

Wadi Sharara: A PPNA Site at Wadi al Hasa Gorge, Jordan

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ABSTRACT

After a Bedouin's suggestion, we discovered a new Pre-Pottery Neolithic A (PPNA) site marked by the locals as Wadi Sharara. It is a hilltop that rises above a steep turn of the Wadi al-Hasa Gorge. The excavation of the Aegean University at the site took place in two periods in 2011 and 2012 and revealed seven loci at the top of a hill (Fig. 2), while two other constructions remained unclear, one of which was located far from the others in a strongly downhill area. The undisturbed layers yielded lithic and ground stone tools, human burials under the floors and archaeobotanical remains. Archaeological finds allow comparisons to be made with neighboring sites of the same period as el-Hemmeh, Drha' and ZAD 2, as well as with the sites of Jordan Valley. New radiocarbon dates from the site help complete the chronological framework in the southern Levant and in an area such as Jordan where PPNA sites are currently scarce.

Keywords: Pre-Pottery Neolithic A, burials, ground stone tools, material dating, Jordan.

INTRODUCTION

The Site

The access to the site from the Pre-Pottery Neolithic B (PPNB) site Wadi Hamarash 1, an extensive settlement excavated from 2008 to 2011 by the Aegean University (Sampson 2013), is very difficult and dangerous as there is no path today due to intense erosion; the route through the river was preferred for the first hour

as well as the ascent to the place for the rest 30 minutes. Observing the map (Fig. 1) we discover that, despite the fact that we are among mountains, the altitude of the place is almost at the level of -0 or a little more like that of Wadi Hamarash 1. Access to the place could also be done from the Jordanian plateau through mountain roads or even through the river which is passable most of the time except a few times during the winter when it overflows and becomes dangerous.

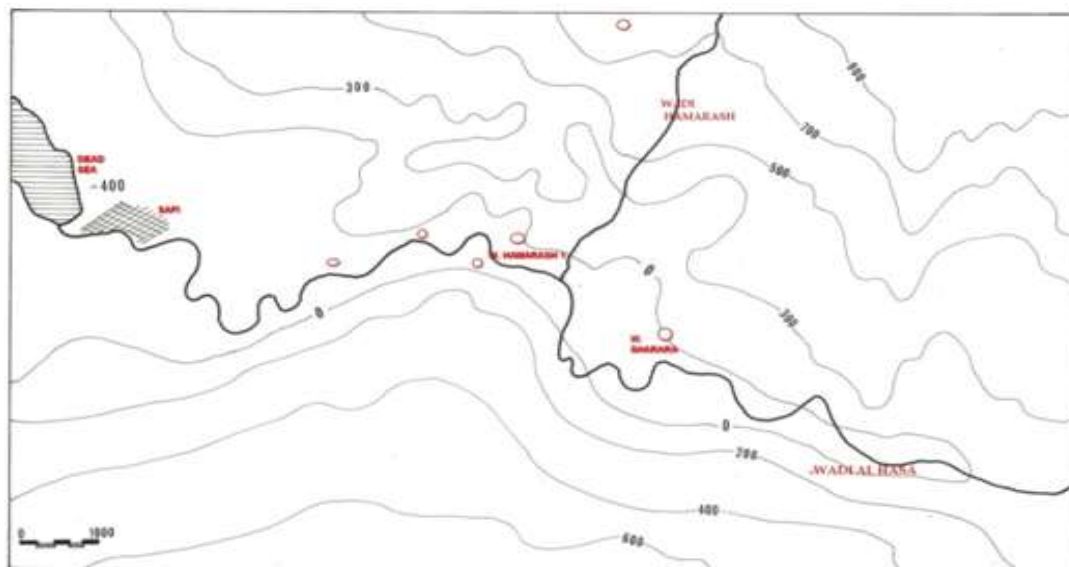


Figure1. Map of Wadi al Hasa area

From the smooth top of the WS there is a good view to the SW and the east while a large part of the river can be controlled from there. Importantly, although mountains generally north

and south of the river are bare of vegetation even during the winter, there is low vegetation in the area around the settlement, suitable for animal grazing.



