WĀDĪ GHUWAYR 17: A NEOLITHIC OUTPOST IN THE NORTH-EASTERN AL-JAFR BASIN

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Introduction

The Jafr Basin Prehistoric Project (JBPP), headed by the first author, was organized in 1995 with a view to tracing the process of pastoral nomadization in southern Jordan on the basis of archaeological evidence. The first and second phases of the project took place for twelve years from 1997 until 2008, focusing on the establishment of a chronological framework in the north-western part of the basin. The reason we chose this area for research was that it was nearer to the Neolithic farming communities to the west and, therefore, allowed easier tracing of the relationship between the desert and the sown. To this end, we investigated more than a dozen archaeological sites varying in date and nature. This series of investigations has enabled us to trace the cultural sequence from the appearance of pastoral transhumance in the Pre-Pottery Neolithic B (hereafter PPNB) until the establishment of full-fledged pastoral societies in the Early Bronze Age (hereafter EBA) (e.g. Fujii 2003: Fig. 23, 2004: Fig. 23, n.d.b: Figs 7 - 8).

Recent efforts have centered on the comprehensive investigation of the PPNB agro-pastoral outpost of Wādī Abū Ṭulayḥa (Fujii 2006a, 2006b, 2007a, 2008a, 2009a; Fujii and Abe 2008). A total of six excavation seasons showed that the small settlement was sustained by a mixed economy consisting of small-scale pastoral transhumance, probably from the west, hunting mainly of gazelles and hares, and cereal cultivation in a flooding area associated with a stone-built barrage attached to the settlement (Hongo 2008; Nasu *et al*. 2009, n.d.). Discovery of this remote agro-pastoral outpost lent support to the suggestion that small-scale pastoral transhumance in the Neolithic paved the way for the emergence of full-fledged pastoral nomadism in subsequent periods (Köhler-Rollefson 1992; Rollefson and Köhler-Rollefson 1993; Quintero *et al*. 2004). Of significance is the fact that the outpost was equipped with a well-organized water catchment system comprising a large cistern, basin-irrigation barrage and two minor wadi barriers (Fujii 2007b, 2007c, n.d.a). Evidence suggested that climatic deterioration, culminating in the so-called 8.2 K event, resulted in a shortage of pondage at the cistern and instability of agricultural production associated with the basin-irrigation barrage, and that this eventually led to the abandonment of the neighboring outpost. It was suggested that a small group may subsequently have camped at the disused, half-buried cistern. This group may be defined as the first pastoral nomads in the Jafr basin, in the sense that they abandoned management of a fixed outpost and water catchment facilities and, instead, made temporary visits to the disused cistern (Fujii n.d.b). It thus appears that the dysfunction of the water catchment facilities led to the abandonment of the fixed outpost and a consequent shift to pastoral nomadism. In this sense, we can argue that the rise and fall of a water system associated with a remote outpost holds a key to understanding the process of pastoral nomadization.

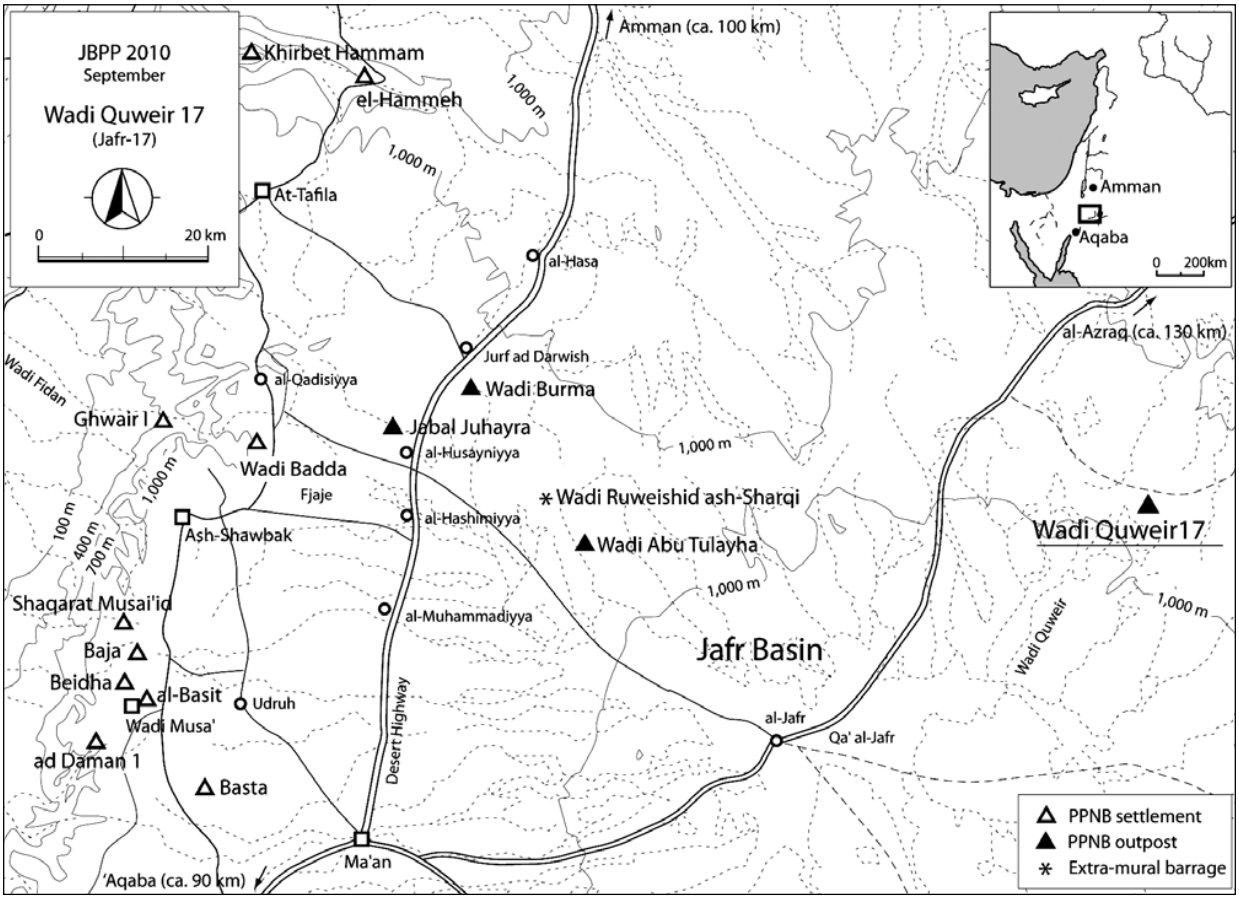
The third phase of the research project was designed to test this challenging hypothesis. The first field season was conducted in the summer of 2009, being devoted to a comprehensive review of Neolithic water catchment facilities and associated agro-pastoral outposts. It turned out that this combination extended far into the basin beyond Wādī Abū Ṭulayḥa (Fujii 2010a, 2010b).

The second field season took place over approximately three weeks between 14 September and 2 October 2010, and was devoted to rescue excavations at the sites of Wādī Ghuwayr 17 and 106, both located in the north-eastern part of the basin (**Fig. 1**). The excavation at Wādī Ghuwayr 17 aimed to collect further information about the type of PPNB agro-pastoral outpost first found at Wādī Abū Ṭulayḥa. The investigation at Wādī Ghuwayr 106, on the other hand, was intended to provide further insights into the Jafr PPNB barrage system first located again at Wādī Abū Ṭulayḥa and Wādī ar-Ruwayshid ash-Sharqī. This report focuses on the former site; the latter site is covered elsewhere in this volume.

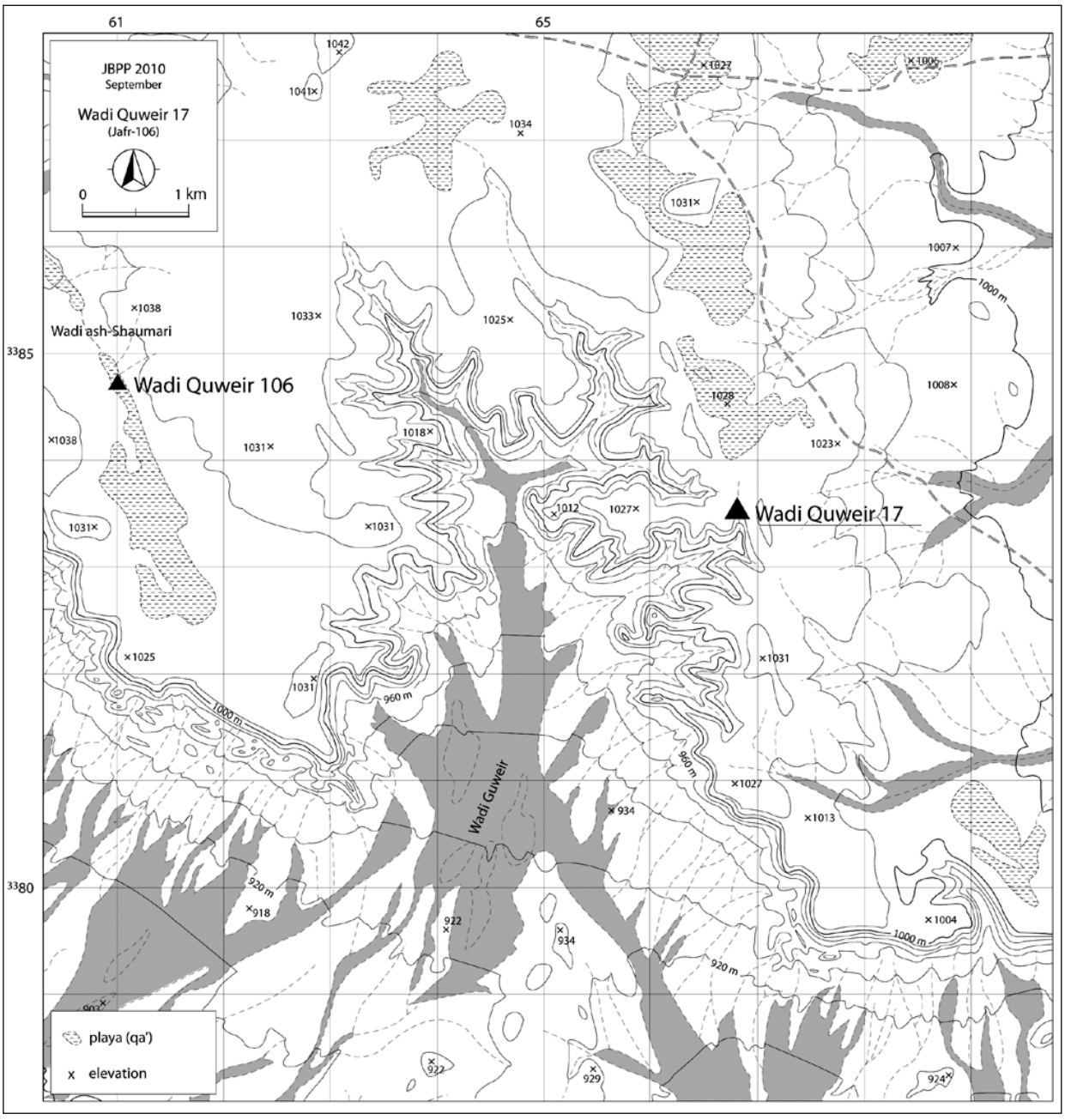
The Site and its Setting

The Jafr basin is a large-scale depression in southern Jordan, forming an inland, closed drainage system covering the vast majority of the Ma'ān Plateau. Numerous *awdiya* (sing. *wadi*) drain into Qā' al-Jafr, the enormous playa occupying the center of the basin. Among them is Wādī Ghuwayr, which descends the steep escarpment fringing the northern edge of the basin and meanders southwards for *ca*. 30km to flow into the north-eastern part of the dry lake. The site of Wādī Ghuwayr 17 is located at the head of one of several forks of this wadi where sloping terrain and exposed bedrock suggest the former existence of a spring (**Fig. 2**). The surrounding landscape is characterized by a gently undulating flint pavement desert (Ar. *al-Ḥamād*) and dotted playas (Ar. *Qā'*). Owing to the hyperarid environmental conditions, no settlements currently exist nearby and local land use is limited to seasonal pasturing. The existence of a small Neolithic settlement was unexpected; its presence suggests that, during the early Holocene, the Jafr basin witnessed a short episode of climatic amelioration (Issar and Zohar 2007: 60-65).

