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A Newsletter of Southwest Asian Lithics Research

Editorial

This has been a tumultuous year for many of us, particularly after the violence that began with the tragedy on 11th of September. The consequences have caused great suffering across the world, reaching into the social and professional webs of most of us. The conditions of our research in and out of the field are linked directly to the policies of violence and peace for the Near and Middle East, and few of us find it easy to cope with our research interests and the global and local implications of political unrest. 2001 is behind us, and we can hope that the new year will see steps towards the resolution of all the difficulties that plague us at the moment. We wish a peaceful New Year!

Gary O. Rollefson & Hans Georg K. Gebel

Archaeologists Mourn the Passing of Jacques Cauvin, 1930-2001

The Levantine archaeological community was deeply saddened to learn of the death of Jacques Cauvin at the end of December 2001 after a long battle with illness. After more than 40 years of research in the Levant, which entailed groundbreaking discoveries and interpretations, Jacques' name was virtually synonymous with Near East Neolithic archaeology. His excavations in Lebanon, Syria, and Turkey set exceptional standards of field procedures, laboratory analysis, and synthesis. His many publications inspired several generations of students and colleagues, and his legacy will continue to influence generations into the future. We extend our sincere condolences to Marie-Claire Cauvin and to all of Jacques' intimate co-workers for their loss. The editors will arrange for a special testimonial to Jacques' enormous contributions to Levantine archaeology in the *Neo-Lithics* 1/02 issue.

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Deadline for the coming issue of *Neo-Lithics* is May 1st, 2002 (next deadline: Nov. 15th, 2002)

Please, note that the text of contributions should be send as an email attachment directly to Gary O. Rollefson (rollefgo@whitman.edu; Dept. of Anthropology, Whitman College, Walla Walla, WA, 99362 USA).

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Pre-Pottery Neolithic A Projectile Points at Dhra', Jordan: Preliminary Thoughts on Form, Function, and Site Interpretation

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Introduction

Despite the rapid increase in the frequency of projectile points at the beginning of the Neolithic, they have been regularly interpreted as being associated with a hunting economy during the forager-to-farming transition. Subsequently, sites with high projectile point frequencies have been considered to indicate prehistoric populations relying on terrestrial faunal resources. We feel that the interpretations based on stylistic and typological classifications may be flawed in nature. The purpose of this paper is to begin to build a holistic approach to the interpretation of subsistence economies during the Pre-Pottery Neolithic A in the southern Levant. This holistic approach is based on the inter-site distribution and functional morphology of formalized tools. For the purpose of this paper we focused our analysis on two typologically distinct tool classifications: the awl/borer group and the projectile point group. These data allow us to interpret the site of Dhra' in behavioral contexts rather than under modern day typological considerations. We also feel that analyses like these must be undertaken for researchers to fully understand behavioral aspects at the intra-site level and the overarching transition in from hunter-gatherer to agricultural economic systems in the southern Levant.

Table 1. Distribution of projectile points at Dhra', including the 2001 and 1994 assemblages. Percentages (n/309) in parentheses.

Type/Area	Area1	Area 2	Area 3	Tr. 1	Total
el-Khiam	168 (54.4)	19 (6.2)	13 (4.2)	11 (3.6)	211 (68.3)
Saibiya	18 (5.8)	6 (2.0)	2 (0.6)	16 (5.2)	42 (13.6)
Jordan Valley	2 (0.6)	0 (0.0)	0 (0.0)	0 (0.0)	2 (0.6)
Indet.	45 (14.6)	2 (0.2)	0 (0.0)	7 (2.3)	54 (17.5)
Total	233 (75.4)	27 (8.7)	15 (4.9)	34 (11.0)	309 (100.0)

The Distribution of Projectile Points at Dhra'

The 1994 excavation at Dhra' recovered 106 projectile points and the 2001 excavation recovered 203 (Table 1). There are four main areas of excavation: Area I (formerly Unit One), a 10 x 5m trench; Area 2 a 1 x 3m trench; Area 3 a 1 x 2m trench with a separate 1 x m deep sounding; and Trench I (excavated in 1994), a 9m profile along a military tank trench. Area I contains the most projectile points, with 233 (75.4%). This percentage is similar to the proportions of most of the formal tool categories in Area I, which represent between 70 and 80% of all tools types recovered (Table 2). Based on the architectural and artifact data, Area I has been interpreted as part of the core residential portion of the site (Goodale *et al.* n.d.). Interestingly, the two excavation areas with architectural evidence (Area I and Trench 1) contain the most projectile points. Both Area I and Trench I tool assemblages are comprised of approximately 20% projectile points. Lithic analysis, while still ongoing, indicates that these areas contain a higher number of formal tools compared to Areas 2 and 3, which have been respectively interpreted as a specialized activity area and an initial core reduction center. Goodale *et al.* (n.d.) suggest that the clustering of projectile points in association with the structures indicates that the tool kits typical of the PPNA were manufactured in the resi-

dential loci, while the initial reduction took place in Area 3 (Table 2). Interestingly, the awl/borer category numbers and percentages correspond very closely to the projectile point frequencies in Area 1, and these two tool classifications make up the largest percentage of the formal tools (Table 2).

Projectile points in the southern Levant have traditionally been interpreted as being associated with a focus on hunting, despite their appearance at the beginning of the Neolithic. Fewer projectile points in an assemblage are interpreted as indicative of a heavier reliance on plant resources. Following this model, Dhra' would be classified as either a hunting locality or a residential site with a focus on hunting.

Table 2. Intra-site distribution of tools recovered in 1994 and 2001. Percentages (n/1689) in parentheses.

Class/Area	Area 1	Area 2	Area 3	Tr. 1	Total
Projectile Points	233 (13.8)	27 (1.6)	15 (0.9)	34 (2.0)	309 (18.3)
Awls/Borers	201 (12.0)	37 (2.2)	27 (1.6)	31 (1.8)	296 (17.5)
Sickles	15 (0.9)	3 (0.2)	1 (0.1)	2 (0.1)	21 (1.2)
Scrapers	14 (0.8)	0 (0.0)	4 (0.2)	7 (0.4)	25 (1.5)
Burins	1 (0.1)	0 (0.0)	0 (0.0)	2 (0.1)	3 (0.2)
Truncations	14 (0.8)	0 (0.0)	0 (0.0)	0 (0.0)	14 (0.8)
Non-geometric Microliths	7 (0.4)	0 (0.0)	0 (0.0)	7 (0.4)	14 (0.8)
Ret./Used Bl/bladelets	496 (29.4)	150 (8.9)	31 (1.8)	34 (2.0)	711 (42.1)
Ret./Used Flakes	140 (8.3)	41 (2.4)	34 (2.0)	0 (0.0)	215 (12.7)
Notches/Denticulates	28 (1.7)	9 (0.5)	1 (0.1)	2 (0.1)	40 (2.4)
Double tools	1 (0.1)	0 (0.0)	0 (0.0)	2 (0.1)	3 (0.2)
Tranchet axe	1 (0.1)	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.1)
Beit Ta'amir Blades	3 (0.2)	0 (0.0)	0 (0.0)	0 (0.0)	3 (0.2)
Bifacial Tools	16 (0.9)	2 (0.1)	1 (0.1)	9 (0.5)	28 (1.7)
Varia	4 (0.2)	0 (0.0)	0 (0.0)	1 (0.1)	5 (0.3)
Total	1174 (69.5)	269 (16.0)	114 (6.7)	132 (7.8)	1689 (100.0)

Having outlined the overall characteristics of the distribution of projectile points in the Dhra' assemblage, it is important to consider how this is similar to and different from other PPNA sites in southern Jordan, such as Wadi Faynan 16 (Finlayson *et al.* 2000; Mithen *et al.* 2000) and Zahrat adh-Dhra' 2 (Sayej 2001), and how it compares to other sites in the southern Levant such as 'Ain Darat (Gopher 1995; 1996), Salibiya IX and Netiv Hagdud (Bar-Yosef and Gopher 1997; Nadel 1997). The Dhra' assemblage is composed of a very high number of projectile points when compared to Zahrat adh-Dhra' 2 and Netiv Hagdud, and to a somewhat lesser degree when compared to 'Ain Darat. Projectile point frequencies at Dhra' closely resemble Wadi Faynan 16 and Salibiya IX. Based on these comparisons one might argue that hunting was more important to the residents of Dhra', Wadi Faynan 16, and Salibiya IX while activities more related to plant harvesting may have been more important to those at Netiv Hagdud and Zahrat adh-Dhra' 2.

Microwear Analysis

In order to test the assumption that high numbers of 'projectile' points may be indicative of the relative economic importance of hunting at Dhra', an initial microwear analysis of 100 small, pointed, chipped stone artefacts was undertaken. This section tentatively presents some of the preliminary findings of this ongoing study that is a part of a larger research program examining samples of these tools from several PPNA sites in the southern Levant, including Dhra', Wadi Faynan 16, and PPNA Ghwayr 1. The objective of this study is to examine a regional sample, analyzing patterns of variability in tool frequency, morphology and function in order to study the economic, ideological and social interaction among these sites during this transitional period.

Table 3. Tools selected for microwear analysis from Area 1 and Trench 1.

Type	Area 1	Tr. 1	Total
Salibiya point	2	0	2
El-Khiam point	15	3	18
Point fragment	13	4	17
Awl/Point frag.	4	0	4
Awl	11	7	18
Borer	9	5	14
Gilgal truncation	1	0	1
Burin	0	1	1
Ret. blade	1	3	4
Ret. bladelet	6	1	7
Ret. flake	1	0	1
Unret. Blade	2	2	4
Unret. Bladelet	5	4	9
Total	70	30	100

The preliminary sample from Dhra (Table 3) included several tool types and some unretouched material, all recovered from the 1994 field season. Selected on the basis of broad morphological and metrical similarities, all the examined tools are small (generally less than 50mm in length) pointed artefacts that could plausibly have functioned as projectiles or drills/perforators. The proliferation of small chipped stone points is a striking characteristic of PPNA assemblages, but the possible reasons for this abundance is currently unclear. Indeed, the current subdivision of these tools into pseudo-functional classes, such as projectile points, whilst allowing chrono-stratigraphic issues to be addressed, may be misleading and provide an inappropriate data framework when tackling higher level behavioral reconstructions. Microwear analyses have often demonstrated that assuming a function for a tool, or type of tool, based on the intuition of the archaeological community, or by comparison to tool use in ethnographically studied societies, is a strategy fraught with peril (e.g., Finlayson and Mithen 1997 or papers in Cauvin 1983). An alternative approach, aimed towards constructing a more holistic and reflexive database, may address the question of tool use through functional analysis and experimental replication.

The methodology employed is based largely on those of Grace (1989) and Finlayson (1989). This allows us to study a large sample, employing both high and low power microscopy in addition to analysis of macroscopic wear traces and a consideration of gross tool morphology. The goal is not to provide precise (and possibly erroneous) information regarding contact materials but, rather, to provide accurate information regarding the used area of the tool and the tool motion: this allows the examined tools to be grouped into broad functional categories and has been shown to be reasonably accurate (Grace 1989).

Due to the preliminary nature of this research, and in particular the infancy of the experimental program, many of the functional determinations have been based on experimen-

tal results of other researchers. This is problematic as the raw material used in tool manufacture at Dhra', the particular morphological characteristics of the assemblage and the likely contact materials may often result in wear traces that differ from those found in other experiments. However, there is a general consensus in the available literature regarding the types of wear likely to result from certain activities, particularly at the present coarse level of analysis (Fischer *et al.* 1984; Odell and Cowan 1986; Juel Jensen 1988).

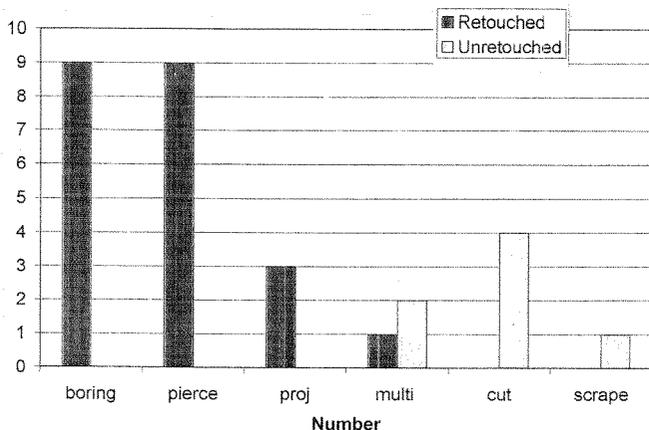


Fig. 1. Microwear-indicated function of tools in the Dhra' assemblage.

Of the 100 analyzed pieces, 41 revealed traces of prehistoric use. This high use rate indicates that these residential areas were the scene of a significant amount of prehistoric activity and were not just manufacturing areas. A total of 18 el-Khiam points was analyzed, of which 12 revealed traces of use-wear (Fig. 1). The wear traces on six of these pieces are currently ambiguous, although further examination and experimental work should allow the prehistoric activity that caused these traces to be identified. Many of the non-diagnostic traces appear to be related to hafting, in that they occur around the base and notch of the tool. Interestingly, many of these traces contain horizontal striations indicative of a rotary or transverse motion. The current literature on hafting traces is somewhat confusing, with several authors claiming that hafting traces are very rare (e.g., Unger-Hamilton *et al.* 1987), whilst others often seem to find traces of hafting (i.e. Bueller 1989). It seems that the efficiency of the haft would govern the amount of use-wear evident on the tool. A very efficient haft, probably incorporating mastic that firmly secures the tool, would tend to leave very few wear traces. Conversely, a less stable haft that allows the tool some movement would cause more discernable wear traces. It is possible that the el-Khiam points at Dhra' were hafted in a fairly loose manner, possibly without the use of mastics.

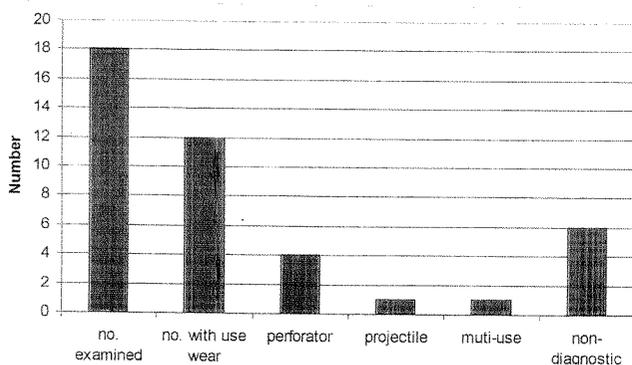


Fig. 2. Retouched versus unretouched tool function.

Of the six points with interpretable wear traces, only one showed clear evidence of projectile use (as defined by Fischer

et al. 1984; Odell 1988). This was in the form of a bending fracture to the tip and a streak of polish emanating near the tip and running parallel to the orientation of the piece. The remaining tools appear to have been utilized as perforators of various types: either with a rotary motion as a drill or borer or as a piercer or punch utilizing longitudinal motion. One specimen revealed evidence of at least two functions: the tip had been used as a perforator whilst one edge had been used for cutting.

These results, although very preliminary, suggest that the primary function of the el-Khiam point, at least in these areas of Dhra', was not as a projectile, rather it was a perforator. Consequently, it may be perilous to interpret this site as a hunting camp based on the number of points recovered. Indeed, in total only three of the 100 analyzed artefacts appear to have been utilized as projectiles; the others constituted a retouched bladelet and a fragment of an undiagnostic projectile tip. Moreover, all the typological perforators that revealed identifiable use-wear traces do appear to have functioned as perforators of some type. If we consider the el-Khiam point as a perforator, rather than as a projectile, then the observed correlation between the numbers of points and perforators (Table 2) may be expected. If the "projectile" points are included in the perforator category then 36.97% of Area I is made up by perforators while Trench I perforators constitute 49.24% of the retouched tools.

This is doubtless an oversimplification, not to mention an overextrapolation from a limited sample. However, it does indicate that understanding tool function alters the manner in which we perceive PPNA behavior. If chipped stone studies are to move into this interpretive role, we argue that a holistic approach, emphasizing tool function, must be adopted. Further work may shed light on how these perforators were used, for example they may have been hafted drill bits used with a bow drill. This work may also elucidate why PPNA Dhra' required so many perforators in such a range of morphological forms. The importance of perforating in the PPNA has already been stressed by Ronen *et al.* (1994), who examined the use wear on a selection of borers from Hatoula: they suggest that the perforators may have been used to pierce reeds, possibly for making fences, traps or baskets. This view of PPNA economy and behavior stands in contrast to the interpretation of Dhra' as a hunting camp. Changing perceptions and interpretations of Dhra' will create opportunities to reevaluate the interaction and relations that must have existed between contemporary sites within the southern Levant during the Pre-Pottery Neolithic A.

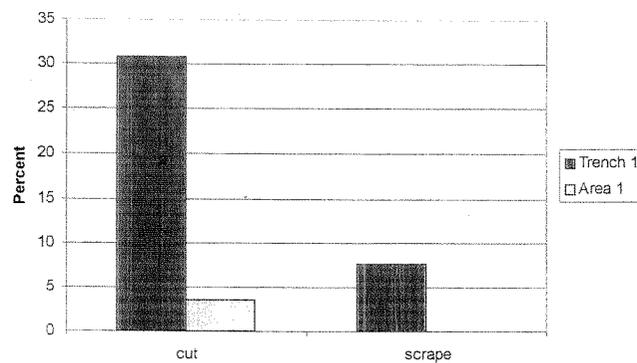


Fig. 3. Percentage of tools used for cutting and scraping.

One other potentially useful result of this study has been that most of the pointed tools had been utilized solely at the tip, as perforators or projectiles, while many unretouched pieces show edge utilization; probably for cutting or scraping (Fig. 2). This may imply, in functional terms, that differences in the relative frequencies of certain retouched artefacts may have less bearing on prehistoric economy than has previously been suggested. Indeed, a real dichotomy may lie in the relative frequency of utilized debitage versus the num-

ber of retouched items. This finding may also provide an example of inter-site differences at Dhra'. Fig. 3 illustrates that Trench I was the scene of considerably more cutting and scraping than Area 1.

