

HARRAT JUHAYRAH 205 AND 202: EXCAVATIONS AT A PPNA ENCAMPMENT AND AN EARLY PPNB SETTLEMENT IN THE AL JAFR BASIN, SOUTHERN JORDAN

Sumio Fujii, Takuro Adachi and Kazuyoshi Nagaya

Introduction

Our long-term research project (*JBPP*: the Jafr Basin Prehistoric Project) started in 1997 with a view to tracing the process of pastoral nomadization in the arid periphery of the southern Levant. Since then, we have investigated more than a dozen archaeological sites varying in date and character. The series of research outcomes was synthesized in the form of the *Al Jafr chronology* (Fujii 2013), which has enabled us to outline the key episodes in a sequential way. However, available datasets are still patchy, and many issues remain to be discussed.

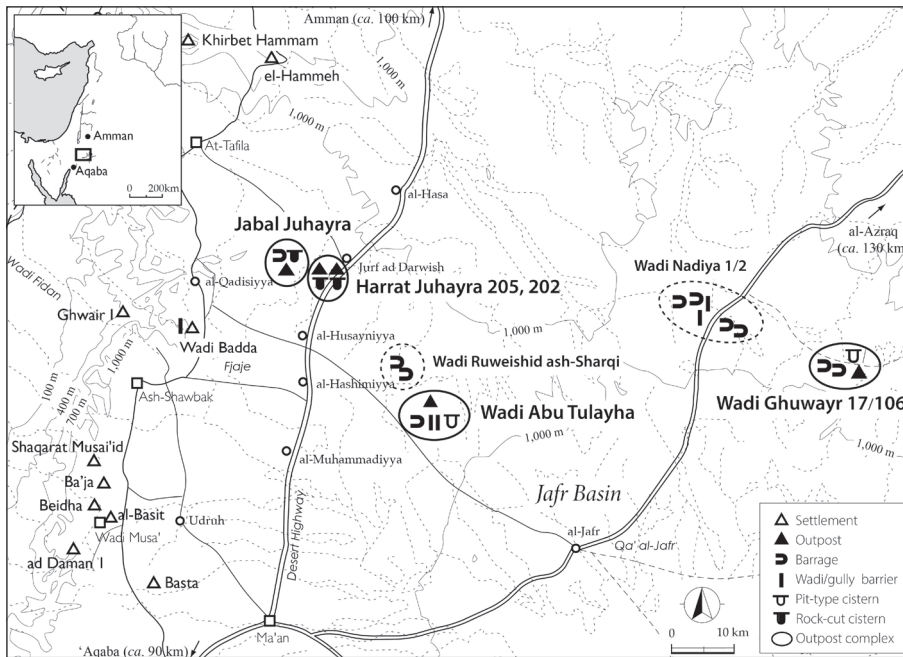
The project has entered Phase 5 since March 2014. The primary goal of the current phase is to increase the precision of the Al Jafr chronology and, by so doing, provide further insights into our main research issue. We selected several sites toward this goal. The four Chalcolithic burial fields, Harrat Juhayra 1-4, are the third target following the Early Bronze Age burial fields of Tor Ghuwayr 1-3 excavated in 2014 (Fujii, Adachi, Yamafuji *et al.* 2014) and the stratified Pre-Pottery Neolithic B (hereafter PPNB) rockshelter settlement of Jabal Juhayra successively excavated from 2014 till 2016 (Fujii 2015, 2017; Fujii, Adachi and Nagaya 2018, 2021). The sites were first located during our preliminary survey in 2003 and registered in more detail in the second and third surveys resumed in 2015. The excavations at the extensive burial fields started in June 2016, immediately following the final operations at Jabal Juhayra, and are still in progress. This report briefly summarizes the research

outcomes from two small Neolithic settlements nested in the Chalcolithic burial field of Harrat Juhayra 2.

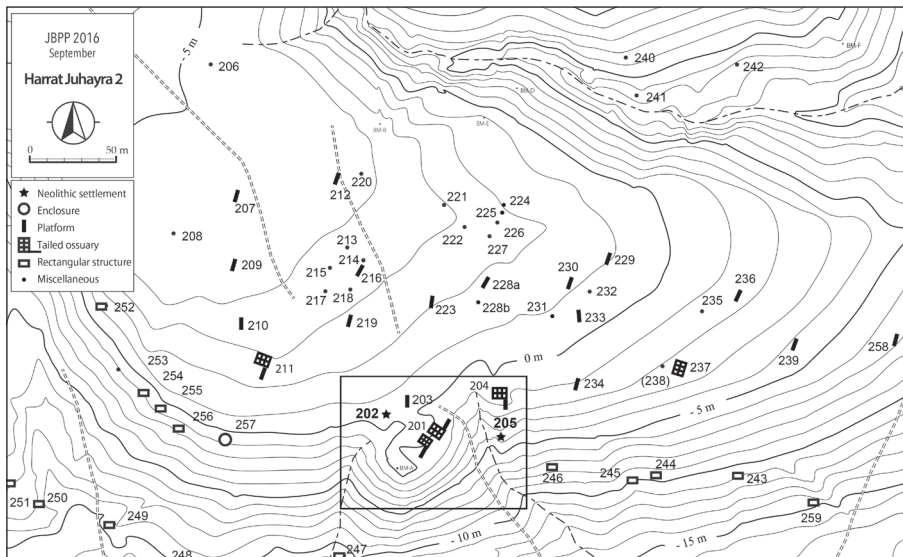
The Sites and Site-Setting

Harrat Juhayra is a collective term for basalt foothills around Jabal Juhayra, an isolated volcanic hill *ca.* 7km west of Jurf Ad Darāwīsh (**Fig. 1**). Our surveys located four concentration areas of stone-built features on the largest foothill that stretches toward the Desert Highway. We designated them as Harrat Juhayra 1-4 respectively and recorded the exposed features one-by-one as HJH-201 (*i.e.* Feature/Locality 01 in Harrat Juhayra 2), for example. The subsequent full-scale investigations have proved that most of them are Chalcolithic dwellings or funerary features (Fujii *et al.* in this volume). Few exceptions to this were HJH-205 and -202 nested in HJH-2, both of which turned out to be small-scale Neolithic encampments or settlements (**Figs. 2, 3**). It is for this reason why we deal with them separately from the others.

In terms of topography, both sites are located at the southeastern corner of the basalt foothill, overlooking the drainage basin of Wādī Quṣayr and beyond (see **Fig. 4**). This small drainage basin appears to have been rich in water supply in prehistoric times, encompassing a variety of sites including the Late Natufian settlement of Wādī Quṣayr 139 (Fujii 2005a: 42-44) also called Wādī Juhayra (Neerly and Delage 2004), the PPNB rockshelter settlement of Jabal Juhayra, the PPNB/Late Neolithic open sanctuary of Harrat al-Juhayra (Fujii 2005b), and the



1. *Hurrat Juhayrah 205 and 202: site location.*



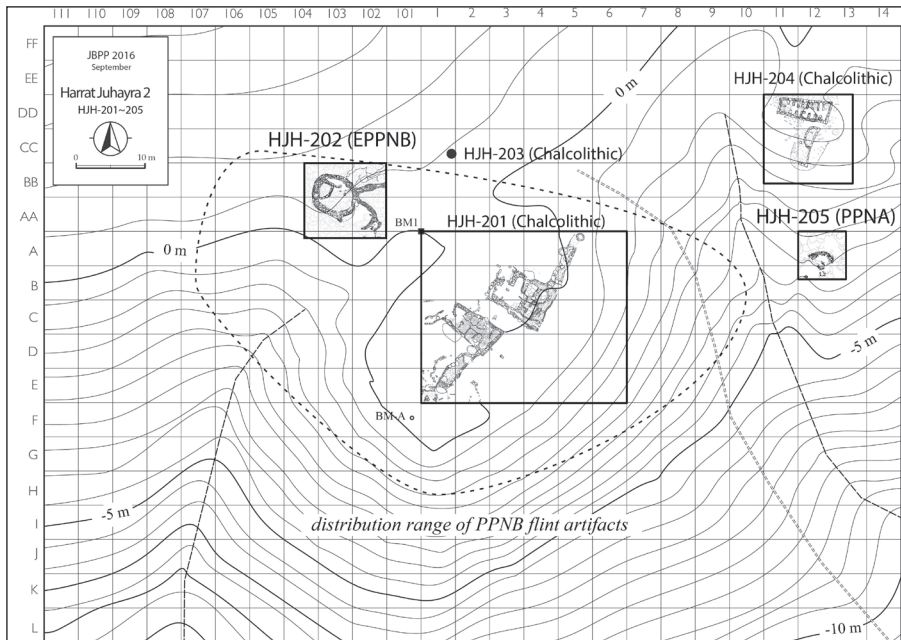
2. *Hurrat Juhayrah 2: feature distribution map (as of September 2016).*

Early Bronze Age tabular scraper lost property site of Wādī Quṣayr 173 (Fujii 2011). The site location of HJH-205 and -202, our main concern, can also be understood in this context.

