Natufian Foragers in the Levant

Terminal Pleistocene Social Changes in Western Asia

edited by

Ofer Bar-Yosef
&
François R. Valla

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Preface

The Natufian Culture in the Levant: Twenty Years Later

Ofer Bar-Yosef and François R. Valla

Since Dorothy Garrod excavated Shukbah cave, and reported her finds which she named "Natufian", after the name of the wadi where the cave is located, the number of colleagues involved in the research of this entity is growing exponentially. Yet the rapidly increasing data sets that pertain to our understanding of this past cultural entity encountered a relative pause in recent years, at least as far as field studies are concerned. Summaries of field and laboratory studies of particular projects facilitates the positing of new questions and conflicting interpretations can be contested and re-examined. In 1989 we thought that it was time to organize an international meeting to put together the widest possible array of data, and the resulting publication served, and still does, as a source of information (Bar-Yosef and Valla 1991). We felt that after twenty years we should organize a similar meeting, not for looking backwards, but for stimulating summaries of new [recent?] research. Naturally, with the constantly growing number of colleagues who become interested in the Natufian culture, other meetings were organized as well and collections of assembled papers were published (*e.g.,* Delage 2004; Rosen and Dubreuil 2010). In addition, numerous papers reporting and interpreting the remains of this prehistoric culture were published over the years. Many were the results of new discoveries and the enlargement of the territory often referred to as the "Natufian homeland". But we felt that there is room for a renewed effort to bring together as many scholars as possible that are involved in data recovery directly related to the Natufian culture. This could be an opportunity both to put together recently acquired data sets, and to acknowledge the weak points in our current studies, thus encouraging new research and new approaches.

Unfortunately, the on-going political situation in the Levant prevented us from organizing the meeting in the region or allowing visits of new excavations. Thus it was in keeping with a certain tradition that this current reunion took place in Paris. However, we did our best to invite as many colleagues as we could to take part in this international meeting, and to even assist financially some of them. In the same spirit we assembled as many papers as we could, and we thank all those who came, and in particular all who had the time and energy to submit their papers. This volume follows the same motivation that drove us as the previous one and we hope it will serve us all in the next decade or so as a source of data to be used in testing new and old models of the Natufian culture.

Instead of providing a brief overview of the papers in this volume we feel that the current collection of reports and interpretations require us to first explain the structure of this volume and then point out a few of the future directions we hope the research of the Natufian culture will take in years to come.

We decided to follow the geographic trajectory that indicates where new discoveries were made, and placed the papers related to the northern Levant first. Second came the southern Levant where both historically and in recent years more field and laboratory studies took place. Here we assembled papers according to the main field projects – el-Wad Terrace and cave, Eynan (Ain Mallaha), Wadi Hammeh, Wadi Qusayr, Wadi Hasa, Azraq basin, Hayonim cave and terrace, Hilazon, Raqefet, and Huzuq Musa, a site on the transition from the Natufian to the PPNA. The last portion of the volume is dedicated to general reviews, climate issues, technological and functional studies, as well as topics of faunal interpretations. Finally, we opted not to include an overall summary of conclusions. We leave this hard task to the readers and those who will employ the published information. Today it is undoubtedly a challenging endeavor to intertwine most of the cultural components of this culture, often seen as the remains of a "complex" (a term which needs clarification) society of hunter-gatherers, into a coherent evolutionary picture. As the number of scholars who try to tie the Natufian with the ensuing expressions of the Neolithic Revolution increases, additional questions are being raised, and needless to mention, interpretations vary considerably. We thus felt that a short proposal for the research of some of the missing data from our records would better serve future research than a summary of past achievements.

The subjects in need of further attention are briefly mentioned:

When reviewing the information about site stratigraphies and the description of Natufian building practices we notice that site formation processes are far from being fully understood. The relative paucity of radiocarbon dates indicates, in spite of repeated efforts by many scholars to recover carbonized plant remains, that preservation in most sites is very poor. It seems that unknown diagenetic processes took place during Natufian and post-Natufian times and the destruction of organic matters, except for bones, were responsible for this lacunae. While a few hypotheses could be put forward the high densities of artifacts in every site where houses or storage facilities were preserved seem to indicate, that the upper structures were built not from clay or stones, but from brush and straw or animal hides supported by some wooden frame. If this is correct, then the amount of missing organic matters is even more surprising.

The interpretations of site stratigraphies, in terms of how long sites were inhabited, why houses were abandoned, was there any evidence for refilling of deserted buildings as in Neolithic times, are intriguing. We often accept the stratigraphic observations, but if we plug in the few radiocarbon dates that we have, we would probably need to consider the periods when the sites were abandoned, and ask ourselves where the people went to? Alternatively, we may interpret the length of time that the same houses were inhabited as having been longer than expected. Thus, issues of seasonality and settlement pattern that were already raised by one of us (Valla 1998) need to be dealt with in detail.

The poor preservation of plant remains effects the issue of mobility, whether 'residential', 'logistical', 'radial', pick your own terminology, and it also, deters us from understanding possible positive responses to seasonal exploitation of resources. In addition, it raises the urgent need in many more phytolith analysis and we hope that someone will take upon himself/herself to initiate systematic starch analysis. The way was already shown in the study of the grinding stone from Ohalo II, an earlier site rich in plant remains (Piperno *et al.* 2004). Phytolith studies may also resolve the issue of the organic materials employed in erecting the Natufian brush huts. The first step was taken by A. Rosen (in Valla *et al.* 2007) and one hopes that the challenge will trigger additional research. Further, the potential discoveries hidden in non-pollen palynomorphs may uncover both plant remains, insects, and even the microscopic remains of fibers (*e.g.*, Bar-Yosef *et al.* 2011; Kvavadze *et al.* 2009).

We believe that there is no lack of lithic studies, and the numerous papers on this aspect of the Natufian culture are well known and also expressed in this volume. We are definitely making progress in understanding the operational sequences (*chaîne opératoire*) in the various Natufian sites. What is missing are more comprehensive studies of microwear analysis. After several years spent with enthusiasm in identifying the sources of the gloss (or sheen) on sickle blades, we notice a decrease in such studies that will research other flint tool types. Although one may expect that traces of mundane activities such as scraping hides, whittle wood, sharpening organic objects and so on, will be repeatedly uncovered there could be unexpected discoveries for example in tracing drilling activities, or tools related to mounting organic matters that forms the houses walls, and the like. To this wish list we add chemical analyses that are at their infancy.

As we all know from personal experience, the excavations of new sites (some reported in this volume) provide the excitement of discovery. Many sites, in spite of their similar contents, have unique characteristics and this aspect is what makes the recognition of the Natufian culture as one of great interest both to us and to the public. This society at the verge of the Neolithic transition provides in the Levant an excitement somewhat similar to the rich Upper Paleolithic contexts of Western Europe. True, we do not have cave art, and the mobile imagery is modest by comparison to the centers of Paleolithic art. But within the geographic confines of this region, Natufian finds bring us a different view of the past, as much as the discoveries of Göbekli Tepe do for the Neolithic period, albeit on a humble scale. Thus, we expect new excavations of sites, especially in areas that are as yet poorly known, beyond what was traditionally called the "Natufian homeland".

We hope for further elaborations and more details concerning past climatic fluctuations. Recent summaries demonstrate the fact that the gross scale does not facilitate a good test for the role played by extent climatic changes which caused economic changes (Blockly and Pinhasi 2011; Maher *et al.* 2011). As it sometimes happens, two different studies may end up with partially contradicting results. We are thus in need of new ways of conducting paleoclimatic research, be it with detailed dated speleothem sequence of $\delta^{18}O$, or entirely new ways of deriving the climatic evidence from the sites themselves.

The reconstruction of different landscapes in the way that was shown by the Late Shoshana Ashkenazi whose last study is included in this volume, has the potential of opening the way to more systematic landscape archaeology of the Natufian. In a region composed of a mosaic of habitats such as the Levant, within the background of the known climatic phases, Bølling-Allerød and the Younger Dryas, it would be interesting and intriguing to find out how each habitat reacted and whether or not humans responded to their changing environment or ignored even minor changes in food resources.

At this point the new jargon term of 'networking' needs to be mentioned, and the apparent possible connections between sites needs to be sought more vigorously. People must have communicated with each other in order to manage and maintain daily life and their reproduction system. Language, or languages and dialects, were essential and we do not need ethnographic examples to bolster the assertion that the Natufians had probably a common language. We will not get as far as suggesting the Natufian language's place within the Afro-Asiatic languages, but we leave this challenge to those whose specialty is the tracing of historic and prehistoric languages. Tracing these past interactions will be facilitated by our understanding of the archaeological past.

Interactions are critical, not only in the past but also in our generation, and in the time to come. We wish to see a larger integration of individual specialized studies into wider syntheses. We believe that this is a desire that could be reached in reality through improving cooperation between researchers. We thus hope that the friendly, amiable spirit that characterized the meeting in Paris will mark the next twenty years and beyond of prehistoric investigations of the Natufian culture in the Levant.

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Last but not least Sveta Matskevich was instrumental in bringing the volume to its final form.

Natufian Lifeways in the Eastern Foothills of the Anti-Lebanon Mountains

Nicholas J. Conard, Knut Bretzke, Katleen Deckers, Mohamed Masri, Hannes Napierala, Simone Riehl, Mareike Stahlschmidt and Andrew W. Kandel

Introduction

Research on the Natufian settlement of southwestern Syria dates back to the well known work of Alfred Rust (1950) in the 1930s in Yabroud. Rust initially visited Yabroud in 1930 and conducted a series of excavations at Yabroud rockshelters I, II and III in 1931 and 1933. Due to delays related to the Nazi period and World War II, Rust was not able to publish the results of his seminal research until 1950. In this work he presented the assemblage of artifacts from cultural layer 2 at Shelter III, which contains a number of lunates with Helwan retouch, end scrapers, laterally retouched pieces, perforated shells, as well as dentalium shell beads. Rust referred to this assemblage, of which 657 flints are housed at the University of Cologne (Hillgruber 2010), as the "älteres Natufien" or Early Natufian. This assessment, however, was based on the absence of notched points including Khiamian points. Based on the current state of research this assemblage would now be classified as Late Natufian (Hillgruber 2010:283).

More recent work on the Natufian of the Damascus Province has been rare. One exception is Cauvin's (1991) survey and report on sites in the Jeiroud Basin near the dry Lake Mallahat-Jayroud (Fig. 1) where he identified four sites, Jayroud 1, 2, 3 and 9. Small excavations and surface collections were made at these sites with each one producing Natufian artifacts. Jayroud 1 produced 1,127 lithic artifacts including geometric microliths and what appeared to be part of a circular house floor. The sites were badly damaged by military maneuvers before they could be studied in detail, so that only preliminary information is available. Jayroud 2, produced a collection of 1,210 artifacts including large lunates with Helwan retouch, which presumably date to an early phase of the Natufian. Jayroud 3 and 9 are located on small hills 200 meters apart. The collections from these sites include a total of roughly 8,000 chipped artifacts, and fragments of mortars and pestles. Based on the small size of the lunates and the absence of Helwan retouch, Cauvin suggested that the finds date to a later phase of the Natufian. The sites of Jayroud 1, 3 and 9 also yielded personal ornaments made of marine shells that Maréchal (1991) placed in the final Natufian.

Another site in our general research area is Seidnaya Rockshelter, which was cursorily studied by van Liere and de Contenson (1963) and mentioned by Cauvin (1991). The materials from Seidnaya Rockshelter were recovered in a non-systematic manner. We have briefly examined some of the assemblage housed at the National Museum in Damascus, and the artifacts clearly contain a strong Natufian component including lunates and other characteristic forms. Until the finds have been studied more systematically, we can say little about the nature of this site.

Although sites such as Nachcharini Cave and the open-air site of Jebel Saaïdé II on the other side of the Anti-Lebanon Mountains in Lebanon lie outside the Damascus Province, it is clear that they are of importance for comparative reasons (Copeland 1991; Garrard *et al.* 2003; Schroeder 1970, 1977, 1991). Both of these sites were badly damaged before they could be studied in detail, but they have yielded lithic artifacts including the usual spectrum of Natufian chipped and ground stone tools, as well as faunal remains.

Natufian Excavations of the TDASP

The Tübingen Damascus Excavation and Survey Project, known by its German abbreviation TDASP, began in 1999. After a season of exploratory

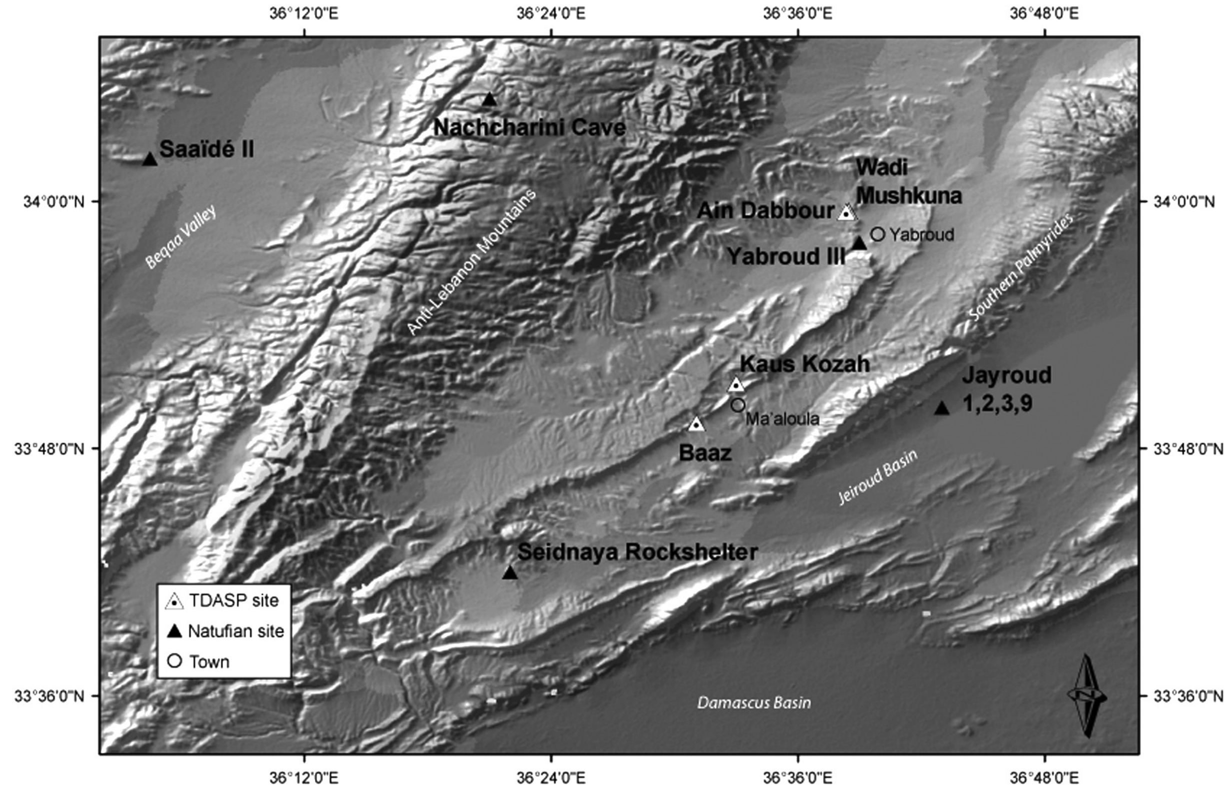

Fig. 1. Map of the TDASP research area showing stratified sites excavated by the TDASP team and the Natufian sites mentioned in the text. (Figure by K. Bretzke)

survey in the Mediterranean region of Syria and in the Damascus Province (Conard and Kandel 2006), we decided to focus our research in the region around Ma'aloula. From the start, our goal was to reconstruct the local cultural history, settlement dynamics and economic systems from the earliest Paleolithic occupation in the region through the Neolithic.

Many of the localities we visited were poorly preserved or badly damaged by looters. One of the few exceptions, and thus a promising site for excavation, was Baaz Rockshelter in the Jaba'deen Pass of the Damascus Province (Fig. 2). Conard and Kandel discovered Baaz on survey on May 14, 1999 near the permanent springs in Wadi Jaba'deen (Conard 2002). The site is named after the Arabic word for falcons (باز) we saw flying overhead when we discovered the site. The rockshelter is located at an elevation of 1,529 meters a.s.l. and provides an excellent view over the surrounding landscape. The shelter is relatively small with an area of about 30 square meters inside the drip line. A number of large boulders in front of the shelter helped to protect the sediments from down-slope erosion, a process that has led to the destruction of archaeological sediments in numerous caves and rockshelters along the prominent Oligocene-aged, limestone cliffline that runs through our research area.

Excavation began at the site in the fall of 1999 and continued in the autumns of 2000 and 2004. The excavation at Baaz covered an area of about 18 m^2. The site contains a long sequence of Upper and Epipaleolithic deposits and concludes with a Middle Neolithic occupation (Barth 2006; Conard 2006; Hillgruber 2010), with dates ranging from 34,200 to 5,200 uncal BP (Table 1). The Natufian finds mainly originate from Archaeological Horizons (AH) III and II. A round house with limestone walls, a packed earth floor, a fireplace and an installed mortar form the base of the Natufian sequence (Fig. 3). According to results from micromorphological analysis of the packed floor (Stahlschmidt 2010), the house was intensively used (Fig. 4).

The other TDASP excavation of primary relevance for this paper is Kaus Kozah Cave (Fig. 5). Conard discovered the cave late in the 2000 season, and the TDASP team conducted preliminary test excavations in 2003, which were followed by excavations in 2004, 2005 and 2006. The site is named after the Arabic word for rainbow (قوسقزح), because a prominent rainbow arched over the site when

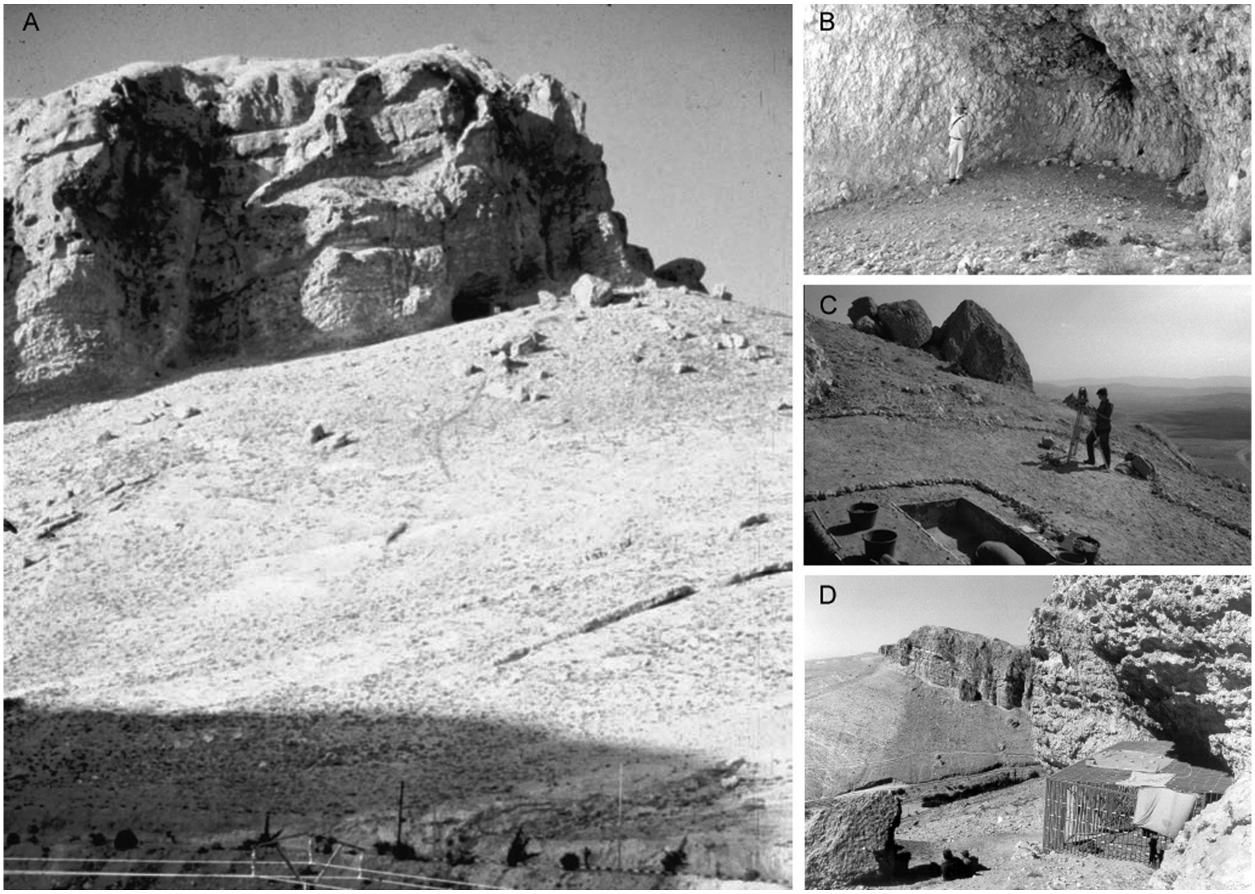

Fig. 2. Baaz Rockshelter. A) view of cliffline and rockshelter seen from Wadi Jaba'deen, B) prior to excavation, C) view from excavation looking southeast, D) excavation with Wadi Jaba'deen below. (Photos by A. W. Kandel)

Table 1. Baaz Rockshelter. Radiocarbon dating results including ages calibrated using OxCal v. 4.2 Bronk Ramsey 2009; Riemer *et al*. 2009)

Lab Number	AH	Square-Find ID	Material	14C uncal BP	cal BC (1 σ)
KIA 11580	Ia	20/33 - 163	Charcoal	5,240 ± 35	4,219–3,980
KIA 11579	II	20/33-425	Charcoal	5,705 ± 35	4,590–4,491
KIA 11578	II	20/33-672	Charcoal	10,380 ± 100	10,466–10,124
KIA 11577	III	20/33-714	Charcoal	10,940 + 70/-60	10,952–10,747
KIA 11576	IIIa	20/33-745	Charcoal	10,400 ± 80	10,464–10,172
KIA 30307	V.1	19/31-1067	Charcoal	21,310 +740/-680	24,646–22,567
KIA 30308	V.1	19/31-1068	Chenopod charcoal	23,040 +270/-260	26,381–25,176
KIA 30310	VII	19/31-1413	Chenopod charcoal	32,060 +600/-560	35,491–33,592
KIA 30309	VII	19/31-1403	Chenopod charcoal	34,200 +1460/-1240	38,931–35,646

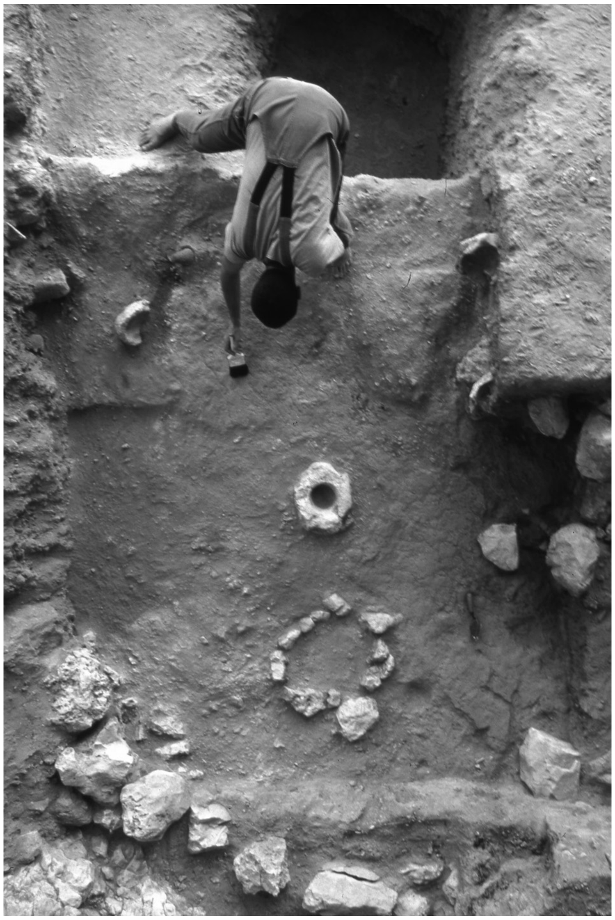

Fig. 3. Baaz Rockshelter. House floor with wall (bottom left), fireplace (lower center), built-in limestone mortar (center) and limestone mortar and basalt pestle (upper left). (Photo by N. J. Conard, October 2000).