The site of Wādī Ghuwayr 17 was first located by two of us (LAQ and PJW) in 1997, in



1. PPNB sites in the Jafr basin and surrounding areas.



2. Research area and location of Wādī Ghuwayr 17.

conjunction with the Jafr Basin Archaeological Project. It was identified as a PPNB pastoral encampment and recorded as Jafr-17 (Quintero and Wilke 1998a: 3, 1998b: 120, Wilke and Quintero 1998: 3; Quintero *et al*. 2004: 205-206). Investigation of Jafr-17 became urgent in 2005 when two of us (LAQ and PJW) discovered that the site had been severely disturbed by illicit digging. These thoughtless activities destroyed large portions of the site but left enough intact deposits, including subterranean architectural features, to allow scientific investigation. In light of the discoveries made by the work in the western Jafr desert described above, a more thorough investigation of Jafr-17 (and Jafr-106) was proposed to the lead author of this paper in order to provide an enhanced view of the PPNB in this remote region. For the subsequent rescue excavation, Jafr-17 was re-designated Wādī Ghuwayr 17.

The Investigation

The illicit excavation exposed a few masonry wall segments and numerous artifacts (**Fig. 3**), which raised expectations that the site might represent a second example of a PPNB agro-pastoral outpost, as at Wādī Abū Ṭulayḥa. Ahead of the rescue excavation, we relocated several features noted in the initial survey, including a large enclosure *ca*. 12m in diameter (**Fig. 4**), two small enclosures *ca*. 4-5m in diameter (**Fig. 5**) and a concentration of five petroglyphs a short distance down the drainage (**Fig. 6**). Dating the enclosures is problematic owing to a lack of datable *in situ* finds. Proximity of the large enclosure to the PPNB deposits may suggest affiliation with the Neolithic, but a post-Neolithic date is also a possibility. Numerous Chalcolithic / EBA sites with structures are known in the region, although all of these also contain lithic artifacts dating to that period, and most are associated with flint quarries or mines for the production of cortical 'tabular scraper' flake blanks (Quintero *et al*. 2002; Wilke and Quintero n.d.). Meanwhile, most of the petroglyphs depict a horseman holding a long spear, indicating that they are not related to the PPNB settlement.

Subsequently, we produced a 20cm contour

3. Wādī Ghuwayr 17: disturbed state before excavation (facing east).

4. Wādī Ghuwayr 17: large enclosure on western slope of gully (facing south-west).

5. Wādī Ghuwayr 17: two small enclosures on eastern slope of gully (facing south).

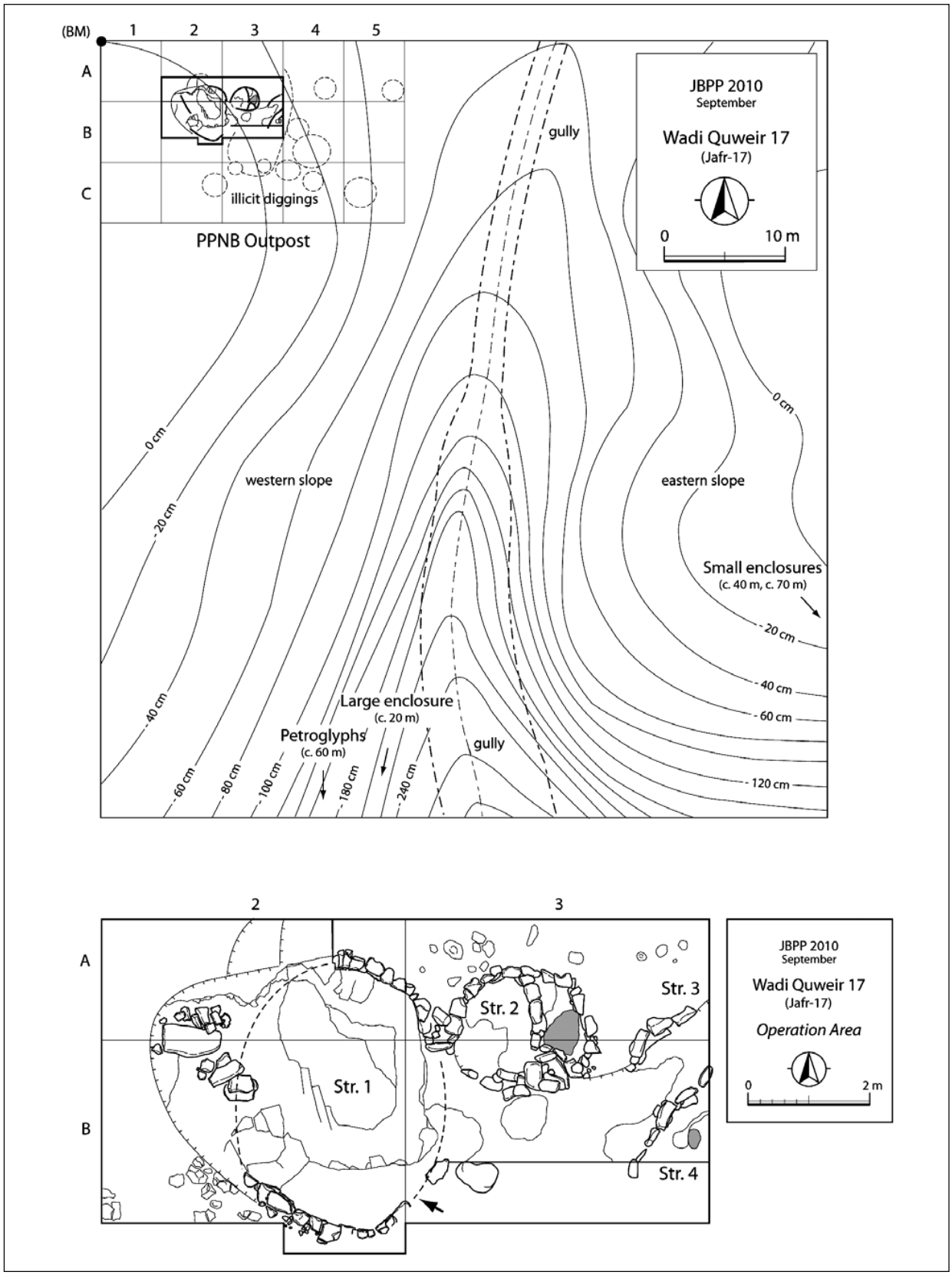
6. Wādī Ghuwayr 17: concentration of petroglyphs along a gully (facing north-west).

map and established a 5m by 5m grid over the supposed extent of the settlement (**Fig. 7**). Since no reliable triangulation point was available, we set up an arbitrary benchmark (elevation *ca*. 1,020m) at the north-western corner of the grid. Then we opened a 10m by 5m excavation area, covering the exposed masonry walls in the disturbed area of the site. The excavated area (including an extension to take in the southern wall of Structure 1) totalled 51 square meters, with the excavated deposits (including disturbed soil) amounting to *ca*. 30 cubic meters. No sieving was done owing to time constraints, but *ca*. 67 liters of floor deposits and hearth contents, largely from the well-preserved Structure 2, were wet-sieved in an attempt to recover botanical remains. The results of this analysis are not yet available.

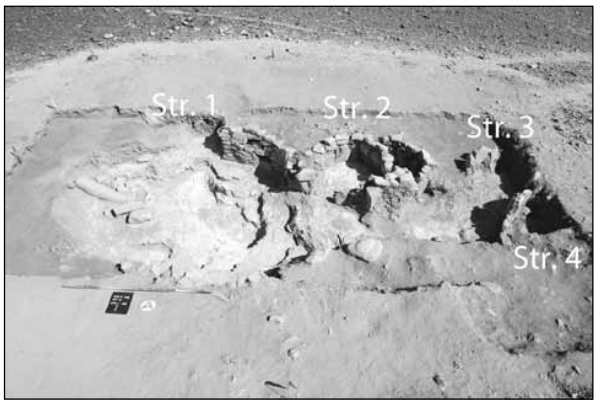
The excavation exposed the following stratigraphic sequence. Layer 1, or the surface layer, was *ca*. 5-8cm thick and contained light buff, slightly compact, silty sand deposits and a large quantity of heavily abraded flint pebbles forming the *al-Ḥamād* surface. Layer 2 was *ca*. 10cm thick, containing light brown, less compact, silty sand deposits and a small number of *Hamād* flints. Layer 3 is a general term for fill deposits left inside the semi-subterranean structural remains described below and, therefore, varied in thickness and nature depending on locus. Though heavily disturbed by illicit digging, this layer was still preserved in a few loci, including the interior of Structure 2 and the floor deposits of Structure 1. Layer 4 consisted of reddish brown, relatively compact, silty sand deposits *ca*. 40-50cm thick. A total of four semi-subterranean structures were originally cut into the upper surface of this layer. Layer 5 was a laminated chalky limestone layer *ca*. 40cm thick, the lower part of which served as a natural floor of the structures. Layer 6 was a cortical flint layer *ca*. 5-10cm thick, being exposed throughout the floors. Layer 7 was a limestone bedrock layer at least 30cm thick. The illicit excavation dug through these layers, leaving big holes throughout the settlement, especially in the center of Structure 1.

Structural Remains

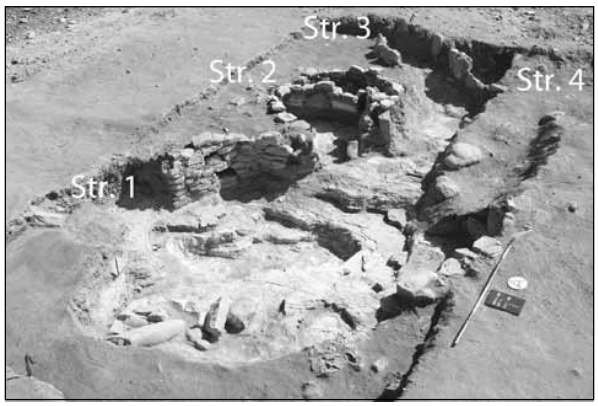
The excavation area contained a total of four



7. Wādī Ghuwayr 17: site plan (above) and excavation area (below).



8. Wādī Ghuwayr 17: general view of Structures 1 - 4 (facing north).



9. Wādī Ghuwayr 17: general view of Structures 1 - 4 (facing north-east).

semi-subterranean structures (**Figs. 8 and 9**). They were oval in general plan and three types could be distinguished: a large masonry structure with a deep floor (Structure 1), a small masonry structure with a relatively deep floor (Structure 2) and two small, shallow features characterized by upright slab walls (Structures 3 - 4). The smaller structures focused on the space in front of the large key structure, forming (probably in combination with other small features still hidden under the disturbed deposits) a small structural complex extending in an east - west direction.

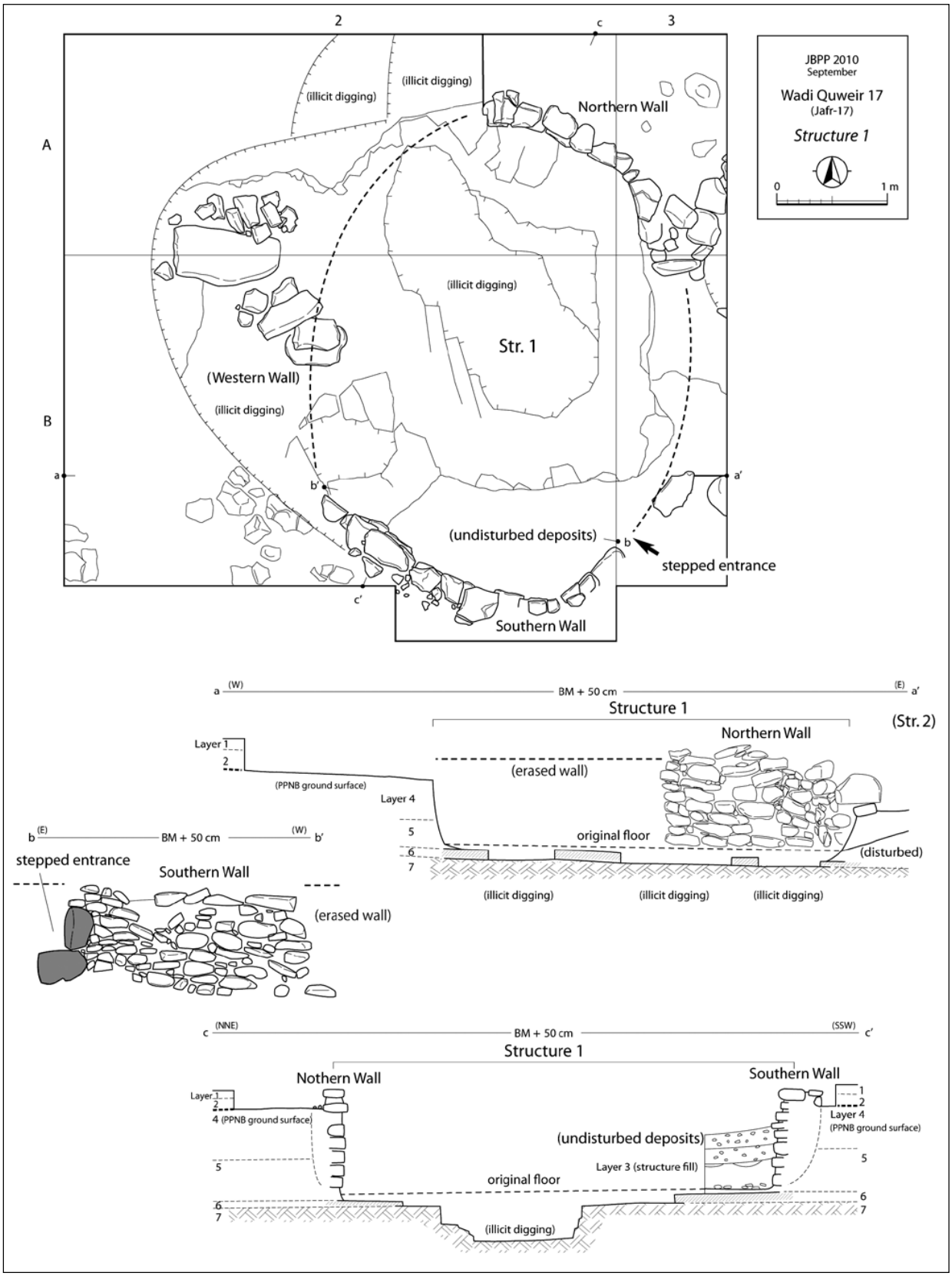
Structure 1

Structure 1, the main component of the complex, occupied the western half of the excavation area, measuring *ca*. 4.5m in the north - south major axis and *ca*. 3.5 m in the east - west minor axis, with an original floor depth of *ca*. 0.8m (**Figs. 10, 11 and 12**). The illicit digging was concentrated on this key structure; only a part of the northern, southern and western walls escaped destruction. The floor was also extensively damaged by robber pits, and no small features such as hearths were preserved.

