NEO-LITHICS 1/16

The Newsletter of Southwest Asian Neolithic Research

Contents

Editorial

On several occasions we co-editors of Neo-Lithics have discussed a peer-reviewed and open access format of the newsletter, encouraged by repeated appeals from our colleagues to provide a publication opportunity that also serves the need to promote careers, *e.g.* by collecting impact points. We hesitated: We didn't want to be just another peer-review network, with problems in transparency, with manipulation opportunities by selecting reviewers, for helping mainstream research topics and strategies, and the like. Knowing our capacities, we also wanted to avoid the immense administrative and moral work related to the organization of peer reviews. Rather we wanted to continue being a 1) direct gate to quickly publish information on important new findings from the Neolithic fields and labs with just a lighter editor-based reviewing, 2) an alternative for Neolithic topics not easily placed in other journals, 3) a place for field reports often considered not reviewable, and 4) especially a chance for young researchers – especially from the Middle East - outside existing research networks to launch their first publications under less severe conditions, to promote regional expertise. How to maintain these goals when introducing peer review?

The discussion is still ongoing and we seek your comments, advice, and collaboration. We can imagine to be an open access newsletter by applying testable standards of transparency, organizing a non-anonymous peer reviewing for our sections *Field Reports* and *Contributions* while keeping the "documentary" sections of reports on conferences, news on books and thesis, *etc*. unreviewed. Our sorrow is, however, that this might lead to the exclusion of worthy information presented by younger colleagues who do not meet advanced standards of research presentation and analysis. But this might become the chance for another type of reviewing, understanding it as coaching authors and raising the discursive levels of contributions by adding - in one way or another - the reviewers' points of view? By reaching high quality contributions through strong acceptance hurdles, resulting from an intense transparent negotiation of results between the author and sponsoring or even nursing non-anonymous reviewers, we can make peer reviewing in Neo-Lithics an interactive motor for high quality Neolithic research, and an investment into the academic offspring as well. It would mean that we would need a much larger community of peer reviewers (or peer coaches), ready to be committed to this future format of Neo-Lithics. It even can result in a paradigm of another type and culture of peer review. Is this idea beyond academic reality, too much idealistic or even naïve?

Upon the publication of this editorial, we will launch this discussion also into the mailing list Forum Neo-Lithics, to open a broader discussion on a potential change of the Neo-Lithics format.

The co-editors Hans Georg K. Gebel, Marion Benz, Dörte Rokitta-Krumnow, joined by Gary Rollefson.

Investigations of a Late Neolithic Structure at Mesa 7, Wadi al-Qattafi, Black Desert, 2015

Gary O. Rollefson, Yorke Rowan, Alexander Wasse, Austin C. Hill, Morag Kersel, Brita Lorentzen, Khaled al-Bashaireh and Jennifer Ramsay

Introduction

The Eastern Badia Archaeological Project resumed its research program in the Black Desert of Jordan's panhandle with a three-week excavation and survey season at Mesa 7 (hereafter M-7) in June, 2015. Earlier reconnaissance of the more than 20 mesas capped with Late Miocene Abed Olivine-Phyric basalt (Rabba' 2005) on both the eastern and western sides of the Wadi al-Qattafi demonstrated dense distributions of more than 600 structures (not including animal pens) from Mesa 3 to Mesa 10 (Figs. 1 and 2).

Excavation in 2012 of SS-11, a small dwelling adjacent to an animal corral at Mesa 4 ("Maitland's Mesa"), showed it to be one of 20 or more corbeled houses on the southern slope of M-4 (Wasse *et al.* 2012; Rollefson *et al.* 2014); at least 11 corbeled houses had attached animal corrals while nine did not. The buildings might represent two small hamlets distinguished by the presence or absence of attached animal enclosures. Charcoal from the interior of SS-11 produced a date of 6450 ± 40 B.P. (2σ 5480–5320 calBC [Beta-346614]). Betts has suggested that houses with attached animal pens are probably late developments in the Late Neolithic of the Black Desert (Betts 2013: 189), which would mean that the corbeled houses without animal pens could be from earlier in the Late Neolithic period.

One of the highest densities of construction was on the slopes and base of M-7, where more than 285 buildings could be identified from APAAME aerial photos (Rollefson *et al.* 2014: 296 and Fig. 16). In addition to the bewildering number of structures, there was also clear architectural variability, with many buildings erected using corbeling techniques and others characterized by walls of basalt slabs standing on edge/end. One structure in particular was of interest because it

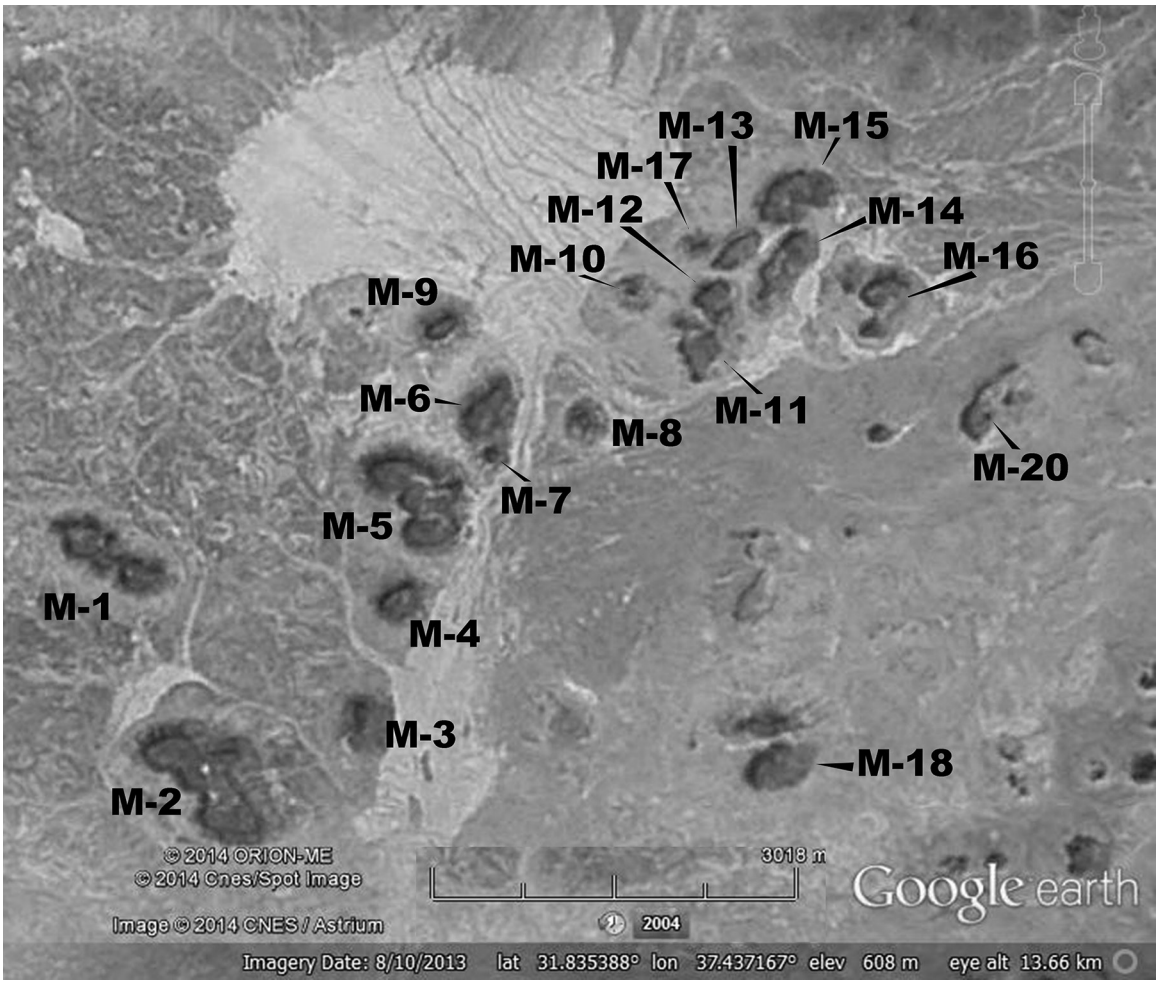

Fig. 1 Location of the mesas in the Wadi al-Qattafi. The numbering sequence follows the one established by APAAME. (© Google Earth)

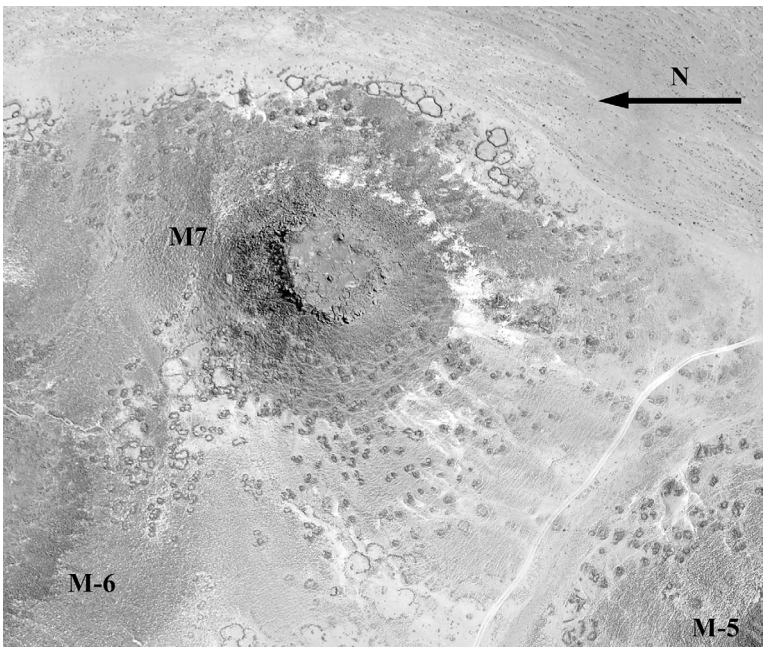

Fig. 2 Aerial view of the dense distribution of buildings around M-7. (photo by David Kennedy; © AAPAME, by permission)

evidenced a combination of the two general approaches. This building (SS-1, for "South Slope-1") was selected for excavation due to its unique structural character as well as its potential for demonstrating architectural renovation over time.

Structure SS-1

SS-1 is a curvilinear building with external dimensions of *c.* 6.30 m NE-SW by 5.40 m NNW-SE (interior dimensions 4.60 x 4 m). Time constraints allowed only the western half of the building to be excavated, but this was enough for a general appraisal of its structural history. There are two major construction phases: the original circular structure that was abandoned eventually, followed by a remodeling phase with a new function that witnessed many occupational visits and cultural deposits until final abandonment. Finally, the collapsed structure was used as a small burial mound.

Phase 1

Phase 1 is represented by Wall 001, a thick (*ca.* 90-95 cm) double-leaf construction with rubble fill between the interior and exterior surfaces of the wall that was built on bedrock (Wadi Shallala Chalk formation). No clear evidence of a doorway was found for this phase, although an opening may have been made in the northern part of the wall and reclosed at a later time; it isn't certain if this was during Phase 1 or during the succeeding period. It is possible that the main entrance was in the unexcavated part of SS-1. Wall 001 likely served as part of a corbeled structure. Almost nothing can be said about the nature of the occupation of SS-1 during this phase due to the activities of the people who first reconfigured the building in Phase 2.

Phase 2

Phase 2 appears to have been a long sequence of rebuilding and subsequent renovations. A new wall (Wall 002) was erected against the interior face of Wall 001 after the Phase 1 fill had been completely scoured down to bedrock, with thin basalt slabs that constituted Wall 002 set vertically on end (Figs. 3 and 4) beneath where the Phase 1 floor would have been. Wall 002 is curious, not only because there was a complete change in the orientation of the basalt blocks (and therefore a change in any kind of superstructure), but also because Wall 002 seems only to have continued around a semicircular arc inside the western half of SS-1. A single pillar *ca.* 40 x 30 x 100 cm was erected against the interior of Wall 001 at the northern end of Wall 002; another pillar of similar dimensions was raised in the center of the floor, and a third pillar at the southern

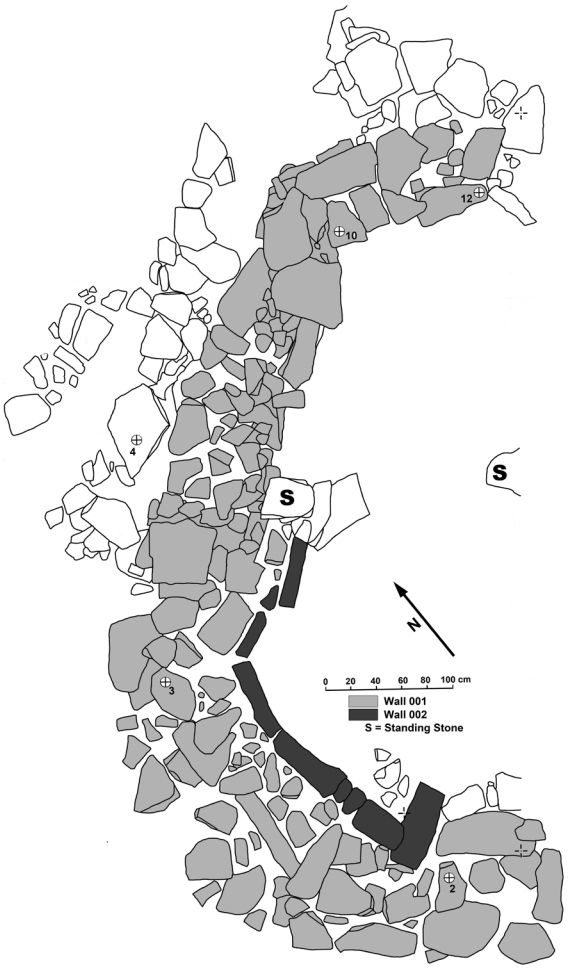

Fig. 3 Top plan of the western half of Structure SS1. (drawing by M. Kersel)

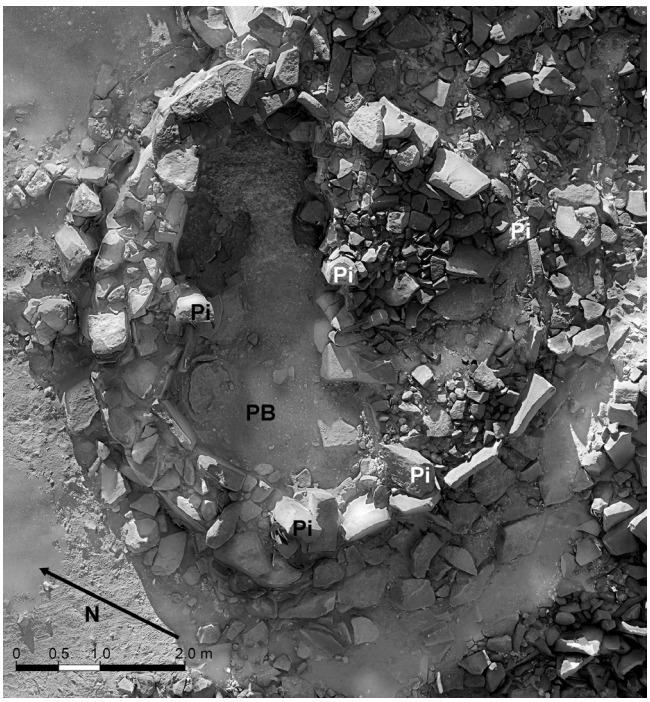

Fig. 4 Orthophoto image of SS-1. PB indicates the location of the nested plaster basins, and Pi indicates the location of five pillars. (photo: A.C. Hill)

end of Wall 002 had collapsed inwards. Another set of pillars, one partially collapsed, occurs at the center of Wall 002 at the southwestern edge of the room.

The pillars at both ends of Wall 002 and the one in the building's center form a straight line that bisects the building into generally eastern and western halves. While Wall 001 in the eastern half could still serve as the base for a corbeled roof, the half containing Wall 002 in the other half would not have served the same purpose. It is likely, in fact, that the western half of SS-1 was left unroofed, and that only the eastern half had some form of protection from the elements.

Phase 2 provided the bulk of information about the use of SS-1. The earliest layer of this phase included making a shallow oval plaster basin (65 x 50 x 10 cm) on the newly re-exposed bedrock adjacent to Wall 002 in the western part of the structure. After a brief period of abandonment represented by a thin (*ca.* 3 cm) layer of sediment, a second, slightly smaller plaster basin was made directly above the first; traces of the use of fingers to smooth the surface of the upper basin were clearly visible (Figs. 5 and 6). The gypsum plaster seems to be a finer and more durable material than the plaster in the floor, basin, and alcove of house W-66 at Wisad Pools (Rollefson *et al.* 2012), although like the plaster from Wisad W-66, the SS-1 plaster also contained charcoal from burnt, small-diameter twigs of the Chenopodioideae (goosefoot) sub-family of Amaranthaceae. Like the charcoal from Wisad, these Chenopodioideae twigs are most likely from *Anabasis*, which is a low woody shrub that grows in dry steppe and desert environments, particularly on rocky terrain (Cordova 2007).

Fig. 5 Nested gypsum plaster basins at the base of Wall 002. Scale is 25 cm. (photo: G. Rollefson)

Fig. 6 Close-up of nested plaster basins. Finger marks are visible above and to the left of the arrow. (photo: G. Rollefson)

Fire pits were common in the eastern (roofed?) half of SS-1, including two that had been cut down through earlier sediments of Phase 2 to bedrock. Ashy deposits that filled and accumulated in the eastern half were dense, thick, and widespread, again restricted principally to the area east of the western and central standing stones. Charcoal within these pits was abundant. Of the 14 charcoal fragments larger than 2 mm that were sampled, 12 could be identified, all of which are from Amaranthaceae subfam. Chenopodioideae. Chenopodioideae species in Jordan are all generally low shrubs common in semi-arid and arid steppe and desert, or degraded and saline environments. The dense wood of Chenopodiodeae taxa is considered a high-quality fuel by the badia's inhabitants even today, and their leaves have additional fodder and medicinal uses (Lancaster and Lancaster 1999: 174). Based on the curvature of the phloem bundles, all of the SS-1 charcoal is from small-diameter stems, which would have been easier to collect and transport to the site.

Two radiocarbon dates from early in Phase 2 are stratigraphically consistent: sample 15 came from

Locus 026, the fill of a pit cut into Locus 0290, and sample 16 from Locus 029 yielded stratigraphically consistent dates: 6455-6390 calBC (2σ, calBP 8405-8340) for the first and 6490-6430 calBC (2σ, calBP 8440-8380) for the second. Since both radiocarbon dates are on short-lived, small-diameter stems, inbuilt age-related biases should be relatively small for both samples. Both radiocarbon dates are roughly a millennium later than structure SS-11 at M-4 (5480-5320 calBC, 2σ, calBP 7430-7280; *cf*. Wasse *et al.*2002) but close to that from Wisad Pools structure W-66 (6600-6460 calBC [Beta-346621: 2σ, calBP 8550-8400]) (Rollefson *et al.* 2014: 291). Structure W-80 at Wisad Pools produced five dates, again stratigraphically consistent (6590-6580 and 6570-6440 calBC for the lowest layer, just above the floor [Beta 366676: 2σ, calBP 8540-8530 and 8520-8390] to 5710-5610 calBC and 5590-5570 calBC [Beta 366675: 2σ, calBP 7660-7560 and 7540-7520] to a layer near the top of the Late Neolithic fill of the structure) (Rollefson *et al.* 2014: 291).

Flotation samples were also productive for the recovery of carbonized plant material from the site. From the seven flotation samples taken several specimens of the genus *Arnebia* (Arnebia) were identified, which are commonly desert annuals or perennials and have roots that can produce a red dye (Feinbrun-Dothan 1978: 68-70). Seeds from the genus *Astragulus* (milk-vetch) were noted and some species in the genus are common pot herbs and can be found in desert environments (Zohary 1972: 54-83; Townsend and Guest 1974: 231-442). *Aizoon* (stone crop) is a genus that has many species that are generally herbs or low-shrubs. These plants can be found in dry wadi stream beds and oases in hot deserts (Zohary 1966: 74-75). These three species of plants all flower in the spring, which points to an occupation period of the site in the late spring. Also found at the site was evidence of wild grasses in the form of carbonized grains and culms (stalks). The most interesting find from an archaeobotanical perspective is evidence of *Ficus carica* (fig) at the site. Not only have the achenes (seeds) of fig been identified but also carbonized fragments of the flesh (fruit). Fig is the first domesticated species in the Near East dating to the Early Neolithic period. However it is difficult to differentiate the wild species (*F. persica*) from the domesticated *F. carica* (Zohary 1966), but both have significant water requirements that may point to a more verdant environment around Wadi al-Qattafi during the Late Neolithic[1]. However, figs may not have been grown locally since they have excellent storage properties and can be transported over long-distances.

Phase 2 consisted of a sequence of superimposed hearths and ashy deposits in the eastern half of SS-1 and a succession of flint-rich sediments in the "open air courtyard" of the western part of the building. In the eastern section there were two paving episodes (Locus 011 above Locus 024) separated by *c.* 30 cm of intervening sediment; paving stones were not coherent (if present at all) in the courtyard sector[2].

Phase 3

Locus 007, which might represent a ceiling collapse in the eastern roofed part of SS-1, marks the end of the intensive utilization of the building. Only a low remnant of the walls would have remained by the time sediment and basalt blocks had filled in the Phase 2 structure. Locus 006, adjacent to the east, is also probably part of the same collapse, although the slabs may have been rearranged in post-abandonment Phase 3 to form a small expanse of capstones over Locus 009, a shallow burial. (Only a few bones were preserved, including a human tooth. It is possible that a headstone exists at the eastern edge of Locus 009 but it couldn't be excavated this season).

Phase 3 is also marked by some reworking of Wall 001 near the far northwest part of the building. In addition to altering the wall (rather poorly; perhaps hastily in conjunction with the burial in Locus 009?), a U-shaped organization of boulders (rather than rectangular slabs) was built adjacent to Wall 001 in the north. It appears to have been an ad hoc construction that saw little duration of use.

Chipped Stone Artifacts

Tools

Chipped stone artifacts were numerous inside SS-1 as well as externally adjacent to the building. Table 1 presents the distribution of tool types. Some layers were virtual "burin sites": it is notable that almost half (48.4%) of the shaped tools were burins of various sorts: 26% were simple or transverse burins, 11% were dihedral burins, and the rest were versions of truncation burins. Drills were the next most frequent tool at 11.3%. Scrapers made up 5.1% of the inventory, and knives of various sorts (including the "tabular/cortical tools") made up 4.8% of the tool kit. Notches and denticulates were surprisingly numerous, with a combined total of 13%.

For tools other than utilized and irregularly retouched pieces, blades and bladelets were used for 59.0% of the tools, 30.7% were on flakes, 2.7% on cores, and 7.6% of the tool blanks could not be determined. Among utilized and irregularly retouched elements, 68.6% were on blades, 26.9% on flakes, and 4.5% of the blanks were unclassifiable.

Projectile points were relatively numerous (Table 2). Of the identifiable types, Badia points (first described by Betts in McCartney 1992: 44; *cf*. Betts 1998: Fig. 4.14) were strongly represented (Fig. 7). The first three types listed in Table 2 were relatively light in weight (Fig. 8): Haparsa points averaged 0.3 grams, Nizzanim points 0.8 gm, and Herzliya points 0.6 gm. Badia points, on the other hand, ranged from 1.5 to 3.0 gm, averaging 2.2 gm. (One miniature Badia point is an outlier at 0.4 gm and is not included in the previous statistics). The bimodal distribution suggests that Badia points were probably used for larger game than the others.

Tool type	n	%	%'
Projectile point	72	4.4	5.4
Sickle	1	0.1	0.1
Burin	644	39.2	48.4
Truncation	45	2.7	3.4
Endscraper	16	1.0	1.2
Sidescraper	52	3.2	3.9
Notch	98	6.0	7.4
Denticulate	75	4.6	5.6
Perforator	1	0.1	0.1
Awl/borer	30	1.9	2.3
Drill	150	9.1	11.3
Biface	11	0.7	0.8
Axe/adze	2	0.1	0.2
Chopper	6	0.4	0.5
Wedge	28	1.7	2.1
Unifacial knife	28	1.7	2.1
Bifacial knife	8	0.5	0.6
Seam knife	5	0.3	0.4
Tuwailan knife	20	1.2	1.5
Tabular/cortical tool	2	1	0.2
Backed element	2	0.1	0.2
Tanged blade	1	0.1	0.1
Rectangular microlith	1	0.1	0.1
Bladelet, exterior retouch	8	0.5	0.6
Bladelet, interior retouch	1	0.1	0.1
Bladelet, abrupt backing	2	0.1	0.2
Other	22	1.3	1.7
Subtotal		**1331**	**100.0**
Retouched flake	39	2.4	
Retouched blade	100	6.1	
Utilized piece	148	9.0	
Unclassifiable	24	1.5	
Total	**1642**	**100.0**	

Table 1 Absolute and relative frequencies of chipped stone tools in the 2015 M-7 inventory.

Type	n	%	%'
Haparsa	18	26.9	38.3
Nizzanim	5	7.5	10.6
Herzliya	8	11.9	17.0
Badia	10	14.9	21.3
Byblos	4	6.0	8.5
Other	2	3.0	4.3
Subtotal	(47)		
Preform	10	14.9	
Tang only	4	6.0	
Unclassifiable	6	9.0	
Total	67	100.0	100.0

Table 2 Projectile point types in the 2015 M-7 inventory.

Type	n	%	%'
Blade/let, symmetrical	52	35.1	38.8
Blade/let asymmetrical	25	16.9	18.7
Burin spall, symmetrical	24	16.2	17.9
Burin spall, asymmetrical	33	22.3	24.6
Subtotal	134		100.0
Mèche de forêt	3	2.0	
Double-ended	1	0.7	
Bit only	10	6.8	
Total	148	100.0	100.0

Table 3 Absolute and relative frequencies of drill types in the 2015 tool assemblage from structure SS-1.

Type	n	%	%'
Hammerstone	1	0.2	0.2
Radial core	9	1.6	2.0
Single face radial core	8	1.4	1.8
Micro-flake core	18	3.2	4.1
Core on a flake	22	3.9	5.0
Single platform, single face flake core	71	12.7	16.1
Single face, multiface flake core	12	2.1	2.7
Single face, multiplatform flake core	25	4.5	5.7
Multiface, multiplatform flake core	69	12.3	15.6
Pyramidal core	5	0.9	1.1
Semi-pyramidal	17	3.0	3.8
90º change-of-orientation core	52	9.3	11.8
Single platform, single face blade core	78	13.9	17.6
Opposed platform, non-naviform blade core	11	2.0	2.5
Other blade core	21	3.7	4.8
Bladelet core	23	4.1	5.2
Subtotal	(442)		100.0
Casual core/tested piece	34	6.1	
Unclassifiable	85	15.2	
Total	561	100.0	

Table 4 Absolute and relative frequencies of core types in the M-7 SS-1 sample.

There has been debate on the function of burins based on the absence of use-wear on many of these tools from burin sites (*cf.* Finlayson and Betts 1990). One suggestion for the predominance of this tool type is that they were not tools per se, but that they were cores for the spalls that were used as bead drills. While that observation might be true in some regard, Table 3 suggests that most bead drills were, in fact, made on blades or bladelets, with burin spalls used for only 42% of the sample. Although intensive analysis of the debitage from the 2015 season has not yet been undertaken, the impression from the initial sorting suggests that unretouched burin spalls were not numerous, probably much fewer than the number of burins would indicate. This leaves at least one plausible alternative, that many of the spalls may have been used as teeth in wooden or bone handles, with the collective assortment used as carding boards (Quintero *et al.* 2004: 209-210).

Among the knives were five examples that were bifacially retouched on pieces of seam flint. In addition, 31 large fragments of seam flint were cached against an interior corner of a low wall (Locus 019) just outside to the northeast of SS-1 (Fig. 9), and seven other pieces of unretouched seam flint were found inside the structure. The blanks and the knives averaged about 4.5 mm in thickness at midpoint, and 13 of the blanks had unpatterned scratch marks in the cortex.