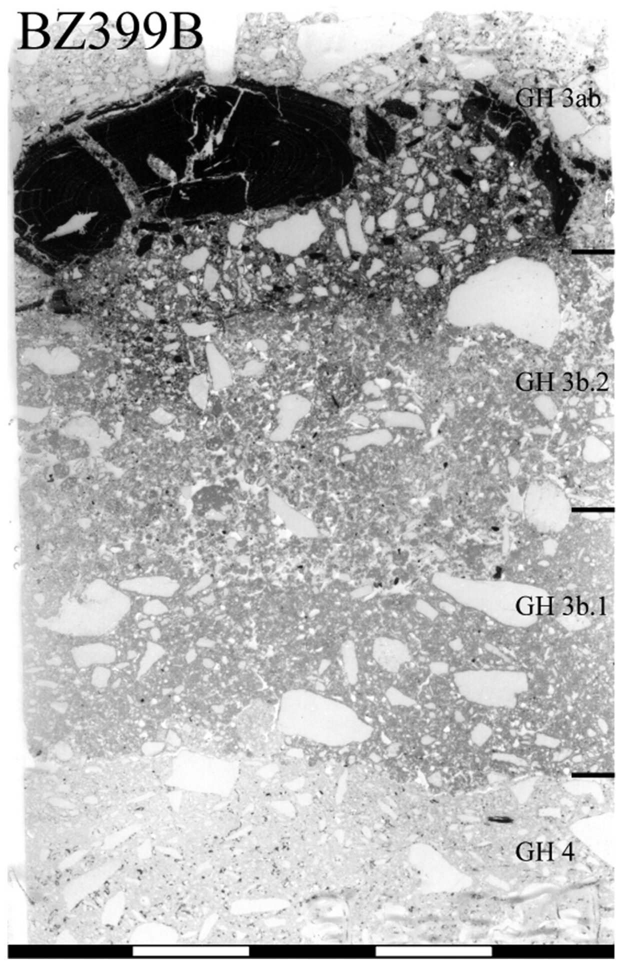

Fig. 4. Baaz Rockshelter. Thin section of the constructed floor and the underlying whitish appearing geogenic layer GH 4. As a consequence of intensive use and trampling, the former homogeneous floor differentiates into three geological units (GH 3b.1, 3b.2 and 3ab) that differ in constituents and microstructure. (Photo by M. Stahlschmidt, scale in cm.)

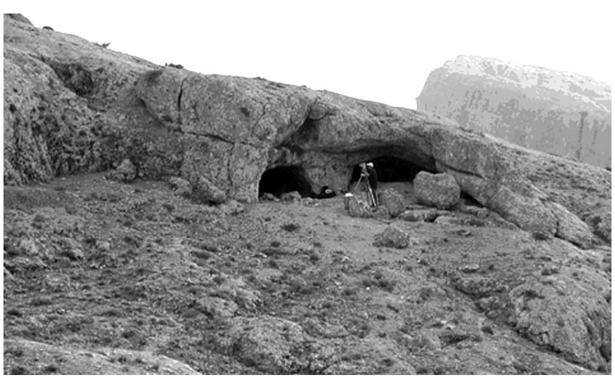

Fig. 5. Kaus Kozah Cave. View of the cave looking southwest showing both entrances. (Photo by N. J. Conard, October 2004)

it was discovered. The cave is on the backside of the cliffline on the Oligocene cuesta high above Ma'aloula and near the permanent springs that have long supplied the city and its famous convents with water of high quality. The site has an elevation of 1,490 meters a.s.l. and, like Baaz, commands an excellent view of the surrounding landscape.

The inside of the cave has been damaged by looters, but the terrace in front of the eastern entrance to the cave appears to have been largely untouched by recent activities. Excavations covering an area of 18 m^2 focused on the terrace and produced rich finds in four archaeological horizons. AH IV contains a small assemblage of Levalloisian Middle Paleolithic artifacts and the intrusive burials (Fig. 6) of two terminal Natufian aged infants with radiocarbon dates of about 10,300 uncal BP (Table 2) (Conard *et al.* 2006; Hillgruber 2010). The upper three units include Natufian, Khiamian and PPN finds. The site contains a rich faunal assemblage (Napierala 2012). Of the many sites in the TDASP survey area, Kaus Kozah is only the second one that preserves bedrock mortars. Two clear examples are present just inside the western entrance of the cave. One is larger with a diameter at the top of 23 cm and a depth of 14 cm, while the other is smaller with a diameter of 15 cm and a depth of 10 cm (Fig. 7).

Geomorphology and Paleoenvironment

One reason for starting work in the Ma'aloula region was that it contained a wide range of geomorphological settings and a strong gradient of rainfall. Relatively high precipitation falls in the highlands of the Anti-Lebanon Mountains with decreasing rainfall as one moves east toward the Syrian Desert. The area the team has thus far surveyed ranges in elevation from 2,350 m a.s.l. in the mountains of the Anti-Lebanons to 800 meters a.s.l. in the Jeiroud Basin. Today the rainfall gradient goes from *ca.* 300 mm in the west to *ca.* 150 mm in the eastern part of the survey area. Moving from the lowlands to the highlands, one crosses a number of geomorphological zones, part of a distinct landscape that includes a lowland lake in the Jeiroud Basin, a highly differentiated lowland and lowland hills, a steep cliff slope, a prominent Oligocene cliffline and cuesta, highland hills, highland plateau and the high mountains of the Anti-Lebanon (Dodonov *et al.* 2007). The most important geological features moving from southeast to northwest are the Jeiroud Basin, the Nabk Anticline of the Palmyride Mountains, the al Majar Depression and the Anti-Lebanon Mountains. Most of our work has focused on the

Fig. 6. Kaus Kozah Cave. Plan view of burial of a 1-2 year old child at the top of archaeological horizon IV in square 51/40. (Photo by A. W. Kandel, October 2006)

Table 2. Kaus Kozah Cave. Radiocarbon dating results including ages calibrated using OxCal v. 4.2 (Bronk Ramsey 2009; Riemer *et al*. 2009)

Lab Number	AH	Square-Find ID	Material	14C uncal BP	cal BC (1 σ)
KIA 44008	I	50/43-168	Goat, Mc L	10,120 ± 45	10,005–9,676
KIA 41200	II	51/41-71	*Gazella subgutturosa* Mc R	11,285 ± 45	11,291–11,179
KIA 41198	III	50/41-145	*Amygdalus*, charcoal	9,435 ± 60	8,790–8,631
KIA 41201	III	51/41-104.3	Goat, mand P3, apatite	10,620 ± 40	10,668–10,597
KIA 41202	IV	51/41-106.2	*Ovis orientalis*, Phal. 1	9,775 ± 40	9,282–9,241
KIA 28696	IV	51/41-107.4	Human, bone	10,130 ± 70	10,022–9,670
KIA 30306	IV	51/41-123.11	Human bone	10,485 ± 50	10,601–10,440
KIA 41199	IV	50/43-197	*Amygdalus*, charcoal	10,865 ± 45	10,852–10,694

area immediately inside and outside the al Majar Depression. All four of our excavated sites, as well as the famous sites from Yabroud, are located along the Oligocene cuesta that forms the outer edge of the al Majar Depression. These prehistoric sites are all found near permanent water sources, a fact which explains why villages like Jaba'deen, Ma'aloula and Yabroud are situated where they are today.

Since there are few continuous paleo-environmental records in the immediate study area (Hussein 2006) and no well-dated, high resolution profiles for the period in question, we use the organic materials recovered from our excavations and geological sections to reconstruct past environmental conditions. While our work on this topic remains incomplete, we are gradually piecing together a good record of the changing floral and faunal communities of the Late Quaternary. The desiccated impression of the current landscape away from the major springs and areas of irrigation is misleading. In modern times the cutting of trees for fuel and building combined with overgrazing by sheep and goats has stripped the entire area of much of its natural vegetation. However, during the Pleistocene, the TDASP study region would have included a grassy lowland steppe and upland forests separated by a mixed parkland. Under favorable conditions cedar grew in the highlands. The border between oak, almond and pistachio forests and the grassy steppe would have shifted laterally across the region depending on the levels of precipitation and temperature.

The dominating charcoal taxon identified from Baaz is *Amygdalus* (almond). Besides *Amygdalus*, other typical taxa common to the almond woodland-steppe occur, such as *Pistacia* (pistachio), Maloideae species, *Rhamnus* (buckthorn), *Acer* (maple), *Juniperus* (juniper), and Chenopodiaceae (goosefoot family). Besides the woodland-steppe taxa, Baaz has a relatively large proportion of hydrophilic vegetation; for example, *Fraxinus* (ash), *Populus/Salix*, and *Vitis* (vine) occur (Deckers *et al.* 2009, Deckers and Conard 2011). This shows that the residents of the site had access to well-watered areas. Evidence for steppic or degradation elements comes from seeds recovered during the excavations from taxa such as *Astragalus* spp. (tragant) and other small-seeded pulses and grasses.

The faunal remains from the Natufian at Baaz include both goitered and mountain gazelle (*Gazella subgutturosa, G. gazella*), wild sheep (*Ovis orientalis*) and onager (*Equus hemionus*) (Napierala 2012) It is noteworthy that, although the majority of remains from wild caprines are not identifiable to species level, only the wild sheep has been confirmed so far in the faunal assemblage. The cuesta was therefore probably not high enough, and the terrain not rugged enough, to sustain a wild goat population. Small game species, which make up a large portion of the assemblage, include mostly hare and tortoise. Finally, species of fish including brown trout (*Salmo trutta*) and several cyprinids demonstrate that perennial streams existed in the al Majar Basin and were linked directly to the Orontes River system. This hypothesis, which is borne out through reconstruction of the regional drainage systems using GIS, is the easiest way to explain how these fish could have populated the waters of the highlands near Ma'aloula (Napierala *et al.* herein). Alternatively, one could argue that fish were dried and used as a mobile economic resource during the Natufian. However, this hypothesis is unlikely since no other Natufian site has produced finds of brown trout, even though the sites are located much closer to the modern distribution of this species.

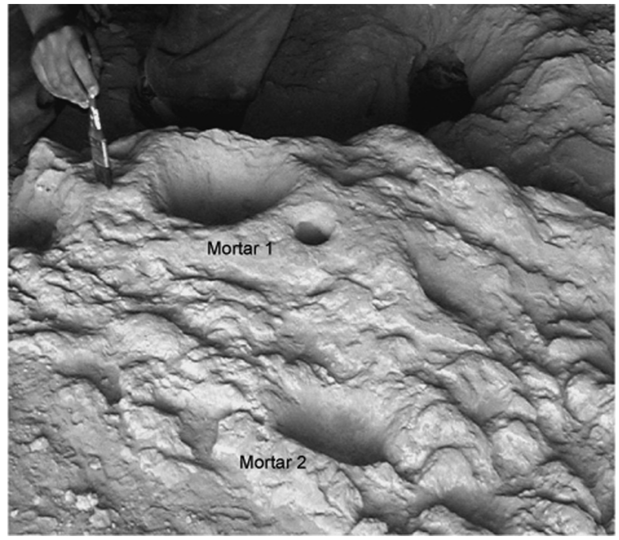

Fig. 7. Kaus Kozah Cave. Two bedrock mortars in western entrance to cave: 1) 23 cm diameter, 14 cm deep; 2) 15 cm diameter, 10 cm deep. (Photo by N. J. Conard, September 2005)

Although the chronology of hydrological changes in the region has not yet been established in detail, survey has identified Pleistocene lakeshore sediments in the basin above the deeply incised Ma'aloula Canyon. This fossil lake was named Lake Dodonov after its discoverer and our late colleague, Andrey Dodonov, from the Russian Academy of Science in Moscow. The lake sediments consist of clayey carbonate silt and contain three taxa of terrestrial gastropods (Pupillidae, Succinidae, Helicidae) (Dodonov *et al.* 2007). Upper Paleolithic artifacts found *in situ* in the lake sediments indicate a Late Pleistocene age for the lake. A radiocarbon date of 35,725 uncal BP (KIA-41197) supports this interpretation. Survey also recovered Upper Paleolithic artifacts from near the shore of the fossil lake, suggesting that the Ma'aloula Canyon was blocked during the Upper Paleolithic. Thus, Lake Dodonov provided standing water on the highland side of the cuesta during the Late Pleistocene.

The overall picture derived from the floral, faunal and geological data suggests that the Ma'aloula region provided an attractive environment for human adaptations during the Late Natufian and the Younger Dryas, the period during which the Natufian is best documented in the region.

Survey

From the start of TDASP, team members conducted excavation and survey in parallel (Conard 2006; Conard *et al.* 2010). This work led to the discovery of 538 Paleolithic localities. Individual localities often contain sites from multiple periods. At these localities, sites are well documented from all periods from the Lower Paleolithic to the early Neolithic (Table 3). The Epipaleolithic sites show a radically different pattern of land use than that derived from the distribution of sites and artifacts dating to the Upper Paleolithic and earlier periods (Fig. 8).

While the distribution of pre-Epipaleolithic sites shows a fairly consistent distribution with many sites in the lowland and highland hills, Epipaleolithic sites show a much more diffuse pattern with sites in a variety of environmental settings and more often isolated on prominent high terraces, hilltops and mountain tops. Although most of the caves and rockshelters along the cuesta have been swept completely clean by erosion, Epipaleolithic lithic artifacts are often present on the ground below caves and rockshelters. This distribution pattern suggests that many of the caves and rockshelters were used during the Epipaleolithic. In addition to Baaz, Kaus Kozah and Yabroud III mentioned above, TDASP excavations in the large cave of Ain Dabbour (Conard *et al.* 2008; Hillgruber 2010), located in Wadi Mushkuna near Yabroud, represent another example of Epipaleolithic use of caves and shelters along the cliffline of the cuesta.

The distribution of Epipaleolithic sites also appears to be less strongly tethered to water sources and flint outcrops. The spatial pattern of Epipaleolithic finds indicates a diversification in off-site activities. The presence of Epipaleolithic

Table 3. TDASP Survey. Summary of sites based on cultural group and artifact density. Percentages are related to the data for the artifact density of each cultural group. These sites are present at 538 localities documented since 1999. A locality may contain sites from more than one cultural group (* Each of these sites contained only one handaxe.)

Cultural Group	Low Density Sites n (%)	Medium Density Sites n (%)	High Density Sites n (%)	Total Number of Sites n
Lower Paleolithic	30 (37%)	36 (44%)	16 (20%)	82
Handaxes	16 (94%) *	0	1 (6%)	17
Middle Paleolithic (Levallois)	143 (40%)	160 (45%)	51 (14%)	354
Middle Paleolithic (non-Levallois)	9 (38%)	12 (50%)	3 (13%)	24
Upper Paleolithic	65 (36%)	92 (51%)	24 (13%)	181
Upper or Epipaleolithic	7 (88%)	1 (13%)	0	8
Epipaleolithic	55 (57%)	33 (34%)	9 (9%)	97
Post-Epipaleolithic	11 (41%)	10 (37%)	6 (22%)	27
Indeterminate	60 (79%)	14 (18%)	2 (3%)	76
TOTAL	**396**	**358**	**112**	**866**

flints on hilltops and other exposed settings might in part be due to their younger age and less intense exposure to erosion, but on the whole, it appears that the recorded distribution of sites reflects changing land use during the Epipaleolithic.

The survey has identified several different kinds of sites. These include comparatively rich sites documented at the excavations at Baaz, Kaus Kozah and Yabroud III; rich surface sites on plateaus or near eroded rockshelters, mountain top sites, and isolated finds in the open-air or near large boulders that have broken off the cuesta and rolled or slid down slope. Since we have not yet studied these assemblages in detail and are not able to assess how strong the Natufian component is, it seems prudent, while noting the diverse Epipaleolithic record, to concentrate this report on the results from excavation.

Behavioral Analysis

One simple way of examining Natufian lifeways in the Ma'aloula region is to look carefully at the archaeological record from excavations to demonstrate what activities have taken place on-site. The finds from excavation and survey also allow us to draw reasonable conclusions about some of the activities that took place off-site to reconstruct past settlement dynamics and past economic systems. This approach incorporates aspects of a life history analysis of the sites to help determine how a site was used and how these activities articulate with the broader setting beyond the spatial limits of the site. Below we consider this approach for the Natufian sites excavated by the TDASP team.

Baaz

Following the late Upper Paleolithic and early Epipaleolithic use of Baaz Rockshelter, Late Natufian people arrived at the site and dug a shallow depression into the geogenic silt and limestone gravel that respectively form the matrix and clasts of the substrate. After they prepared this anthropogenic surface , they placed limestone blocks in position and packed and stabilized them. In addition to the numerous limestone blocks necessary for this construction, they carried many tens of kilograms of red-brown silty clay to the site (Stahlschmidt 2010). We do not know exactly where the builders of the house collected this material, but the wadi bottom contains such sediments and is a likely source. Based on local geology, it seems unlikely that the uplands served as a source for this material. In any case, carrying large amounts of sediment to Baaz was certainly a strenuous activity.

The silty clay was then carefully spread across the surface of the site to create the floor. This material lay in direct contact with the limestone blocks that form the lower level of the circular stone wall of the house. In the middle of the structure within a depression, the builders placed silty clay to secure the limestone mortar and integrate it into the house floor. The same is true for the limestone cobbles that constitute the adjacent constructed hearth. Based on microscopic studies we can say that the floor was used intensely, as shown by its post-depositional partition into three parts (Fig. 4). Following the terminology of Gé and colleagues (1993), the floor consists of a so-called passive layer at its base (GH 3b.1), which is very compact

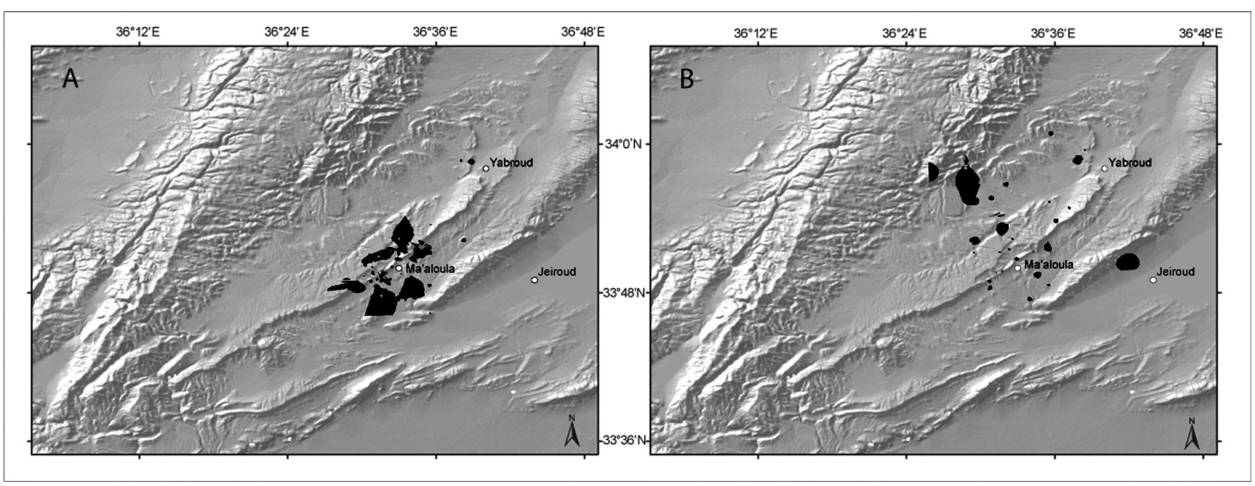

Fig 8. TDASP Survey. Comparison of Upper Paleolithic (A) and Epipaleolithic (B) land use patterns. Dark areas indicate central zones of human activity. (Figures by K. Bretzke)

and not post-depositionally altered. The passive layer underlies the reactive zone (GH 3b.2) with rounded floor aggregates in a more porous texture as a result of trampling. The overlying active unit (GH 3ab) results from activities performed on the floor and incorporate charcoal, ash and rounded floor aggregate.

The house was well made, with a diameter of about 3 meters and an area of about 7 square meters. One can reasonably assume that the roughly volleyball-sized, angular limestone blocks that form the walls of the house were available very near the site and that there was no problem transporting these materials to the site. The same applies for the mortar that was installed into the house floor with its external diameter of about 30 cm and a depth of about 20 cm.

We do not know exactly what kind of organic materials were used to cover the structure. Wood, reeds and matting materials for this purpose could have been obtained in the wadi bottom. Poplar or willow, which represent about 5% of the identified wood charcoal from AH III, may have been used as construction wood (Deckers *et al.* 2009). These tree species probably provided the largest and straightest pieces of timber in the vicinity. Since the house is situated inside the dripline of the small shelter, it may not have needed a substantial roof. Excavators recovered three small fragments of red plaster from AH I in the northwestern part of the house. This implies a fairly labor intensive production of lime and grinding of pigments to produce the colored plaster. However, given their relatively high stratigraphic position, there is no compelling reason to assume that they originate from the Natufian house.

Felix Hillgruber (2010, herein) has recently presented the lithic assemblages of Baaz and Kaus Kozah in great detail, so we will not describe the chipped stone artifacts here. What is clear, however, is that the inhabitants of Baaz used a variety of locally available flints (Dodonov *et al.* 2007) that they collected in the surrounding lowlands and highlands. High numbers of cortical flakes and early products of lithic reduction demonstrate that cobbles were often reduced directly on site. The assemblages also document all subsequent stages of lithic knapping and frequent discard at the site.

The nature of the assemblages provided clear insight into activities executed both on and off-site. Both Barth (2006) and Hillgruber (2010) have interpreted the lithic assemblage from AH III and II as indicative of a site used primarily as a camp from which hunts were staged and to which hunted game was brought. This is consistent with the abundance of lunates, which could have served as composite projectile-tools. The abundance of scrapers is consistent with an emphasis on hide or woodworking. A key point in interpreting Baaz as a hunting camp is the complete absence of sickle gloss on the backed blades, backed bladelets, lunates and other tools. The site provides little or no evidence for harvesting wild grains, which is supported by the small amount of seed remains.

Several backed bladelets bear traces or even nearly complete hafts along their backed edges with preserved mastic made of bitumen (Fig. 9). Using methods from organic petrology, Bertrand Ligouis from the Institute for Archaeological Sciences in Tübingen has identified the material used for hafting. The mastic may or may not have been processed at the site, but regardless of where the hafts were made and curated, the inhabitants of Baaz must have had access to bitumen via trade or direct procurement. While we are not sure about the exact origin of this bitumen or what variables controlled its access, sources are known from the eastern Syrian Desert and Iraq (Boëda *et al.* 1996). The best preserved hafted backed bladelet shows macroscopic damage to the cutting edge, but lacks sickle gloss.

