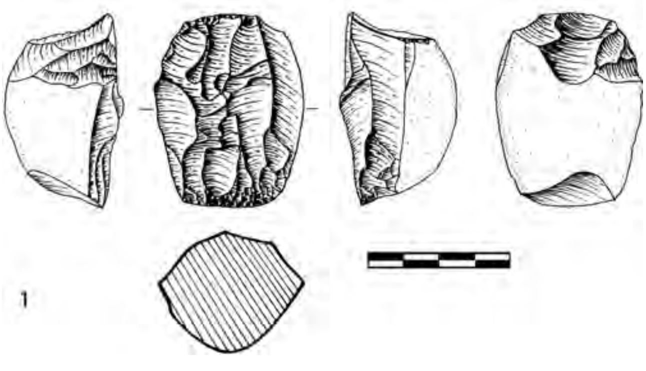


Fig. 6. Wadi Tumbaq 1: bipolar bladelet nucleus.

The tool kit (Table 2)

Most of the tool kit consists of micro-perforators. They are made on bladelets (Fig. 7), more rarely on small flakes. They are usually found whole, but many fragments come from within the houses.

The denticulated tools are also an important component of the tool kit of the site; 96 flakes are denticulated and 106 end-scrapers were made on denticulated pieces. They are mostly fabricated on flakes. The burins, also well represented, are knapped on flake or on blade. The rest of the tool kit is mainly composed of bladelets, blades and retouched flakes. Two tools which are poorly represented deserve mention because of their relation to the industries of the northern Levant: the picks and the adzes. The latter are bifacial or unifacial. They are distinctive from the adzes of Mureybet in the nature of the blanks used. At Mureybet, it is the flakes from Euphrates pebbles produced intentionally that are used to this end

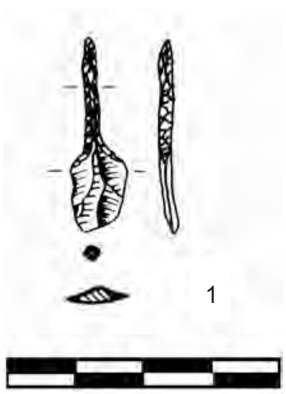


Fig. 7. Wadi Tumbaq 1: micro-perforator.

(Brenet *et al.* 2001: 121-164); at Wadi Tumbaq it is the flint nodules or non-standardized flakes that are mainly used (Fig. 8: 2). The picks are made on the same type of blanks (Fig. 8: 1).

Table 2. Tool kit from the Khiamian levels.

Tools	NB
Projectile points	79
Micro-perforators	257
Lunates	11
Diverse microliths	19
Perforators	35
Burins	127
Denticulated endscrapers	106
Endscrapers	19
Picks	9
Adzes	5
Retouched blades	54
Retouched bladelets	44
Truncated blades	22
Sharpened blade	1
Retouched flakes	179
Lustered blades	5
Total	*972*

Weapons

These are represented by projectile points (79 points) and microliths (12 sub-triangular elements, 11 lunates and 7 Natif Hagdud truncated pieces).

The points are essentially El Khiam points (72 points), represented by all the known Near Eastern variants (straight or concave base, simple or double notch, Fig. 9). They are made on bladelets or small blades. Points with retouched base and no notch of Salabiyah type are also present but rare (5 points).

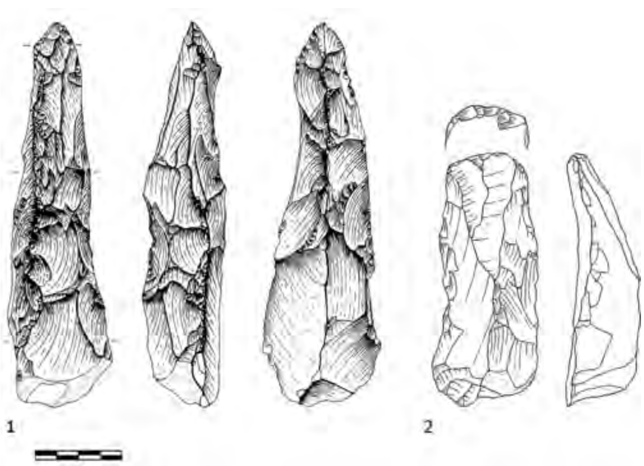


Fig. 8. Wadi Tumbaq 1: pick (1); adze (2).

Present but rare are wide points with tang (2 points) on flakes or on blades from nucleus maintenance (Fig. 10: 1).

The lunates are of a tradition which began in the Natufian. They are symmetrical or have an unsymmetrical curve. They are thus close to the sub-triangular microliths which are also represented. In both cases, they sometimes have at one extremity a "burinizing" fracture typical of an impact, which confirms their use as projectile elements (Marder *et al.* 2006). These microliths have the same dimensions as certain El Khiam points.

The Stone Objects

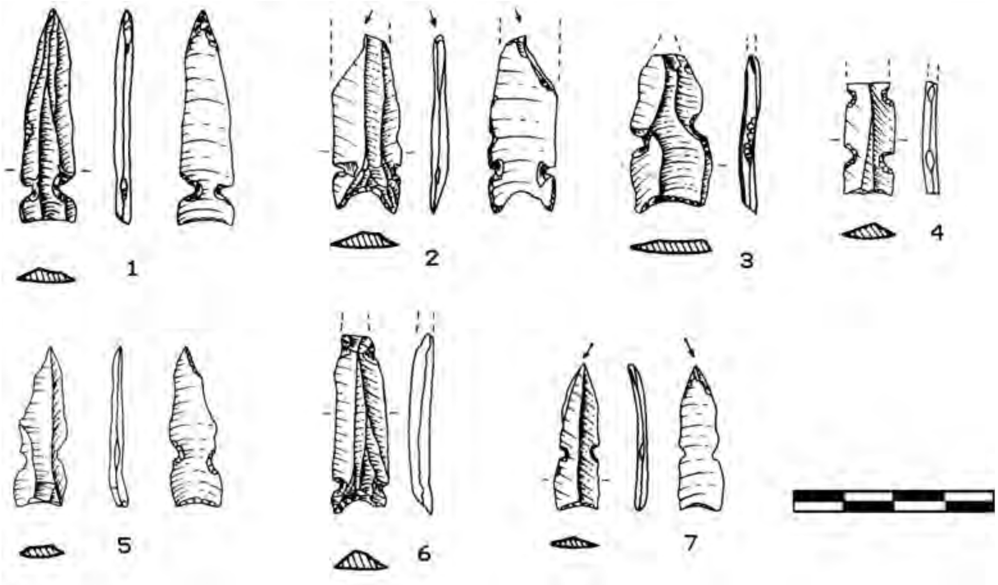
The receptacles. Two types of receptacle are in evidence. Receptacles in soft limestone and in "chaille" present natural concavities. The first are only simple blocks scraped out with flint. This process and this type of receptacle are frequent in the northern Levant. Limestone of this quality is not present in the region of Bal'as. The material is reminiscent of certain limestones of the Euphrates and the steppe zones. The second type of receptacle corresponds to natural formations used because of their concavities, evoking small beakers. They also sometimes have incisions made with flint in a band running on the exterior of the receptacle. The blocks used are present in the flint deposits near the site.

Pierced discs. These are limestone discs which are polished and pierced in the centre. Such objects have already been found in the Khiamian and PPNA levels at the site of Mureybet. The type of limestone used, which is very soft and identical to that of certain receptacles is not present in the Bal'as mountains.

A bead workshop. The whole of the Khiamian occupation produced circular beads in stone and shell of differing qualities and colours. Pale green stones are particularly abundant (analysis in progress by F. Formenti, CPE, Lyon). The deposits from which these stones came have not been identified. However their abundance at all the prehistoric sites of the Bal'as suggests that these deposits are nearby. The interior and exterior space of habitation n° 3 produced many micro-perforators associated with these green stones in the form of natural fragments, flakes, ring-shaped beads and a polished fragment which was in the process of being pierced. The assemblage strongly suggests a "workshop" where all the stages of the *chaîne opératoire* for bead fabrication are represented. A small grindstone in sandstone, a material not native to the mountain, was discovered a few meters from habitation n° 3. The wear and the size of the grindstone do not seem to be related to grinding activity. It suggests the hypothesis of a "work table" related to the polishing of beads.

The saddle querns. The interior of habitation n° 2 produced a saddle quern and its hand stone *in situ* placed on a clay base. Other hand stones were recovered near the clay base. Another quern was found also with its hand

Fig. 9. Wadi Tumbaq 1: el Khiam points.



stone placed on it near habitation n° 1. Two other querns were found one placed on the other in the abandonment layer of habitation n° 2. All these grinding tools were found in primary positions. Whatever the exact function of these tools of transformation in this context of hunter-gatherers, they are either in a functioning position associated with their hand stones, or stocked one upon the other.

The Fauna and the Flora

The data concerning the hunted fauna and the plant environment of the site are still only partial (study in progress)[3]. The initial analyses indicate the presence of gazelles, equids, tortoises and small mammals including foxes. A worked ivory fragment was also found. Shells of almond and pistachio were found in the hearths of the houses.

A Preliminary Assessment

The whole of the Levant was united by the same Khiamian culture in 10,000 BC. The distinction between the northern Levant and the southern Levant rests on the development of a few particular characteristics mainly perceptible in the lithic industries. The presence of Khiamian occupations between these two regions provides information to fill in the gap which exists for this period. Of particular importance is the density of the occupations found in the Bal'as. These are not simply landmarks which unite the two extremities of the Levant, but evidence for a development of Neolithisation which was early and unbroken in all the region.

The contacts between the Bal'as and the rest of the Levant are clear, seen as much in the importation of raw material as in the fabricated objects: towards the northern Levant, mainly in the presence of the Mureybet adze, Euphrates flint and obsidian, towards the southern Levant, mainly in the evidence of the Natif Hagdud truncated pieces. The architecture and the use of space appear closer to the southern Levant; however, the rareness of excavations for this period in the northern Levant does not allow an evaluation of this statement. Finally, the Khiamian culture of the Bal'as is characterized by an abundance of denticulated tools, which suggests the existence of a local facies which our future research will attempt to define.

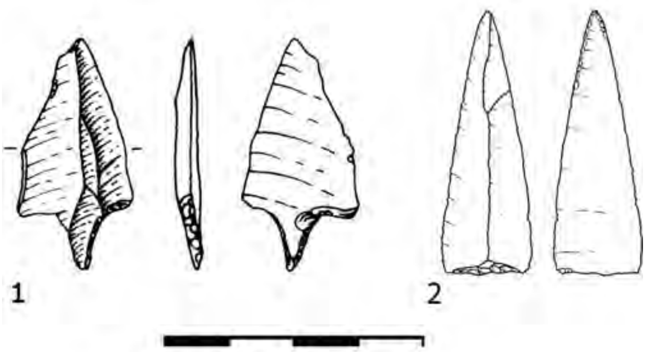


Fig. 10. Wadi Tumbaq 1: point with tang (1); point with straight base (2).

Note

[1] The *"Les marges arides"* research program of the Maison de l'Orient at Lyon is directed by B. Geyer. Its objective is the analysis of human-environment relations, the dynamics of transformation of human and physical environments and their interactions in a region of high constraints.
[2] Archaeological mission of the French Ministry of Foreign Affairs directed by D. Stordeur.
[3] G. Willcox (archaeobotany, CNRS-UMR 5133), D. Helmer (archaeozoology, CNRS-UMR 5133) and L. Gourichon (archaeozoology, post-doctoral UMR 5133).

References

Abbès F.
1998 Réflexions concernant les nucléus bipolaires et naviformes du Proche-Orient néolithique. *Cahiers de l'Euphrate* 8: 139-150.

In press Analyse technologique des industries de Tell Mureybet: comportements techniques et intention de débitages durant la néolithisation. In J.J. Ibañez-Estevez (ed.), *Hommage à Jacques Cauvin. Le tell de Mureybet (Syrie du Nord).* BAR Int. Ser. Oxford and Lyon: Archaeopress and Maison de l'Orient et de la Méditerranée.

Brenet M., Sanchez-Priego J. and Ibañez-Estevez J.J.
2001 Les pierres de construction taillées en calcaire et les herminettes en silex du PPNA de Jerf el Ahmar (Syrie), analyses technologique et expérimentale. In L. Bourguignon, I. Ortega and M.-C. Frère-Sautot (eds.), *Préhistoire et approche expérimentale.* Montagnac: Éditions Monique Mergoil. 442 p.

Borrell Tena F.
2006 *La gestion de los recursos minerales siliceos en las primeras comunidades campesinas en el valle medio del Éufrates; VIII°-VII° milenios cal. B.C. Implicaciones socioeconómicas del proceso de producción lítico.* Universitat Autònoma de Barcelona, Facultat de Filosofia i Lletres, Departament de Prehistoria. Vol. 1. 386 p.

Marder O., Pelegrin J., Valentin B. and Valla F.
2006 Reconstructing Microlith Shaping: Archaeological and Experimental Observations of Early and Final Natufian Lunates at Eynan (Ain Mallaha), Israel, *Eurasian Prehistory,* 4 (1-2): 99-158.

Nishiaki Y.
2000 *Lithic Technology of Neolithic Syria.* Oxford: BAR International Series 840. 241 p.

Translation: Elizabeth Willcox

Field Report

Two Petroglyphs from Wadi Abu Tulayha, a PPNB Agro-pastoral Outpost in the Jafr Basin

Sumio Fujii
The University of Kanazawa <fujii@kenroku.kanazawa-u.ac.jp>

Introduction

It is commonly accepted that in comparison with the PPNB of the northern Levant, and the upper Euphrates River basin in particular, the southern Levantine PPNB is deficient in iconographic material. The contrast has been further spurred by the investigations at Nevalı Çori (Hauptman 1999) and Göbekli Tepe, for example (Schmidt 2003). Such a cultural difference involves some profound implications to be explored, but bias attributable to differences in intensity of research, if any, must be corrected. This is all the more true because many petroglyphs are left undated in arid peripheries of the southern Levant.

Two petroglyphs recently found at Wadi Abu Tulayha, a PPNB agro-pastoral outpost in the Jafr Basin, shed new light on the issue. It is the purpose of this brief report to describe them in some detail and provide basic information for further discussion.

The Site

The site of Wadi Abu Tulayha is located in the northwestern part of the Jafr Basin, a closed drainage system occupying the southern half of the Transjordanian Plateau. It was first found during our 2001/2002 winter season survey (Fujii 2002) and has continuously been excavated since the 2005 spring field season (Fujii 2006a, 2006b, 2007a, 2007b, 2007c). Available evidence suggests that the site was a M/LPPNB outpost used on a seasonal basis, and that the seasonal yet stable use of the outpost was based on a mixed economy consisting of the hunting of wildlife (largely of gazelle), short-range transhumance (bringing along domesticated sheep and goats from a farming society probably to the west), and small-scale basin-irrigation agriculture (utilizing a stone-built barrage). Thus the site can be defined as a PPNB agro-pastoral outpost founded by initial multifaceted transhumants who probably made a seasonal round-trip between the western hilly country and the Jafr Basin.

To date, several dozen semi-subterranean stone-built structures have been revealed at seven excavation sectors from E-0 to W-III (Figs. 1, 2). They vary in general layout, floor size, and floor depth, but they are roughly unified in terms of general orientation. Though seemingly arranged at random, they constituted several complexes with a large key feature as a core. These complexes were connected in a lateral direction, thus forming a unique elongated settlement. Two petroglyphs, our main concern, occurred from two of the key features: Structure B at Area W-I and Structure M at Area W-III.

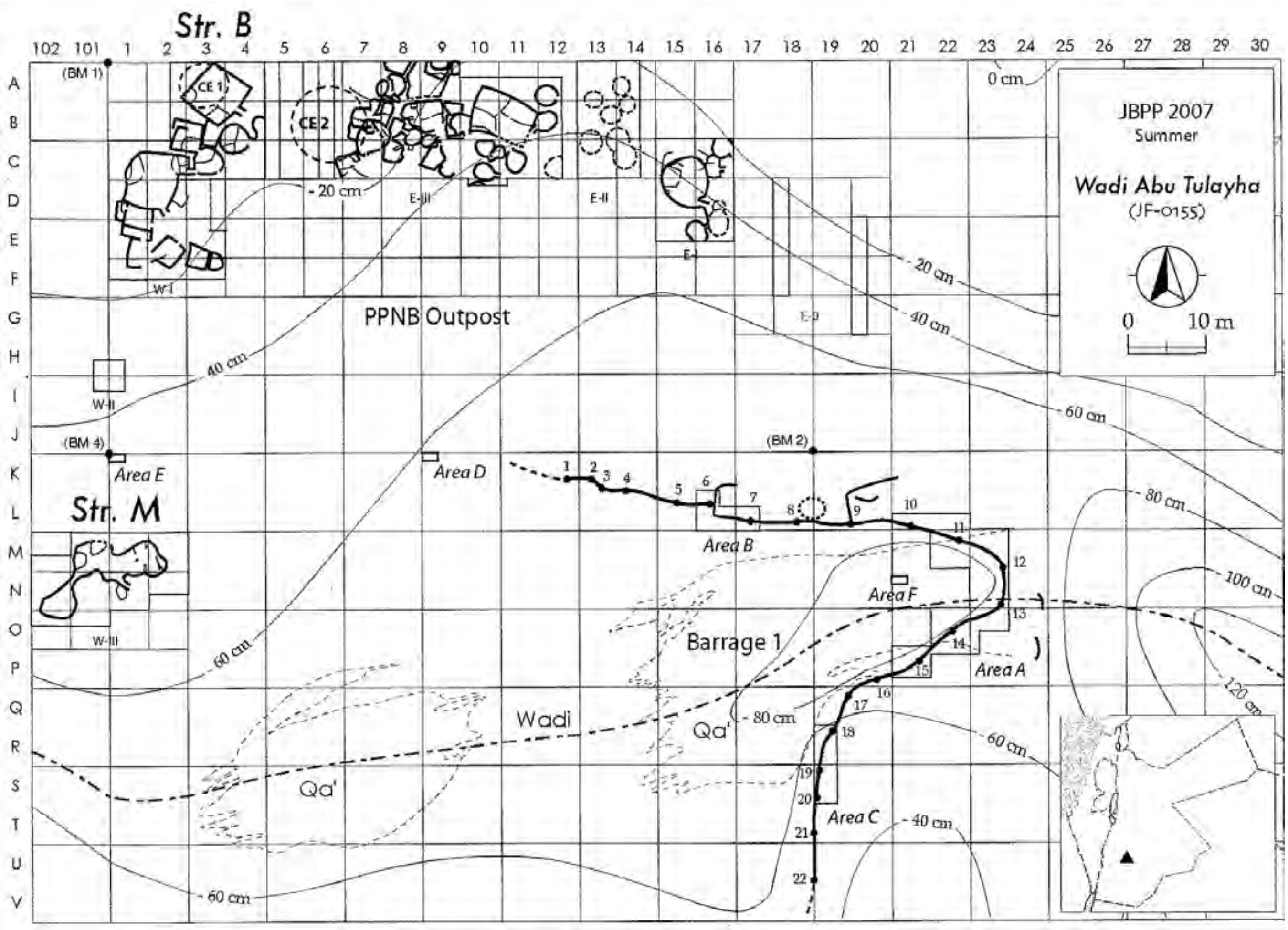


Fig. 1. Site map of Wadi Abu Tulayha.

Petroglyph 1

Archaeological Context

Petroglyph 1 (Register No. WAT-7033) was found at Structure B during the 2005 summer field season[1]. This structure, dated to the LPPNB on the basis of the frequency of Amuq type points as well as three 14C dates from a neighboring structure, was among the largest features in the outpost, having a floor size of *ca.* 6 m by 5.5 m and a floor depth of *ca.* 0.8-1 m (Fig. 3). It also stood out in terms of construction quality and surpassed every other structure in both the standardization of construction material and the regularity of masonry work. Typologically, it was a single-room structure and contained only two small bins. The floor, on the other hand, incorporated a number of small features including a large clay-lined hearth, a pair of large postholes, and a dozen minor depressions of unidentifiable use. In addition, a narrow stepped entrance was positioned in the middle of the southeastern wall.

The petroglyph decorated the front surface of a right-hand gatepost (Fig. 4). The limestone boulder on which the petroglyph was depicted was much larger in size than surrounding stones, measuring 71.0 cm high, up to 31.0 cm wide, and 15.5 cm thick. It is most unlikely that such a heavy boulder was brought to the outpost from any great distance. A likely material source is the lower course of the neighboring wadi, where similar limestone boulders are still to be found scattered over the terrain. The boulder was pointed at one end, but no clear evidence of anthropogenic modification was confirmed. The upper end was slightly discolored due to prolonged exposure to sunlight, but the lower part, buried by deposits, was less weathered.

Interestingly, the gatepost was placed upside down in view of the original orientation of the iconography. This allows for various interpretations. A likely explanation is that it was converted from another structure in the outpost and, for this reason, handled without regard for its original orientation. This assumption may explain why the two gateposts were unbalanced in terms of both size and decoration. An alternative interpretation is that it originally stood in a normal orientation, namely, with its pointed end facing downward until it fell down to be restored with its flat, more stable end below. This is not inconceivable, because many foundation stones at the outpost were found plunged into the ground with their

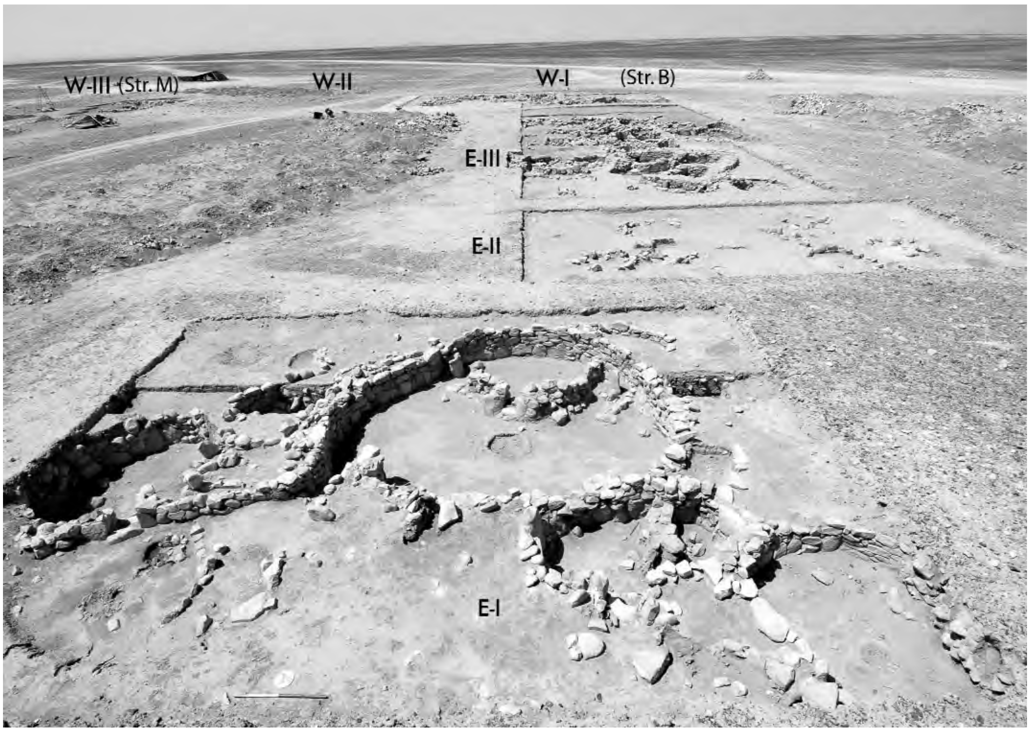


Fig. 2. General view of the site (from E).

pointed ends directed downward. It would seem, however, that the imbalance of the two gateposts casts doubt on this view and favors the first interpretation. An eclectic yet more convincing explanation is that the gatepost was brought from an existing structure and placed, at first, in a correct orientation but subsequently it had fallen down and restored upside down. This explanation sounds reasonable in theory, but it may not be entirely realistic considering its improbable nature. For that matter, neither can the possibility be fully ruled out that the reversed position itself involved some ritual significance, a declaration of intent to abandon the structure concerned, for example.