Figure2. Air photo of Wadi Sharara site

Architecture and the Stratigraphy

Locus 1

It is a large round building (diam. 3.50m) built on the ground level of a small plateau (Fig. 3). The masonry consists of large boulders, and more small stones, while the northern side of the wall used upright large boulders. This is a fairly solid construction (Fig. 4), since the thickness of the walls is more than 0.50m. Before the excavation,

digging by looters had destroyed the sediments till the depth of 1.10m in most of the area of the structure, mainly at the W/SW side. Removing layers of 10 cm in the unspoiled part, we moved up to the depth of looting excavations. Into the sandy gray soil sporadically were located blades and flint artifacts. Proceeding deeper, the soil was getting darker. In spit 9 (0.80-0.90m) on the northeastern side of the area, several lithic artifacts and animal bones were found.

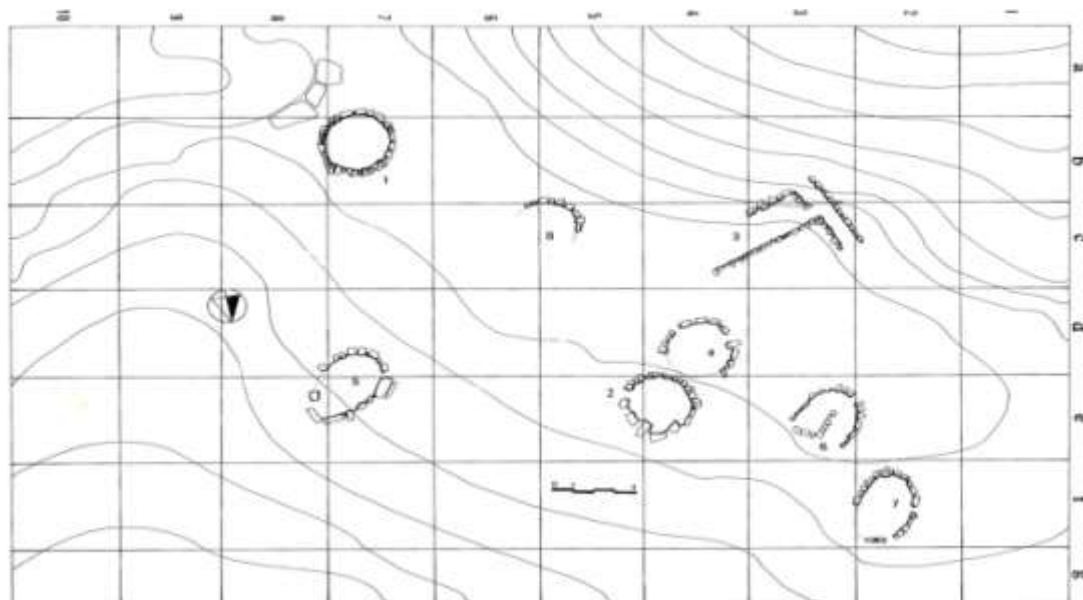


Figure3. The grid of the excavation



Figure4. Ground plan of locus 1

Spits 10 and 11 yielded animal bones, flint blades and two turquoise beads. In spit 12 (1.20m deep), a new hard floor in the color of yellow ocher was identified. The soil above the new floor was gray, while at the southern side of the structure a thick layer of ash was found. Under the second floor at the 13th and 14th spits, a gathering of human and animal bones was revealed.

Another floor appeared in spit 15 (1.45m) on the southern side of the locus while under this (1.55m depth) there was a gathering of damaged human and animal bones. Apart from the bones, stone tools (blades, flakes, points) were also unearthed. Loose soils with scattered human bones were up to the virgin soil at a depth of 2.00m.

Locus 2

The circular structure was found in a very different location than the previous as it was built on a slope so that the circular wall was destroyed and only two rows of stones were left on the top mainly in the western and southwestern side. While the remaining part of the structure is built with well hinged small stones, at the south and west side the wall was damaged. Since the beginning of the excavation, burnt soils appeared which continued until the last layer. At the northern side, by removing a huge rock, the area reached at this point the depth of 1.30m. At this depth the soil was like amber and in all spits were collected animal and human bone as well as two pestles; the human bones belong to an adult individual.

At the greater part of Locus 2, the excavation reached a depth of 1.90m (spit 19), while at the northern side reached 2.00m. At the last two spits were found two pestles, a stone axe and a stone object with incisions.

Rectangular Constructions (Locus 3)

Unusual for this period were the constructions at the top of the site in a sloping area facing the al-Hasa river and the impressive mountains to the south. Two thin walls (1, 2) composed of small stones formed an angle (Fig. 5). The wall 1 goes to the north approaching the circular locus 4, while the wall 2 is directed to the west. Another wall (3) to the same direction at the north along with the wall 2 seems to define a narrow path one meter wide. Another damaged wall (4) is built lower in the intense slope and probably served as a retaining wall. From a charcoal found nearby the wall 1 (depth 0.30m) came the date 9650±50 BP, the youngest one from the site.