Fig. 9. Baaz Rockshelter. Mastic made of bitumen adhering to flint lunate. Scale in cm. (Photo by A. W. Kandel)

The Natufian horizons from Baaz include a number of mortars and pestles. The mortars are invariably made of local limestone, while pestles were typically made from basalt originating from either the vast volcanic fields near Homs, the

Hauran or the Golan. While we cannot rule out the possibility that the mortars were used to grind grain, in this case they may well have been used to grind nuts, fruits, herbs or other materials. The best preserved and most complete pestle made of basalt appears to contain red pigments in its porous cavities along the pounding and grinding surface, indicating that the pestle was at times used to process pigments.

Another activity certainly involved the transport of essential resources such as water, firewood and food to the site. While the transport of water left no obvious signature in the archaeological record, there is unambiguous evidence of fuel being used at Baaz in the form of charcoal. Remains of *Amygdalus*, *Populus/Salix*, Chenopodiaceae, Maloideae, *Pistacia*, *Rhamnus*, *Juniperus*, *Larix/ Picea*, a Monocotyledon species, and *Fraxinus*, are present in decreasing order of abundance in AH III. Despite having excellent conditions for charcoal preservation, we have recovered few seeds. Two specimens of *Celtis* sp. (hackberry) are the only seeds from edible plants recovered in the Natufian deposits at Baaz.

Faunal analysis shows that gazelle, wild sheep, onager, hare and tortoise represented the most important animal food sources. Fish and birds also contributed to the diet of the Natufian inhabitants of Baaz. Most of these faunal resources would have been available within a few kilometers of the site. The inhabitants of Baaz must have regularly hunted animals in all of the major landscape forms of the vicinity. Goitered gazelle and onager were probably ubiquitous, with a slight preference for the grass-rich steppe of the eastern lowlands, while sheep were probably hunted along the cuesta. This being said, the gazelle were probably not hunted in the open landscape but rather in the more sheltered terrain of the lowland hills or in wadi drainages that provided better cover for hunters. The fish must have come from former highland waters that flowed through the al Majar Basin into the greater drainage system of the Orontes. The patterns of faunal exploitation at Baaz do not conform to the observations of Stiner and Munro (2002) based on their work at Hayonim, Hilazon Tachtit and El Wad. While they have argued that the reliance of small, low ranked game indicates that the Late Natufian was a time of resource stress in the Mediterranean geographic zone (Munro 2003, 2004; Stiner and Munro 2002), our analyses are more consistent with a mixed economy utilizing a wide variety of faunal and botanical resources without the need to invest heavily in low ranked, or low quality food sources (Napierala *et al.* 2012).

The faunal remains at Baaz include a poorly developed bone industry consisting of several pieces of bone points or awls and an artifact of yet unknown purpose. Tortoise shell bowls were used for heating or cooking, as is indicated by the soot-covered outer surface of several specimens.

Excavations at Baaz produced 41 examples of personal ornaments made of shell (Table 4). These include three kinds of perforated marine gastropods (*Nassarius gibbosulus, Columbella rustica* and *Conus mediterraneus*) from the Mediterranean. Also present are the freshwater gastropod *Theodoxus jordanii*, the tusk shell *Dentalium* spp. and a bivalve from the family Cardiidae (Riethmüller 2010; Wahl-Gross 2006). We assume that the marine shells originate from the Mediterranean since it is much closer than the Red Sea. These finds provide us with a number of insights into the use of the site. First, the small number of people who lived at or used the site of Baaz participated in the patterns of social signaling characteristic of the Natufian in other parts of the Levant where these mollusks have been recovered from many sites (Bar-Yosef

Table 4. Baaz Rockshelter. Distribution of 41 shell ornaments by layer. Other species include one bivalve from the family Cardiidae (AH II) and one *Conus mediterraneus* (AH III)

AH	***Nassarius gibbosulus***	***Columbella rustica***	***Dentalium***	***Theodoxus jordanii***	**Other species**
SURF	2	2	2	-	-
I	2	8		-	-
II	2	6	6	3	1
III	1	2	2	-	1
IV	1	-	-	-	-
TOTAL	**8**	**18**	**10**	**3**	**2**

2005). The personal ornaments, together with the clear Natufian house structure, lithic artifacts and radiocarbon dates, unambiguously place Baaz within the Natufian cultural group.

Although Baaz Rockshelter has produced a small number of isolated human bones, these bones are from AH I and likely postdate the Natufian. The site was probably not used year-round and was not viewed as the appropriate place to bury the dead. Due to its small size and more specialized function, there may have been no need to bury the dead here. This being said, other small Natufian sites in similar settings have been used for extravagant burial activities (Grosman and Munro 2007; Munro and Grosman 2010).

In summary, Baaz did not serve as a base camp, but instead seems to have been used regularly as a semi-permanent camp from which multiple activities including hunting and gathering were staged. Although stationary and mobile mortars and pestles are present, the scarcity of carbonized grains at the site and the lack of lithic artifacts carrying sickle gloss suggest that the harvesting of wild grains was not an important activity associated with the site. Still the level of energy involved in building a semi-permanent structure represents a significant investment in a site that was regularly used and maintained. The large amount of ash and charcoal and the relatively high amount of debitage at the site also point to the repeated use of this site.

The features that may have attracted people to this location include: 1) the ready access to water in Wadi Jaba'deen; 2) the presence of wood for tools, building and fuel in Wadi Jaba'deen; 2) the outstanding view over vast areas of the lowland hills; 3) the incised canyon providing passage from lowland to highland; 4) the presence of abundant flint in the area; 5) opportunities for collecting nuts, fruit and perhaps harvesting small amounts of grain; and 6) access to an abundance of game along the cliffline, and in the lowland and highland hills.

Kaus Kozah

Unlike most of the sites known along the cuesta of the al Majar Depression, Kaus Kozah is located on the back of the cuesta overlooking the highland hills above Ma'aloula. The site is near the top of the cuesta, granting its residents an excellent view over the vast lowlands east of the al Majar Depression. Unlike Baaz, the geographic setting of Kaus Kozah suggests a stronger connection to the highlands than the lowlands, to which there was less direct access. Water would have been easy to come by. Although we do not know if Lake Dodonov still existed during the late Younger Dryas, there is every reason to assume that the major springs of Ma'aloula flowed and provided permanent sources of water.

Unlike Baaz where architectural remains are well preserved, no such features have been preserved at Kaus Kozah. Given that Kaus Kozah is a cave with a relatively large interior space of ca. 350 m^2, the inhabitants of the site could always use the interior for shelter, if needed. Still the richest deposits at the site seem to be on the terrace in front of the eastern entrance to the cave.

The site had been used since the Middle Paleolithic, but the richest cultural deposits date to the period stretching from the Late Natufian to the early Neolithic. Kaus Kozah is well protected and hard to see from the valley, unlike Baaz which is visible from much of the area below the site.

The stratigraphy at Kaus Kozah does not allow a clear separation of the Late Natufian, the Khiamian or the early PPN. Still the presence of lunates and small, broad cores with multiple removal surfaces document a Natufian component among the lithic assemblage (Conard *et al.* 2006; Hillgruber 2010). The relatively small size of the lunates and the absence of Helwan retouch indicate a late age for the Natufian of Kaus Kozah.

The placement of the lithics within the Late Natufian is also consistent with radiocarbon dates on bone and charcoal, which fall between 11,300 and 9,400 uncal BP (Table 2). Radiocarbon dates of 10,130 and 10,485 uncal BP were obtained on human skeletal material from the child burials at Kaus Kozah. These ages place the site at the end of the Younger Dryas and near the end of the Natufian.

The two small children found at Kaus Kozah are under study by Fred Smith and Shara Bailey. For now we can say that they were buried in graves that intruded into AH IV, the layer which contained a small assemblage of fine Levallois debitage. Since careful excavation of the burials revealed no indications of an intrusive burial pit, we initially thought the skeletons dated to the Middle Paleolithic. The radiocarbon dates, however, demonstrate that the children of roughly 3-4 and 1-2 years of age were interred in the dense red clay of AH IV near the end of the Late Natufian. No grave goods were found directly associated with the children.

Personal ornaments made of shell were more numerous at Kaus Kozah than at Baaz. In all 53 perforated mollusks were recovered from the site (Table 5). These include two species of marine gastropods (*Nassarius gibbosulus* and *Columbella rustica*), the tusk shell *Dentalium* spp. and one taxa of the small freshwater gastropod *Theodoxus jordanii*. Additionally, excavators recovered a total of seven other mollusk species including four gastropods and three bivalves (Wahl-Gross 2006, Riethmüller 2010). As with Baaz, we assume that the marine shells came from the Mediterranean, but it is possible that some may have originated from the Red Sea. The freshwater mollusks could have been collected from nearby perennial rivers or lakes (see Napierala *et al*., herein). The personal ornaments were scattered throughout the fill of the site rather than being found in groups. While we cannot prove that all of the ornaments date to the Late Natufian, given their abundance at Baaz and in other Natufian contexts, it seems likely that many of them date to this phase of the occupation at Kaus Kozah.

The wood charcoal from the site shows again that *Amygdalus* dominated (more than 60% of the finds in AH III-I). A similar range of other woodland-steppe taxa was found at Kaus Kozah as in Baaz (Deckers et al. 2009; Deckers and Conard 2011). Overall, though, it is of particular interest that Kaus Kozah contains a fairly large percentage of *Pistacia*, a fragment of deciduous *Quercus* (oak), and a smaller proportion of Chenopodiaceae. This may be due to the fact that some of the occupation phases represented at Kaus Kozah were later than the main occupation phase represented in Baaz. In addition to the woodland-steppe taxa, Kaus Kozah also has a relatively large proportion of hydrophilic vegetation, for example, *Fraxinus* (ash), *Populus/Salix*, *Vitis* (vine), *Tamarix* (tamarisk) and *Platanus* (plane). This shows that the inhabitants of Kaus Kozah also had access to well-watered areas. As at Baaz, no remains of wild grains were recovered at Kaus Kozah, and there are no indications of sickle gloss on the lithic artifacts. Thus, intensive harvesting of cereals is not documented at the site. There are, however, some seeds of the small pulses indicating open habitats. The seed assemblage from Kaus Kozah contains uncarbonized, modern seeds, indicating a degree of disturbance.

Like Baaz, Kaus Kozah also provides evidence for grinding activities. The most note-worthy evidence comes in the form of two bedrock mortars just under the roof of the cave near the western entrance (Fig. 7). Excavators did not recover examples of basalt grinders as they did at Baaz.

The faunal assemblage from Kaus Kozah differs greatly from Baaz, with considerably fewer remains of small game at Kaus Kozah. It is not entirely clear, whether these differences reflect seasonal, diachronic, environmental, taphonomic or functional differences between sites (Napierala 2012). In contrast to Baaz, no fish remains have yet been recovered from Kaus Kozah, but several mammalian species, such as fallow deer (*Dama dama*) and red deer (*Cervus elaphus*) as well as the hartebeest (*Alcelaphus buselaphus*) point to moister conditions. The charcoal remains from Kaus Kozah also point to wetter conditions than those documented at Baaz (Deckers and Conard 2011).

Although there are important differences between Baaz and Kaus Kozah, both sites represent short but repeated occupations. The sites are too small to be considered hamlets, since only a small group of people could have used the sites at one time. The children's burials at Kaus Kozah suggest that this cave, with its pleasant setting above former Lake Dodonov and the springs of Ma'aloula, was viewed as home by the people who occasionally lived there. Although Baaz preserves more deposits, the bedrock mortars at Kaus Kozah point to a period of occupation that may have been more substantial. The strongest arguments against this

Table 5. Kaus Kozah Cave. Distribution of 53 shell ornaments by layer. Other species include one *Murex trunculus* (Surf.), four *Melanopsis praemorsa ferussaci* (AH I), one *Glycymeris* sp. (AH I) and one *Andara* sp. (AH I)

AH	*Nassarius gibbosulus*	*Columbella rustica*	*Dentalium*	*Theodoxus jordanii*	Other species
SURF	2	2	3	-	1
I	3	8	5	7	6
II	2	4	6	4	-
III	-	-	-	-	-
TOTAL	**7**	**14**	**14**	**11**	**7**

interpretation is the heavy investment in building a semi-permanent house at Baaz. The study of the faunal remains from Kaus Kozah provides additional insight into the seasonality of the site and how it fits into the larger economic system of the latest Natufian and early PPN people living in the eastern foothills of the Anti-Lebanon (Napierala 2012).

Conclusions

In addition to the survey, the results from TDASP's excavations at Baaz and Kaus Kozah indicate that the region around Ma'aloula in the Damascus Province of Syria was occupied more intensely during the Late Natufian than during the Early Natufian. These observations do not negate the results of decades of research in in what has often been called the Natufian heartland, where small hamlets with multiple houses are well documented at several sites during the Early Natufian, and Late Natufian occupations are more ephemeral (Bar-Yosef 1998; Bar-Yosef and Valla 1991; Goring-Morris and Belfer-Cohen 2008). Instead, they demonstrate that each region of the Near East needs to be examined in its own right rather than projecting models from one region across the entire Levant.

In the Ma'aloula region the Early Natufian is poorly documented, while the Late Natufian is much better represented. This suggests that the impact of the Younger Dryas was much different than in the Mediterranean zone, where this relatively harsh climatic phase that followed the warm climatic phase of the Bölling/Alleröd is thought to have caused a radical reorganization of subsistence and settlement systems. Interestingly, the available pollen diagrams from the Mediterranean zone do not support this interpretation (Wright and Thorpe 2003). As far as we can tell based on our data from excavations, the Late Natufian of the eastern foothills of the Anti-Lebanon Mountains was better suited for settlement than the previous period. The Late Natufian of the area documents small, relatively mobile groups that had access to stable sources of water, the economically important open pistachio and almond woodlands, as well as flowing highland streams and resource-rich wadi bottoms. The faunal resources appear to have been rich and allowed regular hunting of gazelle, onager, wild sheep, hare and the collection of tortoise. The faunal patterns recognized do not conform to the proposed high stress models developed for the Mediterranean Levant during this period (Napierala *et al.* 2012). While wild cereals must have been present in the wider area, their use does not seem to have been as ubiquitous as one might expect. Instead the economies of the Late Natufian seem to have relied on a balanced use of medium and small-sized game, and to an as yet undetermined extent on fruits, nuts and cereals. As far as we can tell, population densities were moderately high, but people tended to use the landscape broadly without forming major settlements containing substantial groups of houses or extremely high densities of finds. These results are consistent with the Epipaleolithic survey data that show the use of a variety of environmental settings and a far less rigid tethering to permanent water and flint sources than in all of the earlier phases of the Paleolithic.

The data from the TDASP study area raise the question of why, during the climatically favorable period of the Bölling/Alleröd and Early Natufian, was the region less intensely inhabited than in the subsequent Younger Dryas and Late Natufian? This pattern stands in contrast to the observations made by Bar-Yosef (1998), Munro (2003, 2004) and other scholars in the Natufian heartland of the southern Levant. Clearly we cannot expect one model to explain the complex history of a region as geographically diverse as the Levant. Our area of study, however, is ideal for pursuing these questions due to its strong gradients in elevation, temperature and precipitation and its shifting zones of floral and faunal communities.

Finally, with the start of the pre-pottery Neolithic, settlement intensity in the uplands of the TDASP survey area declines and settlement shifts to the lowlands, where local village life begins and tell deposits accumulate. This lowland settlement was made possible by large scale cultivation of wild and later domesticated cereals and pulses which were augmented by domesticated livestock later during the PPN. Evidence for intense agricultural activities becomes apparent in the lowlands rather than in the highlands, where in the preceding period small groups of Late Natufian people maintained a seemingly reliable and productive settlement system based on the exploitation of a wide variety of wild plants and animals. Gaps remain in our record of human adaptations in the TDASP study area and more work needs to be done in the adjacent regions of Syria and Lebanon to see if our observations also apply to the neighboring countryside. Based on what we see in our study area in southwestern Syria, the Younger Dryas represents a period of fairly productive ecological conditions as well as the high point of Natufian settlement intensity.

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The Natufian of Moghr el-Ahwal in the Qadisha Valley, Northern Lebanon

Andrew Garrard and Corine Yazbeck

The Natufian in Lebanon

The Natufian as a cultural entity, is commonly thought to have originated amongst communities living in the Mediterranean woodland and moist steppe environments of the southern Levant and subsequently spread north as far as the Euphrates Valley as well as south and east into the drier habitats of the Negev and the Syrian-Jordanian plateau (Bar-Yosef 1998; Goring-Morris and Belfer-Cohen 1997; Henry 1989; Valla 1995). In terms of present-day rainfall regimes, these are areas which have a mean of significantly below 750 mm per annum. However, there has been very little information from the coastal mountains of western Lebanon, north-west Syria and adjacent areas of southernmost Turkey. This region currently receives the highest rainfall in the eastern Mediterranean (well above 750 mm and up to 1,500 mm in the mountains) and the lower and middle elevations are likely to have been forested through much of the late Pleistocene and early Holocene (Hajar *et al.* 2008; Niklewski and van Zeist 1970; Yasuda *et al*. 2000). The adjacent coastal plain is often narrow, and is particularly restricted along parts of the Lebanese coast, although the Natufian coastline would have been at least 60 m below that of the present (Fleming *et al.* 1998). Very few traces of late Epipaleolithic (or Pre-Pottery Neolithic) settlement is known from this region, and it is difficult to be sure if this is due to more restricted survey in these areas or whether it relates to the more thickly forested and rugged nature of the environments and to more limited use by these communities.

Owing to the conflict in Lebanon between 1975 and 1990 and to the subsequent focus on reconstruction, archaeological research was put "on-hold" for many years. However prior to 1975, seven sites had been found with material which relates to the Natufian (Copeland 1991). Of these, four were in the higher rainfall environments on the coastal side of Mount Lebanon and the other three in the less mesic Beqaa Valley and Antilebanon Mountains. Those on the coastal side of the mountains were all within 15 km of Beirut and included Borj Barajne to the immediate south of the city and Antelias, Jiita II East and Jiita III in the mountain foothills to the north (Fig. 1). Borj Barajne was an open site eroding from paleosols within the fossil sand dunes to the south of the Beirut promontory. The mixed surface assemblage included material of probable Geometric Kebaran, Natufian and PPNA date (Copeland and Wescombe 1965, Kukan 1978). Unfortunately the site is now covered by urban developments. Antelias Cave has also been destroyed by quarrying, but had a long history of investigation. It is best known for its Upper Paleolithic levels, but possible Natufian harpoons were found in a disturbed Epipaleolithic horizon during the excavations by Zumoffen in the late nineteenth century (Copeland 1991; Copeland and Hours 1971). The other evidence of Natufian occupation came from 50 m inside the large cavern of Jiita III in Nahr el-Kelb and also from a rock platform above the Jiita III cavern entrance, which is known as Jiita II East (Jiita II West being the rock shelter excavated by Hours with a Kebaran sequence). Unfortunately investigations by Hours demonstrated that the Natufian deposits at both these localities are derived and not *in situ*, but nevertheless attest to a local Natufian presence (Copeland 1991; Hours 1966).

The sites with Natufian material from the eastern side of the country are Saaide II in the Beqaa Valley, and Ain Chaub and Nachcharini Cave in the Antilebanon Mountains (Fig. 1). Saaide II is the most extensive of all the Natufian occupations known from Lebanon and underlies a modern village on a low promontory at the western edge of the Beqaa. It was test excavated by Schroeder in 1970, and was clearly a major settlement with possible structural remains, an extensive ground-stone industry which included substantial limestone mortars and at least one human burial (Churcher 1994; Schroeder 1991). There are springs adjacent to the site, but it was in the rain shadow of Mount

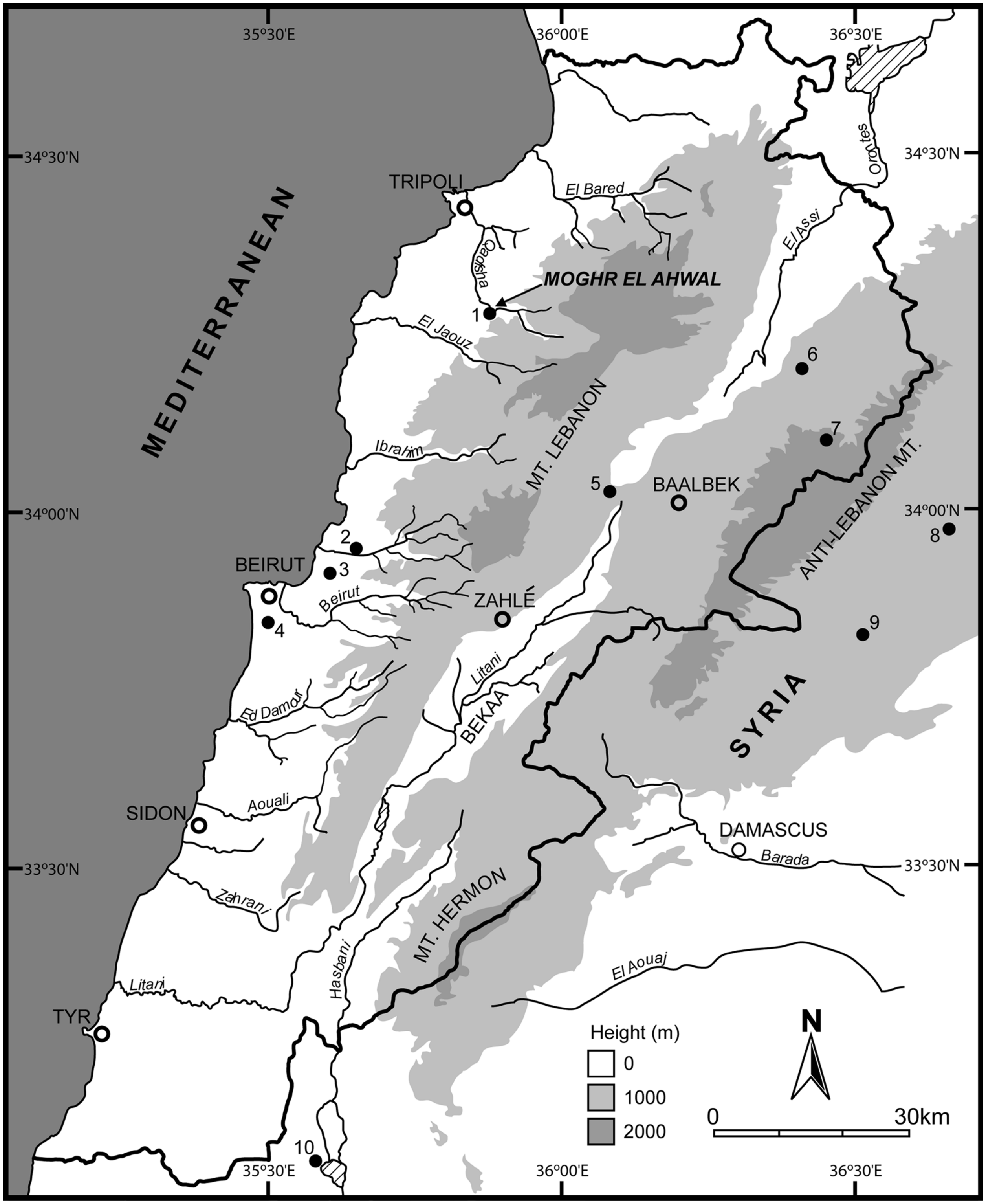

Fig. 1. Map of Lebanon and adjacent regions showing location of Natufian sites. (1) Moghr el Ahwal, (2) Jiita II East, Jiita III, (3) Antelias Cave, (4) Borj Barajne, (5) Saaidé, (6) Ain Chaub, (7) Nachcharini, (8) Yabrud III, (9) Baaz Cave, (10) Mallaha.