The Excavations

The excavations took place using an arbitrary benchmark (N: 30.38.51.24; E: 035.49.09.17; Elevation: ca. 1087m) set up a flat terrain between the two sites. Though varying to some extent depending on *loci*, the general site stratigraphy can be summarized as follows: Layer 1 (or the surface layer covered with basalt cobbles and pebbles) is ca. 5-10cm thick and consists of light buff, relatively loose, silty sand deposits;

Layer 2 (ca. 10-20cm thick) contains light brown, relatively compact silty sand deposits including numerous basalt cobbles and pebbles; Layer 3 (ca. 10-50cm thick) is composed of light to grayish brown, somewhat loose deposits including fine-grained basalt pebbles; and Layer 4 (ca. 5-20cm thick) represents very compact, blackish weathered soil of the underlying basalt bedrock layer (Layer 5). The two sites were equally based on Layer 4 or 5 and buried with the Layers 3-1 deposits. Incidentally, excavated soil was not sieved due to time constraints, but several dozen litters of floor deposits and hearth contents are kept aside in our local storage for future archaeo-botanical analysis.



3. *Harrat Juhayrah 201-205: contour map.*

Harrat Juhayrah 205: PPNA Encampment

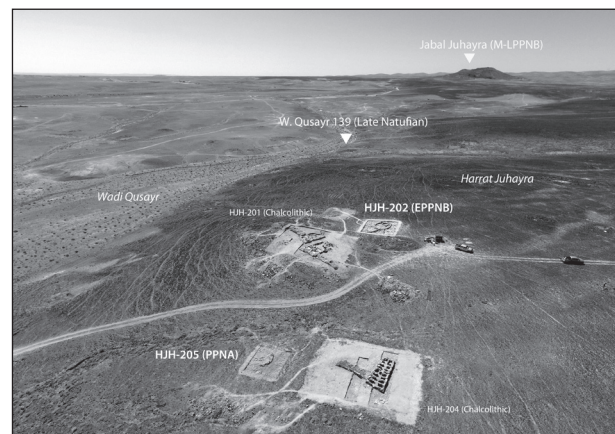
Harrat Juhayrah 205 or HJH-205 is located near the upper edge of a gentle slope that fringes the southeastern corner of the basalt foothill. This site is very small in scale (*ca.* 0.01ha), consisting of a windbreak-like masonry wall and several small features only.

Structural Remains

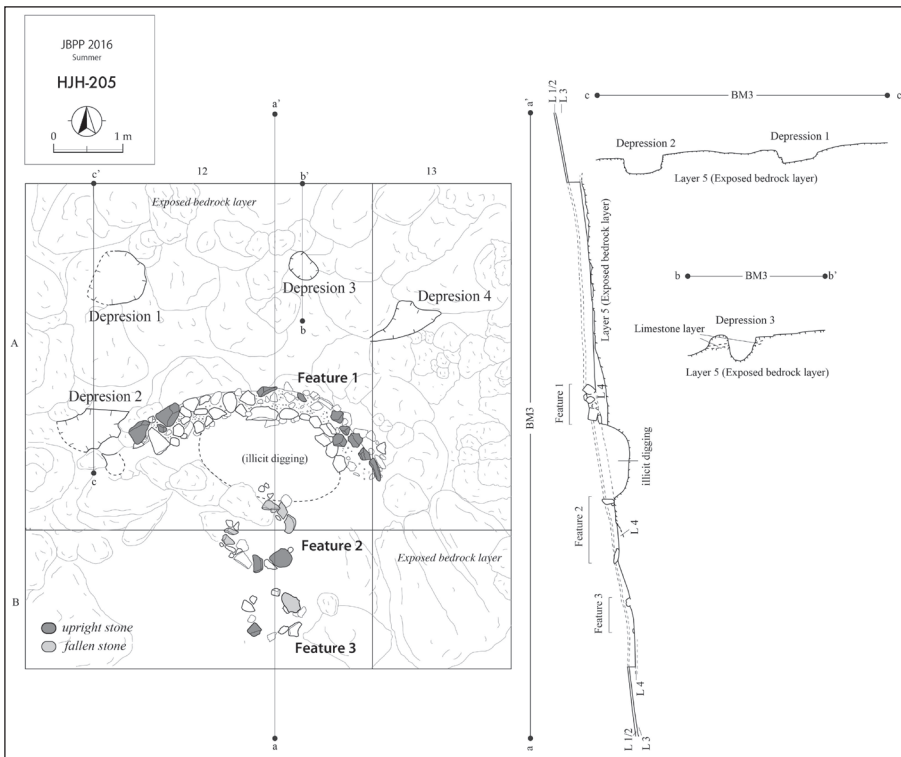
When we first located the site, a short, intermittent stone alignment was slightly exposed on the ground surface covered with basalt cobbles and pebbles. The excavation revealed a curvilinear, south-opening masonry wall *ca.* 4m in total length, *ca.* 0.3-0.5m wide, and up to *ca.* 0.4m in preserved height (**Figs. 5-6**). In terms of technology, the wall was constructed using a double-faced, rubble-core masonry technique, using clay mortar and at the same time, reinforced by a low facing wall attached to its southern, lower-in-elevation side. Undressed basalt cobbles *ca.* 10-30cm long were used as major construction materials, most of which, especially those of the foundation course, were put (or originally put) in an upright position. This simple feature was probably used as a windbreak wall against the predominant northwesterly wind typical to the Al Jafr basin (Fujii 2014b: 107-112). Two stone circles *ca.* 0.7-1.0m in outer diameter, probably hearths, were found in front of the feature.

Additionally, four small depressions (De-

pressions 1-4) measuring *ca.* 0.5-1m long and *ca.* 0.2-0.5m deep were confirmed behind the windbreak wall (**Fig. 7**). Among others, Depressions 3 and 4 vertically dug through an intrusive limestone sub-layer included in Layer 5, suggesting the possibility that they were semi-anthropogenic water-catchment facilities belonging to the windbreak-like feature. Suggestive in this regard is the existence of a more substantial, rock-cut cistern at the neighboring Early PPNB settlement of HJH-202, which was also located behind living space and constructed taking advantage of a natural depression on the exposed bedrock layer. Such a water-catchment system is characteristic of the Al Jafr Neolithic (Fujii 2010b, 2013), and the primitive examples attested at HJH-205 and -202 can probably be regarded as its forerunners or prototypes.



4. *Harrat Juhayrah 201-205: aerial view (looking W).*



5. *Harrat Juhayrah 205: plan and section/elevations.*

Small Finds

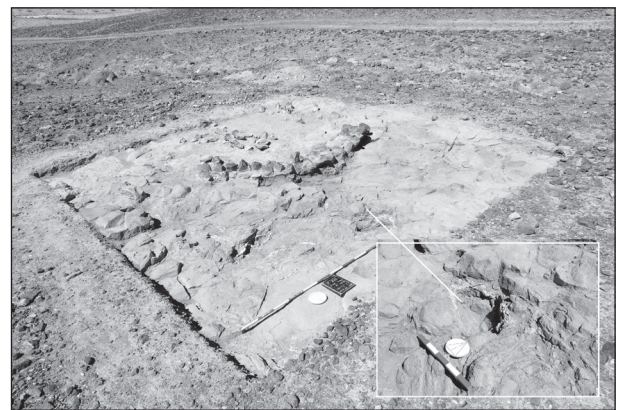
The complex yielded some seven thousands chipped flint artifacts and several grinding tools made of basalt. No other categories of artifacts were included. The scarcity of artifact variety, coupled with the small site size, is suggestive of the involvement of a small-scale, high-mobility population group.

The chipped flint assemblage occurred mostly around the semi-anthropogenic pools. The concentration of flint artifacts around a water-catchment facility has been confirmed at HJH-202 mentioned below as well, suggesting that Neolithic flint-knappers in the Al Jafr basin preferred a waterside as their workshop.