There are several weaknesses in our results that prevent any real interpretation at this stage, other than to state that the el-Khiam point was not solely a projectile armature. First, the preliminary nature of the analysis and the lack of detailed experimental work means that the numbers of tools for which a function could confidently be assigned is relatively low. This is exacerbated by the fact that only 100 tools have been examined at this stage, and in this sample only 18 were el-Khiam points. This is particularly problematic when we attempt to understand if certain morphological features, such as length, tip angle or weight, determine the function of a tool. However, this project is ongoing and it is anticipated that an additional several hundred more pieces will be examined in the near future. Moreover, a detailed experimental program to determine the exact causes of wear traces on PPNA projectile points is currently underway.

It may also be argued, that projectile use leaves fewer wear traces than other functions (e.g., drilling), as the tool may only be used once and will only be in contact with the target for a short while. However, in an experimental program Fischer (1985) discovered that macroscopic wear traces were visible on 40% of arrowheads fired once into an animal target, and microwear traces were visible 60% of the time. Although these figures may well vary with the type of projectile, the target and the delivery mechanism, it seems likely that if the Dhra' points were being regularly used as projectiles, then more than one specimen would attest to this fact. Secondly, problems exist in addressing specific tool design function. Tools used for a function other than its designed intent are more likely to become damaged, developing use wear traces. While this is true, the fact that four times as many Dhra' points show evidence of perforating, rather than projectile damage, renders this explanation less likely. Thirdly, the chance that utilized projectile points would return to a living site may be very unlikely and many would probably be lost or discarded during the hunt. Consequently, a residential area may not be the best place to find used projectile points.

Despite these limitations, the preliminary results of the microwear analysis have provided evidence to suggest that the typologically distinct el-Khiam point may not have solely functioned as a projectile armature. Consequently, the traditional interpretation of PPNA sites, which have assumed that this was the primary function of this tool, may be flawed. While these findings are tentative, they are probably not surprising. Indeed, Nadel has frequently suggested that projectile points may not, in fact, have functioned as such (Nadel 1994; 1997). Further, Odell (1988), in a functional study of "projectile" points from the Lower Illinois Valley, discovered that the vast majority of projectile points had been utilized for cutting or sawing. An analysis of tanged points from PPN Abu Hureyra (Moss 1983) showed that several of these tools were used for other functions. However, in this case the majority had been used as projectiles. A preliminary analysis of el-Khiam points from the PPNA site of Wadi Faynan 16, whilst discovering a higher incidence of projectile use than at Dhra', also illustrated that these tools were often utilized as perforators of some kind (Smith 1999). It would appear that the issue of tool function is exceedingly complex and that current typological groups do not reflect classifications that reflect the prehistoric use, or perception, of the tool.

Conclusion

This paper sought to illuminate trends in PPNA site interpretation based on the typological classification versus the functional morphology of projectile points. The site of Dhra' contains a very high frequency of typologically distinct projectile points, but when a holistic approach is applied based on microwear analysis that emphasizes tool function, the

interpretation of Dhra' changes from one where the prehistoric residents relied on hunting to one that emphasized perforating and drilling. Moreover, the microwear study enabled a fine-grained interpretation of Area 1 as an activity area. Instead of just being a formalized tool manufacturing center (as indicated by the typological analysis by Goodale *et al.* n.d.), it was also the place where the prehistoric inhabitants of Dhra' were using the tools. Future studies may reveal subtypes based on morphological and material differences in projectile points that will link to their seemingly various functions. Although preliminary and based on a limited sample, this work is setting the foundation for future studies into the lithic assemblages during the Pre-Pottery Neolithic A. This foundation will allow us the unique opportunity to go beyond typological considerations and move to behavioral aspects indicated by lithic artefacts that characterize the transition from forager to farmer in the southern Levant.

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trenches excavated on two adjoining knolls. Radiocarbon determinations have been made on wood charcoal from all three areas (Table 1). Overall, occupation seems to have occurred in the latter part of the PPNA. On-going analyses into the site and its artefacts include soil micromorphology by Eleanor Roe and microwear of chipped stone tools by Sam Smith.

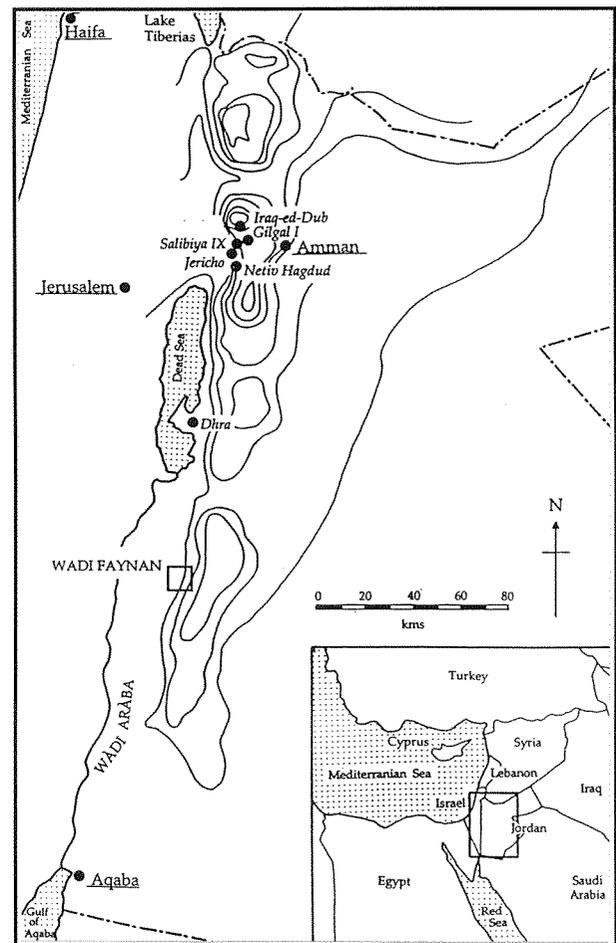


Fig. 1. Map of various PPNA sites.

Table 1. Wadi Faynan AMS radiocarbon dates from Trenches 1-3 on wood charcoal, uncalibrated radiocarbon years BP.

Sample	T-1	T-2	T-3
Beta-135111			10220±60
Beta-120210		10220±60	
Beta-120211		9890±50	
Beta-12205	9690±50		
Beta-120206	9420±50		
Beta-120207	9400±60		
Beta-135110			9180±60

This article will briefly describe the chipped stone assemblages from the three trenches and look at variability between them based on preliminary work with the chipped stone assemblages from the 1997-1999 seasons.

WF16 Chipped Stone Typology

The lithic assemblage at Wadi Faynan is typical of the PPNA (Table 2). Tools are on small blades and bladelets and include ubiquitous PPNA types such as awls, borers, and points. The awls and borers are variable in form; they can be either heavily bilaterally retouched, or only partially retouched in order to produce a sharp tip. As with other early Neolithic assemblages, a large proportion of the assemblage

Wadi Faynan 16 Chipped Stone: PPNA Variability at One Site

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WF16 was discovered by Steven Mithen and Bill Finlayson during field survey in 1996. It was immediately apparent that, as a rare example of a PPNA site outside of the central Jordan Valley area in its location 60km southeast of the Dead Sea, WF16 was an important site (Fig. 1).

Excavation over four field seasons has revealed oval structures with stratified floor deposits, human burials, a rich faunal assemblage and charred plant remains. Artefactual remains including marine shells, polished bone objects, stone beads, several engraved objects, and ground stone artefacts complement an extensive chipped stone assemblage (Finlayson and Mithen n.d. a; n.d. b; Mithen *et al.* 2000). Small-scale excavation has, to date, taken the form of three

consists of marginally retouched blades. A few of these show signs of sickle gloss. The points are small triangular elements (usually microlithic in size) referred to as el Khiam points, Jordan Valley points and Salibiya points depending on the arrangement of retouch and notches (Nadel *et al.* 1991), all of which are diagnostic of the early Neolithic. WF16 has an unusually high proportion of these points – in trench 1 they make up 28% of the tool assemblage. The assemblage also contains microliths, ranging from irregularly retouched bladelets to backed, shaped pieces such as lunates or straight-backed bladelets. Most of the microliths are relatively large and irregular, with little retouch compared to those of the preceding Epipaleolithic. Some few pieces, including geometrics in the form of lunates (1% of retouched assemblage), however, have a Natufian appearance.

The three trenches differ in their assemblage composition. Bifacial pieces with the characteristic Sultanian tranchet sharpening blow across the working edge were recovered from trench 3. A few rough bifacial pieces were also retrieved from trench 2. Bitruncated pieces on bladelets and small blades were recovered from trenches 2 and 3.

Table 2. WF16 retouched tools (preliminary numbers based on 1997-9 seasons) in Trenches 1-3 (T1-3).

Tool class	Tool type	T 1	%	T 2	%	T 3	%
Backed blades		1	0.6	-	-	1	0.9
Bifacial pieces		-	-	2	1.9	8	7.3
Microliths	Backed	12		3		2	
	Retouched	20		21		13	
	d	1		3		-	
	Geometric	4		4		2	
	Fragment	37	22.7	31	29.0	17	15.5
TOTAL							
Burins		3	1.8	1	0.9	7	6.4
Notch/ denticulates		3	1.8	6	5.6	2	1.8
Perforators	Awl	18		18		13	
	Borer	6		1		5	
	Fragment	1		2		1	
	TOTAL	25	15.3	21	19.6	19	17.4
Points	El Khiam	31		10		-	
	Salibiya	7		1		1	
	Jordan Valley	-		2		-	
	Fragment	9		5		-	
	TOTAL	47	28.8	18	16.8	1	0.9
Retouched pieces	Blade	18	11	12	11.2	23	21.1
	Flake	19	11.7	8	7.5	19	17.4
Scraper		10	6.1	6	5.6	4	3.7
Truncations	Single	-	-	-	-	4	
	Double	-	-	2	1.9	4	7.3
Total		163		107		109	

Trench 1 had the highest proportions of all point types. Trench 3 had the lowest proportions of these tool classes. In fact, only one point has been retrieved from this part of the site, and most of its microliths were lightly retouched or truncated bladelets rather than backed pieces.

In summary, while certain tool classes, such as awls and borers, remain fairly constant across the three trenches at WF16, other classes show differing proportions of those tools considered diagnostic of the two PPNA facies. Trench 1 has a high proportion of el Khiam points, with microliths including some backed and geometric forms. No bifaces or truncations were found in trench 1. This is suggestive of a 'Khiamian' assemblage. Trenches 2 and especially 3, on the other hand, contain fewer points, but with microliths that are often truncated, bifacial pieces and glossy blades, making a typically 'Sultanian' assemblage. Trench 2, however, has a higher proportion of microliths generally than trench 1.

However, radiocarbon dates do not confirm the sequence usually suggested. Dates from Khiamian trench 1 place it later

than Sultanian trench 2, and Sultanian trench 3 spans dates from the other two trenches (Table 1).

Technology

Cores are single and multiple platform, small, and often irregular or subpyramidal. The assemblage is largely composed of flakes, as well as irregular blades and bladelets. Bladelets are more common than blades. This is even more marked at WF16 than at other PPNA sites, reflected in the high proportion of microliths, points and other tools made on bladelets. There is a lack of distinction in size or technology between blades and bladelets. That is to say, there is a continuum in the size of blades, from large bladelet proportions up to small, narrow-blade sized; and all are created using the same reduction process and techniques. There is a high proportion of flakes – again, even more marked at WF16 than at other PPNA sites. In trenches 1 and 2, however, the majority of retouched tools are on blade/lets. Those flakes that are retouched are the largest ones, and they are rough, marginally retouched pieces. Trenches 1 and 2, despite their differences in typology, show no differences in technology. Interestingly, at Hatoula, the other site with both Khiamian and Sultanian levels, no technological differences were reported between the two assemblages (Lechevallier and Ronen 1994).

In contrast, trench 3 shows some interesting technological differences from the other two trenches. There seems to be more concern for control of blank dimensions with more platform preparation, and production of thinner blanks. Retouched artefacts are often less modified than those in trenches 1 and 2, possibly explaining the importance of initial control of blank dimensions. There is less differentiation of flakes and blade/lets. Both show some prepared platforms and similar dimensions. Flakes are retouched much more often than in trenches 1 or 2 or any other PPNA site, making up 63% of the retouched tools. This contrasts with the site of Hatoula, for example, where only 28– 35% of the retouched tools were on flakes.

Table 3. Debitage from trenches 1-3 at WF16 (preliminary numbers based on 1997-9 seasons).

Debitage	T 1-2	%	T 3	%
Blades	198	2.5	48	1.6
Bladelets	548	6.9	409	13.6
Flakes	3675	46.8	1335	44.3
Cortical	387	4.9	168	5.6
Cores	51	.6	44	1.5
CTEs	29	0.4	28	.9
Microburin	11	0.1	1	.03
Spall	-	-	1	.03
<i>Subtotal</i>	<i>4899</i>		<i>2034</i>	
Debris				
Chips	1884	24	550	18.2
Chunks	1066	13.6	432	14.3
<i>Subtotal</i>	<i>2950</i>		<i>982</i>	
Total	7849		3016	

WF16, Chronology and the PPNA

Chipped stone and other variability between PPNA sites has been much debated over recent years, and interpreted variously as chronological (e.g., Ronen and Lechevallier 1999), functional/distributional (Nadel 1990), or taphonomic (Garfinkel 1996).

Assemblages have been classified as either

- Khiamian, containing many points and microliths, and seen as transitional assemblages from the Epipaleolithic to earliest Neolithic, or
- Sultanian, containing some new specifically Neolithic tool types, such as bifacial pieces and bitruncated bladelets as well as sickle blades, and fewer points and microliths, and seen as 'full-blown' Neolithic following on from the Khiamian.

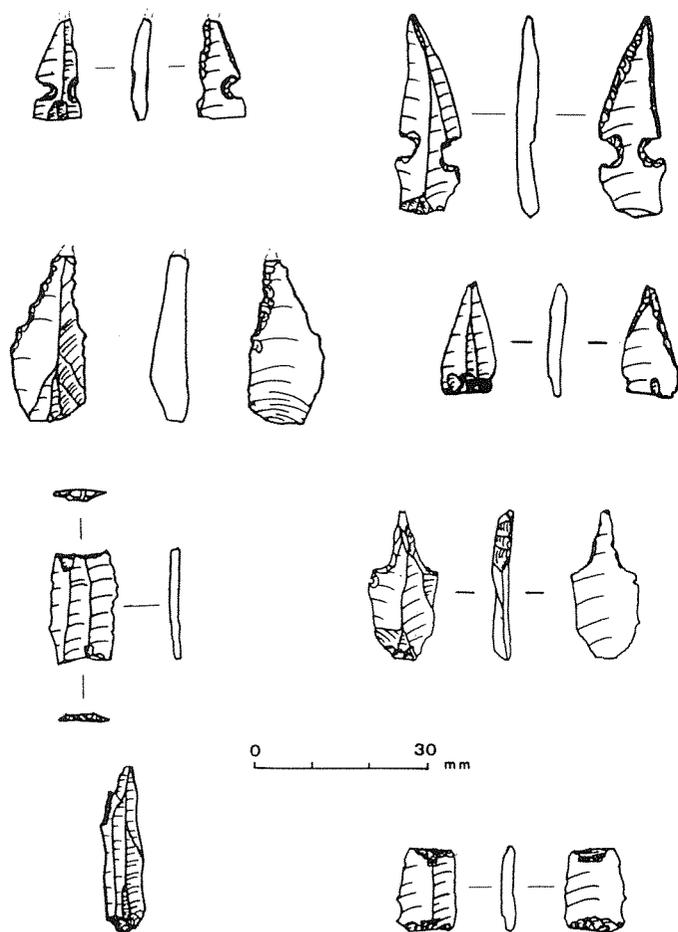


Fig. 2. Retouched tools from Wadi Faynan. (Drawing by S. Dennis).

Variability has been measured in terms of stone tool typology: the presence, absence, or relative proportions of microliths, points, sickle blades and truncated bladelets have formed the basis for a lively debate on how variability in these assemblages can be understood (Nadel 1998; Kuijt 1996; 1997; Gopher and Barkai 1997).

At WF16 we have good examples of both these PPNA entities in neighbouring radiocarbon-dated trenches. The Sultanian assemblages, from two trenches, appear to span the occupation of the site, while the Khiamian assemblage is limited to the *latter* part of the occupation in one trench. The two tool assemblages show the classic differences in proportions of tool types. However, all trenches show a similar technology, with trench 3 diverging from the other two in terms of the treatment of flakes and overall control over blank preparation.

This seems to throw significant doubt on the idea of two successive cultural entities, at least in Wadi Faynan. Analysis of radiocarbon determinations in relation to stratigraphy and to chipped stone variability may reveal further patterns. For example, the question of the very small number of Natufian-like pieces in trenches 1 and 2 must be clarified in relation to the radiocarbon dates and especially to site stratigraphy. They stand out from the rest of the microliths, and the possibility of intrusion cannot be ignored, whether from the activities of Neolithic inhabitants or from post-depositional factors. There is as yet no sign of underlying Natufian occupation. It is possible that some of the Natufian-like elements may be associated with building materials brought on-site in the course of Neolithic building activities.

Indeed, the differing proportions of other tool classes may also relate to differing types of context and the Neolithic activities that formed them. Trench 1 contains pits filled with midden layers and fewer formal structures, which were dug into midden. This could in some way relate to its assemblage composition. The lack of bifacial pieces and truncations, along with fewer formal microliths, may stem from the segregation of midden-related activities and associated tools. Further work on site formation and its relation to chipped stone variability is necessary.