Lebanon, and so not as high a rainfall regime as the coastal side of the mountains. The other two sites are located in the northern Antilebanon Mountains on the eastern side of the Beqaa Valley. Ain Chaub is a rock shelter overlooking the Beqaa at about 1,280 m and Nachcharini is situated on the much higher plateau to the south-east at 2,120 m. It is a small cave located within a crag in a chain of doline features which would have provided seasonal shelter in this extensive highland area. Schroeder excavated at the site in 1972 and 1974 revealing a rich PPNA occupation and also possible traces of earlier Natufian activity (Copeland 1991; Schroeder 1977). The site was revisited in 2001, and the spoil from a deep robber trench cutting through the former excavations was sieved, but unfortunately no further traces of Natufian material were found (Garrard *et al.* 2003; Pirie 2001). The northern Antilebanon Mountains currently receive a lower rainfall than Mount Lebanon with a mean of under 600 mm per year.

The Qadisha Valley Project

The first major field project undertaken on the early prehistory of Lebanon since the mid-1970s, was begun by the authors in 2003. It focused on the Qadisha Valley, which is in the north-west of the country (Garrard and Yazbeck 2004, 2008). Its primary objective was to expand our knowledge of the environmental history of the coastal mountains of Lebanon through the late Pleistocene and early Holocene and to obtain information through survey and excavation on the exploitation of these forested mountain habitats by late Paleolithic and Neolithic communities. The Qadisha Valley drains the highest sector of Mount Lebanon which rises to over 3,000 m within 30 km of the coast to the south-east of Tripoli (Fig. 1). Rainfall currently varies from 900 mm on the coast to over 1,500 mm near the summits (Boulos 1963). There is striking altitudinal variation in the vegetation, from evergreen woodland dominated by species such as *Quercus calliprinos* and *Pistacia palaestina* up to 1,000 m, to deciduous woodland with *Quercus boisieri* and *Q. cerris* up to 1,500 m, to coniferous forest with *Cedrus libani, Abies cilicica* and *Juniperus excelsa* up to 2,000 m, to subalpine and alpine shrub cover above (Abi Saleh and Safi 1988; Zohary 1973). In geological terms, the valley cuts through a major anticline formed from highly karstic Jurassic limestones overlain by sandstones, clays and localised basalts which provide a high level springline. These are in turn, overlain by massive Cretaceous limestones which form the lower slopes as well as the summits of the mountains (Dubertret 1955). They contain localized bands of nodular chert suitable for stone tool industries.

During 2003, archaeological survey and paleoenvironmental investigations were conducted at various elevations and contexts in the valley and a number of Paleolithic and Neolithic sites were recorded (Garrard and Yazbeck 2004). Localities with Middle Paleolithic, Epipaleolithic and Late Neolithic material were well represented. A particularly rich complex of sites with surface artefacts from each of these periods was found adjacent to the village of Moghr el-Ahwal, which is located 17 km to the south of Tripoli at 35°53' E x 34°17' N (Fig. 1). At the centre of this locality is an upstanding outcrop of limestone, known locally as Timsah (Crocodile) Rock on account of its linear eroded shape (Fig. 2). The outcrop is pierced by three caves and is presently set amongst terraced olive groves, which contain extensive scatters of lithic artefacts some of which probably derive from the caves, and others of which stem from open air activities. Timsah Rock is located at about 620 m elevation and a short distance from steep pathways which lead down into the Qadisha ravine which is about 200 m deep in this vicinity.

As will be outlined below, excavations were conducted in two of the caves revealing well preserved Kebaran and Geometric Kebaran occupation levels which are providing valuable information for comparison with the only other excavated early and middle Epipaleolithic excavated sequences from Lebanon: these being Ksar Akil, Jiita II and Abri Bergy just north of Beirut (Hours 1992, Yazbeck 2004). Traces of Natufian activities were also found in both caves but they were less extensive and in some areas disturbed by Neolithic and later activities. This short article will focus on the evidence from the Natufian occupation but will also provide general background on the earlier Epipaleolithic and Neolithic levels. It will then place the results in regional context.

Excavations at Moghr el-Ahwal

As will be seen from Figs. 2 and 3, Timsah Rock at Moghr el-Ahwal is an unusual karstic feature approximately 80 m in length, between 12-23 m in width and up to 12 m in height. Cave 1 at the western end forms a natural archway and is now paved providing access to a house built adjacent to the site. Cave 2 consists of a low south-facing rock shelter roughly 11 m wide, 3-5 m deep and up to 2.5 m in height. The shelter extends into a

Fig. 2. View north over Timsah Rock at Moghr el-Ahwal.

small cave at its western end. Cave 3 pierces the rock diagonally and is approximately 30 m deep, between 5-8 m wide and up to 5 m in height. The western half of the cave opens into a natural fissure but with a high rock overhang on one side. The cave has two entrances, with the larger one at the eastern end opening on to a brecciated talus.

Three seasons of excavations were undertaken at the site: the first in Cave 2 in 2004 and the second and third in Cave 3 in 2005 and 2008. A brief report was published at the end of the first season (Garrard and Yazbeck 2003), but as a result of post-excavation analysis and radiocarbon dating, a lot more information is now available which has necessitated changes in some of our initial interpretations and that report has been superseded by a new evaluation (Garrard and Yazbeck 2008). The analysis of the chipped stone assemblages is being undertaken by Corine Yazbeck at the Lebanese University and the study of the animal and human bones by Yvonne Edwards in collaboration with Andrew Garrard and Simon Hillson at University College London. Other specialists working on material include Katherine Wright (ground-stone assemblages), Gassia Artin (shell beads), Assaad Seif (ceramics), Susan Colledge (plant remains) and Martin Bates and Richard Macphail (sediments and micromorphology).

Results from Cave 2

Cave 2 was the smallest of the three caves and the front chamber where excavations were undertaken was effectively a rock shelter (Fig. 3). After removal of the superficial deposits, a high bedrock sill was exposed across the front of the shelter and also bedrock ledges at the back. The deposits between these appeared to be shallow and for this reason a broad area excavation was undertaken within a 30 square meter grid. All archaeological sediments were coarse sieved through a 5 mm mesh and then the residues were processed through a flotation machine, with a 2 mm mesh for collecting fine residues and a 250 micron mesh for carbonized plant remains. The deposits proved to be only 50 cm in depth but 43 separate loci were recorded.

Fig. 3. Plan of Timsah Rock at Moghr el-Ahwal.

Four phases of activity were recognized relating to the Middle and Late Epipaleolithic and Neolithic but there were also earlier deposits with faunal remains and sparse lithics which could be Early Epipaleolithic or Upper Paleolithic in date.

The earliest well dated phase is Geometric Kebaran. Material was found across the whole width of the shelter, but it was particularly well preserved at the eastern end, where occupation levels were only minimally disturbed by more recent activities. Most notable was a burial pit just inside the front bedrock sill. The human remains comprised the left leg and foot and the right lower leg of an adult. Two polished stone pebbles were found in close proximity to the left patella (Garrard and Yazbeck 2003: figure 4). Apart from the femur, the bones were fairly complete and found in full articulation, but there was no evidence for the remainder of the skeleton, and it appears that the body parts had been separated from the rest of the corpse before burial. An attempt was made to obtain direct AMS dates on the bone, but unfortunately unlike the Neolithic human remains described below, there was no bone collagen preserved. However an AMS date has been obtained on charcoal from close to the bones, which relates to the late Geometric Kebaran (12,664 +- 63 ^{14}C yrs BP: see Table 1 for calibrations). All the diagnostic artefacts in association are from this period. Human burials from the Geometric Kebaran or contemporary sites are rare in the Levant, but Maher (2007a, 2007b) has recently described seven late Geometric Kebaran burials from Uyun al-Hammam in northern Jordan, which include both primary and secondary inhumations, and in some cases have possible grave goods in association. Other single burials are known from Wadi Mataha in southern Jordan (Stock *et al.* 2005) and from Neve David on the western side of Mount Carmel (Kaufman and Ronen 1987), both of which were primary inhumations with possible grave goods.

Remnants of Natufian occupation were exposed at the western end of the shelter, but the lithic assemblage indicated that there may have been some localized mixing with underlying Geometric Kebaran levels perhaps as a result of trampling. The Natufian lithic material included end scrapers and a small number of lunates some of which had Helwan retouch, but these were mixed with trapeze-rectangles and other geometrics. The Natufian material was made from a locally available beige semi-fine grained chert. However they were also using fine grained dark blue and grey-green flint which appeared to be coming from secondary sources, possibly nodules from the Qadisha gorge about 30 minutes return walk from the site. The Natufian artefacts also included a well preserved section of a bone sickle haft (Fig. 4), which is very similar in form to the working end of a sickle haft from the Natufian levels at Kebara Cave in Mount Carmel, particularly in relation to the knob situated below the shaft which held the sickle blades (*cf.* with Turville-Petre 1932: plate 27:1 and Noy 1991: figure 6:3-4). The stylistic similarity of this and other artefacts suggests that cultural networks interlinked with those of groups living in the better known areas of Galilee and Carmel over 200 km to the south. There were also a small number of marine shell beads and two limestone artefacts from the Natufian levels: one a roughly square but naturally worn block of *ca.* 20 cm width with a sinuous groove cut across its surface and the second a possible perforated limestone pendant.

Fig. 4. Bone sickle haft from Cave 2.

Cutting into the Natufian and Geometric Kebaran levels at the western end of the shelter were a series of pits containing disarticulated human remains of infant, juvenile and adult age. Apart from one tooth and a fragment of an infant skull, there were no cranial remains present. Two AMS dates using ultra-filtration methods to remove contaminants have been obtained on the human bones and these are mid-late Pre-Pottery Neolithic B in period (8,710 +- 45 and 8,517 +- 39 ^{14}C yrs BP). Skull separation is of course well attested in mortuary practices from this time period and it is possible this had been practiced at this location (Kuijt and Goring-Morris 2002). Interestingly, there were very few artefacts from the deposits, which were diagnostic of the PPN, and it is possible that the Neolithic community was living outside the shelter but using it as a cemetery. Two later Neolithic dates were also obtained on small flecks of charcoal from these pits (7,645 +- 43; 7,610 +- 42 ^{14}C yrs BP) and there were other traces of Pottery Neolithic material in the shelter.

Although the archaeological sediments were shallow, over 5,000 bone fragments were retrieved from Geometric Kebaran and Natufian levels. Amongst these, over 30 species of mammal, bird and reptile have been identified (Yvonne Edwards pers. com.). In these phases the large herbivores are

Table 1. Radiocarbon dates from Caves 2 and 3 at Moghr el Ahwal

MOGHR EL AHWAL, CAVE 2: RADIOCARBON DATES							
Locus	**Square**	**Material**	**Lab Code**	**14^{C} Date**	**Cal. Date - 1σ**	**Cal. Date - 2σ**	**Period**
18	U	Charcoal	Wk 20841	7,610 ± 42 BP	8,430–8,375 BP	8,520–8,340 BP	Late Neolithic
9	J	Charcoal	Wk 20839	7,645 ± 43 BP	8,510–8,390 BP	8,550–8,380 BP	Late Neolithic
18	T	Human Bone	OxA 18862	8,517 ± 39 BP		9,595–9,524 BP	Mid-Late PPNB
18	U	Human Bone	OxA 18863	8,710 ± 45 BP		9,871–9,598 BP	Mid-Late PPNB
30	Y	Charcoal	Wk 20843	12,664 ± 63 BP	15,090–14,800 BP	15,250–14,600 BP	Late Geo. Kebaran
MOGHR EL AHWAL, CAVE 3: RADIOCARBON DATES							
Locus	**Square**	**Material**	**Lab Code**	**14^{C} Date**	**Cal. Date - 1σ**	**Cal. Date - 2σ**	**Period**
442	Cd	Charcoal	OxA 20551	12,230 ± 75 BP	14,190–13,989 BP	14,463–13,859 BP	Early Natufian
456	Cb	Charcoal	OxA 20673	13,585 ± 55 BP	16,357–15,969 BP	16,578–15,799 BP	Mid Geo. Kebaran
462	C	Charcoal	OxA 20552	15,750 ± 75 BP	19,019–18,896 BP	19,123–18,827 BP	Late Kebaran
461	C	Charcoal	OxA 20674	17,220 ± 70 BP	20,447–20,232 BP	20,577–20,091 BP	Mid Kebaran

dominated by wild goat, which probably came from the adjacent crags, but there are also substantial numbers of deer and wild pig indicating a forested environment. Fox, hare, chuckar partridge and tortoise are also common. Rarer species include wild cattle, equids, gazelle, bear, hyaena, badger, wild cat, marten, polecat, porcupine and hyrax. There are distinctions between the Geometric Kebaran and Natufian levels. Whilst the former contained Red Deer, Fallow Deer and Roe Deer, the latter only contained Roe Deer and there was also a higher percentage of wild pig in the Natufian levels relative to earlier levels. As was indicated, gazelle are rare, in contrast to sites in more open wooded and moist steppe habitats in the better known southern and eastern Levant (Bar-Oz 2004; Cope 1991; Garrard *et al.* 1996).

Results from Cave 3

Cave 3 is by far the largest of the three caves at Timsah rock (Fig. 3) and was the subject of two seasons of excavation. Four separate areas were excavated, but only one had a well preserved stratigraphic record from the Epipaleolithic time frame. This was Area C, located in the eastern sector of the cave adjacent to the main entrance (Fig. 5). A trench with an area of 13.5 square meters was excavated and all archaeological sediments were coarse sieved through a 5 mm mesh and then the residues dry or wet sieved through a 2 mm mesh. Samples were processed through a flotation machine. The maximum depth of deposits excavated was 1.3 m (bedrock not reached) and 64 separate loci were recorded. Post-excavation analyses are still at a preliminary stage, but three main Epipaleolithic phases were recognized and these are supported by radiometric dates.

The earliest two phases were of Kebaran and Geometric Kebaran date and both contained well-preserved *in situ* activity areas within the occupation horizons. Three stratigraphically ordered AMS dates on charcoal were obtained from these levels, these being: 17,220 +- 70, 15,750 +- 75 and 13,585 +- 55 ^{14}C yrs BP (see Table 1 for calibrations). Overlying this sequence was a series of features that appeared to be of Natufian date, although they contained some derived material

Fig. 5. View east over Area C in Cave 3, showing stone bin with plaster base and upturned groundstone mortar. Recent cave wall in background.

from the underlying Geometric Kebaran deposits. The upper of the two features was a shallow pit containing lunates in addition to trapeze-rectangles and rectangles. An upturned basalt mortar in an oval slab was found (Figs. 5, 6) and an AMS date was obtained on charcoal adhering to the underside of the mortar of 12,230 +- 75 ^{14}C yrs BP. There were also several unfired clay objects including two possible "figurines". One of these was an oval item with a groove running across one surface (Fig. 7) and the other a roughly spherical object with two raised relief bands running around its circumference. Unfired clay artefacts are also known from the Natufian levels at Hayonim Cave in the Galilee area (Belfer-Cohen 1991: figure 8.1).

The deposits of the shallow pit lipped over the stone bin seen in Fig. 5. This is a roughly oval feature of *ca.* 80 cm diameter with a stone slab surround, which contained lime plaster at its base. A micromorphological analysis of a section through the plaster showed that it was composed of several thin layers or replasterings (Macphail p.c.). Although the use of plaster is commonplace in the Neolithic, there are also several known examples from the Natufian. These include plaster from a 2.5 m diameter stone structure in Hayonim Cave which was interpreted as a lime kiln (Bar-Yosef 1991:89; Kingery *et al.* 1988:223-4), a plaster bench and a plaster grave lining from Mallaha (Kingery *et al.* 1988:224-6; Valla *et al.* 2007:162-4), and a plaster floor from Saflulim in the Negev (Goring-Morris 1999:39-40). No ^{14}C dates or diagnostic artefacts have been obtained from inside the stone bin in Cave 3, but on stratigraphic grounds it appears to be Natufian. No Neolithic levels were identified within this area of the cave.

Fig. 6. Basalt mortar from Cave 3, Area C.

As was mentioned, three other trenches were excavated in Cave 3, but none had well preserved prehistoric levels. However each contained derived material from Epipaleolithic occupation including lunates some of which had Helwan retouch, as well as trapeze-rectangles and other geometric microliths. The most notable find which is attributed to the Natufian is a fragment of a uniserial bone harpoon (Fig. 8) which was found in Area A which is located in the fissure in the western sector of the cave. As with the sickle haft found in Cave 2, the nearest parallel for this artefact is from the Natufian levels at Kebara Cave in Mount Carmel (Campana 1989:97-101; Turville-Petre 1932: plate 28). Possible Natufian bone harpoons were also found in Zumoffen's excavations at Antelias Cave just north of Beirut, but they are very different in form to others known from this period in the Levant (Copeland and Hours 1971: plate 16:10-11).

Fig. 7. Unbaked grooved clay "figurine" from Cave 3, Area C.

Fig. 8. Uniserial bone harpoon fragment from Cave 3, Area A.

Conclusions

Much of our knowledge of the Epipaleolithic and more specifically the Natufian of the Levant derives from research in what are likely to have been the more open wooded and moist steppe environments of the region. Very little information is available from the higher rainfall forested mountain environments and adjacent coastal plain of western Lebanon, north-west Syria and adjacent areas of southern Turkey. Within western Lebanon, the Kebaran has been the best known of the Epipaleolithic periods, with the records coming from three excavated localities (Ksar Akil, Jiita II, Abri Bergy) and a number of surface assemblages (Hours 1992; Yazbeck 2004). The Geometric Kebaran has been less well documented with only one excavated site (Abri Bergy) plus surface assemblages, and the Natufian has been the most poorly known (see introduction to this article and Copeland 1991).

The recent excavations at Moghr el-Ahwal in the Qadisha Valley of north-west Lebanon have provided important new insights into Epipaleolithic technology, resource use and activities within this region. The Kebaran and Geometric Kebaran levels are particularly well preserved but there are also traces of Natufian occupation in both the caves excavated. The material culture from the Natufian contexts bears strong similarities with that from the Mount Carmel and Galilee areas over 200 km to the south and indicates that there were cultural networks linking these regions. However, the analysis of faunal remains (so far only from Cave 2) indicate a subsistence base which is quite distinct from that in the southern and eastern Levant and focusing on the use of forest resources as well as those from the extensive crags in the rugged mountain environments. Wild goat is the dominant species in both Geometric Kebaran and Natufian levels, and there are also relatively high proportions of deer and in the Natufian wild pig. Although field research in western Lebanon has been more restricted than in some other regions, the limited nature of the Natufian occupation recorded from caves, rock shelters and open localities is suggestive of lower population levels and greater mobility. These are adaptations one might expect from hunter-gatherers inhabiting such forested mountain environments.

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The Natufian of Southwestern Syria Sites in the Damascus Province

Kurt Felix Hillgruber

Introduction

In the Spring of 1999, a joint project of the University of Tübingen and the Syrian Department of Antiquities under the direction of Prof. N.J. Conard initiated fieldwork in the area near the village of Ma´aloula, about 50 km northeast of Damascus, Syria. Since then the "Tübinger Damaskus Ausgrabungs- und Survey Project" (TDASP) successfully completed excavations in four caves and rockshelters and conducted extensive surveys from the low lying Jeiroud Basin at 800 m above sea level (asl) to the peaks of the Anti Lebanon Mountains at 2350 m asl (Conard 2006). Since the work by Rust in Yabroud and the studies by Solecki and Schroeder in Lebanon on the other side of the Anti Lebanon Mountains, this area was only on the fringes of the Paleolithic research interests. Due to the new excavations, to date a number of theses have been completed or are in the process of being completed. This article describes the finds from four caves and rockshelters, namely the Baaz rockshelter and Kaus Kozah cave near Ma´aloula, and the Yabroud rockshelter III and Ain Dabbour rockshelter near Yabroud. Over 20 assemblages were under examination, including finds from the Middle Paleolithic up to the Pottery Neolithic.

The area, situated at the boundary between different habitats and characterized by the availability of permanent water sources in the form of perennial springs, was repeatedly settled through time. This is apparent from late Epipaleolithic finds dated to the Natufian, which are derived from Baaz rockshelter archaeological layer I-III, Yabroud shelter III layer 2, and Kaus Kozah cave level 1-2. The archaeological site of Baaz rockshelter is located approximately 35 km northeast of Damascus, adjacent to the Jaba´deen Pass, which connects the lowland with the highland plateau leading to the Palmyrid Mountains and which provides a reliable source of water due to a number of perennial springs. The rockshelter is situated at an elevation of 1529 m asl overlooking the pass and the lowland hills. The small rockshelter is around 6 x 10 m in size and is located in a nook-like position, protected from rain and wind with opening to the southwest. From 1999 to 2004, a total of 18 m² out of the approximately 60 m² of the whole rockshelter were excavated. At this excavation, seven archaeological layers were discovered (Fig. 1).

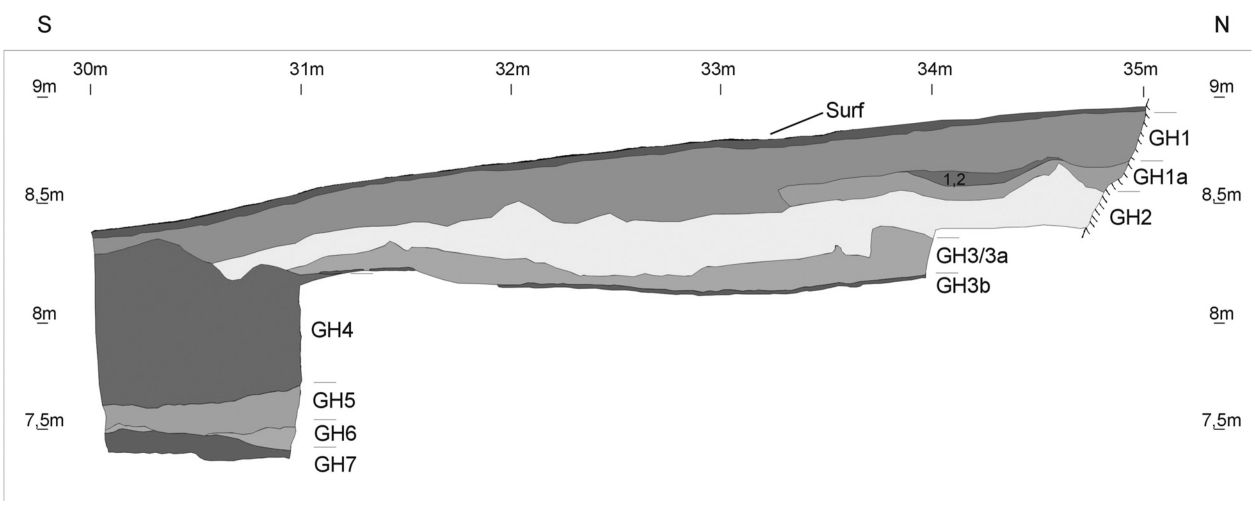

Fig. 1. Profile of Baaz rockshelter at the E20 line (TDASP archive).