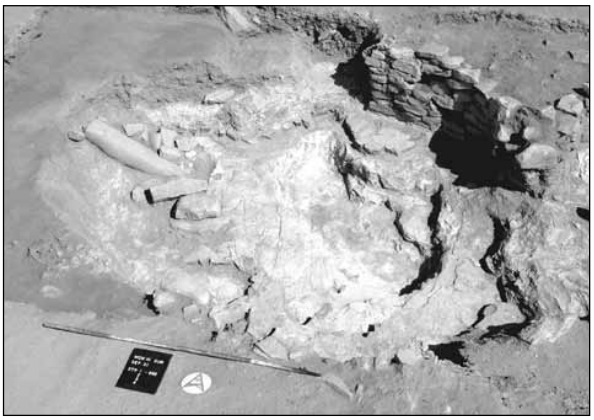
The northern wall was preserved to a height of *ca*. 0.9 m and a length of *ca*. 2m (**Fig. 13**). It was constructed of up to ten courses of undressed or partly dressed limestone cobbles set in stretcher bond. The uppermost courses protruded above the contemporary ground surface, suggesting the existence of an upper structural component. However, the scarcity of fallen stones around the wall implied that the upper structure, if any, was not more than several courses - inclusive of the preserved part - or *ca*. 0.5m high. Overall, the construction was of relatively high quality; every course was laid nearly horizontally using clay mortar with small stones to stabilize. However, the eastern half of the wall leant inwards to a considerable extent, indicating that it was subjected to strong sideways pressure from the surrounding soil for a considerable period of time. A few holes were found in the top of the wall, but these probably represent shallow probing activity by the looters. In addition, a large stone weight, a key to dating the Jafr PPNB barrage system, was found more or less *in situ* beside the wall (**Figs. 14, 28: 1**).

The southern wall, on the other hand, was preserved to a height of *ca*. 0.9m and a length of *ca*. 3m (**Fig. 15**). In contrast to the northern wall, it was poorly constructed, and construction materials were less standardized and often piled up irregularly with a large mortared gap between any two adjacent stones. There is a strong possibility that the original wall collapsed at some point, owing to soil pressure, and was then reconstructed in a hurry. It is probably for this reason that the structure was slightly skewed in general plan at the south-eastern corner. A narrow, *ca*. 30cm wide, stepped entrance originally flanked by a pair of upright boulders was identified at the eastern edge of the preserved wall.

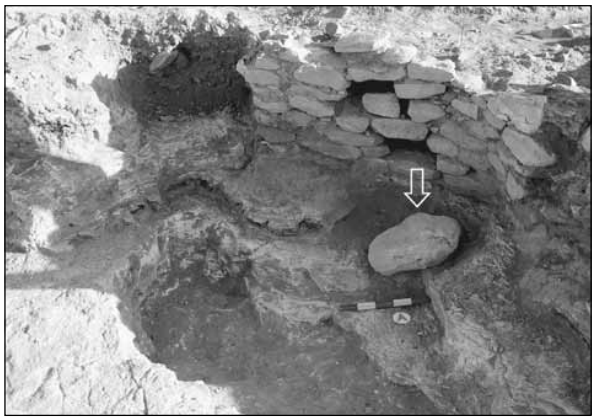
The western wall was almost destroyed, but a few foundation stones still remained roughly *in situ* (**Fig. 16**). In addition, a dozen construction stones were found dislodged from their original positions. They included a limestone boulder *ca*. 1.1m high, which reminded us of the *massebot* found at Structure 03 of Wādī Abū Ṭulayḥa (Fujii 2007a: Fig. 7). It is interesting to note that both examples occupied the same recess of the



10. Wādī Ghuwayr 17: plan and sections / elevations of Structure 1.



11. Wādī Ghuwayr 17: close-up of Structure 1 (facing north-north-west).

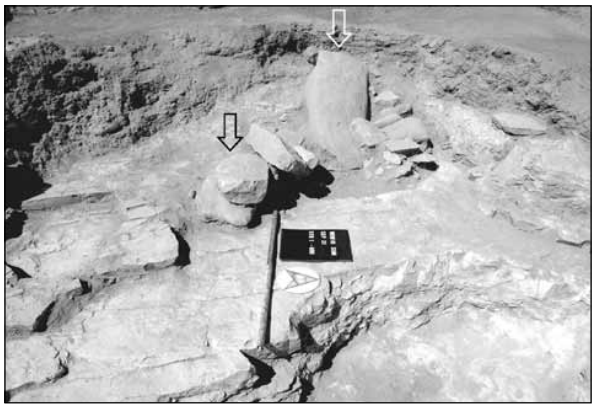


14. Wādī Ghuwayr 17: grooved stone weight found in situ beside the northern wall (facing north).

12. Wādī Ghuwayr 17: close-up of Structure 1 (facing south-east).

15. Wādī Ghuwayr 17: close-up of southern wall of Structure 1 (facing south).

13. Wādī Ghuwayr 17: close-up of northern wall of Structure 1 (facing north).

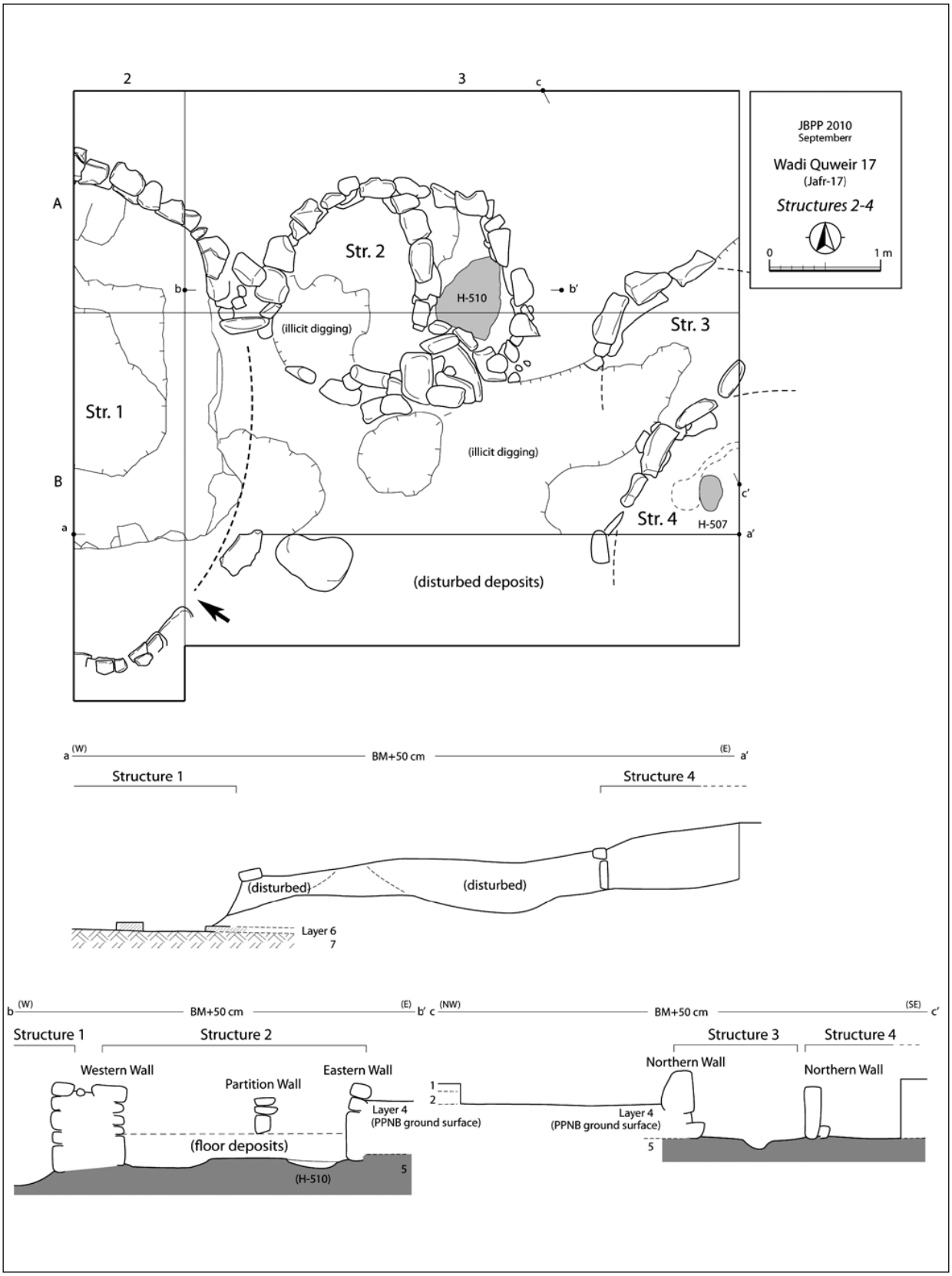


16. Wādī Ghuwayr 17: close-up of western wall remnant of Structure 1 (facing west).

key structure, namely, its north-western corner.

Structure 2

Structure 2 was one of three small features attached to the key structure; it measured *ca*. 2.3m in the east - west major axis and *ca*. 2m in the north - south minor axis, with a floor depth of *ca*. 0.6m (**Fig. 17**). This small structure escaped damage by looters and was relatively well-preserved. The only exception to this was the south-western corner, which was entirely absent, leaving a small gap along the wall alignment. It appears that a stepped entrance existed



17. Wādī Ghuwayr 17: plan and sections / elevations of Structures 2 - 4.

here; the existence of a large slab at the western corner also hints that the structure was directly connected with the neighboring key structure by means of a narrow path (**Fig. 13**).

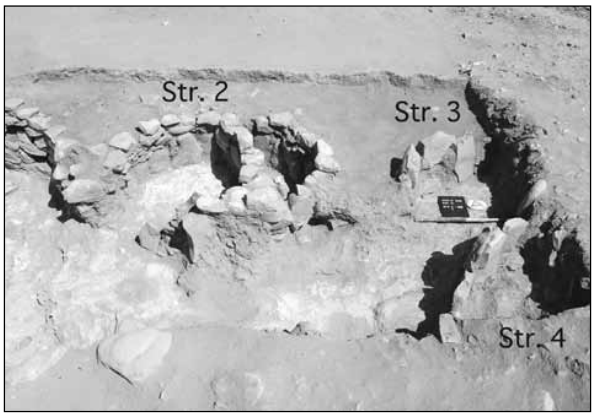
This structure was eclectic in its construction; while the foundation course utilized large upright stones, upper courses used a stretcher-bond technique using smaller cobbles (**Fig. 18**). Again, the uppermost few courses protruded from the contemporary ground surface. An irregular hearth, *ca*. 60cm in diameter and *ca*. 8cm in depth, was found at the eastern corner of the floor. In addition, a partition-like wall was found at the easterly part of the room, but was interpreted as a later addition in view of the stratigraphic gap between it and the original floor (**Fig. 19**). It appears that this additional wall functioned as a support for the inclining retaining walls. The deposits on the secondary floor included a number of naviform core and blade elements, indicating that this reinforcement work was undertaken in the PPNB period.