While underlying technology at trench 1 and trench 2 remains the same despite differences in tool class proportions, trench 3 shows some other technological differences. The differences may suggest a reduction process adapted to different tool needs. With the point-and-microlithic assemblage in trenches 1 and 2, the emphasis is on a blade/let technology in both trenches, despite some differences in tool classes and a time span between the two trenches of up to 500 years. In trench 3, apparently contemporaneously, the emphasis is on the controlled production of blade/lets and flakes for the production of small, marginally retouched tools and truncated pieces. How this relates to the more formalised structures of this part of the site and the as yet enigmatic burials and other finds remains to be seen.

Conclusions

At WF16 we have a fascinating opportunity to look at the relationships between three assemblages showing cross-cutting areas of similarity and differences within one phase of the PPNA.

There may well be two different types of assemblages in the PPNA; in fact, it may turn out, after careful technological studies of more assemblages, that there is *more* variability, rather than less, in the PPNA. The variability within sites (e.g., Ronen and Lechevallier 1994; Nadel 1998) and notorious variability within both Khiamian and Sultanian entities (Nadel 1990) suggests that a simple cultural-historical progression of site types does not allow us to fully understand chipped stone variability and its relationship to Neolithic activities. Increasing complexity of settlement and economy may have created different types of sites. Ian Kuijt (1994) has argued for a settlement hierarchy between PPNA sites in the Jordan Valley, and indeed differences in subsistence between sites in different areas may be greater than hitherto supposed (Mithen *et al.* 2000). Activities within site may be more spatially defined, resulting in a more complex archaeological record or variability within site. Some researchers (Hodder 1990; Watkins 1990; 1992) have emphasised a change in attitudes to the house, and in the organisation of space, as a major innovation in the earliest Neolithic. Certainly at WF16, different areas of the site show evidence for different building and destruction practices as well as building forms and contents; this may also be reflected in variability of tool technology and form.

How far differences in chipped stone assemblages relate to new sources of variability, structure and patterning in Neolithic activities must be a priority for future research.

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The PPN/PN Settlement of Tell Seker al-Aheimar, The Upper Khabur, Syria: the 2001 Season

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Introduction

Tell Seker al-Aheimar is a Neolithic mound situated on the right bank of the Khabur main stream near Tell Tamor, Syria. It encompasses an area of about 300 by 180m, rising around 11m from the surrounding surface. The archaeological excavations at this Neolithic site were first carried out by the University of Tokyo mission in 2000, when trial trenches were opened in five sectors mainly along its northern edge (Nishiaki 2001). The trenches exposed thick cultural deposits of both the PPN and the PN periods beneath relatively thin levels of the late Chalcolithic period.

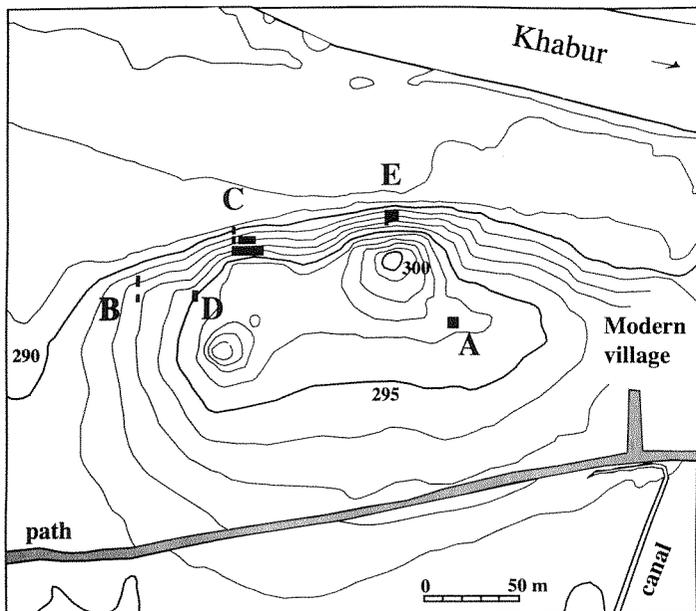


Fig. 1. Tell Seker al-Aheimar and the location of the trenches.

Of most interest are the PPN remains, since substantial archaeological evidence of this time period had been rarely reported from the Upper Khabur basin (Hole 1999; Nishiaki 1992, 2000a). They represent so far one of the earliest traces of Neolithic occupation in this part of North Mesopotamia, a key archaeological resource for understanding the origin(s) of the PN or Proto-Hassuna settlements that are widely known in the region. Thus the main target of the second season's excavation, conducted between August 26 to September 30, 2001, was to investigate the PPN levels more extensively so that their cultural relation to the PN can be determined in detail. Three of the five sectors designated in 2000, i.e., A, C and E, were further excavated in the 2001 season (Fig. 1).

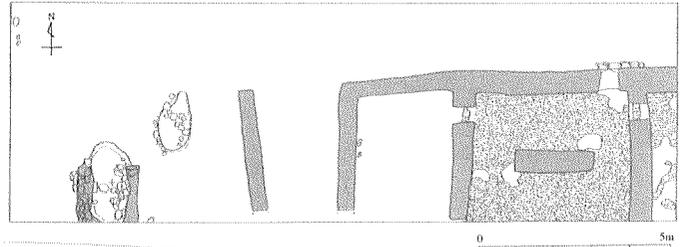


Fig. 2. Architecture from the latest PPNB level of Sector C (C9/10). The dotted area indicates gypsum-plastering.

Excavations

Sector A, situated in the eastern part of the mound, was excavated as a 4 x 4m pit in 2000. It was enlarged in the present season 2m to the south and the east respectively. Further enlargement was difficult in practical terms because of its location in a narrow area between the communal cemetery and the irrigated cotton field. It reached to a level about 280cm below the present surface, yet several meters higher than the supposed virgin soil level. Three Chalcolithic and seven Neolithic occupation levels were identified. While the upper Neolithic levels were more or less disturbed, the bottom two, Levels 9 and 10, produced better-preserved remains. They contained similar pisé-walled buildings, whose rooms were characterized by a combination of several small rectangular or square rooms about 0.6-1.2m by 1.2-3.5m. The general

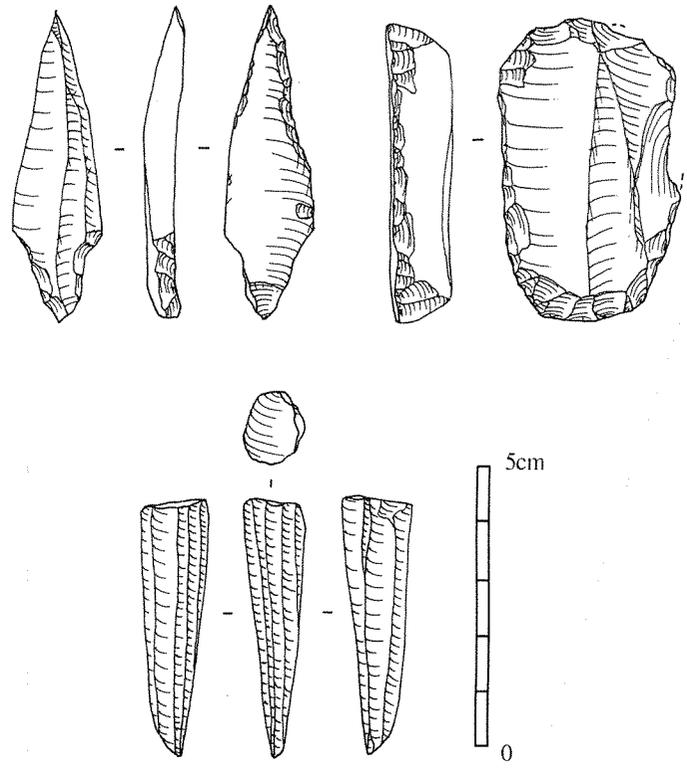


Fig. 3. Flaked stone artifacts from Sector C. left: point (flint, PPN), middle: end-scraper (flint, PPN), right: bullet core (obsidian, PN).

appearance closely resembled the final PPNB to the earliest PN buildings of Tell Bouqras (Akkermans *et al.* 1981), although no use of mudbricks was recognized at Tell Seker al-Aheimar. Level 10 was aceramic, but whether or not it indeed represented a PPN level is yet to be confirmed by further excavations.

In Sector C, situated at the northwestern edge of the mound, three rectangular trenches (C9/C10 [17 x 5.5m], C8 [8 x 4m and C6 [2 x 4m]) were excavated. The C9/10 trench is the one located in the south, close to top of the mound. The excavation reached about 240cm below the present surface, and at least five Neolithic levels were identified below an extensive eroded layer of the late Chalcolithic. The upper two levels were derived from the PN period, containing coarse ware pottery of the Proto-Hassuna type. Due to much disturbance of the Chalcolithic period, the surviving PN architecture was limited to several round pits and a couple of fragments of stone walls, perhaps foundations of pisé-walled buildings.

The architecture of the underlying PPN considerably differed from the PN. Buildings showed far more solid construction. The best-preserved structures were from the latest PPN level (Fig. 2), comprising two large ovens in the west and a rectangular building in the east. The larger oven rose about 60cm above the floor, with a rectangular base 160cm long and 90cm wide. The smaller oven had an oval plan of 140 x 80cm, and its side-walls were only about 20cm high. The construction techniques of these ovens and their relative position to each other are quite similar to those of the

PPNB settlement at Tell Halula, the Upper Euphrates (Molist 1998). The pisé-walled building in the east had at least three rectangular rooms connected with each other through narrow entrances about 50 to 60cm wide. The floor of the central and the eastern rooms were nearly completely plastered with thick layers of white gypsum, but the western one was only partially plastered. The inner wall surface of the former rooms was also neatly plastered with fine yellowish white gypsum. This suggests that the eastern two rooms may have had a roof, and the west one was an open-air courtyard. As a matter of fact, the central room contained a freestanding wall, which might well have supported the roof beams.

Comparable PPN buildings were discovered in the lower levels of C9/C10, and in C8 and C6 as well. Judging from the oldest architectural level unearthed so far in C6, located at the northern edge of the mound, the PPN cultural deposits of Sector C are at least 5m thick. Throughout this PPN sequence the architecture was characterized by rectangular buildings with gypsum-plastered floors. The walls were made of pisé, and no use of mudbricks was recognized. One remarkable discovery associated with the architecture was a human footprint on a mud-plastered floor of the second PPN level of trench C9/C10. Our preliminary observation indicates that it represented an impression of a shoe, unique evidence demonstrating the use of shoes in the Neolithic period.

The small trench (originally 2 x 4m) of Sector E, situated on the northeastern slope, was also enlarged in this season to form a rectangular pit of 7.5 x 6 m. The deposits, about 320cm thick at the deepest point, belonged entirely to the Neolithic period. They were divided into at least four occupation levels, including two PN and two PPN layers. A standing structure was discovered from the earlier PPN level only. It was a pisé-walled building, partitioned to have rectangular rooms. One of the rooms was nearly fully excavated, although its northern edge was missing due to erosion. It had a rectangular plan of about 5.5 x 4.4m, with a thick gypsum-plastered floor and inner walls. The room showed unique features: the southwestern wall had a rectangular niche about 90cm wide and 30cm deep, and the northeastern wall had a ca. 20cm high platform nearly the same size as the niche. In addition, it had a water channel with a gypsum-plastered floor that led to a room in the south. Thus the structures of the earlier PPN level of Sector E, also assigned to the late/final PPNB, differ greatly from those of Trench C, suggesting a special character of this building complex.

Artifacts and Faunal Remains

Preliminary analysis indicates that the settlement of Tell Seker al-Aheimar was occupied during the late/final PPNB to the early PN periods. The artifactual assemblages of these periods resemble each other, but at the same time some chronological changes are observable. For example, flint and obsidian artifacts show remarkable time-vec-tored changes in technological aspects (Fig. 3). The flint blade production became less common in the later PN levels, and standardized tools such

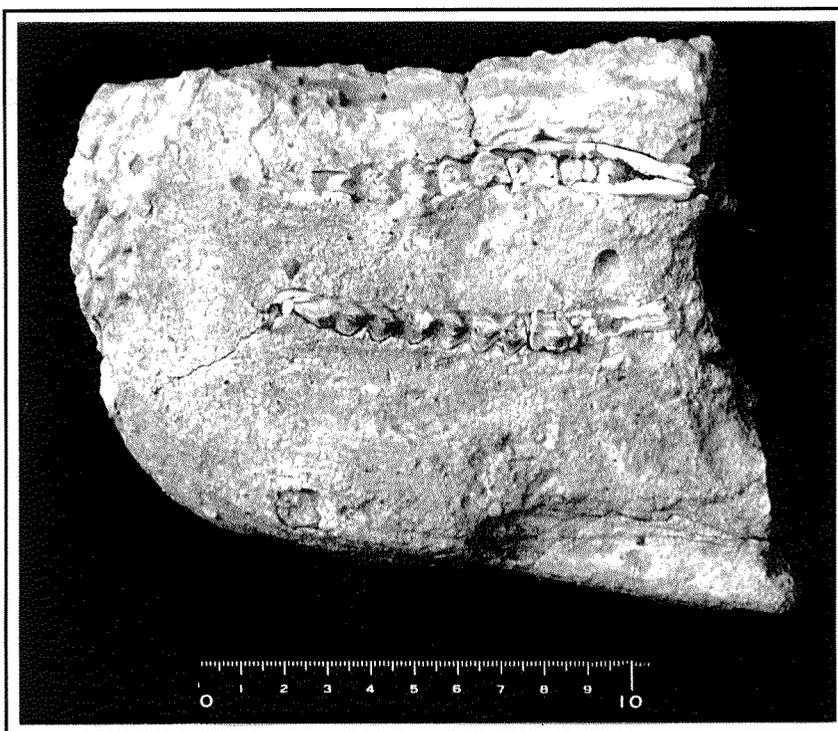


Fig. 4. Gypsum object from the second PPNB level of Sector E.

as burins and end-scrapers were also increasingly replaced by amorphous flake tools. In addition, the amount of obsidian decreased in the PN phases from nearly 40 % to about 10 %. All these trends well match those already documented at other late PPNB to the PN sites in the Syrian Jazirah (Nishiaki 2000b).

The pottery also changed. The typological study by Marie le Mièrè shows that the PN sequence of Tell Seker al-Aheimar is divisible to at least two phases. The pottery from the later PN levels was mainly chaff-tempered coarse ware of the Proto-Hassuna type, while the earlier one contained a greater amount of mineral-tempered sherds. The latter ware, first discovered in Trench B in the 2000 season, has been suggested to represent one of the oldest pottery industries known in the Khabur basin (Nishiaki 2001). The excavations of Sectors A and E in this season confirmed this estimate, attesting that the use of the mineral tempered ware predates the Proto-Hassuna entity at least in this part of Syria. The PN levels of Sector C represent the Proto-Hassuna phase only, on the other hand.

The other artifactual remains from the Neolithic levels consisted of grinding stones, vessels made of either gypsum or stone, bone tools, stone beads, and so on. Among these particular attention should be drawn to the gypsum objects. They included at least four fragments of 4 to 5cm thick disk-

shaped gypsum objects, in which several (up to six) jaws of goat, sheep and gazelle were embedded with their teeth upright (Fig. 4). Since no traces of human use were identified on the teeth, they could have been of a non-practical or ritual use. These pieces were recovered from both PN (Level 9 of Sector A) and PPN (Sector E) levels, suggesting continuation of the ritual practice (?) over this time period. A very similar piece to these curious gypsum objects is said to have been excavated in the early PN context of Umm Dabaghiyah, Iraq (Stuart Campbell, pers. com.).

A preliminary analysis of the faunal assemblages from Sector E by Lionel Gourichon suggests possible subsistence changes between the PPN and PN levels. Remains of *Bos* and *Equus* significantly increased in the PN levels, and the proportion of *Sus* remains also increased. Consequently the relative importance of *Caprinae* decreased from the PPN levels. The more diversified faunal assemblages may indicate an introduction of new subsistence technologies in the PN period.

Conclusion

In summary, the major results of the second season's excavations at Tell Seker al-Aheimar are two-fold. First, the discovery of well-preserved PPN architecture in Sectors C and E is important. The structures are the first ones to have been ever reported from the upper Khabur region. Second, the pottery sequence established in Sectors A and E should also be emphasized. It confirmed that an earlier phase of the PN had existed before the Proto-Hassuna entity emerged on the Khabur.

Our interest in Tell Seker al-Aheimar was originally based on the current knowledge of the earliest settlement history of the Khabur basin. Surveys and excavations in the last decade located dozens of Proto-Hassuna sites of the PN, but very rarely were any earlier ones found in this vast fertile plain (cf. Hole 1999). Accordingly, it has been suggested that occupational or subsistence strategies may have significantly changed during this time period. Tell Seker al-Aheimar is now providing us with a unique opportunity to understand how and why this change occurred, for our two seasons' work produced a range of evidence directly related to this problem.

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A Brief Note on the Chipped Stone Assemblage from PPNA Nachcharini Cave, Lebanon

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Introduction

Nachcharini Cave was first discovered in the early 1970s, and excavated by Bruce Schroeder in 1972 and 1974 as part of the University of Toronto's investigation of Natufian and early Neolithic occupation in the Béqaa area of Lebanon (Fig. 1). Natufian, PPNA and PPNB horizons were identified within the 2-metre deep deposits, identified on the basis of preliminary chipped stone analyses. Unfortunately, work was cut short by the civil war. That work has been published in brief notes (Schroeder n.d.; Copeland 1991), but the chipped stone assemblage, which was stored in the National Museum of Beirut, was never fully described.