Whatever the case, there is little doubt that the petroglyph was produced before the boulder was incorporated into the gate as a gatepost. To begin with, the fact that the petroglyph was completely buried with pre-EBA deposits warrants its early dating. Second, a later addition, even if immediately after the PPNB, must have necessitated either crawling (on the stomach) or crouching (over the upright gatepost) position, an unrealistic assumption for such detailed time-consuming work. Thus it is safe to say that the petroglyph dates back as late as the construction date of Structure B, namely, the LPPNB. The question, if any, concerns the time lag between the production date and the installation date of the petroglyph. It is most unlikely, however, that it was produced in the remote past and then found by chance to be reused, all the more because aside from Lower and Middle Paleolithic flint scatters, the Jafr basin is deficient in archaeological evidence for pre-PPNB sites. It is therefore more reasonable to assume that the inhabitants of the outpost were involved in the production. Seeing that the time lag, if any, can be regarded as being negligible in an archaeological sense, one may conclude that the petroglyph falls within the time range of the PPNB.

Fig. 3. General view of Structure B (from NE).

Fig. 4. The entrance of Structure B (from NE).

Technology

The iconography of Petroglyph 1 was depicted by a pecking technique, although a few possibly scratched marks are also distinguishable on the hind legs of Design A and forelegs of Design B, for example. The prevalence of a pecking technique is the norm for the site, and numerous groundstone artifacts were produced by means of the same technique (Fujii 2006a). Nevertheless, nothing specific can be said about the implements used for pecking or scratching operations, except that solid stones with a more or less pointed end were used for respective purposes.

Pecked marks were relatively large in size, measuring *ca.* 2-4 mm in diameter and *ca.* 0.5-1 mm in depth. Both the intensity and density of pecking varied with designs, producing by chance some sort of graded effect on the iconography. Overall, designs in the upper tiers were sharply delineated and those in the lower tiers were vaguely outlined. This probably means that the former designs were more important and depicted at an earlier stage of the production process than the latter ones.

Iconography

The iconography of Petroglyph 1, when placed in a correct orientation, occupied the upper half of the front surface of the gatepost (Fig. 5)[2]. It contained a total of six major designs *ca.* 7-12 cm long and two oblong marks *ca*. 3 cm in major axis, covering, as a whole, an area of *ca*. 800 cm^2. The iconography was divided into three tiers, which included one to three major designs respectively. Every design was depicted in parallel with the shorter axis of the boulder, a contrast with that of Petroglyph 2 described below.

The uppermost tier consisted of two well-defined quadrupedal animal designs. In light of its slender neck and leg profile, Design A to the left can probably be defined as a moderate-sized ungulate, a gazelle for example. Design B, on the other hand, can be regarded as a feline, perhaps a panther, on the basis of its long tail and relatively horizontal body silhouette. The feline is attacking the ungulate from behind, a common scene in petroglyphs as well as the wildlife world. Interestingly, the ungulate is trying to tear itself away from the attack of the feline, stretching its elongate neck and forelegs forwards. Such animated representation reminds us of sprinting onagers depicted on a wall painting of Umm Dabagiyah (Kirkbride 1975: plate VII-a). Both designs were depicted more clearly and in a larger scale than the others, suggesting that the fighting scene between the two was the main motif of the whole iconography. It is understandable in this light that they occupy the uppermost tier of the iconography.

The middle tier was busier in composition, containing three ill-defined designs and two oblong marks. Among others, Design C and E were obscure and it is unknown what species of animal they represent, or even whether or not they were representations of animals. Design D, on the other hand, may be identified as a two-footed animal with a large tail, an ostrich, for example, although the possibility cannot fully be ruled out that it was a poor representation of a quadrupedal animal. Neither is it impossible to assume that, as was the case of the uppermost tier, Design C and D represented another fighting scene between two animals. In addition to these major designs, a pair of amorphous signs or simple concentrations of pecked marks was distinguished between Design C and Design F described below.

In an about-face from the middletier, the lowest tier consisted only of a spiral pattern (Design F) *ca.* 10 cm in diameter. It was the only geometric design in the iconography and occupied the locus slightly left of the center of the tier. As noted above, it was depicted by a less intensive (or much finer) pecking technique than that applied to the other designs. However, what the difference implies is still unknown. Neither is the significance of the design itself obvious. Spiral patterns are often regarded as a representation of the sun, but an impetuous conclusion should be avoided.

From the above, one may conclude that the iconography, as a whole, depicts a pair (or possibly two pairs) of fighting animals and a spiral pattern. It is a fairly rare motif in the Neolithic Levant, and no clear parallels have been reported.

Fig. 5. Close-up view of Petroglyph 1.

Petroglyph 2

Archaeological Context

Another petroglyph (Register No. WAT-7235) was found at Structure M in the 2007 summer field season. This structure was located immediately beside the flooded area of the neighboring wadi, a critical difference from the other structures that constituted the main body of the outpost. Another difference is the typology of the structure itself. It was a large composite feature *ca.* 15 m in total width, consisting of three rooms that were laterally connected. A stone-lined entrance was found along the southern wall of the central room, suggesting that the room served as vestibule-like space leading to the two side rooms. Unexpectedly, its low floor depth up to *ca.* 2 m was attained by means of digging through compact silty sand layers *ca.* 1 m thick and underlying chalky limestone layers again *ca.* 1 m thick. Interestingly, retaining masonry walls were built not on the floor but on fringes of a hard limestone layer capping the chalky limestone layers. This unique masonry technique also differentiated Structure M from the others that constitute the main body of the outpost. Radiometric dating is still in progress, but a MPPNB date is suggested for it on the basis of the frequency of Jericho points and its beehive-like plan. Available evidence – the great floor depth despite the location adjacent to the flooded area and the use of impermeable limestone layers for the floor and lower wall – suggests that the structure may have served, at least at its initial stage, as a cistern for the neighboring outpost (Fujii 2008a, 2008b).

The structure is yet to be fully excavated due to its unexpected floor depth, but the eastern room itself was entirely excavated, and this is where the petroglyph was found (Fig. 6). Again, the petroglyph was executed on construction material, but the limestone boulder on which it was depicted was, in this case, incorporated into one of five buttresses attached to the peripheral walls. It measured 56.5 cm high, up to 27.3 cm wide, and 14.0 cm deep, being only partly dressed at one end. As with Petroglyph 1, it was probably brought from the neighboring wadi.

The boulder stood in a 90 degree clockwise-rotated position in view of the original orientation of the iconography (Fig. 7). It appears, however, that the boulder was originally placed in this manner, because as illustrated by its rear counterpart, such an upright position was the norm of foundation stones in the outpost. The fact that it was tightly incorporated into the foundation course of the buttress *ca.* 1.5 m high also rules out the possibility that its position altered during use. Thus, a troublesome question as with the case of Petroglyph 1 does not arise here. Assuming that the petroglyph was produced after placing the boulder in a horizontal position, it follows that its placement in an upright position resulted in the 90 degrees rotation of the iconography.

There is little doubt that the petroglyph was produced before the boulder was incorporated into the buttress. Otherwise it would follow that the artisan would have had to twist his neck sideways for an extended time, an

Fig. 6. General view of the eastern room of Structure M (from SE).

Fig. 7. A buttress of the eastern room (from E).

unreasonable posture for such time-consuming and detailed work. More convincing is that the petroglyph was embedded within sandy-silt deposits including a few possibly in situ PPNB artifacts3. This fact completely rules out the possibility that the petroglyph was added on to the unmarked boulder at a later period. It is therefore concluded that the petroglyph dates back as late as the construction date of Structure M, namely the MPPNB. The time lag between the production and installation dates, if any, is almost negligible for the same reason as Petroglyph 1.

Technology

Once again a pecking technique predominated. Nevertheless, pecked marks on the boulder were much finer and shallower than those of Petroglyph 1, making the iconography less clear (Fig. 8). This is to say that tools with a more pointed end were used for the operation, and that the limestone boulder itself was of finer texture. In addition, a few possibly scratched marks are distinguishable on the forelegs of Design A, for example.

What differentiates Petroglyph 2 from the other is the fact that two of seven major designs, namely, Design B and C, partly overlap. This is not to say, however, that both of these were depicted in perspective. In light of a remarkable difference in texture between the two, it is more likely that they merely reflect the difference in execution date and probably in the artisan(s) concerned. If this is the case, one may also suppose that the three elaborate designs (A, B, and G) had, as a whole, an earlier depiction date than the other three less elaborate ones (Designs C to E). Needless to say, all of these were depicted before the boulder was incorporated into the buttress and fall within the time range of the PPNB.

Iconography

Unlike Petroglyph 1, the iconography of Petroglyph 2 was produced in parallel with the longer axis of the boulder, covering almost the whole range (*ca.* 1500 cm^2) of its front surface. A total of six major designs and a few amorphous marks, arranged in two tiers, constituted the ensemble. In comparison with the major designs of Petroglyph 1, those of Petroglyph 2 were much larger in size, measuring up to *ca.* 17 cm long.

The upper tier, the focus of the iconography, consisted of five major designs and two patternless marks. Of all these major designs, only Design A was oriented to the right; the others were oriented to the left or in the direction of Design A. Design A stood out in terms of sharpness and size of image too, suggesting that it was the key component of the entire iconography. In light of its slender neck and body profile and a pair of short horns, it can be regarded as a representation of an ungulate, although its long drooping tail may cast doubt on its identification as a gazelle. Design B is probably its counterpart and can be regarded as the same species of ungulate as Design A. It was depicted as carefully and largely as Design A, suggesting that both of these constituted the central motif of the overall iconography. The three less elaborate designs following it were poorly preserved, but they appear to represent the same species of ungulates as the other major designs. As noted above, they seem to have been subsequent (yet, of course, before embedding) additions. In addition, the upper tier included an elongated mark (above Design C) and an amorphous sign (below Design B).

The lower tier, on the other hand, consisted only of a naturalistic representation of an ungulate (Design F) and a small mark behind it. In light of its smaller size and more slender profile, the ungulate may represent an infant individual. It was similar in execution to Design A and B, suggesting that these three elaborate components were depicted by the same experienced person.

To summarize, one can conclude that the iconography includes as major components at least six ungulates depicted probably twice. It appears that all of these represent the same species of ungulates. Thus, unlike Petroglyph 1, no fighting scene between an herbivore and a carnivore exists here; instead, a less static, peaceful scene among the same species of ungulates reigns over the canvas.

Fig. 8. Close-up view of Petroglyph 2.

Summary and Discussion

It turned out that the two petroglyphs from Wadi Abu Tulayha can be dated to the M/LPPNB. So far as the southern Levant is concerned, in addition to the material from Dhuweila (Betts 1987), they are the first large petroglyphs to date back to the period for certain. What follows is a brief review focusing on their archaeological contexts, technology, and iconography.

Both petroglyphs are depicted on a flat surface of slender limestone boulders probably brought from the nearby wadi. The boulders used are otherwise almost unmodified.

A simple pecking technique was applied to produce the iconography. Aside from a few probably *ad hoc* scratches, no clear evidence of line engraving is distinguishable. Thus the iconography is expressed in a plain shadow method based on the difference in tone between the dull-colored ground and the pecked (thus more or less brightened) designs. The pecking is often perfunctory, suggesting that the two petroglyphs were not monumental in nature and assumed a limited-term of use. Nevertheless, they decorate a prominent part (such as a gatepost or buttress) of a major structure probably used for a communal purpose. Furthermore, they are oriented forward an easy-to-see direction.

Even so, both petroglyphs are isolated in the structure and not combined with other decorations. Even in the case of the petroglyph on the gatepost, it does not form part of a pair.

In addition, the boulders on which the petroglyphs are depicted are placed either upside down or in a 90-degree rotated position, regardless of their original orientation.

Both iconographies are simple in layout, consisting only of a few tiers. The major designs involved are also small in number, totaling only six or seven.

Both iconographies are simple yet realistic in terms of execution, and geometric designs are rarely included. Among the more realistic of representations, ungulate designs prevail, a phenomenon consistent with the excavated fauna from the outpost (Fujii 2007c, 2008a). No domesticated animals are included, again, the norm of PPNB iconographies. The iconographies depict a scene of wildlife either in conflict or at peace. It appears that ritual significance, if any, is involved to a lesser extent.

A few designs are of good craftsmanship, suggesting the involvement of experienced persons, if not to say specialists. Nevertheless, the iconographies also include designs of inferior craftsmanship, which can be regarded as subsequent additions.

It is our general impression that the petroglyphs from Wadi Abu Tulayha are *ad hoc* in nature. First of all, the fact that only two examples sporadically occurred despite the extensive excavation attests to their impromptu nature, which is also manifested in 1) the use of undressed natural stones procured from the nearby wadi, 2) the prevalence of a simple pecking technique, 3) the perfunctory nature of the pecking, 4) the isolation in the structures, 5) the indifference to the original orientation of the iconography, and 6) the taboo-free subsequent additions. 7) The same may be true of the simple layout of the iconography, 8) the naïve yet realistic representation of real animals and the scarcity of symbolic designs, and 9) the simple motif merely depicting the natural world. All these items highlight that the two petroglyphs were produced under a less restrained, more or less mundane mentality, although their incorporation into a prominent part of a key feature and the probable involvement of experienced persons differentiate them from mere graffiti.

It appears that such a simple and ad hoc character is the norm of many Neolithic artistic representations in the southern Levant. Contrary to this is the situation of the northern Levant, especially the upper Euphrates River basin, where more substantial, more ceremonial, and more symbolic representations seem to prevail. It is also differentiated from the south in that they often form a group (or a pantheon) in a structure. It is also interesting to note that while a simple pecking technique predominates in the southern Levant, a time-consuming bas-relief technique is commonly used in the north. Such contrasts may mirror a deep-rooted difference in social ethos between the two cultural spheres, an essential issue to be addressed further beyond mere techno-typological comparisons.

Concluding Remarks

Wadi Abu Tulayha is a unique outpost in that it yielded two large petroglyphs incorporated into structures. To date, no parallel examples have been reported even from coeval sedentary settlements to the west; only Dhuweila to the north has petroglyphs, and they are made using a somewhat different technique. One may say that they appeared at these sites precisely because they are located in an arid periphery of the southern Levant, the "home" of petroglyphs. However, that is the very reason why they hold importance. The identification of PPNB petroglyphs will hopefully invigorate the iconographic study of the Neolithic Levant.

Notes

[1] Although Structure B and consequently Petroglyph 1 were excavated in the 2005 summer field season, it was not noticed until our short revisit in the 2006 winter study season when heavy rain washed away tough dirt covering its surface. This is the reason why our first preliminary report (Fujii 2006a) did not refer to this important find.

[2] Figs. 4 and 7 are close-up pictures specially processed on a computer. The original iconographies are much less clear.

[3] This possibly means that the structure was converted to a normal house in the course of in-filling, although the final conclusion must await further excavation.

References

Betts A.V.G.

1987 The Hunter's Perspective: 7th Millennium BC Rock Carvings from Eastern Jordan. *World Archaeology* 19(2): 214-225.

Fujii S.

2002 A Brief Note on the 2001-2002 Winter Season Survey of the al-Jafr Basin in Southern Jordan. *Annual of the Department of Antiquities of Jordan* 46: 41-49.

2006a Wadi Abu Tulayha: A Preliminary Report of the 2005 Spring and Summer Excavation Seasons of the Jafr Basin Prehistoric Project, Phase 2. *Annual of the Department of Antiquities of Jordan* 50: 9-32.

2006b A PPNB Agro-pastoral Outpost at Wadi Abu Tulayha, al-Jafr Basin. *Neo-Lithics* 2/06: 4-14.

2007a Wadi Abu Tulayha and Wadi Ruweishid ash-Sharqi: An Investigation of PPNB Barrage Systems in the Jafr Basin. *Neo-Lithics* 2/07: 6-17.

2007b PPNB Barrage Systems at Wadi Abu Tulayha and Wadi Ruweishid as-Sharqi: A Preliminary Report of the 2006 Spring Field Season of the Jafr Basin Prehistoric Project, Phase 2. *Annual of the Department of Antiquities of Jordan* 51 (in press).

2007c Wadi Abu Tulayha: A Preliminary Report of the 2006 Summer Field Season of the Jafr Basin Prehistoric Project, Phase 2. *Annual of the Department of Antiquities of Jordan* 51 (in press).

2008 Wadi Abu Tulayha: A Preliminary Report of the 2007 Summer Field Season of the Jafr Basin Prehistoric Project, Phase 2. *Annual of the Department of Antiquities of Jordan* 52 (in press).

Hauptmann H.

1999 The Urfa Region. In M. Özdoğan and N. Başgelen (eds.), *Neolithic in Turkey: The Cradle of Civilization:* 65-86. Istanbul: Arkeoloji ve Sanat Yayınları.

Kirkbride D.

1975 Umm Dabagiyah 1974: A Fourth Preliminary Report. *Iraq* 37: 3-10.

Schmidt K.

2003 The 2003 Campaign at Göbekli Tepe (Southeastern Turkey). *Neo-Lithics* 2/03: 3-8.

2006 “Ritual Centers” and the Neolithization of Upper Mesopotamia. *Neo-Lithics* 2/05: 13-19.

Field Report

Neolithic ‘Ain Jamam near Ras an-Naqb: The Pre-1993 Field Research History

Hans Georg K. Gebel

Institute of Near Eastern Archaeology, Free University of Berlin <hggebel@zedat.fu-berlin.de>

Introductory Note

Little is known about the southernmost LPPNB mega-site of ‘Ain Jamam near Ras an-Naqb, despite being extensively excavated during 1995 and 1996 in a salvage operation by the Department of Antiquities of Jordan (Waheeb and Fino 1997; Fino 1996, 2004; *cf.* Rollefson 2005 and Wilke *et al.* 2007). A recent preliminary survey of documents and finds by Gary O. Rollefson brought to light that much of this material is either lost or displaced (Rollefson 2005: 22). To improve the information on the site, data from its early investigation are offered here[1], mainly taken from my unpublished but often quoted on-file report of April 1993 to the Department of Antiquities, Amman (Gebel 1993).

In 1986, when ‘Ain Jamam was found, the LPPNB Mega-Site Phenomenon was not yet understood as such (Gebel 2004), and its Pottery Neolithic occupation made it a unique location for southern Jordan, since almost no Late Neolithic sites with pottery were known from southern Jordan (Najjar *et al.* 1990). The southern Jordanian PN is still barely known, and possibly differs from what we know from the north with its Yarmoukian. It appears that the southern Pottery Neolithic largely remained aceramic, and that only some of the large LPPNB sites continued to exist near strong springs in the PN (*e.g.*, while ‘Ain Jamam witnesses a prominent PN occupation, the Lower Rubble Layers at Basta have only scarce evidence of the Early PN). Any limited evidence of pottery use on ephemeral or seasonal sites of this period might have vanished from the surface (Gebel 2004). The presence of a Final PPNB/PPNC, assumed for ‘Ain Jamam also by our investigations in 1992 and observations between 1986-89, was claimed to exist also as a consequence of the 1995-96 large-scale excavations: seven occupational phases were identified representing the LPPNB, PPNC, and PN, with impressive tall-standing architectural remains (<3m) of the LPPNB (Waheeb and Fino 1997; Fino 1996, 2004). However, the material which could be studied by Rollefson (2005) did not reveal an evidence of a PPNC at the site.

The LPPNB site of ‘Ain Jamam is estimated – on the basis of LPPNB surface artifact distribution – to be around 6-8 ha (Gebel 1993), but this calculation includes the areas of artifacts and cultural sediments washed downslope. However, the site’s size raises the question how far south we can expect sites belonging to the Jordanian LPPNB Mega-Site Phenomenon. If this culture was connected to the former extension of the Mediterranean floral region and its junctions to the Irano-Turanian steppes, we may not exclude this culture’s extension into the Early Holocene mountainous region north of Aqaba ...

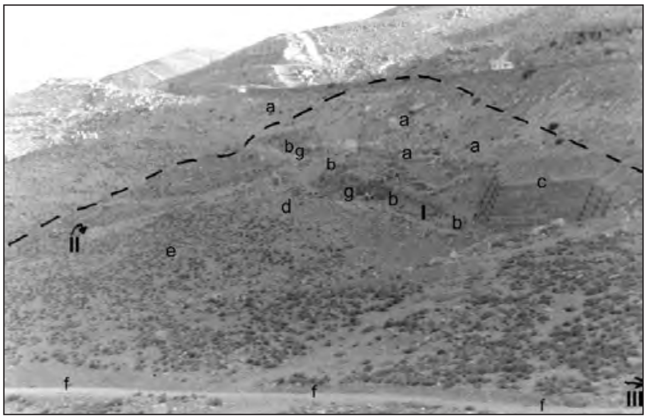


Fig. 1. ‘Ain Jamam setting: views from SW with major areas of site damage (records 1986-1992 by H.G. Gebel).
a area of (blasted) rock debris below highway, covering the upper part of site; *b* bulldozer cut of a track running parallel below the highway ("Main Section"); *c* modern slope retaining wall south of the Main Section (slide protection of highway); *d* bulldozer terracing below the Main Section; *e* looter’s pit in the central part of the cone-shaped mound; *f* bulldozer cut of the track leading to the spring; *g* location of exposed channel system in the Main Section; - - - approximate extension of site/cultural layers; *I* Sampling Spot Salim I; *II* Sampling Spot Salim II; *III* Sampling Spot Salim III.

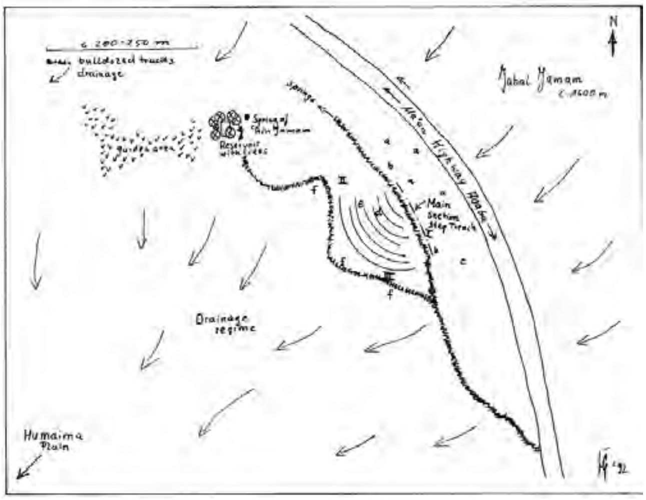


Fig. 2. ‘Ain Jamam setting: sketch of location made in 1992. (by H.G. Gebel; for information *cf.* Fig. 1)

Early Research at the Site

Since 1986, the Neolithic site of ‘Ain Jamam, near Ras an-Naqb, was visited by the author and other members of the Basta Joint Archaeological Project after the Department’s representative of the 1986 season, Suleiman Farajat, reported to me that he found the site “shortly before” during the Humayma Regional Survey. He guided us to the site seeking our expertise, suggesting that this site is similar to Ba‘ja and Basta. It remains questionable if the site was identified before as a Neolithic setting: Bisheh *et al.* (1993: 121) as well as Waheeb and Fino (1997: 215) mention that earlier visitors to the spring area of ‘Ain Jamam either failed to see the site (Glueck 1935: 65; Hart and Falkner 1985: 255; Jobling 1983a: 188) or did not identify its chipped lithic inventory as Neolithic (Jobling 1983b: 199, 207). However, repeated on-site discussion of surface materials with Mujahed Muheisen and Nabil Qadi between 1986 and 1988 made us certain that the ‘Ain Jamam occupations witness at least the presence of the LPPNB and PN.