The stratigraphy of the Baaz Rockshelter can be divided into two parts. The upper part, which includes the Neolithic and Epipaleolithic Layers Surf-III (Surf-GH3b), and the lower part, which consists of the Upper Paleolithic Layers IV-VII (GH4-7). This division is marked by a Natufian house-floor (AH IIIb). Apart from the intrusion of the house-floor IIIb into Layer IV, which probably removed a portion of the older deposits, other signs of slight disturbances occur mostly in the upper part of the stratigraphy. First, a decrease of finds in the layers south of the drip line was observed due to a slight sloping of the layers in the southern section. This erosion into the wadi is much more pronounced in the upper layers and much less so in the more horizontally orientated Layers IV-VII. Secondly, a mixture of typologically significant finds, especially in the surface material and layer I, indicates that post-depositional processes may have occurred.

The stone tools associated with the Natufian of Baaz are generally small, backed lunates. These tools already appear in layer AH I, where there are only few of them, which occur in combination with a large number of transverse arrowheads and a few Khiamian points and Hagdud truncations (Figs. 2 and 3).

From the 204 tools belonging to layer AH II, the small lunates increase in number (15%) ranking third after backed pieces (25%) and blanks with a lateral retouch (18%). Khiamian points are absent in this layer (Fig. 4).

Very similar to layer AH II is the composition of the inventory of layer AH III situated on top of the house floor. Again, backed pieces, laterally retouched tools, and small, backed lunates are dominating the inventory of tools (Fig. 5).

The lunates from Baaz Rockshelter are dominantly backed; only 2 pieces from layer AH II (Fig. 5:7 and 5:9) and a single piece from layer AH III (Fig. 6:7) have a bidirectional Helwan retouch. The size of the lunates ranges between 11 mm to 25 mm in length.

Consequently, it can be concluded that the Natufian house floor, the layer AH III, and most of layer AH II can be dated to the Late Natufian. The concentration on hunting tools, the lack of Helwan retouch, the small size of the lunates, the absence of sickle gloss, and the scarcity of ground stone tools (Barth 2002, Hillgruber 2010) all support this interpretation.

In contrast, layer AH I as well as parts of layer II reveal a mixture of occupations. The transverse arrowheads, the El-Khiam points, the Hagdud truncations, and the lunates suggest that at least two different time periods are represented in these layers. The transverse arrowheads probably belong to the late Pottery Neolithic (PN) and are also well represented in the sites of the southern and central Levant (Gopher 1994:223). Hagdud truncations and the Khiamian points are generally found in sites associated with the Pre-Pottery Neolithic A (PPNA).

The archaeological site of Kaus Kozah is located on the back side of the Oligocene limestone questa above the town of Ma´aloula, approximately 3 km north from Baaz. The Kaus Kozah site was identified during the 2000 field season, after many lithic artefacts had been recovered on the surface in front of the cave and in the vicinity of the entrance. Three very small test-pits were opened up in 2003. While 2 pits inside the cave revealed only a thin layer of dusty sediment, the one directly in front of the shelter suggested being more promising. In 2004, an excavation of 10 m^2 was opened at the eastern entrance of the rockshelter. This location was chosen due to the greater thickness of the sediments. The excavated area was a longitudinal section through the cave and the main terrace. The amount of artefacts and the thickness of sediments were the reasons for continuing the excavation in 2005 and 2006 and focussing the work on the northern part of the section. The excavation near the eastern entrance of the cave was increased in size to cover an area of 3 m x 4 m. In total, 18 m^2 were excavated. A total of 4 archaeological layers were found in Kaus Kozah yielding finds from the latest Epipaleolithic down to some slight traces of Middle Paleolithic occupation (Fig. 6).

The archaeological material could be attributed mostly to the PPNA, which was represented by Khiamian points, fragments of Jericho/Byblos points, and some lunates of dubious origin. The absence of Beit-Ta'amir knives, sickle blades, ground stones, and heavy duty tools indicates a specialization for an occupation of a short term hunting camp. This interpretation is further substantiated by the near absence of any cereals in the unearthed botanical remains (Deckers *et al.* 2009:338) (Fig. 7).

In addition to the excavations described above, I had the opportunity to review material from Yabroud shelter III, which is currently stored at the University of Cologne, Germany. The rockshelters of Yabroud were discovered nearly 80 years ago by Alfred Rust (Rust 1950). In the years 1930 to 1933 he excavated three rockshelters and discovered one of the longest archaeological sequences in the Near East, which spanned from the Middle Paleolithic

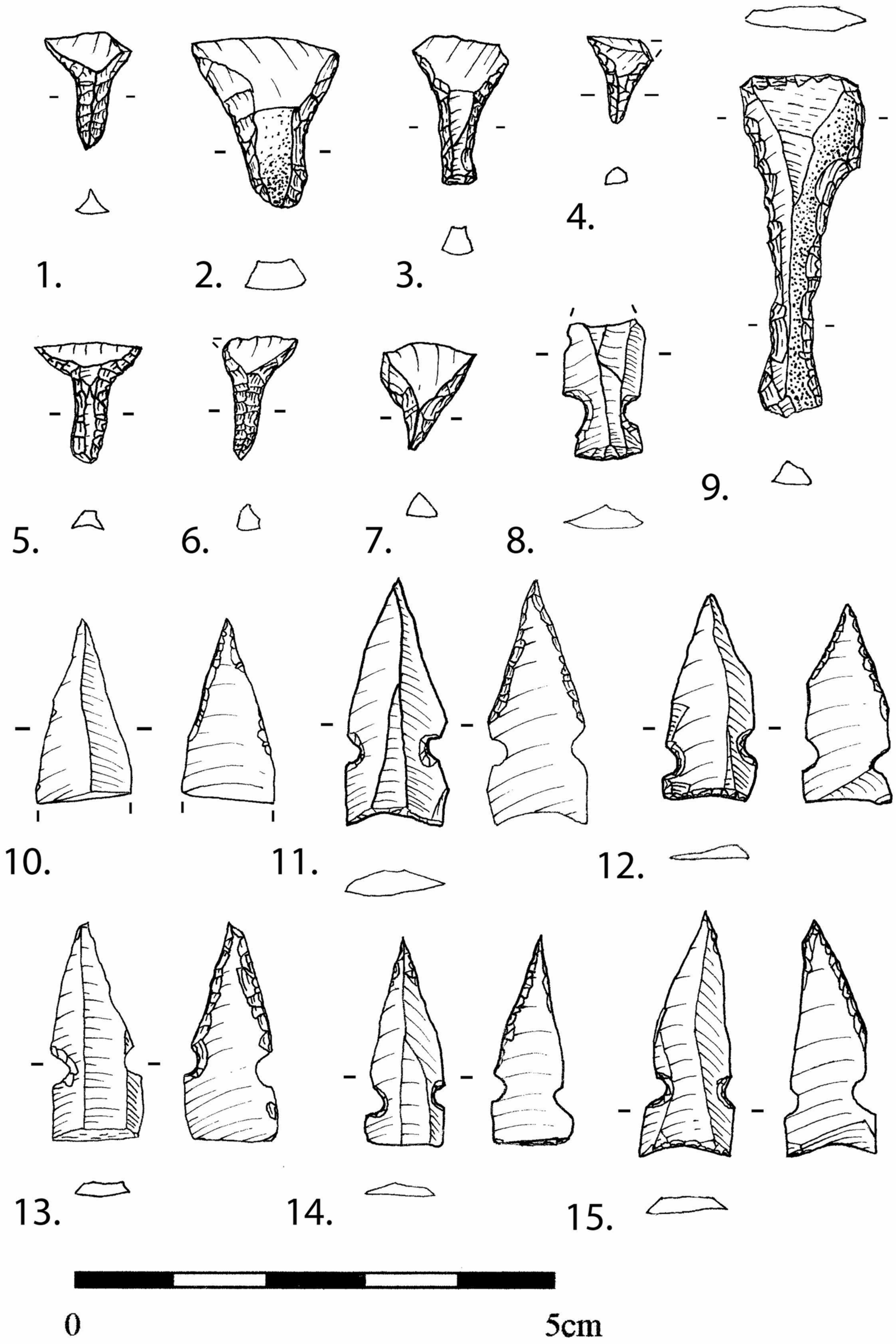

Fig. 2. Transverse Arrowheads and Khiamian points from Baaz layer AH I (Drawings by M.Barth, S. Feine, E. Ghasidian, F. Hillgruber and S. Rathje).

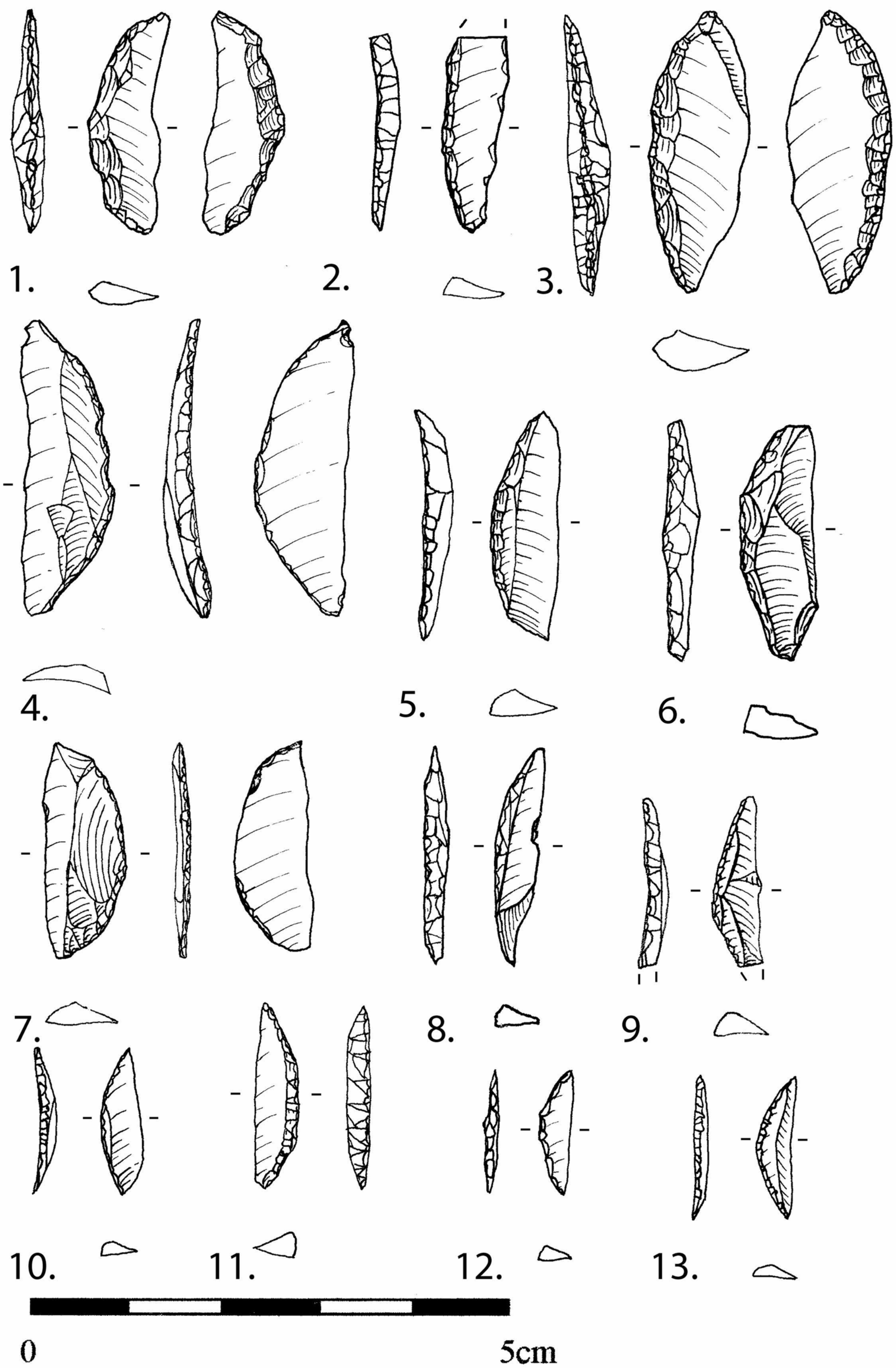

Fig. 3. Lunates from Baaz layer AH I (Drawings by M.Barth, S. Feine, E. Ghasidian, F. Hillgruber and S. Rathje).

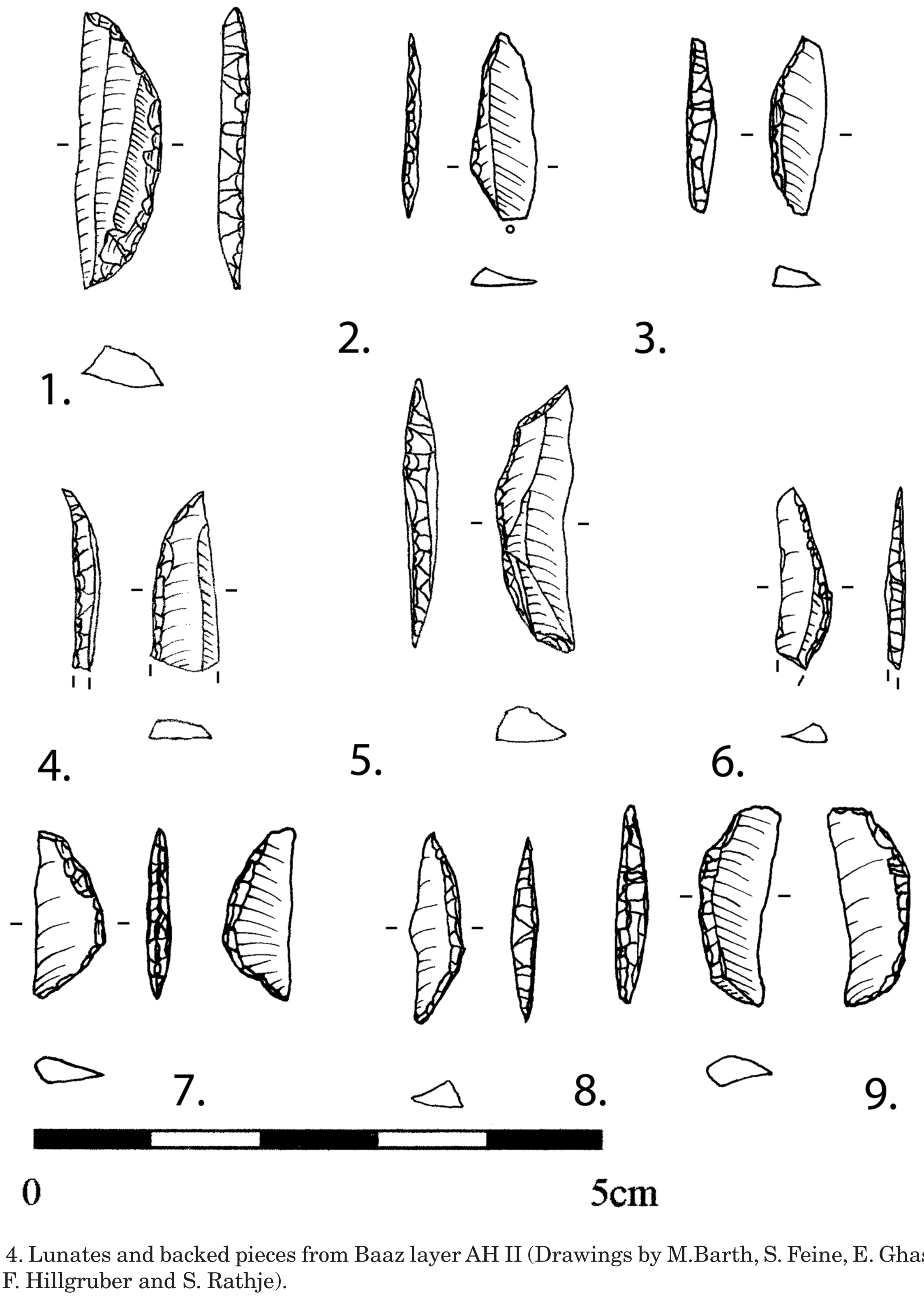

Fig. 4. Lunates and backed pieces from Baaz layer AH II (Drawings by M.Barth, S. Feine, E. Ghasidian, F. Hillgruber and S. Rathje).

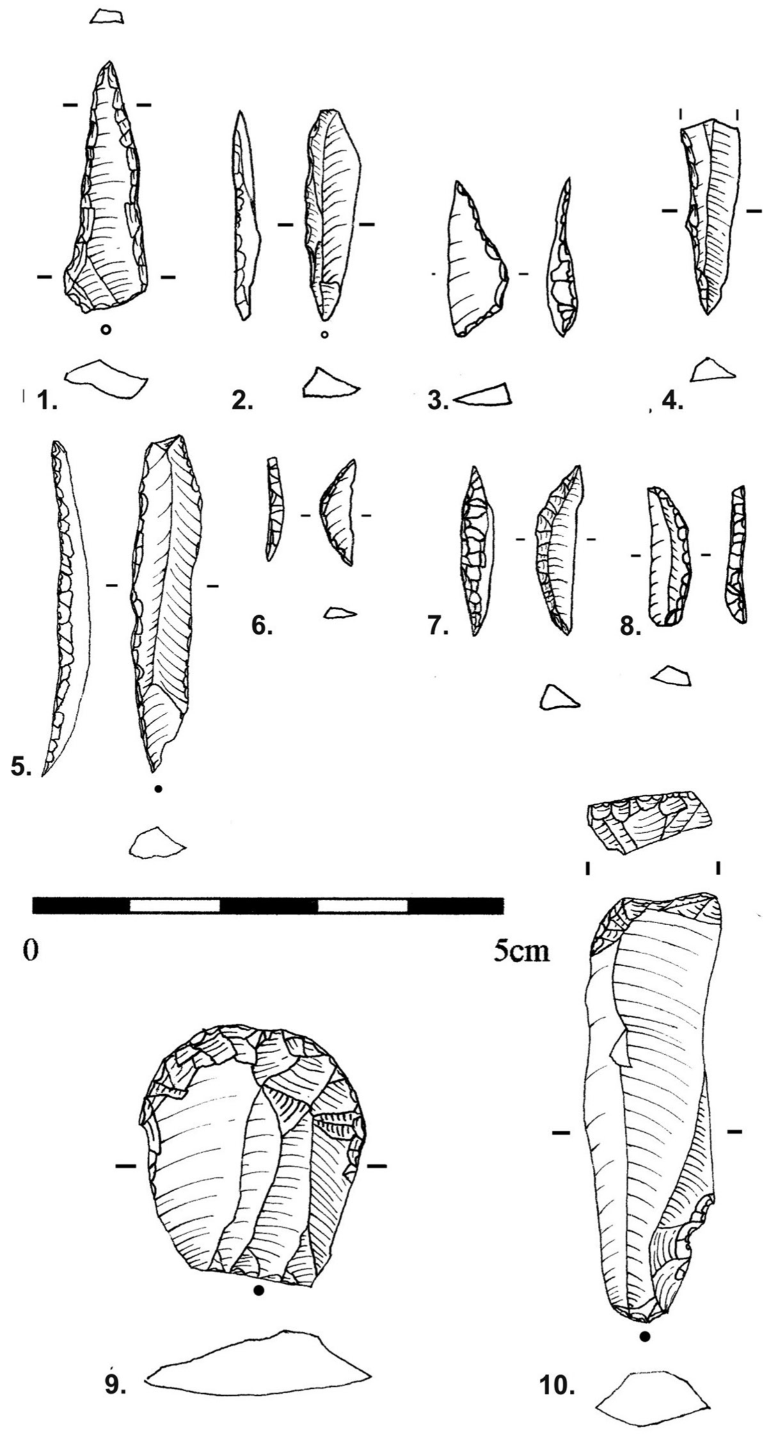

Fig. 5. Backed pieces, lunates and endscrapers from Baaz layer AH III (Drawings by M.Barth, S. Feine, E. Ghasidian, F. Hillgruber and S. Rathje).

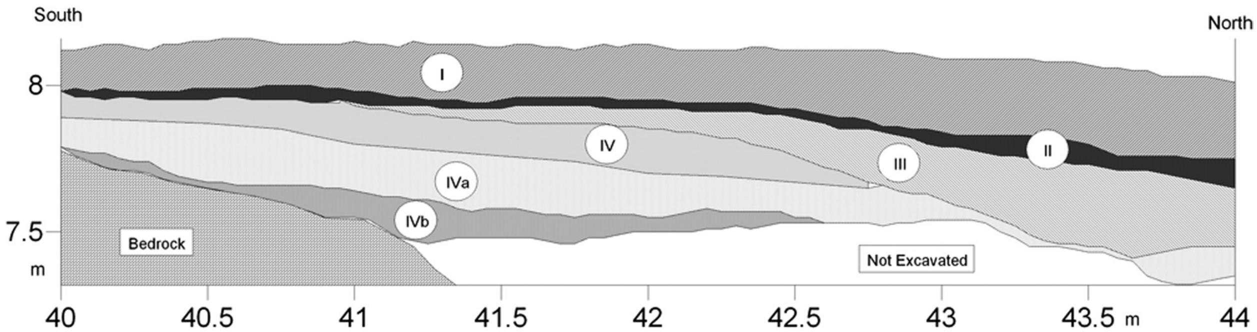

Fig. 6. Kaus Kozah, N-S stratigraphic profile along 50-meter west line (Figure K. Bretzke).

to the End of the Epipaleolithic. Ten archaeological layers were defined by Rust in the 30 m² excavation of rockshelter III with a definite focus on the Epipaleolithic assemblages (Fig. 8).

While the assemblages are of special interest primarily to better understand the expression and development of stone tools in the early and middle phases of the Epipaleolithic, only the smaller inventory of layer 2 can be attributed to the Natufian. Despite the outstanding quality of the excavation by Rust, a few conditions should be noted. First, only a part of the artifacts found in the excavation was shipped back to Germany. Secondly, some of the layers were separated not solely by changes in the sediment but also by the changing predominance of tools and raw material. In addition, only approximately 50% of the uncovered finds were blanks, often of outstanding regularity and beauty. Thus, the whole recovered assemblage must be viewed with caution because of an apparent sampling1 bias. While a random sample from the whole assemblage may provide valid results, even if the portion chosen is quite small (Orton 2000), it seems that typological and valuable "museum pieces" are overrepresented in the stored material, even though quite a diversity of blanks and cores are preserved. Still, Yabroud can be used for comparisons even though some aspects, like questions regarding primary debitage have to be interpreted with caution. The inventory of layer 2 is dominated by a large amount of end-scrapers, which make up nearly 40% of the tools, followed by less diagnostic laterally-retouched pieces and notched and carinated pieces. Only 9 lunates are part of this inventory. In contrast to the finds from Baaz and Kaus Kozah, these tools are evenly divided between pieces having a backed edge or a Helwan retouch. The latter group is larger than the more delicate backed lunates. While the presence of the Helwan lunates is already a sign for an older setting in the Natufian, the larger size of the pieces, in comparison to the small backed lunates in Baaz and Kaus Kozah, further strengthens their chronological position (Fig. 9).

After the typological assignation, absolute dates can further verify the chronological position of the inventories. In order to achieve the best possible results, we tried to follow some simple guidelines. First of all, samples were taken from areas that clearly showed signs of human occupation, such as charcoal samples or bones with cut marks. In addition, we tried to take our samples from squares, which were the least disturbed. Also, the samples were collected, if possible, from the uppermost part of each layer down the sequence. The samples were sent to the Leibniz Laboratory at the University of Kiel (Germany) for radiocarbon dating. The calibration for the samples of Baaz Rockshelter and Kaus Kozah cave was done with the programs Calib Rev 5.0.1 (Stuiver and Reimer 1993) and Calpal for the dates over 20,000 BP (Jöris and Weniger 2000). The calibrated date is the 2σ value. The dates of samples from the lower layer of Baaz yielded an asymmetric range. In order to calibrate these dates, I decided to use the larger value in order to better account for all possible mistakes. After the 1999 field season, 5 samples of charcoal from the square 20/33 of Baaz rockshelter were chosen. The samples were taken throughout the excavated area from AH Ia down to AH IIIa just above the living floor. The results of their dating are shown in Table 1.