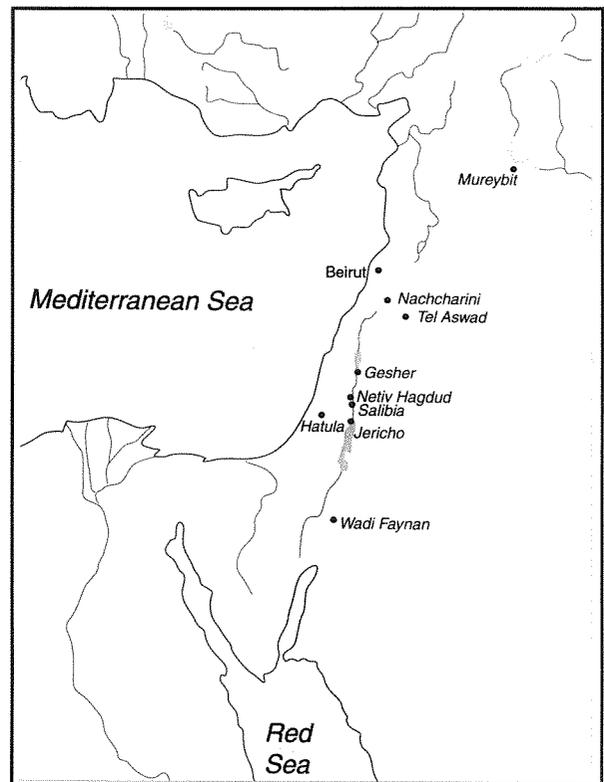


Fig. 1. Map of various PPNA sites.

The cave has recently been subject to reinvestigation in 2001 as part of a project investigating prehistoric land use of the interior highlands of the area under the direction of Alex Wasse (CBRL)¹. The site is located at an elevation of 2100 masl, making it one of the highest PPNA occupations identified to date. Snowfall in the area lasts into the spring months, and snowmelt irrigates the area into June, sustaining what was historically one of the richest pasturages in the Levant. At this elevation there is no large permanent source of water, although there are several small seeps and springs, and more springs at lower levels are a day's walk away. This has led interpretations of the site to suggest repeated short-term occupations during the late spring and summer months (Schroeder n.d.).

The 2001 season surveyed the region to investigate pre-historic upland use in the context of animal exploitation and especially caprine domestication (Wasse 2001). During the course of work it became evident that Nachcharini Cave had been the victim of robbing, with serious damage to part of the cave's deposits dug out to the bottom of occupation deposits. Excavation of the cave had not been a goal for the 2001 season, but rescue and basic analysis of the dug out deposits was clearly a priority. This brief note describes the chipped stone assemblage from these deposits, which obviously is without stratigraphic context. It is hoped nevertheless that a description of the chipped stone will be of general interest given the scarcity of PPNA sites in the central Levant, and especially in upland locations.

Chipped Stone Assemblage

A chipped stone assemblage of 1197 artefacts was retrieved from the spoil of a 2.2m deep pit dug by robbers. All sediments were sieved. The chipped stone is in good condition, with fresh edges and little patination. Raw material was mainly grey to grey-brown and homogeneous, with rare chalky cortex suggesting non-wadi raw material. One obsidian bladelet was retrieved.

The assemblage is very blade/let oriented with a flake: blade ratio of 1.1:1 (including retouched pieces). Blades and bladelets are regular, and there is little size distinction between the two, with narrow blades only slightly larger than bladelets. Some blade/lets also have punctiform or linear butts. Flakes are also small and fine.

There are few cores in the assemblage, and they include mainly single platform subpyramidal cores, and opposed or twisted platform cores. There are two bipolar cores, one of which is naviform in shape. Removals from these and other cores are very structured and regular, with fewer amorphous or multiple platform cores than in many PPNA assemblages. Cores are small and thoroughly used, with bladelet/flakelet removals. Core trimming elements include many platform rejuvenation pieces such as platform and striking face removals and core tablets.

The assemblage has a high proportion of retouched tools (Table 1), the majority of which are on bladelets (76%). Although flakes make up 44% of the assemblage, only a tiny proportion of them is retouched.

Whilst there are elements of all parts of the knapping process present in the assemblage, cores make up only a small part of the total. Cortical pieces are also very rare. The assemblage is suggestive of one in which the initial stages of knapping are rarely present, although later stages of knapping, blank production and core rejuvenation are common.

Table 1. Cross tabulations of debitage and retouched tools in the Nachcharini assemblage.

	Flakes	Blades	Blade-lets	Chips	Chunks	Cores	CTEs	Micro-burins	Total no.
Debitage	515	61	296	169	11	10	24	1	1087
Retouched tools	13	13	84	0	0	0	0	0	110
Total	528	74	380	169	11	10	24	1	1197
% of total artefacts	44.1	6.2	31.7	14.1	0.9	0.8	2	.08	99.9
Retouched as a % of debitage category	2.5	17.7	22	-	-	-	-	-	9.2

Typology

The assemblage is in many ways classically PPNA (Table 2). Overwhelmingly comprised of tools on bladelets, these include bitruncations, points and microliths.

Bitruncations have variously been called bitruncated rectangles (Schroeder n.d.) and Hagdud truncations (Bar-Yosef *et al.* 1987). At Nachcharini they are the largest tool class and

include bladelets (and occasionally small blades) truncated at either end, with straight or occasionally concave truncations.

Points make up a large part of the assemblage, and include el Kham (10) and Salibiya (3) points as well as snapped tip-ends of points (7).

Microliths include mainly marginally retouched bladelets, as well as one Helwan lunate. Other tool classes are also typical of the PPNA. Perforators/borers are made on blade/lets, some with tips retouched to a point, and some with more regular bilateral retouch. The retouched blades are small and marginally retouched with no sign of gloss.

Table 2. Typological distribution of the Nachcharini assemblage.

Retouched tool classes	n	%
Bitruncations	41	37.8
Points	20	18.0
Microliths	12	10.8
Perforators	6	5.4
Retouched blades	12	10.8
Notches	2	1.8
Burins	2	1.8
Retouched flakes	9	8.1
Retouched fragments	6	5.4
Total	110	99.9

The assemblage is unusual for several reasons. The focus on bladelet tools is high compared to other PPNA assemblages, which often also have high numbers of retouched flakes and some retouched blades. Certain tool classes are very heavily represented, such as bitruncations. Bitruncations at other PPNA sites tend to be found in much smaller proportions: 1.55% at Netiv Hagdud (Nadel 1997) or 1.6% at Wadi Faynan 16 (Pirie, this issue). PPNA sites have extremely variable proportions of points – for example, Salibiya has 17.6% (Enoch-Shiloh and Bar-Yosef, 1997), and Wadi Faynan 17.4% (Pirie, this issue), Netiv Hagdud 2.96% (Nadel 1997), and Hatoula Area A 2.2% (Lechevallier and Ronen 1994). Nachcharini thus has among the higher point proportions. The larger or more irregular tool classes are found less commonly at Nachcharini – retouched flakes, retouched blades and notches. Perforators are far less common here than at many other PPNA sites.

Summary

As a whole the assemblage seems clearly to date to the PPNA. The only two pieces suggestive of Natufian occupation found in the 2001 deposits include one Helwan lunate and one Krukowski microburin. The presence of a more regular core technology, including bipolar and naviform technology, is suggestive of phase II at Mureybit (Cauvin 1994), although Helwan points, another indicator of this phase, are absent. Clearly, given the stratigraphic problems of the assemblage, and the fact that it may well include more than one occupation horizon, it would be difficult to pinpoint the assemblage in any more detail. The contents of the retouched tool assemblage have some intriguing differences from other published PPNA sites, which may well be a result of the particular activities carried out at Nachcharini. The focus on the final stages of very regular bladelet production and their subsequent retouch into bitruncations and points, as well as non-formal microliths, may suggest more specialised activities than those carried out at many other PPNA sites. These may relate to hunting and the production of hunting technology, but recent evidence (Smith 1999) suggests that el Kham points at some other sites such as Wadi Faynan 16 may have been used for a variety of non-hunting activities.

Any future work at Nachcharini Cave would probably contribute substantially to our understanding of the hitherto vexing question of variability of chipped stone assemblages

in the PPNA. It will allow us a different view of assemblages from the perspective of specific activities within an upland location.

End Note 1. Members of the 2001 project team included: Joanne Clark (University of East Anglia), Pat Critchley (UCL), Sal Garfi, Andrew Garrard (UCL), Maya Haidar (Université Saint Joseph, Beyrouth), Aladdin Maadi, Steve Rhodes (University of Toronto), Bruce Schroeder (University of Toronto) and Corine Yazbeck (Université Saint Joseph, Beyrouth).

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The 2001 Excavation Season at the Pre-Pottery Neolithic A Period Settlement of Dhra', Jordan: Preliminary Results

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Background

Between May 15 and June 30, 2001, co-principal investigators I. Kuijt and B. Finlayson conducted excavations at the Pre-Pottery Neolithic A period (PPNA) settlement of Dhra', Jordan. This project is focused on understanding the transition from foraging to farming along the Dead Sea Basin and the Kerak Plateau. Excavations at Dhra' seek to document the social, economic, and technological developments of this period from the perspective of a single, thoroughly researched case study. This research project is planned for the next three years, and it should provide an excellent basis for comparison with other PPNA sites situated in the same region of the Dead Sea, such as Wadi Faynan 16 (Finlayson *et al.* 2000; Mithen *et al.* 2000), 'Ain Darat (Gopher 1995, 1997) and Zahrat adh-Dhra' 2 (Sayej 2001), as well as with sites within the greater southern Levant.

The prehistoric site of Dhra' is situated five kilometers east of the modern town of ed-Dhra', Jordan. Located at five meters below sea level, the site is bounded by high cliffs to the east, the Wadi Dhra' to the north, and erosional cuts to the west and south (Fig. 1). The springs of 'Ain Waida', 500m to the east, provide a year-round supply of water that runs along the drainage bed of the Wadi Dhra' some 30m below the level of the settlement. Previous research by Raikes (1980) and Bennett (1980) in the late 1970s, as well as that of Kuijt and Mahasneh in the mid-1990s (Kuijt 1994; n.d.; Kuijt and Mahasneh 1998) illustrate that there are two major periods of occupation represented at Dhra': the Pottery Neolithic and Pre-Pottery Neolithic A.

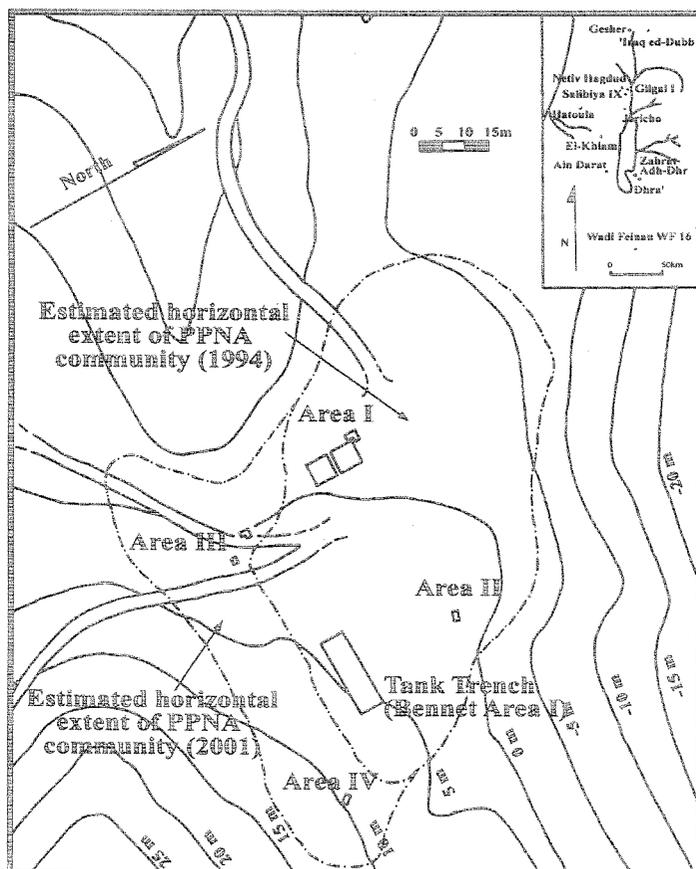


Fig. 1. Site map of Dhra', Jordan. Note the increase in the estimated horizontal extent of PPNA cultural deposits based on the 2001 soundings.

With the exception of several Pottery Neolithic structures in Area I (Tank Trench), there is only limited structural or artifactual evidence for the Pottery Neolithic occupation. Conversely, the PPNA occupation appears to have been extensive at Dhra', with substantial architectural and artifactual evidence indicating that in the past this settlement was a major PPNA settlement. In 2001 excavations focused on two major goals: 1) to define further the physical extent of the PPNA occupation and 2) to expose a large horizontal area around the well-preserved PPNA stone structure identified in 1994. As described below, the first of these goals was achieved by the excavation of several small units in areas previously thought to be outside the distribution of PPNA cultural material, as well as by the use of geophysical survey methods under the direction of Dr. M. Schurr (University of Notre Dame). The second goal was achieved by the excavation of a large unit (Area 1) next to the 1994 excavation unit.

Geophysical Survey

The major goals of the geophysical research were to identify PPNA and Pottery Neolithic sub-surface features before excavation, to provide an indication of the total area of the

settlement, and to assess the application of magnetometry to PPNA research. Using 50 and 25cm intervals, the survey recorded and mapped all sub-surface magnetic anomalies within the site grid. A series of significant anomalies was observed. A 5 x 5m excavation unit was placed over one of the anomalies recorded adjacent to the 1994 excavation unit 1. As outlined below, a large well-preserved, roughly oval mud structure (c. 3.5 x 3.5 meters in size) was found here at a depth of 60cm below surface. While further research is needed to explain the relationships between the location and nature of geophysical anomalies and sub-surface features at Dhra', preliminary results from the geophysical survey suggest that this remote sensing method may be able to help to locate, and perhaps indicate the depth of, large cultural features.

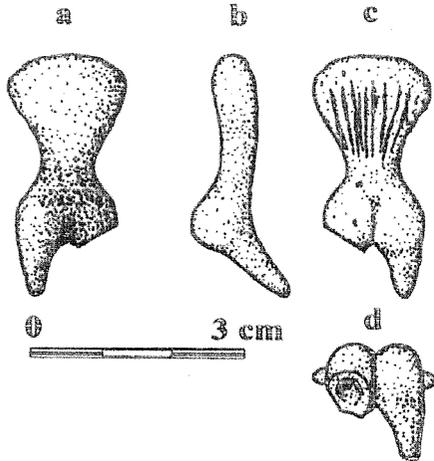


Fig. 2. Views of PPNA clay seated human figurine from Dhra', Jordan: front (a), side (b) rear (c) and underneath. Note stylized lines along the back representing hair.

Excavation Results from Soundings

In addition to the geophysical survey research, the horizontal extent of the PPNA occupation was tested by opening up three small excavation units to the east (Area 2), south (Area 3), and southeast (Area 4) of previous soundings (Fig. 1). Excavations in 2001 employed the same field methodology as in previous seasons, focusing on the excavation of 1 x 1m units by stratigraphic layers, with all sediments screened through 2 mm mesh. This provides a detailed understanding of the nature of subsurface deposits as well as the size of the settlement. In brief, these probes indicate that the PPNA occupation of Dhra' was more extensive than previously understood. While field research conducted in 1994 indicated that the PPNA occupation covered an area of approximately 80 by 50 meters, or an area of 4,000 m², the 2001 test excavations indicate that this is at least 100 by 65 meters, or an area of approximately 6,500 m².

Area 2

This 1 x 3m unit was placed on the edge of a modern military trench to define better the depth and nature of cultural deposits on the eastern edge of the settlement. Excavation was conducted to a depth of approximately 130cm. They were stopped with the identification of feature 9, a well-preserved PPNA mud plaster bin or basin feature. All of the cultural materials recovered from the level of this feature, as well as above it, are PPNA. They include clear diagnostics such as el-Khiam points, borers, retouched blades, and single-platform cores. Sterile deposits were not reached.

Area 3

Soundings in Area 3 consisted of four 1 x 1m units. Three were adjacent to each other and were excavated to a depth of between 30 and 60cm below surface. None of the three reached sterile deposits, and no clear features were identified

during excavation. The fourth unit was placed farther to the south. While almost no cultural materials were observed on the surface, this unit contained dense PPNA cultural materials down to a depth of 200cm where sterile deposits were encountered. The cultural sediments appear to have been deposited as midden refuse, at times in sharply dipping layers, perhaps suggesting that refuse was tipped over the former edge of the hill. This provides useful information on topography during the PPNA and an indication of settlement size. Based on the presence of an alignment of several large stones, it is possible that the remains of a structure or large terrace feature existed in this area, although a greater horizontal exposure is required to verify this. Recovered diagnostic cultural materials from this unit include el-Khiam points, borers, cores, and groundstone items. No cultural material was recovered from other periods.

Area 4

The excavations in Area 4 were placed on the edge of a relatively small military trench in the southeastern area of the site. The 1 x 2m unit was excavated on the up-slope, or southern side, of this feature. This sounding revealed a 30-40cm layer of PPNA deposits capped by 40cm of colluvium redeposited from upslope. Surface examination revealed no clear cultural materials. Area 4, the highest known area of the site, is situated some eight meters above Area 1 (Tank Trench). In light of the considerable slope of the ground surface, it appears that this area of the site might have been terraced, with structures and activity areas located further up slope (to the south). Diagnostic lithic materials from this sounding indicate that this area was occupied only in the Pre-Pottery Neolithic period.