In 1989, the author applied for the permit for a test operation at the upper bulldozer cut (called Main Section since then) at ‘Ain Jamam to the Department of Antiquities, that time under the directorship general of Ghazi Bisheh, in order to record the LPPNB architectural remains exposed there which were in danger of eroding from their steep slope position. Although approved at first, the advice of Suleiman Farajat was to postpone the application due to problems with local residents in the spring area. In late summer 1992, my renewed proposal was approved by Safwan Tell, at that time Director-General of the Department. At the same time (for two weeks in August 1992), an archaeological emergency survey along the Ras an-Naqb – Aqaba highway was conducted by G. Bisheh and others (Bisheh *et al.* 1993), in order to report the most endangered sites in front of the planned four-lane expansion of the highway. During the time we were preparing for the test operation and section recording at ‘Ain Jamam, and after the emergency survey had ended, one of the survey members (Gaetano Palumbo, assisted by Jonathan Mabry) returned twice to the site for drawing part of the Main Section which had been cleaned and excavated during the survey; neither team knew about each other and our “conflicting” interests. Unfortunately, G. Palumbo and his colleague were arrested while they were recording the section (Fig. 5a), for they did not have documents with them testifying that they are authorized to carry out works at the site. On the weekend of September 4-5th, members of the Basta team under the direction of the author carried out the test operation (step trench) described below, described more of the site, and listed the site’s damage known since 1986 (see below and Fig. 1; Gebel 1993).

In August 1993, and in consultation with G. Palumbo as the CRM archaeologist of the Department, I submitted a proposal to the Department of Antiquities to head future salvage excavations at ‘Ain Jamam jointly with Gary O. Rollefson. Records were available which mapped the endangered site areas. Funding for such archaeological salvage works had been provided by the World Bank as part of their financing of the highway project. At that time planning for the salvage excavations at ‘Ain Jamam was delayed for administrative reasons because of considerations by the Ministry of Public Works to re-align the planned highway to avoid harming Neolithic ‘Ain Jamam (G. Palumbo, pers. comm.). Finally, the Department of Antiquities decided to carry

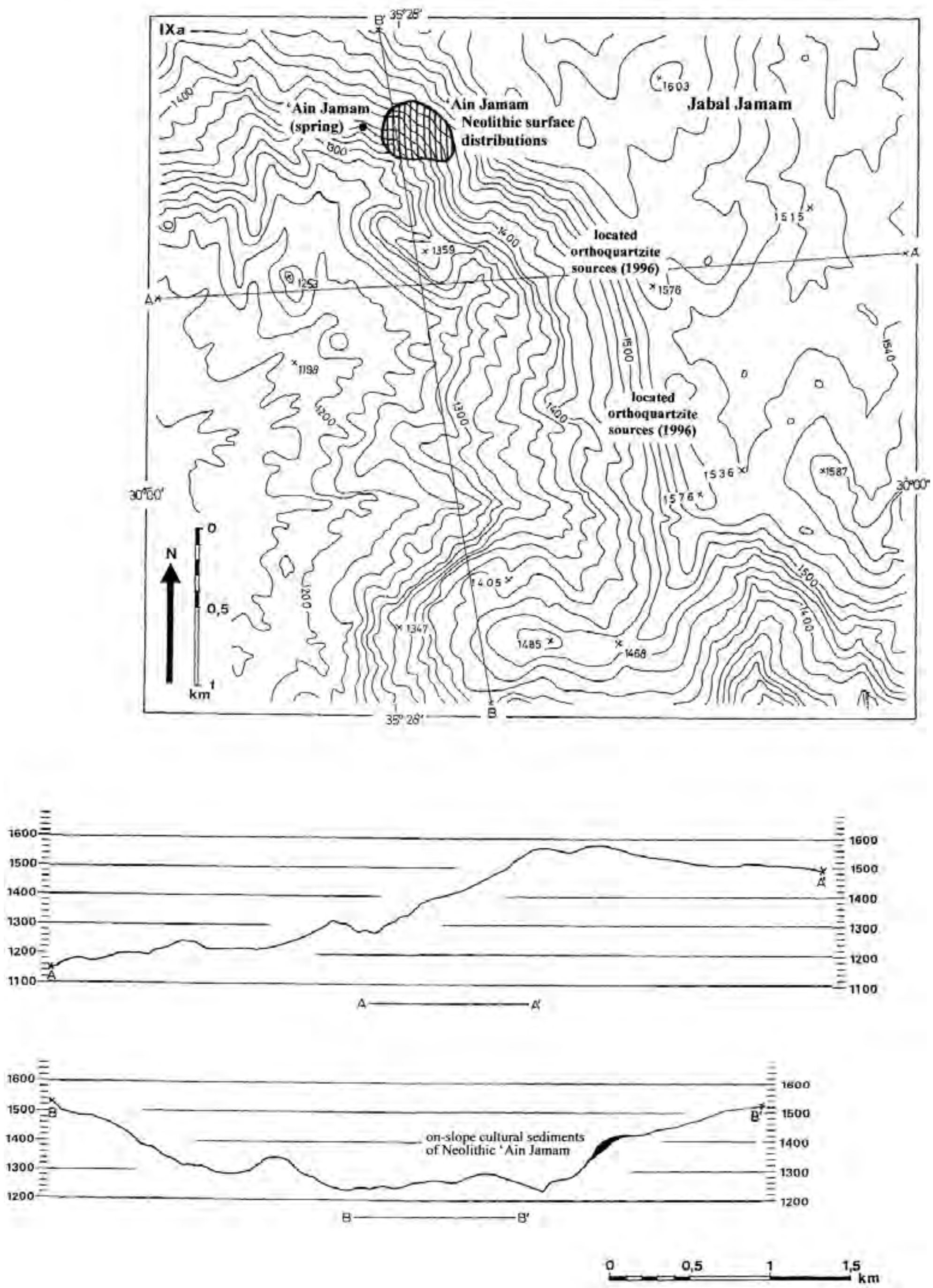


Fig. 3. 'Ain Jamam setting: near-site topography (*top*) with cross-sections of terrain (*bottom*) (based on topographical maps from 1952, 1:50.000), and approximate site extension. (drawing: H.G. Gebel)

out the excavation themselves, with Muhammad Waheeb as director, assisted by Nazih Fino, and for a short period by Hamzeh Mahasneh and others.

After the excavation, Fino wrote his MA thesis on the excavations (Fino 1996), and Rollefson took over the publication of the site's chipped lithic industries (Rollefson 2005). Phil Wilke and Leslie Quintero became involved with the orthoquartzite aspect of the chipped lithic industries (Wilke *et al.* 2007); Quintero and Gebel undertook a very short survey for orthoquartzite sources in the area in 1996 (*cf.* Fig. 3 top). Currently, a proposal to the Department is being developed to secure in-field the architectural information of the exposed areas of the site (H.G.K. Gebel, M. Kinzel, G.O. Rollefson), since the ground plan and diary records of the excavations seem to be lost.

Site Setting and Archaeological Characterization (Figs. 1-3)

The site of 'Ain Jamam is located on the steep slopes of southwestern Jabal Jamam (*c.* 1600 m a.s.l.), extending across the 1450 – 1340 m a.s.l. contour lines (Fig. 3 top), immediately above a very rich spring to the northwest. The present Ma'an – Aqaba Highway cuts its eastern edges. Geographically, it is located some 82 kilometers by road north of Aqaba, or 30 kilometers north of al-Quweira along the Desert Highway, or 3 km northwest of the 1952 location of Ras an-Naqb; its coordinates are 30°01'08" N / 35°28'09" E. Together with Basta, al-Baseet, Ghwair, al-Hemmeh, Khirbet Hammam, and as-Sifiya, it belongs to the chain of LPPNB mega-sites locat-

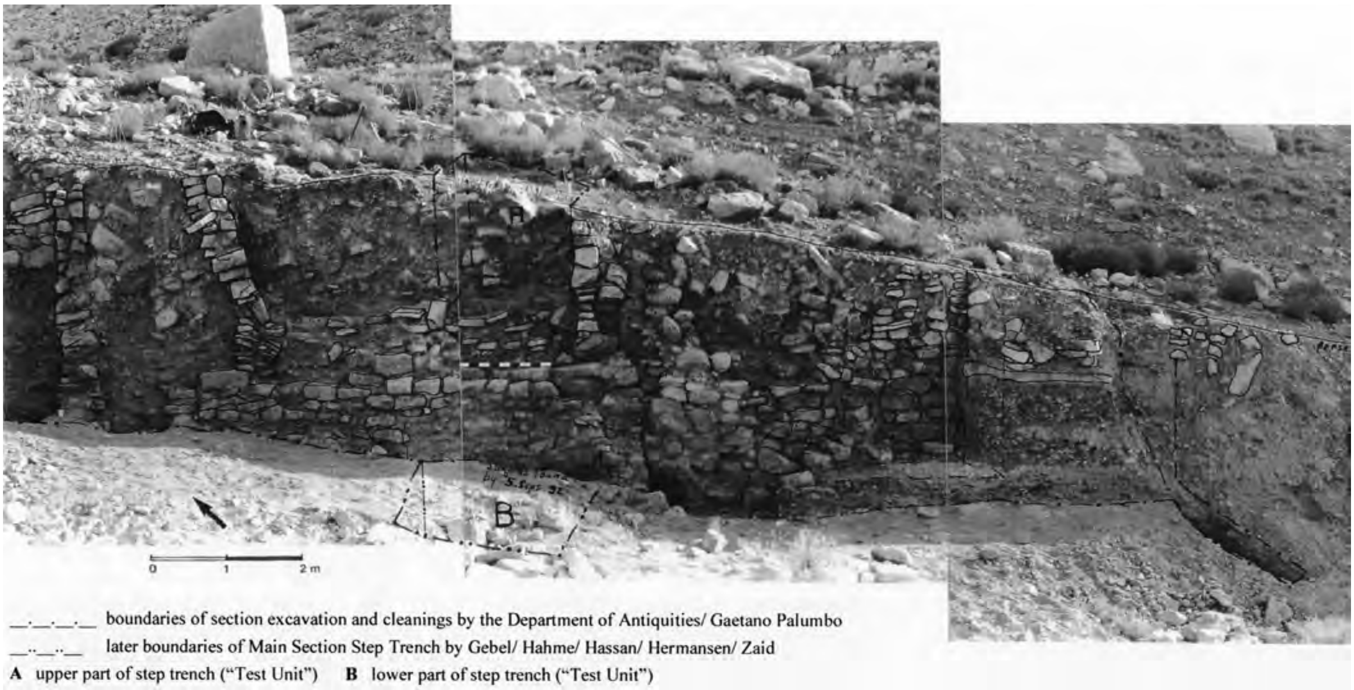


Fig. 4. 'Ain Jamam, central part of Main Section: status of section cleaning by end of August 1993 (DoA, G. Palumbo), prior to the step trench operation of September 1992. (photo: H.G. Gebel)

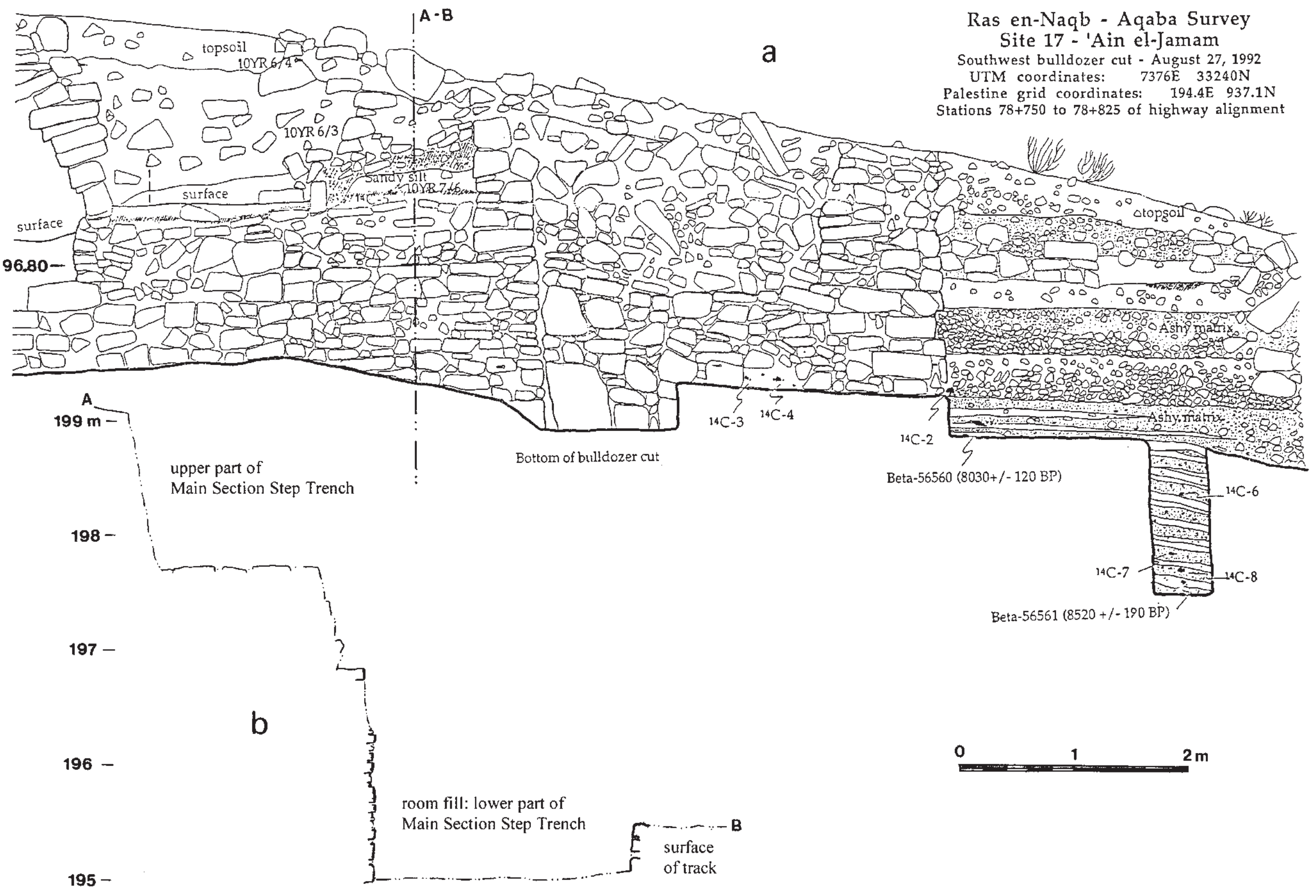


Fig. 5. 'Ain Jamam, central part of Main Section: *a* section record by G. Palumbo and J. Mabry (drawing: J. Mabry and G. Palumbo); *b* NE-SW profile of Gebel's step trench. (drawing: H.G. Gebel; for boundaries' symbols *cf.* Fig. 4)

ed next to strong springs along the western edges of the Arabian Plateau overlooking the sandstone areas. LPPNB traces of Neolithic near-spring occupations were also encountered during surveys near Rajif, Ail, and Tayiba (Gebel, in prep.); the springs to the northwest of ʻAin Jamam (ʻAin Ganah, ʻAin Jumein, lower and upper ʻAin Mansour) have not yet been investigated for their potential LPPNB occupations. The strong spring of ʻAin Jamam certainly was the reason for the site's location, which allows here access from the Humayma plain to the Arabian Plateau and provides a grand visual control of that plain.

The exact site expanse of LPPNB ʻAin Jamam has not yet been determined, and the site itself needs detailed site survey. The preliminary reconnaissance of the LPPNB artifact distribution in 1992 led me expect a size of 6-8 ha. The occupational layers form a cone-shaped mound morphology on the steep slopes between two drainages, of which one includes the spring of Jamam. In the upper parts, the slope inclination is some 20-30°, reaching 30-40° in its lower parts. The two sections exposed by bulldozing the tracks (see below) cut horizontally through the site, and give evidence of a LPPNB cultural stratigraphy of more than 4 m in the upper parts, and of more shallow cultural layers of less than one meter in the lower parts. The latter predominantly appear to be built up by cultural sediments washed down the slope. At some spots, *in situ* layers appear to be preserved (*e.g.* near Salim III, which is part of the 1.5 m section cleaned by S. Farajat in 1986). However, the section of the lower track at several places exposes weathered bedrock, on which the cultural sediments were deposited.

The Pottery Neolithic occupation concentrates on the central and western (closer to the spring) parts of the


a


b


c

Fig. 6a-f. ʻAin Jamam, Main Section step trench ("Test Unit"). (photos: H.G. Gebel)
a general view of step trench from SW.
b general view of step trench from top NE, front: stone pavement Locus 7 reached in the upper part of the step trench, bottom: partly excavated room in the lower part of the step trench.
c lower part of the step trench from SE: northwestern room section and part of the SW wall of the room (running parallel to meter stick).
d lower part of the step trench from SW.
e upper part of the step trench from W (entrance situation?).
f upper part of the step trench from above NE, Locus 6 (plaster layer).

slope; here, chipped lithic surface finds are characterized by more frequent (large) flakes and fewer blades, and the groundstone types are different from those of the LPPNB. As a result of pottery surface collections between 1986 and 1988, the surface of this area almost became "aceramic"[2]. Pottery is also eroding in considerable quantities from layers to the immediate south of the mound's slope (frequent in terms relative to 'Ain Jamam). The surface distribution of bidirectional cores is much less than observed at Basta, but spherical hammerstones appear to be very frequent.

The building techniques observed in 'Ain Jamam's Main Section in 1992 were the same as known at that time from Late PPNB Basta, Ba'ja, and Ail 4, and we expect to have the same ground plans of a terraced slope architecture with small rooms. Dressed wall stone faces and the use of "wedge stones" between the rows of carefully placed stones are characteristic. The Main Section showed evidence of terrace walls supporting smaller rectangular rooms. At one spot in the northern part of the Main Section, a part of a channel-like substructure, well-known from Basta, was exposed by the bulldozer; unfortunately, the only photo taken failed. Dressed wall stones of the LPPNB are distributed all over 'Ain Jamam's surfaces.

The find classes of the surface collections between 1986 and 1988 and of 1992, and as attested in the step trench of 1992 (mother-of-pearl industry, beads, worked bone industry, sandstone rings) are technologically and culturally exactly the same as in Late PPNB Basta. This is, in addition, supported by the radiocarbon dates provided by Palumbo (Fig. 5a). No characteristic cultural elements, except for the pottery, can be reported for the PN occupation. The LPPNB chipped lithic industry (Figs. 8-9) fully reflects the Basta primary production and tool kit, possibly with a less intensive use of the bidirectional (naviform) techniques. In general, the LPPNB grinding stones are rarer on the surface than, for example, at Basta.

The slope sedimentation and small room architecture most likely is responsible for the excellent conditions of architectural preservation, a situation similar to Basta and Ba'ja. The Main Section's LPPNB walls at 'Ain Jamam are preserved to heights of 2.6 m (a wall running out the section, Figs. 5 and 7). Judged by the Basta evidence, I consider the following aspects responsible for the good preservation of the architecture at 'Ain Jamam:

• Thick roof constructions, small rooms, and possibly two-storied buildings concentrate a lot of building material in a restricted space, which rapidly fill the small room ground plans to considerable heights after a house fell into ruins.

• In addition, and most likely of less efficacy, wall openings in 'Ain Jamam's LPPNB architecture (one was exposed in the northern part of the Main Section) eased the post-occupational distribution of cultural sediments into the rooms.

• In general, the steep slope setting with its intensive slope wash – both cultural as well as colluvial debris – reacts with the terraced house agglomerates, which accumulated the material until a certain level was deposited on the terrace.

Of course, a long use of carefully built and maintained room and terrace walls might be also a factor of preservation.

Site Damage Recorded in 1992

1) Large, blasted rock debris from earlier Aqaba – Ma'an highway building activities rests on the upper slope of the site, partly covering and penetrating into the cultural layers. The extension of the destroyed cultural layers cut by the pre-1992 highway is difficult to determine.

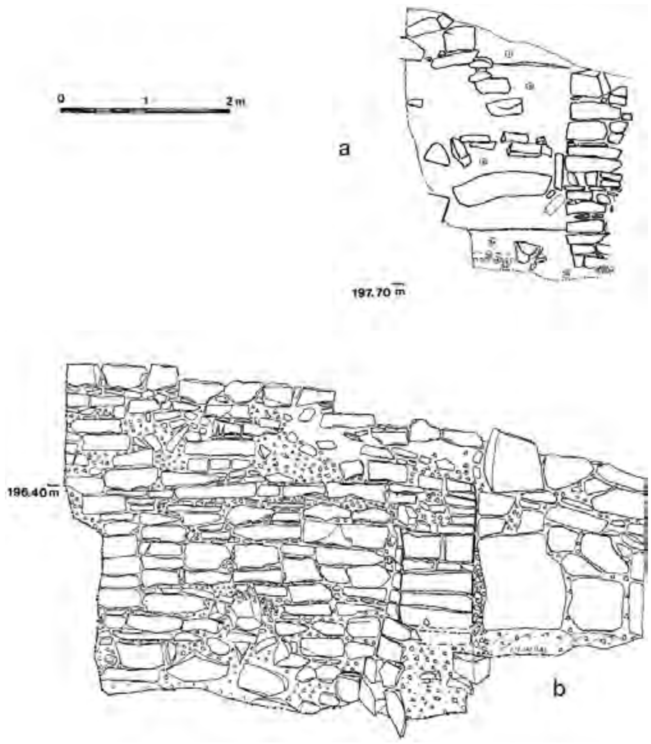


Fig. 7. ‘Ain Jamam, Main Section step trench: *a* step trench, upper part: NE section (entrance situation?); *b* step trench, lower part: northeastern wall face of the partly excavated room (continuation of wall face Fig. 5a). *Note.* Differences in wall stone pattern as compared with Fig. 5a are the result of stone (fill) removals during the September 1992 operation. (drawings: H.G. Gebel, B.D. Hermansen, I.A. Hassan, Z. Zaid)

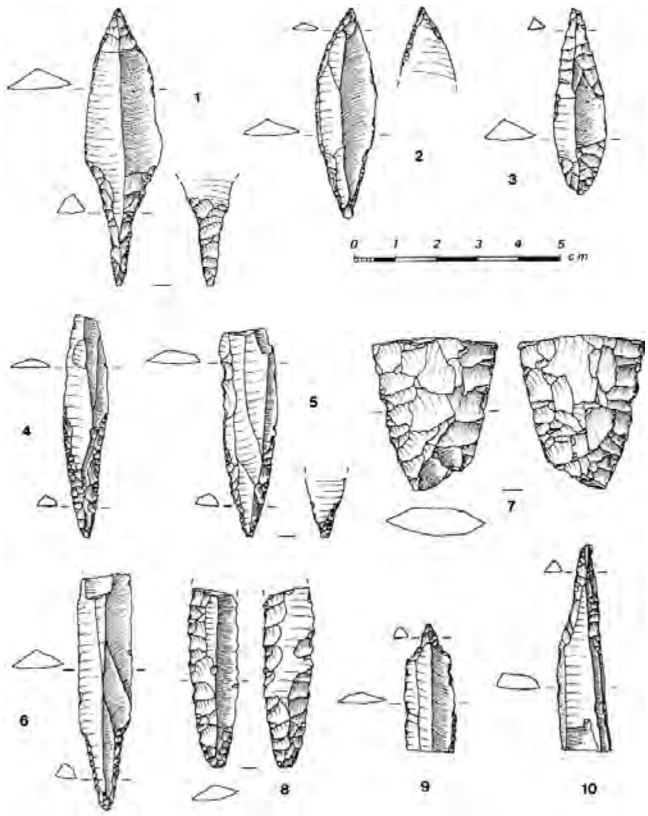


Fig. 8. ‘Ain Jamam, surface: selection of LPPNB chipped stone artifacts. (drawings: I. Raidt)

2) A bulldozer cut for a track running parallel and some 30-40 m below the highway into the site, exposed cultural layers and architecture of up to 2.6 m in height. The length of this Main Section is *c.* 80 m, created between the years 1975-79 according to local information. The track leads to springs in the northwest: ‘Ain Ganah, Upper and Lower ‘Ain Mansour, and ‘Ain Jumein.
3) A modern stepped slope retaining wall (built to prevent the highway sliding downslope, *cf.* Fig. 1: c) SE of the Main Section and below the highway cut deeply through the site’s edges into its cultural layers. This structure mainly rests in a drainage.
4) There is bulldozer terracing in the site’s surfaces below the Main Section: two, possibly three spots of some 20-30 m^2 are visible, connected by a bulldozed lane.
5) A looter’s pit (1-1.5 m deep) is located in the settlement’s central area of the cone-shaped slope. Here, judged from surface finds, a Pottery Neolithic occupation is concentrated. The pit was dug by locals; they report that a complete jar was sold on Aqaba’s antiquities market. Several smaller pits in the settlement cone appear to result also from looting activities.
6) A long bulldozed track further downslope – prepared to give access to the spring of Jamam – cut sections of up to 2.20 m into cultural layers.