Structure 3

This small feature, *ca*. 1.5m by *ca*. 1m in floor area with a floor depth of *ca*. 0.3m, was partly exposed at the eastern edge of the excavation area (**Figs. 17 and 20**). Unlike the two adjacent structures described above, it was constructed with a single row and course of upright limestone slabs. Their basal level varied considerably suggesting that, as with the other structures, this small feature also suffered partial collapse and reconstruction over the course of its history. Neither entrance nor hearth was identified, but a cache of seven grinding stones were found on the south-western corner of the preserved floor (**Fig. 26: 5-8**).

Structure 4

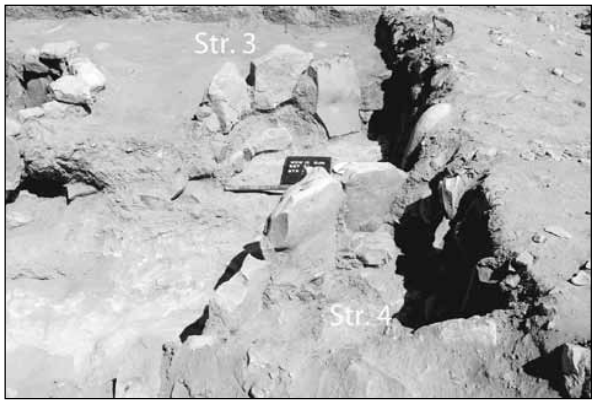
Structure 4 was uncovered at the south-eastern corner of the excavation area (**Figs. 17 and 21**). It had much in common with neighboring Structure 3, being characterized by an upright slab wall technique as well as smaller



18. Wādī Ghuwayr 17: general view of Structures 2 - 4 (facing north).

19. Wādī Ghuwayr 17: close-up of Structure 2 (facing north).

20. Wādī Ghuwayr 17: close-up of Structure 2 (facing south-east).



21. Wādī Ghuwayr 17: close-up of Structures 3 - 4 (facing north).

floor area (*ca*. 2m in major axis) and floor depth (*ca*. 0.3m). No clear evidence of an entrance was confirmed, but a small hearth, *ca*. 30cm in its longer axis and *ca*. 6cm in depth, was found roughly in the center of the preserved floor.

Artifacts

The excavation area yielded several hundred artifacts, most of which were chipped flint and ground stone implements. Other finds were scarce, being limited to two bone tools, several adornments, a dozen petroglyphs and a small quantity of faunal / botanical remains. Overall, the small finds from Wādī Ghuwayr 17 have much in common with those from Wādī Abū Ṭulayḥa, suggesting that the two sites are of roughly the same date.

Chipped Flint Tools

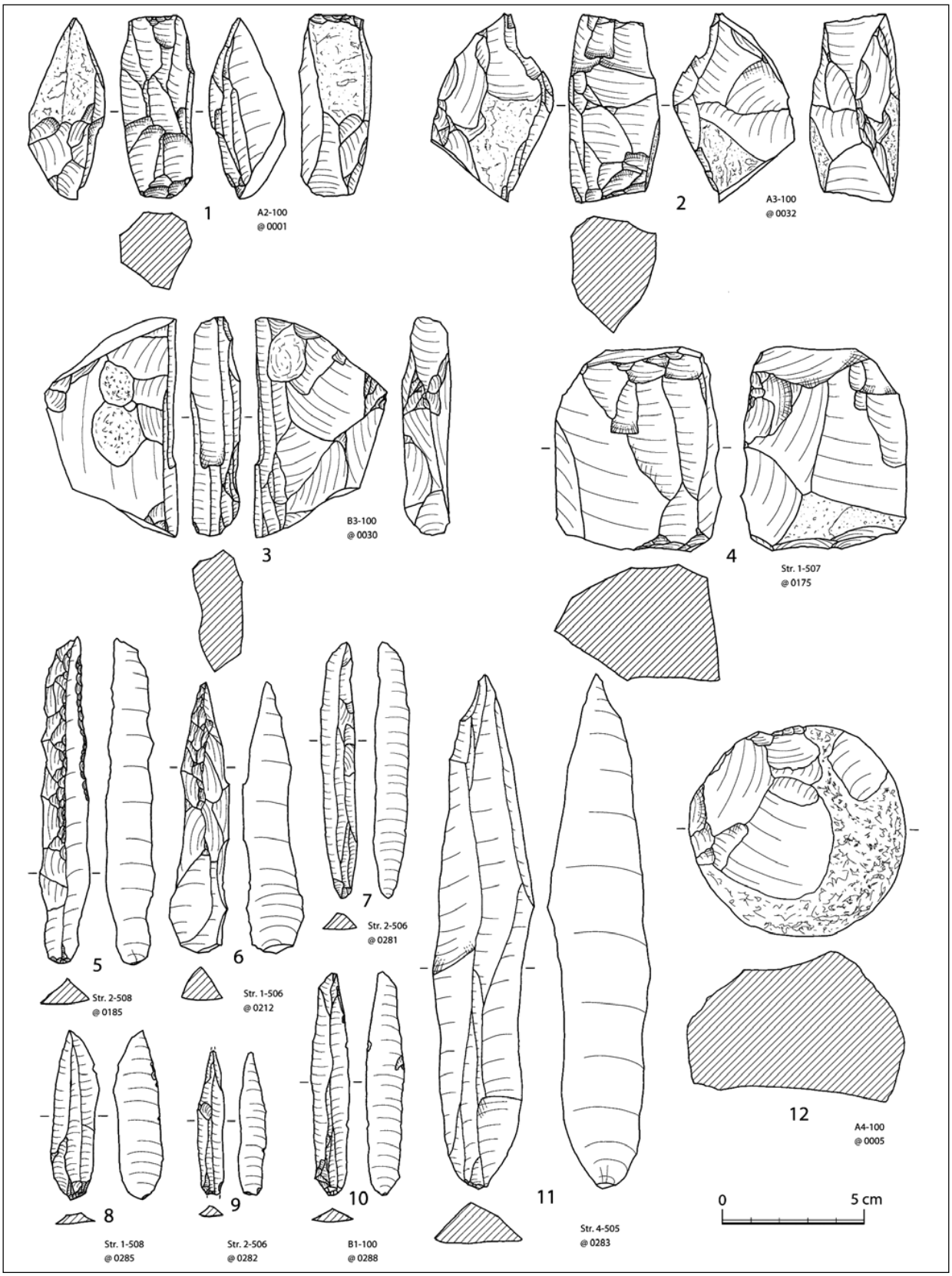
The flint assemblage was dominated by naviform core and blade elements (**Fig. 22**). Intrusive items included Levallois flakes, tabular scrapers, Jafr blades (Quintero *et al*. 2002) and nondescript abraded retouched blades and flakes, but they occurred largely as surface finds and only in limited numbers. The PPNB assemblage used light gray to dark brown, slightly matt, high-quality Eocene flint endemic in the Jafr basin as raw material. No obsidian artifacts were recovered. The existence of several hammer stones (**Fig. 22: 12**) as well as cores (**Fig. 22: 1-4**) and debitage (**Fig. 22: 5-11**) attests to on-site production of the artifacts, although the scarcity of flint nodules and primary elements suggests that the initial core preparation took place elsewhere, probably at flint outcrops in nearby escarpments and drainages.

The tool kit included points / arrowheads (**Fig. 23: 1-18**), spearheads / knives on blades (**Fig. 23: 19-20**), bifacial knives (**Fig. 23: 21**), drills (**Fig. 24: 1-6**), notches / denticulates (**Fig. 24: 7-9**), burins (**Fig. 24: 10-12**), endscrapers, snapped / truncated blades (**Fig. 24: 13-14**) and retouched blades and flakes. In addition, bifacially retouched tools (**Fig. 25: 1-3**), chopping tools (**Fig. 25: 6**), and heavy-duty digging tools made on robust flakes or elongated nodules (**Fig. 25: 4-5, 7**) were also included. Since the illicit digging most likely affected the original character of the assemblage, little can be said about the relative frequency of artifact types. The following two observations should however be noted. First, points / arrowheads still account for 11.4 % of the retouched tools recovered, suggesting that hunting was an important subsistence activity. Second, the complete absence of sickle elements with silica sheen is not consistent with MPPNB assemblages reflecting intensive cereal cultivation, although such artifacts may have been looted from the deposit. Also, some of the unglossed retouched blades with finely serrated lateral edges may have been used as components of reaping tools, an assemblage pattern more consistent with short-term tool use, but also with LPPNB occupations in southern Jordan (Quintero *et al*. 1997).

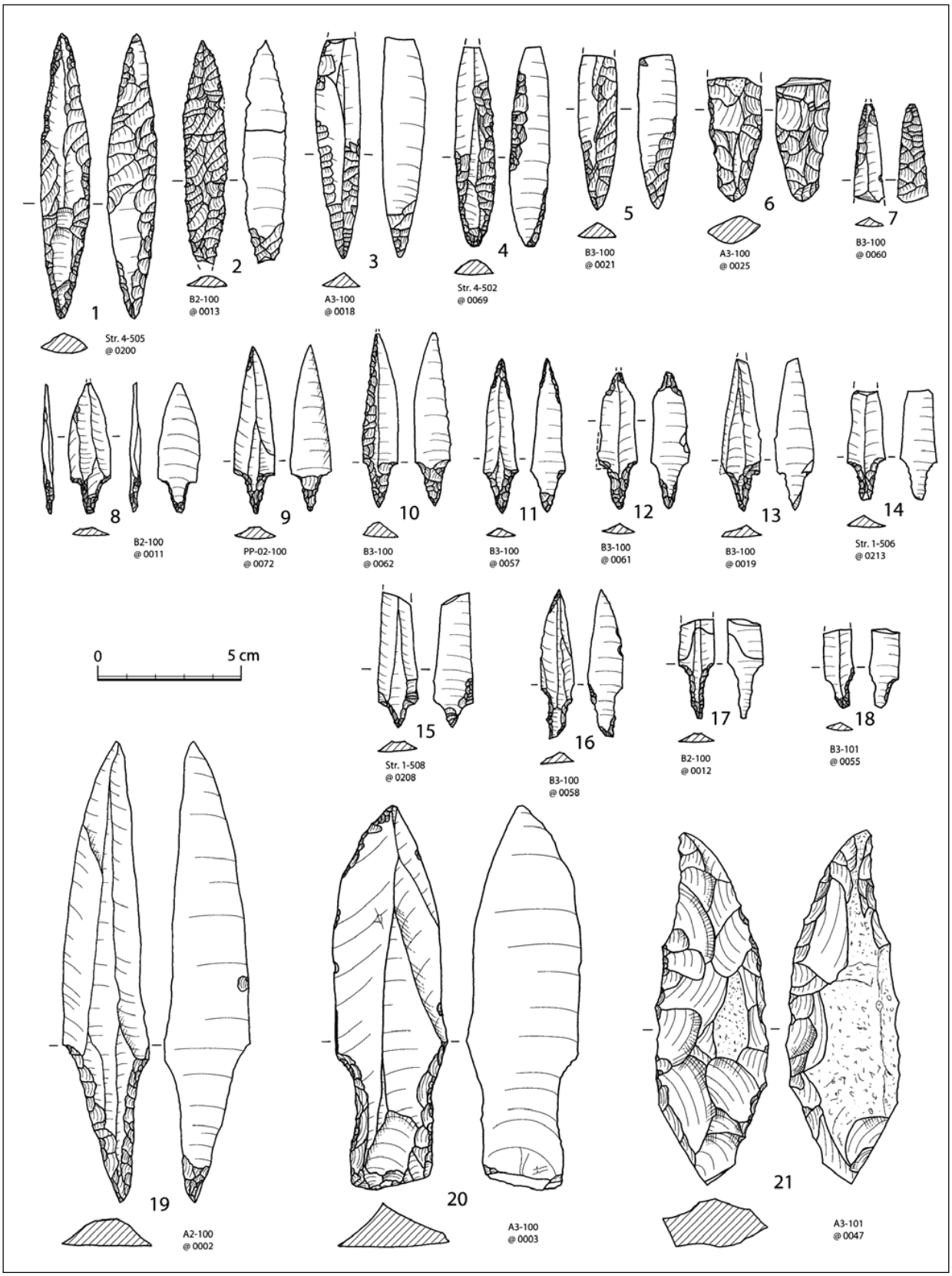
As for the point typology, it is noteworthy that Amuq (**Fig. 23: 1-7**) and Byblos types (**Fig. 23: 8-15**) are predominant. Miscellaneous types also occurred in small numbers (**Fig. 23: 16-18**), but no proper Jericho-type points with a pair of wide, well-developed barbs are included. The frequency of the Amuq type points is, in general, suggestive of a LPPNB date, although aspects of the assemblage seem to show an affinity with the flint assemblage of ʻAyn Abū Nukhayla, a small settlement in Wādī Ḥismā dating to *ca*. 8,500 b.p. (Henry *et al*. 2003), a date widely accepted as transitional from MPPNB to LPPNB (Rollefson 1998). The points from Wādī Ghuwayr 17, excluding Amuq examples, are characterized by their small dimensions and abrupt or semi-abrupt retouch focusing on the tip and the base. It could be argued that some examples are either shouldered (i.e. Byblos-type) or very weakly barbed (i.e. Jericho-type). Similar examples have been found at other desert sites including Wādī Abū Ṭulayḥa (e.g. Fujii 2007a: Fig. 27, no. 15-28, 2008a: Fig. 2-4; Nagaya 2009). Given these considerations, it seems apparent that the flint assemblage can be dated to the late MPPNB or the LPPNB.

