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All articles submitted for publication should follow the "Notes for Contributors", which are printed in this volume

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Notes for Contributors

The Annual of the Department of Antiquities of Jordan is devoted primarily to studies of archaeological fieldwork.

The deadline for submission of contributions is 31 May for publication in the volume of the same year.

Contributions should be sent to: Editor, ADAJ, Department of Antiquities of Jordan, P.O.Box 88, Amman, Jordan; and if sent by courier Tel (4644336). Queries may be addressed to the editor by Fax (+962 6 4615848), or e-mail (publication@doa.gov.jo).

- **Language:** Contributions may be in Arabic or English.

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Should be indicated by underlining in the manuscript. To avoid misleading orthography, Arabic words and site names used in an article in another language of transliteration from Arabic and transcribed with diacritical signs and translated in terms of the system by hand on the hard copy and need not be included on the diskette.

- **Footnotes:**
Long footnotes are to be avoided and where at all necessary kept at a minimum. Bibliographical references are to be included in brackets in the text, e.g. (Brown 1989: 32-35).

- Bibliography/References: should appear at the end of the contribution in alphabetical order. The following format should be utilized:

For articles:

Quintero, L.A. and Wilke, P.J.

1998 Archaeological Reconnaissance in the al-Jafr Basin, 1997. *ADAJ* 42: 113-122.

For collective volumes:

Gebel, H.G.K. and Bienert, H.-D.

1997 Ba'ja: A LPPNB Regional Center Hidden in the Mountains North of Petra, Southern Jordan. Results from the 1997 Investigations. Pp. 221-262 in H.G.K. Gebel, Z. Kafafi and G. O. Rollefson (eds.), *The Prehistory of Jordan II*. Perspectives from 1997. Berlin: ex oriente.

For monographs:

Peacock, D. P. S.

1988 *Pottery in the Roman World: An Ethnoarchaeological Approach.* London and New York: Longman.

List of Abbreviations

AA	Archäologischer Anzeiger
AAAS	Les Annales Archéologiques Arabes Syriennes
AASOR	Annual of the American Schools of Oriental Research
ADAJ	Annual of the Department of Antiquities of Jordan
AfO	Archiv für Orientforschung
AJA	American Journal of Archaeology
AUSS	Andrews University Seminary Studies
BA	Biblical Archaeologist
BAR	British Archaeological Reports
BASOR	Bulletin of the American Schools of Oriental Research
CRAI	Comptes Rendus de l'Académie des Inscriptions et Belles Lettres
JAOS	Journal of the American Oriental Society
JMA	Journal of Mediterranean Archaeology
JNES	Journal of Near Eastern Studies
JPOS	Journal of the Palestine Oriental Society
JRA	Journal of Roman Archaeology
JRS	Journal of Roman Studies
LA	Liber Annuus
LIMC	Lexicon Iconographicum Mythologiae Classicae
MA	Mediterranean Archaeology
PEFQS	Palestine Exploration Fund Quarterly Statement
PEQ	Palestine Exploration Quarterly
QDAP	Quarterly of the Department of Antiquities of Palestine
RB	Revue Biblique
SHAJ	Studies in the History and Archaeology of Jordan
WA	World Archaeology
ZDPV	Zeitschrift des Deutschen Palästina-Vereins

System of Transliteration from Arabic

Consonents

ء	’ (except where initial)	ض	ḍ
ب	b	ط	ṭ
ت	t	ظ	dh
ث	th	ع	‘
ج	j	غ	gh
ح	ḥ	ف	f
خ	kh	ق	q
د	d	ك	k
ذ	dh	ل	l
ر	r	م	m
ز	z	ن	n
س	s	هـ	h
ش	sh	و	w
ص	ṣ	ي	y
ـة ة	a or at	ـه ه	a or ah

Long Vowels

ا، ى	ā
و	ū
ي	ī

Short Vowels

ـَ	a
ـُ	u
ـِ	i

Common Nouns

تل	Tall	دير	Dayr
جبل	Jabal	عين	‘Ayn
خربة	Khirbat	وادي	Wādī

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Arabic Section

PRELIMINARY REPORT ON THE FOURTH SEASON OF THE DANISH-GERMAN JERASH NORTHWEST QUARTER PROJECT 2014

Georg Kalaitzoglou, Achim Lichtenberger, Rubina Raja

Introduction

Between 21st July and 30th August 2014, the Danish-German team from the University of Aarhus (Denmark) and Ruhr-University Bochum (Germany) conducted its fourth campaign in the Northwest Quarter of the ancient city of Gerasa, modern Jarash in the northwest of Jordan. Based on the results of the previous campaigns, which included architectural, geodetic and geophysical surveys, as well as two excavation campaigns in which a total of seven trenches had been excavated, it was decided to lay out five additional trenches in 2014[1], in order to gain further insight into the settlement history of the Northwest Quarter of the city, which has the highest elevation of the area within the ancient city walls, and which since 2011 has been the objective of our research in Jarash. The project is funded by the Carlsberg Foundation, the German Research Foundation (DFG) and H.P. Hjerl Hansens Mindefondet for Dansk Palæstinaforskning[2]. We would like to thank the Director General of the Department of Antiquities (DoA), Dr. Munther Jamhawi, who granted permission for the 2014 campaign, as well as the Director of the Department of Antiquities in Jarash, Ahmad Shami for his and his staff's support during our campaign. Furthermore, thanks go to our representatives Ali Oweisi and Akram Atoum, who were an invaluable help during the campaign.

As noted above, the main objective of the campaign was to gain further insight into the settlement history of this prominent area of the city. Additional objectives were to extend the geodetic net of fix-points for further investigations, undertake a surface survey on the south slope, and re-open a trench which had been excavated in 1983[3]. Five trenches in total (I–M; **Fig. 1**) were laid out on top of the hill, on the northern slope, and on the southern slope on the western limit of a large cistern. Minor follow-up investigations were undertaken at Trenches E and G, which had been excavated the previous year. The sites for the new trenches were based on the results of the 2011 to 2013 campaigns.

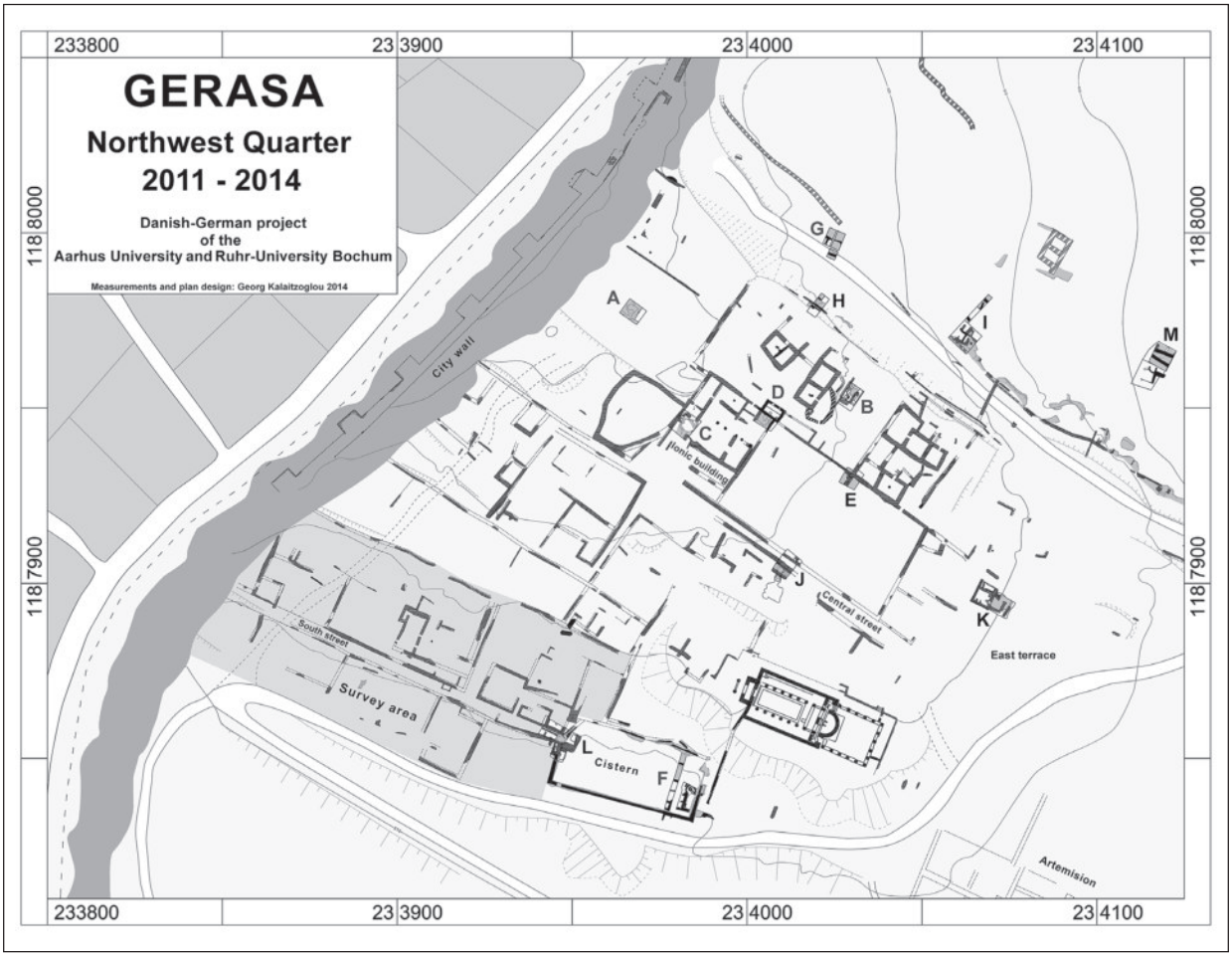
Important information concerning urban organization, street layout and infrastructure of the Northwest Quarter resulted from the 2014 campaign[4]. We were finally able to positively determine that the North Decumanus did not extend further to the west than where it had been excavated close to the North Theatre

1. See Lichtenberger and Raja 2012, and Kalaitzoglou, Lichtenberger and Raja 2012 for the 2011 campaign; Kalaitzoglou, Lichtenberger and Raja 2017 and Lichtenberger, Raja and Sørensen 2013 for the 2012 campaign; and Kalaitzoglou, Lichtenberger and Raja 2017 and Lichtenberger, Raja and Sørensen 2017 for the 2013 campaign.

2. The team consisted of Achim Lichtenberger and Rubina Raja (co-directors), Georg Kalaitzoglou (field director), Annette Højen Sørensen (head of registration), Jens Christian Pinborg (architect), Margit Petersen (conservator), Pernille Bangsgaard Jensen (palaeozoologist). Field and registration team: Anders Meander Bjerggaard, Philip Ebeling, Till Flüchter, Pawel Grüner, Niels Benjamin Hansen, Ditte Maria Damsgaard Hiort, Charlotte Bach Hove, Anne Ditte Koustrup Høj, Hans-Peter Klossek, Signe Bruun Kristensen, Nadia Schmidt Larsen, Line Egelund Nielsen, Sara Ringsborg, Ulrike Rübesam and Janek Sundahl. Alf Hilding Lindroos (geologist, Åbo University, Finland) took mortar samples for ^{14}C-AMS-analysis (Accelerator Mass Spectrometry) and Peter Fink Jensen (geologist) conducted hand-held spectrometer testing during the field season.

3. Clark and Bowsher 1986. This trench was opened in order to trace the possible course of the North Decumanus.

4. See e.g. Kraeling (ed.) 1938; Zayadine (ed.) 1986; Seigne 1992; Kennedy 2007; Kehrberg 2011; Raja 2012, 137–189 for an urban plan and layout of Gerasa/Jarash.



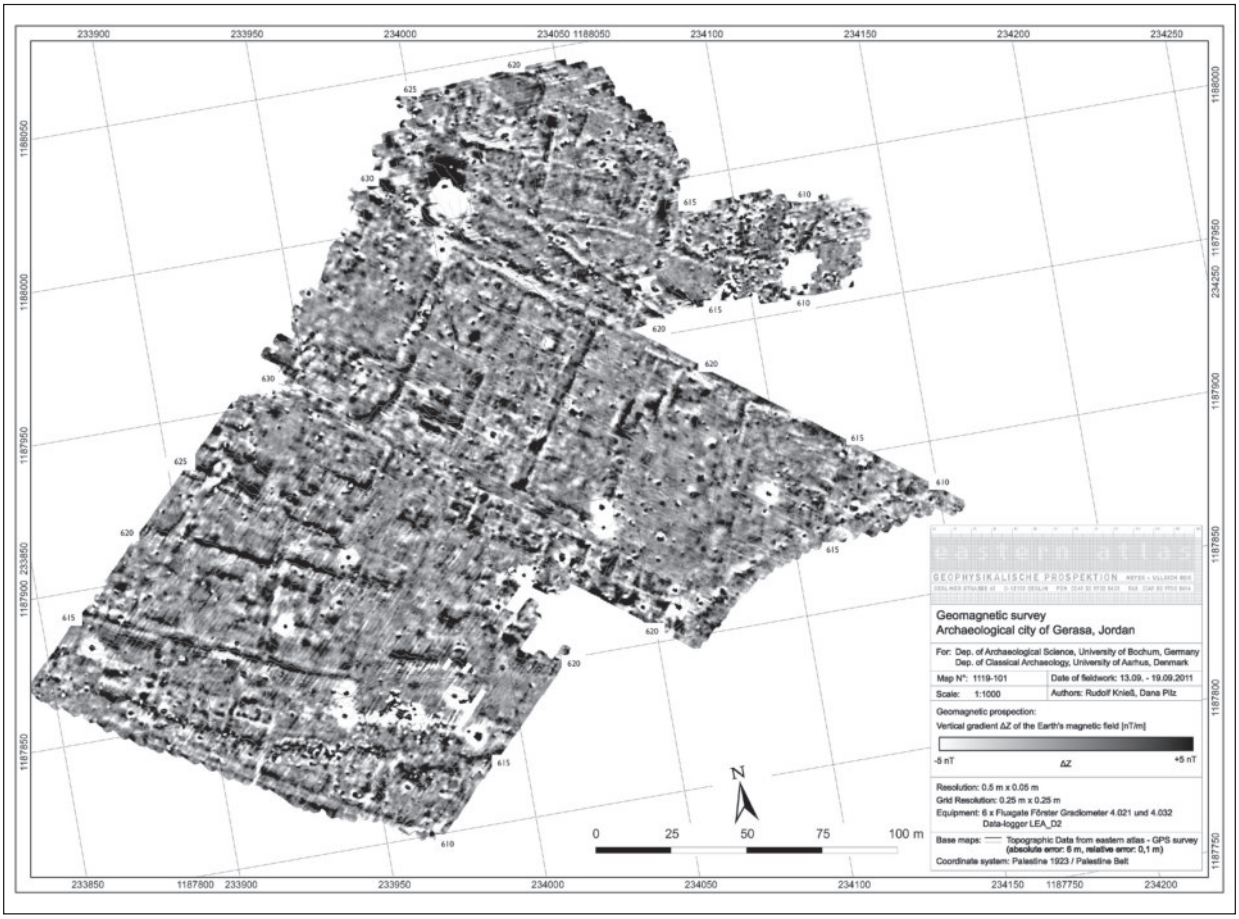
1. Jerash Northwest Quarter 2014 map grey.

(Trenches I and M)[5]. Further investigation of the 'south street' suggests the most likely date for planning and implementing it was the Byzantine period (Trench L). This fits with a newly excavated street in Trench J, which was first laid out either in the late Roman period or the Byzantine/Umayyad periods. This street, the so-called 'central street', runs east west and follows the natural terrain, as does 'south street'; it was already visible in the magnetogramme of the geophysical survey undertaken in 2011 **(Fig. 2)**. Although questions remain open about some aspects of the absolute chronology, the 2014 campaign offered important information on the origins of the large-scale urban development of the Northwest Quarter.

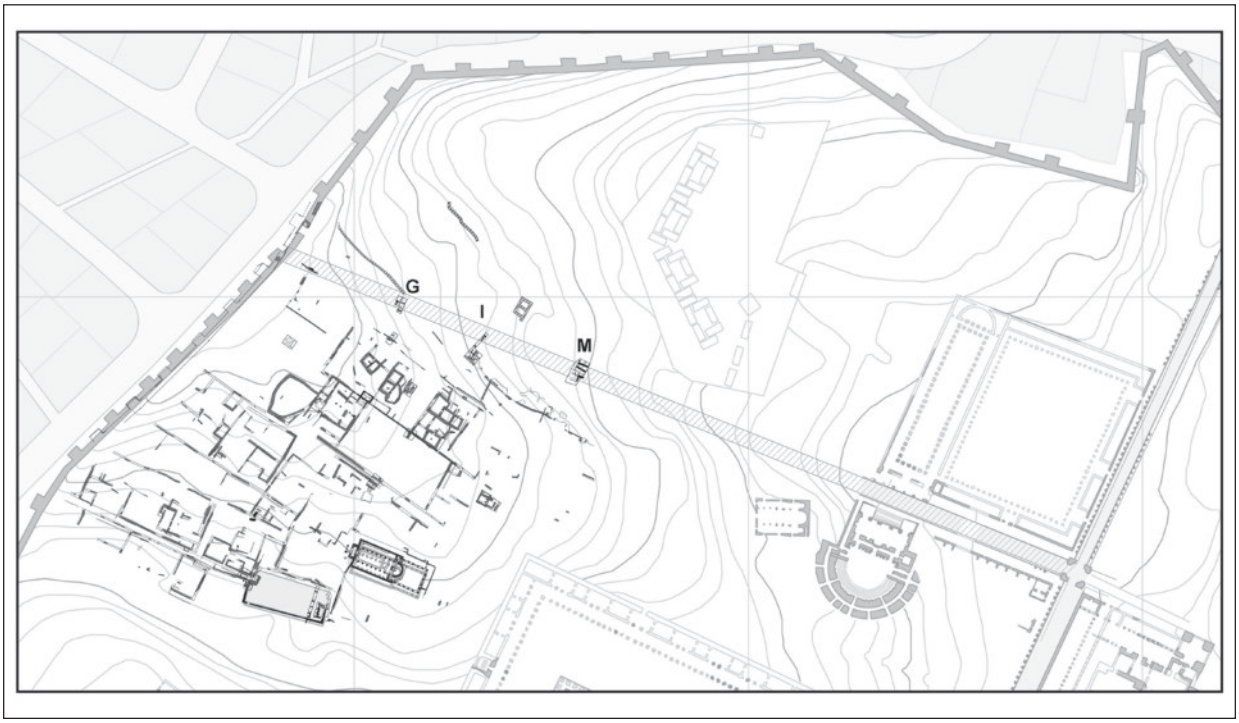
- Trenches I and M were dug to further investigate the slope on the northern slope, and to finally clarify the possible course of the North Decumanus. As a result, the course of the North Decumanus is now clear from the Tetrapylon to the North Theatre, has been mapped, and a projection generated. Trench I was located in this line of projection (**Fig. 3)**.
- Trench J was located on the southern border of the hill top to clarify broad north-south running anomalies which were visible in the magnetogramme from 2011, and to investigate the building patterns opposite the Byzantine to Early Islamic settlement system excavated during the 2013 campaign, north of the large courtyard[6].
- Exploration of the so-called "east terrace" commenced with trench K. In this area, which has dense scatters of collapse, only a few walls are traceable on the surface; however, a large quantity of architectural elements are visible, being dispersed across the area.