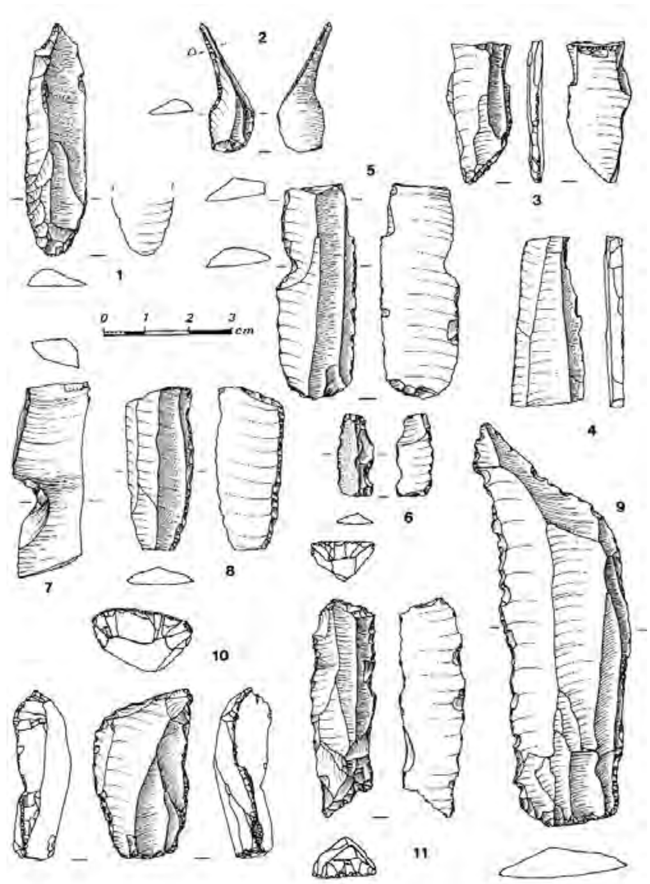


Fig. 9. ‘Ain Jamam, surface: selection of LPPNB chipped stone artifacts. (drawings: I. Raidt)

Currently, there are plans to widen the Ma`an – Aqaba highway again, endangering the upper part of the site by digging into its cultural layers for a considerable length (estimation: 100 m), as well as covering larger parts with rock debris (estimation: 4000 m^2).

1992 Operations at 'Ain Jamam, Previous Investigations (Figs. 5, 6a-f, and 7)

By permission of the Department of Antiquities and with the assistance of its local representative Suleiman Farajat, a short field operation was carried out at 'Ain Jamam, directed by the author on September 4-5, 1992. Team members were Felix Hahme, Bo Dahl Hermansen, Ibrahim Abdallah Hassan, and Zaydoun Zaid (all from the 1992 Basta team). Field work had been discussed on-site with Suleiman Farajat in late August 1992: It was decided to set a step trench in the Main Section, in order to expose the spatial nature of the architecture. More time investment was not possible because of the Basta dig, but it was the clear aim of this mission to develop ideas for the necessary subsequent large-scale salvage excavations at the site. Five workmen, and on the second day nine, assisted in this step trench operation and probes of the Test Units Salim I-III. The workmen, all from Ras an-Naqb, were organized and overseen by a foreman, who was the son of the landowner. A policy employing the assistance of the landlord proved that all work goes extremely well and fast with a foreman from the landowner's family. Expected troubles as in previous years did not occur.

The Main Section's step trench examined a 1x1 m sounding into its upper part, and a 2.2 x 1.7 m sounding into its lower part in front of the LPPNB terrace wall. In addition to the goal to acquire more information about architectural details, the step trench aimed to obtain stratified material of the various find classes so far only attested with surface material. A major focus of investigations was also to get samples for first insights in the site's economies (Table 1). The sampling spots Salim I (Late PPNB layers of the eastern Main Section), Salim II (possibly the upper Pottery Neolithic layers in the central part of the cone-shaped mound), and Salim III (*in situ* [?] layers in the lower parts of the site in the section created by the track leading to the spring) were probed in

Field number	Square, Locus	Material
AJ92, 001	Main Section's step trench, lower part, Locus 4	chipped stones
AJ92, 002	~, Locus 4	bones general
AJ92, 003	~, Locus 4	charcoal sample (hand-picked)
AJ92, 004	~, Locus 6	chipped stones
AJ92, 005	~, Locus 6?	bones general
AJ92, 006	~, Locus 6?	charcoal sample (hand-picked)
AJ92, 007	~, Locus 6	chipped stones
AJ92, 008	~, Locus 6	bones general
AJ92, 009	~, Locus 3	chipped stones
AJ92, 010	~, Locus 3	bones general
AJ92, 011	~, Locus 3	charcoal sample (hand-picked)
AJ92, 012	~, Locus 1	chipped stones
AJ92, 013	~, Locus 1	bones general
AJ92, 014	~, Locus 3	chipped stones
AJ92, 015	~, Locus 3	marine mollusk bead
AJ92, 016	~, Locus 3	bones general
AJ92, 017	~, Locus 3	charcoal sample (hand-picked)
AJ92, 018	~, Locus 1	stone ring fragment
AJ92, 019	~, Locus 3	1 stone vessel fragment, 1 Conus sp. shell, 1 stone ring fragment.
AJ92, 020	~, Locus 1	"grinders?"
AJ92, 021	Salim I Sampling Spot (5-10 m east of the Main Section's step trench)	1 l sediment sample with red plaster fragment., 1 water-sifted palaeobotanical sample
AJ92, 018	Salim II Sampling Spot (central part of the cone-shaped mound)	20 l sediment sample, 1 water-sifted palaeobotanical sample
AJ92, 018	Salim III Sampling Spot (near the Department's trench/section at the track section, = track leading to spring)	10 l sediment sample, 1 water-sifted palaeobotanical sample

Table 1. List of samples taken in 'Ain Jamam during the 4-5th September 1992 operations (sent in Oct. 1992 to the stores of the Faculty of Archaeology and Anthropology at Yarmouk University)

order to obtain cultural sediments that might also contain carbonized material, as well as to secure all faunal remains eroding from these spots.

Summary on Results of the Field Operation (Figs. 4-7)

The recorded part of the Main Section (Figs. 4 and 5a) shows the face of a LPPNB terrace wall with walls running at right angles downslope and upslope, between which room fills with fallen dressed stones can be recognized. In the southeastern part of the section, a multi-layered stratigraphy of ashy deposits of more than 2 m depth exists in its lower parts, possibly accumulations of ashes at the foot of a terrace wall, deposited here from an occupation above. The wall running out of the section is preserved to a height of 2.6 m, and is built less carefully than the terrace wall it joins or crosses.

The two soundings form, together with the face of the large terrace wall in the northeastern half of the Main Section, the upper and lower parts of the NE-SW step trench at the Main Section, as can be recognized in the profile Fig. 5b. In the upper part, a lower room fill with fallen dressed stones (Fig. 7a) was removed until a stone pavement (Fig. 6f) was reached. The end of a wall, probably part of an entrance, was exposed (Figs. 6e and 7a).

In the lower part, a 2.2 m wide room in front of the large LPPNB terrace wall mentioned above was partly excavated. Excavation did not reach a real floor, and it passed through the remaining 50 cm (excavations G. Palumbo/Department) of Locus 1, a thick layer with bands of ashes mixed with bones and smaller stones. Below that, a thick layer of homogenous yellowish-ochre sand (Locus 3, with 2 grinders and a stone weight of 2-3 kg with a groove around it) with high charcoal concentrations was reached and removed, before Locus 6 (very loose olive-brownish sandy sediment) appeared. Embedded in Locus 3, large fallen and obliquely resting stone slabs (Locus 4; up to 70 cm long, giving the impression that they have fallen from the wall), two grinders and one weight/grooved stone (3-4 kg) were found. Locus 5 is the grayish deposit to the SE of the square, here overlying Locus 3 (yellowish deposit); Locus 2 is the wall emerging from the retaining/terrace wall of the main section, along which the bulldozer cut this part of the Main Section.

The Main Section's sampling spot Salim I (5-10 m SE of the step trench) contains a stratigraphy of more than 1 m of ashy layers mixed with flint and heavily burnt bones; these layers have a considerable inclination downslope. They continue quite deep, as can be seen by the narrow trench made here by Suleiman Farajat (around 3.5 m below the present surface).

The archaeobiological and palaeoenvironmental samples taken at the test units Salim I-III were sent in 1992 to the store rooms of the Institute (today: Faculty) of Archaeology and Anthropology at Yarmouk University, awaiting their analyses.

Acknowledgements. I thank warmly Suleiman Farajat, with whom I started working in LPPNB mega-sites as early as 1984 (Basta and Ba'ja), without knowing that they would become part of this outstanding historic phenomenon. Further, I thank Ghazi Bisheh and Safwan Tell, Directors-General of the Department of Antiquities of Jordan, for their support and encouragement, and for putting the threat to 'Ain Jamam at the top of the Department's agenda. Felix Hahme, Bo Dahl Hermansen, Ibrahim Abdallah Hassan, and Zaydoun Zaid sacrificed their leisure time to help in the 1992 operation. The local workmen and the landlord of 'Ain Jamam are warmly thanked for the good atmosphere and efficient work. I regret the inconveniences that happened to Gaetano Palumbo and his colleague Jonathan Mabry in late August 1992, and I am grateful for the nice Chinese dinner we had afterwards, and for providing me Fig. 5a, later published as Fig. 3 in Bisheh *et al.* 1993. Gary Rollefson I thank for his cooperation in developing the salvage program in August 1993. I dedicate this contribution to late Mujahed Muheisen and late Nabil Qadi, with whom I had the initial discussions on the 'Ain Jamam surface materials.

Notes

[1] For this reason, this report is very detailed and offers almost all information available. It is mainly based on notes taken in 1992.
[2] The surface pottery collection of 1986 from 'Ain Jamam is stored under field number Basta J.A.P. 1022 in the storerooms of the Faculty for Archaeology and Anthropology at Yarmouk University. The pottery collections of the 1995-96 excavations seem to be lost (Rollefson 2005: 22).

References

Bisheh G., Farajat S., Palumbo G. and Waheeb M.
1993 Archaeological rescue survey of the Ras an-Naqb – Aqaba Highway Alignment 1992. *Annual of the Department of Antiquities of Jordan* 37: 119-134.

Fino N.
1996 *'Ain Jammam: An Archaeological Study.* Unpublished M.A. Thesis. Amman: University of Jordan.
2004 Evidence of Settlement Organization at 'Ain Jammam. In H.D. Bienert, H.G.K. Gebel and R. Neef (eds.), *Central Settlements in Neolithic Jordan.* Studies in Early Near Eastern Production, Subsistence, and Environment 5: 105-112. Berlin: ex oriente.

Gebel H.G.
1993 *'Ain Jamam Near Ras en-Naqb: Observations on Site Preservation Since 1986 and Field Operation in September 1992.* Unpublished report on-file at the Registration Center, Department of Antiquities, Amman, Jordan.

2004 Central to What? The Centrality Issue of the LPPNB Mega-Site Phenomenon in Jordan. In H.D. Bienert, H.G.K. Gebel and R. Neef (eds.), *Central Settlements in Neolithic Jordan.* Studies in Early Near Eastern Production, Subsistence, and Environment 5: 1-19. Berlin: ex oriente.

Glueck N.
1935 Explorations in Eastern Palestine, II. *Annual of the American Schools of Oriental Research* 15. New Haven: American Schools of Oriental Research.

Hart S. and Falkner R.
1985 Preliminary Report on a Survey in Edom, 1984. *Annual of the Department of Antiquities of Jordan* 29: 255:277.

Jobling W.
1983a The 1982 Archaeological and Epigraphic Survey of the 'Aqaba-Ma'an Area in Southern Jordan. *Annual of the Department of Antiquities of Jordan* 27: 185-196.
1983b Preliminary Report on the Fourth Season of the 'Aqaba-Ma'an Archaeological and Epigraphic Survey 1982/1983. *Annual of the Department of Antiquities of Jordan* 27: 197-208.

Najjar M., Abu Dayya A., Suleiman E., Weisgerber G. and Hauptmann A.
1990 Tell Wadi Feinan: The First Pottery Neolithic Tell in the South of Jordan. *Annual of the Department of Antiquities of Jordan* 34: 27-56.

Rollefson G.O.
2005 Stone Tools from 'Ayn Jammam, near Ras an-Naqb, Southern Jordan. *Neo-Lithics* 1/05: 17-23.

Waheeb M. and Fino N.
1997 'Ayn el-Jammam: A Neolithic Site near Ras en-Naqb, Southern Jordan. In H.G.K. Gebel, Z. Kafafi, and G.O. Rollefson (eds.), *The Prehistory of Jordan, II: Perspectives from 1997.* Studies in Early Near Eastern Production, Subsistence, and Environment 4: 215-220. Berlin: ex oriente.

Wilke P.J., Quintero L.A., Rollefson G.O. and Gebel H.G.K.
2007 The Naviform Core-and-blade Industry in Orthoquartzite at 'Ain Jammam, Jordan. In L. Astruc, D. Binder and F. Briois (eds.), *Systèmes techniques et communautés du Néolithique précéramique au Proche-Orient.* Actes du 5e colloque international. Fréjus 2004: 193-201. Antibes: Éditions APDCA.

Contribution

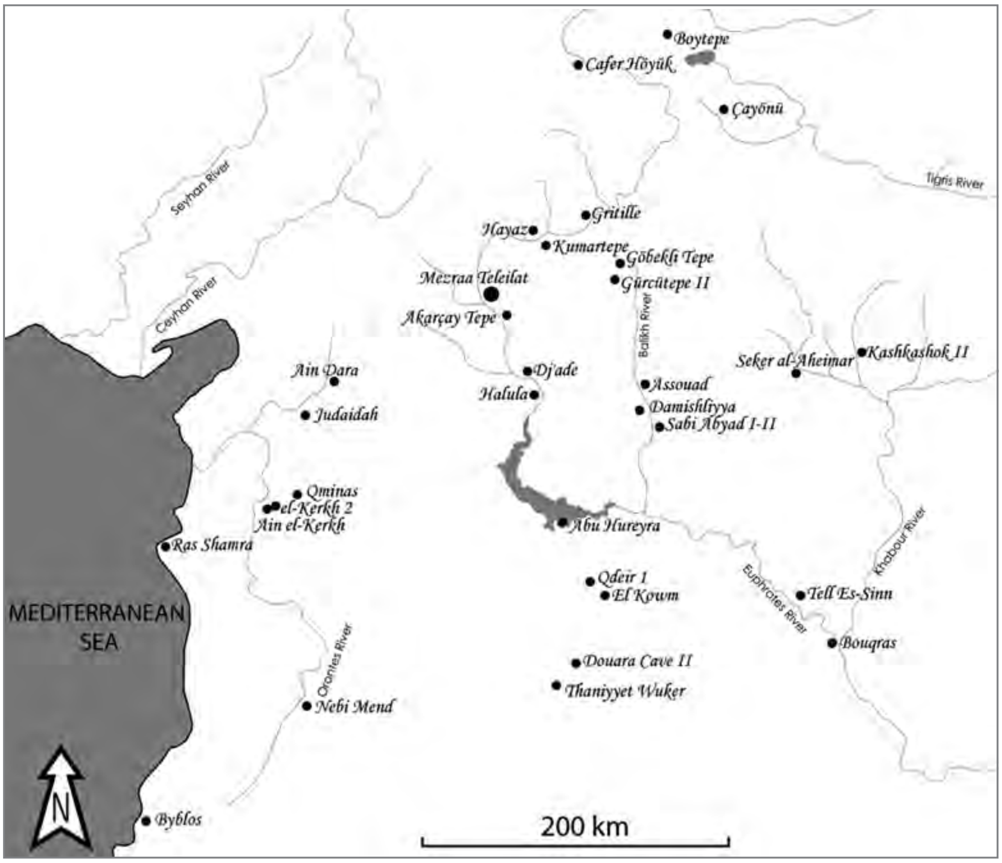
Hole-making Tools of Mezraa Teleilat with Special Attention to Micro-borers and Cylindrical Polished Drills and Bead Production

Güner Coşkunsu
Department of Anthropology, Harvard University <coskunsu@fas.harvard.edu>

Archaeological remains of Neolithic societies show a great deal of change in many aspects towards the end of the Pre-Pottery Neolithic B (PPNB). Many of the characteristics of sophisticated PPNB cultures such as large settlements, cult buildings and/or temples, highly elaborate art and ideological representations, and technological advances in lithic industries disappeared relatively quickly. The end of the PPNB period around 8200 BP and the transition to the Pottery Neolithic (PN) is commonly referred to the "PPNC" or "Final PPNB." It is characterized by the abandonment of many previously flourishing large PPNB settlements across the Near East as well as a reduction in the size of settlements, shifts in settlement organization, and a decrease in population. This phenomenon may reflect important socio-economic and ecological changes during the 8th millennium BP. It has been observed and particularly well documented across the Near East, but comparable phenomena are also attested in Anatolia (Özdoğan 2002).

The phenomenon has remained an enigma due to a lack of continuously occupied sites from PPNB to PN, although recent discoveries of a few sites in northern and southern Levant have broadened our knowledge. Mezraa Teleilat (Fig. 1) is one of those rare sites that shows a stratigraphic continuation and provides invaluable information about LPPNB and early PN societies. In contrast to the broad socioeconomic and material changes noted above, flint and obsidian chipped stone technology, raw material usage, and tool typology demonstrate great similarities from earliest to latest Neolithic occupations. Several significant changes also occurred in knapping technology and tool repertoire (*cf.* Coşkunsu 2007, 2008). As a consequence, products made by such tools changed too, for example, hole-making tools and beads/pendants at the site. This paper focuses on two particular minor flint tool types, which are grouped under the category of "hole-making tools." They are associated with bead production, craft specialization, and trade/exchange at Mezraa Teleilat by technological, typo-

Fig. 1 Location of Mezraa Teleilat (courtesy of Ferran Borrell Tena).



logical, and use-wear analysis, and experimentation. The tools discussed here are micro-borers (MB; Fig. 3: 4, 6) and cylindrical polished drills (CPD; Fig. 3: 7-11; Fig. 4: 1).

Despite their small number at Mezraa Teleilat they are worthy of study because they have the potential to shed additional light on Neolithic culture change and contact issues in the Near East. The paper aims to draw the attention of colleagues to CPDs, which appeared suddenly at the site and are not yet known from other sites in the region. The appearance of these foreign-looking hole-making tools (CPDs) at Mezraa Teleilat brought up intriguing questions about their origin of production, manufacturing technique, raw material acquisition, distribution area, mechanism of exchange/trade, craft specialization, and function. Some of these questions will be answered below, but currently few examples of such tools are known. The author has been trying to trace counterparts of these tools at other sites in the Near East and adjacent regions since 1999, but unfortunately CPDs have not been found at other sites although there might be a single example in the PN levels of Tell Sabi Abyad (pers. comm., L. Astruc 2006). The only known exact ancient and ethnographic counterparts are known from more than 4,000 km away in the Indus region in association with beads (Kenoyer 1991; Mackay 1937) and even with Neolithic dentistry (*cf.* Coppa *et al.* 2006). These particular hole-making tools and their involvement in bead production at the site will be discussed below after brief background on the site.

Mezraa Teleilat

Mezraa Teleilat is located on the lower left bank of the Euphrates River, 5 km south of the Birecik district in Şanlıurfa province in southeastern Turkey. Its actual size is not known due to the serious damage by modern villagers and the river. Currently, the mound is *ca.* 350 m N-S and 170 m E-W (Karul *et al.* 2004; Özdoğan 2003). Excavations were run within the M.E.T.U. TAÇDAM–GAP Kargamış Project under the scientific direction of M. Özdoğan from the Department of Prehistory, Istanbul University and under the direction of the Directorate of the Şanlıurfa Museum. The total excavated area of the site is about 5,000 m^2 (Fig. 2). The site was inhabited from Pre-Pottery Neolithic up to the Pottery Neolithic and the Iron Age. The Neolithic occupation of the site dates from 9,324 uncalbp to 7,760 uncalbp. Stratigraphically, three major Neolithic phases (with sub-phases) have been distinguished at the site. The chronological sequence of the Neolithic, from oldest to youngest, is as follows: Phase IV (LPPNB); Phase III (LPPNB-PN Transition); Phase II (PN) (see Özdoğan 2003: 513 for complete chronology with sub-phases). According to overlapping dates between phases and short time span between Phase III and IV, *ca.* 8,000-7,900 bp (*ca.* 7000- 6500 calBC), the site was continuously occupied during the Neolithic. Being continuously occupied during the end of the PPN and at the beginning of PN, occupation at Mezraa Teleilat therefore spans this transition and is a unique place in the Levant.