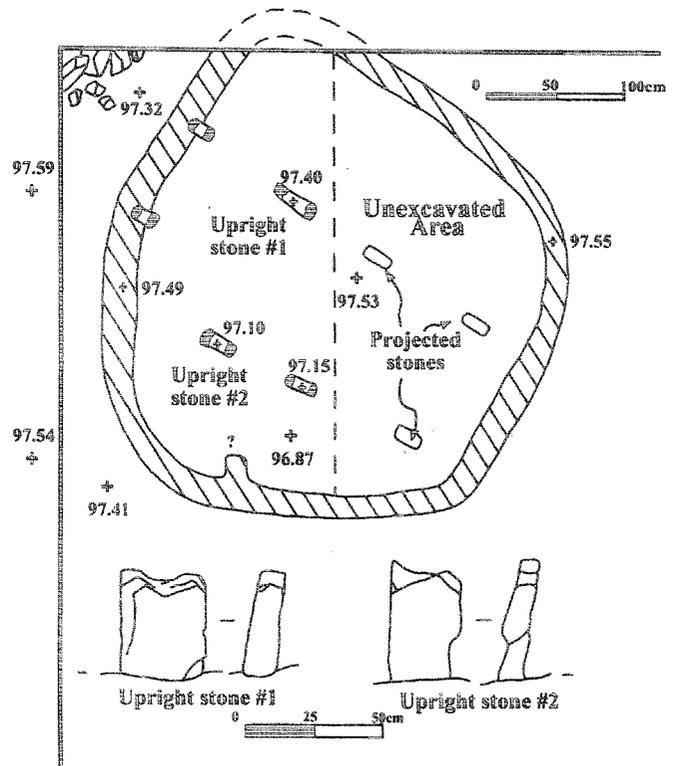


Fig. 3. Plan view of Structure 4, Area I, Dhra', Jordan, constructed ca. 11,300-11,200 BP.

Major Excavations in Area 1

Field research in 2001 concentrated on improving our understanding of the spatial organization of the PPNA occupation around the well-preserved stone structure previously identified in Area 1. This involved opening a 5 x 5m excavation unit to the west of the stone structure, a 5 x 5m unit

north of this square, and a small 2 x 2m excavation extension to trace the outlines of two stone features. Detailed analysis of the features and materials recovered from these excavations are currently being undertaken. Preliminary excavation results include the identification of at least two, and possibly as many as three, large structures in addition to several other smaller features.

Feature 6: PPNA Stone Structure 1

One objective of excavation was to assess the horizontal extent of the well-preserved stone structure identified in 1994 (Feature 6). This structure appears to have been most recently occupied around 11,500 BP (calibrated) during the earliest stages of the PPNA in the southern Levant (Table 1). It is important to note that Feature 6 seems to have been occupied at approximately the same time as the structure excavated in Area I (Tank Trench) and illustrated in Kuijt and Mahasneh (1998: Fig. 2). Due to the depth of cultural deposits in Area 1, as well as the time required to deal with the stratigraphic complexity of these deposits, identification of the horizontal extent of this structure proved to be more difficult than anticipated and will require further excavation. Recovered from the fill above the structure was a small clay figurine remarkably similar to that recovered from Netiv Hagdud (Fig. 2). Lithic materials recovered from above and within this structure in 2001 are similar to those recovered in 1994 (*cf.* Kuijt n.d.), with projectile points, borers, and retouched blades being the most frequent tools recovered.

Table 1. Radiocarbon dates from Area I and Excavation Unit One, Dhra, Jordan.

Location	Radiocarbon date	PDB 13C	Sample number	Be-low surface	Comments
Area I Tank Trench	9,960 ± 110	- 24.7	ISGS-2898	- 1.20 m	Wood charcoal. Sample recovered 20cm above mudbrick and sterile colluvium deposits.
Area I Tank Trench	9,940 ± 180	- 25.9	ISGS-3278	- 2.60 m	Wood charcoal. Sample recovered 20cm above floor of Structure II.
Area I Tank Trench	10,031 ± 69	- 25.2	AA-38141 (AMS)	- 2.30 m	Wood charcoal. Sample recovered from secondary sediments above floor of Structure II.
Area I Tank Trench	10,059 ± 73	- 21.1	AA-38142 (AMS)	- 1.80 m	Wood charcoal. Sample recovered from later secondary sediments filling Structure II.
Area 1, Feature 6 Structure I	9,610 ± 170	- 25.7	ISGS-3277	- 1.25 m	Wood charcoal. Sample recovered from just above flagstone bench next to wall 007, Structure I.
Area 1, Feature 6 Structure I	9,984 ± 67	- 25.5	AA-38143 (AMS)	- 1.31 m	As per above.
Area 1, Feature 6 Structure I	10,000 ± 68	- 25.8	AA-38144 (AMS)	- 1.01 m	As per above.
Area 1, Feature 1 Structure 4	9,9835 ± 59	- 27.4	ISGS-A0246 (AMS)	- 1.01 m	Wood charcoal. Sample either pre-dates or is contemporary with construction of mudbrick Structure 4.
Area 1, Feature 1, Structure 4	9,835 ± 65	- 25.6	ISGS-A0248 (AMS)	- 0.40 m	Wood charcoal. Large beam recovered. Dates abandonment of mudbrick Structure 4.

Feature 1: PPNA Mud Structure 4

One of the most interesting results of the geophysical survey and excavations was the identification of a well-preserved mud structure. The walls of this structure are preserved to a height of at least 60cm (Figs. 3 and 4). Excavation focused on only the western half of the structure, leaving a

north-south section. Excavation in this half of the structure revealed the presence of five upright stones. These were placed in lines, and with notches in the top of the stones. Two of the 35-50cm high stones used as up-rights were reused grinding stones, while the others may have been specially shaped. Large pieces of burned wood recovered *in situ*, as well as lumps of burnt mud with wood and vegetation impressions, suggest that this structure had a raised floor of wood, covered with smaller plant matter and mud. This would indicate that the stones served as supports for horizontal timbers that supported this floor. The substantial quantity of burnt material is presumably the source of geophysical anomaly. Field observations indicate that the sediments recovered from inside the structure were linked to the collapse of the floor, roof and walls. If this interpretation is correct, a peculiar feature of the floor is that it appears to have been slanted at an eight degree angle, with the northeastern end being c. 30cm above the southwestern end.

Two radiocarbon samples date the initial construction and the last occupation phase before construction at 9,913±59 bp (ISGS-A0246), and the abandonment of the mud-brick structure to 9,835±65 bp (ISGS-A0248). Thus, the building appears to have been constructed at some point around 11,300-11,200 BP and abandoned between 11,260-11,175 BP, with the building being used for no more than a hundred years.

All cultural materials recovered from inside and above this structure are diagnostic of the PPNA. This assemblage includes el-Khiam projectile points, borers, and ground stone pestles. Also recovered from inside this structure was part of a carved limestone vessel. In a general sense, this building is similar to previously identified mud structures identified from the PPNA occupations of Netiv Hagdud (locus 26) and at Jericho. This is, however, the first identified example from the southern Levantine PPNA of the use of upright stones in mud or stone structures apparently designed to hold wooden beams for a floor.

Other PPNA Features

Other PPNA features identified in the 2001 season include feature 8, a well-preserved stone silo or cooking feature; feature 7, which appears to be the partial remains of a third large PPNA stone or mud residential structure; and feature 4, a 2 x 2m structure constructed of upright stones. The last two of these were only partially excavated due to time limitations.

Pottery Neolithic Material and Features

Intact Pottery Neolithic A deposits (or indeed any non-PPNA cultural materials), were only recovered in Area 1. The 2001 excavations identified several isolated probably Pottery Neolithic pit features that intruded into the lower PPNA occupation. Typically these were small, approximately 1.5 x 1.5m in size, 30cm deep, and characterized by collections of fire-cracked rock, large pottery fragments, and differences in soil coloration compared to the PPNA sediments.

Excavations in the northern section of Area 1, for example, identified feature 5, a probable Pottery Neolithic bin feature constructed of upright stones along the sides and flat stones placed at the bottom. The fill within this feature consisted of rock rubble and isolated ceramics and lithics.

It is important to note that the cultural materials from the Pottery Neolithic occupation in Area 1 in general, and more specifically the lithic tools, are both very different from those of the PPNA period occupation and are limited to either small pit features or shallow surface deposits. Unlike the lithic tools from the PPNA occupation, those from Pottery Neolithic features consist of large, crude backed flakes or blades based on a flake industry. While the features in Area 1 are not yet directly dated, the recovered ceramics fit well with previous descriptions of material from Jericho IX and with the ceramics Bennett (1980) recovered from Area IV, located some 140m to the west of where our 2001 excavations were situated. This temporal designation is strengthened by the recovery over several years of data from Area I (Tank Trench).

This includes a Nizzanim projectile point, ceramics representative of the Jericho IX period, and a radiocarbon date of $6,980 \pm 70$ bp (ISGS-4002), all of which are associated with at least one well-preserved stone structure. The field research conducted in 1994 by Kuijt and Chesson (n.d.) at Ain Waida', located on the north side of Wadi Dhra' has documented an extensive Pottery Neolithic occupation that dates to the Qatifian period and has been radiocarbon dated to $6,170 \pm 55$ bp (AA-29771).

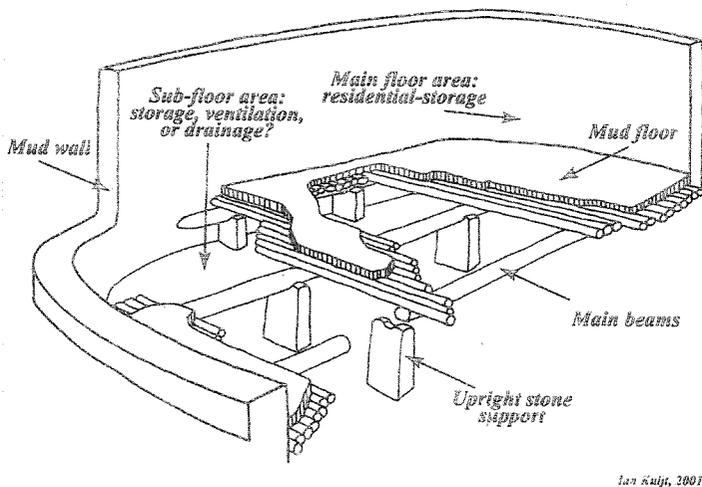


Fig. 4. Reconstruction of Structure 4, Area I, Dhra', Jordan, abandoned ca. 11,260-11,175 BP.

Conclusion and Discussion

Analysis of the 2001 field season materials will provide a more detailed understanding of the spatial distribution and depositional contexts of recovered cultural materials. Ongoing analyses includes lithic technology (N. Goodale), lithic use-wear analysis (S. Smith), stratigraphy (S. Dennis), paleobotanical remains (R. Neef), archaeozoology (C. Becker), and micromorphology (T. Aspin). Field analysis of chipped stone tools has led to the identification of 1,410 tools, and some 64,447 pieces of debitage and debris. This is 25% of the lithic material recovered in the 2001 season, and this indicates that the total number of lithics (tools and debitage) recovered this season is approximately 257,788 items (Goodale *et al.* n.d.). It is planned that the excavation of the PPNA occupation of Dhra' will continue in 2002-2004.

Excavations at Dhra' have reinforced our overall impression of the PPNA settlement, and provided new insights into the forager-farmer transition along the Dead Sea. First, the 2001 archaeological excavations at Dhra' highlight that while it was occupied in the Pottery Neolithic period, it is clear that it was much more intensively occupied in the PPNA period. Second, excavations in 2001 underline that there is no Natufian or Pre-Pottery Neolithic B period occupation at Dhra'. The absence of cultural materials from these other periods is important, for it will ensure no mixing from the preceding and following periods. Moreover, the new excavations have clearly demonstrated that the previously identified Early Bronze Age and/or Pottery Neolithic presence is minor and limited to the area around the Tank Trench. Third, excavations in 2001 echo previously published interpretations of the lithic technology at Dhra' (Kuijt n.d.; Kuijt and Mahasneh 1998), with the overwhelming majority of tools being el-Khiam points, and borers, both produced from single-platform pyramidal cores, in combination with heavy woodworking tools.

The 2001 archaeological excavations have also provided us with significant new information related to the occupation at Dhra'. It is now clear that the PPNA occupation at Dhra' was considerably larger than previously recognized. Furthermore, PPNA Dhra' was complex, being characterized by the construction of multiple stone and mud structures, with a density

of cultural materials that mirrors that seen at such major PPNA villages of Netiv Hagdud and Jericho. This, combined with the on-going analysis of recovered lithic materials, illustrates that the PPNA settlement at Dhra' was one of a limited number of relatively large sedentary village settlements. The field research at Dhra' will provide a unique database upon which researchers will be able to comprehend better the important social and economic transition from foraging to farming in the southern Levant at the beginning of the Holocene.

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Endnote 1. In her original field research Bennett (1980) undertook soundings at six areas (Area I-VI). With the exception of Area I, it has proven impossible to establish where her other soundings were located other than in a very general sense. Due to these complications, as well as the importance of differentiating our excavation units from those of the past, for this project we are designating our excavations by Arabic numerals (e.g., Area 3).

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LPPNB Ba'ja 2001. A Short Note.

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A fourth season of excavation was carried out between Sept. 11 and Oct. 11 2001 at LPPNB Ba'ja, north of Wadi Musa, southern Jordan, under the directorship of both

authors. The team consisted of 20 members from seven countries; up to 22 local workmen were employed.

The already difficult conditions and logistics of excavations at Ba'ja were worsened this year by a considerably more difficult site access, caused by partial deepening of the gorge's bed. Torrential rains in winter and early May had reduced its gravel fill by as much as 2-3m at spots (e.g. Fig. 2), which resulted in more exhausting climbing and transport for maintaining the excavation infrastructure (for reports on the previous seasons *cf.* the bibliography).

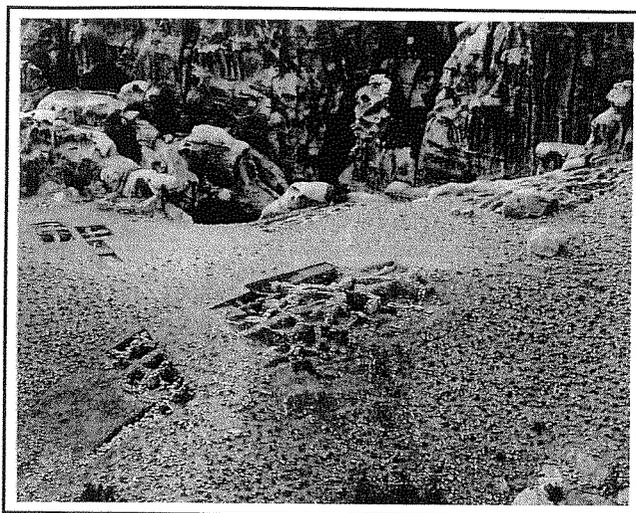


Fig. 1. Site from SE in October 2001. (photo by Boris Borowski)

Research Objectives of the Season

We approached the season with the following objectives:

- 1) Clearance of the supposed gate structure in B 74 (Area B-South), which we assumed to have given access to the site in this prominent topographical position.
- 2) Extension of Area C towards the west in order to identify a possible open space in the settlement. (Fig. 3)
- 3) Removal of the balks in Area B- North for understanding the ground plans exposed here in 2000. (Fig. 4)
- 4) Opening the first squares in the extreme slope setting of Area F in order to understand architectural engineering in very steep locations. (Fig. 5)
- 5) And finally, the excavation of the collective burial in Area D, which was found associated with a wall painting (Gebel 2001). (Figs. 6-7)

In general, it may be stated that the 2001 season was to clarify further the many exceptional finds uncovered in the 2000 season. Except for Area F no new quarters of the site were opened.

Field Operations

Altogether 6.5 new 5 x 5m squares were investigated, while excavation continued in three previous squares in the locus of the collective grave (Area D 11/12/21/22); eight balks were removed in Area B-North. In B-South excavations continued in B74; B84 and B85 were newly opened. In Area C the eastern half of C0 and the western halves of C10 and C20 were opened, while the balks between C11/21, C21/22 and C10/20 were removed; digging continued in the eastern halves of C10 and C20. In the newly opened steep-sloped Area F, Squares F10-12 were excavated. The only operation in Area D was the excavation of the collective burial.

In addition to the excavation work, conservation measures and related work were carried out in the oldest parts of excavation (Area C: partial filling of rooms, conservation of wall tops; storage of dressed stones for wall restoration, etc.).

Results

The results of the 2001 season appear less spectacular than those of the previous season because work concentrated on the further investigation of these findings. In general, the 2001 results have enabled us to plan for an interim monograph evaluation of the site's results so far, in order develop on that basis the future research questions for the long-term project. The next season in spring 2003 will follow some open questions for that monograph, and will open the second term of excavations at Ba'ja.

1) *The supposed gate structure in B 74:* The nature of this interesting structure was not entirely clarified since we did not reach its foundation in 2001. However, having traced the height for about 2m (width: c. 1.7 m), we still feel justified in interpreting it as the passage (which was blocked later) to the main part of the village, situated in a topographically most prominent situation. At an intermediate stage in its development, the width of the feature was reduced by the construction of an east-west wall that narrowed the passage to the east. Later again, the "gate" was blocked by a wall from the west and filled with stones. Then the previously mentioned E-W-wall was taken down to an approximately horizontal level, and the whole area immediately to the east of the gate was intentionally filled in a sequence of events that cannot be detailed here. As indicated by excavation in the neighboring squares B 84-85, the "gate" remnants were finally incorporated in the later domestic architecture of the area that must have provided another access solution for the main and central parts of the village.