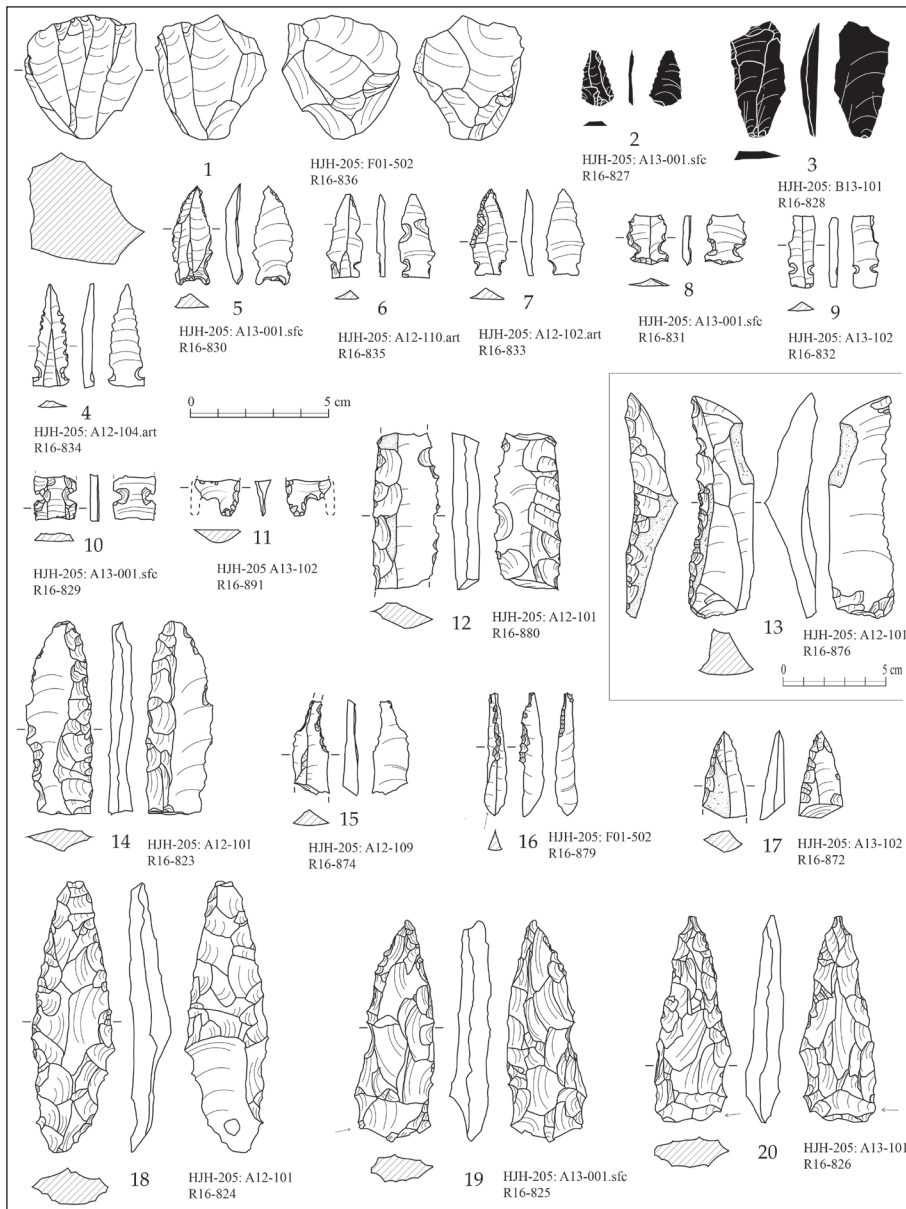
The raw material of the assemblage fell into the following two groups: grayish, slightly lustrous, irregular flint nodules associated with whitish patina, and brown, somewhat mat flint slabs with buff cortex. Both types of flints were used roughly in an equal ratio. Core class products were dominated by single-platform, pyramidal blade/bladelet cores (**Fig. 8: 1**), followed by change-of-orientation flake cores and bidirectional blade-bladelet cores. No naviform cores were attested. Meanwhile, debitage class products included two obsidian flakes (**Fig. 8: 2-3**), which proved to have derived from the Gölludağ East source in eastern Anatolia (Campbell *et al.* 2017). Tool



6. *Harrat Juhayrah 205: general view of the site (looking N).*



7. *Harrat Juhayrah 205: general and close-up views of Depressions 1-4 (looking SW).*



8. *Harrat Juhayrah 205: chipped stone artifacts.*

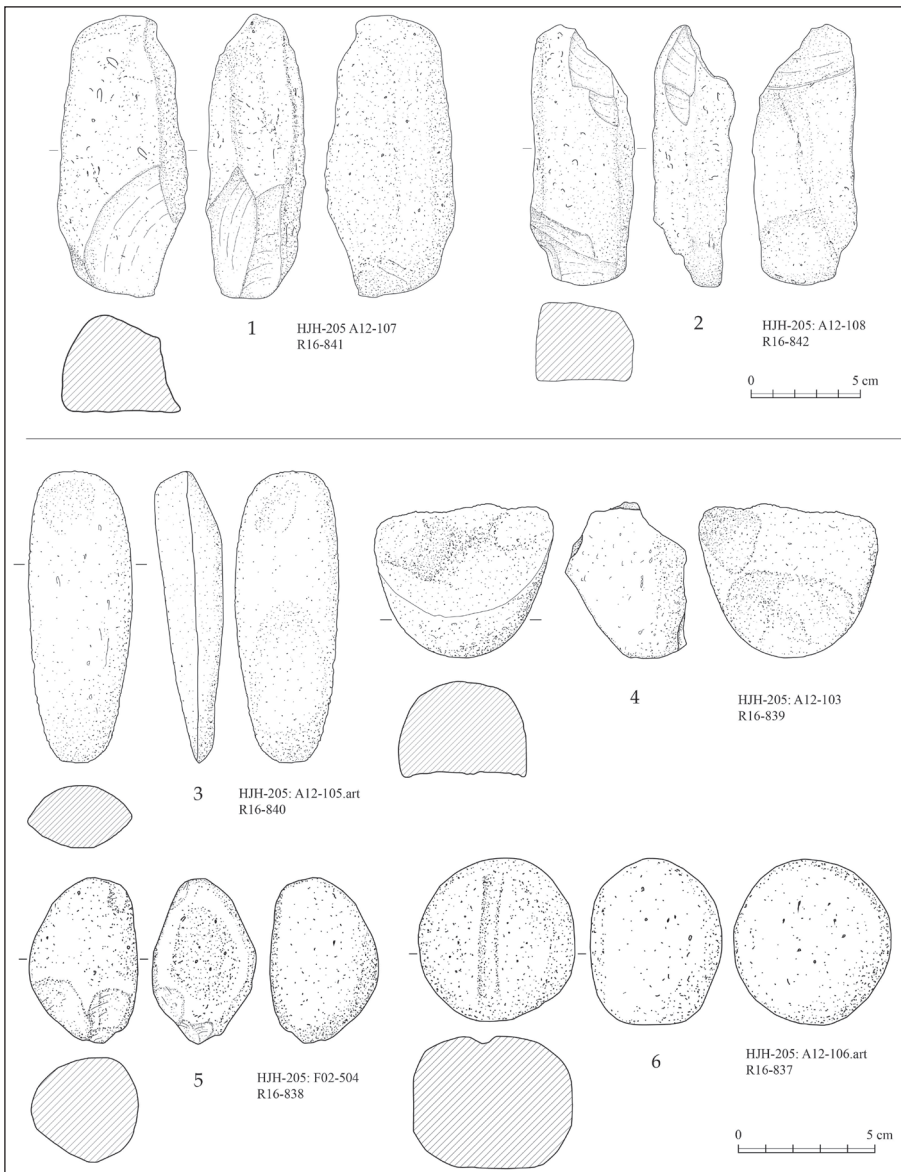
class products centered on al-Khiam type points (Fig. 8: 4-9) and transverse-blow axes/adzes (Fig. 8: 18-20), both of which suggest that the assemblage dates to the PPNA. Other tool types included Hagdud/Giglal truncations (Fig. 8: 10-11), bifacially-retouched knife blades (also called Beit Taamir knives) (Fig. 8: 12, 14), large denticulates (Fig. 8: 13), drills (Fig. 8: 15-16), and retouched blades/flakes (Fig. 8: 17). In addition, a few flint hammer-stones and several heavy-duty basalt digging tools were also attested (Fig. 9: 1-2).

The groundstone assemblage, on the other hand, consisted only of several grinding tools made of basalt (Fig. 9: 3-5) and a grooved whetstone or shaft-straightener made again of

basalt (Fig. 9: 6). Though small in number, their occurrence corroborates that domestic activities other than flint production took place at the site. Thus, the site can probably be defined as a temporary encampment doubling as a flint workshop.

Harrat Juhayrah 202: Early PPNB Settlement

HJJH-202 is located *ca.* 120m west of HJJH-205, occupying a relatively flat terrain at the southern edge of the foothill (see Fig. 3). The first season's excavation took place in August 2016, focusing on Area I set up at the northwestern corner of the supposed range of the settlement.



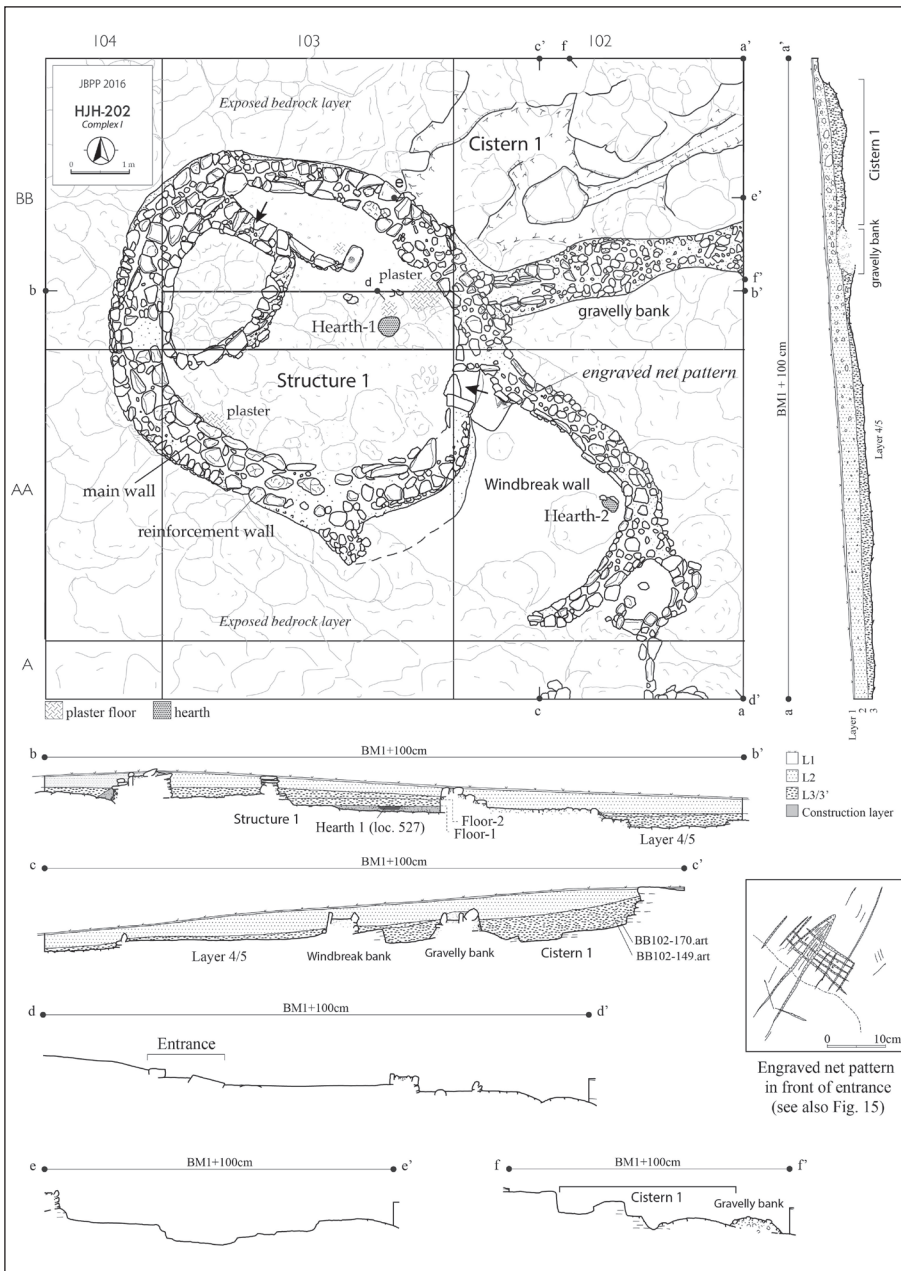
9. *Harrat Juhayrah 205: heavy-duty digging tools (above) and ground-stone artifacts (below).*