5. See Clark, Bowsher and Stewart 1986, 206–207. Lepaon 2011, 409–-20 for the previous most up-to-date city plan of Jarash.

6. See Kalaitzoglou *et al.* 2012 for the geophysical results.



2. Jerash NW-quarter magnetogram 2011.



3. Jerash N-decumanus projection 2014.

- Trench L was located on the southern slope of the hill, where the so-called 'south street' meets the large rectangular cistern. The aim of this trench was to investigate the relationship between the large Roman period water reservoir and the residential area to the west of it. A pottery survey was completed in this area, (c. 5436 m^2 in total), between Trench L and the debris of the city walls.

Approximately 374 m^2 were excavated in total, and an underground cave (app. 25 m^2), was examined in Trench J. It was our objective to completely understand the chronological development by reaching bedrock or virgin soil without removing any ancient built structures which were encountered in the trenches. This was possible for the most part, and only in rare cases were younger structures removed, usually because of safety issues. All trenches have been backfilled, except the cave access in Trench J; this was securely covered with the assistance of the DoA office in Jarash, which means it can be reopened for further investigation during the 2015 campaign. Relative chronologies were reconstructed for each trench and correlated with radiocarbon samples taken in-situ; however, in several cases a refined, absolute dating of the features will be available only after additional ceramic and finds studies. (For a preliminary report on the finds, cf. Lichtenberger, Raja and Sørensen in this volume[7].

As in the previous campaigns, a considerable number of finds are related to the Hellenistic and Roman periods; the cave complex in Trench J in particular, and some of its deliberate fill provide evidence of considerable building activity on the hill during the Roman to Late Roman periods. However, most of the excavation finds indicate a Byzantine to Early Islamic date[8]; of these, an undisturbed destruction layer from the end of the Umayyad period in Trench K is extremely important. Only a few finds from the Ayyubid-Mamluk period have been discovered so far, and these periods were almost completely absent on the southern hill slope where the ceramic survey was conducted.

South Slope Survey

An architectural and geodetic field survey was conducted over the whole Northwest Quarter in 2011[9], and it was decided to conduct a surface pottery survey of an area on the south slope in 2014. This area, which covers an area of about 5436 m^2 between Trench L and the debris of the city walls **(Fig. 1)** is densely strewn with collapse, and structures are visible on the surface. It was divided into three parallel strips, with 42 transects; representative numbers of surface finds were collected. Although the finds analysis is still incomplete, two preliminary results are worth mentioning: (1) finds from the Middle Islamic periods are very rare. This confirms the assumption that Ayyubid-Mamluk settlement and activities were limited to the vicinity of the hamlet on top of the Northwest Quarter. (2) An increasing number of Roman sherds were found the closer we got to the city walls. Although this concentration of Roman surface finds most likely results from a bulldozer lane leading up the hill, it is obvious that the original backfill from the demolished retaining walls on the terraces must have contained remarkable amounts of Roman or even older pottery, attesting to Roman period activities in this area.

Trench E (Sector A)

To gain additional material for radiocarbon dating of the water-supply system, the northwestern part of Sector A was reopened, and samples were taken from the mortar surrounding the clay water pipe (Ev. 53)[10].Although no charcoal sufficiently large enough for ^{14}C dating was found in the mortar, the samples can be used for AMS C^{14} analysis[11].

Trench H (Sector D)

An additional sounding (Sector D), about 1.0 by 1.5 m, was excavated directly west of Trench H on the northern hill edge[12]. This sounding was also intended to extract mortar samples from the fittings around the clay water pipe (Ev. 4)[13] and the lining of the rectangular water channel (Ev. 7)[14] parallel to the escarpment, which can also

7. All catalogue numbers (cat. no.) mentioned in this report refer to the preliminary registration report by Lichtenberger, Raja and Sørensen in this volume.
8. See Avni 2014 for this period.
9. Lichtenberger and Raja 2012.
10. See the preliminary field report Kalaitzoglou, Lichtenberger and Raja 2017 for the results of Trench E.
11. Cf. Lichtenberger, Lindroos, Raja and Heinemeier 2015.
12. See the preliminary field report Kalaitzoglou, Lichtenberger and Raja 2017 for the results of trench H.
13. The samples are J14-H-SM-1 and J14-H-SM-2.
14. The samples are J14-H-SM-3 to J14-H-SM-5.

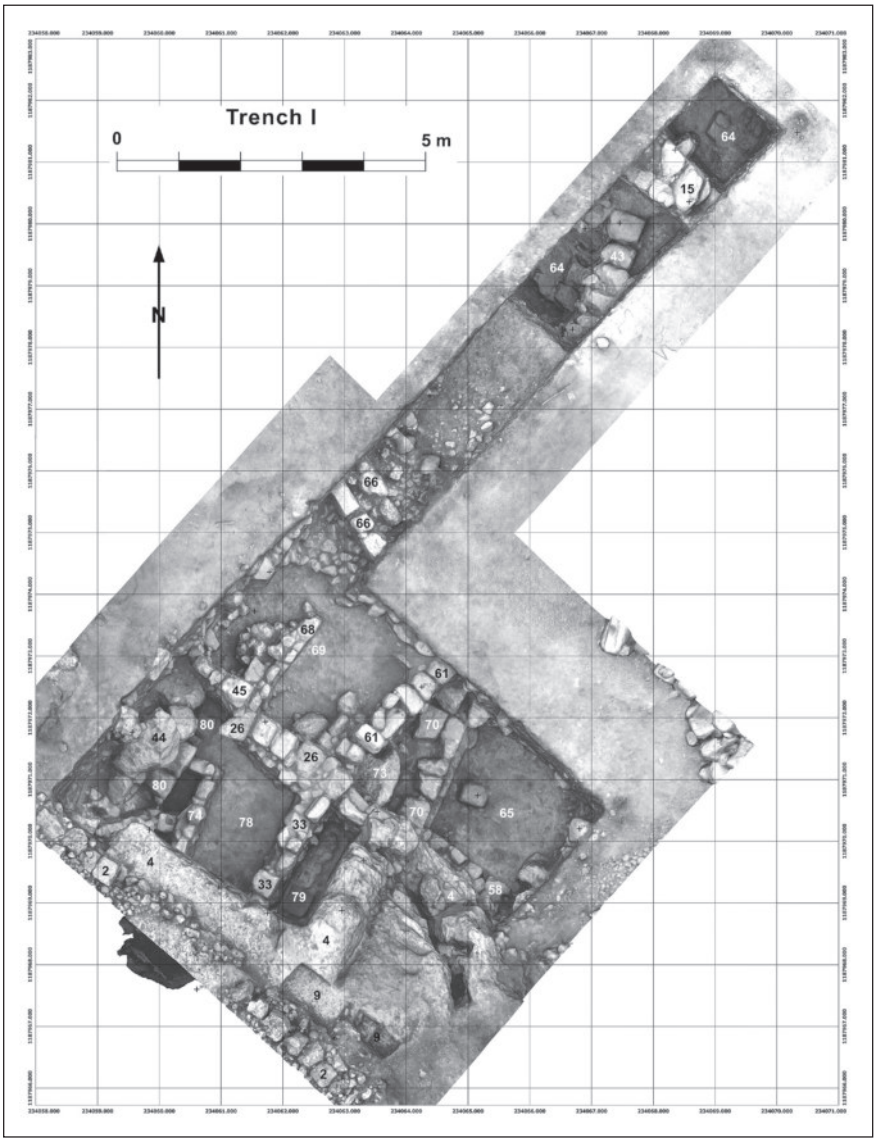
be radiocarbon dated by AMS. The newly observed stratigraphic features attest that the clay water pipe (Ev. 4) was situated on a mortar surface after the water channel (Ev. 7) was built.

Trench I

Trench I is situated in the northern part of the Northwest Quarter **(Fig. 1)**. It was opened to explore the area in front of an L-shaped rock cut on the northern hill edge, where a cave opening was already visible before excavation commenced[15]. The trench (Sectors A–D) measured 6.8 x 7.0 m (46.6 m^2) on the north side of the rock cliff.

An additional sounding trench 10 m in length and 1.45 m in width (Sectors E–H) was opened between Sector A and the bedrock outcrops to the north, in order to explore the original surface of the terrain, and to investigate whether the North Decumanus had originally extended into this area. As noted above, no trace of the North Decumanus was found, thus leading to the conclusion that this street did not exist in this area in antiquity. Further investigation into the possible course of the North Decumanus was undertaken in Trench M further to the east; once again, no proof of the existence of such a street was encountered.

A total of 60.4 m^2 was explored in Trench I **(Fig. 4)**. Whereas bedrock was reached in Sec-



4. J14 Trench I Planum 1-100.

15. Line Egelund Nielsen was trench supervisor.

tors G and H of the sounding trench, the lowest level reached in front of the rock cliff (Sector B) was 614.90 m asl.; 2.0 to 2.5 meters above the level of the bedrock reached in the northern sectors. This means that older structures possibly underlie the deepest habitation level unearthed in the southern part of Trench I. Above this level, the remains of a Byzantine-Umayyad building with at least two rooms were found, which had been built against the rock. In the higher levels on top of these remains, other building structures were uncovered, stemming from distinct (probably early Islamic) phases situated in front of the small natural cave. One of the last phases was a small-scale Ayyubid-Mamluk reoccupation, which seems to have occurred after a long settlement gap.

Building Phase 1 (Roman?)

The oldest anthropogenic modifications found in the trench are the L-shaped cuts into the bedrock, leveling of the top of the rock edge, and rectangular depressions (Ev. 9), which were probably used as block beddings, as well as step-like cuts on the northern flank of the rock edge. Similar cuts are also visible to the east along the rock cliff, indicating that the edge had been prepared to support a larger building structure, such as a wall. These modifications to the rock precede the building structures unearthed, particularly in Trench I. It is not possible to identify a definitive date for Building Phase 1, but it probably antedates the Byzantine period, which is when the constructions in front of the cave were erected during Building Phase 2.

Building Phase 2 (Byzantine/Umayyad)

This building phase is characterized by the construction of a rectangular room, partly rock-cut in front of the cave (the west room) and another, smaller room (the east room) on a lower level. The east room is situated in the southern sectors (A–D), and has a mortar floor (Ev. 65) set from the north against the rock cliff. Only the southwest corner of this room could be excavated within the limits of the trench, preserved to a height of almost 1 m. The corner is formed by a western wall (Ev. 70) which was constructed from the east against a bedrock spur (Ev. 73) which protruded northwards; the wall then turns in western direction. The southern wall (Ev. 58) was built using mortar, on a slightly higher level against the southern bedrock (Ev. 4), and runs against the western wall from the east.

A second room (the so-called west room) is located to the west, adjacent to the east room. The northern wall of this room is missing, but the rock cut (Ev. 4) and the wall (Ev. 70 and probably Ev. 80) served as retaining walls. A row of sloping beam holes in the eastern rock wall (Ev. 4) of the L-shaped cut indicates that a roof had been constructed between the rock wall and another wall parallel to it. As the lowest beam hole is too low to be connected with any of the later building structures, it probably belongs to the roof of a second room situated on a higher level in the L-shaped rock depression[16]. The most probable candidate for the western wall of this room is Ev. 80, which was found underneath the later structures and has a course parallel to the rock wall. A short wall section (Ev. 79) found in front of the rock wall could belong either to this phase or an intermediate phase.

A small natural cave (1.55 by 1.25 m) is situated in the center of the southern rock wall of this room; it was only slightly worked inside, but the base of the entrance was cut horizontally as a threshold. As the mortar floor (Ev. 78) is at the same level as the base of the cave opening, and runs against the wall (Ev. 80) and because all other walls were built on or above this floor, it is very likely that it belongs to this building phase. This also seems to be true for the remains of a mortar floor foundation (Ev. 69) which were found under the later wall (Ev. 68).

The building plan of this phase can thus be described as follows: It consisted of an east room with mortar floor on the lower level and a west room. The wall (Ev. 70) was probably not only the western wall of the east room, but also served as a wall prolongation of the eastern side of the west room. Although a staircase was not found in the excavated area, it is probable that a connection between the rooms existed on

16. The difference of at least 2.07 meters between the top of the bedrock spur (Ev. 73) and the lowest beam hole seems to be sufficient for a ceiling height.

the northern side. As the finds analysis is still in progress, we are relying on radiocarbon samples to date this building phase. The combination of a small charcoal sample from inside the wall (Ev. 70) which suggests a Byzantine date[17], together with the presence of Grey Ware[18] in the fill (Ev. 63) above the floor level of the east room indicates that the structures were built in the Byzantine or Umayyad periods. A thin L-shaped wall (Ev. 74) is probably a later alteration to the plan, because it was built on the floor (Ev. 78) and runs against the southern part of the wall (Ev. 80). Ev. 79 could also belong to an intermediate phase.

Building Phase 3 (Byzantine/Umayyad)

This phase began in the Byzantine or Umayyad period, and is characterized by several minor alterations to the original plan of the buildings, resulting in small architectural units. At some point, the area was abandoned, probably after the earthquake of AD 749, but perhaps earlier. In this and later phases, only the area in front of the small cave was used for diverse small scale building activities. The area of the west room in front of the L-shaped rock depression was filled for the foundation of walls (Ev. 33 and 26), whereas the remains of the older east room were covered completely by debris (Ev. 63 and Ev. 59) and fill layers (Ev. 53). The area in front of the cave was closed by these coarsely built walls, although there was a gap of about half a meter to the eastern rock wall. This gap was closed at its northern end by two stones only. The western limitation of this enclosure could not be detected, but the western end of the east-west running wall (Ev. 26) appears to have been open, forming an entrance on the north side.

The lower part of the cave was filled, and its entrance blocked by a short wall (Ev. 30). North of the wall (Ev. 26), two parallel walls (Ev. 61 and Ev. 68) were built against it on approximately the same level forming another small compartment. Since the structures described were built up to 0.8 m higher level than in the preceding phase, a retaining structure was necessary to level the terrain and to support the large amount of filling material (Ev. 67, Ev. 71 and Ev. 75). This is most likely the function of the double wall (Ev. 66) which was built in front of the rock edge, and appears to be connected with the wall (Ev. 61). The walls of this phase appear to be weak, and lack the stability required to support walls constructed of stone ashlars, and the quantity of soil found between them favors an interpretation that the upper sections were built from mud brick. It is most likely that the compartments were roofed, but since no traces of installations or fireplaces were found, they were perhaps used as stables or shelters in front of the rock cliff. Although the level of the wall foundations were detected, associated floors could not be identified; they probably consisted of a clayish soil which has partly eroded, or been covered by similar soil washed down from the rock cliff. The completed finds analysis will provide insight into which of the fill layers are erosion deposits.

Building Phase 4 (Umayyad/Abbasid?)

The area was abandoned for some time after the previous building phase, and covered by erosion fill and material washed down from the area above the rock edge. The top of some of the walls (Ev. 26 and Ev. 33) remained visible, whereas those on lower levels were covered by an erosion layer (Ev. 40). During this period, parts of the south-western rock edge collapsed, perhaps due to a severe earthquake. A large rock boulder (Ev. 44) was found lying on the erosion deposits in front of the west baulk. It is not clear whether this event can be connected to the earthquake of AD 749, or whether it happened before or after. After this event, a wall like structure (Ev. 45) was built on the erosion fill above the older walls (Ev. 26 and Ev. 68). Only a short stretch of this stone construction, which was badly damaged by erosion and illicit digging, could be unearthed in front of the west baulk. Although its function is not yet clear, it could be determined that it was not in use for long. If the rock collapse resulted from the AD 749 earthquake, the wall could be an Abbasid construction. Further erosion layers

17. Sample no. 21333 (J14-Ib-70-1), Institut for Fysik og Astronomi, Aarhus University (Denmark), ^{14}C age 1499 ± 26 BP, d13C (dual-inlet, extremely small sample) -26.313 ± 0.54, calibration curve IntCal13, 1σ 547–598 AD, 2σ 435–636 AD.

18. The find statistics reveal that the latest dated finds in the fill are Grey Ware. Cf. Lichtenberger, Raja and Sørensen in this volume.

(Ev. 39) filled the area around the wall and the collapsed rock boulder (Ev. 44). The duration of this period of abandonment is indicated by significant quantities of Middle Islamic finds in the next erosion layer (Ev. 35) in front of the cave, which reflect the foundation of the Mamluk hamlet[19] on top of the hill some 20 meters from Trench I.

Building Phase 5 (Ayyubid/Mamluk)

Middle Islamic pottery was found in front of the bedrock which only partly stems from erosion. Most of it relates to an open fireplace formed by three stones, which had more than one layer of ash (Ev. 22 and Ev. 27). It was found in the brownish clay layer (Ev. 29) near the cave opening (Ev. 8), above the remains of the older wall (Ev. 74). East of and at the same level as the fireplace, well preserved examples of so-called Handmade Geometric Painted Ware from the Mamluk period (HMGPW) (cat. no. 22 and cat. no 26) were found. Both features, the fireplace and the pottery, testify to activities in the small area defined by rock walls in the east and south, and the remains of the collapsed rock to the west, between the Late Ayyubid and the Mamluk period. Since no structures were found which could be connected to these activities, it is possible that this site was used as a temporary resting place.

More examples of Middle Islamic pottery were found in the erosion deposits[20] (e.g. cat. no. 21), which sealed the layer (Ev. 29), as well as in the mixed dump of an illicit digging[21] (cat. no. 27, cat. no. 84) conducted in front of the rock cliff and the small cave.

Building Phase 6 (Circassian/modern?)