Cores

Cores (Fig. 10) were relatively numerous (Table 4), reflecting intensive tool manufacture inside the structure. Cores producing flakes made up 56.5% of the classifiable cores (not counting the hammerstone), 33.4% were blade/bladelet cores, and 10.1% produced both flakes and blades (especially pyramidal, semi-pyra-

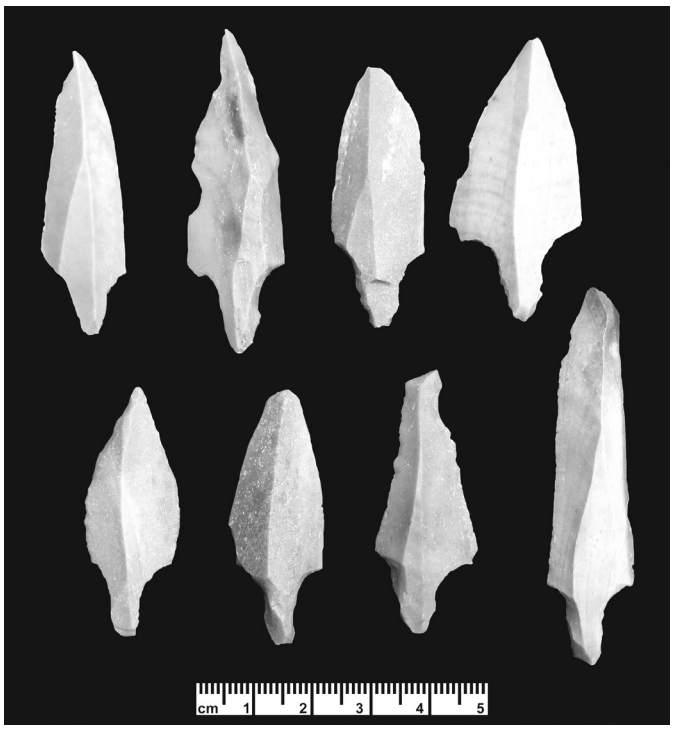

Fig. 7 Badia points from SS-1. (photo: G. Rollefson)

Fig. 8 Haparsa points from SS-1. (photo: G. Rollefson)

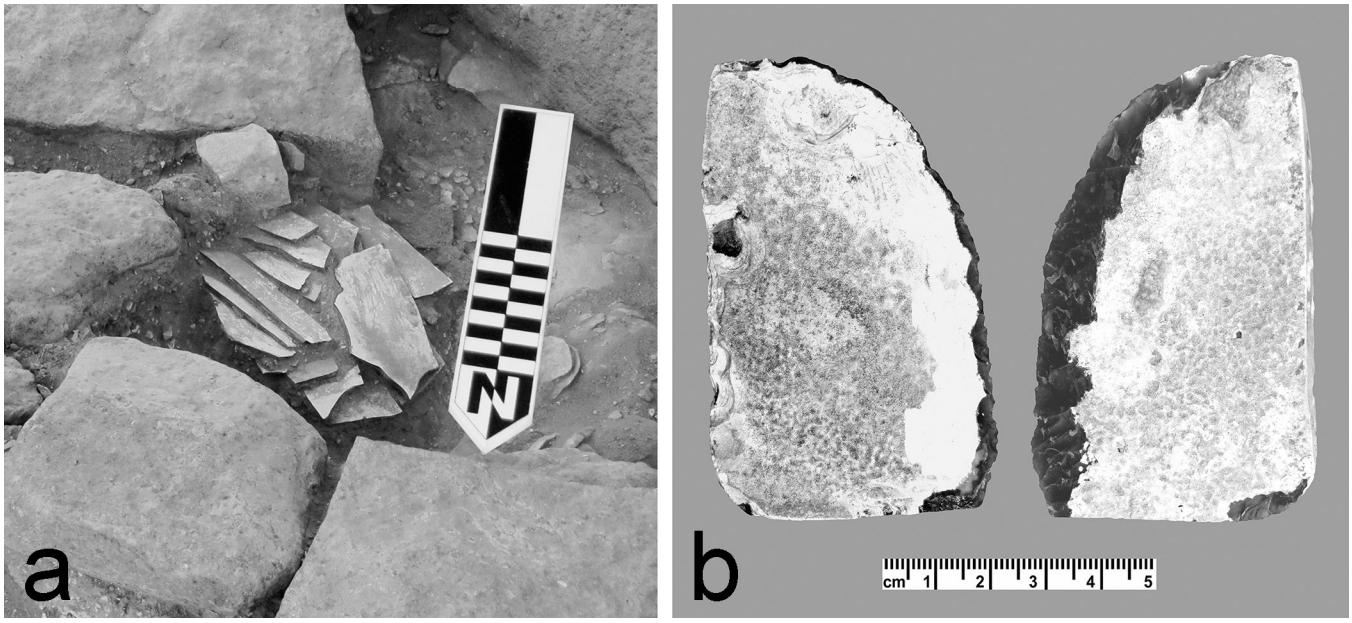

Fig. 9 a: Cache of 31 pieces of seam flint. b: one of the five seam knives from SS-1. (photo: G. Rollefson)

midal, and 90° change-of-orientation types). Most of the cores were heavily reduced, with average length at 43.6 mm, width at 36.1 mm, and thickness at 25.1 mm. There appears to be a high correlation between excellent flint quality and the degree of reduction. Several of the larger cores were converted to pecking stones to shape grinding stones.

Flint of medium to fine quality – mostly of brown color – was found on pedestrian survey eroding out of Wadi Shallala Chalk (WSC) hills just opposite the mesas on the eastern side of the wadi. Other flint sources were also found on hills just beyond the large *qa* north of the mesas (including one source of excellent quality material dark brown to black in color; the hilltop was also the location of a burin site *c.* 60 x 40m, with numerous burins of large size), as well as outcrops eroding out of WSC hills to the southwest of the mesas.

Ground Stone

Groundstone artifacts were not particularly abundant (Table 5), but they nevertheless demonstrate plant processing inside the Phase 2 structure; four of the grinding slabs had been re-used as paving stones. The

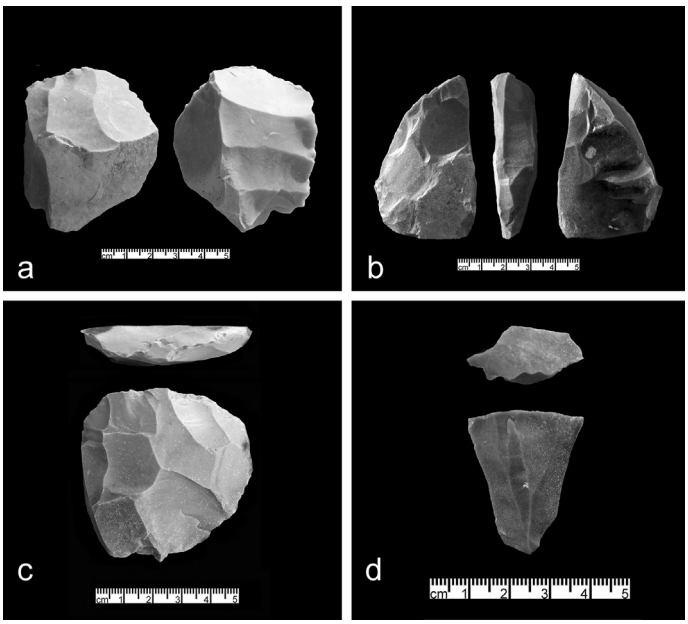

Fig. 10 . Cores from SS-1. a: 90° change-of-orientation (blade:blade). b: bladelet core. c: single face, single platform blade core. d: bladelet core. (photo: G. Rollefson)

number of grinding elements is in stark contrast to the case of SS-11 at Mesa 4 ("Maitland's Mesa"), where only two small fragments were recovered from an area and volume of sediments even greater than the situation at SS-1 (Wasse *et al.* 2012). However, the intensity of plant processing at SS-1 pales in comparison to the near industrial scale of grinding at structure W-80 at Wisad Pools (Rollefson *et al.* n.d.), though it is possible that many more grinding stones will be recovered from the other half of SS-1.

Item	n
Grinding slabs	10
Mortar	1
Hand stones	26
Scoria/pumice fragments	2
Sandstone palette fragments	5

Table 5 Ground stone artifacts from structure SS-1, M-7, 2015.

Small Finds

Table 6 lists the small finds from the 2015 season. The number of beads of all types (n=30), including both whole and broken pieces, is far below the number of drills (see Table 1), which might mean bead production was intended for trade. Outcrops of Dabba marble and a coarse red stone were found on exposed WSC hills on the eastern side of Wadi al-Qattafi and at the northern edge of the large *qa* ("Landing Ground E" in the nomenclature of the British Royal Airmail service; Hill 1929) to the north of the mesas.

Four pieces of obsidian were recovered, including one bifacially retouched flake 56 x 37 x 12 mm.

Fig. 11 Obsidian flake with bifacial retouch. (photo: G. Rollefson)

(Fig. 11). In addition, five pieces of clinopyroxene, a black, shiny crystalline mineral associated with volcanic activity were found, but the material, although superficially similar to obsidian, is essentially useless for tool production (Betts 1985).

Item	n
Shell beads	17
Dabba marble beads	6
Redstone beads	6
"Other" stone bead	1
Spindle whorl	1
Obsidian pieces	4
Clinopyroxene pieces	5
Carnelian fragment	1
Animal figurine fragment	1
Gizzard stones	3
Limestone "finger ring"	1
Drilled limestone fragment	1
Bone awl[1]	2
Seam flint cache[2]	1
[1] More bone tools are expected as faunal analysis proceeds.	
[2] The seam flint cache contained 31 pieces.	

Table 6 Small finds from SS-1, Mesa-7, 2015.

Aerial Survey and 3D Recording

As part of the 2015 season, a limited aerial survey of M-7, M-8, and M-9 was undertaken using an Unmanned Aerial Vehicle (UAV). A series of flights with a fixed wing autonomous drone created a set of aerial images that could be post processed using Agisoft Photoscan Pro and ArcGIS. These images were used to create a high-resolution map of the landscape around M-7 and served as a pilot project for a larger survey of the grea-ter Wadi Qattafi area in order to document the extant structures on the surface (see Fig. 12).

Additionally, SS-1 was recorded throughout the ex-

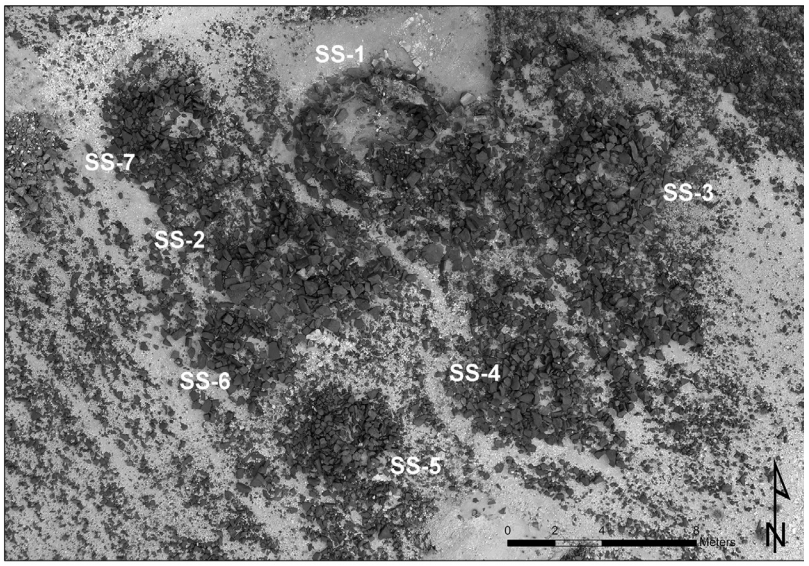

Fig. 12 Orthophoto of a cluster of buildings in the SS-1 area. North is at the top of the picture. (photo: A.C. Hill)

cavations with a Pole Aerial Photography (PAP) setup to create a time series of low elevation image sets. These image sets were also processed with Agisoft Photoscan Pro and ArcGIS in order to produce a series of spatially accurate 3D models of the structure as it was excavated (see figure 4).

Discussion

One of the reasons SS-1 was selected for excavation was that its architectural differences compared to structure SS-11 at Mesa-4 ("Maitland's Mesa") suggested there may have been coincident cultural variability associated with temporal change and/or activity distinctions. Unfortunately, there is no clear evidence for how the first configuration (Phase 1) of SS-1 at M-7 was used due to the removal of original occupational deposits in Phase 2, but based on the dimensions of Wall 001, it is likely that Phase 1 represents a residential building, perhaps one that was corbeled. Phase 2, on the other hand, appears to be a workshop that was the locus of several different kinds of undertaking.

Orthophotos from the UAV survey, recorded from an altitude of 100m and at a resolution of approximately 4cm/pixel, provide some tantalizing indications that the structures on the slopes of M-7 are not randomly distributed but instead might in many instances be spaced in clusters of four or more closely spaced buildings occupied by cooperative economic units. SS-1 and five other buildings are grouped in close proximity over an area of 18m E-W by 15m N-S (Fig. 12). Notably, SS-1 is the only building with a wall constructed of perpendicular slabs, and perhaps the activities carried out inside it were for the benefit of the residents of the other five structures.

Table 1 and Table 7 show how differently M-7 SS-1 was used compared to M-4 SS-11 (*cf*. Wasse *et al.* 2012). In general, the volume of sediment excavated during the 2012 and 2015 seasons are about the same, yet the total number of tools in only half of the structure at M-7 is more than 20 times the tool total from the interior of the M-4 building and its immediate surroundings. Broadly speaking, the relative importance of particular tool types is similar in the two inventories (*e.g.*, high percentages of burins, notches and denticulates, and a low percentage of arrowheads), so one interpretation is that the M-7 structure was used over a longer period than the one at M-4, and that each visit to M-7 during Phase 2 was of a longer duration than what appear to be shorter term stays at M-4. If this were so, it might be the case that the landscape around the mesas had changed substantially by the middle of the 6th millennium BC.

A comparison with another, generally contemporaneous assemblage also shows considerable differences. The excavation of structure W-80 at Wisad Pools (Rollefson *et al.* 2013; Rowan *et al.* 2015) produced a large inventory of chipped stone tools (Rollefson *et al.* n.d.). W-80 was a large, complex oval building (*c.* 5 x 6 m) that began as a corbeled dwelling, but after the original roof collapsed the walls were used as a windbreak for various activities. The volume of sediments dug from W-80 is well over twice the amount excavated during the 2015 season at SS-1. The number of tools at SS-1 is relatively higher than at W-80 (1642 for the western half of SS-1 *vs*. 2346 from all of W-80), although the number of cores is roughly proportionally equal (561 for the west half of SS-1 vs. 1066 for all of W-80). Perhaps the most striking differences lie among the tools: Projectile points account for 27.2% of the W-80 tools (n=629), while they reach only 5.4% at SS-1 (Table 1). Among the arrowhead types, 85.2% are transverse types at Wisad Pools, while not a single example was recovered at Mesa 7; on the other hand, large and heavy Badia points make up almost 15% at SS-1, while none have been found at W-80 or any other excavated structure at Wisad Pools. Badia points occur in the earlier levels at Site 27000 at Burqu, approximately 65 km north of Wisad Pools, but they disappear and are replaced entirely by transverse arrowheads in the later Late Neolithic layers (Betts *et al.* 2013:93).

Other principal differences include burins, where the heavy representation at SS-1 (48.4%) far exceeds the weak figure of 2.5% at Wisad W-80; burin classes were also very different, with truncation types at 66.3% at SS-1 *vs*. 40.4% at W-80 (*cf*. Rollefson 1995). Despite a large number (n=80) of beads recovered from W-80, bead drills were scarce (4.1%); at SS-1, there were 30 beads but bead drills were 9.1% of the tools.

The differences of the tool inventories between M-7 SS-1 and M-4 SS-11 are probably heavily influenced by differences in activities undertaken at the two locations and the large amount of time between the two

occupations. Furthermore, the visits to M-7 SS-1 were probably much more frequent and each of longer duration than the presence at M-4 SS-11. The comparison of the SS-1 inventory with W-80 does not involve much time between the two occupational sequences, so the distinctions probably lie more in the kinds and intensities of activities carried out at the two buildings: both buildings appear to have served as workshops, but SS-1 was apparently more closely directed to whatever pursuits are represented by burins, whereas W-80 (with its strong focus on grinding stones) might have been more of a domestically oriented occupation.

Concluding Remarks

Excavations will be resumed in the summer of 2016 in order to finish the exposure of SS-1 and to investigate its relationship to other buildings in the immediate vicinity. Additional drone mapping of the mesas will be carried out in the spring of 2016, and additional aerial survey will be resumed in the region the following summer.

Acknowledgments: We are indebted to the Department of Antiquities personnel for their continued enthusiasm for the goals of the Eastern Badia Archaeological Project. We have received considerable support and assistance from Dr. Barbara Porter and the staff at the American Center of Oriental Research (ACOR) and from the Council for British Research in the Levant (CBRL). Institutional support and financial assistance has been provided by Whitman College, the Oriental Institute of the University of Chicago, and East Anglia University. Field work was facilitated by the participation of Kathleen Bennallack, Blair Heidkamp, Jackson Somerville, Chris Yeoh, and Mohammad Nasser.

Endnotes

[1] Notably, there is evidence from Soreq Cave speleothems for high precipitation from 8,500 to 7,000 bp (Bar-Matthews *et al*. 2000).

[2] It is not impossible that Phase 1 included the construction of Wall 002, in which case Phases 1 and 2 should be considered to be the same phase. However, the incongruity of the architectural ensemble renders this an unlikely scenario.

Gary Rollefson
Whitman College, Walla Walla
rollefgo@whitman.edu

Yorke Rowan
University of Chicago
ymrowan@uchicago.edu

Alexander Wasse
University of East Anglia
alexander.wasse@uea.ac.uk

Austin C. Hill
University of Connecticut
austin.hill@uconn.edu

Morag Kersel
DePaul University, Chicago
mkersel@depaul.edu

Brita Lorentzen
Cornell University, Ithaca
bel9@cornell.edu

Khaled al-Bashaireh
Yarmouk University
khaledsm@email.arizona.edu

Jennifer Ramsay
The College at Brockport State university of New York
jramsay@brockport.edu

References

Bar-Matthews M., Ayalon A., and Kaufman A.
2000 Timing and Hydrological Conditions of Sapropel Events in the Eastern Mediterranean, as Evident from Speleothems, Soreq Cave, Israel. *Chemical Geology* 169: 145-156.

Betts A.
1985 Black Desert Survey, Jordan. Third Preliminary Report. *Levant* 17: 29-52.
1998 *The Harra and the Hamad.* Excavations and Surveys in Eastern Jordan 1. Sheffield Archaeological Monographs 9. Sheffield: Sheffield Academic Press.
2013 *The Later Prehistory of the Badia.* Excavations and Survey in Eastern Jordan 2. Oxford: Oxbow Books.

Cordova C.E.
2007 *Millennial Landscape in Jordan*. Tucson: University of Arizona Press.

Feinbrun-Dothan N.
1978 *Flora Palaestina: Part III.* Jerusalem: Israel Academy of Science and Humanities.

Finlayson B. and Betts A.
1990 Functional Analysis of Chipped Stone Artefacts from the Late Neolithic site of Ǧabal Na'ja, Eastern Jordan. *Paléorient* 16: 13-20.

Hill R.
1929 *The Baghdad Air Mail*. London: Longmans, Green and Company.

Lancaster W. and Lancaster F.
1999 *People, Land and Water in the Arab Middle East: Environments and Landscapes in the Bilâd ash-Shâm*. Amsterdam: Harwood Academic Publishers.

McCartney C.
1992 Preliminary Report of the 1989 Excavations at Site 27 of the Burqu'/Ruweishid Project. *Levant* 24: 33-54.

Quintero L., Rollefson G., and Wilke P.
2004 Highland Towns and Desert Settlements: Origins of Nomadic Pastoralism in the Jordanian Neolithic. In: H.-D. Bienert, H.G.K. Gebel and R. Neef (eds.), *Central Settlements in Neolithic Jordan*: 201-213. Berlin: ex oriente.

Rabba' I.
2005 *The Geology of Umm Nukhayla and Wadi al Qattafi Areas Map Sheets No. 3453-II and 3453-I.* Bulletin 62. Amman: Natural Resources Authority.

Rollefson G., Rowan Y., Perry M., and Abu-Azizeh W.
2012 The 2011 Season at Wisad Pools, Black Desert: Preliminary Report. *Annual of the Department of Antiquities of Jordan* 56: 29-44.

Rollefson G., Rowan Y., and Wasse A.
2013 Neolithic Settlement at Wisad Pools, Black Desert. *Neo-Lithics* 1/13: 11-23.
2014 The Late Neolithic Colonization of the Eastern Badia of Jordan. *Levant* 46(2): 285-301.

Rollefson G., Rowan Y., Wasse A., Kersel M., Hill A.C., and Lorentzen B.
n.d. Excavation of Structure W-80, a Complex Late Neolithic Building at Wisad Pools, Black Desert. *Annual of the Department of Antiquities of Jordan*. (in review).

Rowan Y., Wasse A., Rollefson G., Kersel M., Jones M., and Lorentzen B.
2015 Late Neolithic Architectural Complexity at Wisad Pools, Black Desert. *Neo-Lithics* 1/15: 3-10.

Townsend C.C. and Guest E.
1974 *Flora of Iraq: vol. 3. Leguminales*. Baghdad: Ministry of Agriculture and Agrarian Reform.

Wasse A., Rowan Y., and Rollefson G.
2012 A Seventh Millennium BC Late Neolithic Village at Mesa 4 in Wadi al-Qattafi, Eastern Jordan. *Neo-Lithics* 1/12: 15-24.

Zohary M.
1966 *Flora Palaestina: Part I.* Jerusalem: Israel Academy of Science and Humanities.
1972 *Flora Palaestina: Part II.* Jerusalem: Israel Academy of Science and Humanities.

A Late Natufian and PPNA Settlement in North-East Jordan: Interim Report on the 2014-2016 Excavations at Shubayqa 6

Tobias Richter, Amaia Arranz-Otaegui, Elisabetta Boaretto, Emmy Bocaege, Erin Estrup, Cesar Martinez Gallardo, George Alexis Pantos, Patrick Nørskov Pedersen, Ingeborg Sæhle, and Lisa Yeomans

Introduction

Pedestrian survey along the northern edge of the Qa' Shubayqa in October/ November 2012 resulted in the discovery of a large, hitherto undocumented prehistoric settlement (Richter *et al.* 2012). Collection of surface artefacts strongly hinted that this site may have a PPNA occupation phase. Three seasons of excavation under the auspices of the University of Copenhagen's Department of Cross-Cultural and Regional Studies have produced evidence for a substantial settlement that was occupied from the late Natufian to the late PPNA.

Although recent work in north-east Jordan and elsewhere in the *Harra* and *Hamad* has begun to dispel the idea that this region was a 'marginal' or 'peripheral' zone throughout prehistory (*e.g.* Akkermans *et al.* 2014; Müller-Neuhof 2014; Richter 2014), evidence for the transition from hunting and gathering to the earliest cultivators, the Epipalaeolithic-Neolithic transition, has to date remained more elusive (Richter and Maher 2013). Thus, most summaries of the emergence of early Neolithic society in the Levant have suggested that the eastern, more arid zone of the Levant was likely occupied by groups that retained a hunting and gathering lifestyle and continued to be more mobile than their plant cultivating, sedentary PPNA cousins further west in the Jordan Valley and north along the Upper Euphrates (*e.g.* Belfer-Cohen and Bar-Yosef 2000; Kuijt and Goring-Morris 2002; Bar-Yosef 2008). Given the paucity of evidence available so far, this seemed a reasonable assumption. However, our work is beginning to show that the picture may be more complex. In this interim report, we describe the fieldwork carried out at Shubayqa 6 since 2014, which provides evidence for a substantial settlement that was occupied across the transition from the late Natufian to the PPNA.

Shubayqa 6 is situated in the Black Desert of north-east Jordan, *c.* 22 km north of the modern town of Safawi and 130 km north-east of the capital Amman at UTM 37S 334076/ 3586839 (Fig. 1). The Natufian sites of Shubayqa 1 and Shubayqa 3 are situated 0.7 km west and 3.1 km south-east respectively. Shubayqa 6 is a 2-3 m high mound which sits atop a low terrace to the immediate north of the Qa' Shubayqa (Fig. 2). The mound appears to consist almost entirely of anthropogenic deposits, as well as structures built of local basalt. Chipped stone and basalt ground stone artefacts cover the mound and surrounding area, totalling *c.* 3,000 m^2. The majority of the extant surface architecture appears to date to the Bronze Age, Byzantine/ early Islamic period, and later constructions that are probably medieval, post-medieval and modern in date. The Bronze Age structures consist of a circular wall that incorporates a burial cairn at its southern edge (see below). There are at least five rectangular buildings which, according to surface finds of pottery, appear to date to the late Byzantine/ early Islamic period. At least seven Muslim graves are located on and around the mound, some of which sit on top of the rectangular structures. A number

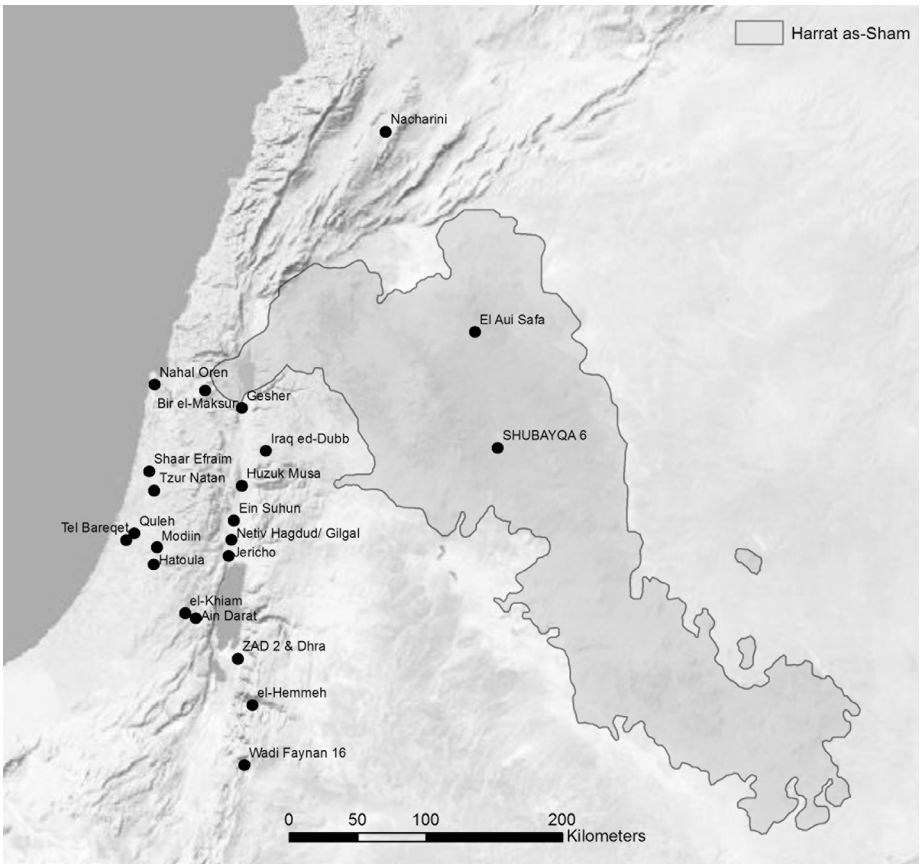

Fig. 1 Location of Shubayqa 6 in relation to other PPNA sites in the southern Levant. (Shubayqa Archaeological Project)

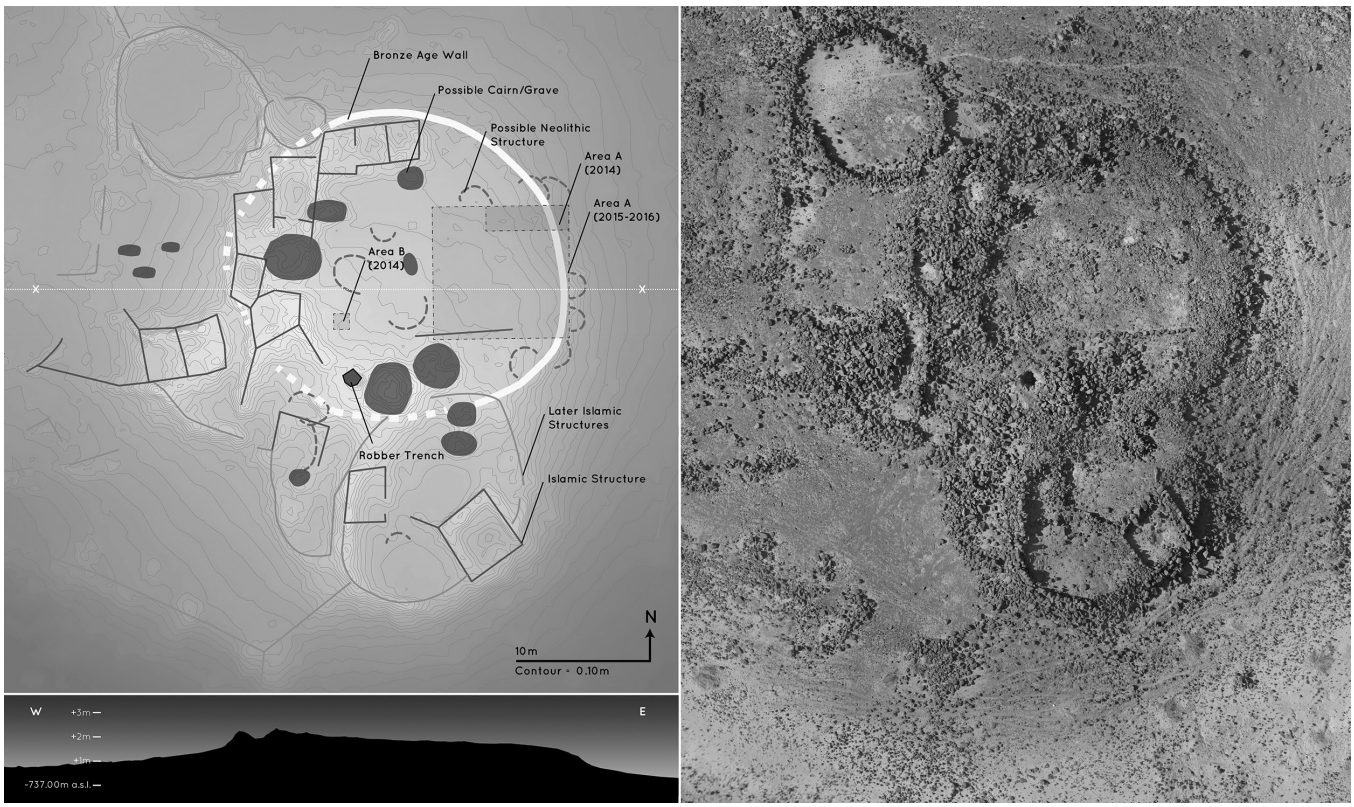

Fig. 2 Plan of Shubayqa 6 and aerial view of the site. (Shubayqa Archaeological Project)

of circular enclosures were built later on top of the rectangular buildings, but they are difficult to date. In addition to the PPNA architecture exposed in excavation (see below), several partially buried circular walls were also observed on the surface of the site, which could date to the Neolithic occupation.