Structural Remains

The excavation revealed a small-scale structural complex (Complex I) consisting of a masonry dwelling (Structure 1) and a rock-cut, open-air cistern (Cistern 1) (Fig. 10). The former had a slightly oval plan, measuring *ca.* 6-7.8m in outer diameter, *ca.* 0.6-1.1m in wall width, and up to *ca.* 0.5m in preserved wall height. In terms of stratigraphy, it was constructed on an exposed basalt bedrock layer (Layer 5) or its weathered soil layer (Layers 4), partly sandwiching a 5-20cm thick gravelly foundation bank (Layer 3/4) in between. As with the neighboring PPNA encampment of HJJH-205, the thick masonry wall was constructed by a double-face, rubble core technique using clay mortar and reinforced by a low facing wall attached to its southern,

lower-in-elevation side (Fig. 11). Undressed basalt cobbles *ca.* 20-50cm long were used as main construction materials, most of which were put in an upright position or a stretcher bond.

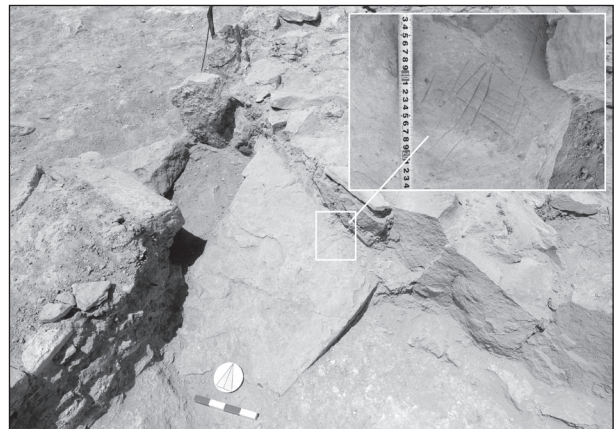
A narrow, stepped entrance opened at the southeastern corner of the structure. A large basalt rock was exposed immediately in front of it, on which an irregular net pattern *ca.* 15 by 35cm in dimensions was engraved (Fig. 12). This structure was basically of a single room type, but an oval compartment *ca.* 1.5m by *ca.* 2.2m in floor area was incorporated into its northwestern corner. The floor slightly slanted southward following the surrounding topography and retained traces of plaster-like pavement at several *loci*. This floor pavement



10. *Harrat Juhayrah 202: plan and sections/elevations of Complex I.*



11. *Harrat Juhayrah 202: general view of Complex I (looking N).*



12. *Harrat Juhayrah 202: close-up view of the entrance (looking N).*

was renewed at least twice, indicating that the structure continued to be used for a certain period of time. A small hearth *ca.* 35cm in diameter and *ca.* 10cm deep was found roughly in the center of the first floor. Small finds from the indoor space were unexpectedly scarce, whereas the forecourt protected by a curvilinear windbreak wall *ca.* 6.5m long yielded hundreds of flint artifacts including several dozen Helwan type points. This windbreak was associated with a shallow hearth *ca.* 30cm in diameter and a small bin *ca.* 1m by *ca.* 1.5m in floor area, the latter of which was possibly used for storage (possibly firewood).

Meanwhile, the rock-cut cistern was located diagonally behind Structure 1. This feature was irregular in plan, measuring *ca.* 6m by *ca.* 2.5m in mouth area and *ca.* 0.5-1m maximum floor depth. It was constructed taking advantage of a natural depression of the exposed basalt bedrock layer, but traces of anthropogenic modification were confirmed at several *loci* (Fig. 13). More importantly, a stone-capped gravel bank more than *ca.* 4.5m long and *ca.* 0.5m high was attached to the southern, lower-in-elevation edge of the semi-anthropogenic depression. This bank was probably indented to dam up the stream overflow from the depression. As with the case of HJH-205, thousands of flint artifacts occurred around this small cistern.

These two distinct components were combined to form a small-scale structural complex, which can probably be taken as a prototype of the outpost/barrage/cistern complex common to the Middle to Late PPNB Al Jafr Basin (Fujii 2010a, 2010b). In fact, a dozen radiocarbon dates of charcoal remains recovered from



13. *Harrat Juhayrah 202*: close-up view of the rock-cut cistern (looking SW).

Hearth 1 and its surrounding *loci* converge on a short time range around 9000 cal BC, corroborating that the complex dates back to the beginning of the Early PPNB (see Fig. 20). The distribution range of surface finds suggests that the site extended southeastward to form a small settlement *ca.* 0.5 ha in total area (see Fig. 3). Subsequent excavations are expected to shed light on the overall picture of the Early PPNB settlement first identified in southern Jordan.

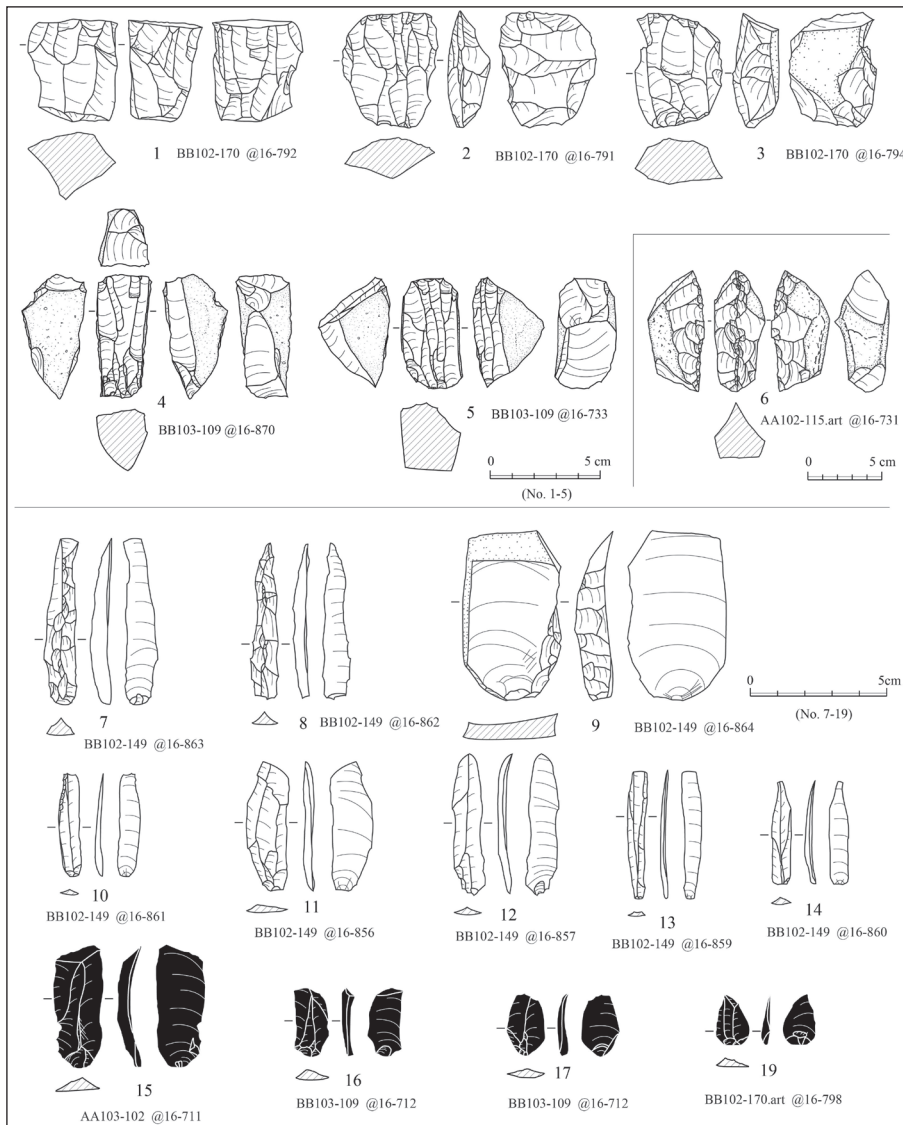
Small Finds

Although again poor in variety, Complex I yielded a huge number of artifacts. Since close examination is still in progress, we will only give their category-by-category overview.