Figure 5. Wadi Sharara. Rectangular structures

Locus 4

Locus 4 is adjacent and slightly higher than the structure 2. It has circular shape with a diameter of 3.05m. The masonry of large and small stones is preserved for the most part to the south, east and west sides, but does not proceed in depth. At a depth of 0.15m, lithic artifacts and a pestle were collected. From spit 3 (0.30-0.35m) appeared dark soil which continued until spit 15 (1.50m). In spit 9 (depth 0.90m) flint blades, animal and human bones, two pestles and a triangular grinder were found. In 13th spit (depth 1.25m) on a floor painted with ochre were found lithic artifacts, animal and human bones and a black oblong polished stone axe. From the same layer an early date (9850±50 BP) came up from charcoal.

Locus 5

Locus 5 is located north of locus 1, at a sloping area and next to a large upright rock (Fig. 6); it has elongated ellipsoid shape and a length of 4 meters. The peripheral wall for supporting the roof is damaged and at the east, south and west side there is only one row of stones. The soil from the higher layers until the spit 12 was very dark as in the other structures while the findings were fragments of flint artifacts and few animal bones. In spit 11, at the eastern part of the locus, human cranial bones and a tooth were found belonging to an adult person not older than 45 years old.

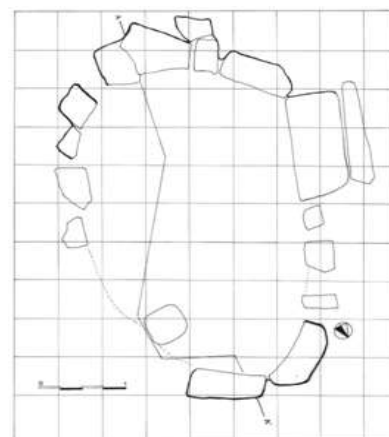


Figure 6. Ground plan of Locus 5

The entrance was at the northern side where a threshold was found. An ortholith was in situ by the entrance in the interior side of the locus resembling probably a human figure. The excavation reached the depth of 1.20m where the soft virgin rock was found. The small height of the locus 5 is due to the intense slope of the ground so that it was not rescued.

Locus 6

The structure was created at the top of the hill to a nearly level area (Fig. 3). The position at the top of the area was exposed to great erosion after millennia and now the trench appears shallow. It has an elliptical shape and is divided into two parts by a wall. On the eastern side at the end of spit 6 (0.60m depth) appeared a soft gray layer with many burnings which continued till the depth of 1.20m. Into this layer (spit 12) scattered cranial bones and teeth were collected. Within the same layer huge amount of carbonized figs was collected, whole and broken. From spit 7 a carbonized fig gave the date 9740±60 BP.

Locus 7

This structure had irregular oval shape (Fig. 7) and preserved in its three sides a wall in two rows which was resting on soil and a layer of clay (pisè). The shape is unusual and reminds the types of houses in Gilgal I (Noy 1989). An intact mortar was built on the eastern wall in a second use. Till the 10th spit the soil was soft without burnings. In spit 11 (1.05m) at the southern part of the structure, a floor of hard soil of light brown color appeared. Under the floor at the south end of the construction (spits 12, 13), a skeleton in crouching position and in good preservation appeared (burial 1).

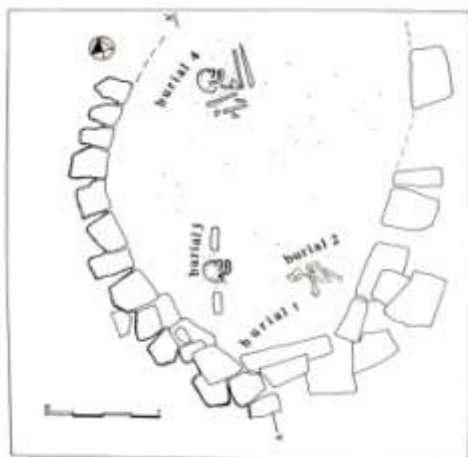


Figure7. Ground plan of locus 7

Shortly after burial 1 to the northeast, remains of scattered child burial (burial 2) were found and a

little further north at a depth of 1.30m between two standing stones, a human skull was unearthed (burial 3). From the layer of the burials 2 and 3 (spit 13), a piece of charcoal gave the earliest date of the site (9930±50 BP). Around the standing stones were found flint and quartz artifacts as well as an arrowhead of el-Khiam type.