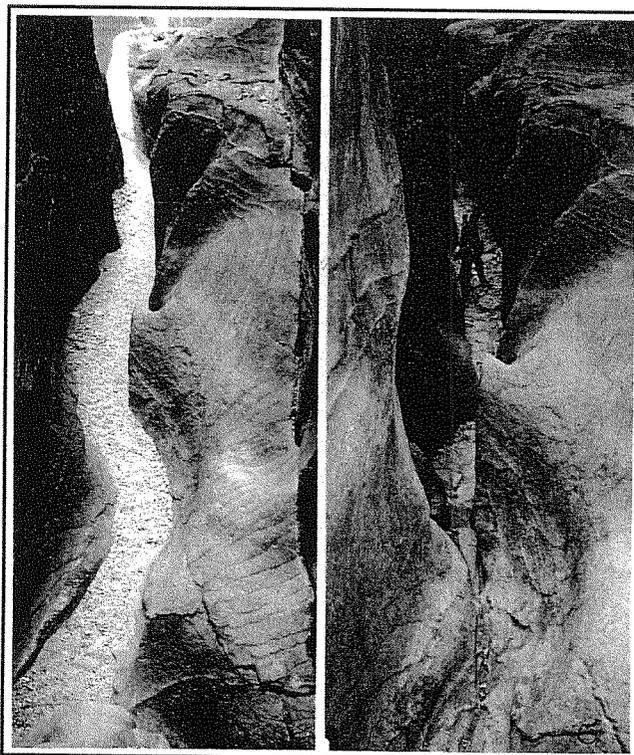


Fig. 2. Access to the site through the gorge in 2000 (left: bed still with gravel fill) and in 2001 (gravels washed out, bottom lowered by ca. 3m). (photos by H.G.K. Gebel)

2) *The supposed open space west of the buttressed wall in Area C (Fig. 3):* Extending the excavation of Area C did not confirm the existence of an open space or plaza immediately west of the buttressed facade in C0/10/20. Rather, a series of walls seem to radiate from this "facade" in the western direction. These are further connected by dividing walls of varying quality oriented roughly north-south. This creates the impression that at least in the upper preserved stratigraphy this area became overgrown by a dense

pattern of rooms and spaces rather than having functioned as a plaza. However, three phases of occupation can be identified in the western parts of Area C, and only the painstaking analysis of the architectural events will reveal whether these spatial subdivisions belonged to the original situation or were subsequently added. *In situ* floors of the first and second phase were exposed and the approximate level of a third phase was also identified. It appears obvious that the buttresses were continuously maintained through all the three phases, and that the building in Area C is a core from which the occupation developed structurally.

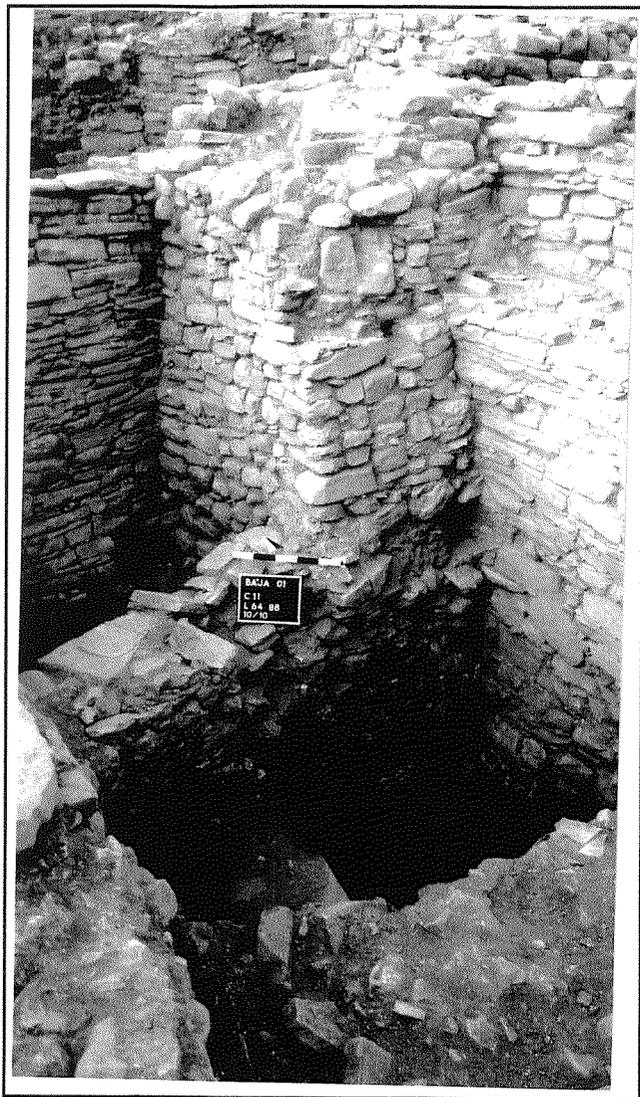


Fig. 3. Western Area C with one of the buttresses existing in two building phases, from SSW. (photo by H.G.K. Gebel)

3) *Ground plans of Area B- North (Fig. 4):* The balk removals allowed us to understand that we are dealing with the basement parts of two or three domestic units on different building terraces, of which the original floors have not yet been reached. Numerous alterations (blocking of wall openings, rebuilt wall courses, inserted staircases, etc.) show that the spatial use of buildings was reconsidered continuously. The remains of a stairwell confirms that connections between basements and first floors could be achieved by built stairs, whereas rooms with no openings in the walls indicate that ladders through openings in the ceilings served this function in other cases.

4) *Area F (Fig. 5):* A considerable depth of deposits (with one wall preserved to a height of at least 3.70m) had already been found in Test Unit 5 during the previous season. In this year's excavations we opened three squares immediately south of the edge that separates the topography of Areas C and F

(Gebel and Bienert 1997: Fig. 4:B). Here we found a dense pattern of architectural features, which indicates that the settlement extended considerably downslope. The main walls of the architecture of the slope run north-south along the direction of the slope, while all the system of east-west room-dividing walls between (following the contour lines) lean extremely downslope. Thus the groundplan is characterized by small rooms, indicating that, here as elsewhere on the site, we are most probably dealing with the basements of two-storied houses. No bottom floors were reached in this difficult terrain, but two and possibly three succeeding floors were reached. So far, no evidence of specific activities other than domestic / workshop has been identified here. Certainly, the northern parts of Area F belongs to the domestic occupation of the site. The occupation of such an extreme slope area (35-40°) in our view triggers arguments of spatial stress in Ba'ja.

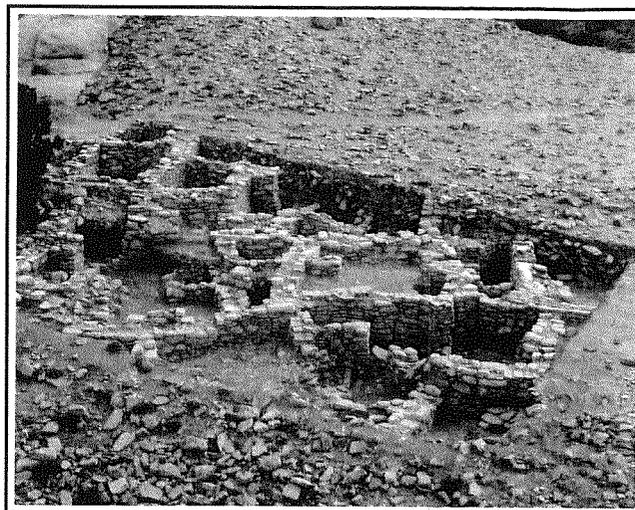


Fig. 4. Area B after the balk removals, from W. (photo by H.G.K. Gebel)

5) *Collective burial (Figs. 6-8):* The final excavation of the multiple burial already encountered in 2000 in a small room lined with chamber-like walls in D1 1/1 2/21/22 was the focus of work of anthropologists headed by Prof. Dr. Michael Schultz, Göttingen University. The burial must have been originally covered by the long stone slabs found in the area, presumably resting on top of the chamber walls. The eastern chamber wall was set in front of the miraculous wall painting on the room wall (Gebel 2001a-b).

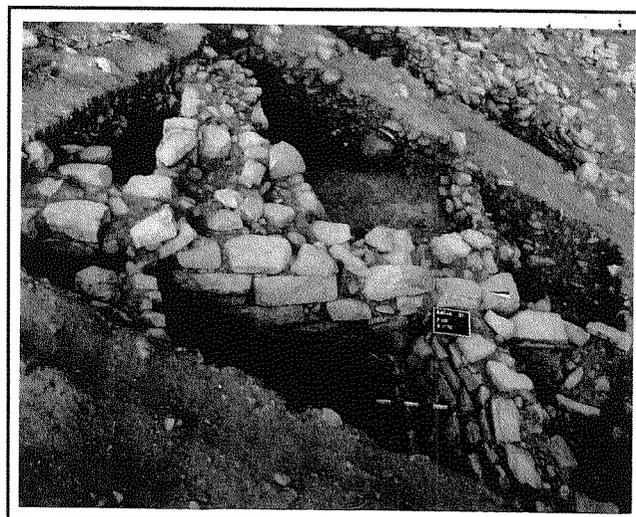


Fig. 5. Area F from W. Note the steepness of the slope. (photo by H.G.K. Gebel)

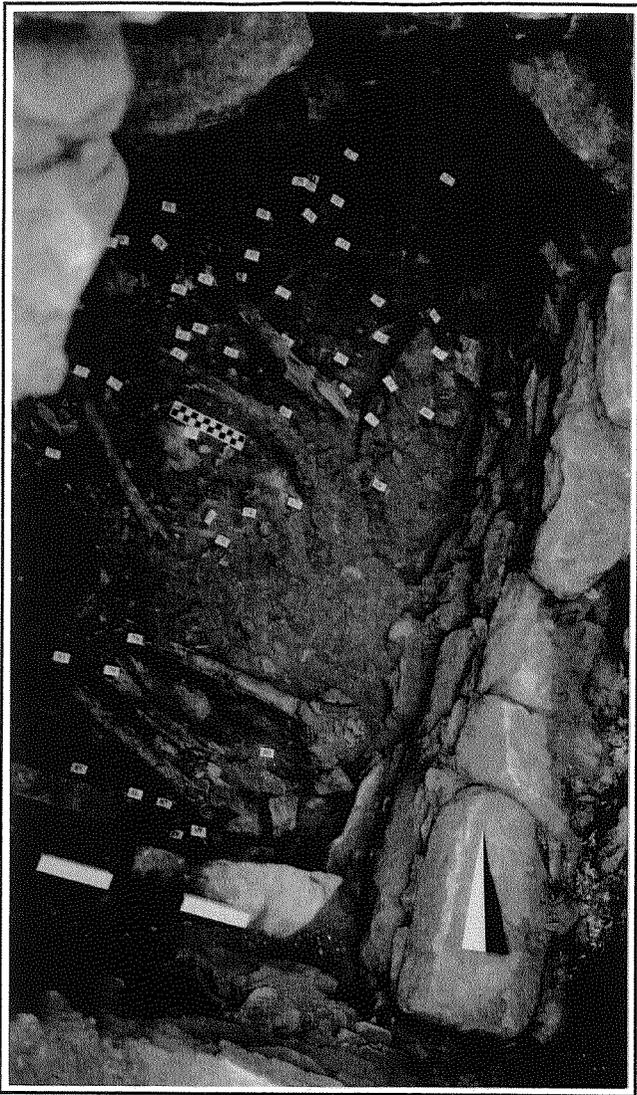


Fig. 6. Upper layer of the collective burial in Area D with wall painting (E of the arrow), as already excavated in the 2000 season. (photo by H.G.K. Gebel)

Prior to final analysis the anthropological investigation of the human bones indicates that c. three adults and nine very young infants were buried in the chamber, which occupied ca. 0,65m². The depth of the bone layer reached c. 35cm. No pathological features were detected with the remains during excavation. The dead were obviously buried in many individual events: the depositions followed the general pattern of placing the last inhumation in the grave's center while the postcranial bones and skulls of the previous ones were pushed towards the margins. This caused a high fragmentation of the bones, and a further separation of the body parts. There is evidence for partial or fully mummified body parts in the grave (several parts were found articulated), but is not clear from the field observations if these were brought into the grave or developed here. The grave obviously was disturbed already in early Neolithic times, possibly in search for grave goods, since parts of its floor pavement was found mixed with the bones. Possibly also grave goods were removed: it still contained plenty of scattered beads, 9 arrowheads of one type, a pressure-flaked dagger possibly deliberately broken in three parts (Fig. 8), one mother-of-pearl ring (Fig. 7B), a "mace-head" (Fig. 7C), a beautiful mother-of-pearl paillette from under a newborn's skull (Fig. 7A). Red pigment occurred throughout the grave, partially coloring bones and grave goods.

Important Insight on a Stratigraphical Pattern of LPPNB Pueblo-Like Villages (H.G.K.G.)

From the excavation in Ba'ja it appears now more than likely that the groundplans of LPPNB pueblo-like multi-roomed buildings, stretching across one terrace or more, exclusively represent basements. They may show ceiling/floor features of an upper storey, staircases leading up, or fill that gives evidence of a second or even third floor. The stratigraphical investigations so far could not explain why only superimposed basements occur in this at least two-storied environment and how basements could undergo the many changes in plan and function in evidence while still supporting an upper storey. Fresh insights from Ba'ja 2001 revealed a simple explanation that may add a new understanding for a hitherto unknown pattern: the "basements" received their alterations when they still were in use as upper storeys. When

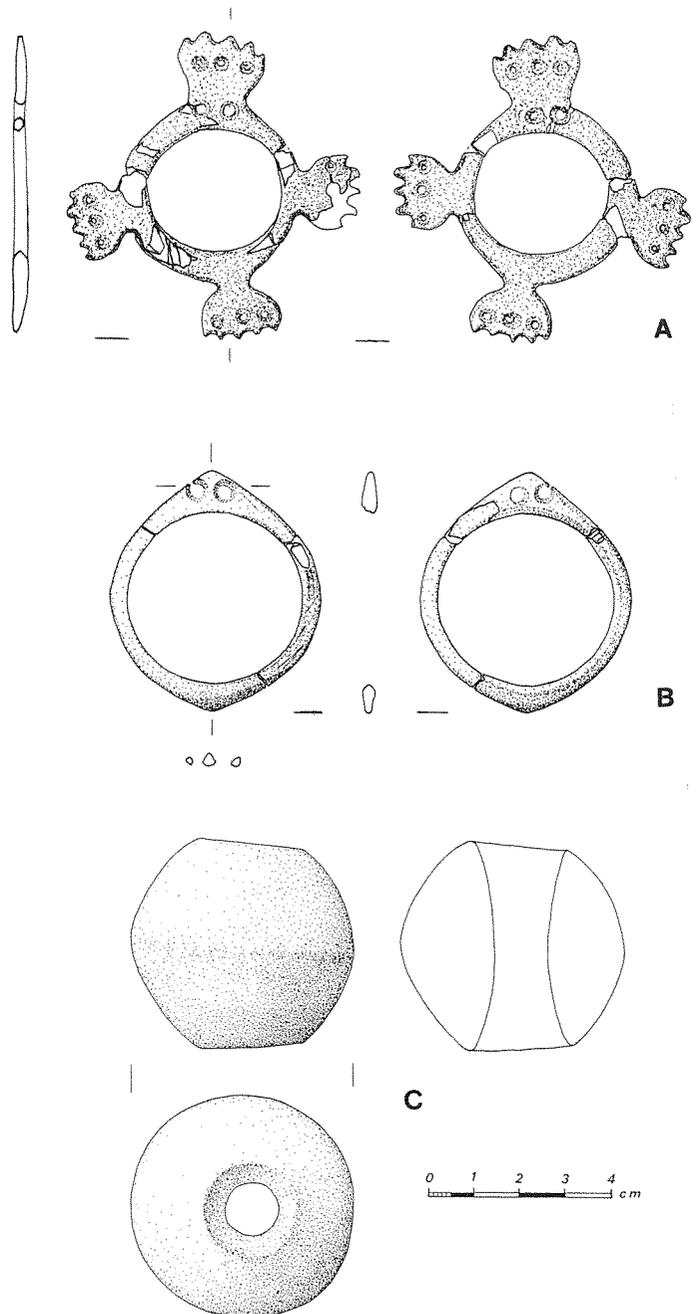


Fig. 7. Goods from the collective burial: mother-of-pearl object found under the skull of a newborn (A); mother-of-pearl ring (B); mace-head- type object made from igneous rock (C). (drawings by Britta Winckler)

their basements became too shallow, or functional changes were necessary, they were intentionally filled, and the former upper storey became a basement by adding a new storey above it. In this moment another episode of groundplan alterations happened by insertions of stairs, walls, buttresses to support planned upper storey features etc., closing of windows and passages, etc. The complexity of architectural events in this process results from the fact that building measures could happen in one building at different levels (terraces), and the overall good preservation of LPPNB buildings (basements) is the result of the aforementioned intentional filling. If we assume that the latest upper storey always is eroded away, the stratigraphies should contain only superimposed basements. (Gebel n.d.)



Fig. 8. Pressure-flaked dagger from the collective burial. The tip was found weeks ago in the lab by Prof. Schultz, attached to human remains extracted as a bloc. (photo by H.G.K. Gebel)

Selected Comments

Generally, the excavations of the 2001 season confirm interpretations offered in previous reports. But in the case of Area C a body of puzzling new evidence was revealed. We dare to speak of architectural monumentality for this important part of the site. In 1997 the eastern part of the building in Area C already revealed an extensive cooking area covering some 4 rooms. The layout of the building and its western extensions exposed in this season let us assume its use by a large kinship group cooperating economically.

While the overall character of the occupations in Areas B, C, D, and F is domestic, the supposed gate may indicate a corporate feature in a strategic position (access to the site from the west) that was deliberately blocked.

The assumed communal space in the flat Area B remains to be tested in the future. It is most likely that the topsoil layer and the underlying fine-grained layer in Area B were cleared of stones in the post-Neolithic (agricultural activities). But this fine-grained layer above the ruined tops of LPPNB walls

already contained striking *in situ* finds of the LPPPN (e.g., one hoard of blades with a core). This contradicting evidence might be explained in view of the stratigraphical pattern described above.