Chipped Stone Artifacts

Some fifteen thousand chipped stone artifacts were recovered largely from the forecourt and the surrounding area of the rock-cut cistern. Aside from four obsidian flakes derived again from the Gölludağ East source (Campbell *et al.* 2017) (Fig. 14: 15-19), the chipped stone assemblage consisted exclusively of flint products. As with HJH-205, their raw materials fell into the following two types. One is small, grayish, somewhat lustrous, discoidal or spherical flint nodule with whitish patina, which is not only scattered on surrounding *wadi* beds but also commonly used at the neighboring Late Natufian settlement of Wādī Quşayr 139 as well. The other is large, brown, slightly mat, tabular flint with buff cortex, which are ubiquitous at layered outcrops extending along the northern fringe of the Al Jafr Basin and marks Middle to Late PPNB flint assemblages in the basin. The Early PPNB flint assemblage from HJH-202 contains both types of flints and, in this sense, can be understood as a transitional form between the Late Natufian assemblage and the Middle to Late PPNB one in terms of material choice as well as date.

Core class products were dominated by single-platform blade/bladelet cores (Fig. 14: 1), followed by opposed-platform blade/bladelet cores (Fig. 14: 2-3) and change-of-orientation flake cores. In addition, unlike the assemblage from HJH-205, several naviform cores and pre-cores were also attested (Fig. 14: 4-6). Meanwhile, debitage class products included crest blades and core tablets (Fig. 14: 7-9),

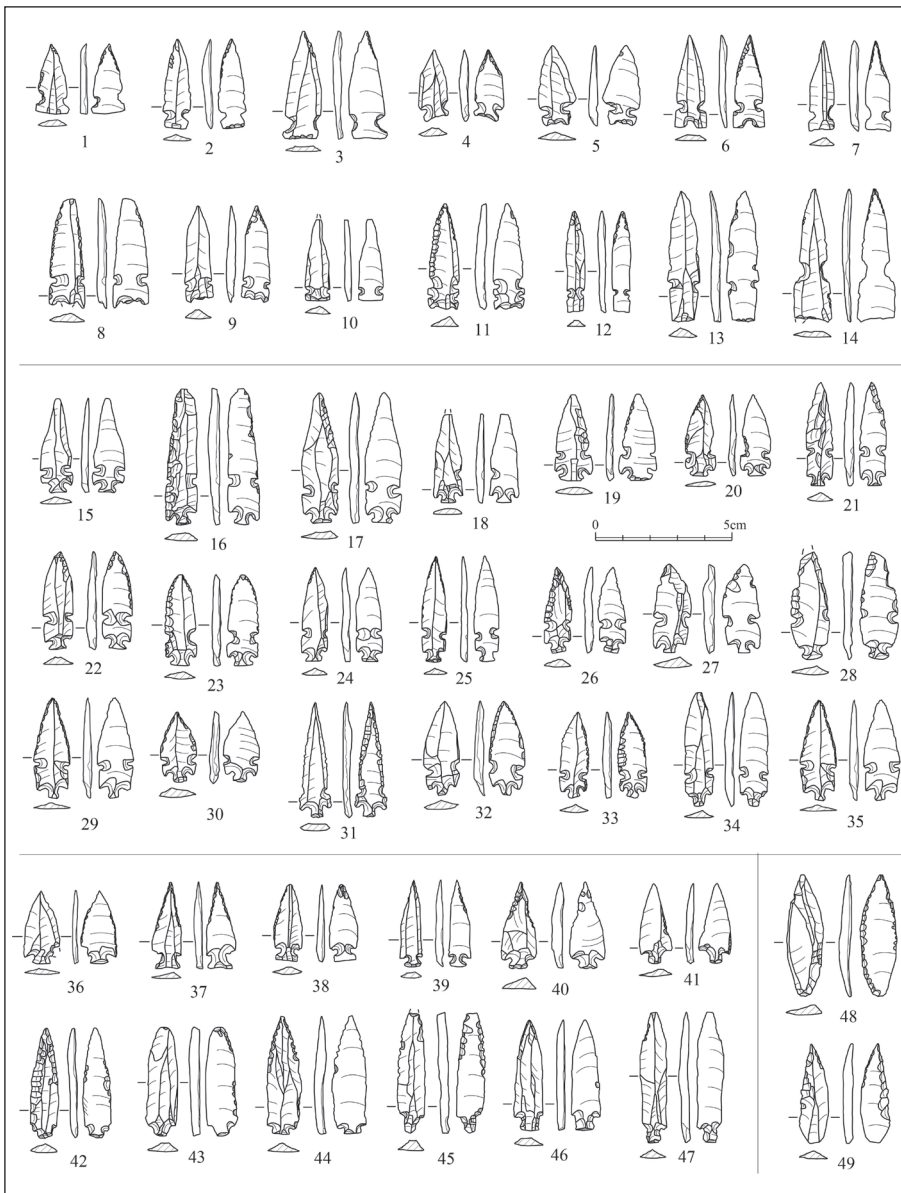


14. *Harrat Juhayrah 202: chipped flint and obsidian artifacts from Complex I (core and Debitage class products).*

both of which probably represent by-products of the naviform core reduction technology. Blades/bladelets contained both uni-directional type (Fig. 14: 10, 12) and bi-directional one (Fig. 14: 13-14). Some of the latter are thought to have been detached from the naviform cores.

As with HJH-205, the tool class products centered on projectile points (Figs. 15-16), transverse-blow axes/adzes (Fig. 17: 1-6), and their roughouts (Fig. 17: 7-12). The points accounted for more than 60 percent of the retouched tools, highlighting the importance of hunting activities at the Early PPNB settlement prior to the introduction of domestic sheep and goats. In terms of typology, they fell into the el-Khiam point (see Fig. 15: 1-14), the Helwan point (see Fig. 15: 15-35), the small tanged point (see Fig. 15: 36-47), and other

miscellaneous types including foliate points (see Fig. 15: 48-49). The Helwan type was predominant (52.3%) in the point assemblage, followed by the al-Khiam type (19.9%) and the small tongued points (18.3%). Their attribute analysis suggests that there is some correlation between the naviform cores and the small tongued points (Fujii, Adachi and Nagaya 2018). Meanwhile, the frequency of tranchet axes/adzes, together with the survival of the el-Khiam points, indicates that the assemblage partly stayed within the framework of the PPNA lithic tradition. The tool kit also included trapezoidal serrated blades (Fig. 18: 1-3), bifacially retouched large knives (Fig. 18: 4-9), drills (Fig. 18: 10), burins (Fig. 18: 11), truncated blades (Fig. 18: 12), and end- and side-scrapers (Fig. 18: 13).



15. Harrat Juhayrah 202: chipped flint artifacts from Complex I (points).

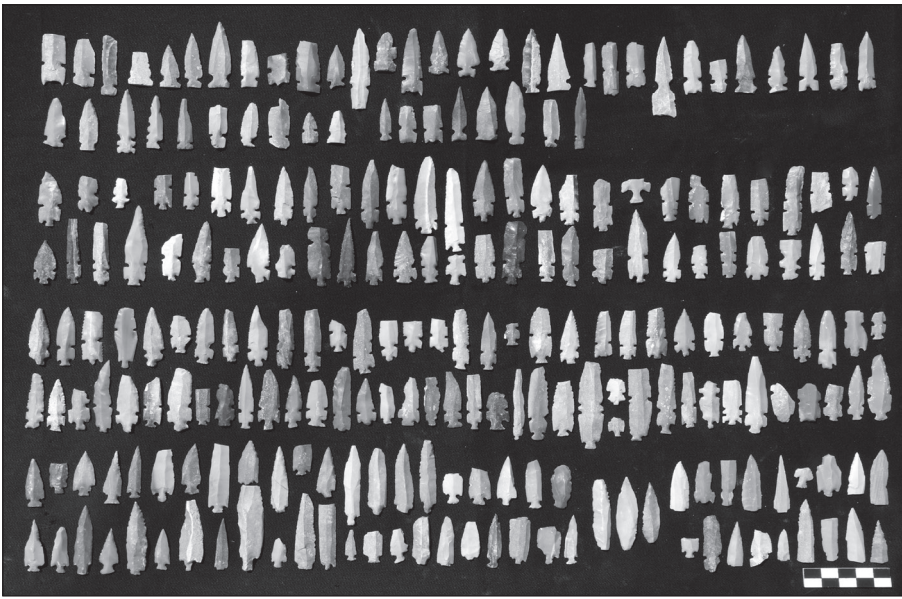
Groundstone Artifacts

The groundstone assemblage included several basalt products with remarkable edge damage (Fig. 19: 1-4). Though different in raw material, they bear a strong resemblance to diagonally truncated limestone bars common to Middle to Late PPNB outposts in the basin (e.g. Fujii 2009: fig. 19, no. 1-3), suggesting their use as heavy-duty digging tools for leveling the construction ground of the oval structure and/or modifying the semi-anthropogenic cistern. The assemblage also included several pounding/grinding pebbles made of basalt (Fig. 19: 5-6) and two cup-hole mortars were also made of basalt (Fig. 19: 7-8). The former were relatively small in size, measuring ca. 5-10cm long and