A fourth burial in crouched position, with a stone vessel next to it, was at the northeastern side of the structure at a lower level (spit 14); the bones that belonged to an adult of 35 years old, were very loose and damaged, dismantled with the softest touch. At 1.45m depth, a second hard floor appeared in Locus 7. In 2012, digging by looters under the second floor revealed a fifth burial in the central part of the structure (depth 1.60m).

Constructing Features

Initially circular or ellipsoid structures in Sharara must have been dug up into the earth. The circular walls that served to support the timber roof did not reach until the original floor and often consisted of two or three rows of stone, except in the case of locus 1 of which the wall was relatively quite high. It seems that the site users applied a technique leaving at some point the walls of the trench a shoulder to place the peripheral wall (Fig. 8, 9) or in some cases put mud on the bottom (pisè) and placed on the walls as it happens in the similar semi-subterranean structures at el-Hemmeh (Makarevicz et al. 2006; Makarevicz and Rose 2011) where the excavators report the clay was fired to be more solid. In WS this layer of fired mud is not certified except Locus 1 where the difference in the color of clay is visible.

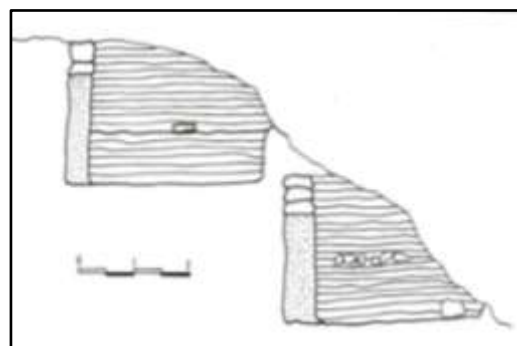


Figure8. Cross section of loci 2 and 4

The roofs of constructions would consist of wood, reeds and bundles of grass and would be water proved with clay layer which should be frequently maintained, as is customary in modern roofs with clay in Jordan or elsewhere (islands of the Aegean Sea). In the case of locus 1 we note that the circular wall is higher and starts at a certain depth. It is certain that the occupants of Locus 1 had a different status from the rest if you count the fact

that the structure is not created on slope areas as the other, but on the flat surface. In Locus 1 the walls are better built consisting of large stones, some of which are carved. In the case of Locus 1 that had depth of at least 2 m., it would not be a problem to access it and it could only be done with stairs as there was not a ramp, as is customary in underground houses in Wadi Faynan16 (Finlayson and Mithen, 2007). In other constructions of Wadi Sharara located on a slope, it was easy to create the entrance on the lower level of the downhill shaping the space around it with stones.

If the settlement was abandoned for a long time it would take a lot of effort to make the loci habitable. Considering that the climate in PPNA was dry and warm, the settlement must have often been abandoned and the occupants should seek more appropriate places for habitation. Probably there were periods of drought when the river below the settlement may occasionally have dried or have little water.

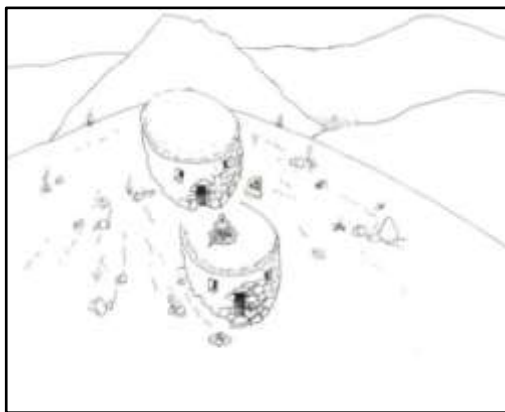


Figure9. Probable reconstruction of loci 2 and 4

The type of structure in Sharara presents varieties. The round structure 1 is a rare case while the loci 2 and 4 present the round shape but their position in the northern slope of the area prevents them to have the same symmetry as structure 1. The other loci had irregular ellipsoid shapes. Some regular ellipsoid houses occur in the PPNA site Netiv Hagdud (Bar Yosef and Gopher, 1997, fig. 3.13, 3.15). In Dhra' (Kuijt, 2001; Goodale et al. 2002) similar round or ellipsoid structures have been found on a sloping area but their walls were very thin, incapable of supporting a substantial roof, although at least one structure appears to have been surrounded by a ring of posts, potentially serving as a roof support.