The next intentional alteration which could be detected was road construction along the top of the rock cliff. The northern limit of the street is a coarsely built wall (Ev. 2) of small and medium sized stones, with a little mortar used as a binding agent. South of this wall, a fill layer of small stones (Ev. 3) covers the bedrock, which is most probably the foundation for the road surface. Above the rock edge and the ancient beddings (Ev. 9), the wall rests on a soil layer (Ev. 6) of post-Middle Islamic date, as cat. no. 85 was found in it. At the western limit of the excavation square, the wall runs over a wide crevice in the bedrock which was filled with erosion deposits. This confirms that the wall is of a more recent age, and that the area in front of the rock cliff was completely covered by slope waste when the street was built. The construction of the street may date to the Circassian resettlement of Jarash in the 19th century, or perhaps later.

Sounding Trench

The excavation results in the sounding trench are very similar to what was observed in Trench G some 45 m to the west in 2013[22]. The soft yellowish bedrock, which was reached about 3.20 m under the surface in Sectors H and G, slopes slightly more in an easterly direction than the modern surface does[23]. The fact that the top of the bedrock in Sector G lies half a meter deeper than in Sector H[24] supports our interpretation that the ancient surface also sloped in a southerly direction, which has formed a kind of ravine in front of the rock cliff. No remains of the North Decumanus or any other ancient road were found, either at bedrock level or higher. If the North Decumanus had extended into this area, it would certainly have passed through Sectors G and H, in the gap between the southern rock cliff and the protruding bedrock north of it (**Fig. 1**).

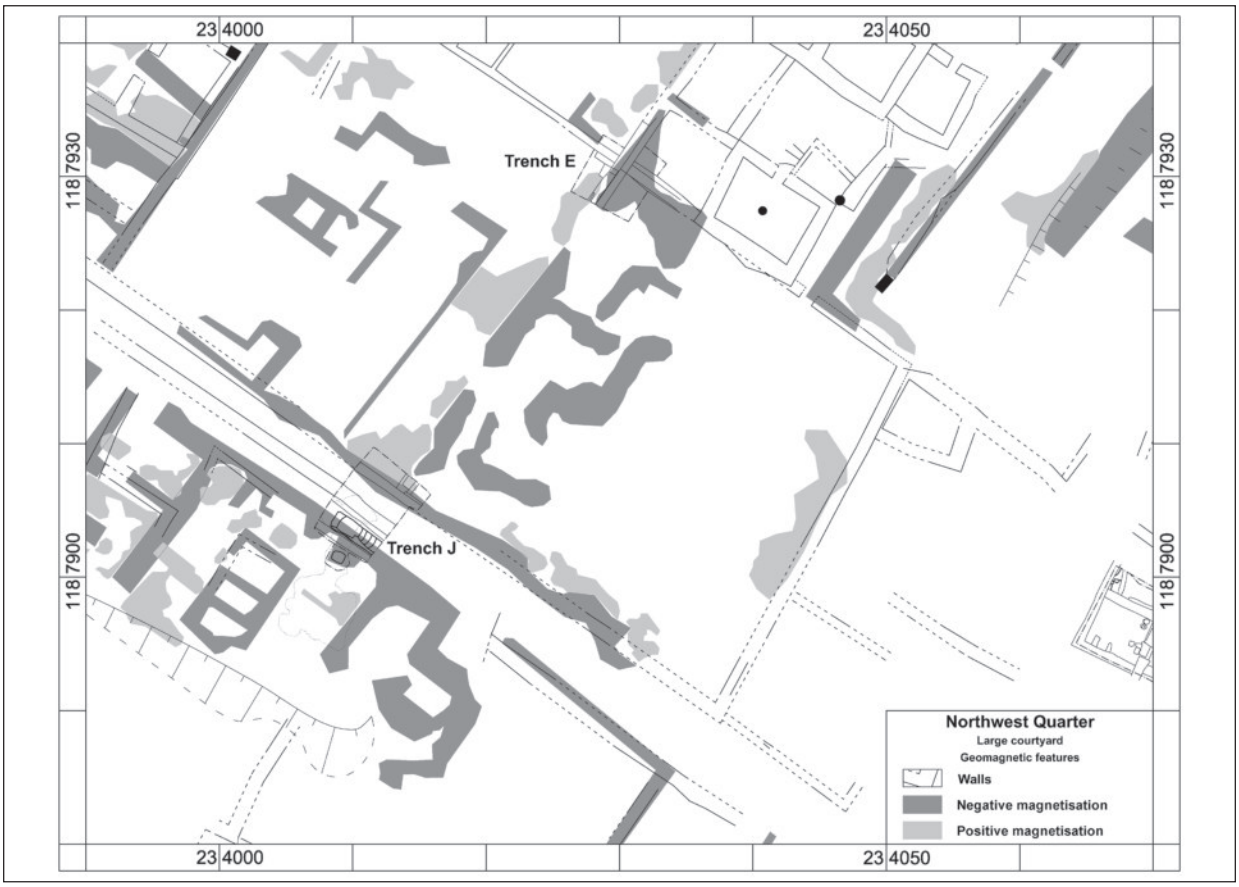
A sequence of erosion deposits were found above the bedrock, as well as two walls at different levels and with different orientations; this stratigraphic sequence resembles the situation in Trench G. In Sector G, the bedrock (Ev. 64) is covered by a layer of yellowish to whitish virgin soil (Ev. 57), whereas in the adjacent Sector H, it is covered by a layer of mixed hard yellowish virgin soil (Ev. 60) which contained pottery[25] and large quantities of cut animal bones, as well as patches of hard clayish soil (Ev. 62). The next intentional feature discovered was a wall-like structure (Ev. 43) in

19. See Raja and Lichtenberger (2016) for more details of this hamlet
20. These are in stratigraphic order (Evidences 25, 38, 21, 20, 18 and 12).
21. These are in stratigraphic order (Evidences 13, 11, 10, 7 and 5).
22. See Kalaitzoglou, Lichtenberger and Raja 2017 for a preliminary report on this trench.
23. While the difference in height between Trenches G and I is about 7 m at surface level, the difference of the bedrock level in both trenches measures only 4.5 to 5.0 m.
24. The top of the bedrock in Sector H is about 613.00 m asl, and about 612.50 m asl in Sector G.
25. See e.g. cat. no. 1.

Sector G, which is roughly north-south oriented but does not continue beyond the later wall (Ev. 15) into Sector H. Its northern end is marked by a hard layer of mortar (Ev. 47) and west of it is a very hard soil layer (Ev. 49). Ashes, charcoal and burned pottery were also found, as well as a curving construction of five stones (Ev. 48)[26] set against the wall. All this rests on a layer of hard whitish-yellowish soil (Ev. 50) and a huge limestone (Ev. 51), above a concentration of stones (Ev. 52), layers of gravel (Ev. 54) and compact soil (Ev. 56 and Ev. 55). Further examination of the finds will help to clarify the function and date of this wall-like structure. Above it, in both Sectors G and H, more or less sterile gravel layers (Ev. 37, Ev. 42 and Ev. 46) were found, which appear to form a horizontal surface[27]. This feature is very similar to the post-Middle Islamic small street or path found in Trench G in 2013[28]. The surface is covered by an erosion layer (Ev. 28) on which a double faced wall (Ev. 15) was built. This wall was found close to the surface, and follows a course parallel to the rock cliff in the south. A 2 m wide area south of the wall was filled with fist size stones (Ev. 16). The debris (Ev. 23) from this wall was found lying to the north on a soil layer (Ev. 19), the upper-side of which marks the walking surface associated with the wall. The structure of a wall with stony backfill is similar to a retaining wall found in Trench G[29].

Trench J

Trench J[30] was opened on the southern side of the large courtyard, on top of the hill and opposite the 2013 Trench E (**Fig. 1 and Fig. 5**). This courtyard is a large plateau which stretches from the so-called Ionic building to the east.



5. NW-Quarter Courtyard magnetic.

26. This structure had to be removed in order to reach bedrock.
27. In Ev. 37, a fragment of imbrex tile (cat. no. 86) was found, while in Ev. 42 a fragment of a Roman terracotta figurine (cat. no. 144) was found.
28. Evidence J13-Gb-11. Compare with Kalaitzoglou, Lichtenberger and Raja 2017.
29. See Kalaitzoglou, Lichtenberger and Raja 2017 for the wall (J13-Gd-6 and J13-Gc-14) and the stone fill (J13-Gd-4) in Trench G.
30. Ulrike Rübesam was trench supervisor.

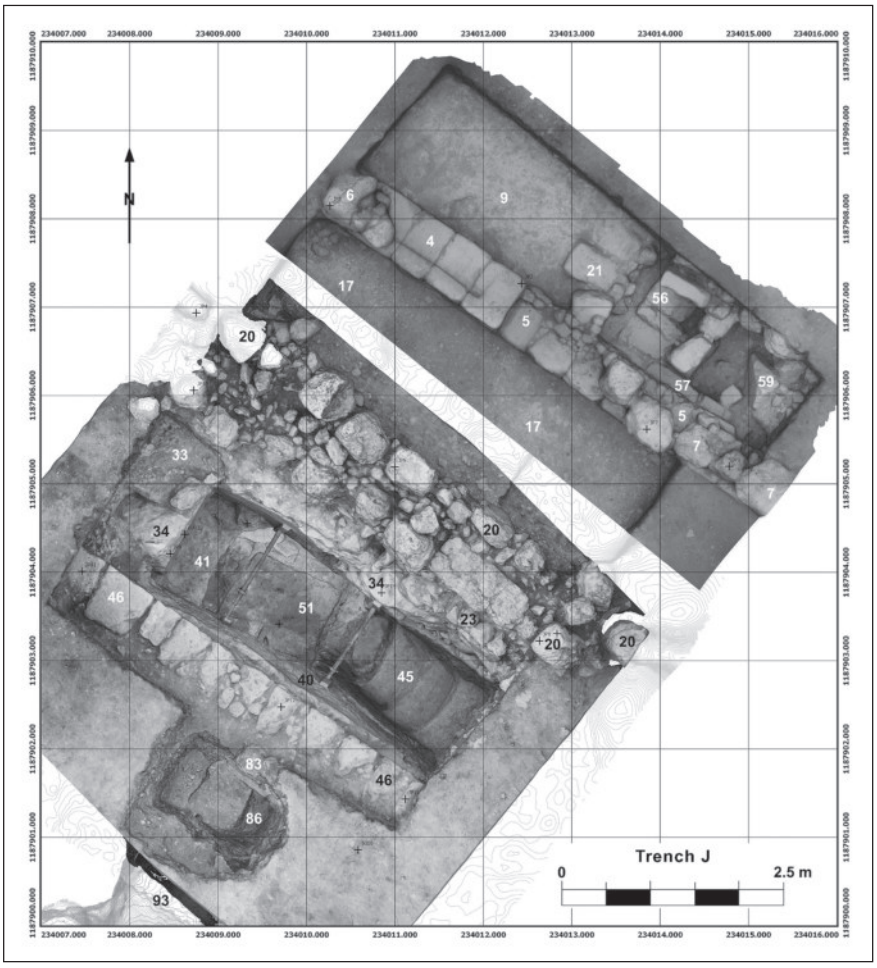
The main reasons for opening the trench were to explore the long east west running walls and the room-like structures detected in the geomagnetic survey, as well as to find the probable continuation of the north-south running clay water pipe found in Trench E in 2013 (**Fig. 5**)[31].

The rectangular trench measuring 4.9 by 7.0 m was later extended by 0.5 m to the south, by 0.7 m in the northeast corner, and by 1.8 m to the east, resulting in an area of 37.65 m^2 (**Fig. 6**). We then encountered a subsurface cave room during the excavation, which added approximately 25.25 m^2 more, resulting in a total area of 62.90 m^2 explored in Trench J (**Fig. 7**).

The main features found in Trench J were building structures arranged to the north and south of the so-called central street, which was built either in the late-Roman or the Byzantine/ Umayyad period. Parts of the structures lining the street were built on deliberate fills in rock-cut shafts, which give access to an older cave room stemming from the Roman period below the surface; this was undisturbed, as it had been closed in the past. Several phases of use and reuse could be observed in this area; however, because some areas could not be excavated down to bedrock, a correlation between the structures and building phases remains hypothetical in some respects. Further exploration scheduled for 2015 may answer some questions.

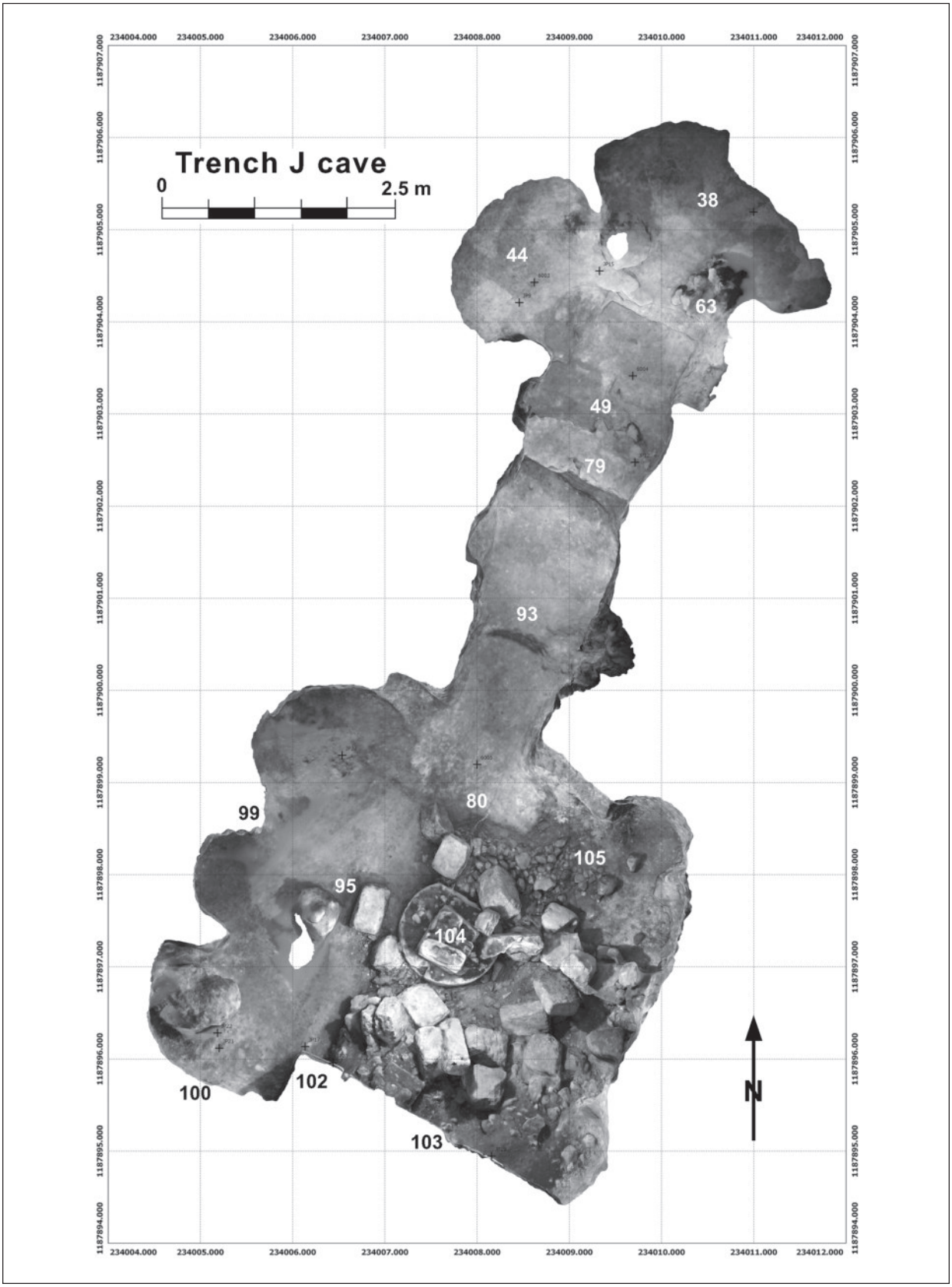
Building Phase 1 (Roman)

As with other areas of the Northwest Quarter, quarry works dated to the Roman period appear to have marked the beginning of human intervention in this area. Since the total excavated area is not large, it is difficult to conclude whether the subterranean cave was accidentally found during quarrying and then subsequently used as a room, or whether it had already been used as a room and access to the cave was from the south, where excavations have not yet taken



6. J14 Trench J Planum 1-75.

31. See Kalaitzoglou, Lichtenberger and Raja 2017 for the preliminary results of Trench E.



7. J14 Trench J cave Planum 1-50.

place. Nonetheless, it is obvious that the concentration of natural cracks, lacunae and small caves north of the cave room must have stopped the quarrying, and may have led to the discovery of the large cave.

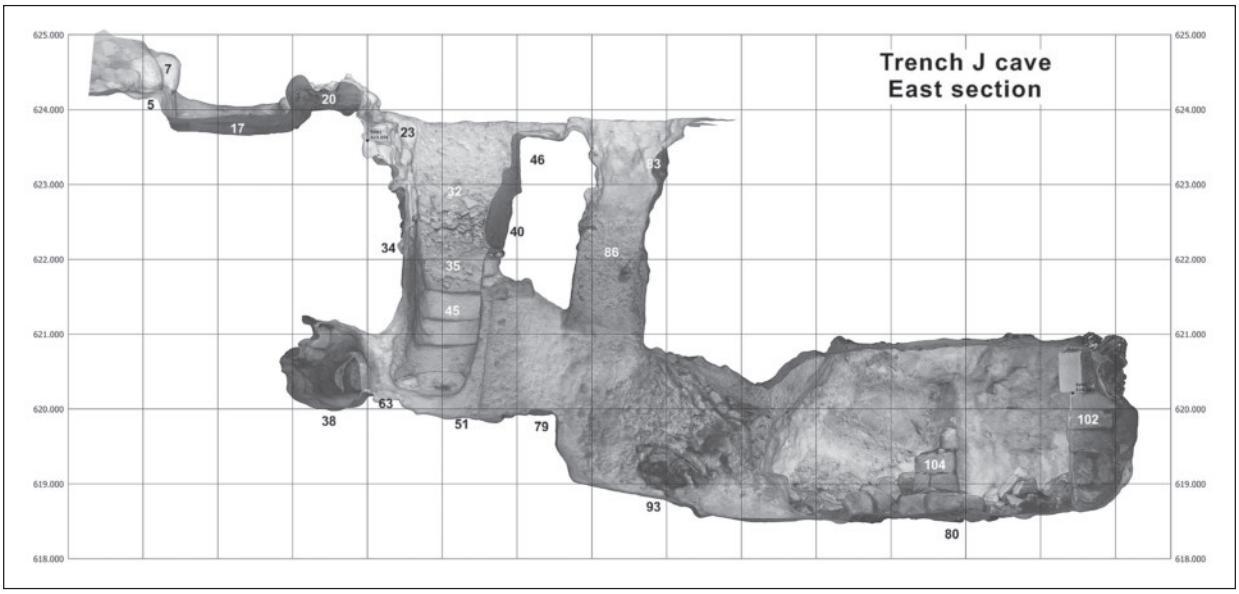
Building Phase 2 (Roman)

A vertical shaft (Ev. 34, 40 and 41) was dug into the limestone rock to determine the layout of the cave. Stairs cut into the rock led down from the east to the west. Although the modern surface is more or less even in this place, and slopes for only 0.6 m from north (624.52 m asl.) to south (623.94 m asl.), the rock surface is more uneven, sloping in an easterly direction for 0.8 m and in a southerly direction for 1.1 m[32]. This indicates that the shaft was most probably cut from east to to west. Due to the fact that the base of the quarry in the western part lies above a small natural cave (Ev. 44) and 1.8 m above the floor of the shaft, work appears to have stopped abruptly here, probably due to a small natural cave (Ev. 44) which was reached, with parts of the rock ceiling (the bottom of the shaft, Ev. 41) collapsing as a result. While the western part of the shaft was left in this condition, two other small caves were found, one on the northern side of the shaft (Ev. 38) and another on the southern side (Ev. 49). The latter was widened to form a tunnel (Ev. 93), which leads in a southerly direction down to the large cave room (Ev. 80; **Fig. 8**).