Excavation Methods

In 2014, we excavated an evaluation trench (6 m east-west by 2 m) at the eastern edge of the site, as well as a 1 x 1 m test unit at the top of the mound. These units were excavated to determine the presence, depth and preservation of sub-surface archaeology and to obtain stratified samples of material culture, fauna and botanical remains. Subsequently, a 10 x 10 m area incorporating the 2014 evaluation trench was opened in 2015. Excavations continued in this area in 2016. The area was sub-divided into four squares labelled A1-A4. Each square was sub-divided into 1 x 1 m or 0,5 x 0,5 m units where warranted (*e.g.* where deposits immediately above floors were reached). Excavated sediment was dry-sieved on site, the residue collected, washed and sorted into find categories at the dig house. A minimum of ten litres of sediment was collected from every deposit for flotation, while 200 ml reference soil samples for pollen and phytolith analysis were also collected. Excavations combined the use of a single-context recording system with excavations in arbitrary horizontal and vertical units ('spits'), whereby the natural boundaries of sediments were always respected. Bulk finds were collected by square, context and – where applicable – spit, while special finds (*e.g.* worked bone) were point-provenienced using a total station. In addition to standard digital photography and hand drawn plans and sections, we utilised more advanced digital recording techniques to create 3D models of excavated features and excavation areas.

Excavated Features

Excavations in the main area have revealed a dense and complex arrangement of architecture and features. The latest phase uncovered in the excavation area is a segment of the circular wall that encloses most of the mound. The wall truncated earlier deposits in Squares A2 and A4. This wall was constructed of unworked basalt boulders, which was preserved only to a height of 1-2 courses. A fragment of early Bronze Age ceramic was found immediately beneath the wall following its removal during excavation. Late Chalcolithic and early Bronze Age ceramics were found in low frequencies in the vicinity of the wall. This and a single ^{14}C date suggest that the mound was occupied during the late Chalcolithic/ early Bronze Age, when it was possibly part of a funerary monument. This is suggested by the cairn that is situated on top of the mound, which appears to be connected to the circular enclosing wall.

Within Square A1 a circular cairn built of unworked basalt blocks was exposed (Space 10, Fig. 3). At the centre the remnants of a disturbed stone-lined cist were exposed, which contained the semi-articulated and disarticulated remains of at least three individuals. Excavation of this feature could not be completed during

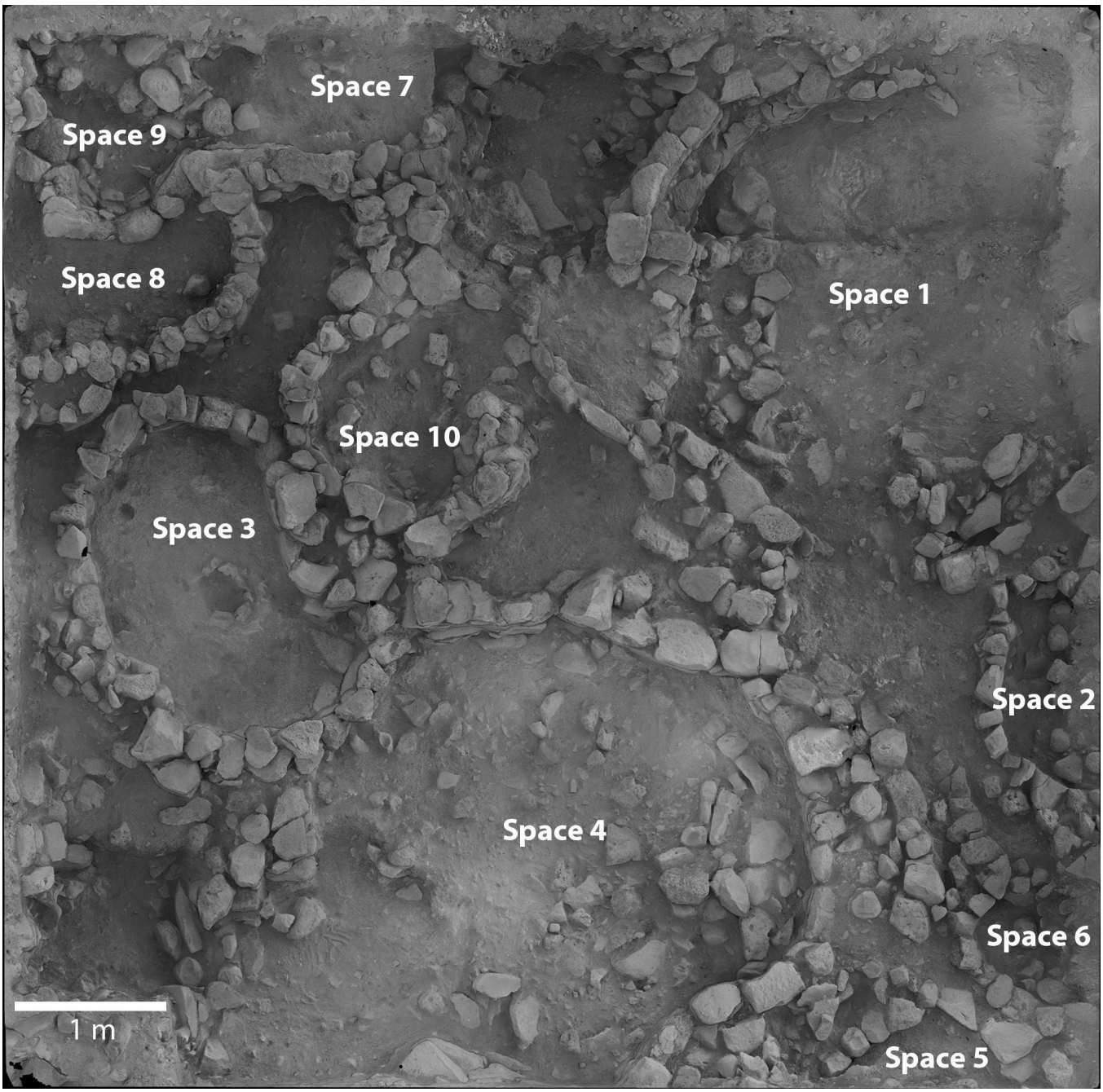

Fig. 3 Orthostatic photo of the main excavation area at the end of the 2016 season. (Shubayqa Archaeological Project)

the 2016 season and further human remains were left unexcavated inside the cist. The cairn reuses an earlier circular structure, which probably dates to the PPNA. No material culture that could clearly be identified as belonging to the burials in the cist was recovered. However, a piece of copper was recovered near the cairn. Cist burials or cairn funerary monuments are unknown from the PPNA, but are common in the Chalcolithic and Bronze Age in the Levant. These observations as well as the piece of copper, the single late prehistoric ^{14}C date and the thin spread of late Chalcolithic/ early Bronze Age pottery, suggest that this cairn likely dates to the same time frame.

A deep pit which truncated earlier PPNA deposits and structures was found in the south-west corner of A3. This pit may be related to the suspected late prehistoric burial cairn on top of the mound. Basalt slabs including some re-used groundstones were set at angles to line the large cut in several layers.

The next clearly visible phase at the site appears to be confined to Squares A1 and A3, where one complete building (Space 3) and several circular structures (Spaces 7, 8 and 9) were exposed. This architecture overlies other structures, of which parts were exposed in A2, A3 and A4. Space 3 is an oval structure constructed of carefully selected large, rectangular and flat basalt slabs, as well as some orthostatic basalt stones (Fig. 4). The building has at least two phases: the southern wall is of a less careful construction and appears to be a later rebuild. Two superimposed stone-lined fireplaces were excavated at the centre of the building, surrounded by well-made mud plaster floors. A series of internal post-

Fig. 4 A PPNA building at Shubayqa 6 (Space 3). (Shubayqa Archaeological Project)

holes suggest a roof superstructure made of organic materials. A number of basalt handstones were found lying in front of the southern wall of this space. Space 7 was also excavated down to a floor and also produced a stone lined fireplace. Spaces 8 and 9 have not been completely excavated yet. This phase of architecture sits on top of rich midden deposits characterised by a humic soil matrix.

An earlier phase of occupation consisting of a series of circular and sub-circular buildings was exposed in A2, A3 and A4. Space 1 was already partially exposed in the 2014 evaluation trench. This large circular structure measures nearly 5 m in maximum diameter. A 'bench' or later wall was built in front of the original exterior wall. One fireplace inside this structure has already been exposed, which was built on top of an earlier fireplace (not yet excavated). To the south in Square A4, three small circular and oval structures (Spaces 2, 5 and 6) were exposed and partly excavated. These are too small to be inhabitation structures, but their actual purpose is not clear at present. Space 4 occupies most of A3, measuring at least 5m in diameter. This building has a complex construction history with numerous phases. Once, this area probably was an outdoor space, as it contained a fireplace and an oval stone alignment situated atop a midden and substantial collapsed building material. The midden beneath proved to be extraordinarily rich in finds. Numerous beads, ground- and chipped stone artefacts, as well as worked bone, animal bone and botanical remains were recovered from this area. A cache of basalt handstones was found placed in front of the eastern wall of the structure. This secondary use of the space seems to be characterised by its use for discarded waste and processing activities in an external area. Burnt and fire-cracked fist-sized basalt rocks were very frequent throughout the midden suggesting that the waste from cooking activities were dumped here. As the various spits of the midden were excavated it was clear that many flat handstones were often left close to the walls of this space.

Radiocarbon Dates

Six charred pieces of plant material from Shubayqa 6 were submitted for dating by Accelerator Mass Spectrometry (AMS). The calibrated ranges cluster between 12,400–10,600 cal BP (10,400–8,640 cal BC) at 68.2% probability or ±1σ. One sample provided a date of 5,710–5,615 cal BP (3,765–3,665 cal BC; 68.2%) (Fig. 5). This late date from a context close to the modern surface confirms the late Chalcolithic/ early Bronze Age occupation at the site already indicated by the ceramic finds from the excavations. The other five dates come from stratigraphically earlier deposits. The dates are stratigraphically coherent and derive from contexts in the 2014 evaluation trench and the sounding. Two of these dates fall within the Late Natufian time frame, while POZ-76082 straddles the transition between the Late Natufian and the early PPNA. The final two dates correspond to the late PPNA in the southern Levant. These dates suggest that Shubayqa 6

					Calibrated BCE		Calibrated BP	
Lab no.	Context Number	Context Description	Material	Age 14C BP	68.2%	95.4%	68.2%	95.4%
Poz-76084	68.2	Midden layer	*fraxinus* sp.	4945 +/-35	3765-3664	3791-3652	5714-5613	5740-5601
Poz-76085	69	Trampled surface	*fraxinus* sp.	9440 +/-50	8780-8639	9114-8572	10729-10588	11063-10521
Poz-76083	75	Midden layer	*fraxinus* sp.	9500 +/-50	9117-8731	9131-8640	11066-10680	11080-10589
Poz-76082	25	Midden layer	*tamarix* sp.	10050 +/-50	9756-9456	9864-9371	11705-11405	11813-11320
RTK-7950	5	Midden layer in deep sounding	*vitex agnus castus*	10270 +/-33	10159-10021	10211-9881	12108-11970	12160-11830
RTK-7952	5	Midden layer in deep sounding	*vitex agnus castus*	10320 +/-34	10421-10071	10432-10031	12370-12020	12381-11980

Table 1 List of AMS dates from Shubayqa 6.

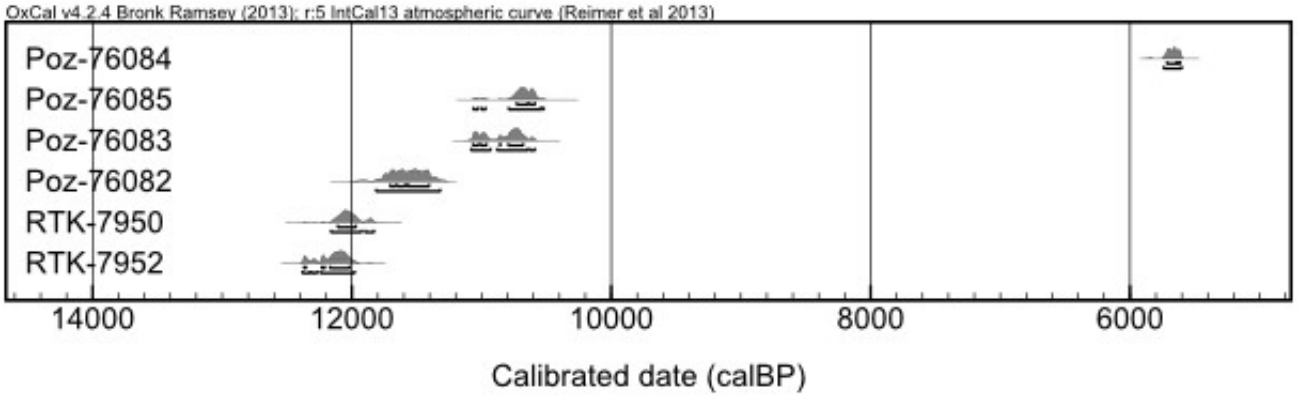

Fig. 5 Plot of probability distribution of calibrated ranges of 14C dates from Shubayqa 6 in year cal BC and cal BP. Calibrated ages in calendar years have been obtained from the calibration tables in (Reimer et al. 2013) by means of OxCal v. 4.2 of Bronk Ramsey (2010) (Bronk-Ramsey 1995, Bronk-Ramsey 2001). Samples are ordered according to their stratigraphic position in the site's matrix.

was occupied during the late Natufian and possibly throughout the PPNA. This makes Shubayqa 6 an unusual site as most Late Natufian sites were abandoned and not reused during the PPNA (see below).

Material Culture and Other Finds

Only a small sample of the chipped stone industry from Shubayqa 6 has been studied so far. The analysed material comes from the lower levels of infill in Space 1, which represents one of the earliest phases excavated at the site so far. The chipped stone assemblage is dom-inated by flint, in addition to small amounts of chalcedony and obsidian. Neither of these two latter raw materials are available locally, and the nearest known sources of flint lie some 70-90 km south of Shubayqa 6 (Betts 1998). Chalcedony is known from sources east of the Azraq oasis (Betts 1998: 34). The obsidian from Shubayqa 6 has not been sourced yet, but the nearest obsidian sources are located in southwestern Turkey, some 790 km away (Carter *et al.* 2013).

The lack of locally available flint let the inhabitants of Shubayqa 6 carry out the initial stages of stone tool production at the source location. This is reflected in the assemblage by a lack of initial platform tablets and low numbers of primary pieces. The lack of cortical pieces indicates that flint knappers pre-shaped the nodules before they brought them to the site. The amount of debris/ shatter is low, resulting in a low ratio of debris to cores and tools. This could reflect an attempt to maintain an efficient reduction strategy at the site in order to conserve raw material.

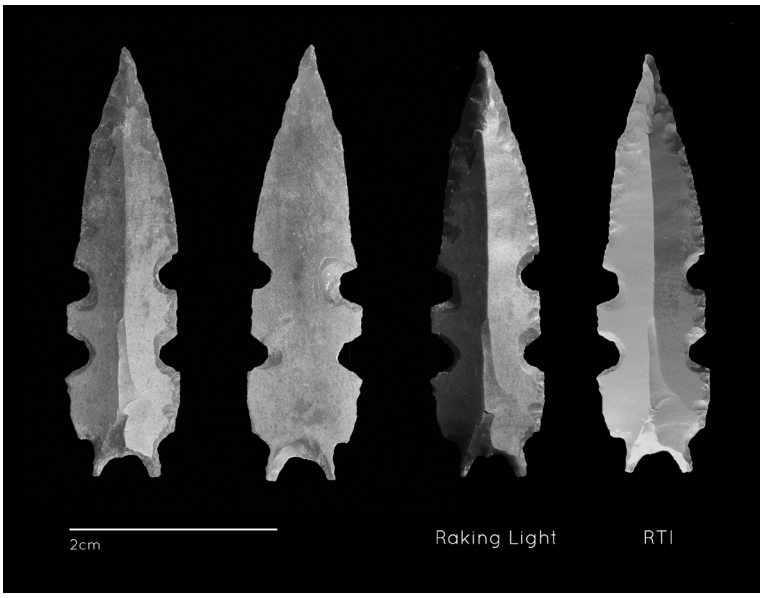

Fig. 6 El-Khiam point. (Shubayqa Archaeological Project)

Fig. 7 Cache of basalt handstones in front of the eastern wall of Space 4. (Shubayqa Archaeological Project)

The chipped stone industry at Shubayqa 6 is heavily flake-orientated, and flakes outnumber both blades and bladelets by more than double in the debitage. This is a typical trait of both Natufian and PPNA lithic industries. Bladelets clearly outnumber blades in the assemblage, but it seems likely that this is a reflection of raw material constraints (small nodules) rather than a cultural prevalence for bladelets. Tools are dominated by informal flake-tools, usually utilized or lightly retouched. Perforators make up nearly 25 % of the tool assemblage, and clearly outnumber all other formal tool categories. High numbers of perforators are a typical PPNA trait, but the unusually high numbers at Shubayqa 6 could be seen in relation to an intensive on-site bead production (see below). Although the sample that was studied inten-sively yielded no projectile points, el-Khiam and Salibiya points were recovered from other parts of the site. The assemblage from the 1x1 m sounding showed an increase in the number of geometric microliths with depth, with abruptly backed lunates becoming more common lower down in the sequence. This further supports the notion of a late Natufian phase at Shubayqa 6 (Fig. 6).

Due to the large number of ground stone tool fragments and debitage, they were collected in bulk according to context and square/ spit, while complete tools found in association with floor surfaces were considered special finds and point-provenienced. The assemblage awaits detailed analysis but a few observations can be noted. Most of the ground stone tools seem to be related to the Neolithic occupation of the site. Discoidal- and ovate shaped handstones are prevalent and, as mentioned above, several of these were found abutting interior wall faces within Spaces 3 and 4 (Fig. 7). Basin-type querns also seem to be common; one of these was reused as building material in the wall of Space 3. In addition to the more frequent tool types, a few pestles, vessel-mortars (Fig. 8) and grooved stones have also been recovered. Large boulder mortars, like the ones observed at the nearby Natufian site Shubayqa 1 (Richter *et al*. 2012), have not been found at Shubayqa 6 so far. The prevalence of grinding tools, *i.e*. handstones and querns, seems to reflect what is commonly observed in Levantine Neolithic ground stone assemblages (Wright 1992, 1994).

The site has also produced a very rich assemblage of faunal remains. Only a very small proportion of the material from the evaluation trench, the sounding and Space 2 have been analysed at this stage. The species present include gazelle with lower numbers of onager, sheep, fox, hare, cattle, tortoise as well as a range of wetland birds. Several large canid bones were also recovered from Space 2. A high proportion of all the faunal remains have passed through the digestive tract of animals clearly displaying the characteristic signatures of acid damage causing enlargement of foramen and the porous structure of trabec-ular bone, faceting of surfaces and sharpening of edges. Together this suggests that dogs were probably companions to the human population during the PPNA. Compared to the faunal evidence for Natufian occupation at Shubayqa 1, hare were a more frequent component of the hunted prey and its possible that hunting activities with dogs could have enabled this evasive animal to be more effectively caught.

The archaeobotanical work carried out so far includes a total of 207 flotation samples (more than 3000 litres of sediment processed). Overall, macrobotanical preservation at Shubayqa 6 is excellent. The preliminary analyses of the plant macroremains indicate the presence of riparian trees such as *Fraxinus* sp. (ash), *Vitex* sp. (chaste tree) and *Tamarix* sp. (tamarisk) suggesting that a wetland existed nearby. This matches the palaeoenvironmental information obtained from the archaeobotanical material from Shubayqa 1. The non-woody plant macro remains comprise cereals such as wheat and barley along with a large proportion of wild plants, including Cyperacea rhizome-tubers. Future analyses will elucidate whether the inhabitants of Shubayqa 6 were gathering wild resources or had already started plant food production activities such as cereal cultivation.

More than 2000 stone beads, roughouts and waste fragments related to bead production have been recovered from Shubayqa 6 to date (Fig. 9). The vast majority of these were made using Dabba marble greenstone, although other types of stone, as well as avian shell and bone were also occasionally used. This material chimes with the large number of chipped stone drills and grooved basalt artefacts, which are likely related to bead production (Wright *et al.* 2008). It is not quite clear at present why this settlement became a locus for bead production given that the nearest known greenstone raw material sources are located *c.* 70 km away. A more detailed study of the bead assemblage

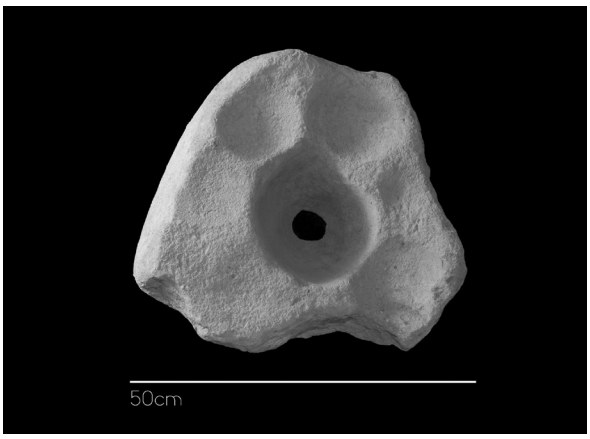

Fig. 8 A vessel-mortar found in the fill of Space 4. (Shubayqa Archaeological Project)

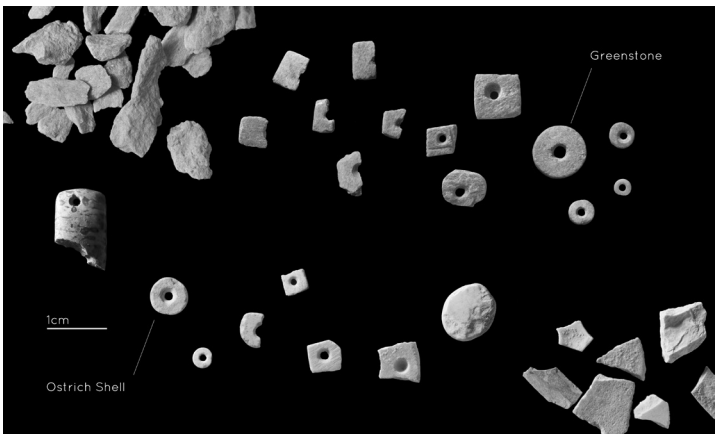

Fig. 9 Beads, production waste and bead roughouts. (Shubayqa Archaeological Project)

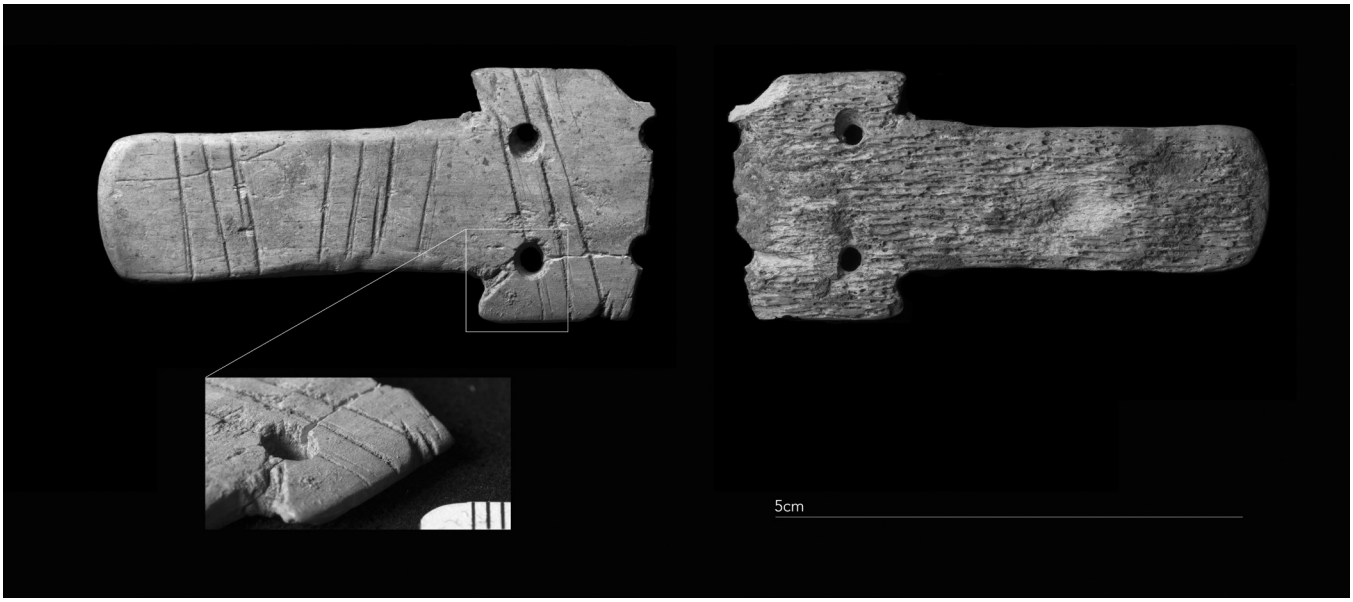

Fig. 10 T-shaped, incised and perforated piece of worked bone. (Shubayqa Archaeological Project)

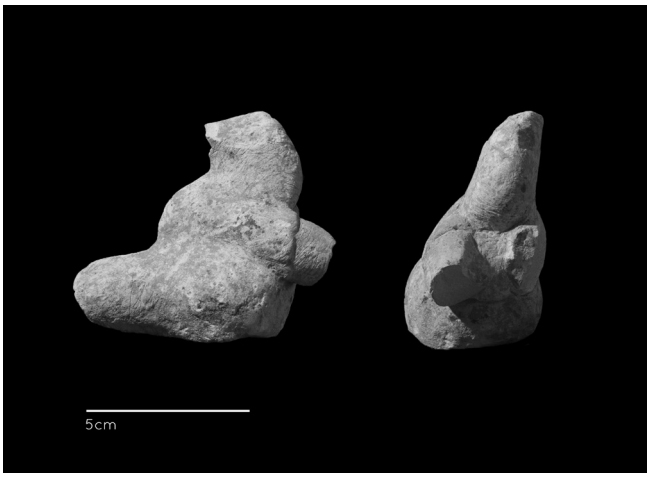

Fig. 11 Anthropomorphic chalk figurine. (Shubayqa Archaeological Project)

will be undertaken in due course, however, a preliminary perusal of the current assemblage reveals beads of types similar and specific to those found throughout the southern Levant from the Upper Paleolithic through the PPNC (Bar-Yosef Mayer 2013). There are a number of pieces of worked bone, with bone points being the most common. One unusual piece of worked bone of unclear function was recovered from deposits associated with typical PPNA material culture in Space 4 (Fig. 10): the rib of a medium-sized mammal was cut into a T-shape and polished smoothly. Three groups of incisions were made on the external polished surface; four small holes were drilled in the broadest part. The function of this object is not clear at present, although the four holes may suggest that it was used as a pendant or was attached to garment. A further unusual object from Shubayqa 6 is an anthropomorphic chalk figurine (Fig. 11). The figure has an oblong top part, a thick middle section and a broad base. Two arms were worked out from the main section, one of which shows a pattern of hatchet pattern of incisions. Further incision and cut marks can be seen in the upper part and along the base.