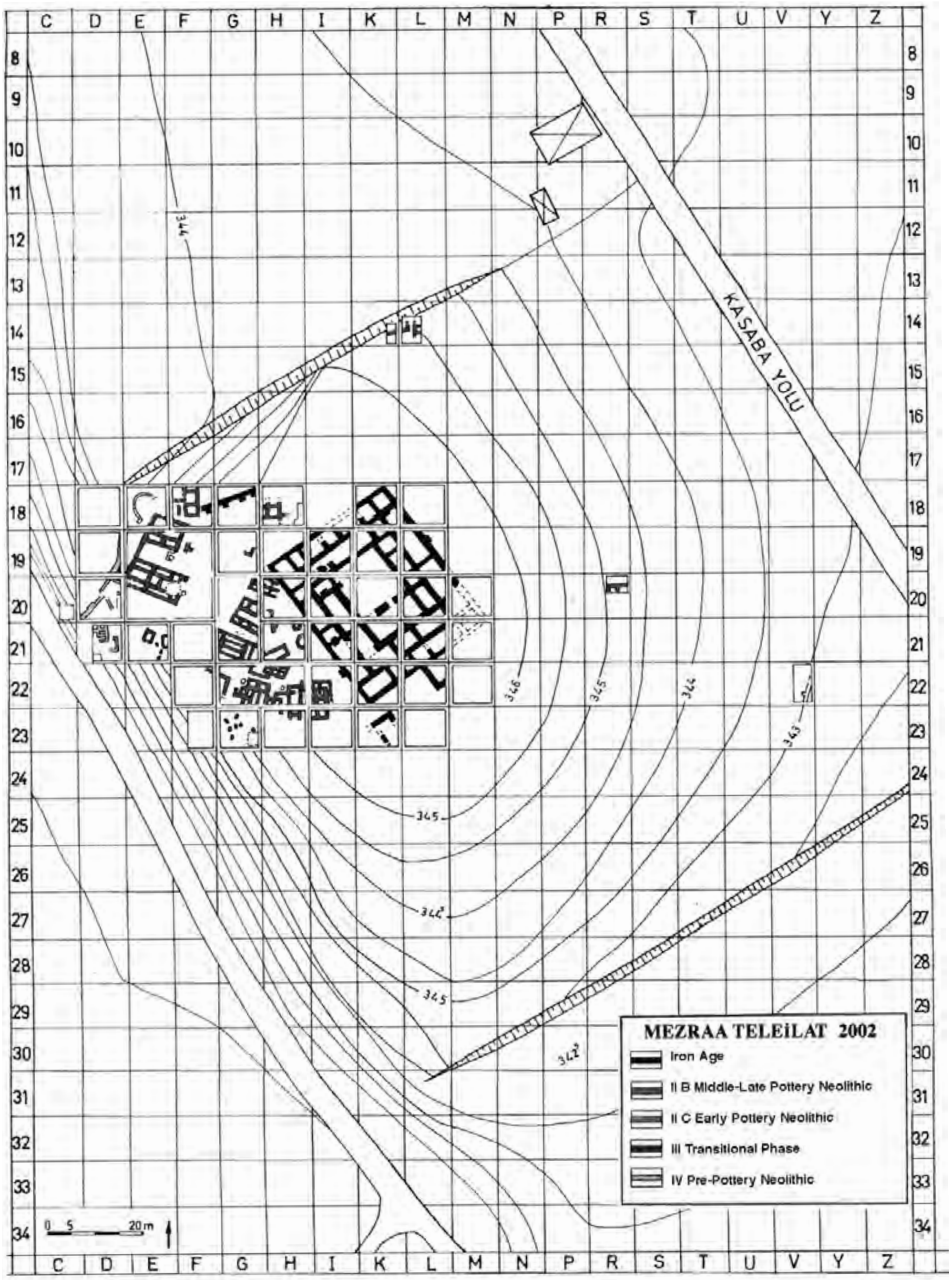


Fig. 2. Mezraa Teleilat: site plan.

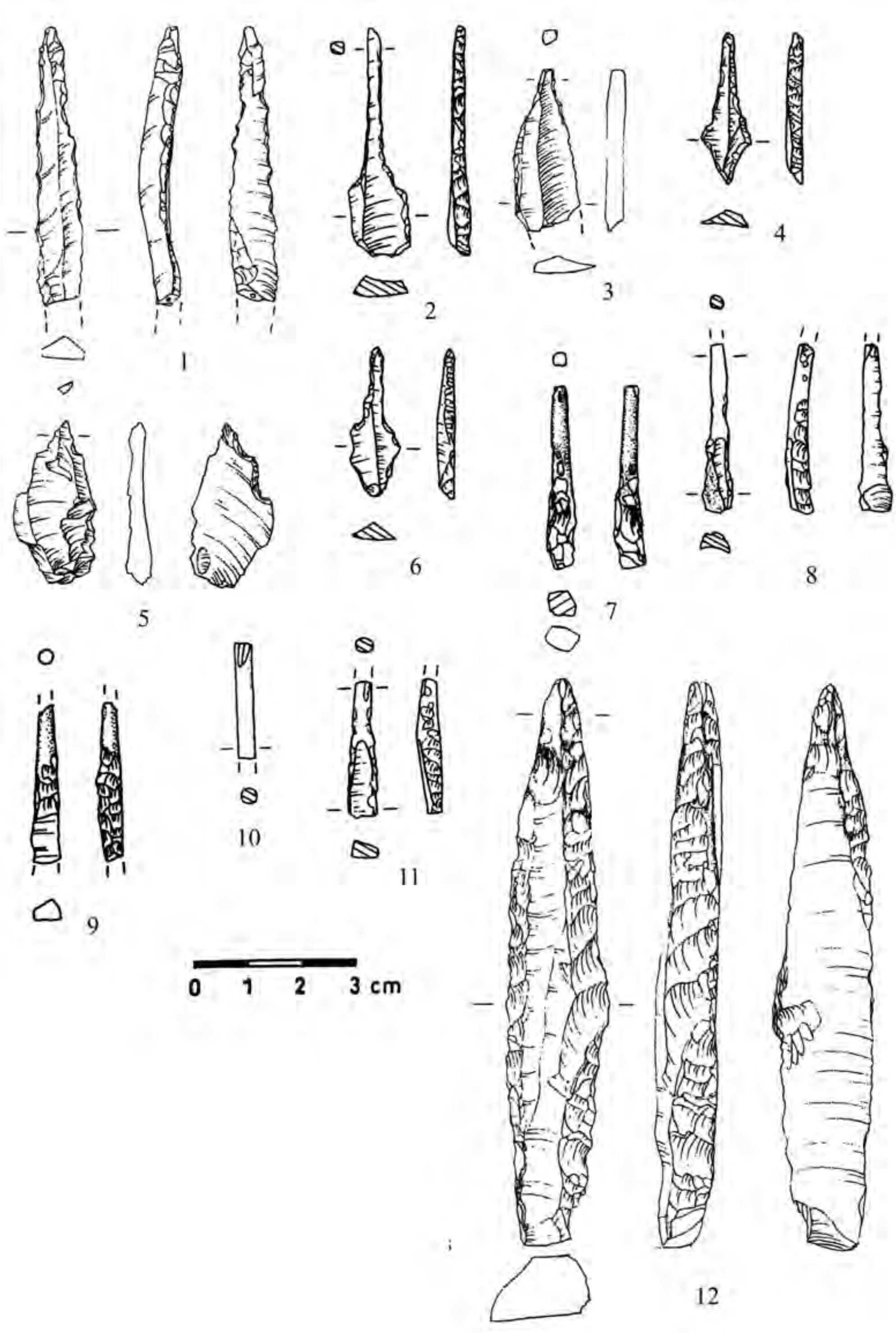
Hole-making Tools of Mezraa Teleilat

Hole-making tools of Mezraa Teleilat are recognized by usually one, and in rare cases two or more, protruding ends that were formed by either retouch or use and may bear diagnostic macro-wear attributes like torsion fracture(s) and rounding on the tip. All drilling, piercing, perforating, reaming, and boring tools that have been classified in lithic reports as awls, piercers, perforators, borers, drills, beaks, rods, etc., are classified as "hole-making tools" in this study. The above-mentioned tools are then divided into four sub-types: perforator, borer, micro-borer, and cylindrical polished drill. To my knowledge the use of "hole-making tools" as a generic term is a new one in lithic studies in the Near East and other regions. This term is intended to encompass a variety of tools that create holes by different ways, because there is little consensus on the exact form or manufacture of each specific type. To further complicate matters, the process of making a hole may require several steps and different tools, depending on the type of hole desired and the type of material in which the hole is made.

The following is the description of the above-mentioned four sub-types of Mezraa Teleilat's hole-making tools:

Perforators (Fig. 3: 3, 5) are characterized by a protruding working tip that is not in the form of a long drill bit, but shorter and with a sharper tip than other types, including beaks and piercers. The tips of perforators are not clearly separated from the body. Sometimes only the tip is retouched and sometimes both tip and edges are retouched. Retouch or edge removals on the tips are usu-

Fig. 3. Mezraa Teleilat: flint borers (1, 12); drill (2); perforators (3, 5); micro-borers (4, 6); cylindrical polished drills (7-11), Phase II.



ally small and semi-steep or flat. It is generally accepted that perforator tips are retouched on one edge of the dorsal surface and the other edge of the ventral surface, but this is not the rule at Mezraa Teleilat. Sometimes perforators are grouped together with notches, denticulates, and backed pieces, in which cases it is difficult to detect whether the prehistoric tool user intended to create a perforator or a notch or a backed tool. Perforators may be on flakes and blades.

Borers (Fig. 3: 1, 12) have a well-defined, intensively retouched, thick and elongated bit of varying length, which is not clearly separated from the body. The retouch is steep and semi-steep, and its location varies. The bits are relatively shorter than those of cylindrical polished drills. Some borers are only larger examples of micro-borers, made with a similar manufacturing technique, while others are very different from micro-borers in terms of form, blank, retouch, and size. Quite robust borers on flakes are also included here, along with some unusually shaped pieces such as the 'unicorn'. Both blades and flakes are common blank types.

Micro-borers (Fig. 3: 4, 6) are small borers with a well-defined, elongated, retouched bit that is clearly separated from the body. The intensity of the retouch does not allow identification of the blanks for these tools, though they seem to be on blades, bladelets, or elongated flakes. Small, flat bulbs are generally retained. Their parallel long edges were retouched on the dorsal surface from just above the bulbar area either along both sides or sometimes also on the center of the tool creating a crest where two retouched edges are joined together forming three faces. Retouch is always carefully done with continuous steep retouch, and sometimes it may extend only from midway to the bottom just above the bulbar part. The tips, which are always located at the distal end, are thick, firm, mostly snapped by use breakage, and can be either long or short. In almost all cases the tips are formed along the central axis of the blank, which is significant considering the rotational force to which these tools were subjected. The workmanship is consistently excellent, and the tools with a single exception never bear cortex. The length, width, and thickness vary between 2.0-3.0 cm, 0.6-0.9 cm, and 0.3-0.4 cm, respectively.

Cylindrical polished drills (Fig. 3: 7-11; Fig. 4: 1). This definition may be new to lithic reports in this area, as such tools are usually called "drills." Because drills found at Mezraa Teleilat show progressive rounding and polishing on the long-used bits that have completely changed the form from its original shape, it is necessary to define these tools by their final form and surface modification. CPDs are usually recovered intact, although sometimes only the rounded polished parts are preserved (Fig. 3: 10). These drills originally had continuous steep retouch along both sides. Only later, due to the rotation during usage, did they become rounded and polished. Like MBs, the workmanship of these artifacts is also excellent and they are completely free of cortex. Although identification of the blank is very difficult because of the retouch and especially the intensive rounding and polish, some slightly rounded and polished counterparts indicate that blade and bladelet blanks were used. They could also have been on elongated flakes. Varying from micro-borers, the bulbs have been removed from these tools, and the bases are flat. They are 2.3-2.7 cm long, 0.4 cm wide and 0.2-0.4 cm thick.

MBs and CPDs show high standardization in raw material and blank selection, retouching, size, and surface treatment. The care given to surface cleaning (no cortex), blank selection, size and shaping might have been due to functional and mechanical requirements. The selection of particular types of raw material was also critical for function of these tools. One major pattern found is that the majority of micro-borers and cylindrical polished drills were made on the same type of flint, usually fine-grained cream, light brown, and beige flints. Pink and black flint types were used occasionally. Coarse grained flint types were probably not used because their rough surface would not move easily on the delicate minerals being worked. Regarding dimensions of the hole-making tools, only micro-borers and cylindrical polished drills show real standardization, signifying products of a specialist.

Frequency and Spatial Distribution

Hole-making tools make up only 5.31% (n=132) of all retouched tools (n=2488) and 2.56% of all formal and non-formal tools together (n=5139) at the site (Table 1 and Fig. 5). Where found, these tools are mainly represented by perforators in all phases. While hole-making tools are very few in Phase IV, they gradually increased in frequency until they were most common of all the phases in Phase II. Though the number of micro-borers and cylindrical polished drills is extremely low in the sampled collection and in the unstudied collection, they are two of the most distinctive and unusual flint tool types of Mezraa Teleilat. Borers, including micro-borers and cylindrical polished drills, were not significant at the site until Phase II. All of the CPDs were found in PN deposits and thus could not be compared diachronically. MBs were largely restricted to PN deposits, except for two from Phase III and one from Phase IV.

The small number of hole-making tools and their unequal distribution by phase, particularly in Phases IV and III, do not provide sufficient data for diachronic comparisons. Interestingly, spatial distribution of these tools shows a difference between the two earlier phases and the latest Phase II. For instance, hole-making tools were found only in exterior contexts in Phases IV and III. On the other hand, hole-making tools not only increase in Phase II but are for the first time found inside the buildings. Although the overall majority was found outside, the number found in the buildings is also relatively substantial. Hole-making tools were not found in all buildings, and two buildings (AG and AT) had relatively high numbers compared other buildings (five and eight items respectively). Perforators are the most common type both in interior and exterior contexts in Phase

Table 1. Mezraa Teleilat: frequency distribution of hole-making tools by phase within the recorded sample (excludes 5 items from stratigraphically unclear contexts.)
Note. The total number of MBs is 24 while of CPDs is 10. Items from areas outside of my sampled trenches are not included in this table.

Hole-making tool types	Phase IV	Phase III	Phase II	Total
Perforators	3	15	56	74
Borers	6	6	23	35
MBs	0	1	14	15
CPDs	0	0	3	3
Total	*9*	*22*	*96*	*127*

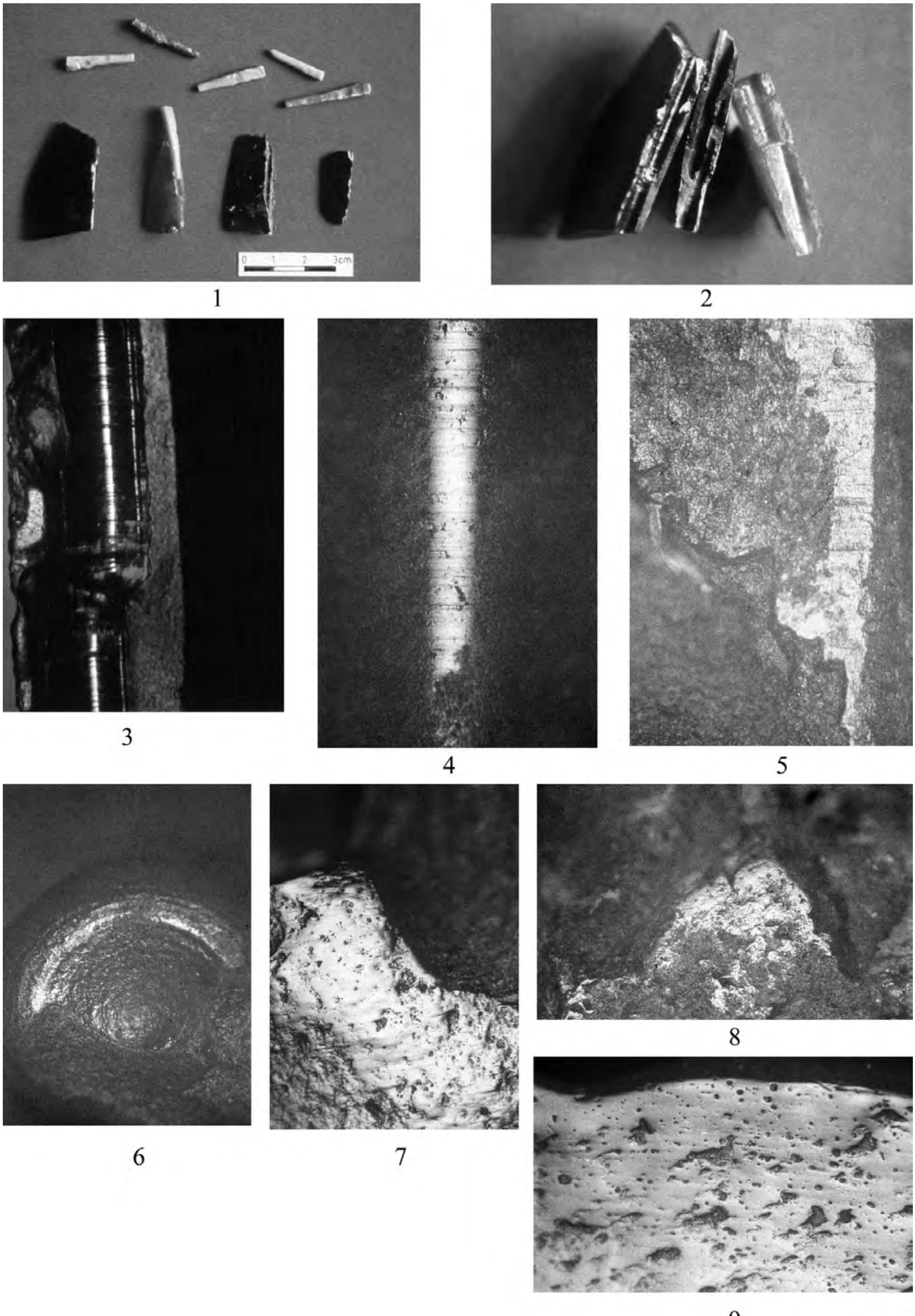


Fig. 4. Mezraa Teleilat: microscopic and macroscopic use-wear observed on the micro-borers and cylindrical polished drills.

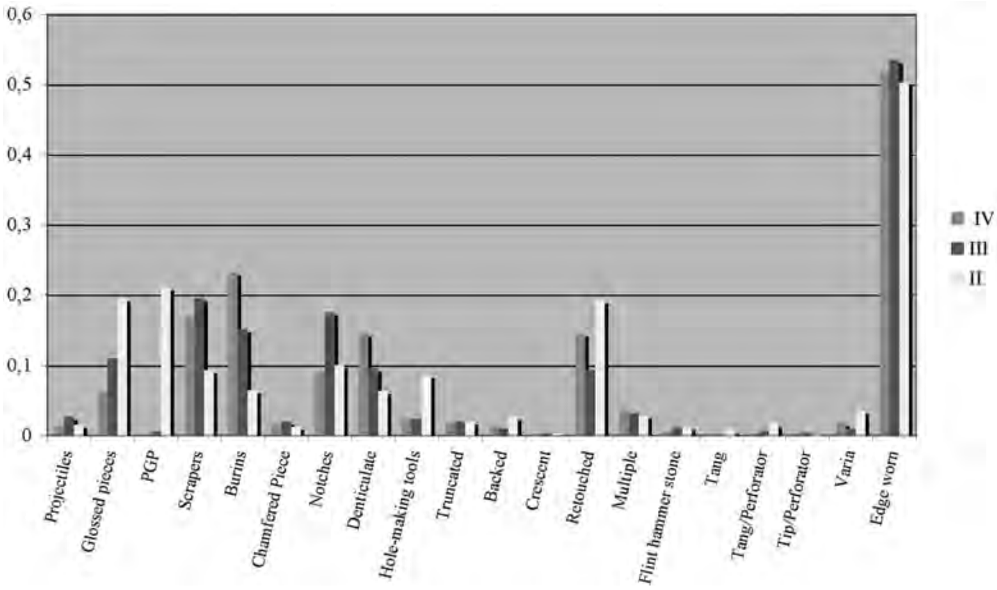


Fig. 5. Mezraa Teleilat: distribution of flint tools by phase.

II, followed by borers. Interestingly, the majority of MBs and CPDs were recovered in the same area of the mound, in Trenches 19 G, 21 G, 23G, 21 H, and 22H. All are adjacent trenches, sharing a common part of the mound where most of the PN buildings cluster. All MBs (except one from Building AN) and CPDs were found outside buildings, including the courtyard areas of the Building AB. It is not known why beads, MBs, and CPDs were recovered outside rather than inside, and exterior recoveries may indicate either a discard context or the production of beads outside of buildings. A high density of cores, debitage, and waste products outside of Building AB suggests that knapping activity took place in that courtyard. Beads might have been made in the courtyards as well, if they were indeed coming from PN layers.

The MBs and CPDs themselves do not appear to have been knapped in any particular building that might be termed a specialized workshop. No workshops for drill and bead manufacture have been found at the site, for two possible reasons. One, material outside the buildings was not always screened, and the small elements of a workshop such as tiny broken tips of drills might have been missed. However, if there were workshops, we should have found more beads, minerals as raw materials, and drills and borers even without screening. Secondly, beads made of exotic stones may have been imported, but then how could we explain the presence of clearly unfinished, broken beads and pendants made of carnelian, green stone, and other non-local, semi-precious minerals (even one possible lapis)?

Beads

Because no other studies have yet been conducted on Mezraa Teleilat beads and pendants, there is no comprehensive information about their number, typology, manufacturing techniques, raw materials, or temporal and spatial distribution. The information used here originates from my own preliminary observations, and I emphasize that it is not my intention to create a morphological typology or to demonstrate a complete production sequence. The majority of the beads are made of stone, but shell and bone beads were also recovered. Mineralogical and source analysis of the stone has not yet been undertaken. Nevertheless, carnelian, agate, greenstone, obsidian, and limestone could be identified by their color and texture. The beads vary in size, with hole diameters ranging from 0.1 to 0.4 cm. Lengths range from 0.6 to 3 cm; maximum width from 0.6 to 2.9 cm; thickness from 0.2 to 1.8 cm. Bead sizes are consistent with those of CPDs and MBs. In many cases, the diameter of the bead holes and the drill bits is more or less the same. The MBs fit perfectly in the perforations of shallow-holed beads, as do CPDs in those of long-holed beads (up to half of the bead or complete hole from one side, as seen in the Fig. 4: 1). The beads found at the site can be divided into two groups based on size and perforation: shallow-holed (Fig. 6: 1) and long-holed beads (Fig. 6: 2).

Based on my initial analysis, the shapes of beads and pendants are correlated to the size of their holes. Long-holed beads are found to have butterfly, biconical/barrel, and tubular shapes, (the first two being almost always bored from both ends). Shallow-holed ones are usually round, discoidal, and/or of a very thin elliptical shape (like a button with two holes); one might have used them as appliqués rather than beads. These were bored either by drilling from one end or by using the punch technique (*e.g.* agate beads), in which a shallow depression on one face of the stone is deepened through pressure or indirect percussion (*cf.* Chevalier *et al.* 1982 for punch technique). Some beads were also shaped by grinding.

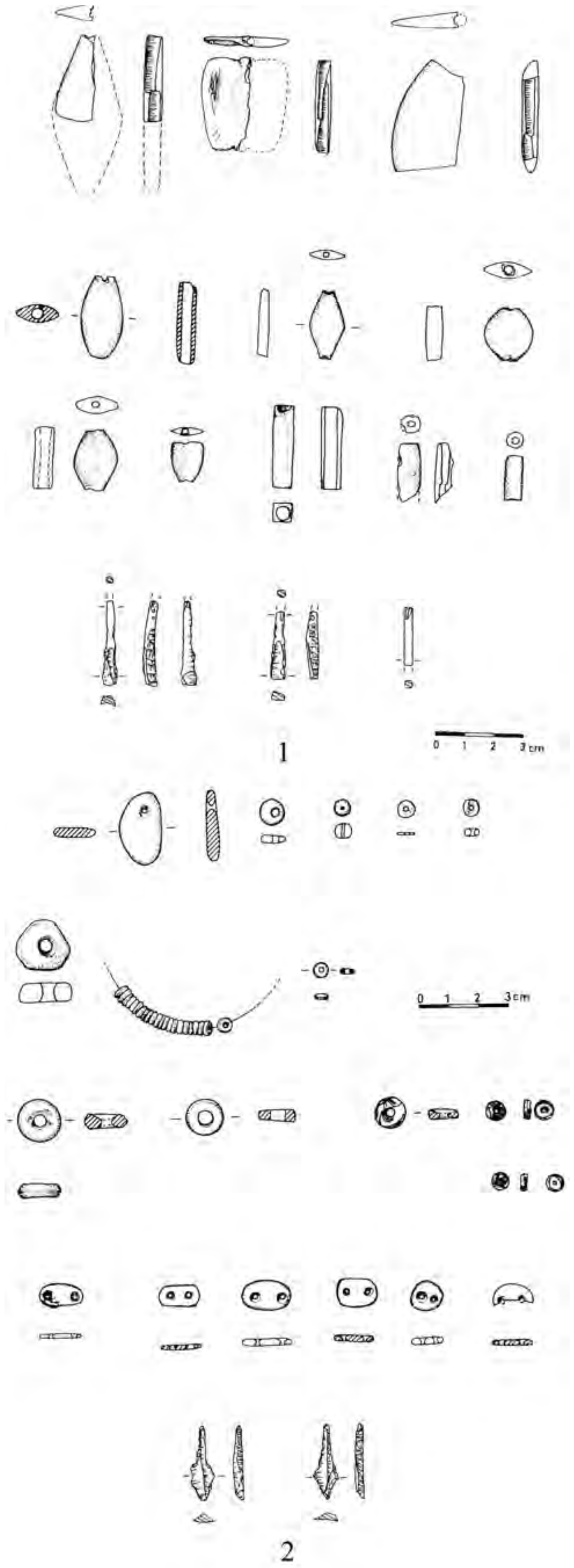


Fig. 6. Mezraa Teleilat: association of certain type of beads with micro-borers and cylindrical polished drills.