The staircase (Ev. 45) descends from the east into the shaft, which is only 1.3 m wide. Five steps could be excavated, four of which were cut into the rock, and one has been repaired by stone and mortar. Neither the height nor width of each step is identical, but the average is 0.34 m high and 0.325 m wide; hence, it would probably need four more steps to reach the top of the bedrock (622.87 m asl.) on the eastern baulk of the trench.

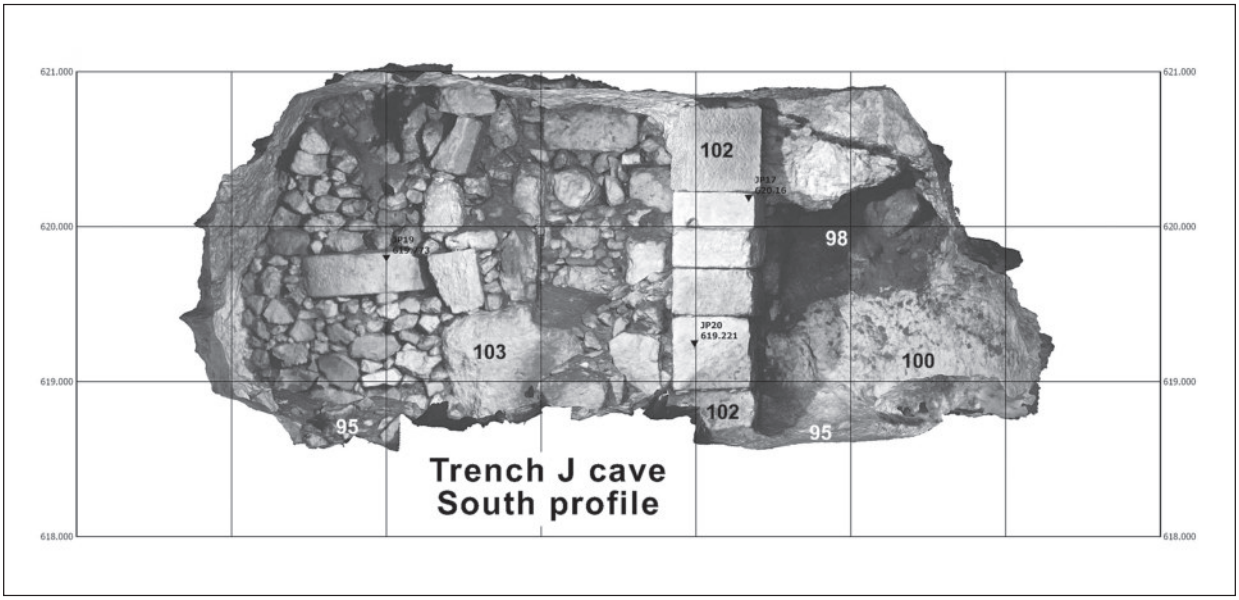
At the bottom of the 3.75 m deep shaft, three small natural caves are situated, none of which are high enough to stand upright. From there a tunnel (Ev. 93) leads about 3.85 m in a southerly direction down into the cave room (Ev. 80), entering it close to its northwestern corner.

The cave room (Ev. 80) is roughly square, and measures about 4.7 m east-west by 5.0 m north-south (**Fig. 7**). Three narrow, roughly dressed, rounded niches of unknown function were dug into the western side of the cave, and another into its northern side. About one third of the south side of the cave is made from natural bedrock (Ev. 100) which has cracks and natural lacunae; this was supported by a short pillar-like wall (Ev. 102; **Fig. 9**). The remaining two thirds were closed by a simple wall (Ev.103) consisting mostly of small to medium sized stones with some larger boulders, one of which may be a large round grinding stone used in a



8. J14 Trench J E-Prof 1-100.

32. Eastern direction: from 623.60 to 622.80 m asl. Southern direction: from 623.60 to 622.50 m asl.



9. J14 Trench J cave S-wall 1-75.

secondary context (spolia). The cave room has a maximum height of 2.43 m[33], which suggests a thickness of only 1.5 m for the rock above the cave. The pillar (Ev. 102) at the western end of the south wall (Ev. 103) is only 2.15 m high, as the cave ceiling curves down towards the south. This could indicate that the southern end of the cave is not far behind the wall. In the center of the south side, there is a small rectangular opening in the wall (Ev. 103). As the opening starts 0.73 m above floor level and measures only 1.13 m in height and 0.57 m in width, it is not clear if it was used as a door. The lower part of the opening was blocked with regularly laid small stones, while the upper 0.38 m was filled with irregularly laid stones and soil. The opening is similar to the resting hole for a press beam[34] but its function cannot be securely ascertained. There is a round limestone torus in the center of the cave, on which a pillar (Ev. 104) stood. The torus is a reused round millstone, similar to the example built into the south wall (Ev. 103). However, at this point, there is no definitive evidence the room was used as a press installation; its function can only be determined by further investigation in the 2015 campaign, which will include cleaning and an exploration of its south wall, which may have provided access to the cave room from the south.

A layer of different sized pieces of charcoal (Ev. 105) found on the undisturbed surface (Ev. 95) above the bedrock (Ev. 91) are the remains of the last phase the cave was in use. This charcoal appears to be connected with another charcoal layer (Ev. 89) found beneath the deliberate fills in the tunnel. In front of the tunnel entrance, the charcoal (Ev. 105) was covered by fill deposits, which suggests it stems from the last utilization phase. The same type of charcoal was covered by the tumbled stones of the central pillar and the south wall in the center of the cave room. This destruction was most probably caused by a later earthquake, which also widened a rock crack in the southwest corner of the cave. Fine sediment (Ev. 96, 97) was washed into the cave through this crack, and found as a large pile on the cave bottom (Ev. 95). The initial date of this building phase is not clear, but it fell out of use in the late 3rd/early 4th century AD, as can be seen from Building Phase 3.

Building phase 3 (Late Roman)

Changes in this phase were mainly with regards to the staircase shaft, the use of which was slightly altered. Previously, the bottom of the staircase shaft appears to have been used as a kitchen, but shortly thereafter after it was completely filled in and levelled; this also terminated all use of the large cave.

During this phase, the natural sediments in

33. The ceiling is 620.89 m asl. and the bottom is 618.45 m asl.
34. See Brun 2004, 14 (types A0 to A4) for a similar beam support built into the wall.

the western and northern caves were most likely removed, to lower the surface levels (Ev. 65)[35]. Since the surface level corresponds with a new mortar floor (Ev. 51) and not with the deeper rock surface, the widening of the small caves is related to this phase (**Fig. 8**). A row of stones (Ev. 79) was laid above an older rock step, and lined with mortar in the entrance to the tunnel (Ev. 49 and 93). This structure lowered the formerly 1.9 m high entrance into the tunnel to only 1.38 m, and formed a steep step (Ev. 79). Rock cuts, stop bars and beam-holes for a wooden framework are visible in the tunnel entrance (Ev. 49). Although this installation is similar to the frame of an ordinary or two-wing door, the presence of a door can be excluded, as the sloping tunnel ceiling means it would be impossible to open it; therefore, it is more likely that the frame served as a wooden screen which closed off the tunnel. The mortar floor (Ev. 51), which was laid in the staircase shaft above the rock, covers the steep step and runs against the older staircase (Ev. 45). An oval tabun (Ev. 52), situated in front of the western cave (Ev. 44) and the tunnel entrance (Ev. 49), is encircled by tile and pot sherds, and integrated into the floor; this would have restricted access to the tunnel. A second, simpler hearth (Ev. 63) was built of two parallel stones on the eastern side of the northern cave opening. The position of these installations suggests that the tunnel and cave room were not in use during this phase. South of the steep step (Ev. 79), a layer of charcoal (Ev. 76 and 89) was found, which covered the bottom of the tunnel and underlies all later wall structures and fills in the tunnel. This charcoal appears to have washed into the cave room (Ev. 105), and could be a result of cleaning the tabun (Ev. 52) and the fire place (Ev. 63) in the staircase shaft.

The features described above lead to the conclusion that the shaft was used in a more basic way during this phase, perhaps as a shelter or kitchen with small side chambers. Although we cannot conclusively determine if the shaft was roofed, it does itself not provide sufficient ventilation for smoke, and rainwater could have flowed into the old cave room.

The staircase shaft was probably filled soon after it was abandoned, because only a thin natural fill of yellowish clay (Ev. 50), either wind-borne or washed in, covered the mortar floor (Ev. 51), the tabun (Ev. 52) and its last charcoal fill (Ev. 53). Radiocarbon dating of the latest charcoal fill in the tabun gives a date between late 2nd and early 4th century AD[36], with a higher probability in the period between AD 212 and 325. The charcoal layer (Ev. 105) on the cave floor, although slightly later, gives a similar date between AD 314 and 404[37]. This can be explained by burning old wood (the old wood effect) in the tabun. According to these dates, the utilization phase of the staircase shaft (Phase 3) can be dated to the early 4th century AD. Not long after the staircase shaft fell out of use, the first blocking wall (Ev. 71) was built into the tunnel entrance, and the shaft (Ev. 30, 40, 45) was deliberately filled with layers of different composition[38]. Large stones were found in the lower layers, with more soil and large quantities of well-preserved Late Roman pottery in the upper layers. These deposits did not completely fill the caves to their ceilings; lacunae were found in the northern cave (Ev. 38), as well as in the western (Ev. 44) and southern (Ev. 49) caves. Although the finds from the fill layers north of the blocking wall (Ev. 71) can be dated primarily to the Late Roman period, the finds south of the same wall are of Byzantine date. The earlier dating of the fill in the staircase shaft is confirmed by a charcoal sample from the lower portion of this fill (Ev. 35), which gives a date between the 3rd century AD and first half of the 4th century AD[39], with a higher probability between AD 226 and AD 358. This corresponds to the dating of the tabun

35. The original surface is still visible in the rear of the caves. The sediment which was removed is very fine, rich in lime and free of organic intrusions.

36. Sample no. 21335 (J14-Jc-54-2), Institut for Fysik og Astronomi, Aarhus University (Denmark), ^{14}C age 1787 ± 29 BP, d13C (dual-inlet, extremely small sample) -25.83 ± 0.7, calibration curve IntCal13, 1σ 174–325 AD, 2σ AD 135–330.

37. Sample no. 21336 (J14-Jc-85-1), Institut for Fysik og Astronomi, Aarhus University (Denmark), C14 age 1701 ± 28 BP, d13C (dual-inlet) -23.71 ± 0.05, calibration curve IntCal13, 1σ 264–390 AD, 2σ AD 254–404.

38. The distinct fill layers, from top to bottom, are: Ev. 32/39, Ev. 35, Ev.43, Ev.47 and Ev. 48 in the staircase shaft. – Ev. 35/60, 47/61, 48/62 in the northern cave. Ev. 38; – Ev. 35/66, Ev. 47/67 and Ev. 48/68 in the western cave. Ev. 44; – Ev. 35/69, Ev. 47/72 and Ev. 48/73 in the southern cave. Ev. 49; – Ev. 82, Ev. 77 and Ev. 81/88 in the vertical shaft. Ev. 86 in the tunnel. Ev. 93 and the cave room Ev.80.

39. Sample no. 21334 (J14-Jd-35-25), Institut for Fysik og Astronomi, Aarhus University (Denmark), C14 age 1753 ± 26 BP, d13C (dual-inlet) -22.8 ± 0.05, calibration curve IntCal13, 1σ 245–330 AD, 2σ AD 226–380.

and the charcoal on the cave floor. The large amount of well-preserved Late Roman pottery provides an indication of Roman habitation in the vicinity of the cave.

Building Phase 4 (Late Roman and/or Byzantine/Umayyad)

This phase is characterized by the construction of a street on top of the refilled staircase shaft and to the north of it (**Fig. 6**). This street has the same orientation as the shaft, and has houses on both the north and south sides. It is not yet possible to determine if the reason for backfilling the shaft and closing the entrance to the underground cave in Building Phase 3 was to construct this street and the houses, or if there was a gap between closing the shaft and constructing the street. Therefore, clarification of the absolute chronology of this phase is subject to further investigation in 2015. This is an important question, as it impacts on the date of commencement for the urban street plan in this area of the Northwest Quarter. Was it constructed during the early 4th century AD, or later during the Byzantine/Umayyad period?

The characteristic features of this phase are leveling of the terrain and construction of buildings at surface level. On the south side, a wall (Ev. 46) with well-dressed stones was built. To the south of it, a vertical shaft (Ev. 86) was cut down to the older tunnel, and probably refilled soon thereafter; the reason for cutting the shaft remains obscure, but may relate to an attempt to drill a cistern. That this shaft antedates the surface buildings is proven by a wall (Ev. 83) which was built on the fill (Ev. 82 and 77) in the shaft, and which runs against an east-west running wall (Ev. 46). In the tunnel behind the older blocking wall (Ev. 71) and under the vertical shaft (Ev. 86) two simple walls (Ev. 75 and 87) of different heights were erected, to limit the amount of material required to refill the shaft[40]. The first additional wall stands on an earlier charcoal layer (Ev. 76) and the second on a fill layer (Ev. 88) above a later charcoal layer (Ev. 89). This charcoal layer (Ev. 89) is obviously later, dated between the 5th century and the first half of the 6th century AD[41]. This Byzantine dating fits well with the fragment of a Jerash lamp which was found within the later blocking wall (Ev. 75). The northern part of the tunnel, which had been closed by the new blocking walls, was then backfilled via the vertical shaft (Ev. 86) with fill layers (Ev. 77 and Ev. 88), which contained large quantities of Byzantine pottery[42].

A wall (Ev. 83) was erected on top of the filled shaft, south of the former staircase shaft, which runs to a wall (Ev. 46). Whereas the northern wall rests on the sloping bedrock, this one (Ev. 83) was built above the fill (Ev. 77) in the vertical shaft (Ev. 86) and a pottery-rich foundation layer (Ev. 82) above the bedrock surface. It could not be established whether Ev. 46 and Ev. 83 were constructed at the same time, or whether Ev. 46 was older, thus antedating the second shaft and wall (Ev. 83).

About 4.65 m north of this wall (Ev. 46) and parallel to it, the southwestern corner of another building was found (**Fig. 6**). It is not yet clear if this building is contemporary with the wall south of it (Ev. 46) or if it belongs to a phase prior to the filling activities. Since the west wall (Ev. 56) and the south wall (Ev. 57) were later covered by an edifice which was also parallel to the southern house, it is obvious that they mark earlier building activity on this spot. Remains of fine wall plaster remains on the western face of the earlier wall (Ev. 56) argues either for another interior room west of the corner or, which is more likely, for preserved exterior wall plaster. The later edifice above the older house corner and the southern building are connected by the mortar surface of the central street (Ev. 17, 33) found between both buildings. Of the later northern building, only the lowest courses of an east west oriented south wall (Ev. 4-7) and a wall (Ev. 21) heading northwards are preserved, as well as a mortar floor (Ev.9) in the northwest corner of the trench. No debris from this building was found, and the stones in the upper course are rounded by bush fires, weathering and ploughing. The south wall (Ev. 4-7) is about 0.70 m thick, and

40. The cave room was almost empty. A wedge shaped pile of filling material (Ev. 77) was found in the tunnel and the entrance of the room, while some stones and pot sherds had rolled further in.

41. Sample no. 21337 (J14-Je-90-2), Institut for Fysik og Astronomi, Aarhus University (Denmark), C14 age 1570 ± 27 BP, d13C (dual-inlet, extremely small sample) -23.66 ± 0.55, calibration curve IntCal13, 1σ AD 430–536, 2σ AD 419–550.

42. See Lichtenberger, Raja and Sørensen in this volume.

built of reused blocks, including a threshold which was broken into five parts, a cut column drum, and a cut ashlar with drafted margins. The inner face of the south wall was built of fist sized stones, and also continues for a short distance along the eastern face of the wall (Ev. 21). This type of masonry was also observed in Trenches D and E, and appears to be typical of the Late Byzantine and Early Islamic periods[43]. As the floor (Ev. 9) runs from the west against a wall (Ev. 21) which runs from the north against the southern house wall (Ev. 4-7), there should have been another room east of this wall (Ev. 21). However, as no floor was found covering the older walls, and the interior of the earlier house corner was filled with stones, it is most likely that this area was excavated and refilled at a later point in time. This approach of cleaning and refilling is very similar to the Mamluk building practice observed in Trenches D and E[44].

The ground plan in this phase has a 4.6 m wide street with a mortar surface, flanked by two parallel houses. The continuation of a wall (Evs. 4-7) can be traced on the surface for a distance of almost 59 m, and a parallel wall, which wall Ev. 46 is part of, could be traced for a distance of 48.5 m (**Fig. 5**). These features not only confirm the enormous width of the street (Ev. 17, 33) but also demonstrate it was one of the main roads on the hill, with 'central street' belonging to an extensive building development on top of the hill.

As noted previously, until a full finds analysis has been completed, it is not possible to determine if the street (Ev. 17, 33), the southern wall (Ev. 46) and the house (Ev. 56 and 57) immediately followed the backfill of the staircase shaft in the early 4th century AD, or if they belong to a Byzantine/Umayyad development of the street grid. In either case, the northern wall (Ev. 4-7) probably belongs to the Byzantine/Umayyad period.