The samples from the archaeological layers AH III, IIIa and one from AH II with dates around 10,800 - 11,000 cal BC clearly place the occupation of Baaz within the late Natufian. This occupation

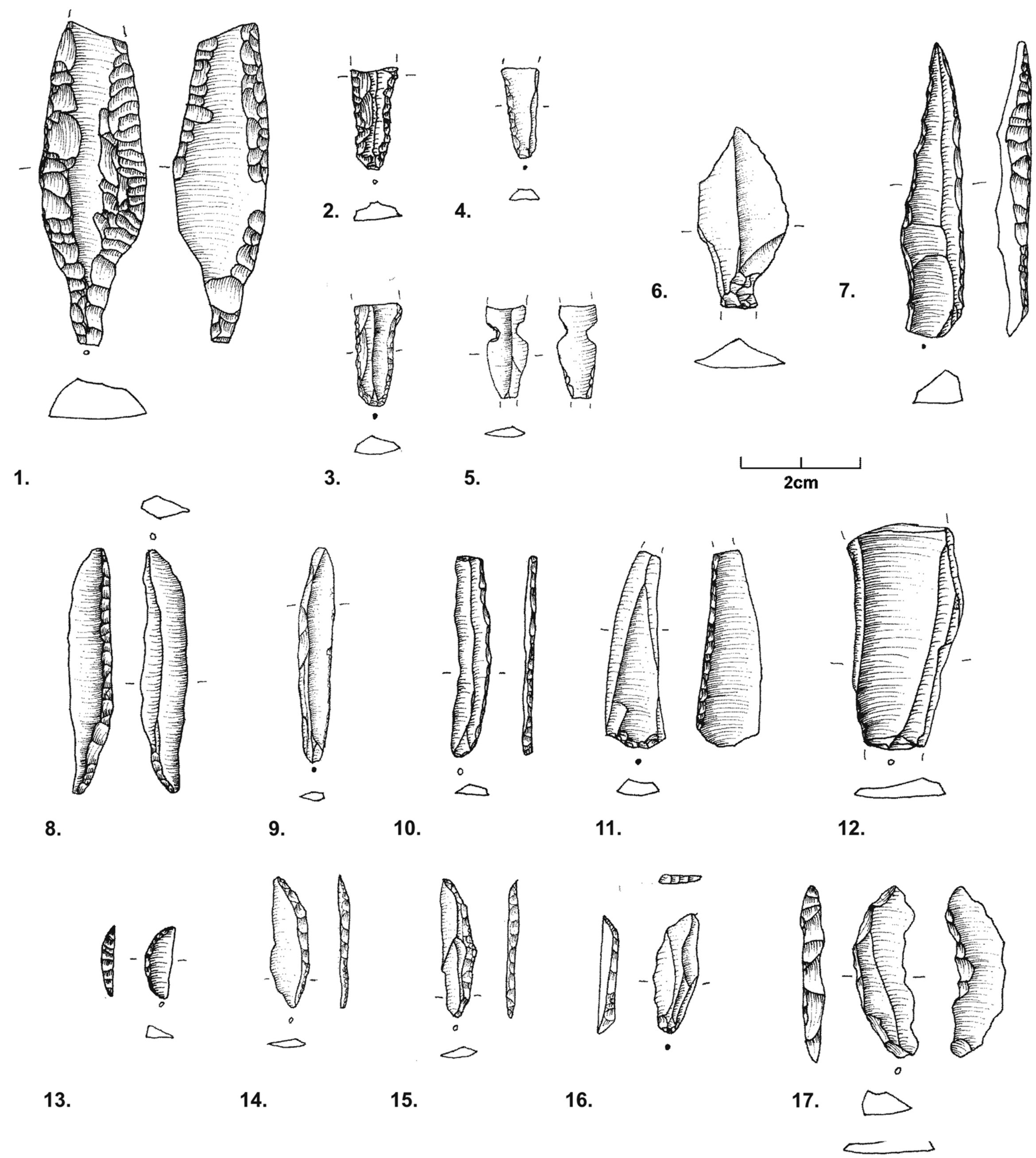

Fig. 7. Projectile points from Kaus Kozah (Drawings S. Feine, E. Ghasidian and F. Hillgruber).

falls into the range of the Younger Dryas Period at approximately 11,000 -10,300 BP or 13,000-11,500 cal BP (Bar-Yosef 1998). The later dates of 4200 cal BC and 4700 cal BC from the upper two layers, especially for Layer AH II, are most likely the result of mixing with younger material. While layer AH I presents a sizable amount of transverse arrowheads, tools typical for the Pottery Neolithic (PN), the inventory of Layer AH II is relatively undisturbed (see above). Thus the older date for Layer AH II seems to represent the majority of finds in this layer. The younger date for Layer AH I is comparable to sites such as Kvish Harif (Rosen 1984) or Nahal Issaron in the Negev (Gopher *et al.* 1994), which also yielded inventories with vast amounts of transverse arrowheads.

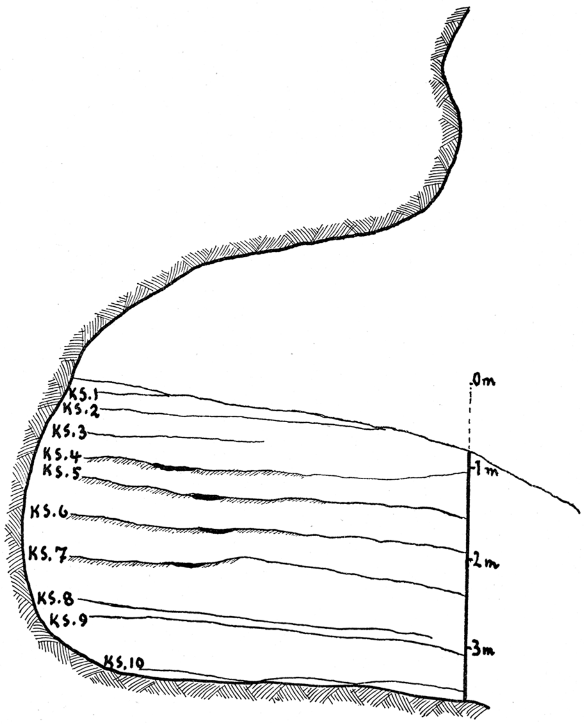

Fig. 8. Stratigraphy of Yabroud shelter III (Rust 1950, figure 96).

To date, we have only two absolute dates for Kaus Kozah cave, which are based on samples taken during the 2005 field season. One (KIA28696) is a small long bone fragment belonging to the child skeleton called "Charlotte". The other probe was an undetermined bone fragment near the supposed burial site.

The dates for these samples of approximately 9000 - 10,500 cal BC indicate an occupation of Kaus Kozah cave at the final stagers of the Younger Dryas Period at the end of the Epipaleolithic between the late Natufian and the PPNA. This date is consistent with the finds of Natufian-style artifacts, such as lunates and PPNA finds, such as the Khiamian arrowheads. The dates, except KIA 30306, are all very similar and represent the majority of the finds. The few Levallois finds of Layer AH IV are not represented by an absolute date. A probable reason for the lack of older dates in Kaus Kozah is the supposed erosion of older sediments by unknown agents. As a result, only a few remnants of Middle Paleolithic origin are remaining (Hillgruber 2010:75-76). With the occupation during the Epipaleolithic, the sedimentation process remained stable, probably due to the partial collapse of the cave's roof. One large stone slab was found during the excavation. In addition, some large boulders were found located in front of the cave, stabilizing the sediment and reducing the effect of erosional processes. The dates also support the relative abundance of younger material and further delimit the Middle Paleolithic occupation in Kaus Kozah.

In the following, the working processes for the Epipaleolithic and especially the Natufian layers of Baaz, Kaus Kozah and Yabroud III are presented. The production sequence is useful for recognizing and defining activities in time and space and for highlighting the operational patterns. The knowledge of different steps involved in the production of tools provides valuable information and is especially useful in recognizing alternative ways of manufacturing a specific tool, which is difficult or impossible to do by considering solely the final form of the tool. The different steps in the production of these tools are presented here:

Core reduction

- Raw material procurement
- Testing and initial preparation
- Core preparation
- Core reduction
- Core maintenance / rejuvenation
- Core abandonment

Tool production

- Blank selection
- Blank trimming
- Retouching and final modification
- Tool maintenance / reworking
- Tool abandonment

Raw material procurement

During the first field season in 1999, the raw material of the stone artifacts was already differentiated macroscopically: color, opacity, gloss, grain, and visible fossils were used to group the pieces into more than twenty categories. In all the sites discussed here, throughout their stratigraphic sequences, the raw material that was mainly used was flint of different variations of brown. The similarity in the composition of the raw material from the different localities and over such a long time period indicates the existence of local raw material deposits. The existence of such deposits was already mentioned by Rust: "…such black flint, as we dug out with difficulties in the big Abri, outcropped two kilometers away at the south slope

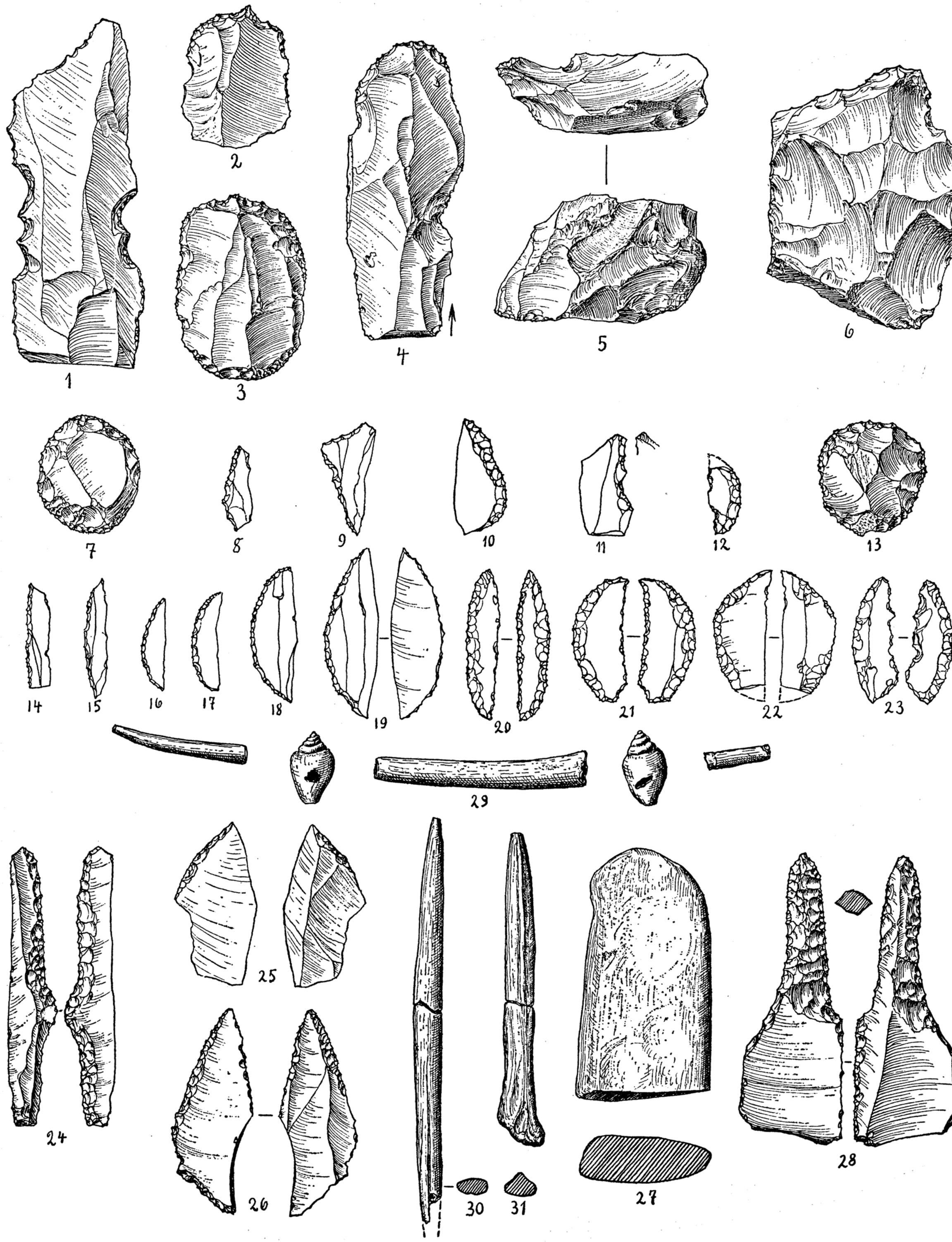

Fig. 9. Tools from Yabroud III, Layer 2 (Rust 1950, figure 107).

Table 1. Radiocarbon dates from the Baaz Rockshelter (Leibnitz Laboratory in Kiel)

Lab. Number	Layer	Material	^{14}C Age BP	Age cal. BC
KIA 11580	Baaz AH Ia	Charcoal	5.241 ± 35	4.228 - 3.969
KIA 11579	Baaz AH II	Charcoal	5.707 ± 34	4.678 - 4.459
KIA 11578	Baaz AH II	Charcoal	10.667 ± 97	10.903 - 10.447
KIA 11577	Baaz AH III	Charcoal	10.942 ± 65	11.051 - 10.874
KIA 11576	Baaz AH IIIa	Charcoal	10.470 ± 121	10.843 - 10.084
KIA 28696	KK AH IV	Bone	10.130 ± 70	10.088 - 9.454
KIA 30306*	KK AH IV	Bone	10.485 ± 50	10.732 - 10.218
KIA 30306	KK AH IV	Bone	8.480 ± 190	8.181 - 7.058
KIA 30805	KK AH II	Bone	9.260 ± 70	8.696 - 8.299

* The sample KIA 30306 produced multiple dates

of the limestone mountains of Yabroud in great quantities…"(1950:7). In addition to these primary deposits, raw material was also obtained from secondary deposits in the Neogene conglomerates, marls, sandstones, and in the quaternary deposits of the wadis (Dodonov *et al.* 2007:642). In order to differentiate between these two raw material groups, we used the expression of the cortex visible on the stone artifacts. The primary raw material was characterized by a white cortex which still retained its chalk-like quality, while flint from secondary deposition yielded a hard, thin, and often battered, scarred cortex that varied in color between white, grey, and brown (Fig. 10).

Altogether approximately 7000 pieces from all study sites and layers displayed some traces of cortex; of these, only very few pieces of primary cortex were identified. Especially in the Epipaleolothic layers nearly all the uncovered pieces could be attributed to secondary deposits; *e.g.* the Natufian layer of Baaz AH III contained not a single definite piece from primary deposits. Interestingly, the amount of primary cortex increased slightly in the Upper Paleolithic layers from Baaz (5.8% in layer AH VII) and even more so in Yabroud, where the inventories of layers IX and X included 29% and 39% of white, chalk-like cortex, respectively. It would be interesting to clarify whether this tendency remains true for the Upper Paleolithic layers of Yabroud II and furthermore to examine the distribution of even older Middle Paleolithic inventories. Unfortunately, no descriptions of the cortex were provided by Bakdach in his work on the Upper Paleolithic of Yabroud (Bakdach 1982). A brief examination of the material stored at the University of Cologne indicated the frequent appearance of primary white cortex in the layers of Yabroud Shelter II. In addition, Al-Kassem described in his work of the Yabroudian (layer 25) of Yabroud Shelter I, 23 raw material units, of which the largest one was attributed to a primary deposition (El-Kasem 2001:32). In part, this observation was most likely based on differences in tool production, namely the increased production of microliths and, thus, a decreased need for elongated blanks. Interestingly, during the Epipaleolithic, the highland hills and lowlands showed an increased find density (Bretzke 2008) in the areas, where secondary raw material may have accumulated downstream of the primary deposits. Thus, spatial use of the area around the caves probably had an impact on the selection of raw material. Throughout the sites nearly no examples for long distance raw material acquisition were observed, with the exception of a few pieces of obsidian from Kaus Kozah and a single piece of obsidian from the Upper Paleolithic of Baaz. While a sole piece must be considered to be of questionable significance, we observed three pieces as part of layer AH 1 from Kaus Kozah. Unfortunately, Kaus Kozah is a site with a very complex stratigraphy; this is primarily true for Layer AH I, which had been subject to mixing and disturbance of varying degrees. Consequently, the affiliation of non-diagnostic blades and bladelets to the Epipaleolithic of Kaus Kozah is questionable. Therefore, only shell jewelry from the Mediterranean (Hillgruber 2010:274-276; Wahl-Groß 2006) and fragments of ground stone tools (Hillgruber 2010:269-274), the latter of which may have originated on the Golan Heights at a distance of approximately 40 km, may indicate relationships over longer distances.

Testing and initial preparation

Tested pieces and semi-chipped cores were nearly absent from the Epipaleolithic in all three sites. The Natufian layers yielded only 2 pieces

Fig. 10. Cores from Yabroud. The left one with secondary, reduced brownish cortex. On the right a core featuring a white, chalky primary cortex.

from Baaz rockshelter. While for Yabroud one has to assume that Rust decided not to transport such pieces to Germany, as they lacked increased techno-typological information, the modern excavations of the other two sites should have yielded such finds if they had been present. Their absence indicates that phase 0 of Geneste's (Geneste 1985) system, comprising of unworked or slightly tested raw material nodules, is missing in the operational sequence. The absence of raw material nodules indicates further that they had already been tested at their deposits.

Core preparation

The core preparation, Geneste`s phase 1, is characterized by removing the cortex, or rather preparing a striking platform and constructing a crest. The late Epipaleolithic layers included a large number of cortical pieces (the number of primary elements with a cortex proportion of more than 50% averages around 10% in the inventories of Baaz rockshelter). The ratio is relatively high in comparison to sites such as Beidha (Byrd 1989:35) and Sunakh (Hoffmann-Pedersen 1995: 37) in southern Jordan, thus representing more intra-site core preparation.

Nearly no primary crested blades, and only relatively few secondary crested blades are visible in the Natufian of Baaz and Yabroud, further indicating a unidirectional way of producing blanks, with some correction flakes to improve and reconstruct the correct curvature for the main reduction face.

Core reduction

The majority of cores from the sites were pieces displaying unidirectional negatives on their main flaking surface, followed by pieces with bidirectional and adjacent negatives. The overall symmetry of the cores was divided into two groups, with the first group belonging into the Upper and Early Epipaleolithic layers (Fig. 11).

These cores were mostly elongated pieces and the main reduction face, often the only one, was situated on the narrow part of the core. The angle between striking platform and reduction face was relatively steep and the overall appearance keel-like. Luc Moreau used the term “frontal reduction logic” for a similar perception of cores in the Gravettian of Central Europe (Moreau 2007:72). The second group was found in the Epipaleolithic layers such as the Natufian of Baaz rockshelter. Even though their maximum dimension did not differ significantly from the first group the cores had a more stocky appearance. This was due to an increased amount of reduction faces, striking platforms, and especially the placement of the main reduction face on the broadside of the piece or including the broadside of the cores. The angle between striking platform and reduction face was also less steep. A hierarchy between the reduction faces and the corresponding striking platforms was identifiable. The core had one primary reduction face, which was primed by the establishing of secondary reduction faces in order to adjust and guarantee the curvature of the former one (Fig. 12).

Core maintenance / rejuvenation

Artifacts, attributed directly to core maintenance and rejuvenation include core tablets, crested elements and removed core faces. The overall amount of these pieces is not very high in the Natufian inventories of Baaz, Kaus Kozah and Yabroud. Still a sizeable amount of core tablets and even some examples of the removal of complete flaking surfaces is visible in Baaz. With regard to the overall form of the cores, which have a less steep angle between striking platform and reduction face of about 90 degree and a wider reduction face, the necessity of core tablets is based on the worsening of the angle between reduction face and striking platform during blank production. If the angle gets too flat, the core tablet removes part of the striking platform, increasing the angle again. The keel-like cores of the early Epipaleolithic and Upper Paleolithic have an overall form that allows a longer period of blank removal, before the reworking of the striking platform is needed. This is in contrast to the stockier cores from the Natufian. The disadvantage of the former cores probably involves the smaller number of blanks generated for further preparation.

Core abandonment

The information preserved in the abandoned cores goes beyond reduction strategy. The preserved

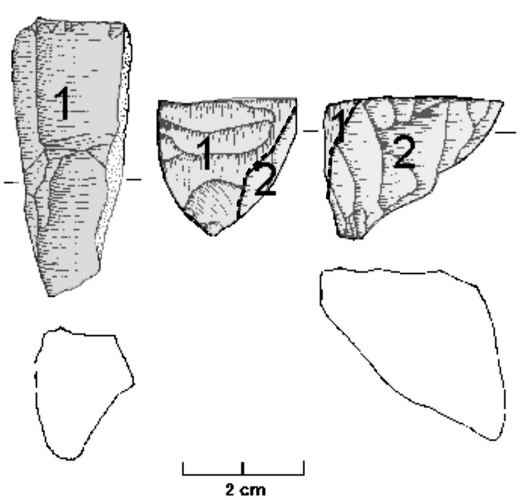

Fig. 11. Core with one reduction face on the small site (left), Core with an additional reduction face incorporating the broad side of the piece (right).

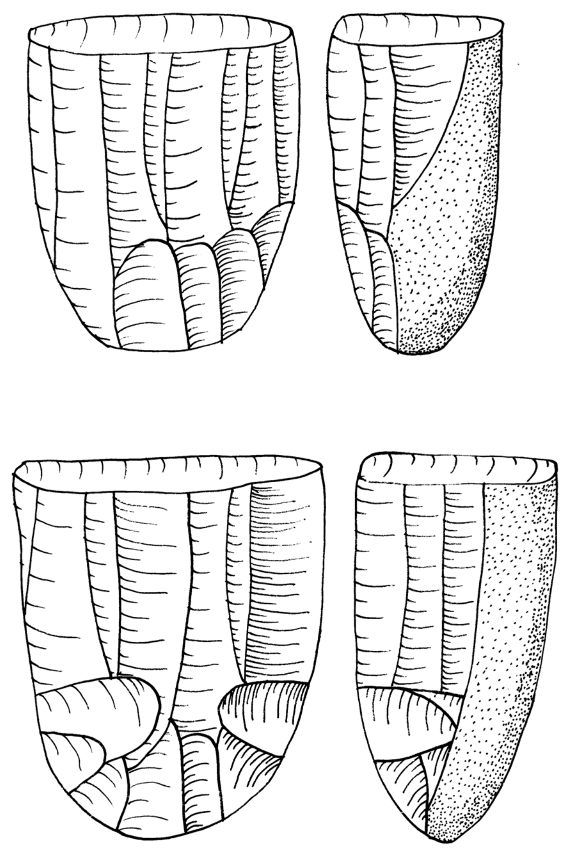

Fig. 12. Primary reduction face being repaired by secondary flake removal from opposing or adjacent direction (Drawing E. Ghasidian).

pieces provide information on the value of the raw material. The degree of exhaustion of the cores sheds light on the availability of raw material and subsequently on the interplay between technological necessity and economy. Information regarding the state of core reduction is preserved in the sizes of the cores, in the amount of reduction faces, proportion of cortex and the size of blanks in comparison to blank negatives on the core.