According to small finds records, approximately 200 stone, shell, and bone beads were found at Mezraa Teleilat. The beads mostly come from Phases II (PN) and III (Transitional), with only a few from Phase IV. This distribution is unlikely to be related to the limited exposure of PPN layers. The majority was recovered from collecting units outside buildings; only 18 were found inside buildings, of which two are BE buildings of Phase IV and the others in nine buildings of Phase II. According to the current small find list, only one type of long-holed bead was found in the buildings with the exception of a cylindrical one in AN. In parallel with the lower number of drills in Phase IV, bead numbers were also lower in Phase IV.

Beads and pendants with long holes (biconical-butterfly shape or long tubular) that were bidirectionally bored and made of carnelian and other non-local minerals were found mostly in Phase II. The long tubular and cylindrical beads come from Phases II and III as well. Nearly all of the large butterfly-shaped beads, almost all of which are broken, belong to Phase II, and one item was found in a pit (an intrusion?) in Phase IV and another one in Phase III. These trenches were found to have many Iron Age (Phase I) deposits along with an Assyrian palace, which leads to the question of possible disturbance of these contexts. Flat and oval appliqué pendants were found mostly in Phase II, but some samples came from Iron Age deposits including mixed layers. As with butterfly beads/pendants, tubular beads were also recovered in trenches cut by Iron Age sediments. It is not sure if these sophisticated beads were whether handcrafts of Neolithic or later Neo-Babylonian or Achaemenid occupants. The other stone beads are small, thin, circular ones made by the punch technique (mostly carnelian with possibly two of flint) and deriving almost equally from Pottery Neolithic and Iron Age layers. Regarding the production of beads, there is some evidence for simple shell, bone, and stone bead production at Mezraa Teleilat. Thin appliqué-like, elliptical stone and bone pendants, pebbles, limestone, and some hard stone beads and pendants were bored by hand from one end (with a few exceptions) using perforators without sophisticated preparation. In addition to perforators, micro-borers also might have drilled some of these beads and pendants since some demonstrate an intermediate quality of bored holes and concentric circles.

The technologically elaborate beads similar to those mentioned above have been found at some other sites in northern Mesopotamia in Pre-Halaf, Halaf, and Obeid layers. Two round obsidian beads are known from Halaf Tell Kurdu (*cf.* Özbal *et al.* 2004) and Domuztepe (Campbell *et al.* 1999; Healey 2000; see also Campbell 2006 for *in situ* possible roughouts of obsidian beads) and from Amuq sites (Phase E of Obeid deposits and First Mixed Range between Phase B of EPN and Phase C of Pre-Halaf; Braidwood and Braidwood 1960: fig. 166: 2 and fig. 100: 2). The presence of Halaf-related sherds at Mezraa Teleilat could indicate the habitation of Halafian people on the mound, whose deposits may have been removed in the Iron Age (Karul *et al.* 2001: 165-166; Karul *et al.* 2004: 103); further excavations may reveal Halaf structures. Similarly, excavations in the Achaemenid palace may reveal a bead/pendant or a bead workshop. Other common Neolithic types of beads in limestone, bone, and shell derive from all phases. I do not think that these types common to all phases can be uniquely attributed to a particular culture, but the elaborate long tubular, butterfly, and small round beads and pendants do deserve special attention, since they can be identified to specific time periods and so may be used to address diachronic questions.

Many of the long-holed beads were found broken (Fig. 4: 2), providing a unique opportunity to understand the method involved in drilling their holes. Almost all of the long-holed beads were drilled from both ends, and some obviously broke during manufacturing because the borings from two directions did not meet in the center. Highly visible concentric circles developed in holes radiating from the initial drilling point (Fig. 4: 2-3). While the surfaces inside the holes between the grooves are dull, the outer surfaces of the beads are highly polished. Microscopic cracks, visible in the agate and carnelian beads under a transmitted light, indicate that they were heated. While inner grooves are dulled from abrasion with sand and a drill, high points on the surfaces may have become shiny due to friction with sand and water. If the broken partial beads had not been washed by the archaeologists, there would have been a chance of finding some residue of sand still present.

Experimental Manufacture of Hole-making Tools and Beads and Use-wear Analysis

Several questions stimulated the application of experimentation and use-wear analysis on these tools: 1) Is the typological classification of flint tools correct? That is, were the tools typologically called “drills” and “borers” indeed used to drill and to bore? 2) Were different hole-making tools used for different kinds of beads and drilling strategies? 3) Is it possible to gain an idea about the production technique of the beads as well as of MBs and CPDs? 4) Since beads and MB/CPDs were recovered together at the site, was bead-making a local craft specialization? Were exotic-looking beads manufactured on the site or were they imported as finished products? Experimental replication of these tools and beads as well as operation of hole-making tools was essential to compare macro- and micro-wears both on Neolithic and experimental tools and to address the questions above. Such analysis would also help to understand the efficiency and techniques involved in using the tools.

A total of 35 experimental tools were manufactured (20 on local flint and 15 on obsidian)[1]. Experimental hole-making tools were used for bead making as well as for opening holes on different materials such as pebbles, sandstone, limestone, malachite, carnelian, shells, and bone either manually (with or without a shaft) or mechanically by insertion into a wooden bow-drill, with or without sand as an abrasive (for more on the bow drill and sand in drilling, see Burian and Friedman 1985; Grace 1990; Gwinnett and Gorelick 1991; Kenoyer 1991; Roux and Blasco 2000; Roux *et al.* 1995). Because of the difficulty in manufacturing long-holed beads, particularly barrel and butterfly shaped ones, as well as a lack of skill and experience, we did not attempt to produce such beads. Use-wear analysis encompassed all experimental tools (35) and 38 archaeological flint items: 18 perforators (not included in this paper), 10 MBs, and 10 CPDs. It should be noted that because of limited recovery of CPDs and MBs in the recorded sample, I included tools from an area outside of my sampled trenches.

Results of use-wear analysis helped to distinguish hand drilling from bow drilling, since the two methods differ in how and to what extent the tool rotates. Concentric circles on cross-sections of drill bits and intensive surface polish are indications of both bow and hand drilling. According to experimental results, incomplete and irregular microscopic drilling circles (sometimes also macroscopic) attest to hand drilling (incomplete rotation is caused by limiting wrist movement to less than 360°), while perfect and complete circles are associated with bow drilling (*cf.* Straus *et al.* 1983: 380). An indication of hand drilling versus bow drilling can also be seen in and around the drilled hole. Hand drilled holes commonly show irregularity on the surface of the material drilled and overlapping incomplete circles in the holes, while bow drilling results in a smooth surface around the opening and complete circles in the hole. Similar observations have been noted by Straus *et al.* (1983: 380) and Gwinnett and Gorelick (1991). The same type of well-developed circles, rounding, and polish are known from other archaeological tools and experimental work. The PPNB sites of Kumartepe (Calley and Grace 1988; Grace 1990) and Akarçay Tepe (Ibáñez *et al.* 2007: 157) in southeast Anatolia yielded similar use-wear on flint micro-borers. Evidence from outside of the Old World comes from Yerkes’ experiments and Mississippian tools (Yerkes 1983).

Using experimental MBs and use-wear as reference, it is possible to determine that the MBs at Mezraa Teleilat performed drilling tasks and were used with bow drills. Tip rounding and surface polish are visible to various degrees. Samples with rounded bits show the polish and complete concentric circles consistent with bow drilling (Fig. 4: 6). Usually edge rounding and polish are located just on the tip and on a small area of the edges on some specimens. Developed polish and concentric circles found on those examples still have round polished drill bits. If MBs had longer drill bits and were used over time to open deeper holes, they would have become more cylindrical, coming to resemble CPDs in addition to their macro and micro use-wear. But, in contrast to CPDs, which were used in longer beads for a longer time, MBs were used in shallow holes for a shorter time per bead, so that while their tips were rounded in a limited section, and concentric circles are visible on this limited section, they did not extend over the larger surface. Three MBs have had their tips snapped off by use. It seems that these tools broke during rotation but continued to be used, as indicated by new edge rounding and polish on the snap breaks.

Specific types of polish were identified on seven pieces; definite limestone polish was found on two MBs (Fig. 4: 7), and mineral polish and striations (Fig. 4: 8) were found on five specimens. Although three did not demonstrate any diagnostic polish and striations, torsion fractures on the tip indicate their drilling activity as borers. Curiously, micro-polishes of siliceous plants were observed on the edges of two MBs (Fig. 4: 9), suggesting that some of them were used as sickle blades for cutting plants before being transformed into borers. Given the attributes of macro- and micro-wear on MBs from all three phases, they appear to have been mounted and used as part of a bow drill. Most likely sand and water served as an abrasive. Although the MBs might have been used in some stage of long-bead drilling, or even involved in the punch technique (which was not tried experimentally), their main use was in manufacturing shallow-holed beads (Fig. 5: 2).

Earlier it was noted that CPDs were originally retouched with elaborate steep retouch along both edges until the edges were rounded and polished by intensive use. The amount of progressive rounding and polishing seems to be related to the hardness of the raw material of the beads, drilling (centrifugal) force, length of time the object was used, and whether abrasive sand was used in drilling. Use-wear analysis has shown that all of the CPDs examined had developed complete concentric micro-polishes and striations on the tip at their rounded sections (Fig. 4: 6) and tool surfaces (Fig. 4: 5). Most of them exhibit burin-like fractures and torsion fractures on their tips. Rounding and complete concentric circles indicate that they were used for drilling stone and manufacturing long-holed beads (Fig. 5: 1). An alternative line of evidence for creation of long-holed beads by CPDs comes from the long beads themselves, which show similar patterns of concentric circles in their holes as are found on the CPDs (Fig. 4: 3-4). The majority of circles in holes originate from the two opposite ends of the beads, indicating drilling from both ends, likely by a bow drill. Fig. 4: 1 shows the perfect fit of a CPD into the hole of a broken bead.

Conclusions and Discussions

Typo-technological analysis, use-wear analysis, and experimentation have been used to illustrate two major technological and cultural shifts at Mezraa Teleilat towards the end of the PPNB and the beginning of the PN: 1) use of MBs and CPDs, which are the two most distinctive hole-making tools among Mezraa Teleilat's flint assemblage; and 2) bead manufacturing. While the study of hole-making tools brought satisfying answers for some questions, others remained only partly answered. One of the questions was if the typological names of these tools were reliable in terms of understanding the function of the tools. Correlations between typological classification and function of hole-making tools were confirmed in many cases by experimentation and use-wear analysis. Although given ethnographic evidence, the typological and analogical functions of MBs and CPDs were described as drills and borers as matched their typological name, this was not necessarily the case for perforators. While some perforators indeed performed hole-making tasks, some did not or they were involved in different activities (*e.g.* scraping, engraving and/or cutting). A few MBs were also used for a different purpose, such as scraping limestone and harvesting siliceous plants in addition to their drilling use. Despite the accuracy of typology in many cases, I argue that misuse of typology as identifying exact function may lead to a false understanding of prehistoric tool functions and hence reconstruction of prehistoric cultures (see Coşkunsu and Lemorini 2001 for an example of PPNB projectile points). Therefore, typology has to be supported with use-wear and residue analysis as well as with experimental work and study of the *chaîne opératoire.*

Relating to this link between typology and function, it was questioned above whether different hole-making tools were used for different kinds of beads and drilling strategies. The analysis summarized here shows that the tools were used for a diversity of beads and drilling purposes. For example, perforators were used to bore shallow holes manually on materials ranging from stone to bone to hide and clay, while micro-borers and cylindrical polished drills were used only for stone drilling with bow-drills, most likely for bead manufacturing. In addition, several lines of evidence indicated that MBs were used to form shallow-holed beads and CPDs for long-holed beads. The origin and manufacturing techniques of MBs, CPDs, and of beads were also questioned; however, this could not be answered completely. Because no workshops for drills/borers or beads were discovered at the site, it is not possible to follow the entire operational sequence from raw material acquisition to discard. Although some raw materials of MBs and CPDs seem to be local, the range of raw material sources in the immediate area is not known. Also, their small numbers and highly standardized bladelet blanks are not common at the site, and this does not support on-site production. Therefore, it is not easy to determine their original size, shape, and knapping methods. A few similar bladelet blanks, of which some are partially or completely retouched with careful steep retouch on one edge, resemble unfinished MBs and CPDs, but their presence is still not definitive of production.

Evidence of a complete production sequence for long-holed beads is currently lacking, as is also the case for beads that were created using the punch technique. The manufacture of long-holed beads and those holed by punch technique needs to be investigated with further experiments. It is certain that long-holed beads were drilled with cylindrical polished drills and are the result of a sophisticated technological process, including heating and cooling, chipping, shaping, polishing, grinding, and abrading with sand. Further experiments may give us an opportunity to understand the whole *chaîne opératoire.* It is also not possible to determine if bead making was a local craft specialization or if some beads were imported as finished products. The number of both professionally made bead/pendants and the MBs and CPDs is too low, and only a few beads were found *in situ* in buildings. Use-wear analysis of many perforators and production evidence across the site indicate that simple bead production was most likely carried out on the site. The technologically complicated beads, however, may have been produced by craft specialists who could operate MBs and CPDs.

The presence of professionally made beads broken during drilling, as indicated by incomplete holes, implies that they were drilled on the site (if not collected from elsewhere). Other than one MB, all professionally made MBs and CPDs were found in contexts outside buildings, some in courtyards. If they came from secure deposits we could assume that some early Pottery Neolithic inhabitants were highly specialized in the manufacture of beads, drills, and borers. The spatial distribution of MBs and CPDs is limited to trenches 19G, 21G, 21H, 23G, and 22H where PN buildings cluster. Beads, on the other hand, have a wider spatial distribution; they are found in the trenches listed above as well as outside these trenches. Regarding production of the tools, however, it is questionable that MBs and CPDs were knapped on the site, in spite of the local raw material and a few similar bladelet blanks.

Overall, MBs and CPDs, as well as some other drills, seem to be two of the most valuable tools of Mezraa Teleilat. These rare tools were used by craft specialists in production of highly specialized beads and pendants. Most probably these two tools, as well as some other rare hole-making tools such as rods, were manufactured elsewhere by craft specialists, as indicated by their standard size, blanks, and high quality workmanship compared to the simple knapping technique and tool repertoire common at Mezraa Teleilat. Such tools likely would have been restricted to specialists such as bead-makers for the crafting of elaborate beads, the only people who could have effectively used these delicate tools with bow-drills. Furthermore, only such craftsmen could have shaped carnelian, obsidian, flint and other hard minerals into perfectly smooth forms and with regular holes, precisely in the center of the stone. In particular, long-holed beads and long drills would be extremely difficult to control.

What can be concluded with certainty is that the people of Mezraa Teleilat were making beads themselves, using very simple tools and processes. In all phases limestone and bone were bored with simple hole-making tools, either with or without a handle. The more complex borers on the site could have been used to make beads out of harder materials, or these types of beads could have been imported. In either case, the boring tools at the site were made for specialist use, but whether that use took place on or off site is unknown.

Acknowledgements. I am deeply thankful to Professor Mehmet Özdoğan for inviting me to work on the excavation and granting me with the responsibility for the entire lithic assemblage of the site. Without advisory help of my primary Ph.D. advisor Professor Ofer Bar-Yosef and other committee members, Prof. C.C. Lamberg-Karlovsky and Dr. Richard Meadow, I would not have been able to complete my research. I am grateful for their help, advice, and support. My numerous friends and colleagues, Eyüp Bucak and Naci Toy (the former directors of the Urfa Museum), the museum staff, our local excavation friends and work partners, Professors Guillermo Algaze and Patricia Wattenmaker, and Dr. Reinhard Bernbeck offered me tremendous help when I was in need during my fieldwork and study season in Birecik and Urfa and I send a heartfelt thank to them. I would like to thank and express my appreciation also for my friends and colleagues, Britt Hartenberger and Mary Settegast, for their meticulous editing and great patience. My thanks and appreciation also go tomy colleagues, Necmi Karul, Eylem Özdoğan, Emre Güldoğan, Bengü Kılıçbeyli, Işıl Demirtaş, Gizem Kartal, Ferran Borrell Tena, and many others whose names could not be included in this short paper for various kinds of help in discussions, drawings, maps, and figures. My research was funded by grants from the Department of Anthropology, the American School of Prehistoric Research (ASPR), and the Graduate School of Arts and Sciences of Harvard University. I take full responsibility for any mistakes made.

Note

[1] In addition to this most recent experimentation, I used also the results of my previous drilling and perforating experiments. The previous experimental work was completed in collaboration with Cristina Lemorini, Yüksel Dede, and Çiler Altınbilek in the Prehistory Laboratory of Istanbul University. Experimentation and use-wear analysis included both flint and obsidian tools. Those of obsidian are not discussed here, nor are all the flint tools (see Coşkunsu 2007).

References

Ataman K.
1999 Threshing Sledges and Archaeology. In P.C. Anderson (ed.), *Prehistory of Agriculture:* 211-222. Institute of Archaeology Monograph 40. Los Angeles: University of California at Los Angeles.

Braidwood R.J. and Braidwood L.
1960 *Excavations in the Plain of Antioch, I. The Earlier Assemblages.* Phases A-J. Oriental Institute Publication 61. Chicago: University of Chicago Press.

Burian F. and Friedman E.
1985 Flint Borers: Methods of Production and Use. *Mitekufat Heaven* 18:63-65.

Chevalier J., Inizan M.-L. and Tixier J.
1982 Une technique de perforation par percussion de perles en cornaline (Larsa, Iraq). *Paléorient* 8(2): 55-65.

Calley S. and Grace R.
1988 Technology and Function of Micro-Borers from Kumartepe (Turkey). In S. Beyries (ed.), *Industries Lithiques: Tracéologie et Technologie, vol. 1: Aspects Archéologiques:* 69-81. British Archaeological Reports – International Series 411. Oxford: B.A.R.

Campbell S.
2006 Domuztepe 2006. *Anatolian Archaeology* 12: 17-18.

Campbell S., Carter E., Healey E., Anderson S., Kennedy A. and Whitcher S.
1999 Emerging Complexity on the Kahramanmaraş Plain, Turkey: The Domuztepe Project, 1995-1997. *American Journal of Archaeology* 103(3): 395-418.

Coşkunsu G.
2007 *The End of the Pre-Pottery Neolithic in the Middle Euphrates Valley: The Lithic Assemblages of Mezraa Teleilat, Southeastern Turkey.* Unpublished Ph.D. Thesis. Harvard University, Department of Anthropology.
2008 Obsidian Assemblage of Mezraa Teleilat: Evidence of Cultural and Chronological Continuation from Late Pre-Pottery Neolithic to Pottery Neolithic. *Neo-Lithics* 2/07: 36-43.

Coşkunsu G. and Lemorini C.
2001 The Function of Pre-Pottery Neolithic Projectile Points: The Limits of Morphological Analogy. In I. Caneva, C. Lemorini, D. Zampetti and P. Biaggi, (eds.), *Beyond Tools: Redefining the PPN Lithic Assemblages of the Levant. Proceedings of the Third Workshop on PPN Chipped Lithic Industries:* 145-159. Berlin: ex oriente.

Coppa A., Bondioli L., Cucina A., Frayer D.W., Jarrige C., Jarrige J.-F., Quivron G., Rossi M., Vidale M. and Macchiarelli R.
2006 Palaeontology: Early Neolithic Tradition of Dentistry. *Nature* 440: 755-756.

Grace R.
1990 The Use-wear Analysis of Drill Bits from Kumartepe. *Anatolica* 16: 154-155.

Gwinnett A.J. and Gorelick L.
1991 Bead Manufacture at Hajar Ar-Rayhani, Yemen. *Biblical Archaeologist* 54(4): 186-196.

Karul N., Ayhan A. and Özdoğan M.
2001 1999 Excavations at Mezraa Teleilat/1999 Yılı Mezraa Teleilat Kazıları. In N. Tuna, J. Öztürk and J. Velibeyoğlu (eds.), *Salvage Project of the Archaeological Heritage of the Ilısu and Carchemish Dam Reservoirs. Activities in 1999/Ilısu ve Karkamiş Baraj Gölleri Altında Kalacak Arkeolojik ve Kültür Varlıklarını Kurtarma Projesi 1999 Yılı Çalışmaları:* 133-174. Ankara: Orta Doğu Teknik Üniversitesi/Middle East Technical University and TAÇDAM.

Karul N., Ayhan A. and Özdoğan M.
2004 2001 Excavations at Mezraa Teleilat/2001 Yılı Mezraa Teleilat Kazıları. In N. Tuna, J. Öztürk and J. Velibeyoğlu (eds.), *Salvage Project of the Archaeological Heritage of the Ilısu and Carchemish Dam Reservoirs. Activities in 2001/Ilısu ve Karkamiş Baraj Gölleri Altında Kalacak Arkeolojik ve Kültür Varlıklarını Kurtarma Projesi 2001 Yılı Çalışmaları:* 57-106. Ankara: Orta Doğu Teknik Üniversitesi/Middle East Technical University and TAÇDAM.

Kenoyer J.M., Vidale M. and Bhan K.K.
1991 Contemporary Stone Beadmaking in Khambhat, India: Patterns of Craft Specialization and Organization of Production as Reflected in the Archaeological Record. *World Archaeology* 23(1): 44-63.

Mackay E.
1937 Bead Making in Ancient Sind. *Journal of the American Oriental Society* 57(1):1-15.

Özbal R., Gerritsen F., Diebold B., Healey E., Aydin N., Loyet M., Nardulli F., Reese D., Ekstrom H., Sholts S., Mekel-Bobrov N. and Lahn B.
2004 Tell Kurdu Excavations 2001. *Anatolica* 30: 37-107.

Özdoğan M.
2003 A Group of Neolithic Stone Figurines from Mezraa Teleilat. In M. Özdoğan, H. Hauptmann and N. Başgelen (eds.), *From Villages to Towns: Studies Pretented to Ufuk Esin*: 511-523. Istanbul: Arkeoloji ve Sanat Yayınları.

Ibáñez J.J., Urquijo J.G. and Rodríguez Rodríguez A.
2007 The Evolution of Technology during the PPN in the Middle Euphrates: A View from Use-wear Analysis of Lithic Tools. In L. Astruc, D. Binder, and F. Briois (eds.), *Systèmes techniques et communautés du Néolithique Précéramique au Proche-Orient.* Actes du 5e colloque international. Frejus 2004: 153-165. Antibes: Editions APDCA.

Roux V. and Blasco P.
2000 *Cornaline de l'Inde/Carnelian in India: From Technical Practices in Cambay to the Techno-systems of the Indus.* Paris: Editions de la Maison des sciences de l'homme.

Roux V., Bril B. and Dietrich G.
1995 Skills and Learning Difficulties Involved in Stone Knapping: The Case of Stone-Bead Knapping in Khambhat, India. *World Archaeology* 27(1): 63-87.

Straus L.G., Gwinnett A.J., Gorelick L and King M.E.
1983 News and Short Contributions. *Journal of Field Archaeology* 10(3): 371-386.