Conclusion

Our excavations at Shubayqa 6 to date demonstrate that this site was a substantial settlement that appears to have its origins in the Late Natufian and continued to be occupied throughout the PPNA. Its complex architecture, rich material cultural assemblage, as well as evidence for apparently intensive plant collection demonstrates that the *Harra* was not occupied by mobile groups focused predominantly on hunting during the late Natufian and PPNA, as has often been suggested. Shubayqa 6 has all the hallmarks of a sedentary settlement, characterised by intensive exploitation of edible plants and animals. Although additional excavations and further analysis of the finds from the site are necessary, Shubayqa 6 demonstrates that the emergence of the cultural and economic patterns that characterise the PPNA happened in the *Harra* at the same time as in the Jordan Valley and on the Upper Euphrates. The Levantine Corridor of the early Neolithic agricultural revolution was therefore probably much wider than previously thought and incorporated the semi-arid zone east of the Jebel Druze. Further work at Shubayqa 6 will allow us to investigate to what extent the late Natufian and early PPNA economy of the settlement was based on emergent plant management strategies. Due to its excellent preservation of macrobotanical remains and successive occupation from the Late Natufian to the end of the PPNA, further work at Shubayqa 6 promises a rare insight into how the economic, social and cultural parameters of gathering-hunting societies changed from the end of the Pleistocene to the beginning of the Holocene.

Tobias Richter
Department of Cross-Cultural and Regional Studies,
University of Copenhagen,
richter@hum.ku.dk (corresponding author)

Amaia Arranz-Otaegui
Department of Cross-Cultural and Regional Studies,
University of Copenhagen
kch860@hum.ku.dk

Elisabetta Boaretto
D-REAMS Laboratory, Helen and Martin Kimmel
Center for Archaeological Science,
Weizmann Institute of Science
Elisabetta.Boaretto@weizmann.ac.il

Emmy Bocaege
Université de Bordeaux, UMR 5199 PACEA
emmy.bocaege@u-bordeaux.fr

Erin Estrup
Department of Cross-Cultural and Regional Studies,
University of Copenhagen
diggingthepast@gmail.com

Cesar Martinez Gallardo
Department of Cross-Cultural and Regional Studies,
University of Copenhagen
cesarmgallardo@gmail.com

George Alexis Pantos
Department of Cross-Cultural and Regional Studies,
University of Copenhagen
gapantos@gmail.com

Patrick Nørskov Pedersen
Department of Cross-Cultural and Regional Studies,
University of Copenhagen
patrick-n-p@hotmail.com

Ingeborg Sæhle
Department of Cross-Cultural and Regional Studies,
University of Copenhagen
ingeborgsahle@hotmail.com

Lisa Yeomans
Department of Cross-Cultural and Regional Studies,
University of Copenhagen
zhr605@hum.ku.dk

References

Akkermans P.M.M.G., Huigens H.O., and Brüning M.L.
2014 A Landscape of Preservation: Late Prehistoric Settlement and Sequence in the Jebel Qurma Region, North-Eastern Jordan. *Levant* 46(2): 186-205. doi:10.1179/0075891414Z.00000000041.

Bar-Yosef O.
2008 Farming, Herding, and the Transformation of Human Landscapes in Southwestern Asia. In: B. David and J. Thomas (eds.), *Handbook of Landpscape Archaeology*. 315-27. Walnut Creek, CA: Left Coast Press.

Bar-Yosef Mayer D.E.
2013 Towards a Typology of Stone Beads in the Neolithic Levant. *Journal of Field Archaeology* 38(2): 129-42.

Belfer-Cohen A. and Bar-Yosef O.
2000 Early Sedenstism in the Near East: A Bumpy Ride to Village Life. In: I. Kuji (ed.), *Life in Neolithic Farming Communities. Social Organization, Identity, and Differentiation*. 19-62. New York: Kluwer Academic.

Betts A.V.G.
1998 *The Harra and the Hamad.* Excavations and Surveys in Eastern Jordan, 1. Sheffield: Sheffield Academic Press.

Bronk Ramsey C.
1995 Radiocarbon Calibration and Analysis of Stratigraphy: the OxCal Program. *Radiocarbon* 37(2): 425-430.
2001 Development of the Radiocarbon Program OxCal. *Radiocarbon* 43(2A): 355-363.

Carter T., Grant S., Kartal M., Coşkun A., and Özkaya V.
2013 Networks and Neolithisation: sourcing obsidian from Körtik Tepe (SE Anatolia). *Journal of Archaeological Science* 40: 556-569.

Kuijt I. and Goring-Morris A.N.
2002 Foraging, Farming, and Social Complexity in the Pre-Pottery Neolithic of the Southern Levant: A Review and Synthesis. *Journal of World Prehistory* 16(4): 360-440.

Müller-Neuhof B.
2014 A 'marginal' Region with Many Options: The Diversity of Chalcolithic/Early Bronze Age Socio-Economic Activities in the Hinterland of Jawa. *Levant* 46(2): 230-48. doi:10.1179/0075891414Z.00000000043.

Reimer P.J., Bard E., Bayliss A., Beck J.W., Blackwell P.G., Bronk Ramsey C., Grootes P.M., Guilderson T.P., Haflidason H., Hajdas I., Hattíe C., Heaton T.J., Hoffmann D.L., Hogg A.G., Hughen K.A., Kaiser K.F., Kromer B., Manning S.W., Niu M., Reimer R.W., Richards D.A., Scott E.M., Southon J.R., Staff R.A., Turney C.S.M., and van der Plicht J.
2013 IntCal13 and Marine13 Radiocarbon Age Calibration Curves 0-50,000 Years cal BP. *Radiocarbon* 55(4): 1869-1887.

Richter T.
2014 Margin or Centre? The Epipalaeolithic in the Azraq Oasis and the Qa' Shubayqa. In: B. Finlayson and C.A. Makarewicz (eds.), *Settlement, Survey and Stone: Essays on Near Eastern Prehistory in Honour of Gary Rollefson*. 27-36. Berlin: ex oriente.

Richter T., Bode L., House M., Iversen R., Arranz A., Saehle I., Thaarup G., Tvede M.-L., and Yeomans L.
2012 Excavations at the Late Epipalaeolithic Site of Shubayqa 1: Preliminary Report on the First Season. *Neo-Lithics* 12/2: 3-14.

Richter T. and Maher L.A.
2013 The Late Epipalaeolithic in the Azraq Basin: A Reappraisal. In: O. Bar-Yosef and F.R. Valla (eds.), *Natufian Foragers in the Levant. Terminal Pleistocene Social Changes in Western Asia*. 429-48. Ann Arbor, Michigan: International Monographs in Prehistory.

Wright K.I.
1992 A Classification System for Ground Stone Tools from the Prehistoric Levant. *Paléorient* 18(2): 53-81.
1994 Ground Stone Tools and Hunter-Gatherer Subsistence in Southwest Asia: Implications for the Transition to Farming. *American Antiquity* 59(2): 238-63.

Wright K.I., Critchley P., Garrard A., Baird D., Bains R., and Groom S.
2008 Stone Bead Technologies and Early Craft Specialization: Insights from Two Neolithic Sites in Eastern Jordan. *Levant* 40(2): 131-66.

A Decorated Bone 'Spatula' from Göbekli Tepe. On the Pitfalls of Iconographic Interpretations of Early Neolithic Art

Oliver Dietrich and Jens Notroff[1]

Introduction

Göbekli Tepe is well known for the monumental architecture of its older Layer III which dates to the Pre-Pottery Neolithic (PPN) A (Schmidt 2012; for radiocarbon data *cf*. Dietrich *et al*. 2013). Up to 4 m high monolithic T-shaped pillars were arranged in circle-like enclosures around two taller (> 5.5 m high) central pillars (Fig. 1). The pillars are interconnected by walls and stone benches and are decorated with various animal motifs, but also with highly abstract symbols. In some cases arms, hands and items of clothing demonstrate unambiguously that the pillars represent stylized anthropomorphic beings (Fig. 2). There is clear evidence to see the site in the context of Early Neolithic cultic ritual (*e.g.* Dietrich and Notroff 2015). A younger phase (Layer II, early and middle PPNB) consists of smaller rectangular buildings, often featuring just two small central pillars or none at all. Besides the architecture, every excavation at Göbekli Tepe has produced a large amount of remarkable iconographic finds, such as reliefs, sculptures, decorated shaft-straighteners, and plaquettes. One of these finds, a rather enigmatically decorated bone artefact, lies at the focus of this short contribution. It highlights the manifold challenges when engaging with the archaeological interpretation of images.

A Find and Many Questions

In 2011 a special object was discovered at Göbekli Tepe in one of the excavation trenches in the tell´s northwestern depression (area K10-45, Locus 7.2; Fig. 3). Excavation had just proceeded into layers undisturbed by modern ploughing, but there were still no traces of architecture, when the fragment of a bone object was found (Fig. 4). The artefact was described preliminarily as a 'spatula' made from a rib bone. It measures 5.3 x 1.9 x 0.3 cm and carries a carved depiction that is only partially preserved. The image is unclear, however the upper part features two hatched T-shaped forms, one of which is completely preserved, the other only fragmentarily. These T-shapes rapidly led to associations with Göbekli Tepe´s most prominent architectural feature, and to a vivid discussion within the research team focusing on the probability of this interpretation and our comprehension of Neolithic art in general. Indeed, due the complexities of the find the decision was made in 2011 to refrain from any form of premature interpretation. In the meantime, the object was put on display in the Şanlıurfa Museum, where it has since attracted the attention of visitors. Although their interpretation generally follows the same line as ours in 2011, it has since taken on more speculative and esoteric slants (Collins 2016). For this reason, it is essential that we return to this object to discuss in more detail the question of its 'readability' and the nature of the Neolithic depiction.

Fig. 1 Enclosure D at Göbekli Tepe. (photo: DAI, Orient Department, N. Becker)

Fig. 2 Pillar 31, one of the central pillars of Enclosure D. (photo: DAI, Orient Department, N. Becker)

A Framework – or Limits – for the Interpretation of Prehistoric Art

There is an ongoing discussion about the possibilities and pitfalls of interpreting art in archaeology. One aspect of this debate is the potential use of iconological approaches. Among the most influential models is Erwin Panofsky's concept which he presented in the 1930s (1934, reprinted in 1982). Panofsky identifies "three strata of subject matter or meaning" (Panofsky 1982: 28, 40-41), *e.g.* levels of inference on the intentions and messages encoded in images by the artist. His ideas have influenced generations of art historians and have also been used widely in Classical Archaeology. In Prehistoric Archaeology they do not seem to have reached a similar impact, although some examples of successful application exist (*e.g.* Orrelle and Kolska Horwitz 2016). This limited use of Panofsky's ideas is obviously related to his basic assessment of interpretational possibilities (*e.g.* Schulz 2010: 84-86).

The first level of meaning is the "primary or natural subject matter", the perception of basic forms as representations of natural objects, *e.g.* humans, animals, plants or inanimate objects and their spatial setting or possible interactions. On this level, interpretation

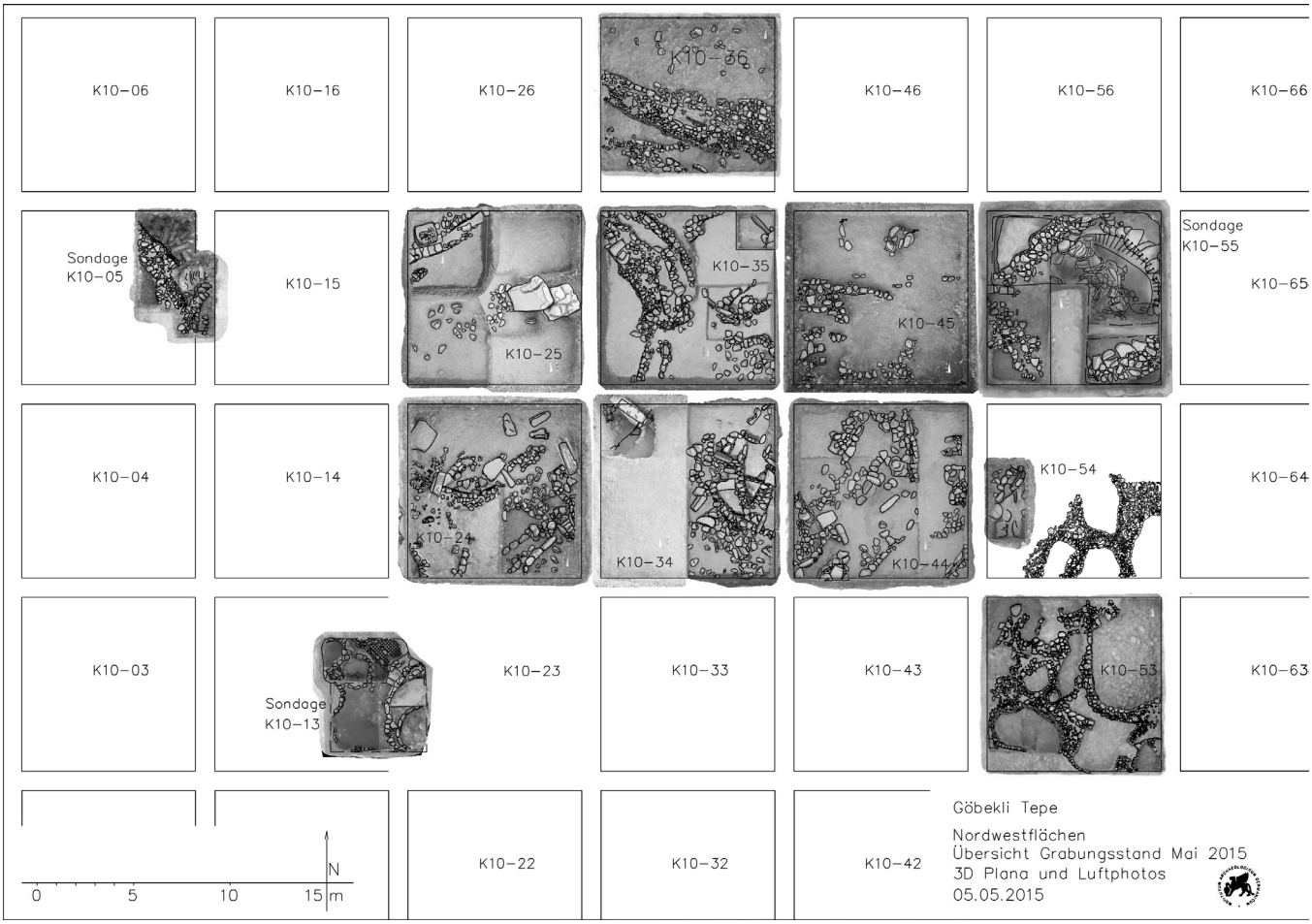

Fig. 3 Göbekli Tepe, excavation areas on the northwestern hilltop. (plans and drawings: DAI, Orient Department, by excavation team, digitalization N. Becker)

in Panofsky's view does not reach beyond the natural meaning of things; it is a basic pre-iconographical description that can be reached without further cultural knowledge.

On the second level, basic motifs are combined and identified with cultural-specific themes or concepts (Panofsky 1982: 29-30). Panofsky's most often cited example for this stratum is to recognize a group of persons seated at a dinner table in a certain arrangement as a representation of the last supper. This iconographical interpretation or understanding needs additional information. If one lacks the acculturation in a society for which these topics are understandable, written sources or other means of information are needed for a correct interpretation.

The third level of interpretation, the iconology, targets the "intrinsic meaning or content", *i.e*. the intentions of the artist in displaying an image just in that way, the messages he wanted to send about his subject, or the historical and political context in which the work was made. The iconological analysis thus tries to elucidate the symbolic values of images. In Panofsky's (1982: 41) words, what is needed to achieve this is "synthetic intuition, a familiarity with the essential tendencies of the human mind, conditioned by personal psychology and Weltanschauung". And of course all the insights gained from interpretation levels 1 and 2.

Fig. 4 Fragment of a bone 'spatula' from area K10-45, Locus 7.2. (photo: DAI, Orient Department, N. Becker)

That in mind, the challenges in reading and interpreting prehistoric art become obvious. As soon as such depictions cross the line to abstraction and symbolism, familiarity with their proper cultural context and knowledge of their connotations is inevitably necessary to perceive and understand these codes.

In particular, this includes us today. Without the cultural intimacy with narratives and concepts linked to these depictions and symbols we could at best guess what is a) depicted and b) meant. Unfortunately, this presents a large probability of misconception, much like discovering the symbol of the cross in a Christian church, yet lacking any knowledge of the whole Passion narrative for which it stands but which is perceived without further explanation by members of most occidental cultures and even beyond.

To be useful for Prehistoric Archaeology, Panofsky's thoughts must be adapted to the specific sources of this discipline. The need for a broad understanding of the cultural setting of images for an iconographical analysis (Level 2) is a requirement hard to fulfil completely, especially when only material remains are available without written sources. But to some extent, this lack can be compensated for by find contexts on a macro (site-) and micro (deposition-) level, and through analogical reasoning (*e.g.* Eggert 2010: 69-70; Orrelle and Kolska Horwitz 2016). Although there are several more theoretic approaches to images, mostly derived from semiotics or communication theory (*e.g.* Belting 2001; Juwig and Kost 2010; Sachs-Hombach 2003; with special reference to the Neolithic: Morenz 2014), Panofsky's model has the advantage that it addresses the 'readability' of an image as a key factor for a successful analysis. It thus seems appropriate to analyse the possibilities of understanding an ambiguous prehistoric depiction like the one on the 'spatula' from Göbekli Tepe.

Pre-Iconography and Iconography: Architecture, an Animal, or Something Completely Different?

Göbekli Tepe is a special site that lacks domestic architecture as known from contemporaneous sites so far (Dietrich and Notroff 2015). The circular enclosures of the earlier (PPNA) layers feature a rich iconography, mostly based on zoomorphic motifs, depicted in flat and high reliefs, as well as in the form of three-dimensional sculptures and of incisions in smaller objects that in some cases seem to have no other function than to carry these signs (especially small stone plaquettes - Morenz and Schmidt 2009). Depictions of humans are scarce in reliefs and on small objects, but are more common among sculptures. So far there is only one case in which possibly inanimate objects are depicted (see below).

The archaeological context of the bone spatula is rather uncertain. It was found immediately below the plough horizon within a deposit without architectural

Fig. 5 Fragments of decorated bone 'spatulae' from Göbekli Tepe. (drawings: DAI, Orient Department, K. Schmidt)

remains or walking levels. There are however two fragments of comparable 'bone spatulae' from Göbekli Tepe with clear proveniences. Both objects have incised geometric decorations. One was found in a deep sounding excavated for the construction of a permanent shelter above the site, north of Enclosure D (area L9-69, Locus 163.5; Fig. 5a). As this sounding had limited dimensions, the stratigraphic relation of the reddish sediment (rich in charcoal and animal bones) with Enclosure D cannot be established with certainty at the moment. The second piece (Fig. 5b) stems from an area with wall debris, probably of Layer II-buildings, in the south of the main excavation area (area L9-58, Loc. 55.2). Besides the insight that objects of this kind may span the whole duration of the site, the contexts of the intra-site analogies are unfortunately rather uninformative.

A pre-iconographical description can thus only be reached by use of intra- and offsite analogies for the decorations, which is made difficult by the ambiguous execution of the depiction. Panofsky (1982: 33) saw this issue as a main problem in describing an image correctly. He adds that our practical experience must be the basis for any recognition of an object matter, but can also be an obstacle that leads to a false interpretation.

This is exactly the case with the bone spatula. From the moment of its discovery some colleagues were convinced that the T-shaped objects on the spatula must be representations of the iconic find category of Göbekli Tepe´s archaeological record: the T-shaped pillars. In adherence to this line of thought, a roughly human shaped figure was interpreted as standing in front of the pillars, while in the bottom left corner of the spatula the enclosure walls were thought to be represented.

Notably, there are some problems with this interpretation. The perspective of the depiction is not easily understandable, as inside the real enclosures the central pillars stand side by side, not facing each other. An explanation might be sought in the artist's intention to display the T-shape of the pillars, which was obviously important to Göbekli Tepe´s builders. Furthermore, one of the visible 'pillar shafts' is depicted very slender, curved and narrowing in the lower part. An explanation for this could lie in the abilities of the artist to depict a perspective view, or it was not important to them to show these details in a realistic manner.

On the other hand, it is rather difficult to explain why the pillars, the presumed walls, and the potential human are interconnected by lines. At Göbekli Tepe, animals and humans are normally depicted individually and not interwoven. Pillar 56 in Enclosure H is to some degree a remarkable exception to this rule (Fig. 6a). It presents extensive animal depictions on its southwestern broadside – about 55 animals are rendered here so tightly that the outline of one animal also marks the contour of the other.

Yet there is another important point regarding the mode of depiction on this bone spatula. If we are really confronted with a depiction of the enclosure walls, they would very much look like the modern, excavated state. Today, the walls end below the pillars. Whether this was the prehistoric appearance of the enclosures remains unclear for the moment; there is the possibility to reconstruct the buildings as semi-subterranean and roofed structures (*e.g.* Kurapkat 2015). In this case, the depictions of very small walls would not make much sense. Another enigmatic motif, the only possible case of depictions of inanimate objects from Göbekli Tepe mentioned above, further complicates the discussion. On the uppermost part of Pillar 43, a row of three rectangular objects with cupola-like 'arches' on their tops can be seen (Fig. 6b). Each of these objects is accompanied by an animal added on the 'arch'. The meaning of these images is hard to fathom, but they might represent the enclosures during their time of use, seen from the side. The rectangular part would represent the perimeter walls, while the cupolas may indicate roofs. As usually depictions of one animal species seem to

Fig. 6 Pillar 56 in Enclosure H (a) and Pillar 43 in Enclosure D (b). (photo: DAI, Orient Department K. Schmidt)

dominate in every enclosure (Becker *et al*. 2012), it is an intriguing thought that buildings of different groups are depicted here with the emblematic animals of these groups added for recognition. Following this line of argument, one would also have to assume that the enclosures were depicted here rather schematic, *i.e.* in an almost technical sectional view – this would be highly unusual when compared to the other naturalistic representations from Göbekli Tepe. Be this as it may, a final decision on the meaning of these images is not possible. To conclude, there are a few difficulties with a pre-iconographic interpretation of the image on the spatula as an architectural representation.

Furthermore, there is another way of understanding the depiction. The people who built Göbekli Tepe had a very distinct concept of depicting their world. On reliefs, animals were usually represented in the way humans see them during a real-life confrontation. Snakes, spiders, and centipedes were thus depicted in flat relief and from above; larger animals like wild cats, foxes, gazelle *etc*. are shown from the side. A very interesting exception from this rule is associated with depictions of cattle. The body of aurochs is depicted in side elevation, the head however is seen from above. The special way of depicting the aurochs´ head could have a distinct meaning. It is possible that the animal is shown with its head lowered for an attack, the sight a hunter sees in the moment the animal charges towards him (Schmidt 2012: 164; Benz and Bauer 2013: 14). Notably, the cattle head is one of the few animal depictions also transformed into a possible ideogram at Göbekli Tepe. Bucrania can be found on several pillars and other elements of architecture (like so-called porthole stones). It is obvious that the mode of representing animals in Neolithic art is far from arbitrary. Starting from here, another interpretation of the spatula appears possible.

Two larger stone slabs from Göbekli Tepe show high reliefs of animals in a crouched position, probably ready to pounce (Figs. 7a-b); another depiction of that type can be found on the front-side of Pillar 6 (Fig. 8). The animals´ limbs lie stretched besides head and body, a long tail is bent to one side. Schmidt (1999: 10-11, nr. A12-13) suggested an interpretation as reptiles, while Helmer, Gourichon and Stordeur (2004: 156-157, Fig. 7) see them as felids, more exactly panthers, and compare them to depictions from Tell Abr´ 3 and Jerf el Ahmar. Meanwhile, two more examples of squatted animals can be added from Göbekli Tepe, one on a fragmented stone slab (Fig. 9a), the other one on the shaft of Pillar 27 in Enclosure C (Fig. 9b). Irrespective of the depicted species, it is important that the special mode of showing certain types of animals is in any case not restricted to Göbekli Tepe, but a characteristic of Early Neolithic art in southwestern Asia in general.

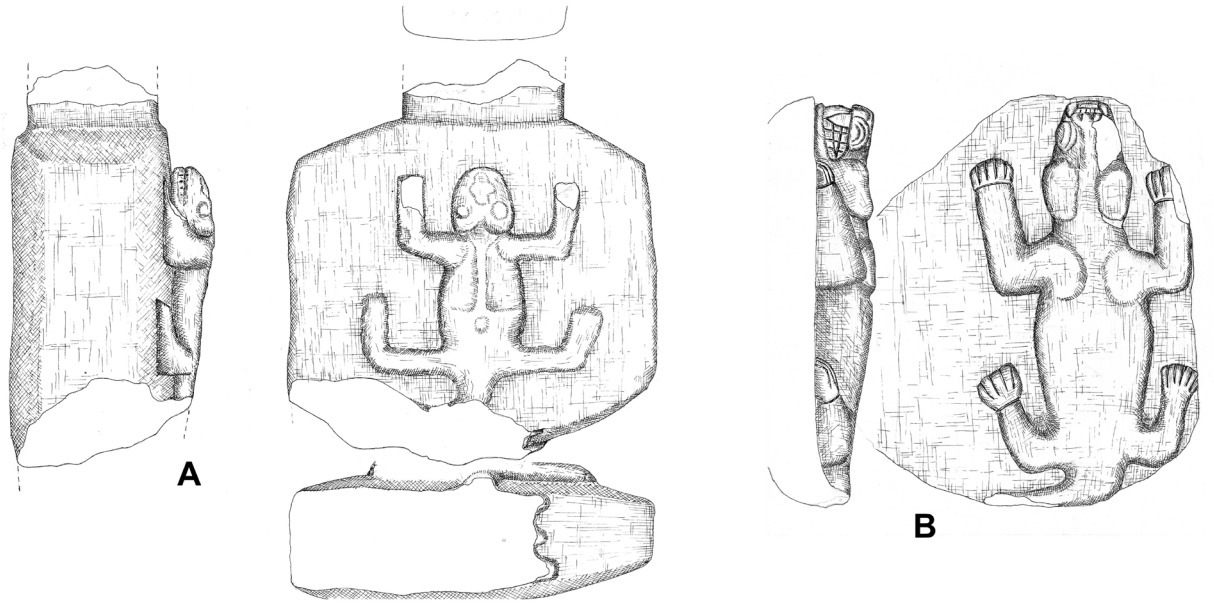

Fig. 7 High-reliefs of crouched animals from Göbekli Tepe. Not to scale, length A=81 cm, B=47 cm. (drawings: DAI, Orient Department, K. Schmidt)

While images of architecture are not well-attested (see below), squatted animals are a standard-type in the repertoire of early Neolithic artists (*e.g.* Atakuman 2015: 769, Fig. 10 on the long history and the translation of this image type into stamp seal designs). The depiction on the bone spatula could thus represent a variant of this well-known type. This would also explain the hatching of the 'body', which could indicate the paws, as it is restricted exactly to these areas. One animal representation in high relief from Göbekli Tepe shares this feature, and its paws also take on a slightly trapezoid form (Fig. 7b).