Grinding Implements

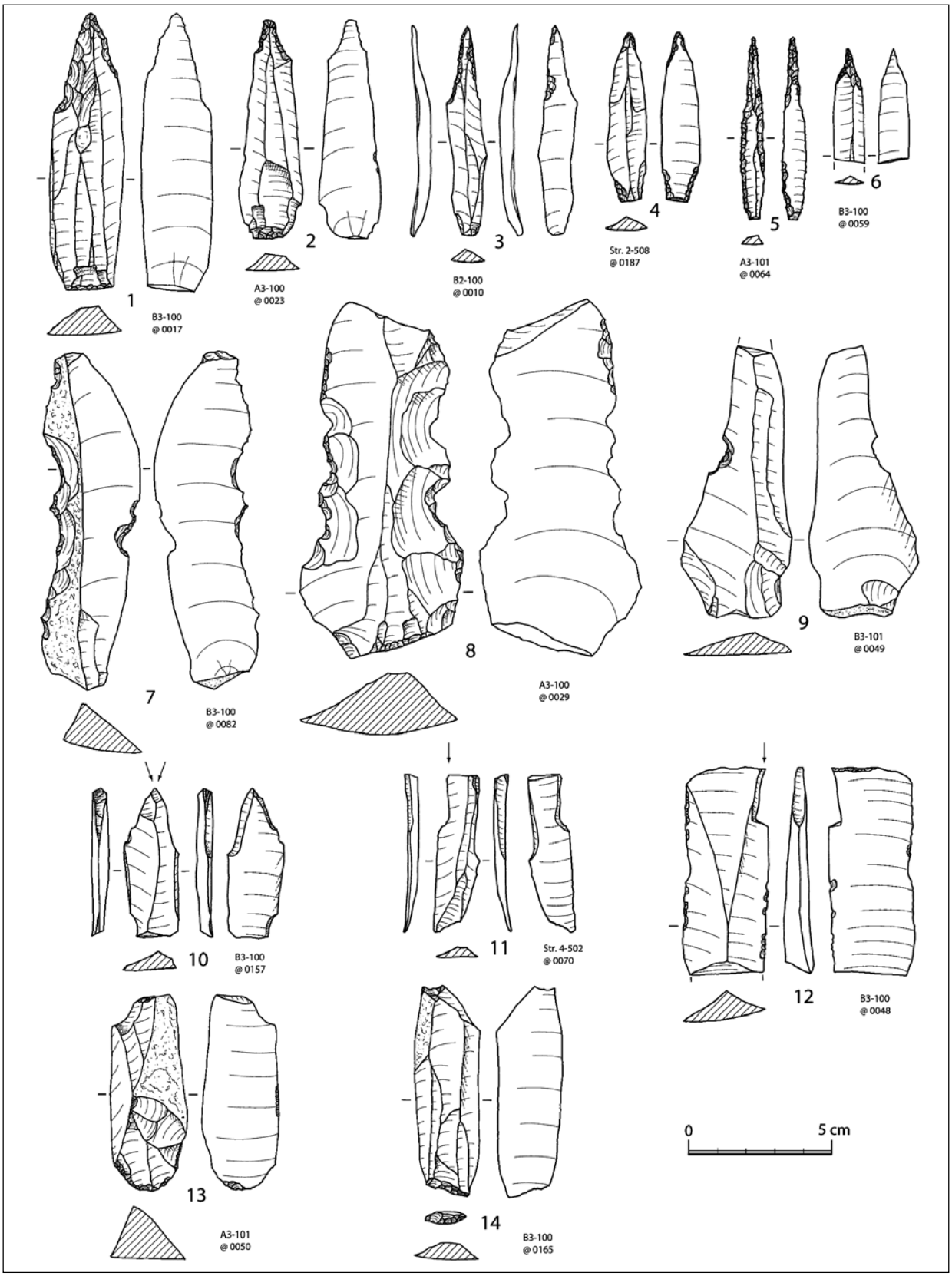
Grinding implements include a few elongated basin querns made of cortical flint, the basin of a large example having been created by flint-on-flint percussion (**Fig. 26: 1**), a few round to oval querns made of limestone (**Fig. 26: 2**), and a few dozen oval to semi-quadrangular handstones made of flint, limestone or basalt (**Fig. 26: 3-10**). Basin querns are standard equipment



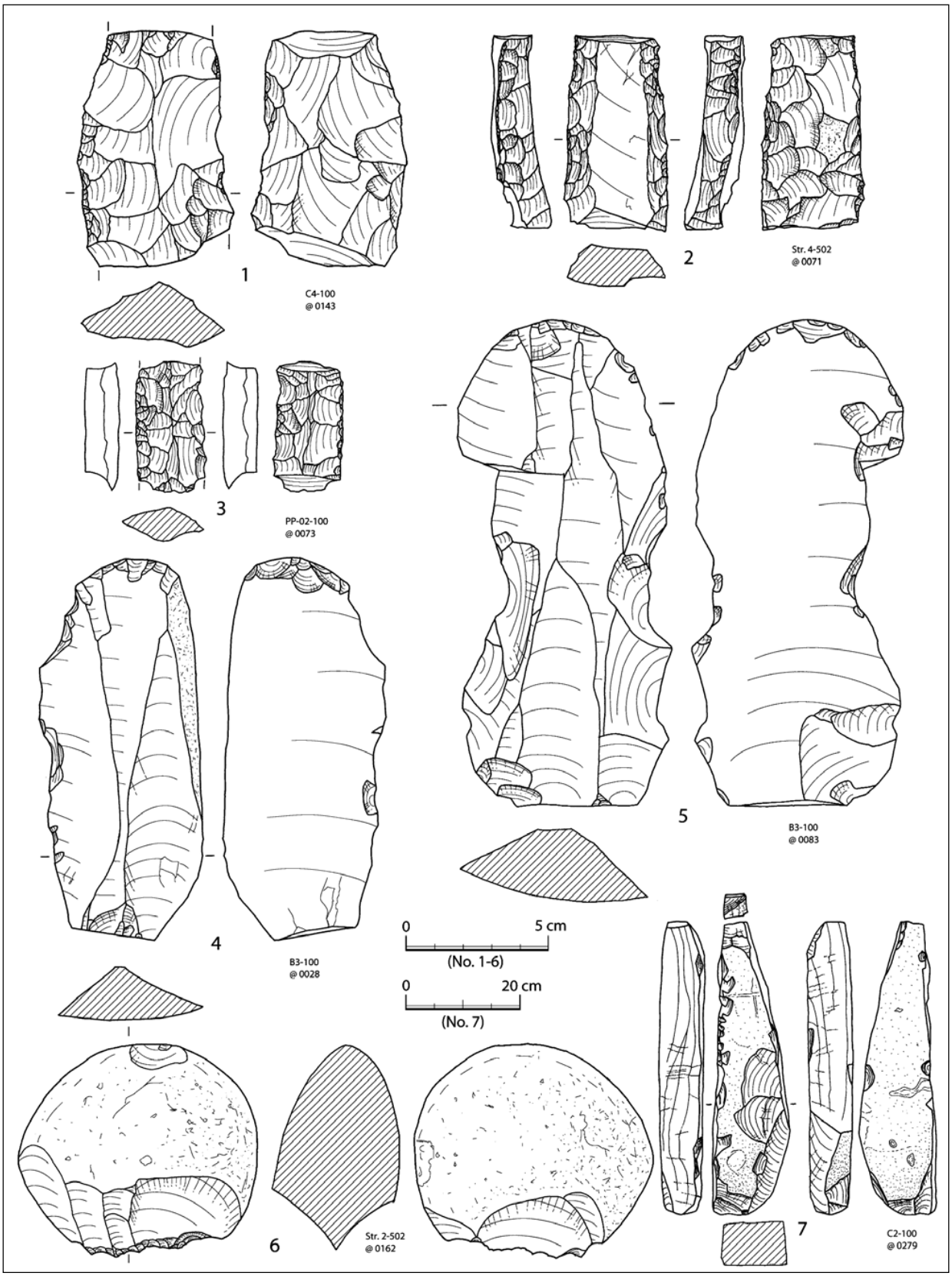
22. Wādī Ghuwayr 17: chipped flint artifacts (cores, debitage and a hammer stone).



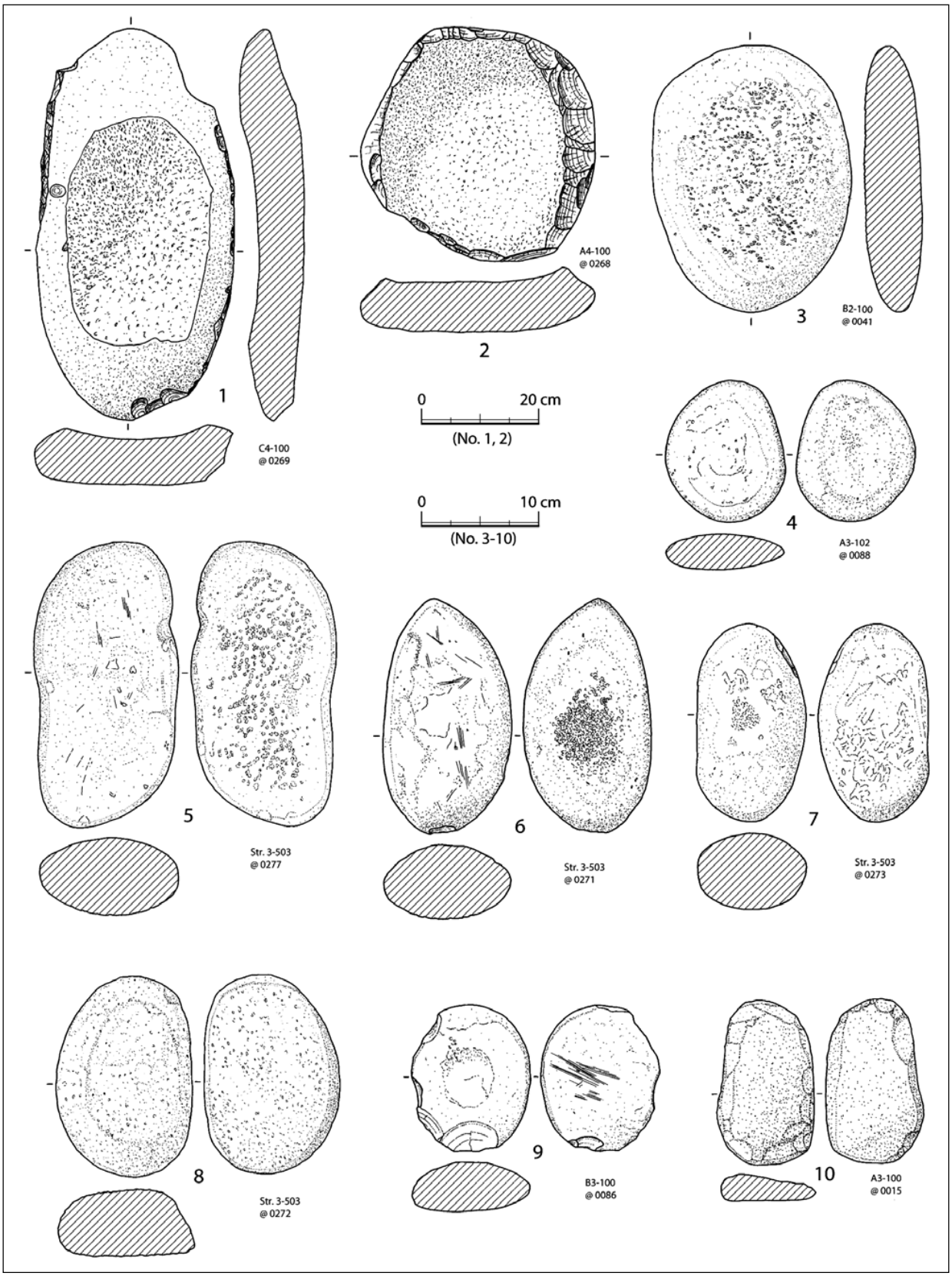
23. Wādī Ghuwayr 17: chipped flint artifacts (retouched tools).