Building Phase 5 (Byzantine/Umayyad)

Only the foundation walls of a very small room, which was built on the northern side of the southern edifice and into the broad street, relate to this phase. Whereas the northern wall (Ev. 23) was built on the sloping northern rock of the staircase shaft, the western wall (Ev. 26) was built into a foundation fill (Ev. 24, 27) above the shaft fill (Ev. 32, 36 and 37). Only a row of stones (Ev. 25) set on the same fill against an east-west running wall (Ev. 46) remains from the southern limitation of this room; this implies that the southern building above the cave was still standing when the new room was erected. Furthermore, as this action narrowed the southern side of the street for about 2 m, it appears that the central street was not as important during this period for traffic in the Northwest Quarter. Similar changing use of public urban spaces can be observed in other places during the Byzantine and Umayyad periods[45].

Building Phase 6 (Ayyubid-Mamluk)

This phase appears to be related to the Ayyubid-Mamluk hamlet on the northern and western side of the large courtyard. After the houses and street had fallen out of use, the area was again leveled, and a simple but almost 1 m wide wall (Ev. 20) was built parallel to the southern limitation of the courtyard. This limitation is formed by the south wall (Ev. 4-7) of the north edifice, of which only one row of stones remains. Both walls seem to have functioned as path delimitations of a small lane leading east-west. The new southern wall (Ev. 20) of this lane was built on a foundation fill (Ev. 30) above the older street surface (Ev. 17, 33) and could be traced for a distance of 27 m, and was almost parallel to the older street's north wall. No debris or destruction layers for the structures of the preceding phases were found, evidencing that the walls (Ev. 21, 46, 56, 57) were demolished close to the surface level. The courtyard fill covering these structures contained chronologically mixed finds, and has traces of ploughing in its upper parts (Ev. 1, 2, 3 and the upper part of Ev. 8). Only the lowest layer (Ev. 8) of the courtyard fill seems to have remained undisturbed, resting on a layer of thin soil (Ev. 14) above the mortar floor (Ev. 9).

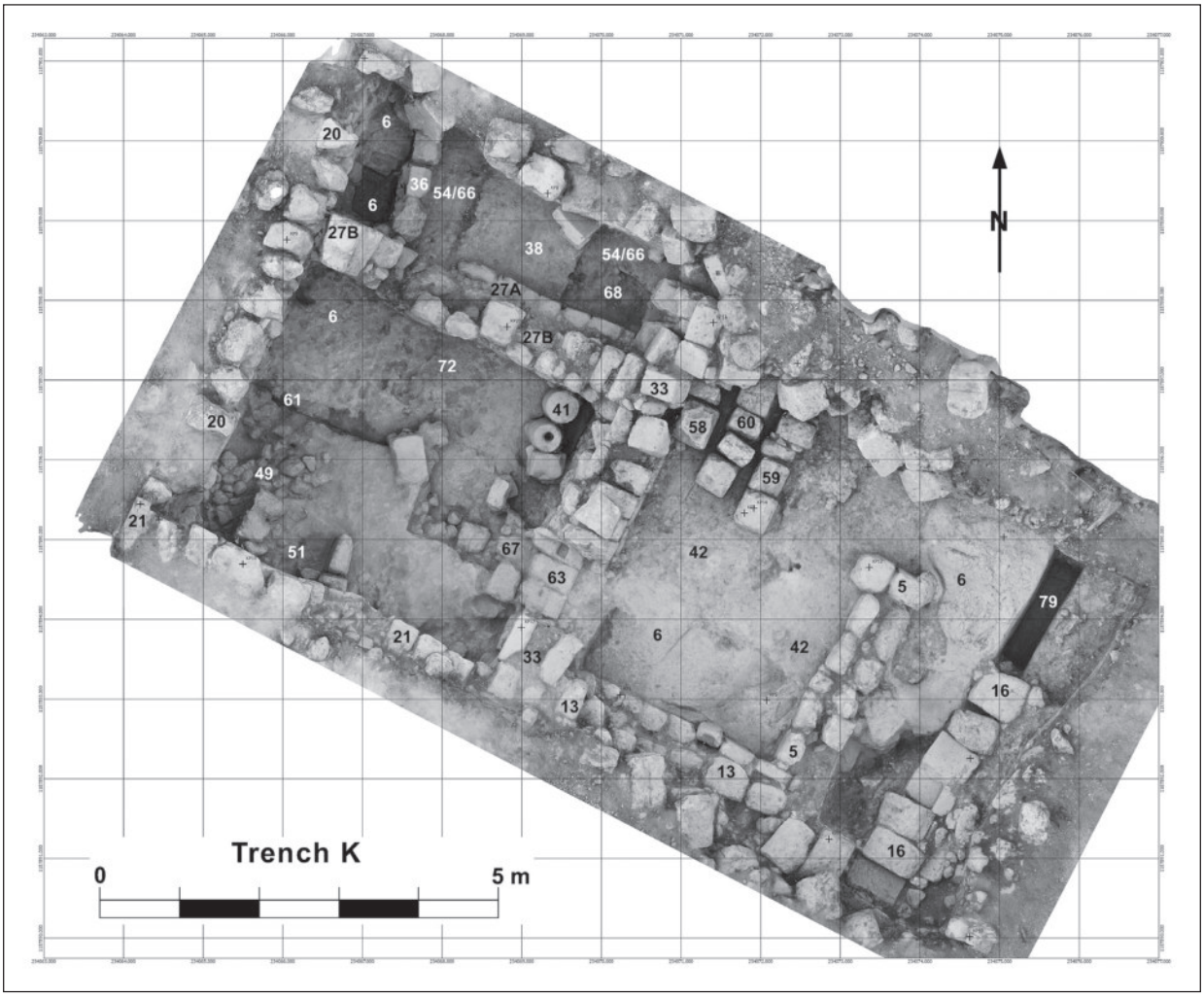
Trench K

43. See the preliminary field report for the 2013 campaign; Kalaitzoglou,Lichtenberger and Raja (2017).
44. See Kalaitzoglou, Lichtenberger and Raja (2017).
45. See e.g. the situation at the South Decumanus in Jarash (Gawlikowski 1986, 111–113). The same can be observed in Scythopolis (Tsafrir and Foerster 1997).

Exploration of the eastern terrace, which lies to the west of and higher than the Artemision, commenced with Trench K[46] (**Fig. 1**). It was opened half way between the large courtyard further to the west and the modern dirt road to the east. Since this terrain is scattered with large stones as well as architectural elements of mostly Roman date, it seemed to have been heavily disturbed during modern times at first. Nevertheless, excavation proved that closed contexts from the Umayyad period were still extant, and that the piles of stones were derived from sudden destruction deposits of large buildings; this destruction was probably due to the earthquake in AD 749. No rebuilding took place in this area at any point in time after the earthquake. Thus, the eastern terrace appears to be predominantly undisturbed by later occupations[47], although the levels close to the surface have been affected by bushfires.

An eastern square (Sectors A-D) was excavated, measuring 6.3 by 5.3 m; this was later extended to the west, resulting in a trench 11.2 m long and 6.5 m wide, with a total area of 65.9 m^2.

The building remains excavated in both parts of Trench K belong to a large edifice orientated parallel to the slope, which continues in both the northern and southern directions (**Fig. 10**). This is evident from the central wall (Ev. 33),



10. J14 Trench K Planum 1-50.

46. Till Flüchter was trench supervisor.

47. Although a hamlet of Ayyubid-Mamluk date is situated only 30-40 meters to the northwest, sherds of that date were very rare and only found close to the surface in Trench K. Some Ayyubid-Mamluk sherds in the upper parts of Ev. 3 are intrusive in most cases, and stem from the top soil (Ev. 1) which fell into the trench when some large boulders (Ev. 2) were removed. Joins between Ev. 1 and Ev. 3 demonstrate that some of these late sherds were moved through the cavities between the stones by animals.

which continues in both directions beyond the trench limits and the western wall (Ev. 20), which continues further north. Although this edifice was built on bedrock, it seems to have had a relatively short occupation history with only minor architectural changes, before it was destroyed by the severe earthquake.

Building Phase 1 (Roman)

The earliest evidence for occupation are traces of a quarry, discovered in the northwest corner of the trench. Although the unearthed part of the bedrock is limited, some irregular step-like cuts provide evidence that medium sized stones were quarried on this spot. Combined with the traces of quarry pits discovered in Trenches A, C, D and E, it is obvious that the surface of the stone quarry extended for a distance of at least 130 m into the east terrace, and thus appears to have covered almost the entire hill top (**Fig. 1**), which has implications for the urban topography of the Roman period.

Building Phase 2 (Umayyad)

The first stage of construction for the house was the excavation of a large rectangular basement room, limited by walls Ev. 20, Ev. 21 and Ev. 33. These walls were built on bedrock, with the east wall (Ev. 33) also built against a step in the bedrock. This room was then divided into a north room and a south room by the east west wall Ev. 27A[48], which does not reach the west wall (Ev. 20), but appears to leave space for a doorway at its western end. The lowest floor discovered is Ev. 72, a thin mortar floor which was laid over the partly leveled bedrock (Ev. 6) and the foundation fill (Ev. 83); the latter was necessary to fill cracks and gaps in the bedrock. Although floor Ev. 72 could only be unearthed in the south room, it must belong to the first plan of the entire building; this is evident by the fact that it runs against the walls of this phase, and also runs in a northerly direction under the foundation of a later wall (Ev. 27B). As the bedrock surface is not even, the remains of quarrying in the northwest corner of the trench must have been visible above the floor level.

An open space was situated to the east of this building, on a 0.5 to 0.7 m higher rock surface which was only roughly levelled (**Fig. 12**). At the eastern end of this open space, a water channel (Ev. 79) was found, oriented north south and almost parallel to the building. The channel was partly cut into the rock and partly built against a (natural?) rock edge. In this first phase, the open space does not seem to have been accessible from the excavated basement rooms, because the door in the east wall was only added later. This suggests that the basement of the edifice must have been accessible through a door further to the north, beyond the limit of the trench.

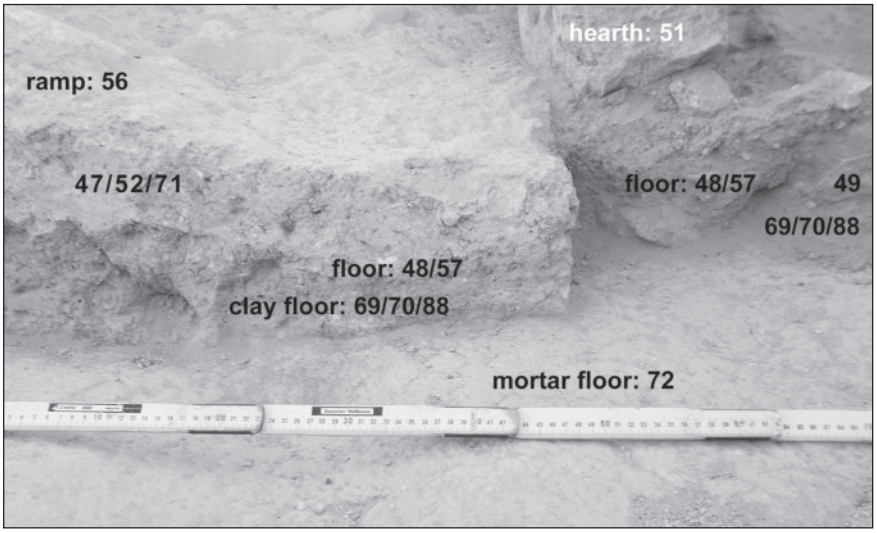
Building Phase 3 (Umayyad)

During this phase, the building was extended to the east, a door was constructed, and another room in the former courtyard erected. The identification of this phase is based on the evidence of a new clay floor in the south room (**Fig. 11**). A corresponding floor was not found in the north room, which was excavated down to bedrock only in its southwestern corner.

There was a simple clay floor in the southern room during this phase (Ev. 69, 70, 87, 88), which was 10 to 15 cm thick, and laid above the earlier floor (Ev. 72), which appears to have been damaged and partly removed, especially the western part. That the new clay floor belongs to the third phase is due to the fact that it runs against the staircase (Ev. 67) and under the subsequent ramp (Ev. 56; Building Phase 4). This verifies that during this phase, to provide access to the open space to the east of the south room, a doorway (Ev. 64) was built into the east wall (Ev. 33) close to the southern limit of the south room. That this door is not an original installation is clear from the open wall cores on both sides. Furthermore, the threshold (Ev. 63) is broken into worn fragments, and is not in line with the wall, but projects into the room; this underlines the secondary character of the door construction. As the wall (Ev. 33) is built against a step in the bedrock, access to the area in the east required a staircase. This staircase (Ev. 67) is comprised of irregular stones, set loosely into a soil and stone foundation against the threshold.

A simple open fire place (Ev. 61) was installed into the floor of the room, near the west wall (Ev. 20). In front of the east wall (Ev. 33),

48. That this wall is older, and not only a bench, is because the later wall (Ev. 27B) rests on a fill above the first floor level.



11. J14 Trench K S-room floors.

two low column drums (Ev. 41) were erected. The southern one was hollowed out and, as a basalt grinder was found in it, used as a crusher. The installations were interpreted as a simple workspace, with an open fire place on the floor, situated in the southern room.

As another door was installed during this phase, which led to the area east of the house, a further room was built in this or an intermediate phase. This east room was constructed in the open space between the central wall (Ev. 33) and the water channel. Its walls (Ev. 5, Ev. 13) were set against the older edifice on a thin foundation fill (Ev. 19 and Ev. 43) over the bedrock, with a door built in the east wall (Ev. 5). The rock and levelled gaps were covered by a mortar floor (Ev. 42). A wall like structure in the east room, which consists of three courses of stone (Ev. 58, Ev. 59, Ev. 60) and laid parallel to the edifice's east wall, possibly belongs to a staircase which led to an upper storey.

Building Phase 4 (Umayyad)

The main feature of this building phase is the division of the north room and the south room into two unconnected rooms by a wall (Ev. 27B), which closed the opening Ev. 27A had provided.

In the north room, the northern wall face of the earlier wall (Ev. 27A) was retained, with a new wall (Ev. 27B) built parallel to it, separating both rooms.

During this phase, the wall Ev. 27B was built on a thick foundation fill, while the floor of the south room was raised by a layer of fist and medium sized stones (Ev. 49) set into a brownish clay (Ev. 48 and 57). This floor completely covered the former fireplace (Ev. 61) in the south room. A simple hearth (Ev. 51) was built on the new floor, formed by two parallel rows of large stone slabs (**Fig. 11**). This hearth was found filled with ashes and sherds from a Grey Ware vessel. Traces of burning were visible on the south wall (Ev. 21). As the floor was now much higher, the former staircase was built over by a simple ramp (Ev. 56) comprised of clay and mortar (Ev. 47, Ev. 52, Ev. 71). The column drum installation (Ev. 41) stayed in place and was integrated into the floor, although a consequence of raising the floor meant the crusher was no longer useable.

The lower clay floor of the north room (Ev. 54, Ev. 66, Ev. 77) was laid on the foundation fill (Ev. 68 and Ev. 76). This floor is partly baked, and shows traces of a fire; hence, it could possibly be concluded that this phase ended due to destruction by fire, at least in the north room.

Building Phase 5 (Umayyad)

Alterations during this phase took place in the north room only. A wall (Ev. 36) was built on the earlier floor (Ev. 54, Ev. 66, Ev. 77) to create a low pedestal in front of the west wall (Ev. 20) which covers the higher bedrock level, which had been left uncovered in the preceding phases. A new thin mortar floor (Ev. 38) was laid over a thin foundation layer (Ev. 55) over the rest of the north room, both of which ran against the new pedestal. Although the floor in the north room was of a higher quality than that

in the south room, traces of wall plaster were found in neither of them.

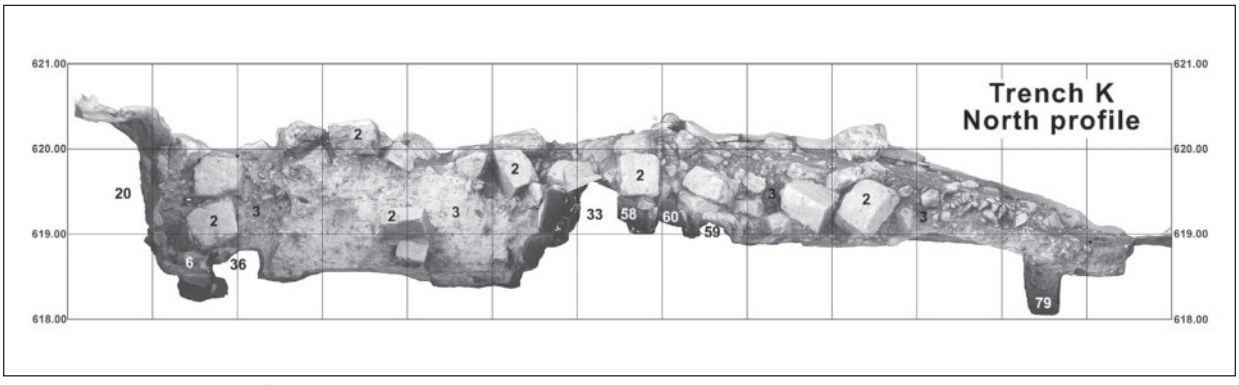
Destruction of the Building (AD 749)

The layout of the complex was as described above when a severe earthquake destroyed the building. The rooms were filled from 1.5 to 2.0 m high with fallen debris (Ev. 2), and a very homogeneous silty clay (Ev. 3; **Fig. 12**); The latter must stem from the pisé (rammed earth) walls of the upper stories[49].

In the south room, a layer of loose brownish soil (Ev. 44) was found under the debris covering the latest floor (Ev. 48, 49, 57) and the simple hearth construction (Ev. 51). As this layer covers the floor and installations of the last occupation phase, it should originate from the ceiling of the basement room, with wood and beams responsible for the brownish coloring and loose consistency. Similar spots of loose brownish soil were recognized in Ev. 3 closer to the walls, and a very similar but much thinner layer of loose brownish soil (Ev. 35) was found in the north room, where it also covered the uppermost floor (Ev. 38).