Fig. 8 Pillar 6 in Enclosure B. (photo: DAI, Orient Department, I. Wagner)

Nevertheless, the image on the spatula does not fit exactly the intra- and offsite analogies presented here. Design and realization appear slightly awkward, which as mentioned above leads to the interpretational uncertainties. We could be dealing with an *ad hoc* engraving here that only superficially abides to the artistic conventions of displaying animals and at the same time overemphasizes certain aspects of the image. Maybe the artist wanted to emphasise the dangerous parts of the animal, its claws. However, a deeper understanding must fail in this case, as, to get back to the starting point and Panofsky, a clear pre-iconographical description is not possible.

The Object

If the decoration of the find from Göbekli Tepe remains enigmatic, the object itself could be more revealing. The 'spatula' is elongated in shape, the preserved end is curved. This feature makes it doubtful that this is the active part of a tool we commonly would describe as spatula (*i.e.* a tool with a flat blade used to spread or lift substances). The parallel, only slightly converging rims show that the piece was originally much longer. Fortunately, there are some very similar objects from other sites that give additional insight into the original form and possible functions (Appendix 1).

Besides the two aforementioned additional small fragments from Göbekli Tepe, a total of eight comparable finds are known from Körtik Tepe (Özkaya and Coşkun 2011, 2013; Özkaya *et al.* 2013), and from Hasankeyf Höyük (Miyake 2013). Outside Turkey, two comparable finds come from Nahal Hemar Cave in Israel[2] (Bar-Yosef and Alon 1988). The more complete finds have an elongated leaf-shaped form with a flattened end and flattened to sharp edges all around. The narrow end is perforated, allowing the objects to be fixed to a cord. Of the 13 finds, eight are decorated

Fig. 9 High reliefs of crouched animals from Göbekli Tepe. (photos: DAI, Orient Department, K. Schmidt, N. Becker)

with incised animal motives, one with painted and four with incised geometric motifs. The clear connection of the find group with animal décor could serve as a further argument in favour of an interpretation of the depiction on the Göbekli Tepe find.

The functional interpretation of these 'bone spatulae' is rather difficult. The finds outside Göbekli Tepe, and the two fragments found there, have more blade-like ends and could have been used as tools. However, the décor in most cases reaches the presumed active end of the tool and generally seems very elaborate for a simple tool for lifting or spreading materials. The holes in the narrower ends could simply be meant to prevent the loss of a potentially symbolically important object by tying it with a cord. But they could also have played a functional role.

A group of objects with a similar general form well known from archaeological and ethnographical contexts are bullroarers, *i.e*. musical instruments, usually made of wood, that produce a noise when swung on a long cord (*e.g.* Seewald 1934; Zerries 1942; Maringer 1982; Morley 2003: 33-37; Fischer 2009). Ethnographic data offers a wide variety of possible uses of bullroarers ranging from cultic ritual to more profane tasks, like scaring away animals from plantations (Morley 2003: 33, with bibliography).

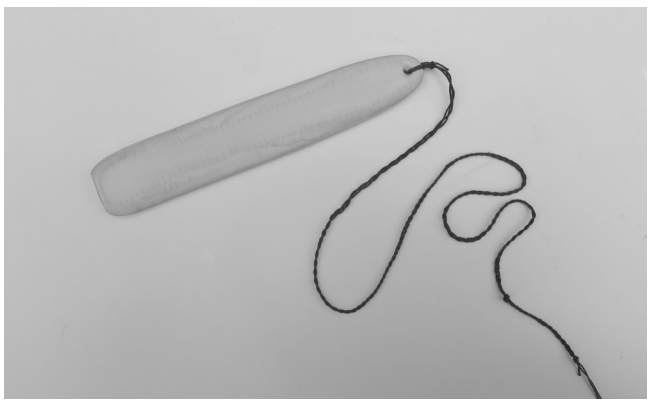

Fig. 10 Replica 'bullroarer' following forms and dimensions of the PPN 'spatulae'. (replica by F. Becker; photo O. Dietrich)

In the archaeological record, bullroarers have been identified since the Palaeolithic. In many cases, however, their function has been open to doubt (Fischer 2009: 3-4). Prominent, sometimes richly decorated items with a likely bullroarer function stem from important French Palaeolithic sites, *inter alia* from La Roche de Birol, Dordogne (Magdalenian), Abri de Laugerie Basse (Magdalenian), Lespugue (Solutreen), Badegoule (Morley 2003: 34-35, Fig. 3.1-2). Experimental work by Dauvois (1989) has proven the sound-making capabilities of these pieces. An example of the late Upper Palaeolithic is known from Stellmoor in northern Germany (Ahrensburg Culture: Maringer 1982: 129), and there is a larger list of possible bullroarers from Mesolithic contexts (*e.g.* Fischer 2009: 12). To get back to the Near East, PPN use of bullroarers is substantiated by bullroarer type pendants in bone from Çatalhöyük (Russell 2005: 351, Fig. 16.14a). Russell tentatively discusses a function as bullroarers for them, however they are rather small.

It has to be noted though that the PPN pieces from southeastern Turkey are a little different from the usual shape of bullroarers. Some bullroarers have a lancet-shape with two narrowing ends, other examples have a narrow and a broad end, but usually the latter bears the hole for the cord. So some doubt remains regarding the functional interpretation of these objects, though they

seem to have been of high value for their users, as they appear as grave goods at Körtik Tepe. An experimental reproduction of the presumed PPN bullroarers of hard wood serves its function very well and produces a deep vibrato sound (Fig. 10).

Conclusion

The point of the present contribution is not to show that Neolithic art in general is not understandable. But there has to be a basic awareness of the fact that not every depiction is 'readable' beyond doubt, and that such depictions naturally should not be used as evidence for far-reaching interpretations. Panofsky's thoughts can be a powerful instrument in determining the degree of interpretational potential in an image. The detailed comments in this paper are meant to prevent the start of an unfruitful dispute. Without further analogies, an exact understanding of the image on the spatula is not possible. Nevertheless, arguments to see an animal instead of T-shaped pillars cannot be ignored.

Oliver Dietrich
Deutsches Archäologisches Institut, Orient-Abteilung
oliver.dietrich@dainst.de

Jens Notroff
Deutsches Archäologisches Institut. Orient-Abteilung
jens.notroff@dainst.de

Endnotes

[1] This paper has greatly benefitted from discussions and scientific resources provided within the project „Our place: Our place in the World", funded by the John Templeton Foundation.

[2] There is one more find from Wadi Faynan 16 in Jordan that may be attributable to this group (Finlayson 2007: 321, Fig. 10/1, nr. SF98). As the hole of this 'spatula' is located more to the centre of the object, and thus its function may have been different, it has not been included here.

Appendix 1: List of elongated bone objects with one perforated end

Site	Context	Description
Göbekli Tepe		
1.	immediately below plough horizon	See above.
2.	in a deep sounding north of Enclosure D	Terminal fragment, decorated with hatched triangular geometric shapes.
3.	in building debris, probably layer II	Axial fragment, decorated with hatched triangular geometric shapes.
Hasankeyf Höyük		
4.	unspecified	Elongated bone plaque, trapezoidal, tapering towards one end. Single terminal perforation at smaller end. Not completely preserved. Carving of geometric forms and lines, interpreted as depiction of a scorpion (Miyake 2013: 45, Fig. 3).
Körtik Tepe		
5.	funeral	Rectangular bone plaque with rounded corners, lower part not preserved. Carved depiction of two goats in profile on top of each other; outlines and body hatchings by carved lines, eye and centre of body left blank (Özkaya and Coşkun 2011: Fig. 36 left, 2013: 32 top).
6.	funeral	Rectangular bone plaque, not completely preserved. Geometric carvings: multiple wavy lines ending in triangular shape, interpreted as depiction of a snake, accompanied by more geometric but less clearly identifiable designs (Özkaya and Coşkun 2011: 99 Fig. 37 right).
7.	funeral	Elongated bone plaque, trapezoidal, tapering towards one end. Single terminal perforation at smaller end. Not completely preserved. Carved depiction of a goat and another animal (probably also a goat) in profile on top of each other; outlines and body hatchings by carved lines, eye and centre of body left blank (Özkaya and Coşkun 2011: 99, Fig. 37 centre).
8.	funeral	Elongated bone plaque, trapezoidal, tapering towards one end. Single terminal perforation at smaller end. Not completely preserved. Carved geometric depiction: concentric circles and a more complex design interpreted as depiction of a spider or an insect, probably a scorpion or centipede, object bears traces of ochre. Özkaya and Coşkun 2011: 99, Fig. 37 (left); Özkaya, Coşkun and Soyukaya 2013: 68 (lower right).
9.	funeral	Rectangular, elongated bone plaque, lower part not preserved. Decoration in form of repeated diagonal lines, the space between them filled with triangular shapes – creating a more complex pattern. Decoration not carved but painted (lines in red, triangular shapes in black), larger shapes composed by smaller triangular / trapezoid shapes, possibly stamped onto object (Özkaya *et al*. 2013: 68 centre right).
10.	funeral	Rectangular, elongated bone plaque with rounded corners, lower part not preserved. Carved decoration in form of geometric designs and lines. Shape in upper part interpreted as scorpion with curled tail, followed by more ovoid motifs without clear interpretation, depiction at lower part may be interpreted as another scorpion due to iconographic similarities. Band consisting of lines, curved lines and concentric rings to the left, apparently repetition of the same complex design. In the centre, between these shapes there are two elongated, pointed forms compiled from carved lines and triangles, with one pointed end towards one side and two towards the other. Interpreted as depiction of insects and catfish (?) (Özkaya *et al*. 2013: 68 No. 1 upper right).
11.	funeral	Rectangular, elongated bone plaque, not completely preserved. Carved decoration, curved, wavy lines forming three parallel bands consisting of five rhomboid designs each, filled with hachures, interpreted as depiction of three snakes. Each band finishing in two lines at one end and two smaller curved lines at the other end (Özkaya and Coşkun 2011: 99 Fig. 36 right).
Nahal Hemar Cave		
12.	Dump layer inside cave.	Elongated bone plaque, trapezoidal, tapering towards one end. Single (terminal?) perforation towards smaller end. Simple carved decoration consisting of almost parallel lines running horizontally and slightly downwards from both sides of the bone object towards the centre (Bar-Yosef and Alon 1988: Fig. 13:2, Pl. III:2).
13.	Dump layer inside cave.	Fragment of a flat bone object. Carved decoration consisting of lines running towards each other from both sides diagonally, forming chevron-like designs (Bar-Yosef and Alon 1988: Fig. 13:10).

References

Atakuman Ç.
2015 From monuments to miniatures: emergence of stamps and related image-bearing objects during the Neolithic. *Cambridge Archaeological Journal 25(4)*: 759-788.

Bar-Yosef O. and Alon D.
1988 Nahal Hemar cave. *'Atiqot* 18, 1988:1-81.

Becker N., Dietrich O., Götzelt Th., Köksal-Schmidt Ç., Notroff J., and Schmidt K.
2012 Materialien zur Deutung der zentralen Pfeilerpaare des Göbekli Tepe und weiterer Orte des obermesopotamischen Frühneolithikums. *Zeitschrift für Orient-Archäologie* 5: 14-43.

Belting H.
2001 *Bild-Anthropologie. Entwürfe für eine Bildwissenschaft*. München: Fink.

Benz M. and Bauer J.
2013 Symbols of Power – Symbols of Crisis? A Psycho-Social Approach to Early Neolithic Symbol Systems. *Neo-Lithics* 13/2: 11-24.

Collins A.
2016 First pictorial representation of Gobekli Tepe found. http://www.ancient-origins.net/news-history-archaeology/first-pictorial-representation-gobekli-tepe-found-003862?nopaging=1 <last access 24.02.2016>

Dauvois M.
1989 Son et musique Paléolithiques. *Les Dossiers d'Archéologie* 142: 2-11.

Dietrich O., Köksal-Schmidt Ç., Notroff J., and Schmidt K.
2013 Establishing a Radiocarbon Sequence for Göbekli Tepe. State of Research and New Data. *Neo-Lithics* 13/1: 36-41.

Dietrich O. and Notroff J.
2015 A sanctuary, or so fair a house? In defense of an archaeology of cult at Pre-Pottery Neolithic Göbekli Tepe. In: N. Laneri (ed.), *Defining the Sacred: Approaches to the Archaeology of Religion in the Near East*. 75-89. Oxford: Oxbow.

Eggert M.K.H.
2010 Hermeneutik, Semiotik und Kommunikationstheorie in der Prähistorischen Archäologie: Quellenkritische Erwägungen. In: C. Juwig and C. Kost (eds.), *Bilder in der Archäologie – eine Archäologie der Bilder?* Tübinger Archäologische Taschenbücher 8: 49-74. Münster, New York, München, Berlin: Waxmann.

Finlayson B.
2007 The worked bone. In: B. Finlayson and S. Mithen (eds.), *The early prehistory of Wadi Faynan, southern Jordan*. 319-322. Oxford: Oxbow Books.

Fischer P.
2009 *Studien zu prähistorischen Schwirrholzfunden*. Berlin: unpublished BA Thesis FU Berlin.

Helmer D., Gourichon D., and Stordeur D.
2004 À l'aube de la domestication animale. Imaginaire et symbolisme animal dans les premières sociétés néolithiques du nord du Proche-Orient. *Anthropozoologica 39(1)*: 143-163.

Juwig C. and Kost C. (eds.)
2010 *Bilder in der Archäologie – eine Archäologie der Bilder?* Tübinger Archäologische Taschenbücher 8. Münster, New York, München, Berlin: Waxmann.

Kurapkat D.
2015 *Frühneolitische Sondergebäude auf dem Göbekli Tepe in Obermesopotamien und vergleichbare Bauten in Vorderasien*. PhD Thesis TU Berlin: Microfiche.

Maringer J.
1982 Musik und Musikinstrumente in vor- und frühgeschichtlicher Zeit. *Prähistorische Zeitschrift* 57: 126-137.

Miyake Y.
2013 Dicle´nin ilk köyü. Hasankeyf Höyük / Batman. *Arkeoatlas* 8: 40-47.

Morenz L.
2014 *Medienevolution und die Gewinnung neuer Denkräume. Das frühneolithische Zeichensystem und seine Folgen*. Berlin: EB-Verlag.

Morenz L. and Schmidt K.
2009 Große Reliefpfeiler und kleine Zeichentäfelchen. Ein frühneolithisches Zeichensystem in Obermesopotamien. In: P. Andrássy, J. Budka and F. Kammerzell (eds.), *Non Textual Marking Systems. Writing and Pseudo Script from Prehistory to Modern Times*. 13–31. Göttingen: Seminar für Ägyptologie und Koptologie.

Morley I.
2003 *The Evolutionary origins and archaeology of music*. PhD thesis University of Cambridge. Online publication: https://www.darwin.cam.ac.uk/drupal7/sites/default/files/Documents/publications/dcrr002.pdf <last access 27.07.2016>

Orrelle E. and Kolska Horwitz L.
2016 The pre-iconography, iconography and iconology of a sixth to fifth millennium BC Near Eastern incised bone. *Time and Mind 9(1)*: 3-42.

Özkaya V. and Coşkun A.
2011 Körtik Tepe. In: M. Özdoğan, N. Başgelen and P. Kuniholm (eds.), *The Neolithic in Turkey 1. The Tigris Basin*. 89-127. Istanbul: Archaeology and Art Publications.
2013 Yerleşik yaşamın başlangıcı. Körtik Tepe / Diyarbakır. *Arkeoatlas* 8: 30-39.

Özkaya V., Coşkun A., and Soyukaya N.
2013 Körtik Tepe. Uygarlığın Diyarbakır´daki ilk adımları. Istanbul: Arkeoloji ve Sanat Yayınları.

Panofsky E.
1982 *Meaning in the visual arts*. Chicago: The University of Chicago Press.

Russell N.
2005 Çatalhöyük worked bone. In: I. Hodder (ed.), *Changing materialities at Çatalhöyük. Reports from the 1995-99 seasons*. 339-367. Oxford: Oxbow books.

Sachs-Hombach K.
2003 *Das Bild als kommunikatives Medium. Elemente einer allgemeinen Bildwissenschaft*. Köln: Halem.

Schulz M.
2010 Von der Ur-Kunde zum Logos der Bilder. Zum Nachleben der Ikonologie. In: C. Juwig and C. Kost (eds.), *Bilder in der Archäologie – eine Archäologie der Bilder?* Tübinger Archäologische Taschenbücher 8: 75-93. Münster, New York, München, Berlin: Waxmann.

Schmidt K.
1999 Frühe Tier- und Menschenbilder vom Göbekli Tepe. *Istanbuler Mitteilungen* 49: 5–21.
2012 Göbekli Tepe. *A Stone Age Sanctuary in South-Eastern Anatolia*. Berlin: ex oriente e.V.

Seewald O.
1934 *Beiträge zur Kenntnis der steinzeitlichen Musikinstrumente Europas*. Wien: Schroll.

Zerries O.
1942 *Das Schwirrholz. Untersuchung über die Verbreitung und Bedeutung der Schwirren im Kult*. Stuttgart: Strecker und Schröder.

The Aegean Before and After 7000 BC Dispersal: Defining Patterning and Variability

Çiler Çilingiroğlu

Introduction

Recent studies provide a coherent picture of a coastal Neolithic dispersal from southwest Asia to the Aegean in the first half of the 7th millennium cal BC using maritime navigation (Perlès 2001; Özdoğan 2011; Çilingiroğlu and Çakırlar 2013; Arbuckle *et al.* 2014; Horejs *et al.* 2015). Key sites along the route show that while new permanent sites were founded on inland or coastal plains, at others, where Mesolithic occupations were present forager-farmer interactions resulted in exchange of goods and technologies in the first instance and then replacement or displacement of local foragers (Munro and Stiner 2015). In this contribution, I will focus on a major dispersal event enacted by multiple small groups moving with domestic plants and herd animals transmitting southwest Asian cultural affinities to few selected localities in the Aegean, around 7000-6600 cal BC, thereby drastically altering the somewhat isolated living of well-established and highly mobile Aegean foragers. This short-term but significant dispersal process can be identified at several sites from western Anatolia, Crete and Argolis only, marking the archaeologically most visible earliest neolithization process of the eastern and western Aegean (Fig. 1).

The process manifests itself archaeologically at few known key sites with common features as well as variabilities (Table 1). As emphasised by Kotsakis (2008), the non-homogeneous and complex nature of this dispersal process resulted not only from temporal

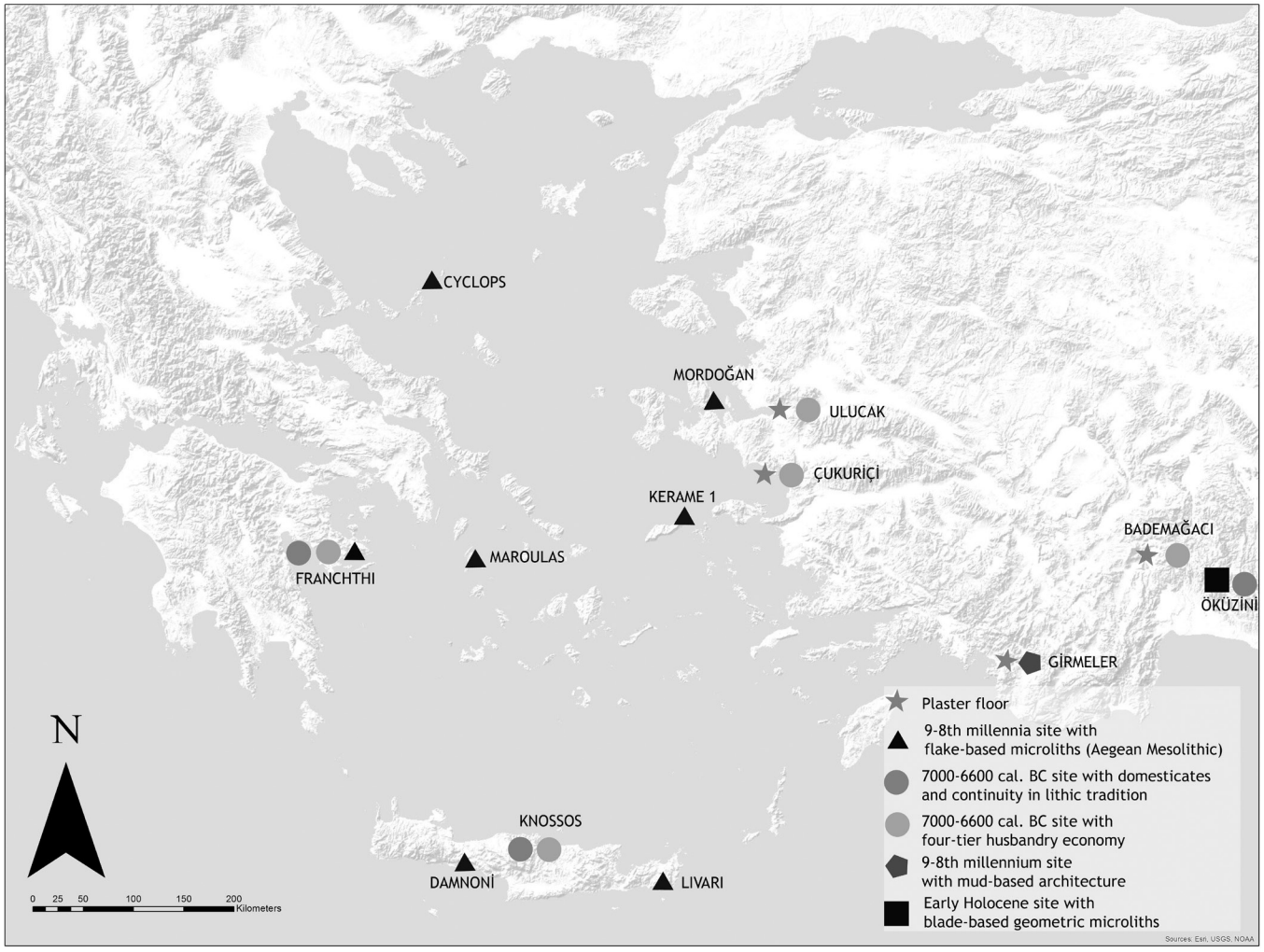

Fig. 1 The location of key sites discussed in the text. The legend aims to highlight the changing nature of archaeological manifestations from pre- and post-7000 BC Aegean. (map: C. Çilingiroğlu)

7000-6600 cal. BC Key Sites	ÖKÜZİNİ	BADEMAĞACI	ULUCAK	ÇUKURİÇİ	FRANCHTHI	KNOSSOS
FOUR-TIER HUSBANDRY	?	X	X	X	X	X
DOMESTIC CEREALS AND PULSES	X	X	X	X	X	X
MUD-BASED ARCHITECTURE	-	X	X	X	-	X
PLASTER FLOORS	-	X	X	X	-	-
PRESSURE FLAKING	-	?	?	X	X	-
FLAKE-BASED LITHICS	-	-	X	-	X	X
BLADE-BASED LITHICS	X	X	-	X	-	-

Table 1 Major archaeological proxies marking the 7000-6600 cal. BC dispersal showing common as well as diverse sets of items.

and environmental factors, but also, and perhaps more importantly, from social and cultural variables. Farmer-herder groups new to a given region may have had diverse cultural practices related to ideology and identity resulting in different sets of material culture and architectural features. These groups may have had on-going and intense interaction with local foragers over centuries influencing and altering certain forms of technologies and practices. Adaptation to new environmental settings and resources may also have affected the nature of utilitarian items used by farmer-herders despite heavy reliance on food production. Additionally, as suggested by Munro and Stiner (2015) diverse groups in different times may have used a variety of maritime routes with different sets of challenges to allow or restrict transport of certain items, especially herd animals.

This seemingly widespread trend to move and establish permanent sites must have followed yet earlier explorations of these areas made by real pioneers in the late 9th and 8th millennia cal BC as suggested by recent evidence from Girmeler Cave (Takaoğlu *et al.* 2014). These findings may indicate that the relatively major movement of 7000-6600 cal BC was a consequence of earlier non-massive mobility that explored "new" landscapes and resources fostering contacts with foragers in western Anatolia and the Aegean. In the later and more visible dispersal trend that is the subject matter of this contribution, it seems like farmer-herders either settled at areas that were not optimal for foragers or displaced them. Although the archaeological record is still poor for this kind of discussions and new research may refine the present picture, aDNA evidence suggests that social interaction or exchange of spouses remained at a minimum between farmers and foragers in the 7th-6th millennia cal BC (Hofmanová *et al*. 2016; Kılınç *et al*. 2016).

The Aegean and Coastal West Turkey Before 7000 cal BC

The last decade has experienced significant progress in Aegean archaeology in terms of Mesolithic research (Galanidou 2011). Mesolithic sites are excavated in southern Crete (Strasser *et al.* 2014; Carter 2016), Aegean islands show remarkable remains of forager sites with architecture and burials (Sampson *et al.* 2012), surveys reveal new find spots on the Cycladic islands (Carter *et al.* 2014) and on the western coast of Turkey (Çilingiroğlu *et al*. 2016). As Sampson *et al.* (2012) suggest Mesolithic architectural features from sites like Maroulas and Kerame 1 may belong to multi-seasonal or even year-round sites of Aegean foragers. While we see permanent sites with food-producing populations in Southwest Asia, in the Aegean we encounter 9th-8th millennia cal BC foragers occupying caves, rock shelters and open-air sites, exploiting certain environmental niches, especially island resources such as migratory and coastal marine fish, hunting wild goat and other mammals, collecting various wild botanical taxa (Trantalidou 2011). Based on the very characteristic, flake-based chipped stone industries, Kozlowski and Kaczanowska (2009; also Sampson *et al.* 2012) define an "Early Holocene Aegean Islands Tradition" that is distinct both from all the contemporary industries from the eastern Mediterranean as well as from the blade-based industries using pressure-flaking of the western and eastern Aegean during the 7th-6th millennia cal BC. As such, the Aegean Mesolithic, *c*. 9000-7000 cal BC, displays an idiosyncratic character, with foragers exploiting marine and terrestrial resources both on the mainland and islands, occupying seasonal, multi-seasonal or perhaps even year-round sites.