24. Wādī Ghuwayr 17: chipped flint artifacts (retouched tools).



25. Wādī Ghuwayr 17: chipped flint artifacts (retouched tools).



26. Wādī Ghuwayr 17: querns (no. 1-2) and grinding slabs (nos. 3-10).

of PPNB desert sites in southern Jordan; parallel examples have for example been reported from Wādī Abū Ṭulayḥa (Fujii 2008a: Fig. 29, no. 1-2, 5-6) and ʻAyn Abū Nukhayla (Henry *et al*. 2003: Fig. 13, no. A-C). Handstones are also common in the Jafr PPNB, and similar examples occurred again at Wādī Abū Ṭulayḥa in large numbers (Fujii 2008a: Fig. 29, no. 7-18, 2009a; Fig. 17, no. 4-9). These heavy-duty tools often bear remarkable production and use wear traces. Most of them occurred in disturbed deposits but, as noted above, seven of the handstones were found together on the floor of Structure 3 (**Fig. 26: 5-8**). Their concentration in the minor structures suggests that domestic subsistence activities focused on those places rather than on the larger key structure.

Incidentally, the frequency of grinding implements is seemingly inconsistent with the harsh site setting and the scarcity of reaping tools, further supporting the likelihood that a more benevolent climate existed when the site was occupied. Noteworthy in this regard is the existence of a barrage system at Wādī Ghuwayr 106 several kilometers to the west (Fujii *et al*. this volume). Given that this system may represent an enclave agricultural field in use during the PPNB, it makes sense that Wādī Ghuwayr 17 produced a certain number of grinding tools. However, the functional association and contemporaneity of the two sites needs verification.

Stone Vessels

A total of seven limestone vessel fragments were recovered from fill layers of Structure 1 and disturbed deposits around it. Shallow bowls *ca*. 10 - 20cm in diameter and *ca*. 10cm in height accounted for the majority (**Fig. 27: 2**), but a large bowl with a diameter of *ca*. 50cm and a height of *ca*. 20cm is also included (**Fig. 27: 1**). Overall, the vessels were not elaborate in craftsmanship, being characterized by irregular profiles and thick walls. Their specific use is still unknown.

Flint and Limestone Bowlets

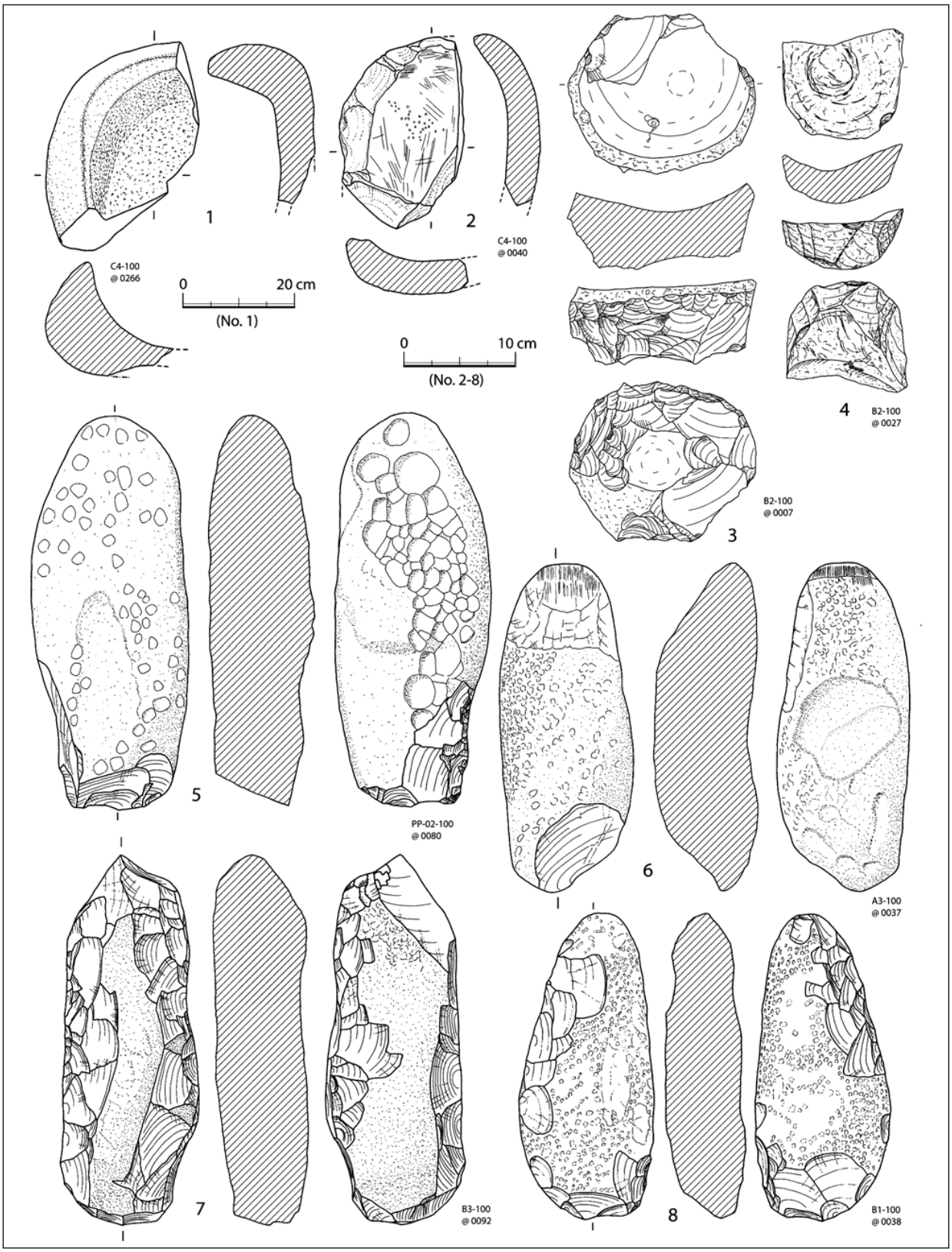
The flint bowlet, a stone vessel flaked from a cortical flint pebble around a shallow, thermal-flaked concavity, is characteristic of the M - LPPNB cultural entity in southern Jordan. A dozen examples have been reported from Baṣṭa, Baʻja, al-Ḥimmah, ʻAyn al-Jammām, and Wādī Abū Ṭulayḥa (Fujii 2009b). The survey and rescue excavation at Wādī Ghuwayr 17 added three examples, including a limestone example (**Fig. 27: 3**), to the collection. At least two of them were found among the disturbed deposits of Sq. B2, suggesting that they originated from the key structure. They were relatively large in dimensions (more than 10cm in diameter) and roughly trimmed around their periphery, being comparable to the MPPNB bowlets from Wādī Abū Ṭulayḥa (Fujii 2009b: 24-25). No remarkable macroscopic use wear was recognized.

Diagonally Truncated Stone Bars

The diagonally truncated stone bar made of limestone (or rarely flint) is another chronological marker of the western Jafr Pastoral PPNB, and parallel examples have been found at Wādī Abū Ṭulayḥa in large numbers (e.g. Fujii 2008a: Fig. 31, no. 1-2, 2009a: Fig. 19, no. 1-3). Despite the limited excavation, Wādī Ghuwayr 17 produced a total of thirteen examples (**Fig. 27: 5-8**). They were standardized in both dimensions (*ca*. 20 - 30cm long) and weight (*ca*. 3 - 5kg), bearing heavy damage at their truncated distal end. In view of their frequency and remarkable edge damage, they are thought to have been used for digging, possibly through the limestone layers underlying the silty sand deposits. It is probably for this reason that, unlike the flint and limestone bowlets, they occurred in various loci within the excavation area. The heavy-duty digging tools made of an elongated flint nodule described above were probably also used for the same purpose (**Fig. 25: 7**). Another possibility is that these tools were used as percussors to form or roughen the working surfaces of millstones.

Notched and Grooved Stone Weight

The large stone weight with a pair of notches and / or grooves in its central part is a type artifact of the Jafr PPNB barrage system. All of the three barrage systems known to date, including Wādī Ghuwayr 106, have yielded these diagnostic artifacts (Fujii 2007a, 2007b; Fujii *et al*. in this volume). It is possible that they served merely as construction material, but this is likely not their original use. In a barrage system they are usually incorporated into a reinforcement wall attached to the central part of the



27. Wādī Ghuwayr 17: stone vessels (nos. 1-2), flint / limestone bowlets (nos. 3-4) and diagonally truncated stone bars (nos. 5-8).

barrage, suggesting that they were a functional component. Nevertheless, that function remains a mystery. Taking this into consideration, one of us (SF) suggests that they were built into the key part of the barrage wall as ritual objects for praying for the safe-keeping and eternity of the barrage (Fujii 2010a).

Unexpectedly, Wādī Ghuwayr 17 also produced a similar example (**Figs. 14, 28: 1**). As with the other examples, it was very large in dimensions, measuring *ca*. 56cm long, 40cm wide, *ca*. 19cm thick and *ca*. 53kg in weight. While one lateral edge was roughly trimmed, the other edge was left unmodified due to the presence of a natural concavity. A shallow groove running horizontally across the upper surface is also of natural origin. The occurrence of the *in situ* find at the PPNB settlement enhanced the validity of the diagnostic stone weight as a chronological marker of the Jafr barrage system.

Pillar Base

The large limestone slab with a central conical depression is also characteristic of the western Jafr PPNB, and a large number of examples, interpreted as pillar bases, were recorded at Wādī Abū Ṭulayḥa (e.g. Fujii 2009a: 24-25). Wādī Ghuwayr 17 yielded a halved example *ca*. 60cm in diameter. It occurred in disturbed deposits in Sq. A2, suggesting its original association with Structure 1 (**Fig. 28: 2**). An anthropogenic, socket-like concavity *ca*. 12cm in diameter and *ca*. 5cm deep occupied its central position. No clear macroscopic use wear was recognized, but a petroglyph was added to the elongated fractured surface across the socket hole. In addition, there was a smaller, questionable example (**Fig. 28: 3**). It should be noted, incidentally, that a significant literature exists which classify similar artifacts as cuphole mortars or cup-shaped mortars, assigning them to milling assemblages (e.g. Shaffrey 2007: 350-353). We tentatively classified them as pillar bases on the basis of our excavated evidence from Wādī Abū Ṭulayḥa (Fujii 2006a: 16, 2007a: 379-380).

Game Board

The game board with two rows of small holes is common in the southern Levant, and a few dozen examples have been reported from PPNB sites including al-Bayḍā (Kirkbride 1966: Fig. 8), as-Sifiyya (Hamzeh Mahasneh pers. comm..), ʻAyn Ghazāl (Rollefson 1992: Fig. 1; Rollefson and Kafafi 1997: Fig. 14), and Wādī Abū Ṭulayḥa (e.g. Fujii 2009a: Fig. 17). Cis-jordan sites including Jericho (Kenyon and Holland 1983: Fig. 229), Wadi Tbeik (Bar-Yosef 1982: 10) and Kfar HaHoresh (Nigel Goring-Morris pers. comm..) have also yielded similar artifacts. Wādī Ghuwayr 17 yielded a halved example (**Fig. 28: 4**). Its occurrence in the disturbed deposits of Sq. A4 suggested its association with minor structural components, a trend common to the early phase of Wādī Abū Ṭulayḥa.