In Sharara, our first simple interpretation for the architecture of the site was to characterize the structures as households (Düring and Marciniak, 2006) of a primitive community of hunters-foragers in a transitional stage towards an early

sedentary way of life. However, even if few structures have been excavated so far, there is an emerging evidence for considerable architectural complexity and that structures are constructed for a range of diverse primary purposes other than simple domestic shelters as shown in WadiFaynan16 (Finlayson et al 2011).

During the excavations at Dhra' (Goodale et al. 2002) a number of structures were identified which had in at least some phases of their use floors suspended above the ground on wooden beams resting on upright, notched stones (Kuijt and Finlayson, 2009). These are argued to be storage buildings, possibly granaries developed to store harvests of wild or cultivated barley. In the most recent excavations at WF16, similar notched stones have been identified (Mithen *et al.*, 2011, 34; Finlayson, 2009; Kuijt and Finlayson, 2009). One building was just emerging through a later floor but aligned in a similar fashion to those at Dhra' (Structure O12), while in one large structure (Structure O45) the notched stones seem to indicate the presence of radial supports around a central internal lightweight pisé structure. The most probable interpretation for this is that it represents a storage building.

At Sharara, the loci vary architecturally in terms of size and shape. The largest building 1 differs from the others, while the usual type is the structure dug on slope similar to the third type of structure found at Dhra'. Locus 6, however, constitutes a third architectural type created on the top of the site in a flat area; its small size, the presence of a wall into the structure and the thick layer of carbonized fruits offer enough evidence to characterize this as a storage building. We have to accept that in PPNA, as in the Natufian period, the need for the storage of cereals of other kind of foods was urgent, regardless of whether the small camp sites were permanent or short-lived.

Comments on the Human Skeletal Material and Burial Customs

It is observed that in all constructions there were anthropological remains, most of which are observed in Locus 1 and 7. Only one burial was found in each of the other constructions. In general, burials are carried out under the floors as it is usual for this period in the Near East, the Aegean and elsewhere. Two intact burials were only found in Locus 7 (Fig. 10), while the rest were scattered and incomplete. The bones are generally few and because of their exposure to high temperatures it is doubtful whether they contain collagen. In only one case (Locus 7, burial 3) there is a secondary burial with a single

skull, indicating that probably some scattered burials in the other loci were secondary burials.

Of the 13 dead, all are adults, with the exception of a 7-year-old child in Locus 7; gender cannot be accurately determined. Most adults are around 30-35 years old and only two are over 40-45 years old. As for pathological findings in most adults, intense abrasions have been observed in the teeth justified by chewing hard foods and the use of teeth as tools. In only one person, 35 years old, osteoarthritis problems have been found.



Figure 10. The skeleton 1 in locus 7

Symbolic Places

The burials beneath the floors are a general rule in PPNA involving the element of symbolism. This custom continues on a long tradition since the Natufians and in the Near East stops in PPNB when new habits were adopted for burying the dead in places outside the settlement and coverage of the skulls with mortar, asphalt and stone masks. In Wadi Sharara, whole skeletons in crouching posture or even skeletal parts were placed under successive floors. Almost in all structures, except Locus 7, skeletal findings were few and scattered. In locus 7, four skeletons at the same level would not be of particular interest if they were not related to the two standing stones which could have as strong symbolic meaning, forming a curve at the upper part depicting bull's horns.

Their resemblance to similar upright stones in an oval building in Dhra' PPNA settlement (Kuijt, 2001), in which these stones were used to support beams of the floor, initially led to thoughts for a utilitarian function. However, the two stones that are not symmetrically placed could not have similar usefulness and should lead to some unknown symbolic practices. Similar upright stones were also found at the PPNA site at Wadi Faynan 16 (Finlayson and Mithen, 2007) in a structure used as store.

Moreover, next to one upright stone was found a bulky and heavy stone tool (pestle) with large dimensions (diam. of base 0.14 m.) bearing coarse

pecking. The very big and heavy stone tool would be difficult to be used and probably had a symbolic significance. Similar giant pestles are reported in Netiv Hagdud (Bar Yosef and Goffer, 1997, fig. 5, 2). The concentration of burials in Locus 7, the peculiar shape of its ground plan and the presence of the upright stones create reflections on the area's use, which probably was not a residence area and served some ritual uses. However, Banning (2003) suggests that symbolically charged structures could also be domestic spaces. In Syria, at Mureybet and Jerf el-Ahmar, the large circular buildings with internal divisions initially were interpreted as domestic spaces, but recently reinterpreted by Stordeur (2001) as communal buildings. At both sites, there is a wide range of architecture in scale and form, and we can assume that these structures served different functions. At Dhra' and Wadi Faynan 16 it seems clear that not every structure served a residential purpose.