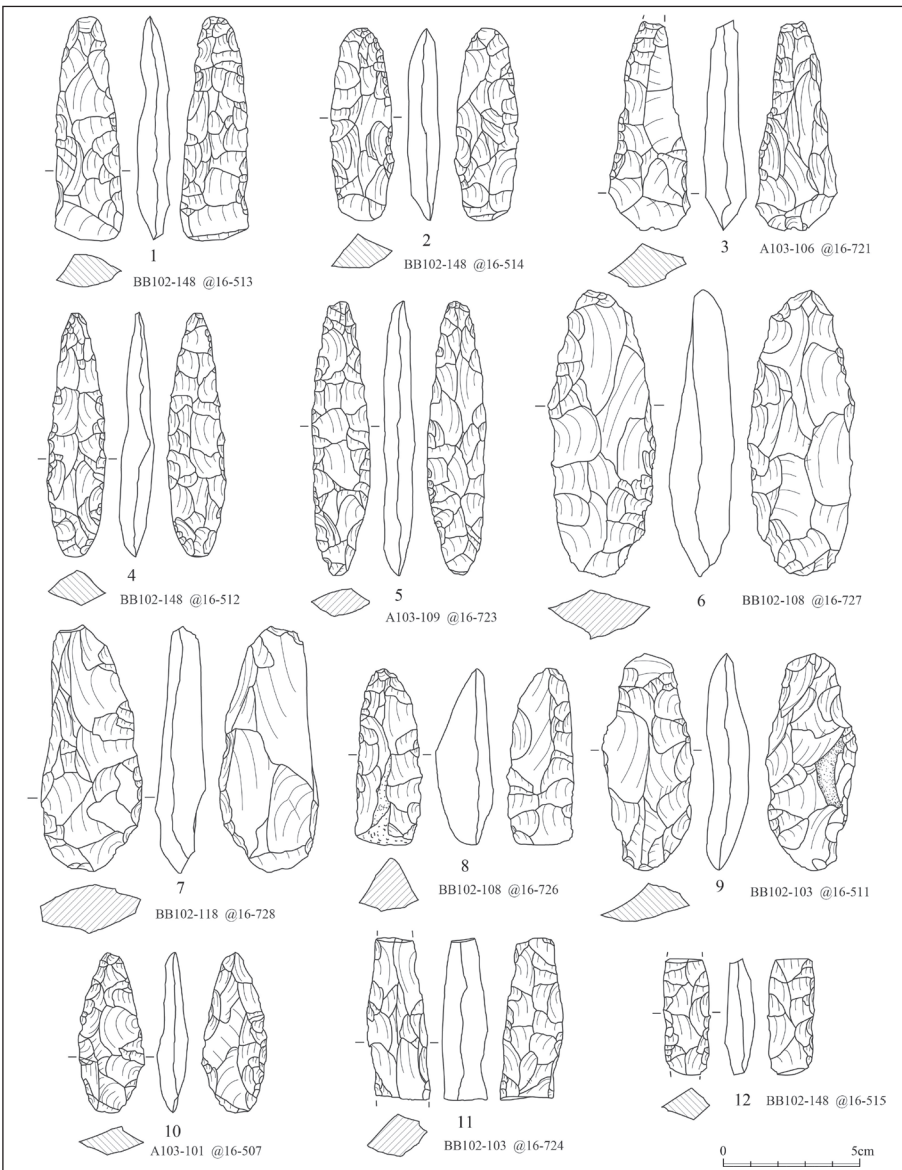
ca. 4-6cm thick. A stamp-like implement made of unidentified green stone also probably falls into the same class (Fig. 19: 9), although the existence of a shallow depression in the center of the working surface is potentially suggestive of its use as a capstone of a bow drill. Meanwhile, the mortars had a shallow cuphole ca. 8-13cm in diameter and ca. 1-4cm in depth roughly in the center of their flat working surface. They were probably used in combination with the small pestles to pound something, but it is still unknown whether cereal seeds were included in it.

Other Stone Products

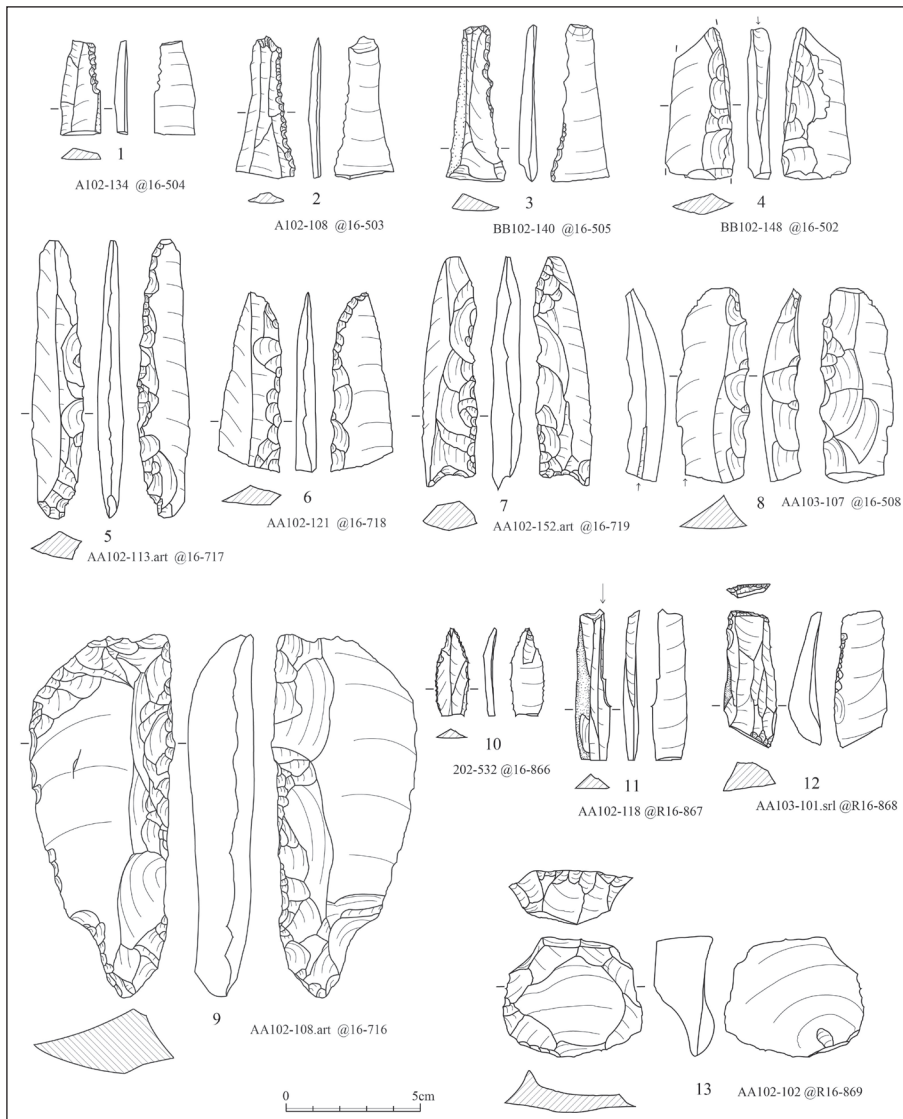
Other small finds were limited to a shaft-straightener made of limestone (Fig. 19: 11) and a small spatula made probably of mudstone



16. *Harrat Juhayrah 202: points from Complex I.*



17. *Harrat Juhayrah 202: chipped flint artifacts from Complex I (bifacials).*



18. *Harrat Juhayrah 202: chipped stone artifacts from Complex I (other tool class products).*

(Fig. 19: 12). The shaft-straightener measured 7.5cm long, being equipped with a 5mm wide groove with a triangular cross-section. The stone spatula, on the other hand, was 4.2cm long and 0.4cm thick, and its round tip had slight luster generated probably by rubbing operations. As noted above, the scarcity of artifact variety is characteristic of the Al Jafr PPNB that developed in the arid margin.