Architectural fittings and some older objects were found embedded in the clay and stone collapse (Ev. 2 and 3; the later formerly incorporated into the wall cores) as well as a large assemblage of objects which had collapsed from an upper storey. More than thirty individual finds and several find concentrations were documented in the destruction fill. While the majority of finds were concentrated in the northern half of the south room, between 0.5 and 1.0 m above the uppermost floor (Ev. 48, 49, 57), some objects were found above the destroyed walls and other structures[50]. Traces of colored wall plaster (in Ev. 35) and stucco profile fragments (in Ev. 39) prove that the upper rooms were elegantly decorated. A broken amphora (Ev. 32, cat. no. 72) and a Grey Ware vessel (Ev. 40, cat. no. 82) were found in front of the west wall; they had fallen from the first floor. Two globular glass bottles survived the fall undamaged[51]. The most important finds are a coin hoard[52] found in close connection with a metal object, a mortar and pestle (cat. no. 183), a flax or wool comb (cat. no. 97) and a bronze object (cat. no. 103). Nearby, only 0.4 m away, another finds cluster (Ev. 34) contained iron and bronze objects (cat. no. 91-94, 99-102, 106-109, 111, 114, 117-118, 121-123, 126-128, 134-135), as well as a bone object (cat. no. 147), spindle whorls (cat. nos. 154-155), an iron lock (cat. no. 101; probably from a wooden box) and a bronze key (cat. no. 104). Only 0.35 m to the west of the coin hoard, a concentration of golden beads (cat. no. 159) and some carnelian beads (cat. nos. 164, 167), together with a broken glass bottle of the known globular type and a small unguent pot were found (Ev. 39).

The building was never repaired, and the entire area was abandoned until the modern era. No traces of building activities from the Ayyubid-Mamluk period were found, and even agricultural work seems to have been impossible in this stone field.



12. J14 Trench K North-profile 1-100.

49. A very similar yellowish clay was found in Trench D during the 2013 campaign.

50. An iron object (J14-Ke-3-18x) above the eastern wall (Ev. 33). A coin (J14-Ke-3-19x) above the older wall (Ev. 27A). A tridacna shell (J14-Kg-3-15x, B141) and a metal object (J14-Kg-3-20x, M153) above the later wall (Ev. 27B). A large iron scissor fragment (cat. no. 96) was found above the hollowed column drum of Ev. 41.

51. J14-Kg-3-11x (G144), J14-Kh-3-22x (G86).

52. See Lichtenberger and Raja 2015 for the coin hoard.

Dating of the final destruction is based on the finds. The pottery which has been found so far in all the Evidences appears to be from the Umayyad period. Only small fragments of Jerash bowls were found, in most cases from the foundation layers. Glass lamps with beaded stems, typical of the early Islamic period, were found in the debris[53], as well as three globular glass bottles with short tubular necks, which are also typical of the Umayyad period[54]. This evidence suggests occupation and destruction of the house took place in the Umayyad period. More precise dating is provided by the coins. The latest coins in the hoard stem from the time of 'Abd al-Malik (AD 685-705), but further coins found in the collapse were undated post-reform coins from the first half of the 8th century AD. A date of destruction towards the end of the first half of the 8th century AD is also supported by three radiocarbon dates, which additionally verify that the edifice was occupied for only two or three generations before it was destroyed. The sample from the simple fireplace (Ev. 61) in the second building phase assigns a date between AD 690 and AD 767[55]. This is almost identical to the date assigned to the charcoal found in the hearth (Ev. 51) built in Phase Three, as this is assigned a date between AD 674 and AD 764[56]. Furthermore, a sample from the lowest part of the debris (Ev. 44) covering the latter hearth is dated between AD 691 and 770[57], thus only slightly later, and providing evidence that the destruction followed relatively soon thereafter. Since the destruction of the room was devastating and final, it can be assumed that the AD 749 earthquake, which destroyed most of the city, was also responsible for the destruction of this house[58].

To sum up the chronological evidence, it is most probable that the house was built in Byzantine/Umayyad times and was destroyed in AD 749 at the end of the Umayyad period, thus providing a closed Umayyad context with a huge diversity of material culture.

Trench L

Trench L was opened on the south slope, where the south street meets the west side of the large rock-cut cistern (**Fig. 1**)[59]. The south street is 2 to 3.2 m wide, and one of the main communication axes on the southern hillside. The street was flanked by buildings along its 103 m long course, which extended from the city walls in the west to the western limit of the large Roman cistern; the buildings on the south side of the street are at a lower level, due to the sloping terrain. The main objectives were to clarify the chronological relationship between the street and the cistern in relation to the settlement history along the street, and the habitation discovered last year (2013) inside the cistern[60]. With some extensions towards the south and the west, the trench measured 9.10 by 11.70 m, an excavated area of 75.30 m^2; the deepest level reached 4.7 m below the surface in the cistern (**Fig. 13**).

The stratigrapy was complex, with several phases of building activity, as well as repairs and alterations to the street layout. Its most important development is the transition from a water reservoir to an extensive settlement, when the area on the southern hill slope was established. An important result of Trench L is a better understanding of the course of the south street, which ran over the former cistern and turned to the north. Absolute chronological dating of the phases is not yet clear, and needs further analysis. However, the 2014 excavations in Trench F, together with an AMS ^{14}C dating of the mortar in the cistern, was enough to establish the main

53. See Jackson-Tal 2012, 65–67 fig. 3 no. 46 for examples.

54. J14-Kg-3-11x, J14-Kh-3-22x, J14-Kg-39-##. Lester 2003, 158–159 fig. 1 no. 1 (Tiberias stratum V = Umayyad) with further references.

55. Sample no. 21340 (J14-Kh-61-1), Institut for Fysik og Astronomi, Aarhus University (Denmark), ^{14}C age 1268 ± 25 BP, d13C (dual-inlet, olive cores) -22.39 ± 0.05, calibration curve IntCal13, 1σ AD 690–767, 2σ AD 667–775.

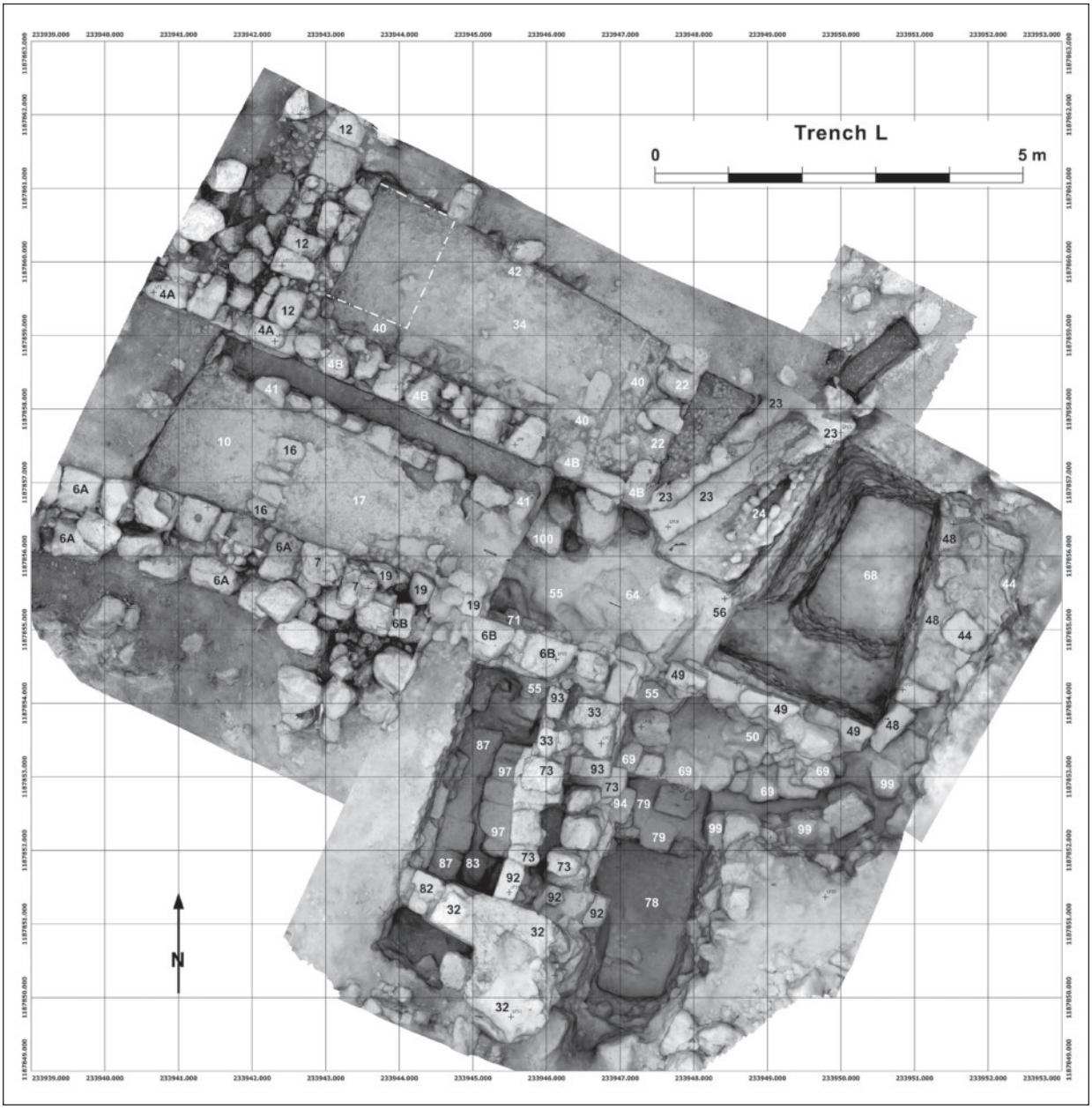
56. Sample no. 21339 (J14-Kh-51-2), Institut for Fysik og Astronomi, Aarhus University (Denmark), ^{14}C age 1294 ± 25 BP, d13C (dual-inlet, wood) -23.30 ± 0.05, calibration curve IntCal13, 1σ AD 674–764, 2σ AD 664–769.

57. Sample no. 21338 (J14-Kg-44-2), Institut for Fysik og Astronomi, Aarhus University (Denmark), ^{14}C age 1259 ± 25 BP, d13C (dual-inlet, wood) -23.26 ± 0.05, calibration curve IntCal13, 1σ AD 691–770, 2σ AD 670–861 (resp. AD 670–778, 90.6%).

58. See e.g. Russel 1985, 47–49 and Marco *et al.* 2003. See Tsafrir and Foerster 1992 for the date. Jarash was situated within the maximum damage zone; see Marco *et al.* 2003, 668 fig. 3 for further information.

59. Anne Ditte Koustrup Høj was trench supervisor.

60. See Kalaitzoglou, Lichtenberger and Raja 2017 for the results of Trench F.



13. J14 Trench L Planum 1-100.

phases of the cistern[61]. It was built during the 2nd/3rd centuries AD, and was in use as a water reservoir until the 5th/6th century AD. After that, the area was transformed into a residential quarter, but this had already been backfilled in the 6th/7th century AD, and the former cistern covered with fill.

Building Phase 1 (Roman)

The oldest structure found was the Roman period cistern. The bedrock (Ev. 55) in most parts was only roughly dressed, with an uneven surface, but two layers of mortar lining were found on both the bottom (Ev. 90 and Ev. 68) and the west wall of the cistern (Ev. 56 and Ev. 57). This situation was also found in the southern extension of the trench (Sector I), where the cut bedrock (Ev. 83) was also lined with two layers of mortar (Ev. 88). The mortar used here is very similar to the oldest one, which was found in the eastern part of the cistern. It came as a surprise that the cistern bottom in the west

61. Lichtenberger, Lindroos, Raja and Heinemeier, 2015, esp. 125; Kalaitzoglou, Lichtenberger and Raja 2017.

is more than 40 cm deeper than the east[62]; this proves that the bottom of the cistern was not even, and that differences in elevation were tolerated[63].

Another new insight was the verification of the originally more or less straight-lined western limit of the cistern. Towards the south, the only section where the bedrock has been worked, the top of the bedrock slopes down for only 0.7 m, between Trench L (614.31 m asl.) and the southwest corner of the cistern (613.80 m asl.). This would lead to a maximum filling level of about 2.8 m at the western end of the cistern. A 3.75 m wide gap found in the western bedrock in southern Sector I does not seems to belong to the original layout of the cistern, because it reaches a level 1.2 m below the assumed filling level and the mortar lining around it was destroyed. Therefore, this opening is later (Building Phase 2), and was originally closed, leaving the question regarding which side the cistern was accessible from unsolved.

Outside the cistern, the bedrock (Ev. 55) remained uneven and protruding rocks (Ev. 100) were not cut; however, gaps and depressions were filled with residual clay (Ev. 66) and mortar (Ev. 64), and partly covered by the first mortar lining (Ev. 56). These preparations stabilized the edge of the cistern, and created an up to 2.4 m wide clean area along its border.

No traces of any further structures, which were contemporary with the Roman cistern, were found. However, it is unlikely that the cistern remained isolated on the southern hill slope, and when more intense building commenced in the area around the cistern still remains to be clarified,. The only building which was founded on bedrock is the so-called north room west of the cistern, belonging to the buildings along the north side of the street. However, since its foundation rises above the edge of the cistern, which therefore must have been covered, it belongs to the next building phase.

Building Phase 2 (Byzantine or Roman and Byzantine)

This phase witnessed the main building activity, and the area plan around the western edge of the cistern was transformed into a habitation area. Even though the building activities took place over time, the results can be summed up as follows. The south street was built in the first instance. The houses on the northern side of the street were built, and in their eastern prolongation, the northwest corner of the cistern was separated from the rest by a multipurpose supporting wall structure, which was built into the cistern and filled up to its edge. This structure can be best explained as serving as a support for the south street's turn to the north on one hand, and flanking a staircase leading down into the cistern on the other. The staircase was accessible from the southern side of the street, where an opening was cut into the rock of the cistern wall, and a staircase with a bent course was built, which leads into the cistern. This installation, with a staircase inside the cistern, implies that the water reservoir was now out of service.

The supporting wall structure formed a base not only for the building structures close to the cistern edge, but also for a street corner leading in a northerly direction, although due to erosion a street surface could not be detected. Hence, the staircase establishes a connection with the cistern, which was already inhabited in this phase. According to our 2013 research in the eastern part of the cistern, habitation began in the 5th/6th century AD[64]. This can also probably be assumed for the construction of the staircase.

This reconstruction of the building history implies that the Roman cistern remained more or less isolated on the hill, with construction of the south street and development of the quarter north and south of it beginning only when it ceased functioning as a water reservoir in the 5th/6th century AD. However, that the street and some of the adjacent buildings (such as the north room) are older, that is, contemporary to a functioning Roman water cistern, cannot be ruled out at this preliminary stage of analysis. If the latter theory is correct, it would indicate that development of this quarter commenced much earlier than the 5th/6th century AD, and that Building Phase 2 would have to be divided into more phases. Nevertheless, as no definitive evidence has been found so far that either the

62. The base of the cistern is 610.94 m asl. in Trench L and 611.30 m asl. in Trench F.

63. This type of irregular cistern wall, with a thick mortar lining, is widespread in the region; see e.g. the large reservoir at Umm al-Jimal (Butler 1913, 159–160, fig. 138).

64. Lichtenberger, Lindroos, Raja and Heinemeier 2015, 125.

street or the adjacent buildings were constructed in the Roman period, we consider this as a single construction phase.

The North Room and the Street

The north room belonged to a larger (mostly unexcavated) building complex extending to the west. The complex was accessible from the south street, and comprised from west to east by a large rectangular room (11.1 by 11.15 m), a smaller L-shaped room (8.85 m x 5.45 m) and the north room built next to it (see the map, **Fig. 1**). The south wall (Ev. 4B) of the so-called north room is 5.35 m, and the east wall (Ev. 22) is at least 4.6 m; only 2.75 m of this wall has so far been excavated. An entrance can be assumed to exist in the unexcavated north wall. Only parts of the east wall (Ev. 12) and the south wall (Ev. 4A) of the L-shaped room have been unearthed, but as the latter binds into the south wall (Ev. 4B) of the north room, it is obvious that both rooms were built in one process.

From a sounding in front of the room's southeast corner, it became apparent that the south wall (Ev. 4B) rests on residual clay (Ev. 66) which cover depressions in the bedrock (Ev. 55), and is set from the north against outcrops of bedrock (Ev. 100). The wall did not come into contact with the cistern mortar (Ev. 64), but from the south, a reddish foundation soil (Ev. 65) was filled 0.4 m high against the wall (Ev. 4B). This layer was covered by a yellowish soil layer with an even surface (Ev. 63), which seems to be the first (temporary?) surface level, some 0.6 m above the cistern. Above this, but only in front of the wall, a soil layer (Ev. 62) with patches of charcoal was found; this implies that the building activities took some time.

The next fill layer (Ev. 61) is the first to run against both the south wall (Ev. 4B) of the north room and the southern retaining wall of the street (Ev. 6B) with its foundation (Ev. 71). It is already a repair of the older retaining wall, Ev. 4A. This later repair (Ev. 47) cut through several earlier street layers at the eastern end of the street, and disturbed the connection between the southern and the northern street side. The next layer (Ev. 60), which is the first mortar layer and thus perhaps the earliest street surface, was also cut by the repair. It rests on a soil layer (Ev. 61) as well as on parts of the upper cistern fill (Ev. 21). The mortar surface could only be investigated in the sounding between the street limits, as to the east and above the cistern, it seems to have been removed by later building activities.

Another sounding undertaken inside the north room confirms that the room and the wall (Ev. 40) which was set against the outer walls (Ev. 4B and Ev. 22), were built on bedrock, and are thus contemporary. The stone foundation (Ev. 84) of the wall (Ev. 40) was founded partly on raw and uneven bedrock (Ev. 85) and partly on a foundation fill (Ev. 76) of contaminated reddish residual clay, which also runs against the wall fundament. Above this, the lower part of a compact filling (Ev. 75) was found inside the room. The upper part (Ev. 35) served as the soil foundation for a mortar floor (Ev. 34) which also covered the inner plinth wall (Ev. 40). A plaster imprint of a round pillar (Ev. 42) was found on this floor in the middle of the room. The dating for this room layout is based on preliminary results. A charcoal sample taken from fill layer Ev. 75 gives a quite early date, between the 1st century BC and the beginning of the 1st century AD[65]. However, a Grey Ware sherd found in the same fill appears to contradict this early date, and favors a later foundation date[66], which seems to be confirmed by another four Grey Ware sherds which were found in the upper part of the fill (Ev. 35), representing the latest finds under the mortar floor. As few further alterations could be detected in the north room, its layout seems to have been the same for a long period of time.