The connection between domestic space, sedentism and economy is made clear by Schmidt's assertion (2001) that the makers of Göbekli Tepe were nomadic hunter-gatherers who used it as a periodic sacred site. However, Banning (2003) suggests that the large houses may have been residences, but not for small families, rather for larger co-residential groups of sedentary Neolithic villagers.

Other symbolic items in Sharara could be the two oblong stones found in Locus 4 and in the constructions of Locus 3. Both stones are curved and end up at the top with oblique ends. The upright stone found in front of the symbolic building in Wadi Hamarash 1 has the same shape and finish (Sampson, 2013, pl. 11b) though it is dated to the PPNB. Generally, standing stones of unknown use occur in dwellings of the Neolithic period. In the Black Desert, 100 km ESE of Azraq, where hundreds of structures of the Late Neolithic have been surveyed (Rollefson et al. 2011), in one of them a pillar was found.



Figure 11. Flat stone with cup marks

Also the flat stone with cup marks (Fig. 11) found in parts in a distance from the settlement of Wadi Sharara and by the path leading to it, has a resemblance with the game boards found in Wadi Hamarash1 (Sampson,2013, fig. 8). Objects like this, apart from their use as games would have symbolic meanings. Similar cup marks on bedrock are reported in PPNA settlement Tzur Natan in Central Israel (Marder et al. 2007, fig. 3). Cup marks on bedrock were found recently in the Final Epipalaeolithic / PPNA site Huzuq Musa in the Jordan valley (Nadel and Rosenberg, 2010, fig. 7) while cup marks and incisions have been also found in PPNA site Tell Basequet at the region Ayalon in Israel (Paz et al. 2009).

Another symbolic item would be the curved stone found by the entrance of Locus 5 resembling a human figure (Fig. 12). The "sculpture" found in situ should have an unknown significance for the occupants of the locus. A possible anthropomorphic standing stone in the interior of a round structure of Late Neolithic at Wisad Pools (Rollefson et al. 2011, fig. 5).



Figure12. Locus 5. Anthropomorphic stone by the entrance

The Finds

Ground Stone Tools

Typical tools called «mortars with cup marks» or «mortars with cup holes» appear on the site in abundance (Fig. 13). The huge amount of cup-hole mortars at the settlement leads to other interpretations about the economy of the time and the use of the structures. Mostly, a great number of tools were found around the structures as in Wadi Faynan 16 (Finlayson and Mithen, 2007, 147, fig. 6: 4, 11: 7).



Figure13. Wadi Sharara. Mortar with cup marks

At Dhra' the mortars with cup holes (Goodale et al. 2002) are found into the structures or around of them like in WS. At ZAD 2 the same type of mortars occurs (Edwards, 2002, fig. 3, mortar with four cup holes; Edwards et al. 2011). Many mortars were collected from the surface of the site before the excavation. Usually in PPNA Hatoula the mortars have only one cavity (Chevallier, M. and Ronen, A. 1994, fig. 3, 4). In Gilgal I (Noy, 1979, fig.2-6) and Netiv Hagdud (Bar-Yosef et al. 1991, fig. 10) there are three or more cup holes and resemble those in Wadi Sharara. At Gesher (Paléorient 1989, pl. I, 2) there are also cup holes as in WS. At Abu Salem in Negev mortars with cup holes are present in the interior of houses and are usually colored with ochre (Marks and Scott, 1976, fig. 11).



Figure14. Pestle from basalt

Another typical tool that does not exist in other phases of the Neolithic is the pestle (Fig. 14). The standardized tool is usually selected to be from basalt, a very nasty volcanic material which does not readily become smooth and it preserves a very rough surface except its active end. However, there are few tools from white limestone. In Dhra' the pestles are also made from basalt and limestone (Kuijt, 2001, fig. 8). In Wadi Sharara tools are more standardized, generally conical in shape with great height, but

some of them are flattened at the base. Less are the short conical items from basalt or soft limestone as those of type G in Jericho (Dorrell, 1983, fig. 221:7). In Netiv Hagdud (Bar Yosef and Gopher, 1997, fig. 5, 1-2) cylindrical and slightly conical pestles have been found. Some of them are over 20-25 cm long and were found in deep parts of the excavation. Cylindrical or conical pestles were found in Wadi Faynan 16 (Shaffrey, 2007, 327, fig. 11.1, 11.2).