Area F shows that we have in the steep slope settings of Ba'ja an immediate access to the floor levels of the basements, since major parts of the eroded building material of the upper storeys were taken downslope here. The exploitation of an extreme slope like Area F as a residential construction area illustrates that all space in Ba'ja was needed, despite the fact that architectural engineering was unable to maintain stable massive buildings on such topographies.

It appears obvious that the collective burial does not contain a special selection of individuals, such as those related to an ancestral ritual. It may rather represent the regular mortality distribution within a large family, whose members received individual grave goods. The high rate of infants may reflect a high infant mortality in Ba'ja.

Acknowledgements: The project is carried out in collaboration and with the continuous and efficient support of the Department of Antiquities, Amman. Sincere thanks go to its Director-General, H.E. Prof. Dr. Fawwas al-Khreisheh as well as to Mr. Marwan from the administration and to Mr. Abdel Rahim from Jerash, who was our representative and dear colleague supporting the dig by also supervising a square. The excavations are conducted under the organization of *ex oriente* at Free University of Berlin, with the financial support of sponsors and (for initial conservation measures) by the German Foreign Ministry, Berlin.

We warmly thank our team for the devoted and exhausting engagement: Jürgen Baumgarten (also logistics director), Boris Gregor Borowski, Kerstin Kreuz, Hans Jerg Erlenmeyer, Julia Eva Gresky, Anna Malin Ihr, Laila Skak Kristensen, Claire Julie Laude, Daniel Mietchen, Osaid Baninasor, Bernhard Schulte-Heuthaus, Michael Schultz, Amanda Joy Staley, Ditte Højriis Stoltze, Line Thorup, Muhammad Tarawneh, Klaus Traulsen, Heidi Mariendahl Underbjerg, Britta Winkler; and the helping guests: Dorothea Hanisch, Oula Seitsonen, Owen Peter Taylor. Twentytwo workmen from the al-Amareen and al-Bdul guaranteed the success of the excavation, although not very happy about the difficult site access this year.

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Brief Report on the PPN Chipped Lithics Workshop, Niğde, Cappadocia, Turkey (4-8 June 2001)

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The 4th Workshop on PPN Chipped Lithic Industries, held in Niğde, Turkey, was extraordinarily interesting and enjoyable for the nearly 50 registered participants. One of the highlights of the Workshop was a visit to the obsidian sources at Kaletepe/Kömürçü, one of the Göllü Dağ flows, where we saw outcrops of obsidian, and workshops ranging from lower Paleolithic to the PPNB. This was followed by a short tour of tourist sights, including Derinkuyu, one of the amazing underground cities that are cut into the soft tufa.

There were three days of oral presentations and posters, 38 in all, organized around four themes: PPN Lithic Technology, Obsidian Production and Exchange from late Epipaleolithic to Pottery Neolithic, Integrative Studies of PPN Technical Systems, and PPN Lithic Cultural markers: Spatial, Social and Symbolic. The final afternoon was a general discussion and synthesis.

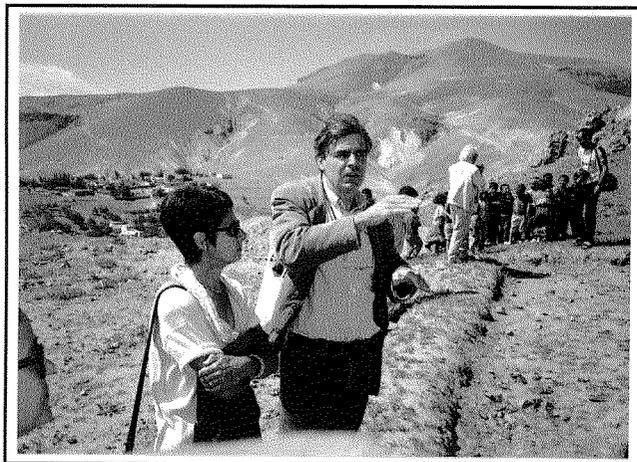


Fig. 1. Excursion scene from the PPN Chipped Lithics Workshop 2001. (photo by F. Hole)

The last day of the Workshop was a day-long tour of the amazing Cappadocian countryside with its strange tufa formations, and of the archaeological sites, Köşk Hüyük, Tepecik, Aşıklı and Musular. We also toured the Gümüşlar Monastery and underground city cut into the face of a tufa cliff, and the beautiful gorge-like Ihlara Valley with its own rock-cut churches and houses. The day ended with a splendid dinner at the Ağaçlı Motel in Aksaray.

The Workshop was held in the Niğde Museum auditorium. Unlike previous Workshops, there were no displays of lithics and few papers discussed technology or typology as such; rather most of the papers dealt with the implications of the lithics in terms of raw material, function, trade, prestige, and symbolism. Of particular interest were the discussions of lithics from recently-excavated sites in Turkey, presented by a number of Turkish graduate students. A mere suggestion of the variety of topics follows.

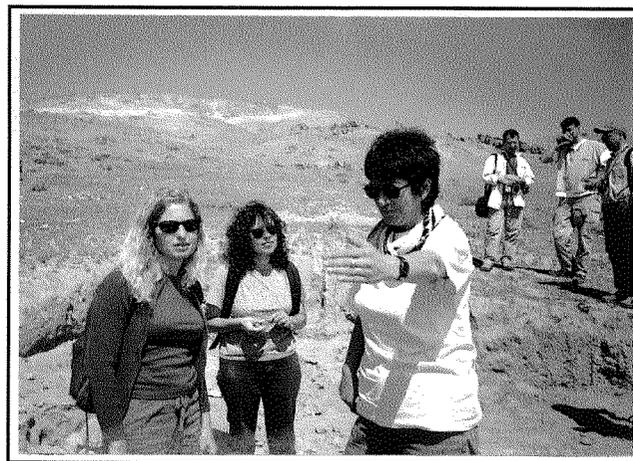


Fig. 2. Excursion scene from the PPN Chipped Lithics Workshop 2001. (photo by F. Hole)

There was considerable discussion of the nature and role of the *ad hoc*, expedient (or "non-Hollywood") versus standardized or formal lithics. It is now well-known that the proportion of the *ad hoc* group rises through the PPN, but the functional and social implications are not understood. It was also noted that the raw material for the different categories of tools differed. Another discussion concerned the implications of differential quantities of flint versus obsidian in sites and, indeed, differences within contemporary contexts in a single site. It has come to be realized that the PPN in Anatolia refers to settled communities lacking agriculture, unlike the situation in the central and southern Levant. It is curious, and also unexplained, why some sites grew very large and compact, like Çatalhöyük, while the surrounding plain was essentially devoid of sites. The question of special function sites, some for ritual, was also highlighted, particularly in relation to Nevalı Çori, Göbekli, Jerf al-Ahmar, and Nahal Hemar to name the most prominent.

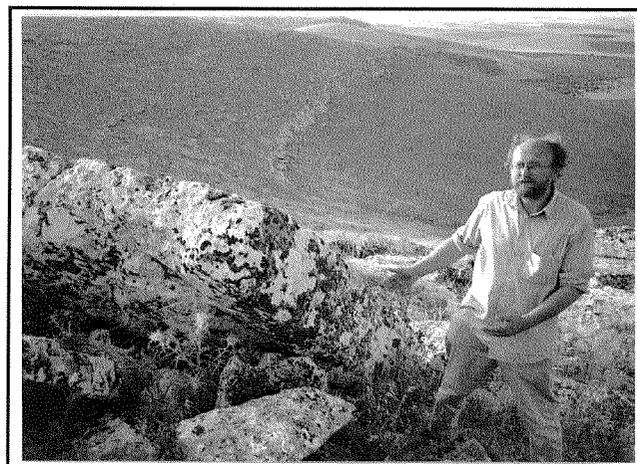


Fig. 3. Excursion scene from the PPN Chipped Lithics Workshop 2001. (photo by F. Hole)

Another unresolved issue is the location of the living sites whose artisans worked the obsidian flows, and under what system they transported the finished products. Use-wear analysts are coming up with a number of new and interesting results including the ability to recognize sheen on obsidian, and the (apparent) re-use of arrow heads for burins, scrapers, knives, etc. Several reports dealt with the geographic distributions of specific types and how some that had been thought generally regarded as restricted in space are now known to overlap, for example, the distributions of bullet and naviform cores.

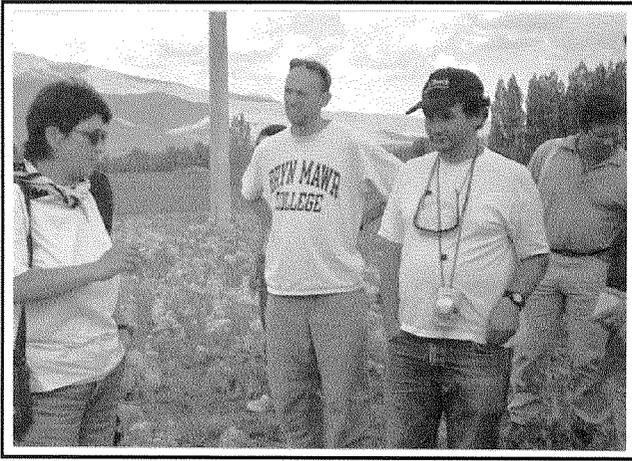


Fig. 4. Excursion scene from the PPN Chipped Lithics Workshop 2001. (photo by F. Hole)

It is notable that there was no explicit discussion of the tool groups that had been the focal point of many previous sessions. It now appears that there is little enthusiasm for creating and implementing a strictly formal system of classification that can be applied across the region. Rather, individuals and groups working in separate geographic regions have reached consensus on how to describe local occurrences and, with adequate illustrations, these can be compared to occurrences in other regions. A plea was made to illustrate the non-standardized tools so that more fruitful comparisons can be made of these along with the formal tools.

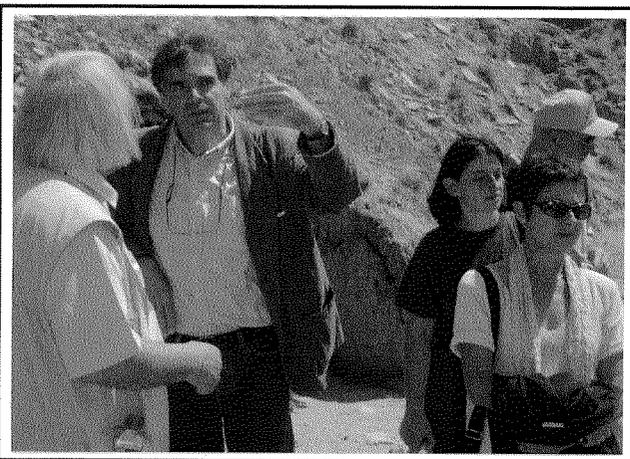


Fig. 5. Excursion scene from the PPN Chipped Lithics Workshop 2001. (photo by F. Hole)

In terms of the future, it seems that use-wear is well established and producing excellent results that should be applied routinely. These will ultimately help us understand the relationship between lithic form and function and perhaps more accurately interpret activities at sites. Clearly more work needs to be devoted to identifying lithic sources and workshops concerned with various stages of reduction. The question of site integrity also needs to be addressed. There were concerns expressed about deflation, resulting in conflation of deposits; deliberate removal of artifacts upon abandonment; opportunistic scavenging of sites for raw material, such as obsidian, by later peoples; and models of behavior that would result in the kinds of spatial and contextual occurrences of lithics that we find both in sites and between sites.

It is now clear that many of the issues that the study of lithics exposes cannot be resolved only by analysis of the lithics themselves. The lithics occur in a matrix of many materials, originally built by humans, and degraded to various extents by human and physical processes. The question of whether there is a real "*in situ*" in most sites needs careful

consideration. Finally, as regions are explored archaeologically, there will continue to be surprises as southern Anatolia and even Cyprus have recently shown to those whose vision blurred beyond the Levant or Mesopotamia.

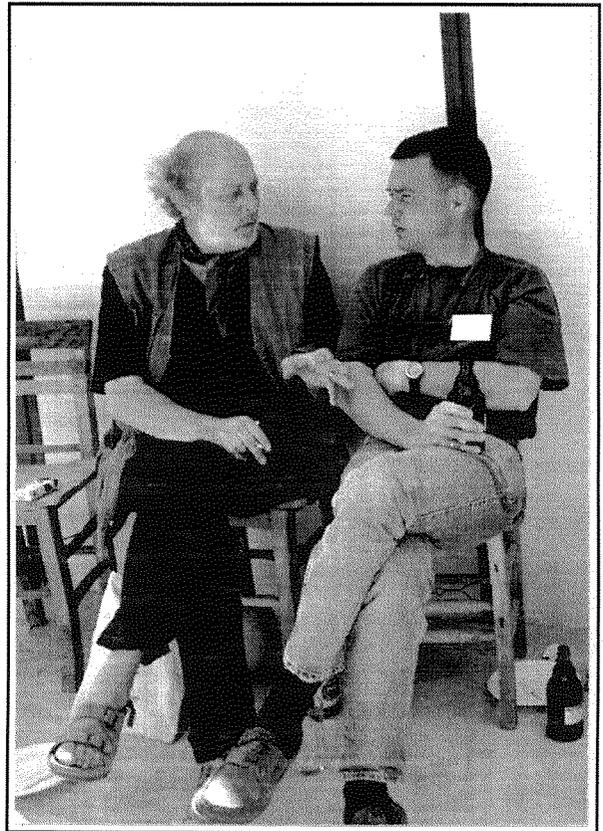


Fig. 6. Excursion scene from the PPN Chipped Lithics Workshop 2001. (photo by F. Hole)

The members of the Workshop greatly regretted the absence of two of our founding members, Hans Georg Gebel and Gary Rollefson who did so much to shape the vision and content of our earlier meetings. The Workshop was dedicated to Marie-Claire Cauvin who, as most already know, has for many months maintained vigil at Jacques's bedside in southern France. We missed her experience and insights both in north Mesopotamian lithics and in Anatolian obsidian.

We must thank the Niğde Museum and the city officials who welcomed us and provided a splendid auditorium for the meetings. The staff of the Evim Hotel who served our breakfast and dinner must be specially commended for handling our group so efficiently. Similarly, we commend the staff of the local restaurant that served us an extensive menu at lunch. Finally, and most importantly, it is a pleasure to acknowledge and commend Nur Atlı-Balkan for her splendid organization and attention to all the details that made the Workshop such a success. She and her team of student volunteers worked tirelessly and effectively in helping us with all the logistic details. Nur, along with Didier Binder and Çiler Altınbilek Nurcan Kayacan helped us understand the sites we visited by providing essential commentary based on first-hand experience. For those of us who were new to the region it was altogether a rich and rewarding experience. We look forward to the 5th Workshop that has tentatively been scheduled for January of 2003 in southern France.

Fig. 7. (group photo of workshop: cf. next page)



Fig. 7. Group photo of the PPN Chipped Lithics Workshop in Nigde, June 2001 (provided by Nur Balkan-Atli and Didier Binder).

8th Neolithic Seminar on the Neolithisation of Eurasia – Perspectives on Pottery

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The Department of Archaeology, University of Ljubljana organized the 8th International Neolithic Seminar on "The Neolithisation of Eurasia - Perspectives from Pottery." The Seminar took place in Ljubljana from Thursday 8th November to Saturday 10th November 2001. The aim of the Seminar was to advance the integration between different approaches to pottery interpretation - pottery technology and use of ceramic vessels in the contexts of "transition to farming" and "secondary products scenario", in terms of both "traditional" and "new" methodologies and their possible implications.

Contributions Presented:

Introduction to the Seminar

Andrew Sherratt (University of Oxford, UK). Diet and Cuisine: Farming and its Transformations as Reflected in Pottery.

John Chapman (University of Durham, UK). Milking the Evidence - Rubbing Salt into the Meat? Secondary Products, Pragmatism and the Salt Trade in Neolithic and Copper Age Eastern Europe.

Kostas Kotsakis and Duska Urem Kotsou (University of Thessaloniki, Greece). A New Technology for a New Way of Life: the Role of Ceramics in the Neolithic of Greece.

Richard P. Evershed (University of Bristol, UK). Lipids in Ancient Ceramics as Carriers of Anthropogenic Signals from Prehistory.

Oliver Craig, John Chapman, Carl Heron, Matthew Collins (Newcastle University, UK). The Identification of Milk Residues: Which Way Next in Europe?

Peter Day and Peter Tomkins (University of Sheffield, UK). Local Pots for Local People? A Review of Analytical Studies of Greek Neolithic Ceramics and Their Interpretation.

Luiz Oosterbeek (Instituto Politécnico de Tomar, Portugal). Potters and Users: A Fragile Neolithic Interaction.

Masaki Nishida, (Tsukuba University, Japan). Another Neolithic in Holocene Japan.

Yaroslav V. Kuzmin (Pacific Institute of Geography, Vladivostok, Russian Federation). The Earliest Centers of Pottery Origin in Siberia and the Russian Far East: Review of Chronology and Paleoeconomy of the Oldest Neolithic Cultures.

Zhang Chi (Peking University, China). An Introduction to the Funerary Pottery in Baligang Site in Southern Henan Province, China.

Peter Tomkins (University of Sheffield, UK). Distance, Value and Status: Characterising the Exchange of Ceramic Vessels During the Early Neolithic on Crete

Milos Bilbija (Museum of the City of Skopje, R Macedonia). Man, Bread and Pottery.

Dimitris Vlachos (University of Sheffield, UK). Changes in the Production and Use of Pottery from the 'Early Neolithic' to the 'Secondary Products Revolution': Some Evidence from LN Makriyalos, Northern Greece.

Eva Lenneis (University of Vienna, Austria). The Combination of Different Methods for Analysing Early Neolithic Pottery.