The Supporting Wall Structure and Staircase

Probably related to the construction of the south street and the development of the quarter adjacent to it as a whole, is the construction of a street junction at the eastern end of the south street. A supporting wall structure was built into the cistern, the foundation for the street which

65. Sample no. 21342 (J14-Lg-75-5), Institut for Fysik og Astronomi, Aarhus University (Denmark), ^{14}C age 2035 ± 25 BP, d13C (dual-inlet) -21.84 ± 0.05, calibration curve IntCal13, 1σ 88 BC– AD 4, 2σ 154 BC– AD 47.

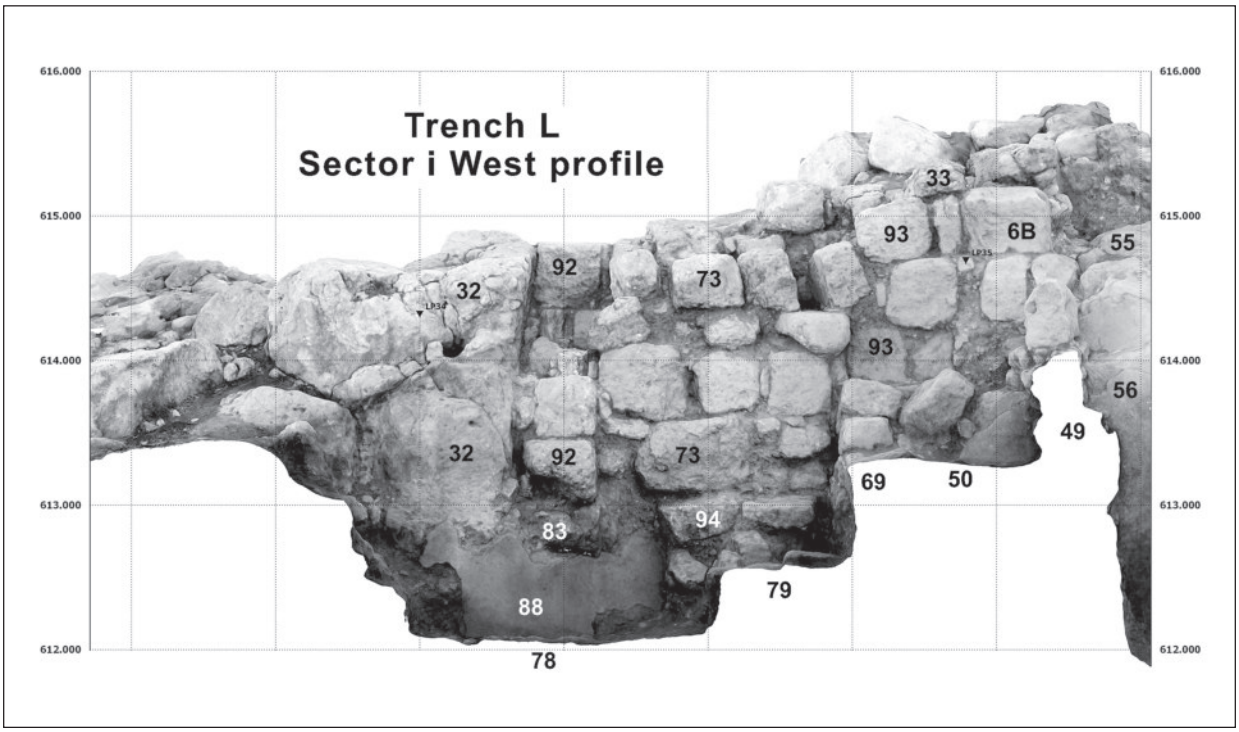
66. This sherd is the latest when compared to the total registration of Evidence 75; the rest of the finds range from Roman to Late Roman.

turned to the north, as well as a staircase leading down into the cistern. The staircase was accessible through a newly constructed opening into the cistern which could be reached from the southern side of the south street.

The supporting wall structure inside the cistern was constructed of dry-built walls, and is preserved to a height of 3.52 m above the cistern bottom; this roughly corresponds with the top of the bedrock to the west. Only the southern part of the structure was excavated; it was at least 3.4 m wide and 5.7 m long, with an internal free space of 2.3 m. It was not possible to clarify whether the structure reaches the northern limit of the cistern, which is 4.4 m away, or if it links to another wall which is located in the eastern part of the cistern, 2.3 m in front of the northern limit.

The eastern wall structure (Ev. 48) rests on a thin reddish soil foundation (Ev. 67), which covers the mortar lining (Ev. 68) on the cistern bottom. The upper part of this wall binds into the northern face of the south wall (Ev. 49), which does not rest on the cistern bottom but rather on the lower part (Ev. 51) of the fill between both walls. This proves that both walls are contemporary, and supports the hypothesis that the building and filling activities took place at the same time. Furthermore, although the cistern bottom south of the structure could not be reached, it is obvious that the southern face of the wall (Ev. 69) for this structure must rest on the cistern bottom, in order to support both the filling and the core fill (Ev. 50) between both wall faces. Some of the stones in the wall (Ev. 49) were set with mortar (Ev. 58) against the mortar lining (Ev. 57) of the western cistern wall. The southern wall face (Ev. 69) was set against the mortar lining of the cistern, and at a higher level against a stone pillar (Ev. 93), which is the northern edge of the doorway in the cistern's western wall (**Fig. 14**). That this doorway is contemporary with the cistern's supporting wall structure is attested by the probable staircase (Ev. 79) built against the wall (Ev. 69), which leads from the doorway around the enclosure.

The doorway was cut 1.82 m deep; its upper part is 3.75 m wide in the western bedrock, whereas the lower part in front of the staircase is only 2.29 m wide. This opening is bordered on both sides by stone pillars (Ev. 93 and Ev. 92), with the northern one set against both the bedrock (Ev. 55) and the southern street retaining wall, and the southern one against the cut rock (Ev. 32). Access to the doorway was



14. J14 Trench Li W-Profile.

organised by more steps (Ev. 97 and Ev. 87), which lead between the southern (Ev. 82) and the northern wall (Ev. 6A?) in a westerly direction, where it was probably possible to reach the street level. It was not possible to excavate this important area, where the stairway and the street met; however, it appears to be covered by the later south wall of the street (Ev. 6B). What is clear is that this opening does not belong to the phase in which the cistern served as a water reservoir, because it cuts the mortar lining, and there are no remains of hydraulic mortar on the cut bedrock.

The filling inside the supporting wall structure consisted of several, mostly sterile, gravel layers filled in from the west, attested by their sloping position. The lowest portion (Ev. 51) of the filling (Ev. 21) rests on a thin wall foundation layer (Ev. 67). Closer to the walls, which were built with reddish clay between the stones, the layers were darker in color (Ev. 52). The bright, uppermost part of the filling (Ev. 21) reached a level above the western edge of the cistern, and was also found south of the north room. Above the enclosure, this fill layer was covered by later structures and an erosion layer. There are few finds from the filling which can assist with dating. A charcoal sample (Ev. 72) taken from the fill (Ev. 52) gives a Late Roman date[67], which appears to agree with the date of a rim from a closed vessel (cat. no. 57) found next to it. For now, we have to be satisfied with the conclusion that this structure was erected in the Late Roman period, or later.

Building Phase 3 (Byzantine)

The course of the street junction appears to remain unchanged in this phase, but the street was resurfaced. A deliberate fill layer (Ev. 59) was laid above the older mortar surface (Ev. 60), and on this a horizontal clay layer (Ev. 53) with an even surface was found. These foundation layers were covered by the second street surface (Ev. 43), which consisted of a thick mortar layer. As the backfill (Ev. 19) of the later retaining wall (Ev. 6B) cut through this surface, it is only connected with the south wall (Ev. 4B) of the north room.

Building Phase 4 (Byzantine)

An east-west oriented structure with two parallel stone rows (Ev. 38) of uncertain function was built on top of the street surface (Ev. 43) during this phase[68]. The structure consisted of two rows of fist sized stones, which were only about 25 cm apart; two courses were preserved which were filled with soil (Ev. 45). It appears to have been connected with a very similar north-south oriented structure (Ev. 24) which was found at roughly the same level on the cistern fill east of the north room's southeast corner. Both structures give the impression they served as protection for a drain or water pipe. However, since no traces of mortar or clay pipe have been found, and furthermore the eastern structure (Ev. 38) was filled with soil and covered by a later stone structure in the street (Ev. 41), it is most likely that a lead pipe was originally installed, as such a pipe could have been removed later without trace. A new mortar surface (Ev. 37) was also laid in this phase, south of the probable drain (Ev. 38). As this street surface runs against the later southern wall (Ev. 6B) but not against the northern wall (Ev. 4B), the width of the street was reduced about half a meter in this phase. That wall Ev. 6B was already in existence in this phase also proves that a repair to the street's south wall was necessary, perhaps because the older wall could not withstand the pressure of the street, as only the open stairway into the cistern was located to the south of it.

Building Phase 5 (Byzantine)

Major alterations occurred during this phase, as the staircase providing access to the cistern was closed, its western part was filled, and the course of the street corner was changed. This appears to have been necessary because the southeastern end of the street on the supporting wall structure was unstable, and underwent several repairs.

To achieve the situation described above, the doorway in the western cistern wall was closed by a wall (Ev. 73) and the area west of it was backfilled (Ev. 81 and Ev. 80) to stabilize the street. Following this, a wall (Ev. 19) was prob-

67. Sample no. 21341 (J14-Lb-72-1), Institut for Fysik og Astronomi, Aarhus University (Denmark), ^{14}C age 1775 ± 25 BP, d13C (dual-inlet) -21.19 ± 0.05, calibration curve IntCal13, 1σ AD 230–325, 2σ AD 142–337.

68. This structure was removed during the excavation due to the sounding in front of the north room.

ably constructed at street level, in order to block access to the former stairway into the cistern and to retain the street. The next step was to fill the cistern; a large fragment of mortar lining (Ev. 91) was found in the cistern fill (Ev. 78) outside the wall enclosure. During this action, the upper part of the supporting wall structure was destroyed, because debris (Ev. 99) was found around it in the backfill. On top of the remains of the supporting wall structure, a new wall (Ev. 44)[69] was erected, which had a more diagonal course parallel to a new water channel (Ev. 23) which had been built against the southeast corner of the north room. Both of these structures mark the new direction of the street, which now leads more towards the northeast and the area north of the cistern. The area west of the new eastern retaining wall (Ev. 44) was filled with a layer of stones and soil (Ev. 46). The street surface was not preserved above this foundation deposit, as the area has been badly eroded and covered by an erosion layer (Ev. 39) in which a terracotta figurine from the 2nd century CE was found (cat. no. 139). However, more evidence remains west of the street corner, and a street surface is preserved there.

Above the old street surface (Ev. 37) and the probable drain (Ev. 38), a row of large stones (Ev. 41) was laid, parallel to the south wall (Ev. 4B) of the north room. The space north of it was filled with very compact soil (Ev. 29), which contained large quantities of pottery; amongst other finds, Jerash bowls were also present. Since parts of the stone structure (Ev. 41) rest on this fill, they were built at the same time. South of the stone row, a mortar foundation (Ev. 18) was applied and then covered by a new mortar surface (Ev. 10 and Ev. 17), which connected to the stone row.

The stone row could be traced for a distance of 4.9 m along the north side of the street; however, its function is not yet fully understood. It should be associated with the water channel (Ev. 23) constructed against the east side of the north room, and, although the building techniques are different and no traces of mortar or a raceway were found on top of the stone row (Ev. 41), both structures are at the same level and could have been connected, even though a direct spatial connection could not be established. The channel (Ev. 23) was constructed in a U-shape of rectangular stones, with a thick mortar lining on the inside and covered by stone slabs, thus forming the western side of the new street course. The triangular space between the channel and the east wall (Ev. 22) of the north room was filled with layers of compact soil (Ev. 36, Ev. 26). Another probable channel (Ev. 16) was found integrated into the street surface, leading southwards from a right angle with the channel (Ev. 41).

Whether the new west wall (Ev. 31) inside the north room, which was set on the mortar floor (Ev. 34) against the old west wall (Ev. 12), was constructed in this or in one of the earlier phases is still unknown, as a direct connection with the street is lacking.

Building Phase 6 (Byzantine/Umayyad)

The housing complex declines during this phase, and only poor quality, minor additions can be observed. It is obvious that the north room lost its residential function during this phase, and was perhaps used as a terrace or platform. Its interior was covered by a foundation fill (Ev. 14/30) on which a deposit of small to medium sized stones (Ev. 11) was laid. Above this, a row of large worked stones was set against the wall (Ev. 4B). The latest structures were found underneath tumbled stones (Ev. 13) mixed with top soil (Ev. 2).

In the street, a dry built short rubble wall (Ev. 7) was set from the north against the former south wall (Ev. 6B). The channel like structure (Ev. 41) and the fill north of it (Ev. 29) were covered by a row of large stones (Ev. 5), which appear to stem from the nearby wall (Ev. 4B). The street area between these structures was covered by a soil layer (Ev. 9), which perhaps constituted the new surface level. This last surface was covered by debris (Ev. 3) and top soil (Ev. 2). As there are no Middle Islamic or later finds, the settlement around the south street must have come to an end before then, perhaps shortly after the devastating earthquake of AD 749.

Trench M

Trench M was a partial re-excavation of a trench excavated in 1983 by J. Schaefer[70], lo-

69. Parts of this wall had to be removed for safety issues.

70. Clark and Bowsher 1986, 343–345 with fig. 1–4 and pl. 1–2 (area E trench I).

cated on the possible course of the North Decumanus. A line of two columns was visible in the trench. The main reasons for reopening this trench were to explore the original rock surface on the northeast slope, and to provide additional information to the results gained from Trenches G and I. This area is particularly important with regards to understanding the possible course of the North Decumanus, and determining how far it extended to the west; in this respect, it is related to the research undertaken in Trench I. Results from this campaign determined that the North Decumanus never reached this area. Additionally, a colonnaded architectural façade from the Byzantine/Umayyad period was uncovered, which was interpreted as the revetment for a terrace.

The work in this area was necessary because the results presented in the short report from the 1983 excavation did not conclusively answer the question of the North Decumanus[71]. In order to do so, the eroded excavation dump was removed and new profiles cut to clarify the main stratigraphic features. In order to clear some undisturbed layers the west, north and east profiles were extended for about half a meter; this resulted in a 5.9 x 6.6 m trench, with a total area of 37.5 m^2 (**Fig. 15**). Removal of the excavation dump determined that the original excavation reached bedrock in the middle of the trench only, and that the water channel (Ev. 13) which crosses the trench from west to east had been misinterpreted as an unusual foundation wall by the first excavators[72].

North of the east west oriented wall (Ev. 1; formerly Locus 016) the lowest level reached was marked by a layer comprised of plastic bags. Underneath this, undisturbed foundation layers (Ev. 10, 12) were found above the bedrock (Ev. 15). Although the bases of the western and middle columns had been reached, the former excavators had not gone deeper, in order to unearth the bedrock in this area[73]; rather, excavation ceased about 20 cm above the western stylobate and its associated foundation structures. The northeast corner of the trench had also not been excavated by the earlier excavation. A third column base (Ev. 19) was found here underneath a soil ramp, which had been used during the 1983 excavation to remove the excavation dump[74].

The 1983 excavation report does not provide a clear picture for the function of individual building structures which had been found, nor how they related to the buildings in the southern part of the trench, which are at a higher level. In contrast, the research undertaken in 2014 indicates there are three distinct construction and utilization phases.

Building phase 1 (Roman/Byzantine?)

The oldest traces of human activity are a roughly levelled rock surface south of wall Ev. 1, a shallow rock-cut trench in Ev. 15, which crosses the excavation square from west to east, and a well levelled rock surface north of the rock trench. As none of the foundations, either for the wall (Ev. 1) or for the column stylobates (Ev. 4, 21, 22) were set on or against the rock cuts, it is obvious that the built architecture and the rock cuts did not belong together.

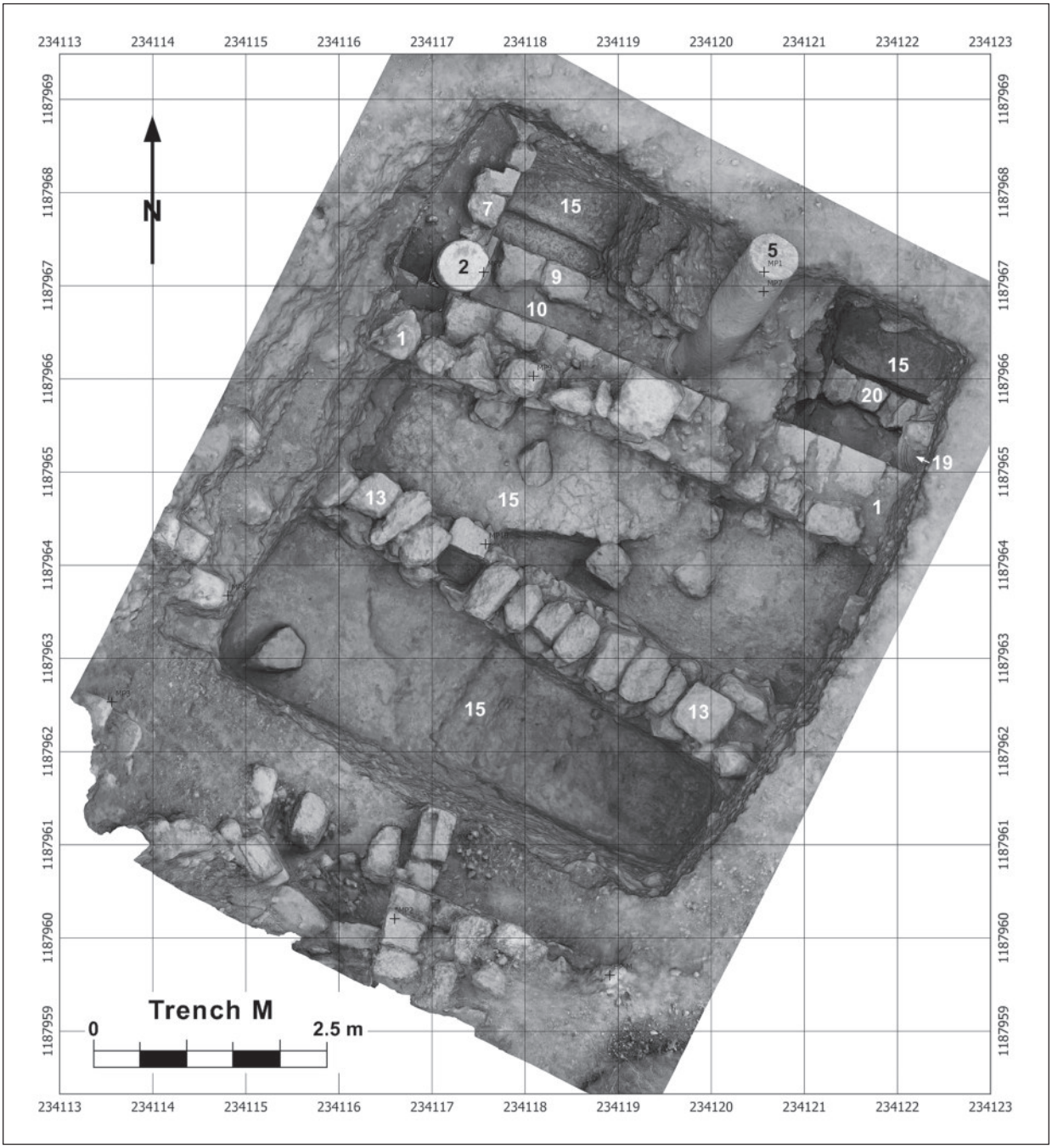
The only roughly dressed rock surface south of wall Ev. 1 slopes about 0.70 m downwards from west to east, giving an uneven surface. Towards the north, the bedrock was cut vertically down to the bottom, as a foundation trench for an older, robbed structure. The bottom of this foundation trench is almost even, only sloping 1.4 cm downwards from west to east, while the slightly higher rock surface immediately north of the rock-cut trench slopes downwards for about 8 cm from west to east. Although the exact width of the rock-cut trench could not be measured without removing parts of the wall Ev. 1, it was possible to estimate that it was at least 1.0 to 1.2 m and at most 1.66 to 1.7 m from west to east. The rock trench could be traced for a distance of 5.12 m, crossing the trench from east to west. Over this distance its northern edge is not completely in line with wall Ev. 1, and it seems to be too wide and not deep enough (only 0.17 to 0.24 m) to be an open water channel. Furthermore, no traces of mortar were detected, either in the trench as a lining or at its edges

71. This new trench measures 5.9 m in width and 6.6 m in length, covering an area of about 37.5 m^2. Line Egelund Nielsen was trench supervisor.