In the new PPNA site Bir el-Maksur in Israel (Malinsky-Buller, 2009, fig. 6) pestles and grinders were found adjacent to a burial and the excavators suggest that they served as burial offerings. It is probable that some of those items had a symbolic meaning, especially those of big size like the huge pestle found by the skeleton in locus 7.

A rare stone object from granite was found in locus 5 bearing along deep groove (Fig. 15); this item can be characterized as a *schaftstraightner*. In PPNA period of the Levant there is a larger distribution as they occur in several sites. Similar grooved stones are reported in Wadi Faynan 16 where the grooves have convex straight profile (Shaffrey, 2007). Similar items for the smoothing of arrow have been found in Gilgal I (Samzun, 1994, fig. 13g), while in Jericho seven grooved stones are dated to the PPNB (Dorrell, 1983, fig. 226), if we accept that was not a contamination in the layers. In Netiv Hagdud (Bar Yosef and Gopher, 1997, fig. 5.9, 5.10) 20 similar items are made mostly of basalt and limestone too.



Figure 15. Stone *schaftstraightner*

In Anatolia at Cayonü similar objects had traces of burning (Davis, 1982) and according to Cosner (1951, 147, 148) the fire served in their use as *schaftstraightners*. In the Northern Aegean two items have been found in Cyclops

Cave (Sampson, 2008) in Lower Mesolithic layers (mid 9th mill. BC), a period that arcs and bows were in use for hunting.

Skilled artisans could be the ones who made the stone vessels, some of which have a fine appearance and thin walls. Some of them were found into the structures, while most of them were collected around them. They are usually shallow open vessels with a large diameter. They are usually made of sandstone or marble limestone.

Lithic Industry

As for the lithic industry a sample of 1849 artifacts was analytically and completely studied and described extensively by Dr. C. Matzanas.

The morphotechnical characteristics of these tools were analyzed and codified for further statistic treatment. Namely 146 representative objects of this material were drawn.

In general terms, the debitage of Wadi Sharara concerns a very privileged raw material that is available in the form both of nodules as well as pebbles of mainly chestnut color flint of very good quality. During this very early period (middle of 10th millennium BC, there isn't yet a concrete strategy or process of shaping out and preparation of the core before the final debitage, with exception of the usual decortication of the rock through blades knapped from the striking platform (cf#49). The debitage of the blades is held after the previous elimination of the overhang with direct micro-removals consorted by mild abrasion. The technique of debitage is the direct percussion, usually by stone hammer, but also in some cases by a soft hammer (wood, bone or antler), if we judge by the frequent absence of the bulb scar and a presence of a lip on the intersection between the butt and the lower (ventral) face or flaking face of the blade (cf#54). In some cases of bigger blades is eventually used hard or semi-hard hammer, sometimes worn-out, resulting the creation of a cone, in some cases double (cf#50).

Archaeobotanical Remains

An assemblage of carbonized seeds was studied analytically by the PhD cand. Aggeliki Karathanou. The preliminary results show that the settlement must have been inhabited throughout the year, as indicated by the flowering time of the plants attested. An indirect clue supporting this hypothesis is provided by the charred droppings included in the assemblage. Though micro faunal remains have not been retrieved from the heavy residues yet, the droppings, presumably of rodents,

could suggest the occurrence of commensals at the site, such as the house mouse and the rat.



Figure 16. Seeds of the Asteraceae family from Locus 6

Though preliminary, the study of the charred macrobotanical remains from Wadi Sharara demonstrates that the inhabitants of the site exploited a broad spectrum of plants, which later on developed in the renowned staple crops: barley, glume wheat, lentils, bitter vetch and figs. Whether they were harvested from cultivated plots cannot be proved, yet it is not unlikely. Figs, possibly propagated, were certainly highly appreciated for their calories and nutritional value. Other wild plants found at Wadi Sharara could have been also used either for supplementing the inhabitants' dietary needs or due to their medicinal, aromatic/flavoring properties, though some could also represent cultivation weeds. Further analysis of the material retrieved from the heavy residues of the samples studied so far, will possibly help to cast more light on the various aspects of plant uses in this early Pre-Pottery Neolithic settlement.