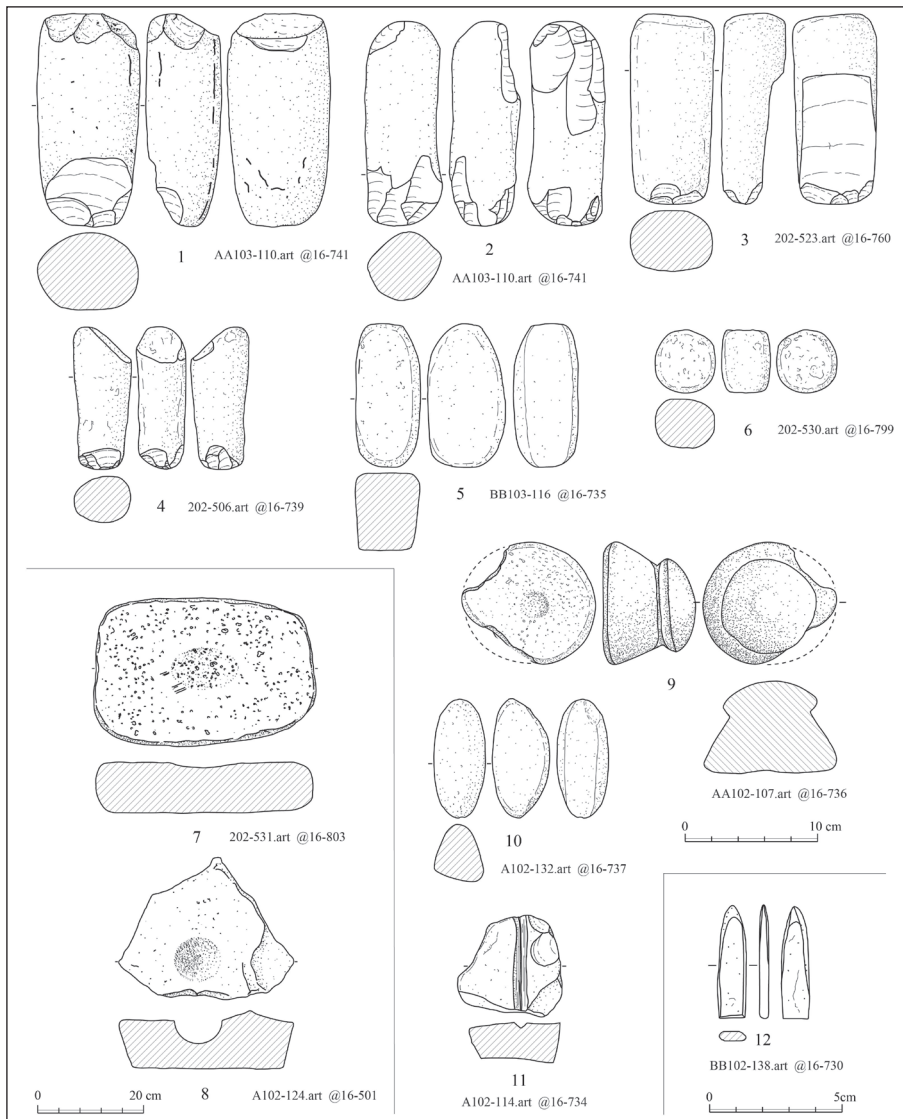
Discussion

The excavations at HJH-205 and -202 have provided valuable insights into the initial phase of the Neolithization process in the Al Jafr Basin. Since the excavations have just finished, the following discussion summarizes the research outcomes from the two sites and offer a few tentative perspectives for future study.

Harrat Juhayrah 205: PPNA Encampment

HJH-205 is a PPNA site first identified in the basin. Although no radiocarbon data are available, the site can probably be dated to the period on the basis of the diagnostic flint assemblage marked by the predominance of the al-Khiam type points and the tranchet axes/adzes as well as the absence of naviform core-and-blade components. The unique flint assemblage suggests that the small encampment belongs to the Khiamian phase.

The finding of this small site adds a new aspect to the study of the PPNA culture in southern Jordan that has focused exclusively on the Faynan area in the Lower Jordan Valley (e.g. Finlayson and Mithen 2007). Also of significance is the occurrence of the two obsidian flakes transported from central Anatolia, which



19. *Harrat Juhayrah 202: ground-stone artifacts from Complex I.*

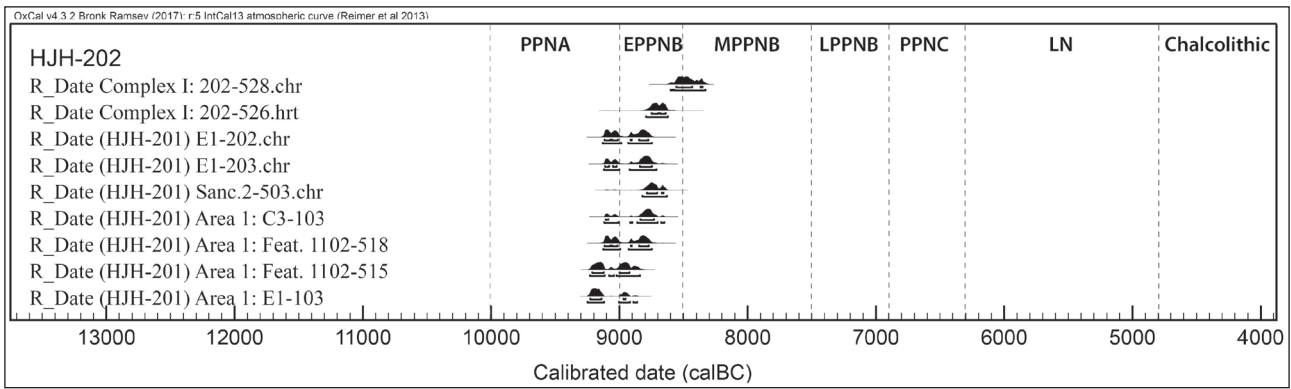
highlights some cultural contact between the Al Jafr Basin and the outside society at the initial stage of the Neolithization process.

Harrat Juhayrah 202: Early PPNB Settlement

HJH-202 is an Early PPNB site located again for the first time in the basin, and coupled with neighboring HJH-205, fills up a chronological gap at the initial stage of the Al Jafr Neolithic (see Fig. 21). Both the radiocarbon dates and the unique flint assemblage marked by the predominance of the Helwan type points also support the chronological perspective (Fig. 20). The finding of the Early PPNB settlement in the Al Jafr Basin, together with other related investigations (*e.g.* Burian *et al.* 1976; Garrard *et al.* 1994; Gopher 1997; Khalaily *et al.* 2007;

Rokitta-Kurmnov 2016; Rollefson 1996; Stefanisko and Purschwitz 2016; Vardi *et al.* 2016), corroborates anew the presence of the Early PPNB phase in the southern Levant that has long been discussed (*e.g.* Cauvin 1994; Edwards *et al.* 2004; Edwards and Sayej 2014; Kuijt and Goring-Morris 2002). Of significance is the supposed combination of the naviform cores and the small tongued points made on bi-directional, multi-ridged blades/bladelets, which probably represents the initial form of the PPNB flint industry in the southern Jordan (Fujii, Adachi and Nagaya 2018).

No less important is the finding of the Early PPNB rock-cut cistern, which pushes up the date of the Neolithic water-catchment system in the basin by another several centuries (Fujii 2007a, 2007b, 2010a, 2010b, 2013; Fujii *et al.*



20. *Harrat Juhayrah 202: C-14 dates from Complex I and its surround loci (as of July 2016).*

	Outpost/Encampment	Barrage/Cistern	Open Sanctuary
Late Natufian	Wadi Qusayr 139		
PPNA	Harrat Juhayra 205	Depressions 1-4	
EPPNB	Harrat Juhayra 202	Cistern 1	
MPPNB	WAT: Complex 00-III? Wadi Ghuwayr 17	WAT: Barrages 1-3/ Str. M Wadi Ghuwayr 17: St. 101 Wadi Ghuwayr 106 Wadi Nadiya 1: Barrages 1-2	
LPPNB	Jabal Juhayra: Layer 3 WAT: Complex IV?-IX	J. Juhayra: Barrage & cisterns WAT: Barrages 1-3 Wadi Nadiya 2: Barrages 1-4	J. Juhayra: slab-lined features

WAT: Wadi Abu Tulayha
----- : Jafr PPNB outpost complex.

21. *Renewed chronology of the Jafr Neolithic (as of August 2016).*

2013). In this sense, this Early PPNB settlement (and the neighboring PPNA encampment) can be regarded as a proto-type of the Middle to Late PPNB outpost/barrage/cistern complexes attested at Wādī Abu Tulayha (e.g. Fujii 2009, 2013, 2014a), Wādī Ghuwayr 16/107 (Fujii, Quintero *et al.* 2011; Fujii, Adachi, Quintero *et al.* 2011), and Jabal Juhayra (Fujii 2015, 2017; Fujii, Adachi, Nagaya 2018, 2021). The question is whether HJJ-202 was equipped with a barrage as well as the rock-cut cistern. Our previous survey in the Wādī Quşayr drainage basin located a barrage-like stone wall *ca.* 30m long (Fujii 2005a: fig. 61), but its date remains unknown due to the absence of radiocarbon data and *in situ* finds. Future re-excavation is expected to shed new light on the issue.

Concluding Remarks

The excavations at Harrat Juhayrah 205 and 202 have provided specific insights into the initial phase of the Al Jafr Neolithic thus far poorly understood due to the lack of basic information. Of significance is that the two key

sites have filled up a millennium gap between the Late Natufian settlement of Wādī Quşayr 139 and the Middle to Late PPNB outpost complexes at Wādī Abu Tulayha and Jabal Juhayra and, by so doing, enabled us to start the discussion on the Badia Neolithization with its earliest stages. Furthermore, the finding of the PPNA and Early PPNB rock-cut cisterns has shed new light on the water-use history in the basin. However, despite this early data from HJJ-202, it is important to note that the excavation at HJJ-202 have just begun, and we would like to continue our efforts toward a better understanding of the overall picture of this key site.