Despite its name, it is known that this specific lithic production is not confined to the islands. A corresponding trend has already been recognized on the Greek mainland, namely in the Franchthi sequence. Perlès (1999: 315) emphasises the toolkit at Franchthi Lithic Phase VII is formed by what she calls "transformation tools" such as notches, denticulates, endscrapers and laterally retouched pieces. A similar lithic industry was also identified at Sidari on Corfu (Perlès 2001: 34). Therefore, Argolis and western Greece can be included in the Aegean Mesolithic tradition in terms of lithic assemblages. Moreover, a flake-based, non-geometric microlithic industry has been identified at an open-air site during our 2015 survey from Karaburun Peninsula in Izmir. The site POI.15.31 near Mordoğan overlooking the Balıklıova Bay at an altitude of 140 masl produced

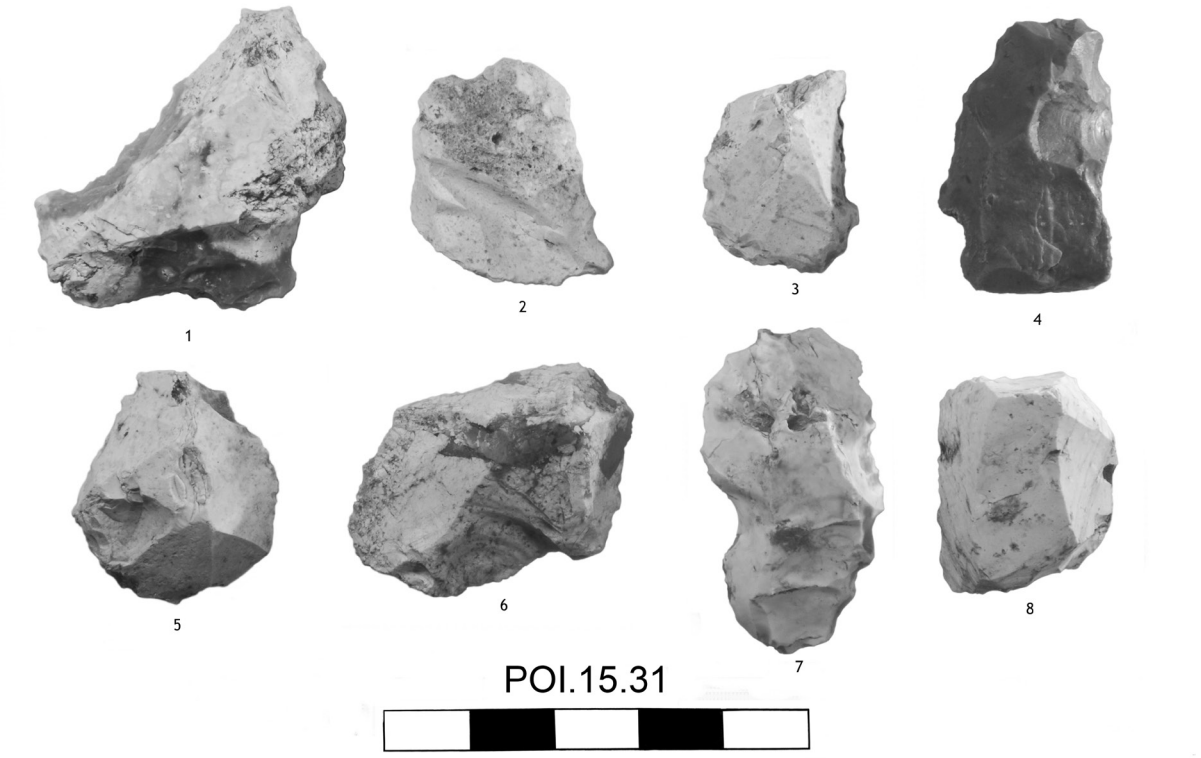

Fig. 2 A selection of chipped stones discovered at the site of POI.15.31 near Mordoğan, Izmir. Flakes (1,3-4), retouched flakes (2,6), blade fragment (5), notch (7) and endscraper (8). (photos: Berkay Dinçer)

116 lithics, most of them produced from white patinated flint, with few brown flint and no obsidian present (Fig. 2). With an average length of 27 mm (ranging from 14-70 mm), the assemblage is heavily dominated by unretouched flakes (n=63). Five cores (four flake and one blade) are also identified. Only *c.* 10% of the assemblage can be identified as specific tool types. Three endscrapers, three notches and six retouched flakes constitute the only pieces that can be identified as tools (Fig. 3). The assemblage contains only three blades (Çilingiroğlu *et al.* 2016: 5). The preferred raw material from site 31 is identical to the raw material from Kerame 1 on Ikaria (Sampson *et al*. 2012; personal observation). The industry from Mordoğan bears therefore close similarities to known Aegean Mesolithic sites in terms of raw material and techno-typology. These findings from the eastern Aegean coast demonstrate that flake-based Mesolithic industries are prevalent on western Anatolian coast. Also, it shows the coastal western Anatolia was culturally part of the greater Aegean with possible mobility between the Anatolian mainland and eastern Aegean islands. It additionally accentuates the idea that blade based industries arrived to the eastern Aegean in the early 7th millennium cal BC as evidence from Çukuriçi suggests (Horejs *et al.* 2015).

So, where lay the spatial limits of the "Aegean Mesolithic Tradition"? To define the eastern margins of this peculiar and original Aegean Mesolithic technology, it is worth highlighting the contrasting picture from the Antalya area. It is reported that post-10,000 cal BC deposits at Öküzini, for instance, contained large amounts of geometric microliths and that use of geometrics continued well into the final stages of the cave occupation (Otte *et al.* 1995; Kartal 2009). This shows that Öküzini is strongly connected to the Epipaleolithic/Early PPN traditions of eastern Mediterranean even in the Early Holocene which makes sense especially when one considers the Natufian-type lithics and material culture from the earlier phase III (Otte *et al*. 1995). The contrast with the Early Holocene Aegean is so clear that one can suggest that the southern Turkish coast lies outside of the Aegean interaction zone. So instead of a connected Aegean, we can actually suggest vibrant forager communities interacting within a rather closed Aegean network as suggested by its locally developed and maintained chipped stone industry. This idiosyncratic character of the Aegean Mesolithic is an indication of its local development and its isolated nature compared to sites outside the Aegean (Kozlowski and Kaczanowska 2009: 362).

The only evidence that complicates the picture from the Aegean comes from a newly investigated site from southwest Turkey, namely Girmeler Cave near Fethiye. Late 9th millennium deposits (8200-7900 cal BC) at the site revealed a plastered floor, post-holes with remains of a wattle-and-daub superstructure (Takaoğlu *et al.* 2014). Besides circular hearths, pits as well as a large collection of grinding instruments like querns at Girmeler Cave present a good candidate for evidence of sedentary living. Takaoğlu *et al.* (2014) suggest that these may be remnants of a permanent residence of foragers who reportedly hunted wild boar, red deer, fallow deer and hare. It is known that the earliest sedentary villages appeared in SW Asia already in the 11th-10th millennia cal BC (if not earlier; see Maher *et al.* 2012), on Cyprus around 9500 cal BC, in Central Anatolia around 8500 cal BC (Baird *et al.* 2012). Multiple seasonal sites appeared in Antalya

LIST OF ABSOLUTE DATES FROM KEY 7000-6600 CAL. BC SITES						
Site Name	**Stratum**	**Lab-Nr**	**Conventional RC Age**	**1 sigma calibration**	**Material**	**Reference**
BADEMAĞACI	EN8	Hd-22340	7949±31	7025-6767	Charcoal	Duru 2012
ÖKÜZİNİ CAVE	Öküzini IV (GH III)	Poz-1858	7970±50	7060-6690	Lens	Martinoli 2004
	Öküzini III (GH VII)	Poz-1859	8030±50	7090-6700	Triticum monococcum	
ULUCAK	VI	Beta-269727	7950±50	7026-6710	charcoal	Çilingiroğlu *et al.* 2012; Brami 2014
		Beta-317542	7870±50	6767-6644	Emmer wheat	
		Beta-269729	7850±50	6768-6609	Charcoal	
		Beta-317544	7850±40	6751-6635	Emmer wheat	
		Beta-317543	7830±40	6689-6604	Emmer wheat	
		Beta-269731	7820±50	6733-6591	Bone (sheep)	
		Beta-317538	7810±40	6678-6596	Emmer wheat	
		Beta-250266	7770±50	6646-6513	Charcoal	
		Beta-317539	7730±40	6598-6502	Emmer wheat	
		Beta-269730	7710±50	6591-6493	Bone (goat)	
		Beta-269728	7680±50	6586-6465	Charcoal	
ÇUKURİÇİ	XIII	MAMS-24429	7748±28	6633-6515	Wheat	Horejs *et al.* 2015
		MAMS-24430	7886±28	6767-6657	Cereal	
		MAMS-24431	7851±29	6695-6642	Wheat	
FRANCHTHI CAVE	IN (Stratum X2, Interphase 0/1 or Initial Neolithic)	P-2094	7930±100	7027-6686	Charcoal	Brami 2014; Stiner and Munro 2015
		P-1527	7900±90	7021-6647	Charcoal	
		P-1392	7790±140	6821-6465	Wood charcoal	
		GifA 11016/SacA 23624	7805±40	6637 ± 34	Wheat	Perlès *et al.* 2013 (Calibrations run by quickcal2007 v.1.5)
		GifA 11455/SacA 26197	7740±50	6568 ± 54	Wheat	
		GifA 11017/SacA 23625	7780±40	6601 ± 44	Wheat	
		GifA 11456/SacA 26198	7645±50	6509 ± 49	Wheat	
		GifA 80044/SacA 10908	7555±40	6427 ± 23	Charcoal	
		GifA 80043/SacA 10907	7910±40	6825 ± 115	Charcoal	
KNOSSOS	X	BM-124	8050±180	7246-6690	Wood charcoal	Brami 2014
		BM-278	7910±140	7029-6647	Wood charcoal	
		BM-436	7740±140	6765-6434	Wood charcoal	
	Level 39 (Aceramic)	OxA-9215	7965±60	7030-6780	Wood charcoal	Facorellis and Maniatis 2013

Table 2 A list of radiocarbon dates from key sites mentioned in the study.

region as early as 12,000 cal BC (Atıcı and Stutz 2002; Martinoli 2004). Therefore, it is possible that late 9th millennium cal BC site at Girmeler may be a year-round forager site. Takaoğlu *et al.* (2014) report that late 8th millennium cal BC deposits at the site revealed multiple plaster floors with 12 cm thickness; much in the tradition of Cappadocian site of Aşıklı with plaster floors that are as thick as 6-8 cm (Hauptmann and Yalçın 2000: 62).

The lithics from the 9th millennium site Girmeler is said to be of flake based with rare retouched specimens produced on local raw materials. Although the issue of sedentism needs to be addressed with proper seasonality research, this constitutes the earliest mud-based architecture in southwest Turkey that may reflect architectural know-how attested from early PPN sites of the Konya Plain and Cappadocia (Takaoğlu *et al.* 2014). The building materials and employed techniques at Girmeler Cave can be juxtaposed with the stone-based features (stone lined and stone paved remains) excavated at Maroulas and Kerame 1 in the Aegean islands. A detailed analysis of chipped stones from the site may shed light whether the industry is more related to Aegean Mesolithic, eastern Mediterranean traditions or a mixture of the two.

A Dispersal Event: 7000-6600 cal BC

The subsistence economy and material culture of early 7th millennium cal BC Aegean farmer-herders is easily distinguished from Early Holocene Aegean tradition. Current archaeological data suggests that basal deposits at Bademağacı, Ulucak and Çukuriçi are sites that were first established following a major dispersal event around 7000-6600 cal BC as these sites show strong parallels in terms of their faunal-floral remains as well as material culture and architectural features (Çilingiroğlu *et al.* 2012; Duru 2012; Horejs *et al.* 2015). As it will be argued below, a corresponding trend that shares many similarities with the west Anatolian sites in terms of faunal-floral remains, architectural tradition and material culture can be recognized at the Initial Neolithic sites in Greece: namely, the Franchthi Cave and basal Knossos (Efstratiou *et al*. 2013; Perlès *et al.* 2013). In my opinion, these commonalities arise from culture specific choices and practices that share a common historical and societal background as suggested by Perlès (2001), Özdoğan (2008) and more recently by Broodbank (2013). Many of the elements and technologies identified at these sites find their closest parallels not in the local Mesolithic 'cultures' but in the southwest Asian Neolithic. Radiocarbon evidence is not crystal clear but a time period of several centuries seems probable for this specific dispersal process (Table 2). This time period must have allowed for mobility in all directions and variability of interactions among farmer-farmers and forager-farmers. One thing is certain though. The Aegean Mesolithic that flourished in the 9th and 8th millennia cal BC in a rather closed Aegean network came to an end with 7000 cal BC marking the beginning of a new prehistorical era with new incomers. As suggested by radiocarbon data, one of the striking aspects of this process is its rapidity when compared to Neolithic dispersals in inland Anatolia (Schoop 2005; Brami 2015). The rather rapid process of dispersal in the early 7th millennium BC was enabled

by a coastal mobility using long established sea routes, possibly improved forms of navigational know-how and maritime technology (Broodbank 2013: 188). The seafaring knowledge of communities who were familiar with eastern Mediterranean waters at least since the Epipaleolithic period – as typically known from Cypriot evidence – facilitated the rather speedy movement of people along with their heavy and alive cargo such as domestic cattle, pigs, sheep and goats; not to mention loads of domestic cereals and pulses. This movement penetrated inland areas using well-known mountain passes and valleys targeting mainly rich alluvial plains with access to freshwater (mainly lacustrine but also perennial) and woodland environments (Çilingiroğlu and Çakırlar 2013; Arbuckle *et al.* 2014; Horejs *et al.* 2015). Although the archaeological evidence is still patchy, a general dispersal pattern using multiple routes and diverse engagements with local foragers can be inferred. Further evidence for population dispersal comes from aDNA evidence. Farmer-herder sites of the early 7th millennium cal BC were arguably occupied by groups with close genetic affinities as indicated by recent aDNA studies which demonstrate that early farmer-herders of Central Anatolia, western Anatolia, Greece and even Central Europe and western Mediterranean cluster together forming a homogeneous group who shared common ancestors somewhere in eastern Mediterranean but did not or minimally mixed with local foragers (Hofmanová *et al.* 2016; Kılınç *et al.* 2016).

Below I will try to outline the general characteristics of this dispersal event as incorporated by archaeological evidence.

First of all, the presence of all four domestic herd animals (sheep, goat, pig and cattle) is a strong link between these sites indicating common herd compositions and husbandry strategies (Isaakidou 2008; De Cupere *et al.* 2008; Çakırlar 2012; Horejs *et al.* 2015; Munro and Stiner 2015). Four-tier economy identified at these sites is not a feature of Central and Northwest Anatolian Initial Neolithic sites. It is well-known that domestic cattle and pigs are absent in Central Anatolia and domestic pigs are absent in the earliest northwest Anatolian sites (Arbuckle 2013). Therefore, four-tier husbandry practice which requires encyclopaedic knowledge (Munro and Stiner 2015) can be described as a culturally and historically determined choice that is peculiar to both southwest Asian and Aegean Early Neolithic groups to the exclusion of Central and Northwest Anatolian groups. The recognition of this pattern led zooarchaeologists (Arbuckle *et al.* 2014) to infer a human-mediated mobility of herd animals by way of coastal navigation which is the most probable scenario especially when one considers the well-established colonization cases of Cyprus and Crete (Broodbank and Strasser 1999; Vigne *et al.* 2012).

There are other commonalities among these sites. One of the most interesting attributes of these sites is the lack of diversity and abundance in the material culture (Evans 1971: 115; Çilingiroğlu *et al.* 2012; Duru 2012; Horejs *et al.* 2015). The typical items of the Southwest Asian and Anatolian Neolithic such as the clay stamps, figurines, spindle whorls or biconical slings are scarcely found in this early horizon. The material culture is composed of few utilitarian items, mainly bone tools, grinding instruments and chipped stones. Rarities like well-made stone bracelets (such as the ones from Çukuriçi; Horejs *et al.* 2015: 303; and Knossos IX; Ünlüsoy 2002) and pierced circular beads (such as the ones from Çukuriçi and Ulucak; Horejs *et al*. 2015: 303-304; Çilingiroğlu *et al.* 2012) constitute the only portable symbolic items. Total lack of or minute amounts of clay containers at these sites are but one indication of their common technological level and attitude towards food preparation and storage practices. All the early 7th millennium cal BC sites suffer from the Aceramic/Ceramic Neolithic discussion which actually indicates that clay containers and the associated technology was perhaps known but was not integrated into the daily lives which left sporadic finds of pottery (Perlès 2001: Chapter 5). All these items appear variously at these sites, however overall this set of objects composes a material culture that is vaguely related to Aegean forager material cultures which is, apart from the flake-based chipped stones, dominated by bone pointed instruments, bipoints, hooks, few polished objects and ad-hoc bone tools (Perlès 1999: 34; Galanidou 2011; Moundrea-Agrafioti 2011).

The architecture of 7000-6600 cal BC sites can be contrasted with the known Aegean Mesolithic architectural features. Mainly, Initial Neolithic sites show construction of rectilinear dwellings, use of mud, mudbrick, timber for superstructure and occasionally stones as foundations. At west Anatolian sites beside the use of rectilinear mud-based architecture, one observes the widespread construction of lime plastered floors. Basal Bademağacı, the so-called "Aceramic Hacılar", Ulucak VI and Çukuriçi XIII all contain well-preserved remains of red plaster floors which are in most cases renewed several times (Mellaart 1970; Çilingiroğlu *et al.* 2012; Duru 2012; Horejs *et al.* 2015: 297). Painted plaster floors at these early 7th millennium cal BC sites may be important in terms of origins of farming groups as this practice which incorporates use of large amounts of lime, pyrotechnology and red paint are a well-defined characteristic of PPNB-C sites in southwest Asia and PPN sites in Central Anatolia (Garfinkel 1987; Özbaşaran 2012). The symbolic substance of these can be inferred from the labour intensive production stages on the one hand and the persistent use of colour symbolism on the other; however it would be premature to suggest that buildings with red plastered floors entailed solely ritual purposes (Çilingiroğlu 2011). Their widespread occurrence in southwest Asia, including Central, southwest and western Anatolia is in my opinion yet another culture specific practice that is unrelated to forager practices in those areas. In the context of west Anatolia their appearance can be linked to the 7000-6600 cal BC dispersal event as this practice is absent at post-6500 cal BC sites.

Interestingly, red plaster floors are not known from Greek Initial Neolithic (IN) sites. Remains of such features are known neither from Mesolithic nor Initial/Early Neolithic deposits at Franchthi Cave or basal Knossos

(Kotsakis 2015). In this respect it is worth highlighting architectural features from basal Knossos (X-IX) to gain a perspective of the architectural techniques at Greek IN sites. Evans (1971: 102-103) reports that at Knossos, the earliest level X lack evidence for mud-based architecture, but has instead produced stake holes and pits. In the following level IX, burnt mudbrick pieces and more substantial remains of rectilinear architecture were recovered. Recent rescue excavations at Knossos exposed additional archaeological remains of basal layers in a very limited area (1.5 x 1.5 m). These showed presence of "dissolved unbaked mudbrick" pieces in the earliest stratum (Levels 38-39). The overlying deposit likewise contained mudbrick pieces with straw imprints (Efstratiou *et al.* 2013: 19). Old and recent evidence from Knossos indicate that use of mudbrick as a building material and construction of rectilinear spaces started in the basal layers along with use of pits and postholes. Use of mudbrick can be considered as a practice brought to the island by farmer-herders in the early 7th millennium cal BC as part of the dispersal process as earlier sites on the island did not reveal any evidence of architectural remains (Galanidou 2011; Strasser *et al.* 2014; Carter 2016). Absence of red plaster floors at Greek IN sites is intriguing and may entail a demographic or cultural variability differentiated from the west Anatolian populations despite many commonalities in their general composition.

Use of pressure flaking and blade-based chipped stone industries is another significant index of 7000-6600 cal BC farming groups which contrasts with the known Aegean Mesolithic industries. Because chipped stones constitute a major material cultural item common to both periods, their techno-typological comparisons would yield the most reliable information on the nature of forager-farmer encounters. Here emerges the possibility of peaceful interactions (such as gift giving, exchange of spouses, exchange of goods/foods *etc*.) that may have resulted in an influence of forager toolkit on incoming farmer-herders or adaptation of Neolithic features by local foragers. This idea seems to be supported by the chipped stones both at Knossos X and Franchthi Cave IN deposits because they are characterized by flake-based chipped stones of Mesolithic character together with blades (Perlès 2001: 47; Kozlowski and Kaczanowska 2009: 375). However, new evidence from Franchthi Cave also opens up a path for new interpretations. Earlier understanding of Franchthi Cave (Perlès 1999: 317; 2001: 48) data presented a case for interaction and exchange of goods upon early contacts with the farmer-herders. Perlès (1999: 317) indicates that first encounters during the Initial Neolithic caused foragers to adapt some domesticated species like wheat, lentils and ovicaprids with local chipped stone industry maintaining its Mesolithic (*i.e.* flake-based) character. In the second instance, *i.e*. during the Early Neolithic, however, no forager component can be identified in the archaeological strata. These disappeared completely, possibly following a brief abandonment of the site when a fully developed Neolithic subsistence and material culture is recognised at the site, both in the cave and in Paralia (Perlès 1999: 317). However, new dates from Franchthi Cave establishes a hiatus of 200 years between the Final Mesolithic and IN periods (Perlès *et al.* 2013: 1011) which speaks against uninterrupted encounters of farmers and foragers or a smooth adaptation of farmer-herder practices by local foragers. More importantly, new zooarchaeological investigation from the site establishes that there is no piecemeal transition from forager to farmer-herder subsistence at the site. Instead, the broad spectrum diet of Final Mesolithic groups heavily dominated by red deer (*Cervus elaphus*) was suddenly replaced by a fully-developed package of domesticates including all four herd animals with a clear focus on domestic sheep which is a non-native animal (Munro and Stiner 2015: 597-601). Munro and Stiner (2015: 601) suggest that the low numbers of cattle and pigs at IN Franchthi Cave may be linked to difficulties of their maritime transport. A similar contrasting pattern can be observed in the plant taxa from the cave's Final Mesolithic and Initial Neolithic levels, with two-row barley and emmer wheat suddenly appearing along with the locally collected wild plants (Munro and Stiner 2015: 600). New evidence suggests an abrupt introduction of farmer-herder components in the Argolid but how to accommodate the continuing Mesolithic character of the chipped stones remains an issue to be further addressed.

Forager-farmer interactions may have been in place at Öküzini, a cave site in Antalya with forager occupations since 18,000 BP. Two AMS dates on domestic seeds opens a previously unnoticed possibility of farmer-herder presence at the cave or in the area around 7000-6600 cal BC. It is striking to see that two domesticated seeds of *Lens* and *Triticum monoccocum* provided AMS results of 7060-6690 cal BC and 7090-6700 cal BC (Martinoli 2004: Table 3). These dates correspond to the emergence of fully-sedentary and food producing villages in Southwest and West Turkey and may signify a similar event at Öküzini. The fact that geometric microliths (lunates, triangles, backed bladelets, trapezes) continue to be produced after 10,000 cal BC at Öküzini may indicate that Antalya foragers adapted some of the components of the farmer-herder living upon early encounters. If strong continuity of Epipaleolithic industries at Öküzini's Phase 4 can be taken at face value, then a piecemeal adaptation or at least mutual exchanges with arriving farmer-herders seem probable. Presence of polished axes in the same phase further lends probability to the notion of farmer-forager interaction (Broodbank 2013: 175). Alternatively, a scenario similar to Franchthi Cave may have been in play. Unfortunately, the final phase at Öküzini contains mixed deposits (Kartal 2009: 150) which impedes further investigation of the nature of forager-farmer contacts in this area. Nevertheless, the fact that sites like Bademağacı, which can be reached via a mountain pass from Mediterranean littoral, was established by farmer-herders around 7000-6600 cal BC indicate that the area received newcomers around this time (Duru 2012) and that domestic seeds from Öküzini can be historically contextualized within the 7000-6660 cal BC dispersal event. Öküzini-Bademağacı connection shows

also that maritime dispersal was at times accompanied by inland penetrations.

As already mentioned for west Anatolian sites, it is early to discuss forager-farmer interactions based on firm archaeological evidence. From western Anatolian sites, there is yet no compelling lithic evidence to suggest a similar interaction phase. A recent report stated that basal Ulucak incorporates flake based chipped stones co-occurring with blades and bladelets (Çevik and Abay 2016: 190). Also, one lunate from basal Çukuriçi (Horejs *et al.* 2015: Fig. 7a) can be tentatively highlighted as a possible local forager component in the otherwise typically blade-based industry. Horejs *et al.* (2015) relate this item to Neolithic technologies of southwest Asia where it finds good parallels, but local forager option may likewise be considered here based on the evidence from Ulucak VI and IN sites from Greece.

Discussion

Since Central Anatolian Neolithic sites are distinguished from the Aegean sites in terms of herd composition (specifically by the absence of domestic pig and cattle), researchers working in Turkey and elsewhere developed a model of maritime dispersal that operated more or less independently from the inland dispersal and interaction zones in the eastern Mediterranean, reaching western Turkey, Argolis and Crete as shown by radiocarbon data pointing towards the first half of the 7th millennium cal BC (Çilingiroğlu and Çakırlar 2013; Arbuckle *et al.* 2014; Horejs *et al.* 2015). Brami's work (2015: Fig. 5) on radiocarbon data from Neolithic sites reveals that Greek and western Anatolian sites mirror similar trends – same peaks and troughs – in terms of chronological distributions with a marked increasing trend beginning in the early 7th millennium cal BC, implying that farmer-herders founded permanent sites in western Anatolia, Crete and Argolis around the same time.

This contribution aimed to evaluate and discuss the archaeological evidence from Bademağacı, Ulucak, Çukuriçi, Knossos and Franchthi Cave as key sites with deposits from this temporal horizon. My aim was to demonstrate that establishment of these sites can be understood as manifestations of a demographic movement process from southwest Asia to different areas of the Aegean. Zooarchaeological, archaeobotanical, archaeological, architectural and finally aDNA evidence is in favour of such a dispersal process and presents us a non-homogenous, complex course of events with multiple variables causing the diverse appearances of archaeological evidence (Fig. 1; Table 1).

I also tried to support this interpretation by contrasting the material culture from the Aegean Mesolithic with the evidence from early 7th millennium cal BC sites. There is little correspondence between Aegean Mesolithic and IN assemblages. The continuity of Mesolithic or Epipaleolithic lithic traditions at cave sites and at Knossos may indicate well-functioning forager-farmer interactions and exchanges of goods upon early encounters. But as discussed above, the evidence from Franchthi Cave and Öküzini Cave do allow for multiple interpretations. This is virtually the most challenging aspect of the neolithization research in this area which still needs to be clarified.

At key sites of the early 7th millennium cal BC, sheep, goat, cattle and pig are morphologically domestic with clear genetic links to Southwest Asian species (Scheu *et al*. 2012; except for pig; see Ottoni *et al.* 2013). Fourtier economy requires vast knowledge on each of these species behaviour, management techniques and their reproduction cycles *etc*. We know that all these species were first domesticated in southwest Asia around 8000 cal BC (Zeder 2008). All of them together appear in West Anatolia (both Lake District and coastal West Anatolia) and at Greek IN sites (Knossos and Franchthi Cave) around 6800-6700 cal BC. All four domesticates are also present at Yumuktepe, a coastal site in eastern Turkey, around 6700 cal BC; further underscoring the option of maritime dispersal (Arbuckle *et al.* 2014). Archaeobotanical work is still under progress and is not as clear as the faunal evidence. The sites dating between 7000-6600 cal BC incorporate evidence of cultivation of einkorn wheat, emmer wheat, durum wheat, barley, free-threshing wheat and lentil; some of these species being non-native to the Aegean (Çilingiroğlu *et al.* 2012; Horejs 2012; Perlès *et al.* 2013). Archaeological evidence substantiates this view with presence of southwest Asian traits at these sites such as pressure flaking technique that is absent in Central Anatolia until 6500 BC, also traits like rectangular mud-based architecture, red plastered floors, elaborately made stone bracelets and shaft straighteners (Çilingiroğlu and Çakırlar 2013; Horejs *et al.* 2015; Munro and Stiner 2015). The absence of red plaster floors at Greek Initial and Early Neolithic may hold a differentiated cultural significance and does highlight the level of social variability during and after this dispersal process.

Using a long-existing, pre-Neolithic maritime route, farmer-herder groups moved over long distances, implementing 'slow-motion seafaring' to use a term from Braudel, that intensely and constantly operated along the coastal lines within short distances and sporadically used for long-distance engagements in all directions (Çilingiroğlu 2016). An unorganized, spontaneous and constant movement of people along with plants, animals, finished goods and raw materials co-existed with infrequent yet planned long-distance mobility that aimed at exploring new lands and resources upon which new villages are established at some optimal localities. This movement was not limited to coastal areas but at times penetrated inland areas using natural mountain passes as with the case of Bademağacı and Ulucak. Before this movement, a 'colonization' phase requiring careful planning and organization (as described by Broodbank and Strasser 1991), an exploration phase epitomized by manifold forager-farmer interactions must have been present which pre-dates 7000 cal BC.

Acknowledgements: I would like to thank my colleagues Berkay Dinçer, Canan Çakırlar, Tristan Carter and Bogdana Milić for their help, feedback and suggestions.

Çiler Çilingiroğlu
Ege University, Faculty of Letters
Protohistory and Near Eastern Archaeology
35100 Bornova-Izmir-TURKEY
ciler.cilingiroglu.unlusoy@ege.edu.tr

References

Arbuckle B.S.
2013 The late adoption of cattle and pig husbandry in Neolithic Central Turkey. *Journal of Archaeological Science* 40: 1805-1815.

Arbuckle B.S., Kansa S.W., Kansa E., Orton D., Çakırlar C., Gourichon L., Atıcı L., Galik A., Marciniak A., Mulville J., Buitenhuis H., Carruthers D., De Cupere B., Demirergi A., Frame S., Helmer D., Martin L., Peters J., Pöllath N., Pawłowska K., Russell N., Twiss K. and Würtenberger D.
2014 Data sharing reveals complexity in the westward spread of domestic animals across Neolithic Turkey. *PLoS ONE* 9(6), e99845.