The proportion of cortex was quite small for most of the cores preserved in the different inventories, indicating that these pieces were in a reduced state of core exploitation. The comparison of blank size to the last complete negatives on the cores indicated a size reduction of the cores. On the other hand, since the raw material was available near the sites, a long-lasting core reduction is unlikely.

Tools

Blank selection

The differentiation of blanks into flakes and blades is an artificial one for the Natufian and late Epipaleolithic inventories of Baaz and Kaus Kozah. The sizes of the blanks revealed no subdivision or bimodal distribution, which would indicate a systematic production of multiple blank forms. In addition, no obvious differences in the cores or carinated scrapers were visible in the assemblages. Still, a comparison of the whole sequence of Baaz revealed that average blank sizes decreased from the Upper Paleolithic layers to the Epipaleolithic inventories. The length-width index in Baaz layers IV-VII ranged between 2.2 and 2.6 and decreases down to 1.5 to 1.9 including the Natufian layer AH III. At the same time, a decrease in the size of the cores was not noticeable. These observations clearly indicated that with the invention of the geometric microliths, segmented with or without the microburin technique, the importance of blank size and regularity decreased. By segmenting blanks, the final form of the tool was detached from the starting product. Thus, the need for careful production of regular, long blades and bladelets decreased, while the need for numerous blanks for segmenting into geometric microliths probably increased. "Such use of the microburin technique and backing may make blank production more, not less efficient - as almost any elongated flake is potentially suitable as a blank... By contrast, during some of the Terminal Upper Paleolithic and much of the Early Epipaleolithic the blanks produced tend to be more elongate and thus initially approximate the shape of the retouched tool." (Goring-Morris 1996:134). Thus, size reduction must be understood as the more industrial way of producing tools, starting with the Geometric Kebaran. The enlargement of the reduction faces, seen by the division into the prismatic cores of the late Upper Paleolithic and early Epipaleolithic in contrast to the broader cores of the middle and late Epipaleolithic, is therefore an adaption to facilitate the production of higher amounts of blanks that leads to a decrease in the production of elongated blanks.

Blank trimming

No traces of the microburin technique were found in the Natufian of Baaz or Yabroud III. This is not totally unexpected, since there were known Natufian sites with none or only a slight impact of this technique of blank segmentation (Bar-Yosef and Valla 1979). Interestingly, a couple of half-finished lunates or backed microliths from Baaz illustrate, that the tools were formed by the backing used on the solid blanks without prior segmenting of the pieces (Fig. 13).

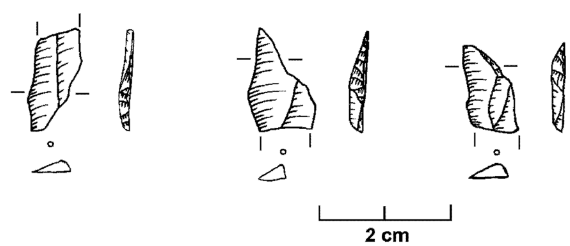

Fig. 13. Microliths being backed without being segmented by the microburin blow (Drawings S. Feine, E. Ghasidian and F. Hillgruber).

Retouch

The Natufian and Late Epipaleolithic inventories were dominated by backing of one lateral edge. In general, the differences in preferred retouch observed throughout the margins of the Epipaleolithic inventories was slight. Most of the tools displayed a normal, steep, sometimes irregular retouch. The relatively coarse retouch typical for sickle blades was nearly absent and another indication for the absence of this tool type in the inventories.

Tool use, maintenance and reworking

Sickle gloss is one of the major attributes associated with special activities. Together with ground stone tools, sickle gloss suggests the use of plant food. The presence of this surface polish is strongly associated with tools such as sickles or harvesting tools (Rosen 1997:55ff.). Even though a few ground stone tools were found in the Natufian layers of Baaz, no stone tools with sickle gloss were identified in the inventories, thus revealing that wild cereal harvesting was not of increased importance for the people inhabiting the caves and rockshelters of Baaz.

The question of tool maintenance and reworking is commonly connected to the strategy behind the technological organization of an inventory. Binford (1979) separated stone tool technologies into curated technologies and expedient technologies. The first include tools that are repaired and reworked during use and, after primary utilization, are transformed for further use. The second include tools that are produced for a very specific, direct task and are discarded after use. Microliths, as implements in composite tools, belong to the second category due to the discrepancy in reworking stone tools and producing microliths as disposable composite tools. The question of tool maintenance and reworking is well known in a Middle Paleolithic context (Dibble 1984). In the younger time periods, such as the Upper Paleolithic, tools are often clearly defined for a specific task, representing the end-product of a sequence of reduction (Otte 1990:443). Nevertheless, the reworking of tools is known from younger time periods, such as in the case of burins worked on scrapers (Hiscock 1996). For the Epipaleolithic of the Levant, the question of reworking microliths was the center of a discussion introduced in the work of Neely and Barton (Neeley and Barton 1994), which was strongly criticized by a large number of researchers (*e.g.* Goring-Morris 1996). The entire discussion will not be reviewed here, but it is necessary to point out that the work of Neely and Barton contained numerous problems, which were addressed in detail by response articles in Antiquity (Neeley and Barton 1994). Still, one aspect of their work is of importance to the results presented here. “Because compound tool maintenance involves periodic replacement of some of the microlithic components, a new microlith would need to fit into the space left by one being replaced. We showed how slight modifications of a replacement’s hafting portion (*i.e.* its backing) to fit a pre-existing space would alter a geometric shape from one type to another.” (Barton and Neeley 1996:141). While I agree with their view on the role of microliths, I do not see why the replacement of microliths should somehow result in a continuity of microlithic forms, rendering typologically distinct forms useless. If such continuity in microlithic forms were present, the diversity of forms in the assemblages would have been higher and the whole package of forms would have been present. In contrast, we observed distinct assemblages dominated by one or two major forms such as lunates, different points, and numerous geometrics. Still, the work by Barton and Neely also demonstrated the problems associated with attempting to distinguish forms which appear very similar; this observation was also stressed by Pirie (Pirie 2004). With regard to the reworking of tools, the reshafting of composite tools with microliths probably occurred at the sites, indicated by the huge number of microliths and the relatively high amount of broken tools (see below). A reworking of the microliths itself did not occur. If we continued the search for reused stone tools, only singular examples such as burins on laterally-retouched pieces or on truncated pieces, are of interest.

Tool abandonment

The amount of tools, especially broken ones, may provide insight into some activities, such as the repairing and refitting of composite tools through the removal of microliths from the organic handle. The ratio of complete to broken tools is similar in the inventories of Baaz and Kaus Kozah, with approximately one-third of the tools still complete. Thus, a significant amount of time must have been dedicated to refitting of tools. Still, the amount of complete tools indicates more diverse tasks and/or more intense occupation, particularly if one compares these with the tools from specialized short-term hunting camp like the one of Ain Dabbour, with its Geometric Kebaran inventory (Hillgruber 2010:190 ff.).

Synopsis of the production sequence

Continuity in stone tool technology is apparent, with typological changes in the projectile points defining the different assemblages. Even though the upper layers of Baaz and Kaus Kozah revealed some mixture of finds, the earliest phases of the Neolithic are visible in the Khiamian arrowheads, but not through clear differences in stone tool production. Due to some disturbances in the material, one has to be careful in interpreting the results; however, our work clearly seems to indicate that the technological trends, which already are apparent in the early Epipaleolithic layers of Baaz and Yabroud, continue in the PPN and move the Khiamian-complex into the Epipaleolithic . Therefore, our results demonstrate a separation of these industries from the PPNB.

Conclusion

This study was initiated in order to closely examine the distribution of the Natufian in southwestern Syria. The excavations in Baaz, Kaus Kozah, and Yabroud III unearthed layers from the Natufian and Pre-Pottery Neolithic. Our results indicate that the area, situated in a diversified landscape, was repeatedly settled by mobile hunters. This study was aimed to determine the techno-typological attributes of these inventories. Local raw material was used to produce tools, predominantly microliths and projectile points. A detailed typo-technological analysis of the recovered stone tools was conducted; even though typological differences were observed, clearly visible similarities in the stone tool production throughout the Epipaleolithic were found. Throughout all inventories a frontal reduction logic was applied, but between phases, specifically, from the Upper Paleolithic and Early Epipaleolithic to the industries in the later Epipaleolithic (*e.g.* the Natufian) a change in the volumetric form of the cores was observed. This change in the volumetric form is most likely connected to the development of geometric microliths. Even without the microburin technique, which was never observed in inventories recovered from our Natufian layers, elongated pieces for tool production were not as important as in the previous periods due to the segmentation of the blanks. Our results substantially increase our understanding of the Natufian in the Central Levant and close a gap in our knowledge of its distribution. Still, more research is clearly necessary to better document technological similarities and diversity in this important phase of the Epipaleolithic.

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The Natufian Occupations of Qarassa 3 (Sweida, Southern Syria)

Xavier Terradas, Juan José Ibáñez, Franck Braemer, Lionel Gourichon and Luis C. Teira

Introduction

The Leja Plain is a large inland basalt plateau, located in the south of Syria (Fig. 1), to the northwest of the mountain massif of Jebel Druze (at an altitude of 1839 m above sea level). Since 2004, a Franco-Syrian scientific mission conducted under the general auspices of the General Direction of Antiquities and Museums (GDAM, Syria) and the Centre National de la Recherche Scientifique (CNRS, France) an archaeological project entitled "*Atlas archéologique des sites pré et protohistoriques de la Syrie du Sud*" in the area of Mohafazats of Damascus, Sweida, Deraa and Kuneitra.

In 2007 after four years of intensive archaeological survey the same team began a detailed exploration of the Qarassa area, located on the southern edge of the Leja Plain, some 20 km to the west of the city of Sweida. The preliminary surveys succeeded in documenting several signs of human occupations in the area around an ancient lake where some active springs still exist. These occupations covered the periods from the Epipaleolithic through the Iron Age (Braemer 2007, 2008), discovered at a number of specific sites (Fig. 2):

- Tell Qarassa South: Bronze Age and Iron Age occupations.
- Tell Qarassa North: Neolithic and Bronze Age.
- Qarassa 3: Natufian site, to be described in detail below.
- Megalithic necropolis: with over 250 monuments including isolated enclosures and megalithic tombs, of protohistoric age.

Since 2009, within the Franco-Syrian archaeological mission directed by Frank Braemer (CNRS), these sites have been studied with the collaboration of a team from the Spanish National Research Council (CSIC) and several Spanish universities (Universities of Cantabria, Las Palmas de Gran Canaria, Basque Country, and Barcelona) supervised by Juan José Ibáñez. This team has undertaken the excavation of the PPNB layers at Tell Qarassa North (Ibáñez *et al*. 2010), and the different Natufian remains at Qarassa 3, the subject of the present paper.

Qarassa 3

Qarassa 3 is the name given to the area including several basalt hills (757 m above sea level) and the surrounding lowland, situated to the north of the two tells (north and south) at the village of Qarassa. During the 2007 season, the following evidence was uncovered:

- Twelve circular structures on the surface, with diameters of about 4 m, whose walls were built directly on the basalt outflow. Initial observation showed that the floors had been very poorly preserved together with levels corresponding to the destruction of the structures. Apart from these remains, the basalt outflow covered most of the surface of the hills around.
- A small rock cliff, completely filled by sediment containing archaeological material, which suggested the existence of a rock-shelter.
- A large number of bed-rock mortars.

In all these localities, a large number of lithic artefacts were found, whose technological analysis showed that the lithic production was oriented towards the production of bladelets, with a high proportion of microliths (lunates). This industry, associated with other characteristic objects such heavy implements made from basalt, bed-rock mortars, and the absence of pottery meant that this ensemble could be attributed to Epipaleolithic

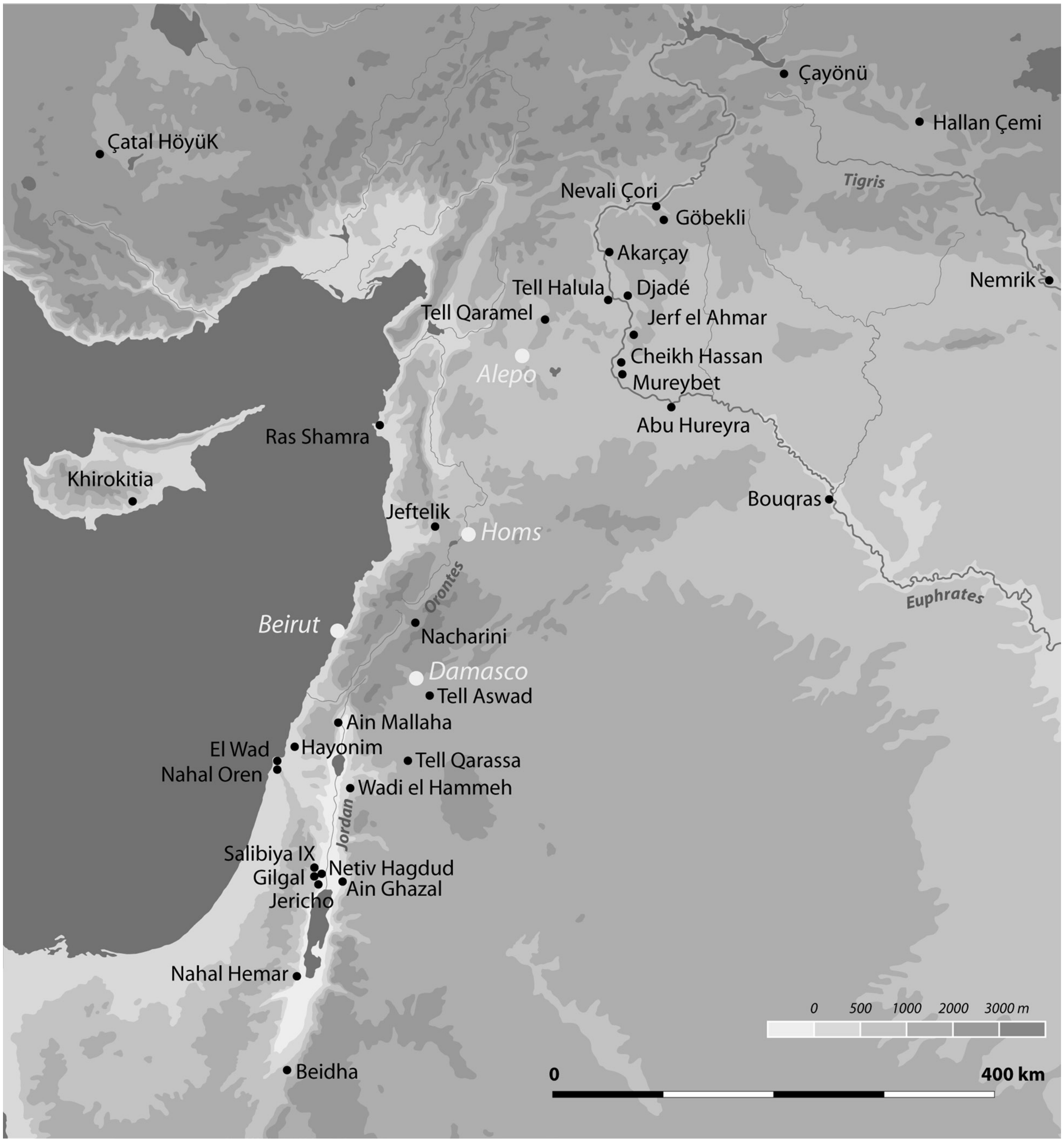


Fig. 1. Location of Tell Qarassa and other Epipaleolithic and Neolithic sites of the Near East.

occupations, corresponding to the Natufian culture. Within the framework of the collaboration between the Spanish team (CSIC) and the Franco-Syrian mission, two seasons of excavations have been carried out (2009 and 2010) at Qarassa 3. In spite the preliminary nature of the work carried out so far, we can describe the main results obtained to date.

Topographic survey work

One of the priorities of the research project at Qarassa 3 was to develop a program to produce a detailed survey of the site. The aim was to obtain a picture of the relief in the area, including micro-topographical data (micro-relief, rocks, fractures in the basalt outflow, platforms conserving sediment, etc.), on which the circular structures observed on the basalt hills could be located (Fig. 3). At the same time, other elements of anthropic origin were included (walls, graves, bed-rock mortars, beds of stones, concentrations of knapped lithic artefacts, etc.). This way it would be possible to figure out the associations between the different archaeological features, and their relationship with the particular elements of the terrain. The final objective is to obtain a high-density 3D model, using stereometric techniques, in order to produce a specific Geographical Information System for the micro-spatial study of this archaeological ensemble.

For this work we have used a Leica total station (model TCRM 1205). The Digital Terrain Model (DTM) was produced with n4ce software (Applications in CAD). The high-density 3D models have been created with Photomodeler Scanner software. To date, the mapped area covers over 6,700 m^2, with over 10,500 points being taken on place, which gives a density of 1.57 points per square meter.

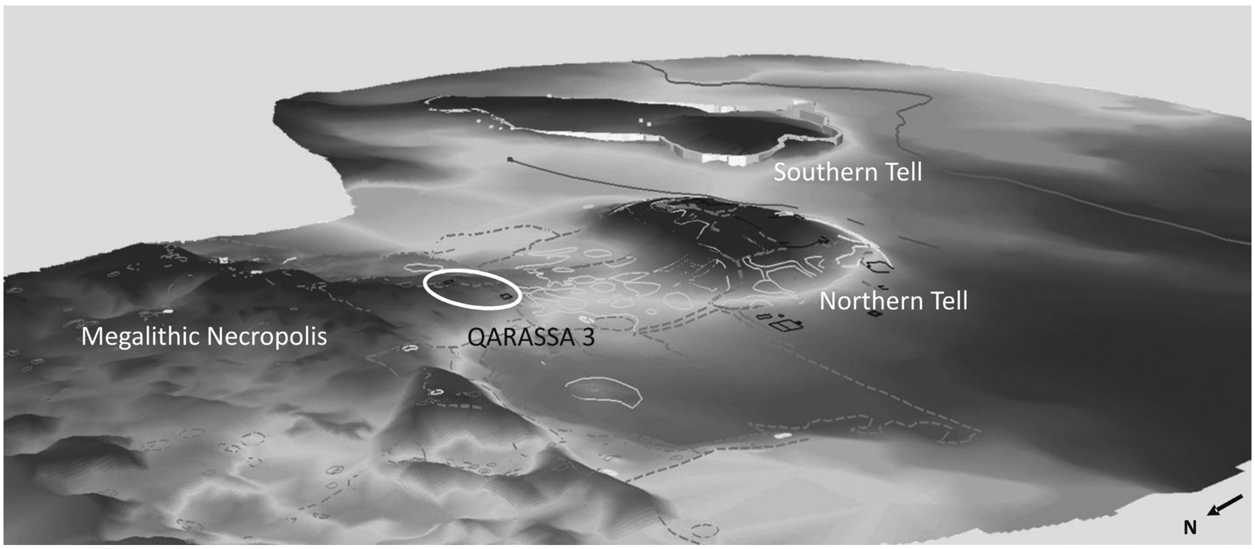


Fig. 2. Digital Terrain Model of the Qarassa sites (Gourguen Davtian).

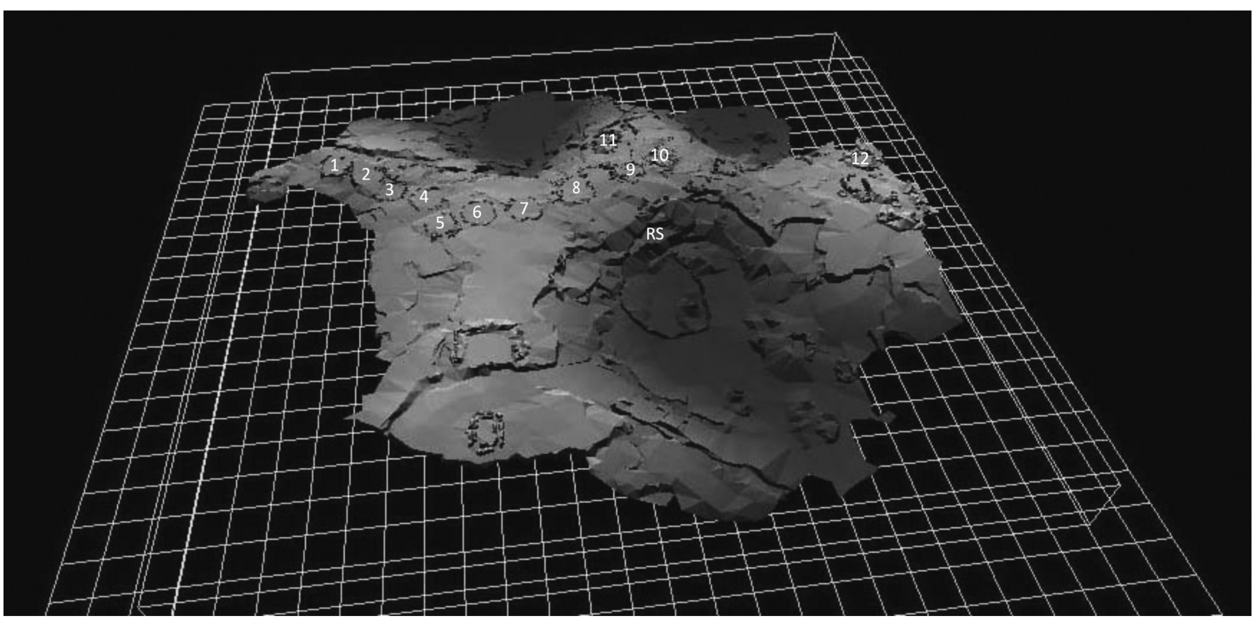


Fig. 3. Topography of the Qarassa 3 site with the location of the 12 circular structures and the rock-shelter (RS).

At a more detailed level, photogrammetric techniques have been used to obtain 3D models of the group of constructed remains, whose points have been geo-referenced within the general survey of the site. These models can incorporate data concerning the stratigraphic units and position of archaeological remains in those structures that have been excavated in these two seasons.

The circular structures

This association of built circular structures on top of the basalt hills was the main feature that attracted the attention of the research team at Qarassa 3. During the archaeological survey in 2007 nine structures were documented. However, during the field work in 2009, with the aid of aerial photographs taken by using a kite, up to twelve structures could be identified, and these were designated correlative numbers, from 1 to 12 (Fig. 4). The work carried out since then has not succeeded in detecting similar structures outside this area.

At first sight, we can clearly distinguish a group of eleven structures in line, very close together, forming an arc around a natural depression in the basalt outflow. One of them (Number 12) is a little isolated from the others. The distribution of the first eleven structures, next to each other, forming a continuous line with no overlapping, suggests that this group could have been in use at the same time.

- The walls defining these structures are founded directly on the bedrock; they were built by using only basalt blocks. These structures are almost circular in shape. In reality, the east-west axes are longer than the north-south axes, and therefore they are not strictly circular but slightly oval. Within this regularity, two structures are noticeably different in shape:
- Structure Number 1, with three sides of straight walls, perpendicular to each other, forming right angles. The observation of the layout of these walls seems to indicate that this could originally have been a circular-oval structure like the others, but at a later stage it was reconstructed with straight walls and right angles. It would be necessary to excavate the structure to confirm this visual observation.