Acknowledgement

First of all, we would like to express our sincere gratitude to Prof. Munther Dahash Jamhawi, director general of the Department of Antiquities of Jordan, for his kind support to our long-term research project in the Al Jafr Basin. We are also grateful to the careful support by three DoA representatives (Mr. Omar Smadi,

Mr. Bashar Saleh and Dr. Ali al-Hajj). It should also be added that our research project is financially supported by JSPS KAKENHI Grant Number 25220402.

Sumio FUJII
Institute of Human and Social Sciences
Kanazawa University
Kakuma-machi, Kanazawa
920-1192, Japan
fujiiikun@staff.kanazawa-u.ac.jp

Takuro ADACHI
Same institute as above
mppnb@staff.kanazawa-u.ac.jp

Kazuyoshi NAGAYA
Same institute as above
kazuyoshinagaya@staff.kanazawa-u.ac.jp

Bibliography

- Burian, F.; Friedman, E. and Mintz, E.
1976 An early P.P.N.B. Site in the Nahal Lavan Region - Site No. 109. *Mitekufat Haeven: Journal of the Israel Prehistoric Society* 1976: 50-60.
- Campbell, S.; Healey, E. and Maeda, O.
2017 Obsidians from Wadi Sharma 1 and Harrat Juhayra 205/202. *Manchester Obsidian Laboratory Report* 102 (unpublished).
- Cauvin, J.
1994 *Naissance des Divinités Naissance de l'Agriculture: La Revolution des Symboles au Néolithique*. Paris: CMRS Éditions.
- Edwards, P.C.; Meadows, J.; Sayej, G. and Westaway, M.
2004 From the PPNA to the PPNB: New views from the southern Levant after excavations at Zahrat adh-Dhra' 2 in Jordan. *Paléorient* 30/2: 21-60.
- Edwards, P.C. and Sayej, G.
2014 Resolving contradictions: The PPNA-PPNB transition in the southern Levant. Pp. 117-125 in L. Astruc; D. Binder and F. Briois (eds.), *Systèmes Techniques et Communautés du Néolithique Précéramique au Proche-Orient/ Technical Systems and Near Eastern PPN communities Antibes: APDCA*.
- Finlayson, B. and Mithen, S.
2007 *The Early Prehistory of Wadi Faynan, Southern Jordan: Archaeological Survey of Wadis Faynan, Ghuwayr and al-Bustan and Evaluation of the Pre-Pottery Neolithic A Site of WF 16*. Oxford: Oxbow Books.
- Fujii, S.
2005a Wadi Burma North, Tal'at Abyda, and Wadi Qsair: A preliminary report of the third operation of the al-Jafr Basin Prehistoric Project, 2004. *ADAJ* 49: 17-55.
2005b Harrat al-Juhayra Pseudo-Settlement: A Preliminary Report of the al-Jafr Basin Prehistoric Project, 2004. *ADAJ* 49: 57-70.
- 2007a PPNB Barrage Systems at Wadi Abu Tulayha and Wadi ar-Ruweishid ash-Sharqi: A Preliminary Report of the 2006 Spring Season of the Jafr Basin Prehistoric Project, Phase 2. *ADAJ* 51: 403-427.
2007b Wadi Abu Tulayha and Wadi Ruweishid ash-Sharqi: An Investigation of PPNB Barrage Systems in the Jafr Basin. *Neo-Lithics* 2/07: 616.
2009 Wadi Abu Tulayha: A Preliminary Report of the 2008 Summer Final Field Season of the Jafr Basin Prehistoric Project, Phase 2. *ADAJ* 53: 173-209.
2010a A Comprehensive Review of Neolithic Water Catchment Facilities in the Jafr Basin, Southern Jordan: A Preliminary Report of the Jafr Basin Prehistoric Project (Phase 3), 2009. *ADAJ* 54: 371-386.
2010b Domestication of Runoff Water: Current Evidence and New Perspectives from the Jafr Pastoral Neolithic. *Neo-Lithics* 2/10: 14-32.
2011 "Lost Property" at Wadi Qusayr 173: Evidence for the Transportation of Tabular Scrapers in the Jafr Basin, Southern Jordan. *Levant* 43(1): 1-14.
2013 Chronology of the Jafr Prehistory and Protohistory: A Key to the Process of Pastoral Nomadization in the Southern Levant. *Syria* 90: 49-125.
2014a A Half-Buried Cistern at Wadi Abu Tulayha: A Key to Tracing the Pastoral Nomadization in the Jafr Basin, Southern Jordan. Pp. 159-167 in G.O. Rollefson and B. Finlayson (eds.), *Jordan's Prehistory: Past and Future Research*, Amman: Department of Antiquities of Jordan.
2014b Make-Believe Playhouses at Wadi Burma East: A Cognitive Approach to the Neolithic Unilinear Settlement in the Jafr Basin, Southern Jordan. Pp. 101-116 in B. Finlayson and C. Makarewicz (eds.), *Settlement, Survey and Stone: Essays on Near Eastern Prehistory in Honour of Gary Rollefson*. Berlin: Ex Oriente.
2015 Rescue Excavations at Jabal Juhayra a Stratified Neolithic Settlement in the al-Jafr Basin. *Neo-Lithics* 1/15: 23-33.
2017 Subsequent Excavations at the Neolithic Rockshelter Settlement of Jabal Juhayra, in the al-Jafr Basin. *Neo-Lithics* 2/17: 3-14.
- Fujii, S.; Adachi, T.; Endo, H.; Yamafuji, M.; Arimatsu, Y. and Nagaya, K.
2013 Excavations at Wadi Nadiya 2 and Complementary Research of the Jafr Neolithic Barrage System. *ADAJ* 57: 373-398.
- Fujii, S.; Adachi, T. and Nagaya, K.
2018 Jabal Juhayra, 2014-2015: Excavations of the Layer 2 (Late Neolithic) Settlement. *ADAJ* 59: 193-215.
2021 Jabal Juhayra, 2015-2016: Excavations of the Layer 3 (Pre-Pottery Neolithic B) Settlement. *ADAJ* 60: 675-707.
- forth. (c) Harrat Juhayra 202: An Early PPNB Flint Assemblage in the Jafr Basin, Southern Jordan. *Interactions and Contexts in Neolithic Traditions (Proceedings of the PPN-8)*. Nicosia: University of Cyprus.

- Fujii, S.; Adachi, T.; Yamafuji, M. and Nagaya, K.
 2018 Tor Ghuwayr 1-3: Surveys and Excavations of Tailed Tower Tombs in the Northeastern Edge of the Jafr Basin, Southern Jordan. *ADAJ* 58: 217-234.
- Fujii, S.; Adachi, T.; Quintero, L.A. and Wilke, P.J.
 2011 Wadi Ghuwayr 106: A Neolithic Barrage System in the Northeastern al-Jafr Basin. *ADAJ* 55: 189-212.
- Fujii, S.; Quintero, L.A. and Wilke, P.J.
 2011 Wadi Ghuwayr 17: A Neolithic Outpost in the Northeastern al-Jafr Basin. *ADAJ* 55: 159-188.
- Garrard, A.; Baird D.; Colledge S.; Martin L. and Wright K.
 1994 Prehistoric Environment and Settlement in the Azraq Basin: An Interim Report on the 1987 and 1988 Excavation Seasons. *Levant* 26: 73-109.
- Gopher, A.
 1997 Horvat Galil: An Early PPNB site in the upper Galilee, Israel. *Tel Aviv* 24/2: 183-222.
- Khalaily, H.; Bar-Yosef, O.; Barzilai, O.; Boaretto, E. and Bocquentin, F.
 2007 Excavations at Motza in the Judean Hills and the Early Pre-Pottery Neolithic B in the Southern Levant. *Paléorient* 33/2: 5-37.
- Kuijt, I. and Goring-Morris, N.
 2002 Foraging, Farming, and Social Complexity in the Pre-Pottery Neolithic of the Southern Levant: A Review and Synthesis. *Journal of World Prehistory* 16/4: 361-440.
- Neerly, P. and Delage, C.
 2004 The Late Epipalaeolithic Settlement in the Wadi Juhayra, West-Central Jordan. Pp. 39-54 in D. Delage (ed.), *The Last Hunter-Gatherers in the Near East*. BAR International Series 1320. Oxford: John & Erica Hedges.
- Rokitta-Kurmnov, D.
 2016 *The Chipped Stone Industry of Mushash 163, A PPNB/EPPNB Site in the Badia/North-Eastern Jordan*. Oral presentation in PPN-8.
- Rollefson, G.O.
 1996 Abu Hadhud (WHS 1008): An EPPNB Settlement in the Wadi el-Hasa, Southern Jordan. Pp. 159-60 in S. Kozłowski and H.G. Gebel (eds.), *Neolithic Chipped Stone Industries of the Fertile Crescent and their Contemporaries in Adjacent Regions*. Berlin: Ex Oriente.
- Stefanisko, D. and Purschwitz, C.
 2016 *Chipped Stone Industry of 'Ainab 1A, Early PPNB Site at Jabal 'Ainab (South-East Badia)*. Oral presentation in PPN-8.
- Vardi, J.; Caracuta, V.; Boaretto, E.; Aga N.; Rice, N.; Shemer, E.M.; Brun, E. and van den Brink, E.
 2016 *The Early Pre Pottery Neolithic B Occupation of Ahhud*. Oral presentation in PPN-8.