CANew Istanbul Table Ronde 23-24 November 2001

Frédéric Gerard
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The International Table Ronde in Istanbul (Turkey) on The Neolithic of Central Anatolia, internal developments and external relations during the 9th – 6th millennia cal BC, was held on Friday and Saturday 23-24 November 2001. The program is on the project's web site:

<http://www.chez.com/canew/program.htm> ,
as well as a list of participants:
<http://www.chez.com/canew/participantslist.htm>

Abstracts

Next to the lectures, a considerable part of the Table Ronde was dedicated to discussions involving all participants (lecturers, panel and audience) on a 20 min. conference/40 min. debate basis. All the abstracts of the lectures will be placed on the web site, so that you can inform yourselves: <http://www.chez.com/canew/abstractslist.htm>

At this moment (early November 2001), 11 abstracts are online:

- Time trajectories for the Neolithic of Central Anatolia by Laurens Thissen: <http://www.chez.com/canew/thissen.htm>
- Environmental setting and evolution from the 9th to the 5th millennium cal BC in Central Anatolia. An introduction to the study of relations between environmental conditions and the development of human societies, by Catherine Kuzucuoglu: <http://www.chez.com/canew/kuzucuoglu.htm>
- Proposal for a regional terminology for Central Anatolia, by Mihriban Özbaşaran & Hylke Buitenhuis : <http://www.chez.com/canew/ozbasaranbuitenhuis.htm>
- Central Anatolian origins by Nur Balkan-Atli and Didier Binder: <http://www.chez.com/canew/balkanbinder.htm>
- Homogeneity versus Diversity: Dynamics of the Central Anatolian Neolithic by Roger Matthews: <http://www.chez.com/canew/matthews.htm>
- Transformations and societies in the Neolithic of Central Anatolia by, Frédéric Gerard: <http://www.chez.com/canew/gerard.htm>
- Ethnicity as a form of social relationship between Neolithic Cilicia and Central Anatolia, by Isabella Caneva : <http://www.chez.com/canew/caneva.htm>
- Concerning the Identification, Location and Distribution of the Neolithic and Chalcolithic Settlements in Central Anatolia by Geoffrey D. Summers: <http://www.chez.com/canew/summersbaird.htm>
- Some architectural aspects of the Central Anatolian Neolithic, by Güneş Duru: <http://www.chez.com/canew/duru.htm>
- Symbolic worlds of Central and South-East Anatolia in the Neolithic, by Damien Bischoff: <http://www.chez.com/canew/bischoff.htm>
- Defining the Neolithic of Central Anatolia, by Mehmet Özdoğan: <http://www.chez.com/canew/ozdogan.htm>

We can send you the assembled abstracts as a word document on request to: frederic.gerard@isbank.net.tr .

Preliminary Results

The South-East Anatolian 14C Database is now online: <http://www.chez.com/canew/sedata.htm>, as well as the South-East Anatolian chronological chart:

<http://www.chez.com/canew/seanchart.htm>.

As usual, all information on the project's preliminary results can be found on our homepage: <http://www.chez.com/canew>

The Fifth Millennium BC in the Near East Conference: Emerging or not so Emerging Complexity in the Near East?

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Organized by Stuart Campbell of the University of Manchester and Douglas Baird of the University of Liverpool, The Fifth Millennium BC in the Near East conference took place in Liverpool, England at the Merseyside Maritime Museum from 15 – 18 November, 2001. The con-

ference reviewed several major themes including craft specialization, development of social stratification, chiefdoms, built environments, ritual, economy and reflections on past and present approaches to the 5th millennium. Presenters also addressed numerous related sub-themes such as the nature of specific 5th millennium BCE artifact assemblages over a wide-ranging area from the southern Levant to northern Mesopotamia. Presentations consisted of papers and posters within thematically organized sessions. In all, approximately 40 researchers presented their findings. Despite the plethora of issues covered by the presentations, this review will focus on what the author found to be one of the most important themes underlying the conference, examining social complexity. Many of the presentations forced the audience to rethink complexity and how to identify it in the archaeological record.

Opening the conference, Doug Baird stated that convening the conference followed in the tradition of John Garstang. One needs to keep in mind that Garstang set several important precedents in ancient Near Eastern archaeology. He served as the founding director of the British School of Archaeology in Jerusalem and eventually served the British Institute of Archaeology in Ankara. Along with W.F. Albright and L.-H. Vincent of ASOR in Jerusalem and the École Biblique et Archéologie Française respectively, he also helped formulate the terminology for classifying archaeological material in the southern Levant and northern Mesopotamia.

However, as Stuart Campbell afterward explained, much of our knowledge and understanding of the Late Neolithic remains rather fragmentary. In particular, the time spanning the 5th Millennium BCE represents a mid-point between two major research foci: the origins of agriculture and the rise of complex state societies. Much confusion characterizes the use of chronological terminology. For example, do we identify the cultures of the 5th millennium BCE as being Neolithic or Chalcolithic? In addition, 5th millennium research lacks critical analysis of social organization. To what degree are 5th millennium societies socially complex? The major *raison d'être* for convening the conference lay in the need to identify current and future research issues and directions to rectify this situation.

A number of papers reviewed ways we could analyze different aspects of organization to identify and understand better the apparent changes taking place. For example, several papers presented what Yoffee has referred to as a *longue durée*-type of approach (Yoffee 1993) to the examination of the nature of ritual, political and spatial organization. Marc Verhoeven identified and presented a model in which a shift from public ritual to private ritual took place from the Pre-Pottery Neolithic (PPN) to the Pottery Neolithic (PN). Susanne Kerner argued for the lack of linear social evolution in the southern Levant. She contended that state-like integration does not appear necessarily following the rise of chiefdom-like political organization in the PPNB and PN. Peter Akkermans disputed the claim for large settlements in the same time range. He asserted that large sites represent a palimpsest of smaller, shifting settlements over time.

Concentrating on shorter time frames, other papers focused on more specific aspects of material culture to examine the degree of social or political integration. For the Chalcolithic of the southern Levant, Tom Levy raised the question of why people would want to give up their autonomy, and he conceded that to identify chiefly type of organization in the ancient Near Eastern archaeological record remains difficult. He presented a study of southern Levantine settlement patterns and intra-site organization to consider ways to identify material correlates of control over production or distribution. Also focusing on the southern Levant, Graham Philip looked at production and distribution of basalt vessels to consider social and political relations, while Isaac Gilead considered the possibility of an integration of ritual and production where smiths acted as shamans. David Wengrow extolled the importance of the harmony of motifs

on Late Neolithic ceramics in a manner similar to basketry. He argued that ceramic aesthetics played a key role in interaction and, therefore, changing social organization.

As Ian Kuijt summarized at one point in the conference, many of these approaches represent useful propositions eschewing typical methods used in the past to observe social complexity. Presenters moved away from the typical "well-lit areas," reconsidering different forms of evidence for social differentiation, leadership and dynamics. They approached the problems from different levels ranging from the role of individuals to that of groups on a local or regional level. Such appeals shed light on the question of agency in social dynamics. Much work remains to be done to consider the physical or archaeological manifestations of different aspects of complexity such as exchange, interaction, leadership, economic control and artifact variation to name just a few. According to Kuijt, such reconsiderations even beg the question of whether we should restrict ourselves to constructs of chiefly complexity as applied mainly to the Pacific Islands by T.K. Earle and his associates. In fact, one can question whether chiefdoms ever existed at all, at least in the ancient Near East!

Other papers maintained this trend examining specific sites, chronological markers and artifacts to entertain alternative models for explaining the nature of those assemblages. For example, Stuart Campbell investigated the nature of the overall material culture at 5th millennium BCE Domuztepe in southeast Turkey, identifying a lack of highly complex social integration. Instead he takes the artifact assemblage to reflect a low level, communal integration more akin to the Neolithic rather than the seemingly higher-level integration present in Chalcolithic southern Levant. Ingolf Thuesen later followed by presenting the need to define the 'Ubaid phenomena on more than one interpretative level. He argued that the 'Ubaid ceramic style represents a complex, organic system of symbols developing along a non-linear trajectory for purposes of communication that can be seen in other facets of material culture. To understand better the nature of the sites and assemblages over time, Ted Banning voiced the need to improve chronological designations and assessments on both the absolute and relative levels. He stated that we need to interpret dates on their own accord within a site or chronostratigraphic unit using Bayesian statistical models.

In regard to understanding the nature of specific cultural or chronostratigraphic units through space and time, especially in relation to the above issues and problems, numerous presentations characterized specific artifact assemblages for sites containing Halaf and 'Ubaid material. For example, Sarah Kansa, Bronwen Campbell, Steve Bell, Philipp Rassmann, Sally Irving and Elizabeth Healey presented data on specific artifact or ecofact assemblages from the Late-Halaf site of Domuztepe. The data reveal the complex nature of artifact assemblages in the Late Neolithic. Numerous papers spanning four sessions presented by Michael Roaf, Harriet Crawford, Elizabeth Popescu, Louise Joyner, Mark Beech and Emily Glover presented data on specific aspects of 'Ubaid sites along the Persian Gulf. The data prompted the need for new models to accommodate earlier and more complex than expected relations between southern Mesopotamia and the Gulf region. In addition, a paper presented by Yoshihiro Nishiaki presented a case for continuity between the Late Halaf and the 'Ubaid as indicated by the lithics from Tell Kosak Shamali in northern Syria.

Other researchers presented information from several other geographical and chronological entities. For the southern Levant, Eli Yannai, Yossi Garfinkel, Elisheva Kamaisky, David Ben Shlomo and Ram Gophna summed up the nature of the Wadi Rabbah and Ghassulian considering the characteristics of the artifact assemblages from several sites. In addition Minna Lönnqvist and Kirsi Lorentz summarized their survey data from the Jebel Bishri in eastern Syria, while Jo Clarke discussed identifying identity in Neolithic Cyprus.

Catriona Gibson, Jonathan Last and Tiffany Raszick presented their finds from Çatal Höyük West in central Turkey.

Numerous papers clarified techniques and methods for analyzing different artifact classes from Late Neolithic or Chalcolithic sites. For instance, Olivier Nieuwenhuys, Michael Roaf, Tannis Davidson and Cigdem Eissenstat presented ceramic analyses to understand better the nature of Halaf ceramic assemblages across time and space. Caroline Grigson discussed her analysis of pig bones in relation to environment in the northern Negev Desert. Jessica Pearson argued for applying isotopic analysis to human bones in the ancient Near East, as has been done in many other parts of the Old World, to reconstruct diet. Ellen Belcher and Aurelie Daems analyzed anthropomorphic figurines as a means of identifying important patterns in the Late Neolithic. Merryn Dinely presented considerations and possible methods for analyzing botanical remains of barley based on experimental work.

The conference succeeded in presenting a number of different approaches to understand better the 5th millennium BCE in the Near East. It remains a matter of time and further research to clarify which methods, models, hypotheses and theories work best. For those interested in obtaining more information on the conference, one can access a website at <http://www.art.man.ac.uk/ARTHIST/5mill.htm>. There one can access the full program and read the submitted abstracts. The British Institute of Archaeology in Ankara (BIAA), British School of Archaeology in Iraq (BSAI), Council for British Research in the Levant (CBRL), University of Liverpool, University of Manchester and National Museums and Galleries on Merseyside among others kindly lend their support to assist in the organization of the conference. All the presentations, including those that could not be given, will be published within a single volume in the near future.

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1993 Mesopotamian Interaction Spheres. In N. Yoffee and J.J. Clark (eds.), *Early Stages in the Evolution of Mesopotamian Civilization: Soviet Excavations in the Sinjar Plain, Northern Iraq*: 257-269. Tuscon, University of Arizona Press.

New Dissertaion

Barkai, Ran
2000 *Flint and Stone Axes as Cultural Markers: Socio-Economic Changes as Reflected in Holocene Flint Tool Industries of the Southern Levant*. Tel Aviv, Tel Aviv University: Unpublished doctoral dissertation (in Hebrew).

Abstract: The heart of this study is a thorough analysis of the stone axe, an important tool invented at a crucial period in human evolution - the transition from hunting and gathering to agriculture and food production.

For millions of years, starting from the first tool-using humans some two million years ago and throughout the Paleolithic period, people lived in balance with nature, hunting and gathering on a daily basis and constantly moving around in the pristine landscape in small communities.

At the end of the Paleolithic period, some 12,000 uncalibrated years ago, a major change occurred, a point of no return. This change is distinctively reflected in the Neolithic and Chalcolithic archaeological record, characterized by permanent large villages, an economy based on cultivated crops and domesticated animals, an elaborate symbolic world, a wide range of belief systems and plenty of art objects, varied burial practices, complex-stratified societies, and a special tool kit containing important new flint tools.

The three most significant tool types of the Neolithic period are the arrowhead, mostly used in hunting, the sickle blade for harvesting crops, and the axe. Axes, as well as chis-

els, adzes, picks and other massive bifacially flaked tools (henceforth bifacial tools) are, therefore, one of the most distinctive markers of Neolithic and Chalcolithic lifeways.

Use-wear studies of archaeological bifacial tools, supported by experimental work and ethnoarchaeological studies of simple societies, reveal that these massive tools were used, basically, as woodworking tools, for crafts such as felling trees, preparing house construction, chopping wood, making wooden tools, preparing fire wood, etc. Other suggestions, for example, that bifacial tools were used as hoes or as mining tools, are not supported by the archaeological evidence from the southern Levant.

The spread of agriculture necessitated, most probably, land clearance in order to prepare fields for growing crops, and it is most probable that bifacial tools were used for this purpose. Building permanent houses of stone and wood and preparing firewood both for lime plaster production and later for pottery production (firing) also needed woodworking tools. It seems reasonable to suggest that wood fences were constructed both for marking boundaries and keeping domesticated animals. Wooden tools, such as bowls, shafts, digging sticks, etc., were in use as well. Bifacial tools, therefore, played a prominent role in the activities carried out by Neolithic and Chalcolithic artisans.

Flint axes, chisels, adzes and other bifacial tools were used in the southern Levant for a time period of approximately 7,000 uncalibrated years (12,000 – 5,200 years bp). These stone tools went through many changes in shape and properties during this long period. It is argued here that the changes in bifacial tools were synchronized with major cultural changes, such as changes in housing, architectural design, developments in the field of agriculture, lime plaster and pottery production, and changes in society's structure in elements such as the division of labor and intra-societal struggles. In this study I isolated a specific Neolithic and Chalcolithic material-culture component and demonstrated how the changes in this component through time reflect transformations in different aspects of culture.

It is suggested that the rapid changes in manufacturing methods and in shapes of bifacial tools reflect major changes in economy, architecture and social structure organization of communities from the beginning of the Neolithic and up to the end of the Chalcolithic period, on the threshold of urbanism. Bifacial tools are used as a mirror, reflecting changes in society and human behavior in this period of revolutionary change. The ability of bifacial tools to reflect these changes is demonstrated using an archaeological study of these tools, a study of the contexts in which bifacial tools were found, ethnographic and ethnoarchaeological research of simple societies using stone tools, and experimental work.

About 2,500 bifacial tools from 24 different sites were systematically analyzed, covering the Natufian, Pre-Pottery Neolithic, Pottery Neolithic and Chalcolithic periods. Data analysis is presented after a detailed review and description of different aspects relating to the bifacial tool category, based on a synthesis of studies of bifacial tools from different parts of the world, ethnoarchaeological research, experimental archaeology and more.

The detailed analysis of the Holocene bifacial tools of the southern Levant indicates that the technological, typological and functional changes in the bifacial tool category could help identify general cultural changes in Neolithic and Chalcolithic cultures. Bifacial tools, due to their dual role as important working tools and as symbols, are most appropriate for used as cultural markers.

Bifacial tools were used by Neolithic and Chalcolithic people in order to manipulate nature and make efficient use of vegetal natural resources. Many of the innovative crafts and conceptions of sedentary agricultural societies could not be implemented without bifacial tools. These tools symbolized the changes in the complex relationship between man and nature and the new human attitude towards nature. The characteristics of the bifacial tools reflect the new worldviews and perceptions, as well as the developments in

architecture, lime plaster production, pottery production, etc. The changes in the bifacial tool category could be used in reconstructing the Neolithic-Chalcolithic social systems that supported and encouraged these rapid changes, leading towards effectiveness and intensification.

New Books

T. Yizraeli-Noy: *The Human Figure in Prehistoric Art in the Land of Israel*. Israel Museum and the Israel Exploration Society, Jerusalem, 1999 (in Hebrew; 158 pages, paperback, ISBN 965-278-180-0)

Yossi Garfinkel with a contribution by Claire Epstein: *Neolithic and Chalcolithic Pottery of the Southern Levant*. Qedem. Monographs of the Institute of Archaeology 39, 1999 (Jerusalem)

New Websites

A new Website for for Tell Sabi Abyad is to be found under:

WWW.SABI-ABYAD.NL

(reported by Marc Verhoeven)



Recent publications by *ex oriente*

Jebel Abu Thawwab (Er-Rumman), Central Jordan. The Late Neolithic and Early Bronze Age I Occupations by Zeidan Kafafi, with contributions by Nizar Abu-Jaber, Bo Dahl Hermansen, Ilse Koehler-Rollefson, Reinder Neef, Nabil Qadi, Raeda Quraan, Ziad al Saa'd, Danielle Stordeur, & Hisahiko Wada
bibliotheca neolithica Asiae meridionalis et occidentalis (2001) & Monographs of the Institute of Archaeology and Anthropology, Yarmouk University 3 (2001)
(with 7 specialist contributions, XIII + 222 pages, 77 figures, 42 plates, 23 tables, hardcover. . 70 Euro, postage incl. [ISBN 3-9804241-7-0])

Marion Benz, *Die Neolithisierung im Vorderen Orient. Theorien, archäologische Daten und ein ethnologisches Modell*. Studies in Early Near Eastern Production, Subsistence, and Environment 7 (2000)
(V + 260 pages, 59 + 2 figures, 7 tables, 3 appendices, 6 transparencies, paperback. 70 Euro, postage incl. [ISBN 3-9804241-6-2])

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