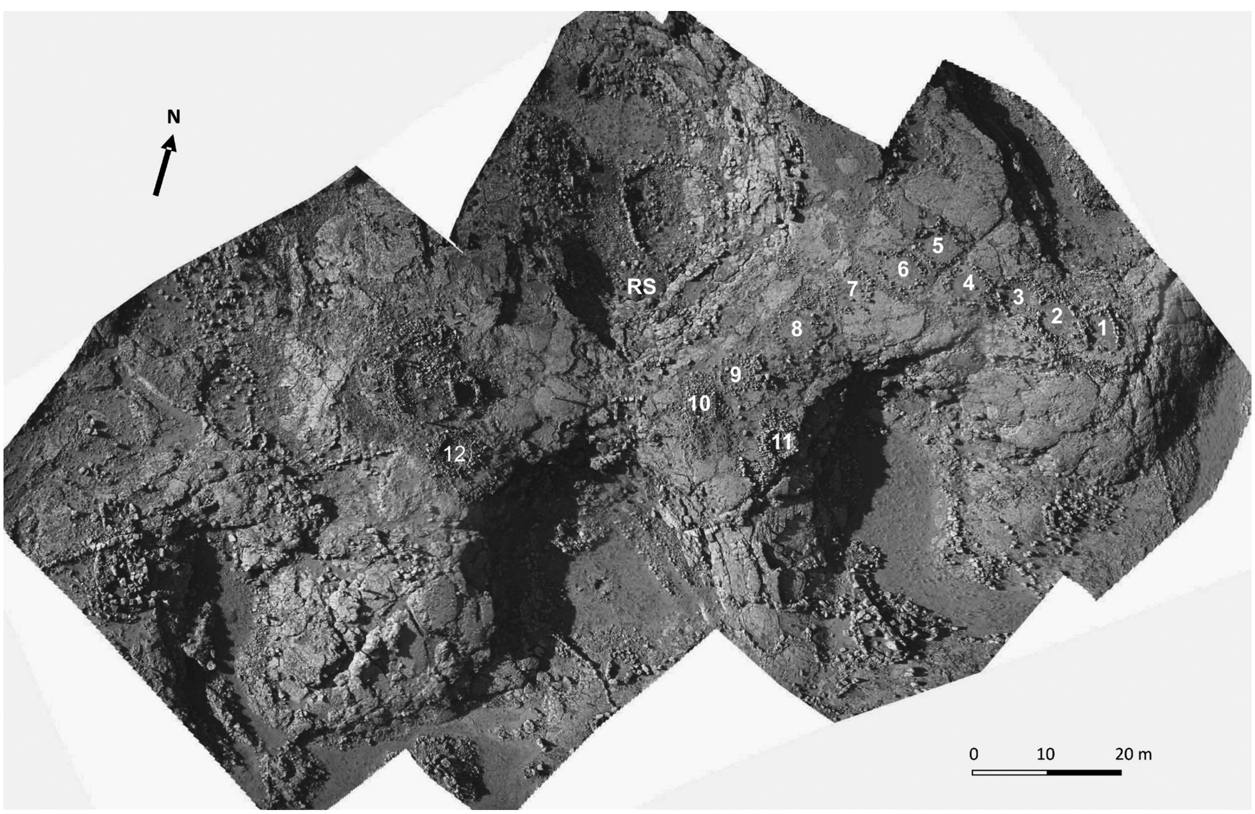


Fig. 4. Aerial photograph of the Qarassa 3 site with the location of the 12 circular structures and the rock-shelter (RS), (Gourguen Davtian).

- Structure Number 10 has two small rectangular platforms next to it, as was noted in previous reports (Braemer 2007).

Within this group of circular structures we can distinguish two subsets:

- Eastern Subset: the easternmost structures (Numbers 1 to 8) with an interior diameter reaching almost 5 m. Their walls consist of a single row of stones of irregular size and shape, where the largest blocks are up to 50 cm long.
- Western Subset: the westernmost structures (Numbers 9 to 11), whose interior diameter is nearer 4 m, and therefore smaller than in the other subset. Their walls are made up of more than one row of stones, and usually more than two and their heights can reach a maximum of 50 cm. The size and shape of the stones are smaller and more regular than in the eastern subset, and the stones are normally laid out in two lines.

Due to the destruction of these structures the archaeological layers were barely preserved, and reach a thicknesses of 10-15 cm in their interior. Outside, the basalt bed-rock is exposed, except in depressions in the rock surface, where accumulations of sediments can be seen. Over the whole surface of the basalt hills, archaeological remains are abundant, especially knapped lithic pieces, although these are distributed differentially. The largest accumulations are found inside the structures and in the depressions or other areas that conserve sediment. It is clear that this is a quite badly eroded surface, due to the combination of processes of aeolian erosion and surface wash. These processes have eroded the sediment in more exposed areas, transporting the archaeological remains and depositing them in the lower areas, which act as sedimentary basins or depocenters.

In the last two seasons (2009 and 2010), we have partially excavated three of these structures. In the selection of the structures to be excavated different criteria were taken into account; whether they belonged to one or other subset or any particular aspect could be seen in the internal structure of the built space:

- Structure 4, belonging to the Eastern Subset, with sediment inside it filling a depression in the basalt outflow. This depressed area exhibits a characteristic profile, in the form of steps, due to the type of fracturing in the surface of the basalt. It is possible that the structure was built in this place because of the depression, creating a similar kind of space to the typical Natufian sunken huts. However, we cannot rule out the possibility that the depression in the basalt was excavated deliberately, or it was enlarged, by removing the top layer of the rock, which has bedding planes facilitating that task.
- Structure 9, in the Western Subset, where a rectangle formed by lines of stones was visible in its interior, in the center of the circular space.
- Structure 10, in the Western Subset. This was chosen because its walls were seen to have collapsed inside it, which suggested that the interior levels of the circular structure might be relatively well-conserved. Additionally, this is the structure with the two small rectangular platforms next to it.

In all cases, the excavation and sampling strategy has been the same, with the excavation of the western half of the structure to understand the processes of building, maintenance and use. The following steps were taken:

- Detailed survey of the structure and the stones that form it.
- Documentation of the layers of stones belonging to the inner and outer collapse of the structure.
- Gathering (in 50 x 50 cm sectors) of the objects found on the surface and screening (dry, with a 5 mm mesh) of the surface layer.
- Excavation.
- Recording all objects found (lithic remains longer than 1.5 cm and all bones and charcoal pieces), taking their coordinates with the total station.
- Sampling: flotation (mesh size: 250 µm) of most of the sediment to collect botanical remains and sampling for phytolith analysis.

Throughout this process, vertical photographs were taken from an average height (5-6 m) and these were rectified and geo-referenced. Equally, the excavated stratigraphic units and the sections that were left, were documented with the total station in order to be able to reconstruct them in the laboratory as required (drawing sections, 3D reconstructions, etc.).

Circular Structure Number 4

Its interior diameters are 4.85 m (north-south axis) and 5.30 m (east-west axis). Around its perimeter we have located as many as seven holes in the basalt outflow, whose position concords *grosso modo* with the wall around the structure. These are holes made to remove blocks, following the bedding planes and fissures in the basalt rock, and were probably used to hold fixing elements related with the circular structure.

The excavation of the western side of the structure revealed how it had been built around a depression in the basalt outflow, which was in turn crossed by a fissure (Fig. 5). The deepest parts of the fissure had been filled with a bed of stones (Stratigraphic Unit 3: SU3) over a layer of clay (SU4) that had been brought to hold the stones (Fig. 6). These were quite similar in size (>25 cm) and had been placed vertically. In this way, the upper surface of this layer of stones was more or less at the same height as the surface of the basalt outflow. All this suggests that this bed of stones had been placed in order to level off the base of the circular structure. There is no doubt that this stone paving was laid down before the large blocks used for the perimeter of the structure were placed because, in the southern part of the excavated area, we have seen how some of the blocks in the perimeter wall rest directly upon the bed of stones.

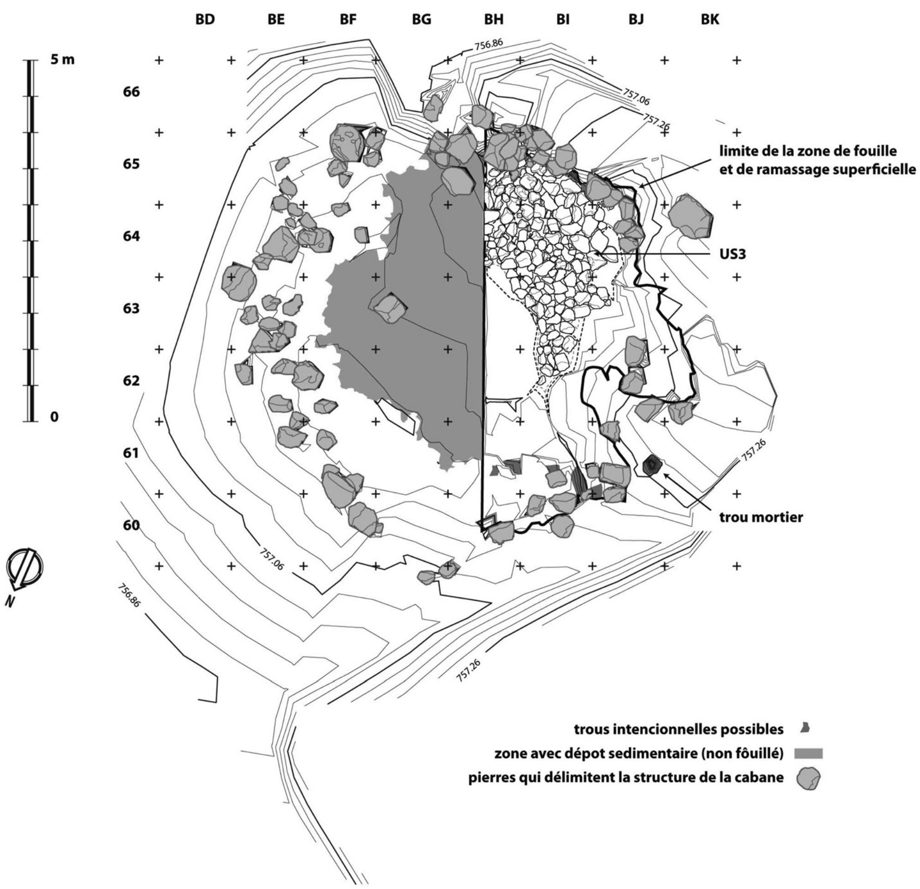
Over the entire leveled-out surface, the stratigraphic unit SU2 corresponded to the habitation level of the structure, and most of the archaeological remains were found in this level. In total, 421 remains were positioned with the total station. The vast majority of these are lithic objects, although some bone remains, charcoal and pottery fragments were collected. In general the material was highly fragmented, undoubtedly due to their prolonged exposure to the elements. Among the lithic objects we should mention the two cores with pyramidal cross-section and unipolar detachments of bladelets. The retouched artefacts include six lunates, five of which were shaped with abrupt retouch and the

Fig. 5. Circular structure 4 with the bed of stones on the right. N-S interior diameter: 4.85m.

other with simple bifacial Helwan retouch. The pottery sherds (16) were very fragmented and do not indicate an exact chronology.

In short, we have evidence of an area suitable for building the structure. It was first chosen due to a natural depression that was probably enlarged. At the same time the surface inside the structure was leveled by filling a natural fissure. A circular wall about 5 m in diameter was built around it. Posts to support the superstructure were placed around the wall in holes that were reshaped by using natural features in the rock.

Most of the archaeological material was recovered in stratigraphic unit 2, which corresponds to the floor formed when the structure was in use. However, a few isolated remains were also collected in stratigraphic units 3 and 4. These may have been introduced when the fissure was filled in, or at



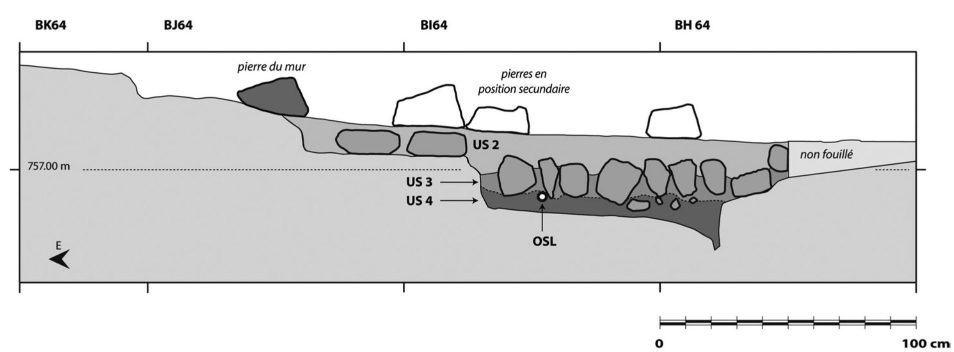


Fig. 6. Top view and section of circular structure 4 with their stratigraphic units.

some later time. A ^{14}C determination of a charcoal sample from stratigraphic unit 3 is 120 ± 40 BP (Beta-262292). A second determination for a charcoal fragment in SU4 produced the result of 110 ± 40 BP (Beta-267370). A bone fragment from SU3 sent for dating did not contain sufficient collagen. Dates of charcoal samples of under 200 years old are clearly too recent for the structures and the associated material and must be due to historical intrusions.

Circular Structure Number 9

The interior diameters of this structure are 3.70 m (north-south axis) and 3.90 m (east-west axis). After cleaning the surface soil the underlying stratigraphic units became evident. Unfortunately we found that the interior floor of this structure had practically disappeared and that its stratigraphic units were destroyed.

The evidence that could be seen included an internal structure located in the center of the circular structure. This consisted of a line of stones (SU5) that marked out a rectangular area measuring approximately 150 cm (east-west) by 125 cm (north-south). Its northern side had partly disappeared, and equally its fill, so that the basalt outflow appeared on the surface (Fig. 7).

The area between the rectangular space and the perimeter wall of the circular structure was filled with a layer of basalt stones (SU3) laid out evenly with their flattest face upwards. In this way they created a paved surface in the form of a bed of stones whose stable position was reached because they were embedded in a layer of clay (SU4) deposited previously (Fig. 7). The surface of this pavement was only disturbed by a post-hole 15 cm in diameter, near the perimeter wall.

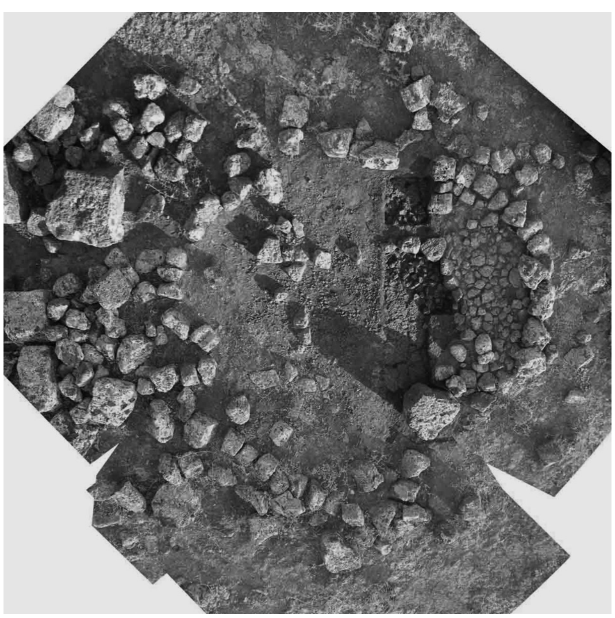


Fig. 7. Top view of circular structure 9. N-S interior diameter: 3.70m.

Below this sequence, on the southern side, in the area where the basalt outflow sloped away more steeply, a layer of clay and small basalt stones (SU6) were laid directly over the basalt in order to level out the surface, on which the central rectangular structure and the paved area between this and the perimeter wall were built.

This structure was so badly damaged that the excavation carried out has only yielded a small number of archaeological remains, and coordinates were only taken of 31 objects. As no pieces of charcoal were found, we attempted to obtain an absolute date for a gazelle bone, which, unfortunately, did not preserve enough collagen.

Circular Structure Number 10

Of the three circular structures excavated to date, Number 10 is the smallest, with interior diameters of 3.10 m (north-south axis) and 3.08 m (east-west axis). It is also the most circular in shape.

Our initial hypothesis, that the presence of collapsed walls would have preserved the interior floor of the structure, was partially confirmed. The stratigraphic unit corresponding to the interior collapse (SU2) was much thicker in the areas near the wall, and became steadily thinner until it was practically non-existent in the center of the circular structure.

From an architectural point of view, this structure is also the most complete one, taking into account the building phases that could be identified and the care taken in their formation.

This structure was built on the edge of the stepped morphology of the basalt outflow, where the area had to be prepared in order to level it. For this purpose, large blocks of basalt (SU11) were brought, over which a layer of clay and smaller stones were deposited (SU10), placing the flat surfaces of the stones upwards (Fig. 8).

The circular wall (SU9) was also built in two stages. First, larger and more heterogeneous stones were put in place. Next to these, on the interior face of the perimeter, smaller and more regular-shaped basalt blocks were placed. These blocks were laid carefully, always setting the flattest surface of the blocks towards the interior of the circular structure, in this way achieving a very homogeneous appearance.

The interior floor of the circular structure (SU3) was preserved unequally, depending on the extension of the interior collapse (SU2) of the perimeter wall. Thus, near the wall, the interior floor was thicker, nearly 20 cm thick, and it became steadily thinner towards the center, where it has practically disappeared. Most of the archaeological remains have been found in this layer, and coordinates were taken of 581 objects. Most of these are knapped lithic pieces, although bone remains and pottery have also been found (13). It may be noted that in general the material is much less fragmented and altered than the objects found in circular structures 4 and 9. The radiocarbon determination of a charcoal fragment found in SU3 has provided a result of 40 ± 30 BP (Beta-280907). A gazelle phalange from the same stratigraphic unit, with a tiny amount of collagen, was dated to 1730 ± 60 BP (Beta-280908). A burnt piece of flint, also recovered in SU3 was dated by TL, with a result of 13,335 ± 855 BP (MAD-5826BIN). The date of the charcoal is too recent, and this sample must be regarded as intrusive. The other two dates should be assessed in conjunction with the other samples found at Qarassa 3 (see Discussion).

In the center of the interior floor we documented a pit with an irregular shape (between quadrangular and circular, (SU4), about 50 cm wide and 20 cm deep, dug in the basalt outflow. The excavation of its fill (SU5) yielded hardly any archaeological remains. Its size rules out its interpretation as a posthole, and we are inclined to suppose it was used as a hearth. This deduction is based on the size, shape and position of the pit, since there was no clear sign of thermo-alteration on the basalt bedrock. The only other evidence was a larger number of charcoal fragments inside the pit than in SU3, although they were not abundant.

Another peculiar feature of structure Number 10 is the existence of two paved platforms, parallel to each other and positioned next to the southern side of the circular structure (Fig. 9). These platforms are rectangular in shape and more or less similar in size, although the westernmost one is slightly longer and narrower (3.8 x 1.6 m) than the eastern one (3.5 x 1.75 m). When the western platform was cleaned it could be seen that it had been built by filling in a perimeter wall (SU6), with a layer of clay (SU16) at the base and a layer of flat stones (SU7) on top. Both platforms were built over a foundation of stones (SU17). In the present state of research, it cannot be affirmed that both platforms are contemporary with the circular structure. On one hand, they are both lined along the axis of symmetry of the circular structure, so they could belong to the same architectural plan. On the other hand, the exterior collapse (SU8) of the walls of the circular structure covers the contact zone between both areas, and no clear link can be seen connecting both architectural features. They

Fig. 8. Circular structure 10 built on large blocks of basalt (SU11) by the edge of the basalt outflow. N-S interior diameter: 3.10m.

Fig. 9. Top view of circular structure 10.

may therefore belong to contemporary buildings, or to structures built in different phases. We hope that further excavations at this site will allow us to clarify this point.

The knapped lithic assemblage is based exclusively on flint. A preliminary study of the 2455 lithics recovered in SU3 (2343) and SU5 (112) has shown that the exploitation was aimed at obtaining flakes and bladelets. In the case of flake extraction, the cores exhibit unipolar working, which was frequently repeated by changing the position of the striking platforms until the cores took on the appearance of cubes, with the edges heavily abraded, a sign of the intensive exploitation of raw material.

Bladelets were detached carefully from conical-shaped cores, which exhibit specific actions to maintain the predetermination criteria that guide the exploitation. Together with this technique we report another, more opportunist and expedient exploitation, that has been observed as a way to obtain small series of bladelets from flake sides.

The significant number of microliths can be noted in the lithic assemblage. They include 31 lunates, most of which are fragmented, of which 16 were made with simple bifacial retouch (Helwan), and 15 by abrupt retouch. The remaining retouched products correspond to backed bladelets with inverse retouch, borers, and some endscrapers and burins. Some artefacts had been made from other raw materials, including basalt and bone tools - two small fragments of awls.

Our preliminary archeozoological study is based on the bones collected within the circular structure 10. The bones are generally poorly preserved: most of them are very small fragments (less than 20 mm in length), sometimes highly mineralised or cracked (weathering effect), and more than 30% are burnt. Among the 778 elements studied, only 168 were identified (Table 1). The assemblage includes at least twelve taxa: wolf or dog (*Canis* sp.), fox (*Vulpes* sp.), panther (*Panthera pardus*), pig (*Sus scrofa*), aurochs (*Bos primigenius*), wild goat (*Capra* sp.), gazelle (*Gazella* sp.), hare (*Lepus capensis*), mallard (*Anas platyrhynchos*), chukar partridge (*Alectoris chukar*), spur-thighed tortoise (*Testudo graeca*) and human. Gazelle and tortoise bones are the most frequent. The single human bone is a fragment of skull. In addition to an incomplete lower molar, the occurrence of a large canid (dog?) is also evidenced by some partially digested bones. A proximal radius of panther shows two traces of disarticulation below the elbow (Fig. 10). Bones of panther are very scarce in Near-Eastern prehistoric sites (see Dayan 1994) but this animal is particularly well known in the iconography of the PPN period (Gourichon *et al*. 2006; Helmer *et al*. 2004; Peters and Schmidt 2004). The cutmarks observed on the bone from Tell Qarassa 3 obviously testify the hunting and consumption of the panther at that time.

Despite the low number of identified specimens, the study indicates that the hunted fauna is relatively rich, including large as well as small game (birds, fox, hare and tortoise). The exploitation of such a large faunal spectrum, with a major contribution of gazelles in the diet, is a common pattern for most of the Epipaleolithic and PPNA sites in the Southern Levant (*e.g.* Stutz *et al*. 2009; Tchernov 1994). More faunal data are required now for addressing issues of seasonality and hunting practices at Qarassa 3.

The Rock-shelter

In 2007, a small platform was identified, next to the rock cliff (Figs. 3 and 4), 20 m to the west of the circular structures, with a high number of bones and lithic visible on the surface. *A priori*, its

Table 1. Faunal assemblage from circular structure 10 quantified in number of identifiable specimens (NISP)

Taxa		**NISP**
Homo sapiens	Man	1
Canis sp.	Dog or Wolf	1
Vulpes sp.	Fox	1
Panthera pardus	Leopard	1
Sus scrofa	Wild boar	4
Bos primigenius	Aurochs	7
Capra sp.	Wild goat	1
Ovis/Capra	Caprines	15
Gazella sp.	Gazelle	12
Lepus capensis	Hare	1
Anas platyrhynchos	Mallard	1
Alectoris chukar	Chukar Partridge	1
Testudo graeca	Spur-thighed Tortoise	74
Small ruminants		36
Large herbivores		6
Total NISP		**162**
Unidentified specimens		616
TOTAL		**778**
% burned bones		31.1