Whittaker J.C.
2000 Alonia and Dhoukanes: The Ethnoarchaeology of Threshing in Cyprus. *Near Eastern Archaeology* 63(2): 62-69.

Yerkes R.W.
1983 Microwear, Microdrills, and Mississipian Craft Specialization. *American Antiquity* 48(3): 499-518.

Rahmatabad: Dating the Aceramic Neolithic in Fars Province

Reinhard Bernbeck[1], Susan Pollock[1] and Hassan Fazeli Nashli[2]

[1] Department of Anthropology, Binghamton University <rbernbec@binghamton.edu>
[2] Iranian Center for Archaeological Research and Department of Archaeology, Tehran University <hfazelin@ut.ac.ir>

In the summer of 2005, salvage excavations were undertaken at the site of Rahmatabad in the Kamin Valley some 40 km northeast of Persepolis. The site is expected to be largely destroyed by the enlargement of the Esfahan-Shiraz highway (Fig. 1). From surface finds, we expected to find mainly Bakun-period remains dating to the 5th millennium BCE and possibly succeeding Lapui layers. Work at the site was funded by Bonyad-e Parseh Pasargad and UNESCO.

Our excavation strategy was primarily to explore the southern portion of the mound, a section that had already been cut by roads leading to the Bolaghi Valley and the construction of the present highway. We opened three 10 x 10 m trenches on the southern side of the mound, and a smaller step trench to the west (Fig. 2). In the large trenches, we encountered a disturbed layer immediately below the mound's surface; beneath that there were two Middle Bakun-period layers, the upper one with small fire installations on an extensive outside surface, and the lower one with several buildings, a kiln, and other fire installations.

In the westernmost Trench A, a few sherds of the Late Neolithic Mushki type were found in Chalcolithic (Bakun period) contexts. We therefore decided towards the end of our work to excavate a deep sounding of 2 x 2 m in the northeast corner of the trench to explore the level and depth of these Neolithic layers. To our surprise, there were no recognizable stratified materials of the Mushki period. Instead, we found a series of surfaces and ash layers that contained no pottery whatsoever, but there were small amounts of lithics, among them microliths and bullet cores, as well as heavily fragmented bones. These materials come from layers characterized by yellowish-buff, fine sandy to silty deposits. This matrix is strikingly different from the bricky, reddish and coarse-grained sediments of the later Bakun strata. The cultural layers in the trench were unexpectedly deep, and on the last day of work we stopped at 1788.84 masl, that is, *ca.* 1 m below the present valley floor, without having reached sterile soil. We excavated a total depth more than 2.50 m of these apparently aceramic strata, and we took samples for radiocarbon dating, phytolith and micro-archaeological analysis. While much of the lab work remains to be done, we have obtained three radiocarbon (AMS) dates from the deep sounding (Table 1). These

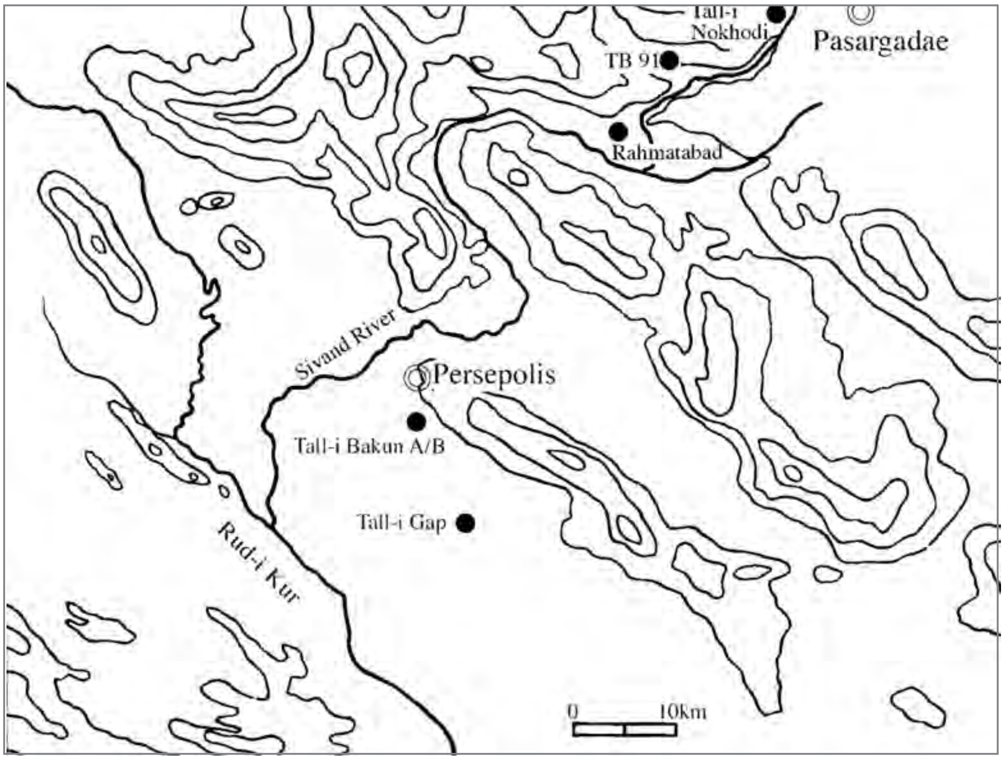


Fig. 1. Map of the region between Pasargadae and Persepolis, Fars Province.

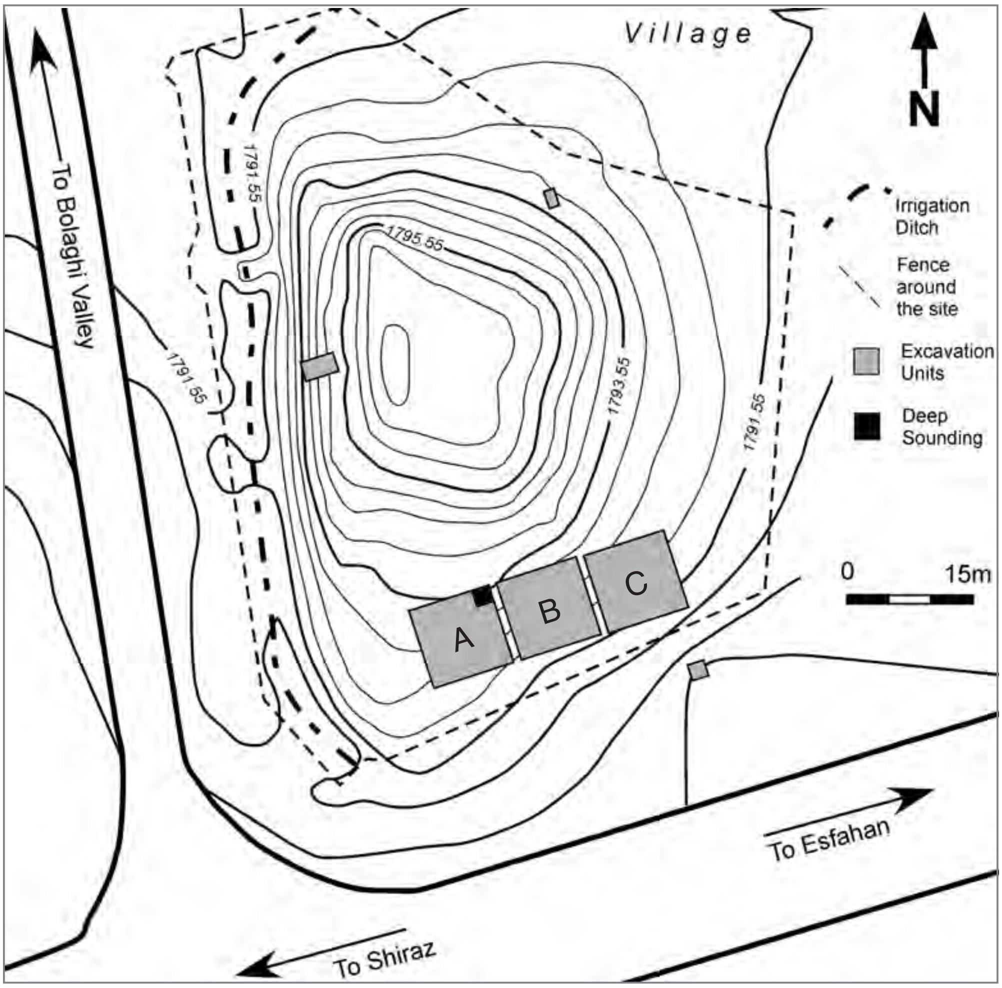


Fig. 2. Site map of Rahmatabad, with excavation trenches and deep sounding indicated.

determinations are from three different loci, one from the uppermost levels of what appears to be aceramic Neolithic (Loc. A53, at 1791.36 m), and two from lower layers, between 0.5 and 0.7 m above the base of the excavation unit (Loc. A61, at 1789.50 m; Loc. A62, at 1789.21 m).

The three radiocarbon samples were submitted to two different labs (Zurich and Kiel[1]) for accelerator mass spectrometry (AMS) dating. The results and the calibrated ranges of each date are presented in Table 1.

Using the available OxCal functions, the three dates can be combined with an acceptable level of agreement (A = 93.4%) to yield a date range of 7050-6760 cal BC (2 sigma). Summing the dates yields a range of 7070-6670 calBC. In both cases, the results indicate a span of time from the very end of the 7th through the first third of the 6th millennium BC.

These new dates from prehistoric Fars are of considerable significance for several reasons:

• First, they confirm what has long been assumed (*e.g.* Vanden Berghe 1954), namely, that there are aceramic Neolithic settlements in the province of Fars. In his survey in the Kur River Basin, Sumner (1972) was not able to identify the aceramic sites that Vanden Berghe claimed to have located. Material from Tsuneki's excavations at Haji Bahrami Cave and the shelter TB130 (Tsuneki 2007) in the nearby Bolaghi Valley has been attributed to the Proto-Neolithic on the basis of the lithic assemblages. No radiocarbon dates are yet available. However, a com-

Table 1. Radiocarbon dates with calibrations from the deep sounding in Trench A, Rahmatabad.

Lab number	**Provenience**	**Material**	**Lab date bp**	**Calibrated date BC (2 sigma range)[1]**
KIA33174	Unit A Loc 53, Level A IV	charcoal	7945 +/-	7040-6690
KIA33173	Unit A Loc 61, Level A VI	charcoal	8023 +/- 45	7080-6770
UZ 5331/ETH 31882[2]	Unit A Loc 62, Level A VII	charcoal	7925 +/- 75	7050-6640

[1] All determinations were calibrated using OxCal 3.10 (Bronk Ramsey 2005).

[2] Necessary preparation and pre-treatment of the sample material for radiocarbon dating was carried out by the 14C laboratory of the Department of Geography at the University of Zurich (GIUZ). The dating itself was done by AMS (accelerator mass spectrometry) with the tandem accelerator of the Institute of Particle Physics at the Swiss Federal Institute of Technology Zurich (ETH).

parison of the lithic assemblages of aceramic Rahmatabad with these two sites could lead to a better understanding of the chronology and socio-economic developments in the region.

• Second, while we have not found clear evidence for architecture in our small sounding, the accumulation of more than 2.50 m of aceramic Neolithic strata suggests a relatively long-term settlement.

• Third, the aceramic Neolithic layers are buried under the present surface of the Kamin Valley. The high sedimentation rates of the Sivand River may be responsible for the disappearance of other similarly early sites. Therefore, the idea of an imported "Neolithic package" as part of a process of "colonization" of the region from the southwest (Weeks *et al.* 2006: 23) needs rethinking.

• Fourth, the Rahmatabad aceramic Neolithic dates to a time slightly later than the transition from the aceramic to the ceramic Neolithic in southwestern Iran. There is a need to account for this time lag in relation to surrounding regions, especially in view of a date of ca. 7000 cal BC from the lowest *ceramic* Neolithic layer at Qale Rostam in the high Bakhtiyari Zagros (Mashkour, pers. comm.).

• Recent dates for the Mushki phase in Fars (Alizadeh *et al.* 2006: 119; tables 9-11) position that cultural tradition chronologically in the final couple centuries of the 7th millennium. This leaves a gap of several hundred years between the Rahmatabad dates and those of the earliest ceramic Neolithic complex known in Fars. The site of Rahmatabad, with its out-of-context finds of Mushki sherds, may in the future illuminate the transition to the pottery Neolithic in this region.

• Finally, questions regarding Neolithization in the southern Zagros must be reconsidered. The bones from the deep trench in Rahmatabad could help elucidate to what extent Neolithic economies were imported fully developed, or whether the region of Fars itself took part in this crucial transition in human history.

References

Alizadeh A.
2006 *The Origins of State Organizations in Prehistoric Fars, Southern Iran: Excavations at Tall-e Bakun.* Oriental Institute Publications, 128. Chicago: Oriental Institute of the University of Chicago.

Bronk Ramsey C.
2005 *OxCal Program v.3.10.*

Sumner W.
1972 *Cultural Development in the Kur River Basin, Iran: An Archaeological Analysis of Settlement Patterns.* Ann Arbor: University of Michigan Press.

Tsuneki A., Zeidi M. and Ohnuma K.
2007 Proto-Neolithic Caves in the Bolaghi Valley, South Iran. *Iran* 45: 1-22

Vanden Berghe L.
1954 Archaeologische navorsingen in de omstreken van Persepolis. *Jaarbericht Ex Oriente Lux* 13: 394-408.

Weeks L., Alizadeh K., Niakan L., Alamdari K., Zeidi M., Khosrowzadeh A. and McCall B.
2006 The Neolithic Settlement of Highland SW Iran: New Evidence from the Mamasani District. *Iran* XLIV: 1-31.

Note

[1] We wish to thank Prof. Svend Hansen (German Archaeological Institute, Eurasia Department) for his assistance in obtaining the two determinations from the Kiel laboratory.

Conferences, Workshops

BANEA 2008 Conference
University of Liverpool, February 29-March 2, 2008

By Karina Croucher
<karina.croucher@liverpool.ac.uk>

This year's conference took a diversion from the traditional BANEA program by focusing predominantly on the role of theory in Near Eastern Archaeology, with the theme of *Theoretically Speaking: New approaches to old problems.* This has followed an increasing trend, begun by Reading and continued at Edinburgh BANEAs. The theme organisers (Brian Boyd, Columbia University, and Karina Croucher, University of Liverpool) were keen that debates should not simply be abstractly theoretical, but should deal with real archaeological data (something often lacking in theoretical debate). This attention to

Speakers of the Palestinian Archaeology Session at BANEA 2008: (left to right) Hamdan Taha, Mahmoud Hawari, Eleni Asouti, Hamed Salem, Hani Nur el-Din.

details was borne out through the second theme of the conference, *Bioarchaeology in Southwest Asia: Recent Advances* (led by Jessica Pearson, University of Liverpool).

We were delighted to open the conference with a plenary lecture from Nigel Goring-Morris (The Hebrew University, Jerusalem), discussing the site of Kfar HaHoresh. This was followed by an opening wine reception in the enigmatic setting of the old chapel at the Foresight Centre. The first morning of the conference began with Brian Boyd's introduction to the main theme, and the commencing session on *Agency, Gender and Materiality.* The theory session papers were diverse in nature, ranging from contributions dealing with death and mortuary practices, facial reconstruction, figurines, craft production, and the materiality of plaster, clay, obsidian and even gaming pieces, providing a real variety of approaches and interpretations. Additionally, a workshop was organised by Phillip Karsgaard (Edinburgh University) on *Theorising Death and Discard in the Ancient Near East,* seeing papers primarily dealing with the later Neolithic and onwards. The Bioarchaeology sessions showcased new research and developments in the field, and were complimented by a discussion session on human/animal relationships in the Neolithic.

An extremely high standard of contributions was seen in the poster session (run by Lyn Hughes, University of Liverpool), with posters showcasing ongoing research. Poster prizes were donated by Oxbow Books, Archaeopress, and Maney Publishers. First prize was awarded to Daisy Knox (University of Manchester), with Alexis McBride (University of Liverpool) a close runner-up. There was also room in the conference for CuneiForum, led by Magnus Widell (University of Liverpool), and a workshop on Akkadian Imperialism and Collapse, organised by Harvey Weiss (Yale University). Individual contributions were also given on a diverse range of topics, including espionage in archaeology, human, animal and environmental engagements, the Bronze Age and beyond, as well as site reports.

The work of Eleni Asouti (University of Liverpool) and Roger Matthews (UCL) ensured that this year's BANEA included a delegation of honoured guests from Palestine and Iraq, with sessions sponsored by the CBRL and the BISI. This provided opportunities for real discussions of the pertinent and crucial issues affecting archaeology in the Near East, with sessions led by Hamdan Taha (Palestinian Department of Antiquities and Cultural Heritage) and Abbas al-Hussainy (Al-Qadissiyah University, Iraq).

The atmosphere at the conference was noticeably upbeat and enthusiastic, attracting BANEA old-timers (I am sure these are Charles Burney's words rather than my own!), as well as a younger audience – a truly encouraging picture for the future of the discipline.

Douglas Baird oversaw the conference as a whole as chair of the organising committee. The organising committee was additionally composed of Bruce Routledge, Eveline Van der Steen, Lyn Hughes, Adnan Baysal, Emma Twigger and Dana Campbell. We are also indebted to our student and post-grad helpers: Alexis McBride, Holly Miller, Jason Jorgenson, David McIntosh, George Lomas, Esme Hammerle, Rachel Bichener, Elizabeth Highfield, Polly Reddy, Tadhg Kirwan, Neyir Kolankaya-Bostanci, Daniel Nikolov, and Naomi Sylvester. We would also like to thank all of those students providing sleeping space for those from other universities, as well as the Foresight Centre staff for hosting us. Obviously the conference would not have been possible without the high standard of thought-provoking papers and stimulating discussions driven by participants.

A full program and abstracts from BANEA can be found at:
http://www.liv.ac.uk/sace/events/confer/banea/index.htm

6th Conference on PPN Chipped and Ground Stone Industries of the Fertile Crescent: STEPS (Studies in Technology, Environment, Production and Society
University of Manchester,
March 3-5, 2008

Incised pendant of obsidian, Domuztepe.

By Elizabeth Healey
<elizabeth.healey@manchester.ac.uk>

The meeting, conceived in Jordan as a rescue package (*Neo-Lithics* 1/07, pp. 48-49) to keep the momentum of the three year cycle of meetings going, in the end turned out to have a lively character of its own. 38 people (including 15 or so research students of whom at least 5 were in the early stages of their studies) attended the conference from 11 countries and 28 papers were delivered. The papers given will be published in the SENEPSE series of *ex oriente* early in 2009.

Hans Georg Gebel set the scene by giving a resumé of the history and development of the meetings since the first meeting in Berlin in 1993. In this time there had been 5 other workshops and/or conferences and the proceedings of four already published. Throughout the years there has been a strong desire to keep the Neolithic family together and to encourage younger researchers.

Ofer Bar Yosef gave the introductory lecture which was an insightful review of the transitions from late foragers to early farmers in South China. He used it to show

Studying artefacts in Manchester Museum.

After tea there were by four papers on the context and/or social meaning of stone tools and included studies by Juan José Ibáñez of the situation of lithics in the PPN in the middle Euphrates valley, Osamu Maeda suggested that social reasons might explain the differences in use of flint and obsidian at Salat Cami Yanı in the upper Tigris valley, and Omri Barzilai re-considered whether the lithics from a ritual context at Mishmar Haemeq were the result of ritual activity. Stuart Campbell and Elizabeth Healey questioned how we might interpret the large number of lithics from the Death Pit at Domuztepe.

Tuesday morning focused on Raw Materials, Technology and Methods of study. Katherine (Karen) Wright reminded us of the need to rethink the analytical division between chipped and ground stone. The following three papers dealt with raw material procurement including characterising the small amount of obsidian from the Epipalaeolithic levels at Ozükini by Tristan Carter, Laurence Astruc elucidated the obsidian networks in the Balikh Valley at the end of the PPN and the beginning of the PN, and Hans Gebel discussed lithic (this time flint) procurement at LPPNB Basta.

The focus then switched to methodology. Michal Birkenfeld impressed us with the use of GIS at Kfar ha-Horesh for reconstructing the location of artefacts in a given context using stratigraphic and spatial (3D) analysis. Ferran Borrell described his painstaking study of raw materials and knapping methods at Tell Halula including a distinctive method of bi-polar blade technology and discussed its wider significance. Omry Barzilai spoke about the knapping workshop at Nahal Lavan 1021 and Jacob Vardi described the use of side-blow blade- flakes (in flint) at the Ghassulian sickle blade workshop of Beit Eshel.

The early afternoon returned to studies of ground stone in various guises – the need for a holistic view of bead and pendant production at Domuztepe by Ellen Belcher,

the transition from foragers and farmers in other areas could inform work in the Near East.

That afternoon was devoted to a discussion of some of the current issues in later Pleistocene chipped stone analysis in the southern Levant organised by Tobias Richter and Lisa Maher. The theme was introduced by Lisa Maher and papers included Tobias Richter speaking about variability, classification and interaction in the Kebaran, Qalakan and the Nebekian in the Azraq Oasis, Deborah Olszewski about issues of lithic 'Cultures' in the Wadi Hasa sequence, Yoshi Nishiaki discussed the assemblages at Dedeiyeh Cave and Nigel Goring-Morris challenged our conceptual frameworks of the Levantine Epipalaeolithic. Unfortunately Christophe Delage was prevented by illness from giving his paper entitled 'Moving beyond the expedient nature of Natufian lithic technology', but it is hoped that the paper might be included in the final publication.

Participants in PPN6 at Manchester University's Chancellors Hotel and Conference Centre.

the likelihood of staged stone ring production at Ba'ja by Marc Hintzman, a chaîne opératoire for basalt pestle production at Dhra' by Philipp Rassmann and the production, use and context of cupmarks at floor level in PPNA structures by Danny Rosenberg.

Later Anne Pirie talked about webs of interaction apparent in the Pinarbaşı chipped stone, Carole McCartney gave us a new perspective on raw material procurement and the early Neolithic assemblage from Ayia Varvara Asprokremnos. Noriyuki Shirai considered the possibility of Helwan points in Northeastern Africa and whether they were related to those in the PPNB in the Levant.

On Wednesday morning Fanny Bocquentin and Omri Barzilai talked about past and present research at Beisamoun in the Hula basin, Zinovi Matskevitch discussed whether the lithic assemblage at Sha'ar Hagolan showed continuity from PPN to PN and whether it was *ad hoc* or specialist. Ferran Borrell demonstrated the change in flint technology at Akarçay tepe and how it was different from the situation at Halula and discussed whether it was related to a decline in hunting technology.

The formal part of the conference was rounded up with an unscheduled paper on Kfar ha-Horesh by Nigel Goring-Morris to replace papers by Güner Coşkunsu and Liora Horwitz who were unable to attend.

During the final afternoon we visited the Manchester Museum where we were greeted by Dr Piotr Bienkowski, the Deputy Director, and able to study some of the Near Eastern lithic collections including Jericho, Abu Hureyra and some of the Dorothy Garrod material from El Wad, Shukbah, *etc.* We wound up for dinner in the appropriately named Obsidian bar and restaurant. A brave few even continued for the next few days in deep discussions of lithics forming lasting friendships.

Publication

It was agreed that proceedings of this meeting would be published under the editorship of Elizabeth Healey, Stuart Campbell and Osamu Maeda in the *ex oriente* series in late 2008/early 2009 provided that articles were submitted promptly. It was also agreed that an offer would be made to Nur Balkan-Atlı to include articles from Niğde and those who had not been able to participate were also offered the possibility of contributing.

P.S. The Niğde papers are now with the editors for inclusion in the Manchester volume and will be prefaced with an introduction by Nur Balkan-Atlı.