CHRONOLOGY AND DISCUSSION

Generally, the PPNA sites are few in Jordan and all belong to the early phase of the period except Zahratadh-Dhra and el Hemmeh, which are the key sites in this case. A well excavated site is Wadi Faynan16 (Finlayson and Mithen, 2007) which gave early dates such as 10220±60, 9890±50 and later (9690±50, 9420±50 and 9400±60 BP). The site Dhra' (Kuijt, 2001) is dated to an early phase of PPNA. Three dates are around 10000 BP, five around 9900-9800 and three more around 9600. The characteristics of the site and the dates commit to the Sultanian phase (Garfinkel and Nadel, 1989).

Contemporaneous with Dhra' seems to be the site Wadi Sharara. Four radiocarbon dates from the site (9930±50 or 9552-9284 BC, 9850±50 or 9413-9241 BC, 9740± 60 or 9312-9121 BC and 9650± 50 BP or 9250-9111 BC) place the site to the early part of the PPNA period, contemporaneous to a large extent with Dhra' and WF 16.

If we ignore expected errors at the above ages, the chronologies show that the at three older PPNA sites of Jordan occur higher and lower dates, so occupation could last for some centuries, though it may not be continuous. Greater occupancy is indicated by the dates from WadiFaynan 16 where younger ages are observed around 9400 BP. The presence or absence in Jordan's five PPNA sites of typical lithic types found in known Jordan Valley PPNA sites may not be a determinant of their cultural and chronological placement, while the long-standing debate over whether to attribute a site to the Sultanian or Khiamian cultural phase makes no sense as there is a great deal of confusion among researchers about the chronology.

In order to determine the presence or absence of the Early Pre-pottery Neolithic B (EPPNB) in the southern Levant we need to find how low the PPNA is dated in the same area. The excavation of the PPNA site at Zahratadh-Dhra (ZAD 2) showed that the settlement had a short duration after the abandonment of neighbor site of Dhra', while there were no findings of earlier or later date. Radiocarbon samples gave determinations of ca. 9500 BP and a calibrated date range of 9150-8550 BC. So ZAD 2 is the latest PPNA site in Jordan (Kuijt, 2001) dated in the late PPNA (9500-9300 BP), probably at its end (9300 BP). The absence of microliths cannot support a Khiamian phase of occupation. We could say that the PPNA site el-Hemmeh (Makarevicz and Rose, 2011) in Wadi al-Hasa area belongs to the late part of the period and is contemporaneous with ZAD 2 judging from the unique radiocarbon date of 9450±60 BP (9120-8570 BC) which may however be random and not represent the time range of the site, as the architecture and findings appear to be similar to those of Wadi Sharara.

Ian Kuijt (2001) argues that the PPNA goes down and covers the gap that is the Early PPNB, concluding that in the southern Levant there was no gap between the PPNA (ZAD 2) and PPNB (Pre-Pottery Neolithic B). Therefore, it seems reasonable and is in accordance with the chronology of the direct transition from the PPNA to MPPNB so the introduction of PPNB culture in the southern Levant happened at the end of the 10th mill BP.

The Middle PPNB or better Early PPNB is estimated to have begun since 9200 BP or a little later. In Ghweir 1 which is included to the Middle PPNB (Najjar, 2001) the dates start from 9000 BP covering the gap from PPNA to PPNB. In ShakarathMazyad (Jensen et al. 2005), where

“Helwan points” also occur, the oldest dates are 8997±60, 8880±80 BP approaching those of Ghweir 1. In Beidha (Kirkbride 1966) the dates are not calibrated, however the site stylistically belongs to the early part of PPNB. The dates of the Wadi Hamarash 1 (Sampson 2013) that coincide between 8700-8650 BP are somewhat younger, yet they belong to the early PPNB.

From different layers of the excavation in Wadi Hamarash 1 came several “Helwan points” and in loci 2 and 18 of Area I were found two atypical el-Khiam points, dated probably at the end of the PPNA. In northern Israel in Carmel and the Mediterranean coast there is another early PPNB unity dated in the second part of 8th millennium BC. In southern Israel in the central highlands of the Negev and in areas with sand dunes in the western Negev there is another early unity starting in the middle of the 8th millennium BC lasting until its end. Finally, if in the southern Levant the “EPPNB” does not exist indeed, the sites Wadi Hamarash 1, es-Sifiya and Ghweir 1 are the successors of the PPNA in southern Jordan. Therefore, the tripartite division of PPNB should be changed in southern Levant to a bipartite one with two phases, early and late.

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