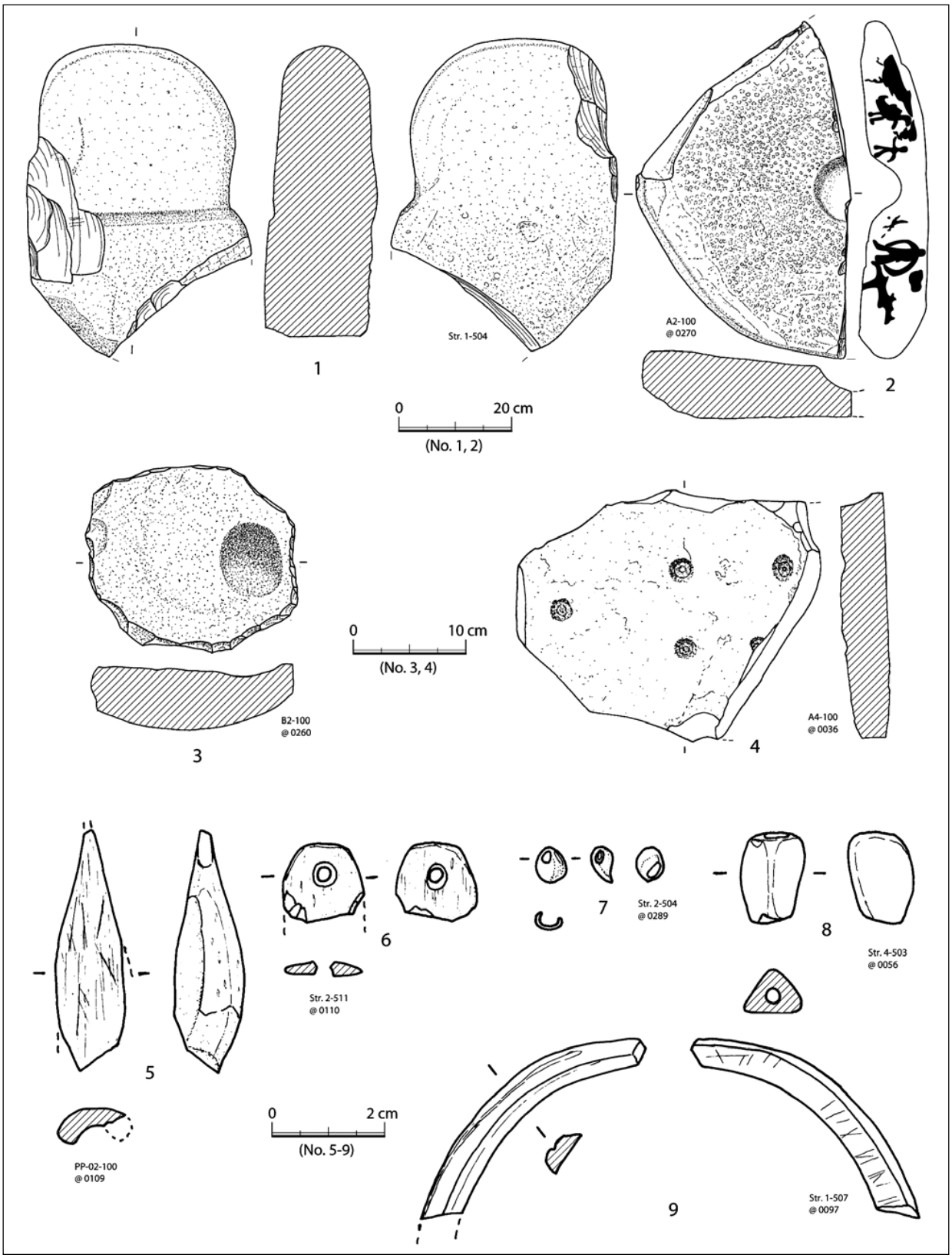
Unlike the other examples, this game board was exceptionally fashioned from a cortical flint slab. It was relatively large in size, measuring *ca*. 27cm in preserved length, *ca*. 22cm wide, *ca*. 3.7cm thick and *ca*. 3.6kg in weight. The cortical surface still retained a total of five small concavities, all of which were produced by a pecking technique. The isolated hole at the left edge was possibly used for a depot of game pieces. The other four holes were arranged regularly in two rows, but were not associated with a pair of horizontal grooves connecting any two adjacent holes. In view of the overall size and morphology, it seems likely that this game board had originally at least six holes and a pair of depots.

Whetstones

The excavation area yielded several whetstones made largely of sandstone. Most of them were found in fill layers of Structure 1 and disturbed deposits around it. They are palm-size in most cases, being oval to semi-quadrangular in general plan. Some striations were still observable on their flat working surface, suggesting that they were used for grinding or rubbing small hard objects such as bone tools and adornments.

Bone Tools

Scarcity of bone implements is a feature of the Jafr Pastoral PPNB. Wādī Ghuwayr 17 was no exception, and only two small examples were recovered from an upper fill layer of Structure 2 and disturbed deposits around it. One of them was a short drill (**Fig. 28: 5**) and the other was a head fragment of a pierced, spatula-like tool (**Fig. 28: 6**).



28. Wādī Ghuwayr 17: notched and grooved stone weight (no. 1), pillar bases (nos. 2-3), game board (no. 4), bone tools (nos. 5-6) and adornments (nos. 7-9).

Adornments

Scarcity of adornments is also characteristic of the Jafr Pastoral PPNB. The finds from Wādī Ghuwayr 17 were limited to a small bead, probably made from a land snail shell (**Fig. 28: 7**), a prismatic bead made of malachite (**Fig. 28: 8**) and a fragment of a stone bracelet (**Fig. 28: 9**). The stone bracelet is common on PPNB settlements in the southern Levant; its production process is elucidated at Ba'ja, for example (Gebel and Bienert 1997: Fig. 14). The occurrence of the malachite bead (and several fragments described below) is also suggestive of material flow from the contemporary west, probably the Faynān area.

Miscellaneous Finds

Several small fragments of malachite, quartz, marble and reddish sandstone were found, largely in fill layers of Structure 1. Since the Jafr basin is thought to be devoid of such material, these colorful exotic stone fragments probably were brought to the site as pigment or raw material for adornments from mountainous areas to the west. In addition, faunal and botanical remains were recovered in small quantities from undisturbed fill layers of Structure 2. A close examination of these materials is now in progress, but preliminary study suggests that nuts (*Pistacia* sp.) are common in the botanical samples (Hiroo Nasu pers. comm.).

Petroglyphs

An abundance of portable petroglyph slabs is a distinctive feature of the Jafr Pastoral PPNB (Fujii 2008b). Wādī Ghuwayr 17 was no exception, and no less than 11 examples were recovered despite the limited excavation area (**Figs. 29, 30 and 31**). The stones with petroglyphs occurred exclusively in disturbed deposits around Structure 1, suggesting they originated from the key structure. Most of the petroglyphs were on a weathered, somewhat darkened, flat surface of an undressed limestone slab or cobble, but one was on the fractured surface of the halved pillar base (**Figs. 28: 2, 31: 1**). In terms of technology, every petroglyph was produced by pecking; no line engraving technique was employed, with the exception of one scratched example (**Fig. 29: 1**).

As for iconography, the predominant motif was that of small to medium herbivores roaming alone (**Fig. 29: 3**) or in a small herd (**Fig. 30: 1, 3-4**). Other motifs include a carnivore-like creature with a long tail (**Fig. 31: 1**), a few bird-like designs with relatively long legs (**Figs. 30: 4, 31: 1**) and several anthropomorphic figures (**Figs. 29: 2, 5; 30: 2, 4, 31: 1-2**). The frequency of anthropomorphic figures is unique to Wādī Ghuwayr and merits special attention. Two petroglyphs depict a human-like figure tending a goat-like quadruped with a short tail and relatively stout trunk (**Fig. 30: 2, 4**). This might be a representation of pasturing around the site. Cross-referencing with faunal evidence is eagerly awaited.

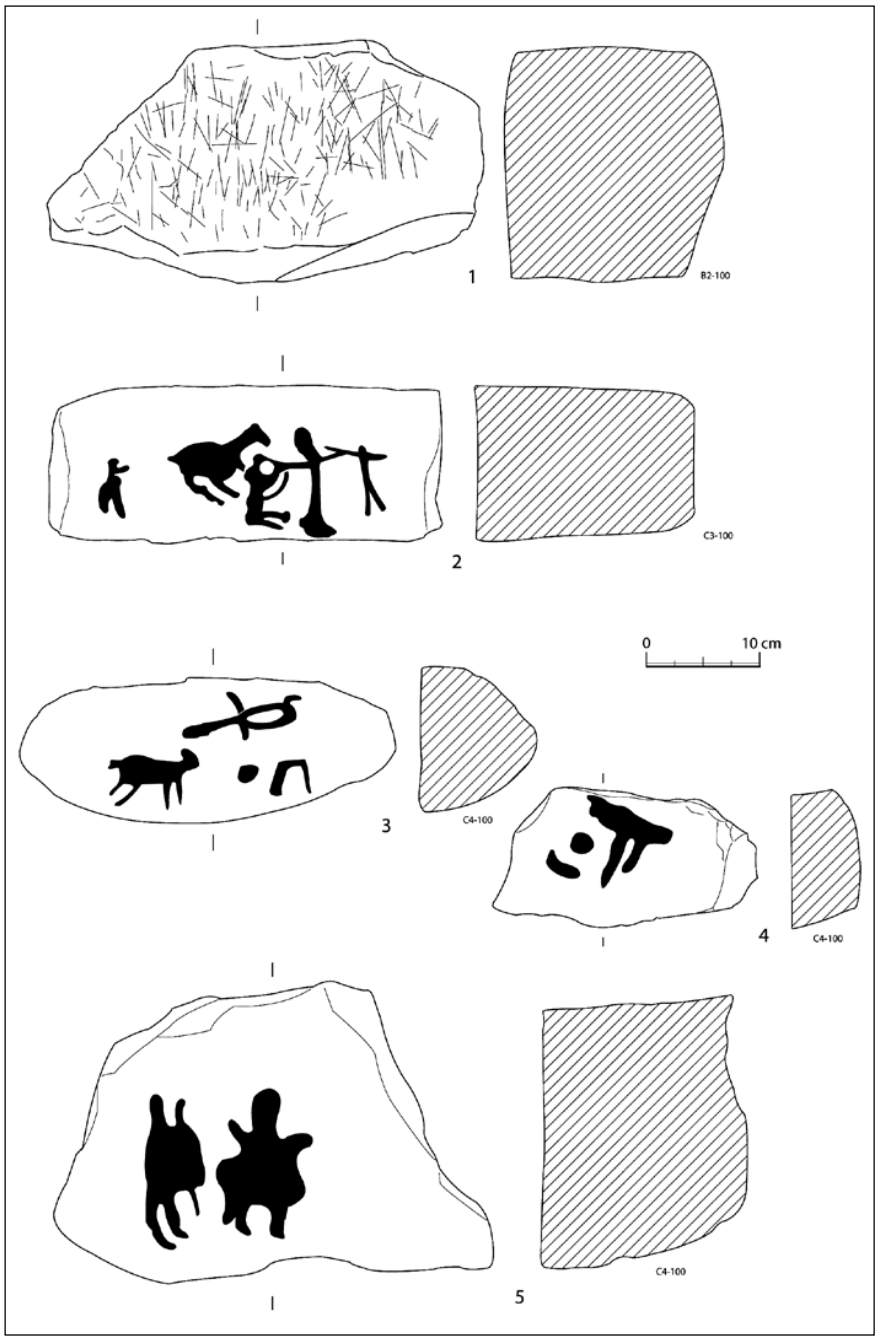
Summary and Discussion

The rescue excavation at Wādī Ghuwayr 17 has provided further insights into the Neolithic land use of the Jafr basin. To conclude, we will briefly review the results of the investigation, focusing on a few major issues.

Settlement Size

In view of the excavation results and distribution of surface finds, the size of the Wādī Ghuwayr 17 settlement is estimated at *ca*. 0.015 - 0.02ha (*ca*. 15 - 20m long by *ca*. 10m wide). This is approximately one-fifth to one-tenth of the norm for PPNB desert settlements, such as Wādī Abū Ṭulayḥa (*ca*. 0.1 - 0.15ha; Fujii 2009a: 204), Wādī Jīlāt 7 (0.07 - 0.2ha; Garrard *et al*. 1994: 75), Wādī Jīlāt 26 (0.8ha; Garrard *et al*. 1994: 77), and 'Ayn Abū Nukhayla (*ca*. 0.12ha; Henry *et al*. 2003: 2). This contrast highlights the ephemeral nature of Wādī Ghuwayr 17.