Atıcı L. and Stutz A.
2002 Mortality Profile Analysis of the Ungulate Fauna from Öküzini: A Preliminary Reconstruction of Site Use, Seasonality, and Mobility Patterns. In: I. Yalçınkaya, M. Otte, J. Kozlowski, and O. Bar-Yosef (eds.), Öküzini*: Final Palaeolithic Evolution in Southwest Anatolia*. ERAUL 96: 101-108. Liège: Université de Liège.

Baird D., Fairbairn A., Martin L., and Middleton C.
2012 The Boncuklu Project: The Origins of Sedentism, Cultivation and Herding in Central Anatolia. In: M. Özdoğan, N. Başgelen, and P. Kuniholm (eds.), *Central Turkey – The Neolithic in Turkey* 3: 219-244. Istanbul: Arkeoloji ve Sanat Yayınları.1

Brami M.
2015 A graphical simulation of the 2,000-year lag in Neolithic occupation between Central Anatolia and the Aegean Basin. *Archaeological and Anthropological Sciences* 7(3): 319-327. doi:10.1007/s12520-014-0193-4

Broodbank C.
2013 *The Making of the Middle Sea: A History of the Mediterranean from the beginning to the emergence of the Classical world*. London: Thames and Hudson.

Broodbank C. and Strasser T.F.
1991 Migrant farmers and the Neolithic colonization of Crete. *Antiquity* 65: 233-245.

Çakırlar C.
2012 Evolution of animal husbandry in Neolithic Central-West Anatolia, the archaeozoological record from Ulucak Höyük (ca. 7040-5660 cal. BC, İzmir, Turkey). *Anatolian Studies* 62(1): 1-33.

Carter T.
2016 Obsidian consumption in the Late Pleistocene - Early Holocene Aegean: Contextualising new data from Mesolithic Crete. *Annual of the British School at Athens* 111: 1-22.

Carter T., D. Contreras, Mihailović D., Moutsiou T., Skarpelis N., and Doyle S.
2014 The Stélida Naxos Archaeological Project: new data on the Middle Palaeolithic and Mesolithic Cyclades. *Antiquity Project Gallery* 88(341). http://antiquity.ac.uk/projgall/carter341 <accessed 13 June 2016>.

Çevik Ö. and Abay E.
2016 Neolithisation in Aegean Turkey. Towards a More Realistic Reading. In: Ü. Yalçın (ed.), *Anatolian Metal VII. Anatolien und seine Nachbarn vor 10.000 Jahren.* Der Anschnitt Beiheft 31: 199-210. Bochum: Deutsches Bergbaumuseum.

Çilingiroğlu Ç.
2011 The Current State of Neolithic research at Ulucak. In: R. Krauss (ed.), *Beginnings – New Research in the Appearance of the Neolithic between Northwest Anatolia and Carparthian Basin*. 67-76. Rahden: Marie Leidorf.
2016 Impressed pottery as a proxy for connectivity in the Neolithic Aegean and Eastern Mediterranean. In: B. Molloy (ed.), *Of Odysseys and Oddities: Scales and modes of interaction between prehistoric Aegean societies and their neighbours*. Sheffield Studies in Aegean Prehistory: 75-96. Oxford: Oxbow Books.

Çilingiroğlu Ç. and Çakırlar C.
2013 Towards configuring the neolithization of Aegean Turkey. *Documenta Praehistorica* 40: 21-29.

Çilingiroğlu A., Çevik Ö., and Çilingiroğlu Ç.
2012 Ulucak Höyük. Towards understanding the early farming communities of Middle West Anatolia: the contribution of Ulucak. In: M. Özdoğan, N. Başgelen, and P. Kuniholm (eds.), *Western Turkey – The Neolithic in Turkey* 4. 139-175. Istanbul: Archaeology and Arts Publications.

Çilingiroğlu Ç., Dinçer B., Uhri A., Gürbıyık C., Baykara I., and Çakırlar C.
2016 New Paleolithic and Mesolithic Sites in the Eastern Aegean: Karaburun Archaeologial Survey Project. *Antiquity Project Gallery*. doi:10.15184/aqy.2016.168.

De Cupere B., Duru R., and Umurtak G.
2008 Animal husbandry at the Early Neolithic to Early Bronze Age site of Bademağacı (Antalya province, SW Turkey): evidence from the faunal remains. In: E. Vila, L. Gourichon, A. Choyke, and H. Buitenhuis (eds.), *Zooarchaeology of the Near East 8: Proceedings of the Eighth International Symposium on the Zooarchaeology of Southwestern Asia and Adjacent Areas*. Travaux de la Maison de l'Orient et de la Méditerranée 49: 367-405. Lyon: MOM.

Duru R.
2012 The Neolithic of the Lakes Region. Hacılar-Kuruçay Höyük-Höyücek- Bademağacı Höyük. In: M. Özdoğan, N.Başgelen, and P. Kuniholm (eds.), *Western Turkey - The Neolithic in Turkey. New Excavations and New Research 4:* 1-65. Istanbul: Arkeoloji ve Sanat Yayınları.

Efstratiou N., Karetsou A., and Banou E.
2013 The Excavation. In: N. Efstratiou, A. Karetsou and M. Ntinou (eds.), *The Neolithic Settlement of Knossos in Crete. New Evidence for the Early Occupation of Crete and the Aegean Islands*. 1-25. Philadelphia: INSTAP Academic Press.

Evans J.D.
1971 Neolithic Knossos: the growth of a settlement. *Proceedings of the Prehistoric Society* 37: 81-117.

Facorellis Y. and Maniatis Y.
2013 Radiocarbon Dates from the Neolithic settlement of Knossos: An Overview. In: N. Efstratiou, A. Karetsou and M. Ntinou (eds.), *The Neolithic Settlement of Knossos in Crete. New Evidence for the Early Occupation of Crete and the Aegean Islands*. 193-200. Philadelphia: INSTAP Academic Press.

Galanidou N.
2011 Mesolithic Cave Use in Greece and the Mosaic of Human Communities. *Journal of Mediterranean Archaeology* 24(2): 219-242.

Garfinkel Y.
1987 Burnt lime products and social implications in the PPNB villages of the Near East. *Paléorient* 13(1): 69-76.

Hauptmann A. and Yalçın Ü.
2000 Lime plaster, cement and the first puzzolanic reaction. *Paléorient* 26(2): 61-68.

Hofmanová Z., Kreutzer S., Hellenthal G., Sell C., Diekmann Y., Díez-del-Molino D., Van Dorp L., López S., Kousathanas A., Link V., Kirsanow K., Cassidy L.M., Martiniano R., Strobel M., Scheu A., Kotsakis K., Halstead P., Triantaphyllou S., Kyparissi-Apostolika N., Urem-Kotsou D., Ziota C., Adaktylou F., Gopalan S., Bobo D.M., Winkelbach L., Blöcher J., Unterländer M., Leuenberger C., Çilingiroğlu Ç., Horejs B., Gerritsen F., Shennan S.J., Bradley D.G., Currat M., Veeramah K.R., Wegmann D., Thomas M.G., Papageorgopoulou C., and Burger J.
2016 Early Farmers from across Europe directly descended from Neolithic Aegeans. *Proceedings of the National Academy of Sciences* 113: 6886-6891.

Horejs B.
2012 Çukuriçi Höyük. A Neolithic and Bronze Age Settlement in the Region of Ephesos. In: M. Özdoğan, N. Başgelen and P. Kuniholm (eds.), *Western Turkey - The Neolithic in Turkey. New Excavations and New Research 4:* 117-131. İstanbul: Arkeoloji ve Sanat Yayınları.

Horejs B., Milić B., Ostmann F., Thanheiser U., Weninger B., and Galik A.
2015 The Aegean in the Early 7th Millennium BC: Maritime Networks and Colonization. *Journal of World Prehistory* 28(4): 289-330.

Isaakidou V.
2008 The fauna and economy of Neolithic Knossos revisited. In: V. Isaakidou and P. Tomkins (eds.), *Escaping the Labyrinth: The Cretan Neolithic in Context*. 95-112. Sheffield: Oxbow Books.

Kartal M.
2009 *Türkiye'de Son Avcı-Toplayıcılar*. Istanbul: Arkeoloji ve Sanat.

Kılınç G.M., Omrak A., Özer F., Günther T., Büyükkarakaya A.M., Bıçakçı E., Baird D., Dönertaş H.M, Ghalichi A., Yaka R., Koptekin D., Açan S.C., Parvisi P., Krzewińska M., Daskalaki E.A., Yüncü E., Dağtaş N.D., Fairbairn A., Pearson J., Mustafaoğlu G., Erdal Y.S., Çakan Y.G., Togan, I., Somel M., Storå J., Jakobsson M., and Götherström A.
2016 The Demographic Development of the First Farmers in Anatolia. *Current Biology* http://dx.doi.org/10.1016/j.cub.2016.07.057.

Kotsakis K.
2008 A Sea of Agency: Crete in the Context of the Earliest Neolithic in Greece. In: V. Isaakidou and P. Tomkins (eds.), *Escaping the Labyrinth: The Cretan Neolithic in Context*. Sheffield Studies in Aegean Archaeology: 49-72. Oxford: Oxbow Books.
2015 Domesticating the periphery. New Research into the Neolithic of Greece. *Pharos* 20(1): 41-73.

Kozłowski J. and Kaczanowska M.
2009 The Mesolithic of the Aegean Basin: How to interpret the pre-Neolithic settlement of the Aegean islands and its role in the neolithization of Southeastern Europe. In: J.J. Shea and D.E. Lieberman (eds.), *Transitions in Prehistory. Essays in Honor of Ofer Bar-Yosef*. 357-383. Oxford: Oxbow Books.

Maher L.A., Richter T., MacDonalds D., Jones M.D., Martin L., and Stock J.T.
2012 Twenty Thousand-Year-Old Huts at a Hunter-Gatherer Settlement in Eastern Jordan. *PLoS ONE* 7(2): 1-10.

Martinoli D.
2004 Food plants use, temporal changes and site seasonality at Epipalaeolithic Öküzini and Karain B caves, southwest Anatolia,Turkey. *Paléorient* 30(2): 61-80.

Mellaart J.
1970 *Excavations at Hacılar*. Edinburgh: Edinburgh University Press.

Moundrea-Agrafioti A.
2011 The Mesolithic and Neolithic Bone Implements. In: A. Sampson (ed.), The *Cave of the Cyclops. The*

Mesolithic and Neolithic networks in the Northern Aegean, Greece II. 3-52. Philadelphia: INSTAP Academic Press.

Munro N.D. and Stiner M.C.
2015 Zooarchaeological Evidence for Early Neolithic Colonization at Franchthi Cave (Peloponessos, Greece). *Current Anthropology* 56(4): 596-603.

Otte M., Yalçınkaya I., Leotard J.-M., Kartal M., Bar-Yosef O., Kozlowski J., Lopez-Bayon I., and Marshack A.
1995 The Epi-Paleolithic of Öküzini Cave (SW Anatolia) and its mobiliary art. *Antiquity* 69: 931-944.

Ottoni C., Girdland Flink L., Evin A., Geörg C., De Cupere B., Van Neer W., Bartosiewicz L., Linderholm A., Barnett R., Peters J., Decorte R., Waelkens M., Vanderheyden N., Ricaut F.-X., Çakırlar C., Çevik Ö., Hoelzel R., Mashkour M., Mohaseb Karimlu A., Sheikhi Seno S., Daujat J., Brock F., Pinhasi R., Hongo H., Perez-Enciso M., Rasmussen M., Frants L., Megens H.-J., Crooijmans R., Groenen M., Arbuckle B., Benecke N., Starnd Vidarsdóttir U., Burger J., Cucchi T., Dobney K., and Larson G.
2013 Pig domestication and human-mediated dispersal in Western Eurasia revealed through ancient DNA and geometric morphometrics. *Journal of Molecular Biology and Evolution* 30(4): 823-832.

Özbaşaran M.
2012 Aşıklı. In: M. Özdoğan, N. Başgelen, and P. Kuniholm (eds.), *Central Anatolia - The Neolithic in Turkey. New Excavacation and New Research 3:* 135-158. Istanbul: Arkeoloji ve Sanat Yayınları.

Özdoğan M.
2008 An Alternative Approach in Tracing Changes in Demographic Composition: The westward expansion of the Neolithic way of life. In: J.-P. Bocquet-Appel and O. Bar-Yosef (eds.), *The Neolithic Demographic Transition and its Consequences.* 139-178. Dordrecht: Springer.
2011 Archaeological Evidence on the Westward Expansion of Farming Communities from Eastern Anatolia to the Aegean and the Balkans. *Current Anthropology* 52(4): 415-430.

Perlès C.
1999 Long-term perspectives on the occupation of the Franchthi Cave: continuity and discontinuity. In: G.N. Bailey, E. Adam, E. Panagopoulou, C. Perlès, and K. Zachos (eds.), *The Palaeolithic Archaeology of Greece and Adjacent Areas: Proceedings of the ICOPAG Conference*, Ioannina, (September 1994). British School at Athens Studies 3: 311-318. London: British School at Athen.
2001 *The Early Neolithic in Greece*. Cambridge: Cambridge University Press.

Perlès C., Quiles A., and Valladas H.
2013 Early seventh-millennium AMS dates from domestic seeds in the Initial Neolithic at Franchthi Cave (Argolid, Greece). *Antiquity* 87: 1001-1015.

Sampson A., Kaczanowska M., and Kozlowski J.K.
2012 Mesolithic occupations and environments on the Island of Ikaria. *Folia Quaternaria* 80: 5-40.

Scheu A., Geörg C., Schulz A., Burger J., and Benecke N.
2012 The arrival of domesticated animals in South-Eastern Europe seen from Ancient DNA. In: E. Kaiser, W. Schier, and J.Burger (eds.), *Population dynamics in Pre- and Early History. New Approaches by Stable Isotopes and Genetics*. 45-54. Berlin, Boston: Walter de Gruyter.

Schoop U.-D.
2005 The late escape of the Neolithic from the Central Anatolian Plain. In: C. Lichter (ed.), *How did Farming Reach Europe?* 41-58. Istanbul: Ege Yayınları.

Strasser T., Panagopoulou E., Karkanas P., Clinton M., Kapranos E., Thompson N., and Murray S.
2014 *The Excavation at Mesolithic Damnoni – The Discovery of a New Culture on Crete*. Poster Presentation at AIA 2014. Online access: http://plakiasstoneageproject.com/

Takaoğlu T., Korkut T., Erdoğu B., and Işın G.
2014 Archaeological Evidence for 9th and 8th millennia BC at Girmeler Cave near Tlos in SW Turkey. *Documenta Praehistorica* 41: 111-118.

Trantalidou K.
2011 From Mesolithic Fisherman and Bird Hunters to Neolithic Goat Herders: The Transformation of an Island Economy in the Aegean. In: A. Sampson (ed.), *The Cave of the Cyclops. The Mesolithic and Neolithic networks in the Northern Aegean, Greece,* II. 53-101. Philadelphia: INSTAP Academic Press.

Ünlüsoy S.
2002 Neolithische und chalcolithische Steinarmringe: Untersuchungen zur Chronologie und Verbreitung im Nahen Osten und in der Ägäis. In: R. Rüstem, S. Blum, G. Kastl, F. Schweizer and D. Thumm (eds.), *Mauerschau: Festschrift für M. Korfmann*. 541-566. Remshalden-Grunbach: Greiner.

Vigne J.-D., Briois F., Zazzo A., Willcox G., Cucchia T., Thiébault S., Carrère I., Franel Y., Touquet R., Martin L., Moreau C., Comby C., and Guilaine J.
2012 First wave of cultivators spread to Cyprus at least 10,600 yrs ago. *Proceedings of National Academy of Sciences* 109(22): 8445-8449.

Zeder M.A.
2008 Domestication and early agriculture in the Mediterranean Basin: Origins, diffusion, and impact. *Proceedings of the National Academy of Sciences* 105(33): 11597-11604.

Conference Report
Iconography and Symbolic Meaning of the Human in Near Eastern Prehistory

10th ICAANE Workshop, April 2016, Vienna

Bérénice Chamel and Eric Coqueugniot

The 10th International Congress on the Archaeology of the Ancient Near East (ICAANE) was held in Vienna, Austria from 25th to 29th, April, 2016. Eight sections and 27 workshops were organized in the *Institute for Oriental and European Archaeology* which belongs to the *Austrian Academy of Sciences* and gathered many archaeologists and specialists from numerous nationalities.

In the last two days of the conference, from 28th to 29th, April, Jörg Becker, Bernd Müller-Neuhof from the *Deutsches Archäologisches Institut, Orient-Abteilung* in Berlin and Claudia Beuger from the *Martin-Luther-Universität Halle-Wittenberg, Seminar für Orientalische Archäologie und Kunstgeschichte* in Halle organized a Workshop entitled "*Iconography and Symbolic Meaning of the Human in Near Eastern Prehistory*". The workshop aimed to highlight new field research on the human representation in ancient Near Eastern prehistory, attempting to provide further and new interpretation on issues like "fertility cult", "god representation", *etc*.

16 participants from 9 countries took part in the two-days workshop; 19 lectures were presented in English in three sections: 1 "Symbolism and Iconography", 2 "Physical Anthropology and Mortuary Practises", and 3 "Self-perception and Self-expression of the Human Being". Both days of the workshop were attended by a large audience.

The first section, "Symbolism and Iconography" included five lectures (T. Watkins' only read) was devoted to human representations (figurines, paintings, engraving or reliefs on ceramics) from the Natufian period throughout the Early Chalcolithic. The lectures discussed the diversity of the human representations in a diachronic and a regional way, and the difficulties of interpreting these objects often found in secondary contexts. Another issue of discussion was that human representations were often found intentionally broken, as in Göbekli Tepe where human stone heads were found buried at the foot of the pillars. Lectures also tried to question the possible use of this human representation for domestic ceremonies or activities.

The second part, "Physical anthropology and mortuary practises", presented a lot of lectures on human remains from the sites of Basta, Lidar Höyük, Uyyun el-Hamman, 'Ayn Qasiyya, Boncuklu, Wadi Faynan 16, Körtik Tepe and Jericho, among others. In this part, authors talked about the treatment of the dead which differs by time and region. Indeed, some of the dead are buried under the floor of the houses while others are buried in a dedicated "cemetery", as in Uyyun el-Hamman in Jordan. As far as that goes, in Boncuklu, Turkey, some of the dead were buried under the houses and some of the others were buried in external spaces, even in the garbage. Isotopic study showed that the

Fig. 1 Group photo with most of the workshop contributors. (photo: E. Coqueugniot)

two populations came from different locations, and that there is a selection of the dead according to their origin. This result drove several authors to question the possible differences of the status of individuals. The question of the adornment and grave goods was also raised, because it is often difficult to distinguish between real grave goods and what D. Baird called "background noise" (objects present in the sediment but not necessarily associated with the burial/dead). The post-depositional treatment of the human remains was particularly treated in the lecture by Yilmaz Erdal on the human remains from Körtik Tepe. These bones show a lot of intentional cut marks, painting with ochre or black pigment and covered with plaster. These treatments indicate either interpersonal violence or special burial rituals.

Finally, the third part of the workshop, "Self-perception and Self-expression of the Human Being", attempted to question the nature of the human representations, and how the human perceives his "beyond". The figurines, sometimes painted or engraved (representing either clothes or tattoos), show us how the human understood her- or himself. Plastered skulls which seem to have been repaired several times suggest a specific use of these representations, maybe for a longer period. B. Müller-Neuhof proposed for figurines in South-Western Asia an apotropaic use as a magical substitute for pregnancy and delivery. And finally, the question of the link between human representation and mortuary practices was raised for the site of Dja'de el-Mughara, where nearly all of the dead for the last phase were buried in a specific building, a "house of the dead".

Of course, the workshop could only approach and not answer all of these questions, but it succeeded in providing new interpretation lines and questions for the various meanings of human representation in the Near East. Exchanges between the lecturers were extremely interesting, as was the exchange with the audience, indicating the high quality of communications and related debates.

Bérénice Chamel
CNRS, UMR 5133 Archéorient - Maison de l'Orient et de la Méditerranée, Lyon, France
berenicechamel@gmail.com

Eric Coqueugniot
CNRS, UMR 5133 Archéorient - Maison de l'Orient et de la Méditerranée, Lyon, France
eric.coqueugniot@mom.fr

Becker, Jörg /Beuger, Claudia / Müller-Neuhof, Bernd: Introduction

Part I: Symbolism and Iconography
Watkins, Trevor: When do human representations become superhuman agents? *(read contribution)*
Conard, Nicholas / Mohsen, Zeidi: Continuity and discontinuity between Paleolithic and Neolithic imagery
Clare, Lee / Dietrich, Oliver / Notroff, Jens: Anthropomorphic iconography at Göbekli Tepe
Nieuwenhuyse, Olivier: To see or to touch? The sensual context of prehistoric human imagery
Becker, Jörg: Anthropomorphic figurines of the Halaf Period

Part 2: Physical anthropology and mortuary practise
Schultz, Michael: Health and disease in the prehistoric and early historical Near East. A contribution to the reconstruction of ancient living conditions
Belfer-Cohen, Anna / Goring-Morris, Nigel: Epipalaeolithic mortuary customs in Southwest Asia
Baird, Douglas: Boncuklu Bodies
Finlayson, Bill: PPN mortuary patterns, archaeological models, people and society
Erdal, Yılmaz: Post-depositional treatment of dead at Körtik Tepe: Symbolic and social implication
Fletcher, Alexandra: Changing faces, from individual to ancestor: a plastered skull from Jericho

Part 3: Self-perception and Self-expression of the Human Being
Biehl, Peter: Forming and transforming the human body in the Near Eastern Neolithic and Chalcolithic
Chamel, Bérénice / Coqueugniot, Eric: Human self-perception and self-expression in the Early Neolithic of North Levant: Funerary practices and symbolic meaning of the human representations in Dja'de, Syria
Goring-Morris, Nigel / Belfer-Cohen, Anna: Skulls, plastered skulls and masks during the Early Neolithic. Self-perception and self-expression
Müller-Neuhof, Bernd: Signals from the past: gestures in SW-Asian anthropomorphic iconography – preliminary observations
Beuger, Claudia: Clothing and nudity in prehistoric Near East
Drabsh, Bernadette: Nude, robed and masked processions: Considering the figural images in the Teleilat Ghassul wall paintings
Molist, Miquel / Ortiz, Anabel / Gomez Bach, Anna: Symbolic documents in Euphrates Valley in the Middle and Late PPNB. Results of the Tell Halula Project in interpretative context *(read contribution)*
Campbell, Stuart: Treatment and representation of humans in the later prehistory of Northern Mesopotamia: integrating approaches

Conference Report
Neolithisation and its Consequences: A Global View (from and to Iran) 1st-4th, March 2016, Tehran

Hojjat Darabi, Hassan Fazeli Nashli, and Judith Thomalsky

Unlike the 1960-70s during which spectacular excavations took place across Iran the succeeding stagnation in research brought the country out of the focus of Near Eastern Neolithic research.

However, important research progress was made again in recent years, and new interdisciplinary approaches enriched previous information. New evidence on Neolithic Iran is flourishing, and results request more excavated data in future. In 2010, a workshop on the Iranian Neolithic was organized by Roger Matthews and Hassan Fazeli Nashli during the the 7th ICAANE in the British Museum in London, published in 2013 (Matthews and Fazeli 2013); it was followed by another overview on the Iranian Neolithic by Roustaei and Mashkour (2016). The international conference *Neolithisation and its Consequences: A Global View (from and to Iran)* held at the University of Tehran, is the most recent enterprise for an overview, concentrating on a wider geographical perspective on the diversity of Neolithisation in Iran. The discussion involved areas as far as Europe and the Pontic region though Iran's important role in the Neolithisation processes became clear enough. During two days, 20 papers were presented at the Bastani Parizi Hall, Faculty of Literature and Humanities, University of Tehran (Figs. 1 and 2). The topics were ordered according to two major public sessions: *Evidences of Neolithisation in Iran* (1st day) and *Global Neolithisation Processes in Adjacent Near East and Europe* (2nd day). Two more days were devoted to visits of Neolithic sites on the Tehran and Kashan plains..

Four brief lectures presented by Hassan Fazeli Nashli and Judith Thomalsky (the conference organizers), Hamideh Choubak (Head of the Iranian Center for Archaeological Research/ ICAR), and Hoseinali Ghobadi (Head of the Research Center for Humanities and Cultural Studies of Iran) opened and introduced the conference.

An impressing, impulse-giving paper ('Worldwide Research Perspectives for the Shift of Human Societies from Mobile to Settled Ways of Life') was presented by Roger Matthews (University of Reading). He discussed basic issues such as the worldwide heartlands of domestication and agricultural dispersals and emphasized on the importance of the major driving factors, the 'Hows' and 'Whys' of Neolithisation. He presented an overview on the theoretical backgrounds, such as the Oasis-and-Hilly-Flanks model and on the new evi-

Fig. 1 The conference group photo in front of the Faculty of Literature and Humanities, University of Tehran. (photo courtesy of H. Fazeli)

dence from aDNA research and other methods. In this respect, and to address the dispersal of Neolithic life modes, for instance, it is believed that male farmers might have migrated from the Near East to Europe and 'married' local women. A strong attention should now be given to palaeoclimatology as an important area of research. All in all, he emphasized that Neolithisation was a long-lasting while very heterogenic set of processes, and not a single event, both to in the global and the niche perspectives.

The Iranian session was started by Hamed Vahdati Nasab (Tarbiat Modares University, Tehran) who talked about 'The Transition from Paleolithic to the Neolithic on the Central Plateau'. After his outline of a methodological-theoretical framework, Vahdati Nasab presented the Paleolithic occupation in the region and concluded that at the end of the Paleolithic development the Neolithic substratum was provided by a climatic optimum. This horizon, the Epipaleolithic, must be understood as the period of adaptation to the environments both in terms of subsistence and technology. But the archaeological record still exhibits a major problem: Although the Central Plateau of Iran hosted some Epipaleolithic occupations, no site with Early Neolithic remains has yet been discovered. Cave-sites such as Komishan showed no evidence of domestication, while the earliest fully domestic species come from Sang-e Chakhmagh West. Although aDNA analyses indicate a sort of spreading Neolithic lifestyles into the region, 'cultural adaptability' seems to have played a major role in this regard.

Hojjat Darabi (Razi University, Kermanshah) gave a summary in his talk 'The Earliest Steps towards the Neolithic World in Western Iran' on the very earliest evidences of Neolithic processes in Iran. By the end of the Younger Dryas, temperature and precipitation increased in Western Iran and, therefore, plants and trees increasingly grew in this area. This basically provided longer occupations at one spot which became one major factor for population increase. While environmental resources were intensively exploited and came under pressure by the people, some species such as emmer, barley, lentil and goats were regularly grown in some communities. This discussion is mostly based on the recent evidence from Chogha Golan, Chia Sabz East, and Sheikh-e Abad. However, it is believed that not only subsistence changed from foraging to farming during the 'Transitional Neolithic' (*c.* 9,500-8,000 BC), but also technologies/ innovations such as the emergence of grinding stones or the 'Pre-M'lefatian chipped stone industry' simultaneously became dominant. This could indicate that western Iran was a Neolithisation center of its own right.

'North-eastern Iran During the Neolithic' was discussed by Omran Garazhian (University of Neishapour). He applied the term 'Jeitun - Sang-e Chakhmagh Culture' and described the sites in terms of pottery and architecture, with an emphasis on Qaleh Khan and Tall-e Atashi. It is understood that both insufficient fieldwork and geomorphological factors – such as erosion and unstable sandy landscape – are responsible for the little knowledge we have on the Neolithic occupations in eastern Iran.

Roger Matthews spoke of 'The Neolithisation of the Eastern Fertile Crescent: New Evidence from the Zagros', and stressed the contextual and social approaches in investigating the Neolithisation processes, and – tackling his recent excavations in Iranian Zagros and Iraqi Kurdistan – aimed at an examination of the role of local ecosystems in domestication in a way that goats initially became domestic in the Zagros Highlands, spreading from here to lower lands such as northern Iraq and southwestern Iran.