Lithic-paedia (with apologies to Wikipedia)

A proposal to build an on-line *Lithic-paedia* to replace the workshops set up in the early days to deal with various aspects of lithic studies, but which were never fully reported was enthusiatically received. It was proposed that it could include artifact definitions, wider lithic topics, analytical methods, drawing conventions and so on as well as a pdf library. It would be regularly updated and all entries would be individually authored but there would be room for additional comments and alternative views. To bring this to fruition would require a web-master and some procedures to be considered – members were urged to be pro-active in this. Readers are invited to send ideas to Elizabeth Healey.

Next Meeting – PPN 7 in 2011

The next meeting will be in Barcelona through the good offices of Miquel Molist and Ferran Borrell in collaboration with Juan José Ibáñez. An offer from Israel to host the conference was noted and it was hoped that it would one day be possible to accept their offer. The hope was expressed that the meetings should return to a workshop format rather than continue the more formal conference style and that there would be financial support and cheap accommodation to enable younger colleagues to participate.

Basta Final Symposium

Free University of Berlin, April 24-27, 2008

By Hans Georg K. Gebel
<hggebel@zedat.fu-berlin.de>

Financed by the German Research Foundation (DFG) and organized by the author and Hans J. Nissen, the Basta Final Symposium aimed to present work results of the participants in the Basta final publication to invited consultants for comment and review, in order to approach a reconstruction of the early Neolithic Basta Socio-Economic and Cognitive Systems. Cornelia Becker (palaeozoology/bone industry), Hans Georg K. Gebel (stratigraphy/stone industries), Bo Dahl Hermansen (small finds), Wajeeh Karasneh (bone industry), Moritz Kinzel (architecture), Reinder Neef (palaeoethnobotany), Hans J. Nissen (architecture), Michael Schultz (physical anthropology/palaeopathology), and Zaydoon Zaid (architecture) represented the Basta Final Publication efforts; Ofer Bar-Yosef, Marion Benz, Bill Finlayson, Moawiyah Ibrahim, Stefan K. Kozlowski, Zeidan Kafafi, Peder Mortensen, Maysoon al-Nahar, Mehmet Özdoğan, Hans-J. Pachur, and Bernhard Weninger were the consultants of the very lifely gathering.

Final site publications often suffer from isolated specialist reports not really linked for a comprehensive view on the site's life system. Thus the main aim of the meeting was to enter and link – under the consultants' supervision in Sessions V and VII – all data and interpretations into the prepared Basta System (*cf.* Hermansen and Gebel in Basta Vol. I, 2004: 177-186). This was only partly achieved since an exhausting number of basic questions related to supra-Basta Early Neolithic understandings and problems urged discussion before we were able to return to the Basta evidence. Ofer Bar-Yosef's repeated epistemological question How We Know What We Know wasn't answered, of course, but gained presence in all discussions. It became a common understanding that the symposium rather should assist to establish the frameworks of understanding for the Basta System's entry works for which the participants in the Basta Final Publication would be the specialists anyhow. The Basta System itself wasn't much questioned by the consultants and seen as a useful tool to guide a comprehensive approach for a reconstruction of – at least the Basta – Neolithic village life. In addition to the discussions following these aims (chaired by O. Bar-Yosef, P. Mortensen, and M. Özdoğan), emphasis was on the rubble slides attested in Levantine Neolithic sites (discussions led by B. Weninger) and the post-excavation fate of Neolithic sites in Jordan (discussions led by B. Finlayson).

Table 1. Structure of the Basta Final Symposium.

Thursday, 24th April Opening of Symposium Working Procedures for Reconstructing the Socio-Economic and Cognitive Subsystems of Basta Session I: Disciplines' Summaries on the Basta Sub-Systems: Architecture and Stratigraphy, Physical Anthropology and Palaeopathology, Industries, Archaeobiology and Palaeoenvironment Session II: Consultants' Comments Session III: The Rubble Layers: The 8.2 Event During the 8.6-8.0 calBP Interval (Presentation/Discussion)
Friday, 25th April Session IV: Sub-Systems Discussion Session V: Sub-Systems Entries / Frameworks of Understanding Session VI: Post-Excavation Fates / The Old Village of Basta (Presentations on Needs and Possibilities of Protecting Neolithic Sites, Problems in Conservation and Presentation, Potentials of Traditional Village Architecture Research)
Saturday, 26th April Session V continued: Sub-Systems Entries / Frameworks of Understanding
Sunday, 27 April Session VII: Evaluation of the Socio-Economic and Cognitive Systems of Basta, and the Mega-Site Issue

In the various question fields related to Basta, discussions concentrated on the following topics:

Architecture/Social structure: Were building masters from outside active in Basta, or is this architecture work of extended family specialists? / Trade of building expertise by migrating architects? / Basta started as a storage village? Where did the inhabitants actually live? / Has the Basta architecture a defensive character? Energy expenses to use this closed architecture. / How representative are Areas A and B? / Central storage in Basta? / Substructures are kind of insulation basements (as seen from the Northern PPNB). / Intentional burying of buildings in Basta? / Conflict potentials in/of these villages? Extended family definition is ambiguous.

Fig. 1. Group photo of the Basta Final Symposium, April 2008. (photo: Kerstin Feller)

Fig. 2. Basta Final Symposium, April 2008. (from left to right: P. Mortensen, C. Purschwitz, B. Weninger, M. Özdoğan, O. Bar-Yosef; photo: Kerstin Feller)

Interregional Comparison: Enormous population movements have to be expected in the PPNB, at least as seen from Anatolia. / Grill-type substructures now also found in Abu Suwwan near Jerash (Maysoon al-Nahar excavations). / Mega-Site PPNB is a phenomenon of its own. / Did migrating architects/craftsmen exist in the PPNB?! / What different conditions made Wadi Shu'eib, 'Ain Ghazal, and Abu Suwwan develop out of the MPPNB, while for southern Jordan we have no such evidence? / Regional differences in settlement patterns?

Environment/Exchange/Procurement: Size of habitats/territories of the various species? How has ownership of territories to be understood? / Difference between local and regional: Is it really working without isochrones, and just using instead the Basta System's social definition, saying that a regional boundary starts where a local community's claim on a certain resource is objected by a neighboring community? / "It is not a concentration of cereals, it is a concentration of people interested in cereals." / Missing landscape studies for Basta: If you exploit an area like Basta for such a long period the embryonal soil cover finally terminates permanent settlements. You have the rubble layers giving such evidence. / Ritual behavior does exist in procurement (*e.g.* the cow butchering of Area C). Are we talking about emerging market economies in Basta?

Critical statements were received on: Picking up/selecting traditional crafts for comparisons from around the world ("How do you use ethnology?"); mixed levels of interpretations like on *e.g.* goddesses; can the Basta System work anywhere?; more explanation needed for "mega-site" in terms of local/regional importance; problem of different scales used in the material presentations: How big are your panoramas?; separation of data and interpretation is possibly not meeting historical reality; Basta System tables operate in two directions: where is the third dimension (time)?; is rituality at Basta a neglected topic?

Although many of the questions were already raised in discussions among the participants in the Basta Final Publication, our symposium generated additional questions and more foci than it was able to answer. Also in that way it was a good piece of experienced research, contributing to the ongoing Basta research and the quality of the remaining final volumes. We heartily thank all colleagues helping us in this during these days.

Bead Technology Workshop
University of Liverpool, January 12-13, 2009

We invite participation in a two-day workshop on beads, their manufacture and all related technologies from prehistoric Anatolia and the Near East. This will encompass research into chipped stone, ground stone, organic materials, ceramics, bone and shell, both beads and the tools that were used in their production.
The event will consist of:

• Pre-circulated papers (to be submitted October, circulated early November)

• Themes generated by submitted papers form basis of round table discussion

• Workshop day 1; Temporal and spatial variation of bead assemblages; Practical session with BM collections and individual contributions.

• Workshop day 2; Manufacturing technology; Practical session on drill manufacture, microwear studies and any other technological aspects.

• Publication/dissemination; edited volume and continuing web discussion.

For more information contact:
Emma Twigger <e.l.twigger@liverpool.ac.uk> and
Holly Miller <holly.miller@liverpool.ac.uk>

Interpreting the Late Neolithic of Upper Mesopotamia
Leiden University, March 26-28, 2009

We aim to organise a conference on, specifically, the Late Neolithic in the northern Fertile Crescent. Both the earlier, aceramic period and the succeeding Chalcolithic-Ubaid period in the Near East have received ample archaeological attention recently with specialized conferences; the intermediate period which is the Late Neolithic has been largely neglected. In spite of this, a wealth of fascinating new data is rapidly accumulating from the region. The Late Neolithic has developed into a research field characterized by a diverse range of methodological approaches and theoretical perspectives. In terms of absolute date, the Late Neolithic covers the 7th-6th millennia cal. BC. It includes what has been termed the Early Pottery Neolithic, Pre-Halaf, Hassuna-Samarra and Halaf cultures.

In our conference, we focus upon the northern parts of the Fertile Crescent because this area in particular has been the focus of much new work over the last two decades: the northern Levant, northern Syria, southeastern Anatolia and northern Iraq. Relevant contributions crossing these chronological and regional boundaries are welcomed, to the degree that the program allows for it.

The conference aims to bring together interpretative, synthesizing contributions. Although we also welcome presentations of new field data, we ask contributors to keep purely descriptive presentations at a minimum.

As provisional themes guiding contributions, we think of:

• settlement patterns
• village lay out and biography
• ritual
• problems of chronology
• regional perspectives
• economic and ecological issues
• mobility and exchange
• constitution and meanings of material culture

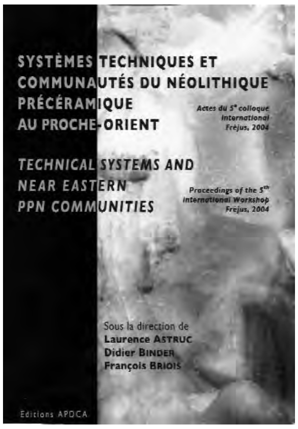
Chronological coverage: 7th-6th millennia BC.
Regional coverage: northern Levant, northern Syria, southeast Anatolia, northern Iraq.

Peter Akkermans,
Olivier Nieuwenhuyse,
Reinhard Bernbeck

Contact:
Olivier Nieuwenhuyse
(info@interpretingthelateneolithic.nl)

Laurence Astruc, Didier Binder and François Briois (eds.)

Systèmes techniques et communautés du Néolithique précéramique au Proche-Orient. (Technical Systems and Near Eastern PPN Communities). Actes du 5e colloque international. Fréjus 2004. 355 p.
Antibes: Éditions APDCA.
ISBN 2-904-110-44-5



Contents

Avant-propos – Laurence Astruc, Didier Binder and François Briois

De la validité de nos interprétations archéologiques. Réexamen d'anciennes collections, apport de l'expérimentation.
The validity of our archaeological interpretation.
Revaluation of ancient collections and contribution of experimentation
A New Look at Old Assemblages: A Cautionary Tale – Anna Belfer-Cohen and A. Nigel Goring-Morris
Quarrying Flint at Neolithic Ramat Tamar: An Experiment – Ran Barkai, Avi Gopher and Jürgen Weiner
Approche expérimentale des modes de fabrication et de fonctionnement des herminettes de type Mureybet – Juan Antonio Sánchez Priego and Michel Brenet
Comments on Experimental Archaeology Presentations – Philip J. Wilke

Typologie formelle, fonction et chronologie du PPNA: regards depuis le Sud-Levant.
Formal typology, function and chronology of the PPNA: Views from the Southern Levant
Lithic Technology of the Pre-Pottery Neolithic A and Late Natufian Occupations of 'Iraq ed-Dubb, Jordan – Ian Kuijt and Nathan B. Goodale
Chipped Stone Variability: An Overview of the PPNA Lithic Assemblage from Dhra', Jordan – Nathan B. Goodale, Ian Kuijt and Bill Finlayson
The Form and Function of the el Khiam Point at Dhra' and WF 16: Issues for Interpreting Chipped Stone Assemblage Variability – Sam Smith
Lithic Variability among the PPNA Assemblages of the Dead Sea Basin – Ghattas Sayej
More Insights into PPNA Intra- and Inter-site Lithic Variability – Daniel Kaufman and Dani Nadel

‚Évolution des systèmes techniques au PPN.
Evolution of the technical systems during the PPN
Resolving Contradictions: The PPNA-PPNB Transition in the Southern Levant – Phillip C. Edwards and Ghattas Sayej
Les débitages laminaires de la fin du PPNA (Jerf el Ahmar, Mureybet, Cheikh Hassan) – Frédéric Abbès
The Lithic Industry of the Early PPNB Layers at Tell Ain el-Kerkh, Northwest Syria – Makoto Arimura
The Evolution of Technology during the PPN in the Middle Euphrates: A View from Use-wear Analysis of Lithic Tools – Juan José Ibáñez, Jesus González Urquijo and Amelia Rodríguez Rodríguez

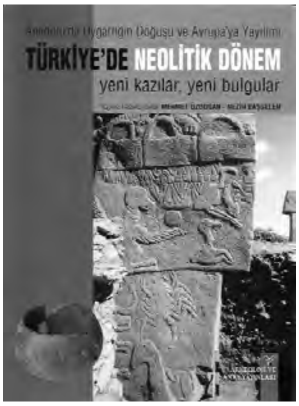
Variabilité des assemblages lithiques au PPNB moyen et récent.
Middle and Late PPNB Lithic Variability
Neolithic Wide Geometrics at Tor at-Tareeq, Wadi al-Hasa, Jordan: Another Introduction from the PPNB Northern Levant? – Deborah I. Olszewski
The Early Neolithic Phases of Beidha in a Regional Context – Charlott Hoffman Jensen
The Naviform Core-and-Blade Industry in Orthoquartzite at 'Ain Jammam, Jordan – Philip J. Wilke, Leslie A. Quintero, Gary O. Rollefson and Hans Georg K. Gebel
The Pre-Pottery Neolithic B Naviform Industry of Yiftahel – Yosef Garfinkel
Assemblage Diversity in the Early Middle Cypriot Aceramie Neolithic – Carole McCartney

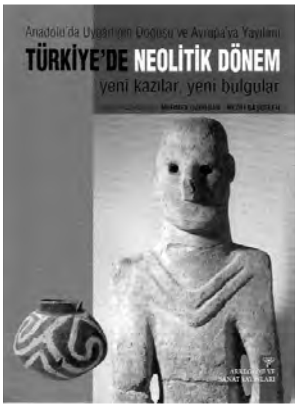
Échanges et interactions culturelles: les obsidiennes anatoliennes, un élément clé.
Exchange and cultural interaction: Anatolian obsidian as a key element
The Choice of Obsidian and its Use at Musular, Central Anatolia – Nurcan Kayacan and Mihriban Özbaşaran
PPN Pressure Technology: Views from Anatolia – Didier Binder
Meanings of Obsidian Exchange and Obsidian Use at Akarçay Tepe – Osamu Maeda
Why is there so much Obsidian at Tell Magzaliyah? – Elizabeth Healey

Réserves et caches de supports lithiques au PPN: implications technologiques et societales.
Lithic stocks, hoards or caches during the PPN: Technological and societal implications
An Early Pre-Pottery Neolithic Blade Cache from Motza, West of Jerusalem, Israel – Hamoudi Khalaily, Ofer Marder and Omry Barzilai
Bidirectional Blade and Tool Caches and Stocks in the PPNB of the Southern Levant – Omry Barzilai and A. Nigel Goring-Morris
Knapping in the Graveyard: A Refitted Naviform Sequence from Kfar HaHoresh, Lower Galilee, Israel – Angela Davidson and A. Nigel Goring-Morris
A MPPNB Blade Cache from 'Ain Ghazal, Jordan – Jesse D. Karnes and Leslie A. Quintero
Les caches de lames de Shillourokambos (Chypre) – François Briois
From Production to Use: A Parcel of Obsidian Bladelets at Sabi Abyad II – Laurence Astruc, Bernard Gratuze, Jacques Pelegrin and Peter Akkermans
Of Blanks and Burials: Hoarding Obsidian at Neolithic Çatalhöyük – Tristan Carter

Mehmet Özdoğan and Nezih Başgelen (eds.)

2008 *Türkiye'de Neolitik dönem. Yeni kazılar, yeni bulgular (The Neolithic Period in Turkey: New Excavations, New Findings). Anadolu'da Uygarlığın Doğuşu ve Avrupa'ya Yayılımı.*
Vol. 1: text, 458 p.; Vol. 2: illustrations; in Turkish, 440 p.
Istanbul: Arkeoloji ve Sanat Yayınları.
ISBN 978-9944-75-022-6
(English edition in preparation)

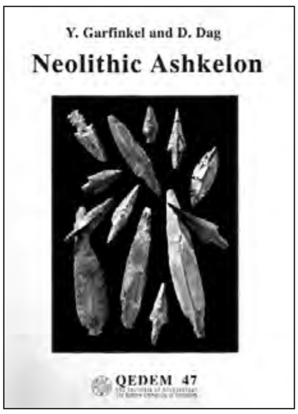




Contributions by:

Songül Alpaslan Roodenberg, Ç. Altınbilek Algül, Olivier Aurenche, Douglas Baird, S. Balcı, Nur Balkan Atlı, Nezih Başgelen, Erhan Biçakçı, Didier Binder, H. Buitenhuis, Isabella Caneva, Jacques Cauvin, Marie-Claire Cauvin, Bahattin Çelik, Altan Çilingiroğlu, Çiler Çilingiroğlu, Zafer Derin, G. Duru, Refik Duru, B. Erdoğu, Aslı Erim Özdoğan, Ufuk Esin, M. Godon, Savaş Harmankaya, Harald Hauptmann, Ian Hodder, Necmi Karul, Nurcan Kayacan, Clemens Lichter, Recep Meriç, Yutaka Miyake, Miquel Molist, Mihriban Özbaşaran, Mehmet Özdoğan, Vecihi Özkaya, Aliye Öztan, Jacob Roodenberg, Michael Rosenberg, Haluk Sağlamtimur, Oya San, Manon Savard, Klaus Schmidt, Halil Tekin, George Willcox.

Yosef Garfinkel and Doron Dag (eds.)
2008 *Neolithic Ashkalon.*
QEDEM 47, 332 p.
ISSN 0333-5844



Contents

Part I: Background
Chapter 1. Introduction – Yosef Garfinkel
Chapter 2. The Chronology of the Eighth Millennium BP – Yosef Garfinkel
Chapter 3. The Geological and Geomorphological Setting of the Ashkelon Neolithic Site – Eldad Barzilay

Part II: The Field Observations
Chapter 4. Expedition Organization and Excavation Methods – Yosef Garfinkel and Angela Davidzon
Chapter 5. The Stratigraphy – Yosef Garfinkel, Doron Dag and Anna Eirikh-Rose
Chapter 6. The Neolithic Occupation – Yosef Garfinkel and Doron Dag

Part III: The Flint Industry
Chapter 7. The Flint Knapping Technology – Doron Dag
Chapter 8. The Flint Tools – Doron Dag
Chapter 9. Comparative Analysis of the Flint Industry – Doron Dag

Part IV: Material Culture and Burials
Chapter 10. Ground Stone Tools, Chipped Stone, White Ware, a Clay Installation, and Various Minerals – Doron Dag and Yosef Garfinkel
Chapter 11. The Obsidian – Yosef Garfinkel
Chapter 12. Bone Tools – Paula Wapnish
Chapter 13. Spatial Analysis – Doron Dag
Chapter 14. Anthropological and Taphonomic Analyses of Skeletal Remains –Marina Faerman and Patricia Smith

Part V: Archaeozoological and Archaeometric Studies
Chapter 15. The Mammal Bones – Brian Hesse and Dolores Rookis
Chapter 16. Testudines Remains – Gideon Hartman
Chapter 17. The Fish Bones – Omri Lernau
Chapter 18. Mollusc Shells and Barnacles – Daniella E. Bar-Yosef Mayer
Chapter 19. Obsidian and Pumice Findings and their Provenance – Jörg Keller, Ernst Pernicka and Kirstin Kasper

Part VI: Discussion
Chapter 20. The Rise of Pastoralism in the Southern Coastal Plan of the Levant – Yosef Garfinkel and Doron Dag

Appendix A. Description of Loci – Yosef Garfinkel, Doron Dag and Anna Eirikh-Rose
Appendix B. Additional Quantitative Data of the Flint Industry – Doron Dag
Appendix C. Earlier and Later Periods (Layers V, III, and II):
Epi-Paleolithic Remains – Doron Dag
Late Chalcolithic Remains – Yosef Garfinkel
Hellenistic to Islamic Remains – Barbara Johnson

New Website

New *ex oriente* website:

This is to inform that the new *ex oriente* website is online since July 2008. Designed by datalino, Berlin, the site can be accessed under www.exoriente.org
The next months will be used as a test phase for further improvement, but you may already now

- find information about the Ba'ja and Eastern Jafr Projects,
- download published articles and the newsletter *Neo-Lithics* (until Issue 2/02),
- and order easily *ex oriente* publications.

Enjoy our site.
The *ex oriente* board: C. Purschwitz, D. Rokitta, M. Kinzel, R. Neef, and H.G.K. Gebel

Masthead

Editorial Board

Co-Editors:
Gary O. Rollefson, Whitman College, Walla Walla
Hans Georg K. Gebel, Free University of Berlin

Managing Editor:
Jürgen Baumgarten, Berlin

Advisory Board

Ofer Bar-Yosef, Harvard University
Didier Binder, CNRS, Valbonne
Frank Hole, Yale University
Peder Mortensen, Copenhagen University
Hans J. Nissen, Free University of Berlin
Mehmet Özdoğan, University of Istanbul
Danielle Stordeur, Archéorient, CNRS-Jalès

Addresses of Neo-Lithics

Submissions NEO-LITHICS, Prof. Dr. Gary O. Rollefson, Department of Anthropology, Whitman College, Walla Walla, WA 99362, USA. Email: rollefgo@whitman.edu
NEO-LITHICS, Dr. Hans Georg K. Gebel, Dr. Jürgen Baumgarten, ex oriente e.V., c/o Free University of Berlin, Hüttenweg 7, 14195 Berlin, Germany. Fax 0049 30 98 311 246
Emails: baumgarten.jurgen@googlemail.com · hggebel@zedat.fu-berlin.de

Orders ex oriente e.V., c/o Free University of Berlin, Hüttenweg 7, 14195 Berlin, Germany
Fax 0049 30 98 311 246 · Email: ex-oriente@gmx.net · Web: www.exoriente.org

Subscription minimum subscription of three years = 6 issues, c. 40-50 pages each – 55 Euro for 6 issues, postage included; back issues available; members of ex oriente receive *Neo-Lithics* free of charge (ex oriente annual membership fee: 40 Euro for employed members, 15 Euro for students/unemployed members)

Deadlines twice a year: 15th of May and 15th of November

Submission Guidelines
Text formats: in WORD; text, bibliography and caption styles: *cf.* current issue of *Neo-Lithics*; illustration formats: high resolution eps or tif.files – no illustrations embedded in the WORD text –, originals prefered (illustrations are required to the Berlin addresses, as well as hard copies of texts); please, keep bibliographic references to the utmost minimum necessary.

Subscription Information
In the upper right part of the address field (envelope) you will find the issue mentioned until which (included) you paid your subscription. If you find an invoice with this issue, a renewal of subscription is necessary for the next three years / 6 issues. If the invoice is not paid after two months it is understood that a prolongation of the subscription is not desired, and no further issues will be sent.

Note
Authors of *Neo-Lithics* receive a pdf file of their individual contribution upon publication. Please, understand that your contribution belongs to ex oriente Publishers and is their copyright. However, you are licensed to circulate this pdf file privately, but beyond that we ask you not to publish it (or parts of it) in the World Wide Web or in any other form without prior permission.

Neo-Lithics is published and distributed by ex oriente, Berlin, Germany

Printing House: digital business and printing gmbh, Berlin