However, this does not necessarily mean that the settlement had a population of one-fifth to one-tenth of that of more typical desert settlements. It should be noted, for example, that the elongated settlement of Wādī Abū Ṭulayḥa is thought to have been formed through the repeated renewal - over approximately ten cycles - of a structural complex, each time extending into an adjacent 'plot' (Fujii 2009a: 206). Wādī Ghuwayr 17, on the other hand, consisted of a single complex with Structure 1 being the key feature. It is therefore unsurprising that this single-complex settlement should have a size around one-tenth that of a ten-complex settlement. Our tentative interpretation is that Wādī Ghuwayr 17

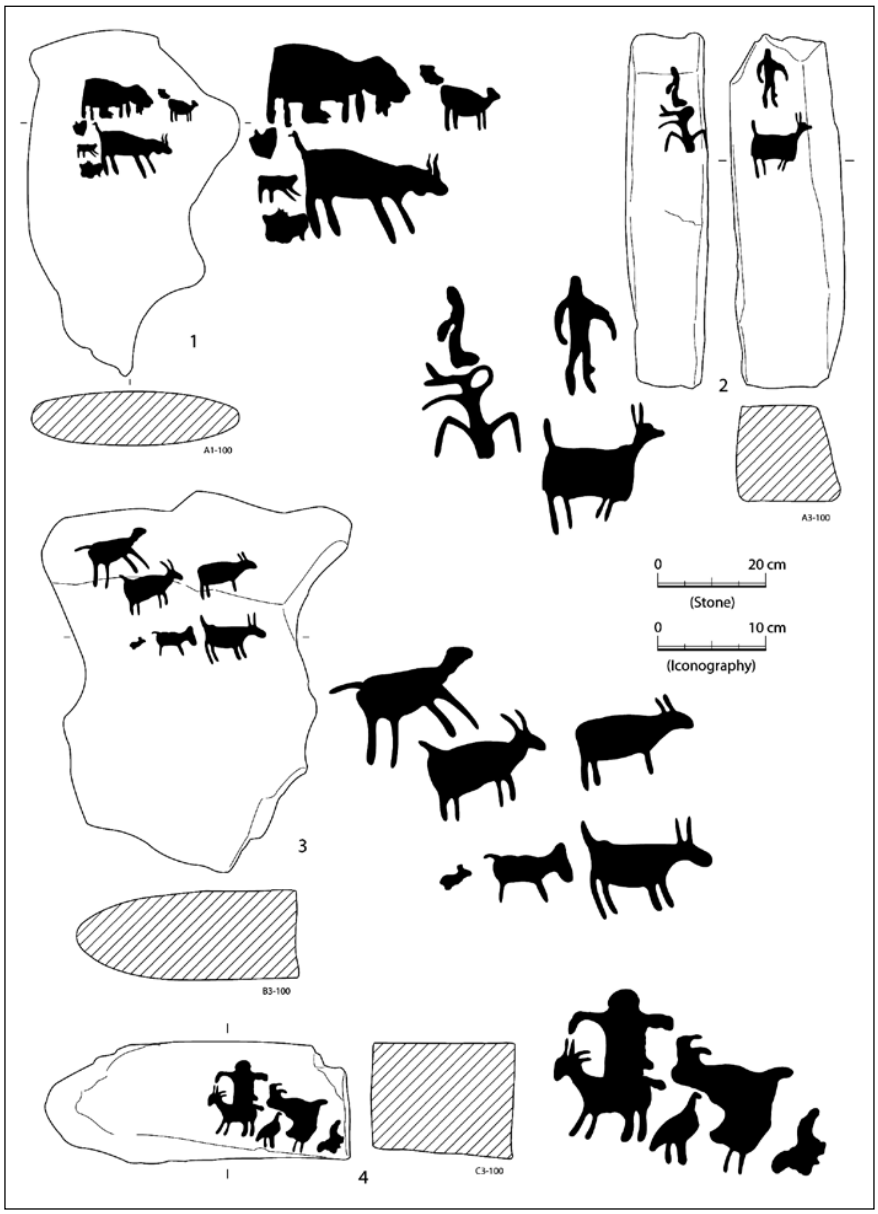


29. Wādī Ghuwayr 17: petroglyphs.

represents a single-phase settlement, possibly overlapping with some stage of the occupation of Wādī Abū Ṭulayḥa. This working hypothesis leads us to the conclusion that, regardless of its apparent size, every desert settlement had a small population, probably not more than a few dozen persons. Such a small settlement size and population may well have been the norm in the Jafr Pastoral PPNB, but further study is needed to validate this challenging perspective.

Dating

Although no C14 data are available at the time of writing, Wādī Ghuwayr 17 can be attributed to the PPNB on the basis of diagnostic finds such as naviform core and blade elements, Amuq- and Byblos-type points, large basin querns made of flint, flint and limestone bowlets, diagonally truncated stone bars and a game board. Overall affinities with the M - LPPNB agro-pastoral outpost of Wādī Abū

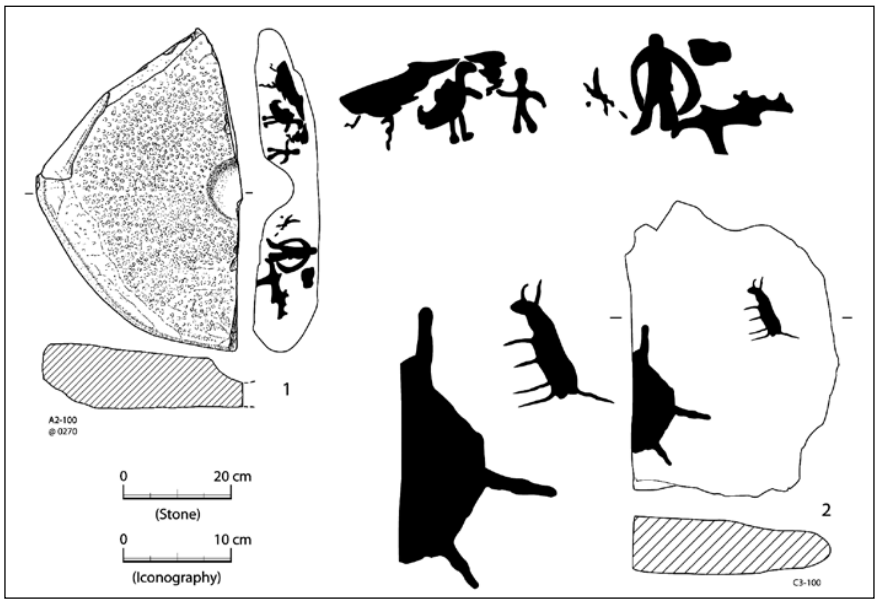


30. Wādī Ghuwayr 17: petroglyphs.

Ṭulayḥa are demonstrated by the techno-typology of structural remains, the general plan of the structural complex and the iconography of the petroglyphs. There is little doubt that both sites share a similar date.

The question of dating, therefore, focuses on what phase of the PPNB might the site represents. The nature of the structural complex sheds some light on the issue. The combination of an oval key structure and several minor components, including a deep floor-type feature, is comparable with Complex I at Wādī Abū Ṭulayḥa (**Fig. 32**). It is also interesting to note that structures at both complexes are equipped with a *massebot*-like upright boulder at their north-western corners (Fujii 2007a: Fig. 5). Also, as noted, the projectile point assemblage is best attributed to the late MPPNB / LPPNB. Given these affinities, the site of Wādī Ghuwayr 17 may be dated to the end of the MPPNB or the very beginning of the LPPNB. Further support for this tentative dating comes from the techno-typology of the bowlets. These are characterized by large dimensions and coarse shaping, and thus most likely fall into the MPPNB group from Wādī Abū Ṭulayḥa (Fujii 2009b: 24-25).

Previous work has suggested that Complex I at Wādī Abū Ṭulayḥa was constructed when



31. Wādī Ghuwayr 17: petroglyphs.

pastoral transhumance resumed in the area after a short interval in the latter stages of the MPPNB, and that the re-occupation involved the construction of a basin-irrigation barrage system (Fujii 2009a: 475-477). Given the supposed chronological affinity between the two sites, it would make sense if Wādī Ghuwayr 17 were associated with the two barrages at nearby Wādī Ghuwayr 106 (Fujii *et al*. this volume). It is interesting to speculate whether, as appears to have been the case at Wādī Abū Ṭulayḥa Complex I, the establishment of Wādī Ghuwayr 17 - sustained by the nearby barrage system - represents one episode in the full-fledged re-occupation of the arid margins at the end of the MPPNB or very beginning of the LPPNB.

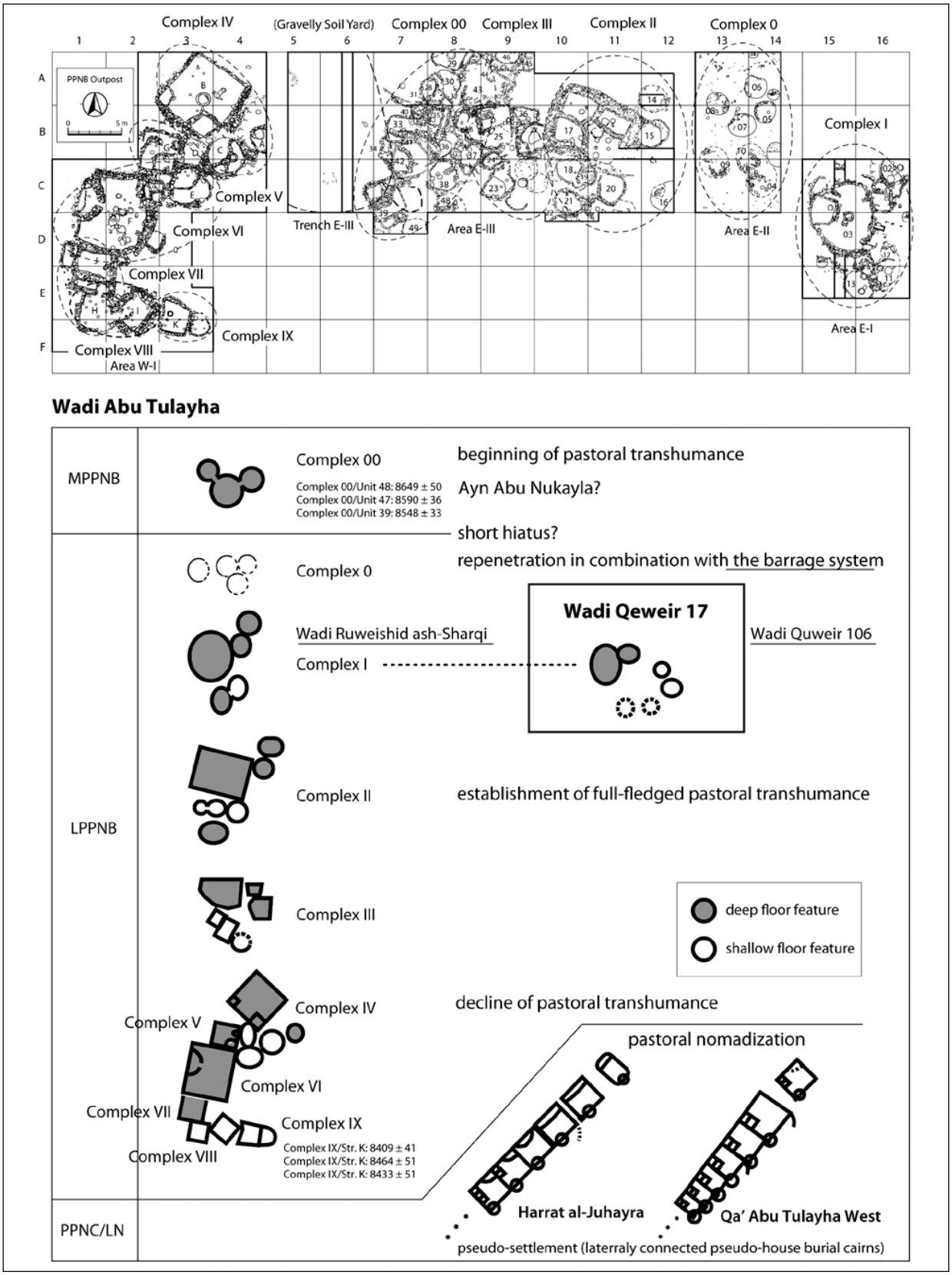
Site Function

In view of the harsh environmental conditions and small site size, there is little doubt that - as with other desert settlements – Wādī Ghuwayr 17 was used on a seasonal basis. No faunal or botanical evidence is available yet, but it would appear that the site was sustained by a mixed, risk-diversifying economy which included hunting (evidenced by the frequency of hunting weapons), pastoral transhumance (suggested by the occurrence of a petroglyph depicting pasturing) and basin-irrigated agriculture (implied by the occurrence of various grinding tools and the existence of the nearby barrage site of Wādī Ghuwayr 106). In addition, exploitation of Eocene flint, which occurs abundantly on the margins of the Jafr basin, may also have played an important role in the life of the site (Wilke *et al*. 2007).

As with Wādī Abū Ṭulayḥa, we can tentatively define the site as a seasonal, agro-pastoral outpost, most probably derived from farming communities to the west. It is most unlikely that the site represents a seasonal camp of early pastoral nomads who migrated within the basin, because the occurrence of malachite fragments, flint bowlets, a stone bracelet and a game board attests to a close relationship with the contemporary west. In view of surface water availability in the desert margins, there is a high probability that the outpost was used for short periods between winter and late spring, when a spring flowed near the site.

Concluding Remarks

Wādī Ghuwayr 17 has much in common with Wādī Abū Ṭulayḥa. The discovery of a second example of a PPNB agro-pastoral outpost has made it clearer that Jafr pastoral transhumance dates back to the end of the MPPNB or very beginning of the LPPNB. In this sense, we can argue that the establishment of full-fledged pastoral transhumance in the Jafr basin had its genesis in the well-known and widespread pastoral dispersal of this period (Quintero *et al*. 2004). We may also argue that the episode was related to the mega-site phenomenon in the southern



32. Comparative chronology of Wādī Abū Ṭulayḥa and Wādī Ghuwayr 17.

Jordan highlands (Gebel 2004, 2010) on the one hand, and the Neolithization of the Arabian peninsula (Zarins 1990; Drechsler 2009; Uerpmann *et al*. 2009) on the other. This expanded perspective might shed new light on the socio-cultural dynamics of the PPNB cultural entity in the southern Levant. We intend to continue our efforts towards a comprehensive understanding of the Jafr pastoral Neolithic.

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