Abbas Alizadeh (Oriental Institute, University of Chicago) gave an all-out talk by using the conference title 'Neolithisation and its Consequences in Early Neolithic times: a Global Perspective (from and to Iran)'. He emphasized the territoriality in the Neolithic period and that social change is poorly documented in Iranian Neolithic. After a brief discussion on the Paleolithic and Epipaleolithic period in the Central Plateau, he focused on the Neolithic sites in lowland Khuzestan, southwestern Iran. Noteworthy is the heavy sedimentation of the region that makes the detection of Neolithic sites almost impossible. Alizadeh believes that regional communication networks were formed from the early 6th millennium cal BC onwards, and that earlier settlements should be considered with regard to 'territoriality'.

The "Southern Zagros During the Neolithic Period" was discussed by Hossein Azizi Kharanaghi (Iranian Cultural Heritage and Tourism Organisation) who highlighted the different landscapes and the research history of the region. The presentation mainly focused on the regional chronology by which some sites were discussed. In this regard, the Proto-Neolithic/ Tang-e Bolaghi Phase (*c.* 10,000-7,400 cal BC),

Fig. 2 Contributors and audience of the conference at the Bastani Parizi Hall, Faculty of Literature and Humanities, University of Tehran. (photo courtesy of H. Fazeli)

the Pre-pottery Neolithic/ Rahmatabad Phase (*c.* 7,400-7,000 cal BC), and the Pottery Neolithic Phase (*c.* 7,000-5,200 cal BC) were distinguished. Based on ceramic styles, the Pottery Neolithic was divided into three sub-phases: Early/ Formative Mushki (*c.* 7,000-6,350 BC), Middle/ Mushki (*c.* 6,350-6,000 cal BC), and Late/ Jari- Bashi-Shamsabad (*c.* 6,000-5,200 cal BC). In particular, excavations at Tapeh Rahmatabad and Qasr-e Ahmad shed new light on the Neolithisation of southern Iran. At Rahmatabad, the chipped stone industry indicates a M'lefatian tradition. Furthermore, a change from hunting/gathering to farming is attributed to the site. In general, the Neolithic might have rooted in the Central Zagros, spreading from here to southern Iran by the diffusion of new ideas.

The Northern Central Plateau of Iran was discussed by Hassan Fazeli Nashli (University of Tehran). His presentation entitled "Caspian Sea and Central Iranian Plateau: Data in Comparison" mostly concentrated on new evidence provided by some Neolithic sites on the Tehran, Kashan and Qazvin Plains. The sites such as Sialk North, Pardis, Chahar Boneh, and Ebrahimabad were debated in the light of their dates, architecture, pottery, burial and botanical/ zoological remains. Cremation was identified at Sialk North. The sites have been re-occupied during post-Neolithic times, usually covered by later deposits. It is stated that the lack of PPN settlements seems to result from deep sedimentation of the plains.

'Neolithic Data from Northwestern Iran' was presented by Bahram Ajorloo (Tabriz Islamic Art University). Arjoloo's discussion concentrated on the role of a 'climatic *playa* stage' prior to *c.* 7,000 cal BC, and that the region was environmentally unhabitable until the late 7th millennium cal BC when settlements such as Ahranjan and Qreh Tapeh were established. It was stated that the earliest Neolithic settlements in northwestern Iran emerged as a result of migration from the Central Zagros. However, petrographic analysis proved the local origin of the Neolithic pottery. Like the Central Plateau, northwestern Iran suffers from the lack of PPN sites.

Genetic analysis and its role in better understanding the Neolithisation was pointed out by Javad Hosseinzadeh (Kashan University). His lecture 'Neolithic of Iran and the Contribution of Archaeogenetics' began with a general discussion on new excavations in the Central Zagros, a chronological debate, and the topic of previous genetic analysis on goats. The rest of the presentation concentrated on recent analyses done on samples taken from three Neolithic sites (Chahar Boneh, Sialk North, and Ebrahimabad) on the Northern Central Plateau. The results showed that the goat samples attribute to southeastern Turkey, possibly meaning that domestic goats were brought from there to the Central Iranian Plateau and from here to southeastern Iran. However, this idea requires further data.

By the end of the first day, as the session on Iran finished, Judith Thomalsky summarized the presentations and emphasized on the importance of current data and on the issues still needing future discussion. In the evening, contributors paid a visit to the Iranology Foundation where the Museum of Iranian Ethnology and a picture-gallery attracted them.

During the second day, Neolithisation was approached from broader geographical contexts, including Syria, Turkey, Jordan and Europe. In addition, as illustrated by the following report, palaeoclimatology was more a subject.

Giving attention to a large region, Dominik Fleitman (University of Reading, UK) presented 'The Context of Neolithisation: Paleo-climates of Iran and the Middle East during the Late Pleistocene and Early Holocene'. He started with a brief look at present climate of the Middle East, understanding that it is mostly influenced by mid-latitude subtropical high pressure systems, and, in this respect, Iran is located between the northern Atlantic and southern monsoon climate systems. Based on available information provided by various methods and sources, such as lake-bed palynology, carbon isotope and cave stalagmite analyses, the transition from late Epipaleolithic to early Neolithic was illustrated by climate data. Based on some evidence from Turkey and the Mediterranean, the two dry cold climatic events (9.2 and 8.2 Kya) during the early Holocene were discussed; it was argued that these should be taken into account by Iranian archaeology in future. For this, continuous records and precise chronologies are the main requirements for meaningful future research.

Fig. 3 The organizers present the conclusions and achievements of the conference. (photo courtesy of H. Fazeli)

Micro-morphological analysis was the central theme of the lecture given by Wendy Matthews (University of Reading) on the 'Early Built Environments and Settled life in the Neolithic of the Central Zagros'. She discussed the change from seasonality to year-round occupations in the early Neolithic Zagros through her analyses of samples taken in Sheikh-e Abad and Jani in western Iran and Bestansur and Shimshara in northern Iraq. In this regard, different functional loci inside the houses were identified.

The discussion then led to the north of the Black Sea or the Pontic region by Norbert Benecke (DAI Berlin) who presented 'Archaeozoological Studies on the Mesolithic - Neolithic Transition in the Pontic Region'. He reminded on some characteristics related to animal domestication, and went into the region by means of zooarchaeology. Showing zoological investigations at some Neolithic sites, it is concluded that the principal animal species (goats, sheep, cattle and pig) were not domesticated locally, and that fully-domestic animals spread from *c.* 6,500 cal BC.

Karin Bartl (DAI, Damascus Branch) explained 'Neolithic Developments in Syria'. At first, the Syrian landscape and research backgrounds were discussed. The chronological debate and the archaeological indicators of each Neolithic (sub-) period were discussed by the presentation of key sites such as Abu Hurayra, Jerf-al Ahmar, 'Abr, lower Qaramel, Halula, Ramad, and Abyad. Then, the earliest Neolithic pottery was presented, from sites like Bouqras. Lastly, the place of the Halaf culture within Late Syrian Neolithic was reviewed. It was stated that, based on the archaeological evidence, the numbers of settlements increased by the Pottery Neolithic.

Mehmet Özdoğan (University of Istanbul) presented 'The Neolithic Cultures in Turkey'. The lecture began with the idea that no suitable sites with late Epipaleolithic to early Neolithic deposits have yet been found in Turkey; however, recent investigations showed occupations dating back to the 10th millennium cal BC onwards. The transition from round to rectilinear houses and the residential and special buildings in Neolithic Turkey were subject. In this regard, sites with T-shaped pillars (*e.g.* Göbekli Tepe) could show a sort of divinization of the nature on the pillars. Different burial practices, craft specialization, supra-regional interaction, and various subsistence strategies in PPN were addressed. In addition, a new way of social complexity established in the Pottery Neolithic when migrations caused the spreads of Neolithic life modes into Europe; this time coming with the emergence of new Neolithic cores in Turkey.

The following contribution, 'Göbekli Tepe in Context: An Early Holocene Ritual Site in a 'Core Zone' of Neolithisation', presented by Lee Clare (DAI, Berlin) debated the chronological dating and description of the site, particularly the architectural remains of the PPN, including the enclosures and pillars. Huge monolithic T-shaped pillars were incorporated into these stone enclosures. The enclosures were intentionally backfilled at the end of their use. In the PPNB, a terrace was established around the pillared areas. Recent investigations at the site show that cisterns and carved channels were significant features of the time which might have been used for water management. One cistern was found with many animal bone fragments, sometimes covered with red ochre. Although the site is mostly believed to have been a ritual area, some evidence like bone and bead working suggests possible domestic spaces. Göbekli Tepe, however, can be taken as an indicator of social grouping among the foragers.

Southern Jordan was the focus of Bill Finlayson's (CBRL, London) contribution ('The Neolithic of Southern Jordan'). Starting with a chronological debate, the settlement diversity was shown in the region. In addition, the phenomenon of mega-sites and their expansion during LPPNB were targeted. Communal storages with raised floors at Dhra' show a kind of food sharing. Communal circular buildings at Beidha and the variation in architectural remains at Shakarat Musay'id were subject of the presentation. Based the zooarchaeological analyses, southern Jordan must have faced the introduction of domestic animals during LPPNB.

European coastal zones and their role for research on global Neolithisation processes were stressed by Friedrich Lüth (DAI, Berlin) who spoke about 'Submerged Prehistoric Landscapes and the Neolithic of Coastal Zones in Europe'. Palaeoclimatic evidence

Fig. 4 Several Neolithic sites were visited (Tapeh Cheshmeh Ali is seen in the background). (photo courtesy of H. Fazeli)

indicates that coasts were located at altitudes *c*. 140 m lower than today, reaching around 9,000 cal BC 40 m below the present sea level. The changes of the Baltic Sea levels, the methods of underwater excavations, and Mesolithic period in northern Germany and southern Scandinavia (during which fishing was the main food source) were discussed. During the early Neolithic (early 4th millennium BC) burials were accompanied by goods such as vessels and beads. It is believed that aDNA analysis would help to increase our knowledge on the origins of Mesolithic-Neolithic peoples in the Europe.

An overview of the role of palaeoecological reconstructions was given by Elena Marinova (KU Leuven): 'Paleoecological Dimensions of the Beginning of the Neolithic in the Near East: Overview and Future Perspectives'. She explained new evidence available, addressing the character of environment and climate during the early Holocene. In this regard, lake diagrams, site pollens (notably from Chogha Golan) and other bio data were taken to show environmental amelioration. Vegetation history indicates a spread of woodlands in the early Holocene across the Near East, based on data we have from lakes such as Göl Hisar. This development of vegetation must have played an important role in Neolithisation process.

The contributions by our – unfortunately unavailable – colleagues Barbara Helwing and Andrea Ricci on 'Early Settlement of the Southern Caucasus: Recent Azeri-German Investigations on the late Neolithic of the Mil Plain' was read by Judith Thomalsky. The results of excavations and surveys of the ongoing project provide significant insights into social feasting, the creation of communal spaces and other social practices that were developed to express and strengthen communal identity during the Neolithic period.

Finally, the organizers (Hassan Fazeli and Judith Thomalsky) summarized the lectures, their question and results, and tried to draft mutual points of understanding and perspectives for the future research, as they emerged during the two days of the conference (Fig. 3). Judith Thomalsky emphasized the fact that the Neolithic period can be regarded as the most innovative period in prehistory when not only domestication, food production and social accumulation took place but also the first deliberate management of new resources such as precious stones and metal started, including – at least – the evolution of explicit social practices targeting to strengthen social ties in communities. All these very different and heterogeneous aspects can be set onto a more generalized "global timeline of Neolithic innovations" that – in a second view – clearly reflects overlapping or interactions, co-inventions, effects of linked innovations, whether in social dimensions or in technologies.

In his concluding talk, Friedrich Lüth, as the representative of Research Cluster 1 (From Hunter to Sedentism) of the DAI that was involved in the organisation of this conference, invited the participants to publish the papers presented in the conference. Lastly, he re-emphasized some important topics, such as the role of coastal zones in Neolithisation of Southern Iran to be addressed in future.

The next two days were devoted to field trips to visit some Neolithic sites on the Tehran and Kashan Plains (Fig. 4), mainly Tapeh Cheshmeh Ali south of Tehran and Tapeh Sialk near Kashan. Hassan Fazeli Nashli, who directed excavations at both sites, guided the site tours, highlighting the importance and archaeological implications of these Neolithic sites on the Northern Central Plateau of Iran.

Acknowledgments: We are very grateful to all the contributors for their invaluable presentations. We would also like to thank all the individuals and organizations that supported the conference.

Hojjat Darabi
Department of Archaeology,
Razi University, Kermanshah
hojjatdarabi@gmail.com

Hassan Fazeli Nashli
Department of Archaeology,
University of Tehran
hassanfazelinashli@gmail.com

Judith Thomalsky
German Archaeological Institute (DAI),
Tehran Branch
judiththomalsky@hotmail.com

References

Matthews R.J. and Fazeli Nashli H. (eds.)
2013 *The Neolithisation of Iran. The Formation of New Societies. Themes from the Ancient Near East.* British Association for Near Eastern Archaeology Publication Series 3. Oxford, Oakville: Oxbow Books.

Roustaei K. and Mashkour M. (eds.)
2016 *The Neolithic of the Iranian Plateau*. Studies in Early Near Eastern Production, Subsistence, and Environment 18. Berlin: ex oriente.

Kubíková, Barbora

2015 *Morphological Study of Sling Projectiles with Analysis of Clay Balls from the Late Neolithic Site Tell Arbid Abyad (Syria)*. Master Thesis, Centre of Prehistoric Archaeology of the Near East, Masaryk University, Czech Republic. Supervisor: Dr. phil. Maximilian Wilding

Abstract

After realizing the interpretation of plain, ball-like items of stone or clay as sling bullets is contested (Tsuneki 1998: 111-112), the goal of the thesis was to look for ways to avoid being caught in controversial assumptions about their real function.

The first part of this effort has been to identify the common shapes of the plain, rounded small objects cited by researchers as sling missiles. Six basic forms have materialized from the BA thesis (Kubíková 2013). The cylindrical form was disqualified, which has already led to excluding countless plain objects that were formerly eligible for interpretation as sling missiles. The logical next step was to study the range of common weights and sizes of sling projectiles in order to further thin down the large category of plain rounded stone or clay objects.

Therefore, the MA thesis tried to establish firm morphological means for the identification of sling projectiles in the archaeological record of sites in the Near East. This effort concentrated on the metric data, physical properties and design of artefacts used as ballistic bodies in order to form parameters characteristic only of sling shots. However, as a consequence of the recent controversy in the identification of rounded handy-sized objects of clay or stone (henceforth called RHO) their interpretation has become volatile. Researchers have proposed explanations that have nothing to do with a ballistic use, such as cooking stones, weights, preparatory lumps or clay, *etc*. (Atalay 2005: 139; Franz 2010: 79). Due to this ambiguity, the size, weight and form parameters of sling missiles cannot be deduced directly from Near East archaeological artefacts.

To cope with this stalemate, it was decided to turn to the study of past and recent sling projectiles in several geographic locations in the Pacific Ocean and North and South America. The rational of this 'move abroad' was to explore whether dimensional parameters could be established among unambiguous sling projectiles, namely cases of their attested use by recent ethnographic societies.

On the supposition that normative principles of physics are ruling the manufacture of these ballistic objects, it has been thought that reasonable parameters of size and weight could be established. The conviction of the author is that such parameters could then be implemented in interpreting RHOs from Near East prehistory, by eliminating RHOs which fall outside these boundaries as possible sling projectiles.

Consequently, the majority of the thesis is a detailed discussion of morphological parameters of sling projectiles based on diverse information from physics,

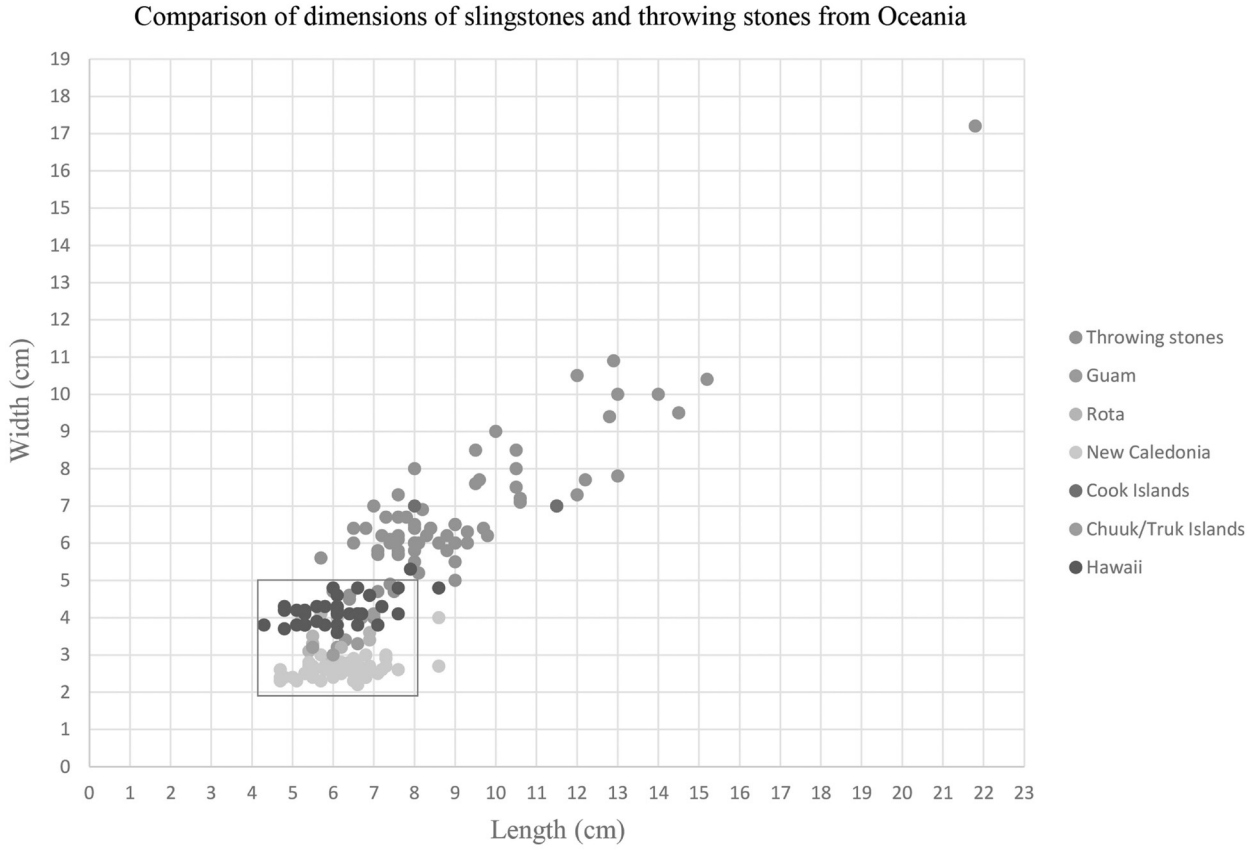

Fig. 1 Graph of all the dimensions of slingstones and throwing stones of Oceania mentioned in the thesis with the resultant K-square frame.

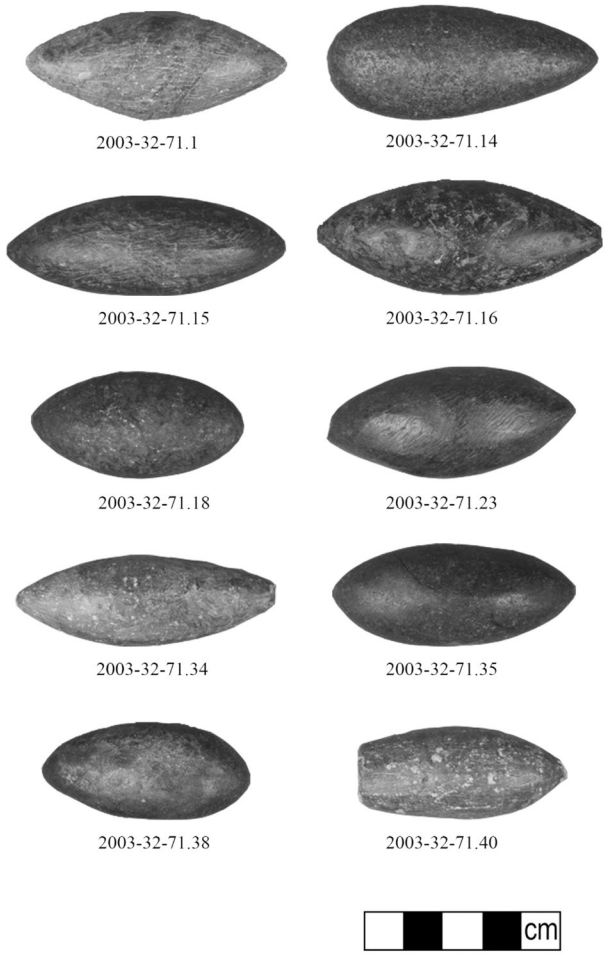

Fig. 2 New Caledonian slingstones, courtesy from the Museum of Archaeology and Anthropology of the University of Pennsylvania (Photos: Pennsylvania Museum).

ethnographic records, experimental archaeology, historical and modern usage. Parameters are differentiated between projectiles made of clay or stone, and between manufactured or natural (unmodified) objects. The plotting of weight, length and diameter data of projectiles from various unambiguous contexts show congruence and clustering to a degree not imagined at the beginning of the investigation. These strikingly similar metrics for sling shots around the globe and from different time horizons allow bounding values to be created which frame plausible upper and lower limits of size and weight for objects intended to be launched via a handheld sling. The resultant K-square frame was determined to be: Width: 2 cm (min) – 5 cm (max), Length: 4 cm (min) – 8 cm (max), Weight: 20 g (min) – 250 g (max).

The study includes a considerable amount of archaeological information and photographs of 'sling stones', 'sling balls' and 'sling projectiles'. These have been brought together to spur comparisons to other objects and to assist archaeologists in labelling small rounded objects that lack other distinct traits.

The dimensional limits for sling projectiles were corroborated through further sources. For example, measurements of clay or stone balls that are exclusively thrown by hand, and parallel data on sling projectiles acquired by the author through the support of the modern-day slinger community in Mallorca. These users keep the historic slinging tradition alive on the Mediterranean island in a sports context.

The MA thesis closes by checking the usefulness of the size and weight bounding values for Near Eastern archaeology. To this end, the sling missile parameters derived from ethnography, over-seas archaeology and more recent historical periods were applied to the plain 'clay balls' found at the Late Neolithic site Tell Arbid Abyad during the first three excavation campaigns (2007-2009). The dimensions of RHOs from the site plot in clear-cut clusters: (1) a recognizable group that largely fit the parameters of established sling missiles, and (2) a group of smaller rounded clay objects that appear to be unfit for slinging as they are below the bounding limits in both size and weight. The crucial observation is that contrary to expectations, there is scarcely an 'overlap problem' hampering the interpretation of RHOs recovered from the trenches at Tell Arbid Abyad.

The exploratory study shows that bounding values established from projectiles outside the Mesopotamian context are viable in making headway in the current interpretive stalemate situation concerning RHOs. The proposed parameters will be useful primarily to define a more limited subset of 'potential sling missiles' within the impressive number of undecorated small balls of clay or stone found at some Near Eastern archaeological sites (Atalay 2005: 140-145). If shooting tests, use-wear study, or experimental reconstruction of production or use contexts are done as future steps in research, it may be possible to further narrow this multitude to the more circumscriptive subset of 'probable sling missiles'.

Barbora Kubíková
barbora.kubikova.89@mail.muni.cz

Selected References

Atalay S.
2005 Domesticating Clay: the Role of Clay Balls, Mini Balls, and Geometric Objects in Daily Life at Çatalhöyük. In: I. Hodder (ed.), *Changing Materialities at Çatalhöyük*: 139-168. Ankara: British Institute of Archaeology.

Franz I.
2010 Pottery Report Trench 5-7. In: *Çatalhöyük 2010 Archive Report*: 77-90. Published online: http://www.catalhoyuk.com/downloads/Archive_Report_2010.pdf

Gaulon A.
2013 Modelled Clay Balls and Socio-Economic Changes in the Late Neolithic: A Preliminary Analysis of Modelled Clay Balls in Halaf Communities. In: O.P. Nieuwenhuyse, R. Bernbeck, P.M.M.G. Akkermans and J. Rogash (eds.), *Interpreting the Late Neolithic of Upper Mesopotamia*: 345-353. Turnhout: Brepols Publishers n.v.

Isaac B.
1987 Throwing and Human Evolution. *The African Archaeological Review* 5: 3-17.

Korfmann M.
1973 The Sling as a Weapon. *Scientific American* 229: 35-42.

Kubíková B.
2013 *Re-assessment of Objects Referred to as Sling Missiles in the Prehistoric Archaeology of the Near East.* Unpublished Bachelor's thesis. Masaryk University, Brno. Available from: <http://is.muni.cz/th/361550/ff_b/>.

Mateiciucová I.
2010 Tell Arbid Abyad - A New Late Neolithic Site in the Upper Khabur Basin, NE Syria: The Preliminary Report. In: P. Matthiae, F. Pinnock, L. Nigro and N. Marchetti (eds.), *Proceedings of the 6th International Congress on the Archaeology of the Ancient Near East (ICAANE)*: 411-422. Wiesbaden: Harrassowitz Verlag.

Özdoğan M.
2002 On Arrows and Sling Missiles: What Happened to the Arrows? In: I.R. Aslan *et al*. (eds.), *Mauer Schau: Festschrift für Manfred Korfmann*: 437-444. Stuttgart: Greiner.

Rosenberg D.
2009 Flying Stones - The Slingstones of the Wadi Rabah Culture of the Southern Levant. *Paléorient* 35: 99-112.

Tsuneki A.
1998 Other objects. In: A. Tsuneki and Y. Miake (eds.), *Excavations at Tell Umm Qseir in Middle Khabur Valley*, *North Syria*: *Report of the 1996 Season*: 108-122. Ibaraki: University of Tsukuba.

Vega M.B. and Craig N.
2009 New Experimental Data on the Distance of Sling Projectiles. *Journal of Archaeological Science* 36: 1264-1268.

York R. and York G.
2011 *Slings & Slingstones*, *the Forgotten Weapons of Oceania and the Americas*. Kent: The Kent State University Press.

Submissions NEO-LITHICS, Dr. Marion Benz / Dr. Hans Georg K. Gebel / Dr. Dörte Rokitta-Krumnow
ex oriente, c/o Free University of Berlin, Fabeckstr. 23-25, 14195 Berlin, Germany,
Emails: benzm@hotmail.com · hggebel@zedat.fu-berlin.de · d.rokitta-krumnow@gmx.de, Fax 0049 30 98 311 246.

Orders (New Subscriptions, Payment of Subscription Renewal, Back Issues)
New subscriptions: via https://www.exoriente.org/bookshop/
Payment of Subscription Renewals: via https://www.exoriente.org/bookshop/ (please, mention the invoice number under Message to ex oriente Bookshop from Customer in the shopping basket) or send credit card details (card type -Visa or Master-, cardholder name, credit card number, expiry date, CVV number) to ex oriente Fax 0049 30 98311246 or by letter to ex oriente, c/o Institute for Near Eastern Archaeology, Fabeckstr. 23-25, 14195 Berlin, Germany.
Back Issues before 2010: can be downloaded from www.exoriente.org/downloads/neolithics.php

Subscription
Minimum of three years subscription requested = 6 issues, c. 40-50 pages each, 66 Euro for 6 issues/ minimum subscription period (postage included); back issues available; members of ex oriente receive Neo-Lithics free of charge (included in the 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 without formatting; for the general style of text, bibliography, and captions consult this or a recent issue of Neo-Lithics - Illustration formats: individual EPS, TIFF- files or JPEG in high resolutions; illustrations should not be embedded in the Word file. Please, sent a hard copy of the manuscript in case of complex contributions; keep bibliographic references to the utmost minimum. Authors are obliged to present with their submissions formal letters of agreement by copyright owners if they use illustrations, texts, materials, or ideas from oral presentations obtained from sources not their own. Captions of photo and graphic illustrations must mention the author(s) of the photo or graph, even if rights for these are in the hands of the institution providing these materials for publication.
ex oriente respects UN resolutions as well as the project permits of antiquities departments and or the ethics of funding institutions. ex oriente does not publish data obtained in occupied territories or assists the publication of field data not covered by a permit.

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 an 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 send.

Neo-Lithics is published and distributed by ex oriente, Berlin.
Printing House: dbusiness, Berlin - © ex oriente e.V., Berlin - ISSN 1434-6990