72. Clark and Bowsher 1986, 345 and fig. 3 (locus 014).

73. Clark and Bowsher 1986, 345.

74. Compare with the empty space in the final top plan published by Clark and Bowsher in 1986, 347 fig. 3.



15. J14 Trench M Planum 1-50.

for securing the covering slabs. Hence, it is not a water channel, but is wide enough to have served as a foundation trench for a massive stone wall. Keeping in mind that other beddings were found in Trench I which followed the edge of the cliff, it is conceivable that the rock cliff and the area north of it had been prepared for building structures. The absolute chronology of this rock cut trench is difficult to determine, but in view of the relative chronology a Roman or Byzantine date is conceivable.

Again, the character of the excavated rock surface definitely excludes the possibility that the North Decumanus extended into this region.

Building Phase 2 (Byzantine/Umayyad)

A terrace was built on the bedrock against the northern hill slope. The excavated archi-

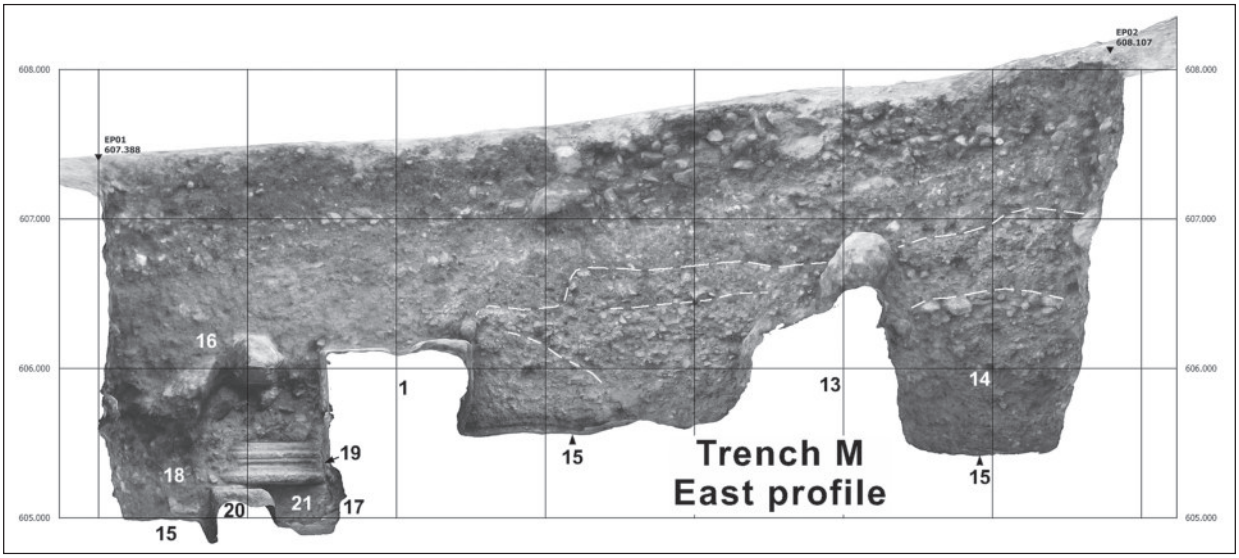
tectural elements suggest that the wall (Ev. 1) and the three columns which were set closely against it belong together, and formed a kind of façade architecture which revetted the northern face of the terrace wall. While the façade opens towards the north, the area south of the wall was filled with soil (**Fig. 16**); the height of this fill could not be determined. The back wall of the façade (Ev. 1) was set against a step in the bedrock, which was up to 1.4 m high. Its northern face consists of ashlar masonry with even courses, whereas the southern side, which was hidden by the terrace fill, was built from irregular stones.

South of wall Ev. 1, the only structure found was a water channel (Ev. 13), which was 0.8 m wide and rested partly on bedrock and on a stony soil fill above gaps in the rock. The channel is rectangular, 0.3 m wide x 0.22 m deep, lined with mortar, and was covered by irregular stones. Excavated for a length of 5.65 m, the channel does not run parallel to the wall. The channel must have been covered completely, because it was built above the bedrock. Horizontal soil layers in the east profile, which run against the wall (Ev. 1) and the water channel (Ev. 13) and furthermore continue in a southerly direction beyond the limits of Trench M, prove that both structures belong to the same building project. Rather than the alternating clay and ashy soil layers observed in this fill by the first excavators[75], we traced only one substantial ash layer in the newly cut east profile (**Fig. 16**), which lay directly above the bedrock, and ran from the south against the wall (Ev. 1). A concentration of Grey Ware storage jar rims (Ev. 14), which was found in the east profile above the bedrock, suggests that the terrace filling should be dated from the Byzantine to the Umayyad period.

A minimum elevation for the terrace and the façade is indicated by the height of the western column; 608.40 m asl. As the building structures in the unexcavated southern part of the 1983 trench (formerly Loci 006 and 007) were built on this terrace fill, they could belong either to this building phase or a later one. The foundation for the building's corner and associated structures is around 607.50 m asl., that is, at least 0.9 m deeper than the top of the western column. Hence, the wall (Ev. 1) would be strong enough to revet a terrace fill of only 1.4 to 2.2 m thickness above bedrock; this is supported by the fact that only the upper parts of the fill (especially in the northeast corner) were affected by erosion.

Concerning the architecture of the façade, neither the wall (Ev. 1) nor the three stylobates (Ev. 4, 22 and 21) stand on bedrock, but rest on a clayish foundation fill (Ev. 10, 17, 20) in the older rock trench. A corresponding floor was not found, which suggests that the levelled rock surface was used for this purpose.

Single rectangular blocks, which were ori-



16. J14 Trench M E-Profile 1-75.

75. Clark and Bowsher 1986, 344–345.

ented north-south and integrated into the foundation of wall Ev. 1 were used as stylobates. Between them, rows of foundation stones (Ev. 10 and 20) were laid, in line with the northern ends of the stylobates. As the blocks were not broad enough for the Attic bases, these were set on them, and the lower tori were cut or, as in the case of the uncut easternmost base (Ev. 19), they also partly rest directly on the foundation stones (Ev. 20) and the soil fill. The Attic bases on the stylobates are similar in shape and dimensions but are not identical; differences are recognizable concerning their thickness and absolute elevation[76]. The distance between the western torus, which is the lowest, and the middle base is 1.90 m, while the distance between the middle and eastern bases is 1.88 m. Only two columns were found (Ev. 2 and 5); both are plain, without thickened ends or volutes. The middle column shaft (Ev. 5) is slightly longer at 2.98 m, with the western shaft only 2.91 m long. As both the stylobates and the Attic bases were built into the back wall, the column shafts stand very close to it. This fact led us to the conclusion that this colonnade should most likely be reconstructed as a simple façade.

V. Clark and J. Bowsher suggested that the colonnade could belong to the south side of the decumanus[77]. However, they at the same time excluded the possibility that a paved street ever existed in the excavated area. This fits with our excavation results in Trenches G, I and M, but we do not agree that the columns were part of a colonnaded North Decumanus.

The colonnades of the North Decumanus between the Tetrapylon and the North Theatre are Ionic, except for four Corinthian columns on the north stylobate[78]. Furthermore, while the Corinthian columns are made of monolithic shafts with swollen ends, the Ionic columns are made from several drums[79]. The examples which do not fit their bases indicate that the Ionic columns of the North Decumanus had been re-used[80]. Sometime later, some of the Ionic columns were moved from the North Decumanus to the Church of Bishop Isaiah, west of the North Theatre[81]. Whether the columns in Trench M belong to the North Decumanus, or whether some of the columns found their way further to the west, can only be ascertained by a comparison of dimensions and similar features. The distance between the bases on the North Decumanus is approximately 1.90 m, and is thus similar to the distances of 1.88 and 1.91 m for the bases in Trench M. As the plain monolithic column shafts in Trench M do not have swollen ends like the Corinthian monoliths on the North Decumanus, a comparison has to concentrate on the Ionic columns from there, which seem to have been made on the whole from short drums, thus requiring at least four drums to reach their length of about 4.5 m. Their maximum diameters measure between 0.62 to 0.66 m. This information fits well with their base diameters of about 0.98 to 1.0 m[82]. Compared with these dimensions, the columns and bases in Trench M are considerably smaller. The length of the western column shaft (Ev. 2) in Trench M measures 2.91 m and has a maximum diameter of 0.58 m, while the fallen middle column (Ev. 5) has the same diameter but is slightly longer, measuring around 2.98 m. The diameters of all three bases are almost the same, measuring 0.88 m, which is 10 cm smaller than the bases used on the decumanus. To sum up, neither the excavation results nor the dimensions of the columns hint at a connection between the architectural features in Trench M and the North Decumanus. Therefore, the columns in Trench M must stem from another building.

Concerning the dating of the terrace façade and the later alteration of the area north of it in the next phase, a date from the late Byzantine or early Umayyad period is most likely[83].

76. The thickness of the bases are: 0.254 m. for the western base (Ev. 3); 0.254 m for the middle base (Ev. 6); and 0.28 m for the eastern base (Ev. 19). The tops of the western (Ev. 3) and the eastern (Ev. 19) bases are at almost the same level, 605.478 m asl. However, the middle base (Ev. 6) rises 5.4 cm above the level of its flanking bases.

77. Clark and Bowsher 1986, 345.

78. Ball *et al.* 1986, 390.

79. Compare Ball *et al.* 1986, 406 pl. XI (Corinthian) with p. 407 pl. XII (Ionic).

80. This and similar observations leads W. Ball to the conclusion that the columns were taken from the original Ionic south Cardo, when it was widened and converted to the Corinthian order. Cf. Ball *et al.* 1986, 390.

81. Cf. Ball *et al.* 1986, 390 with n. 73 and Clark 1986, 307.

82. As Ball *et. al.* 1986, Clark 1986 and Nassar 2004 all fail to provide measurements for the columns and bases, the dimensions were calculated for the most part from Ball *et. al.* 1986, 382 fig. 16.

83. Although the finds analysis is not yet complete, a Byzantine or later date is most probable for the important Evidences (Ev. 11, 12, 14, 17 and 18) in the second and third phases.

Building Phase 3 (Byzantine/Umayyad)

The façade was altered during this phase, and at least one room was built against it. The only floor found here (Ev. 11, above Ev. 15), belongs to this phase. It is of yellowish clay, and belongs to a later wall (Ev. 7) which was set against the western column shaft (Ev. 2) above the level of the column base (Ev. 3)[84]. The clay floor (Ev. 11) lies on a thick foundation layer (Ev. 12)[85] in the west, which covers the northernmost rock surface and part of the stylobate (Ev. 4). In the previously excavated part, the clay floor (Ev. 11) does not run against the older wall (Ev. 1) because it was dug through by the first excavators, and the gap filled with excavation dump (Ev. 9). The wall (Ev. 7) is 0.45 m wide and preserved to a height of 0.8 m. Only 1.42 m of it could be excavated between the column and the north baulk. Close to the column shaft, a doorframe with no threshold was found, indicating an interior room west of the wall. The roughly built wall, the simple clay floor, and the missing threshold, all point to a more basic character of the rooms installed in front of the façade.

The evidence of the collapse layer (Ev. 8) found on both sides of the wall (Ev. 7), and thick erosion layers on top of that, indicates that occupation seems to have ceased on this part of the hillslope after the room was destroyed.

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84. The base of the later wall (Ev. 7) lies 0.35 m above the bedrock, at 605.42 m asl.

85. The east corner of the trench (Ev. 18) possibly corresponds with this fill; however, the floor was not preserved in this place.

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THE DANISH-GERMAN JERASH NORTHWEST QUARTER PROJECT 2014
PRELIMINARY REGISTRATION REPORT

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with contributions by
Pernille Bangsgaard, Christoph Eger and Peter Fink Jensen

Introduction

This report presents the general characteristics of the material evidence from the five trenches excavated in 2014 in the Northwest Quarter of Jerash during a six week campaign from 21st July until 31st August 2014. The registration team consisted of the head of registration, students, a conservator, a bone specialist, two geologists and an architect[1]. Furthermore, four interns from the Department of Antiquities in Jerash worked with the team for three weeks during the campaign.

The presentation and the descriptions of the ware types refer to the terminology applied in the preliminary reports of the 2012 and 2013 campaigns[2]. This report focusses on general observations of the finds, and includes a catalogue of 188 representative objects[3]. Furthermore, it also includes a report on selected metal finds from the 2014 campaign by Christoph Eger, a report by zooarchaeologist Pernille Bangsgaard on the animal bones, (primarily those from trenches J and K, but also trenches A and B which were excavated in 2012)[4], and finally a report on XRF scanning results by geologist Peter Fink-Jensen.

With extensive ancient fill layers, especially in Trench J, and trench extensions into well preserved Evidences, especially in Trench K, the total number of registered objects is over 186,000. All finds were documented by the registration team using the following system; every find is documented within the "total registration" process in the first instance, which includes statistical documentation (photographic and written) of all objects from all find categories. From this documentation, it is possible to sequence the evidence, and to prepare statistics of finds for each find category as well as for the project as a whole. The second step in the process is "basic registration", in which selected objects are described, drawn and photographically documented; these objects are representative of the shapes, wares and chronological timeframe of a specific trench, and include all finds categories. 3,129 objects, 1.68% of the total number, were retained for further registration, beyond mere statistics. All bone, metal and glass finds were retained and, as bones and glass were found in almost all contexts, they add significantly to the total amount of stored objects[5]. 1,441 pottery sherds have been retained from the total number of registered objects.

The pottery of the Northwest Quarter is generally characterized by locally produced plain wares, with a reddish or yellowish-red hue[6], together with a significant amount of the charac-

1. Head of registration Annette Højen Sørensen, conservator Margit Pedersen, zooarchaeologist Pernille Bangsgaard Jensen, geologist Peter Fink-Jensen, geologist Alf Lindroos, architect Jens Christian Pinborg and archaeology students Philip Ebeling, Pawel Grüner, Niels Benjamin Hansen, Ditte Maria Damsgaard Hiort, Charlotte Bach Hove, Signe Bruun Kristensen, Sara Ringsborg, Nadia Schmidt-Larsen and Janek Sundahl. Drawings were prepared for publication by Janek Sundahl.

2. Lichtenberger, Raja and Sørensen 2013 and 2017.

3. The coins and glass finds will be discussed in forthcoming publications.

4. Lichtenberger, Raja and Sørensen 2013.

5. The bones and glass pieces are usually counted in bags and not separately as single finds. Special glass pieces and most metal objects are, however, numbered individually.

6. We have discussed the research history of the pottery production and local wares of Jerash in the 2012 report (Lichtenberger, Raja and Sørensen 2013). The most comprehensive studies are Uscatescu's monograph from 1996 on the Macellum excavation, the Jerash International Project during the 1980's (Zayadine 1986) and the Hippodrome excavation (Kehrberg 1989 and 2009).

teristic, locally produced, reduction fired Grey Ware, which is also found almost everywhere[7]. The total assemblage mostly consists of undecorated household pottery, but numerous glass, metal and stone objects, coins, bones, mortar and plaster have also been documented.

A statistical table illustrating the frequency of some of the pottery wares described in this report[8] has been made; the statistics in the tables below are based on the total amount of clay objects from the trench in question. The general picture is that very low numbers of special ware types have been found. The vast majority of the material, as noted above, consists of plain reddish yellow and reddish brown wares, most forms of which were made from the Roman period to the Umayyad period, with pale yellowish-red variants during the Roman era. These common local wares are included in the tables below as part of "other ceramic finds", along with other clay objects such as tiles and bricks.

General Characteristics of Trench I

The structures in the trench are characterized by sets of walls (which were built over several phases) in front of a small cave in the southern part of the trench (cf. Kalaitzoglou, Lichtenberger, Raja, this volume). There is an L-shaped cut in front of the cave; a long, deep sounding to the north of it brought to light only a few structures. The total number of registered objects from Trench I was 41,226; of these, 558 (1.35%) were kept for further documentation. 40,376 pottery objects were registered, and constitute the majority of the finds; of these, only 267 were kept[9]. The finds in Trench I are characterized by mixed deposits, which are mainly dated to the Byzantine/early Umayyad period; this generally concurs with the second phase of the structures in the trench, but is particularly apt for the southern part of the trench, where Handmade Geometric Painted Wares (HMGPW) from the Ayyubid/Mamluk period were found in several Evidences. An almost complete HMGPW jug (cat. no. 26)[10] was found close to the small cave entrance, which most probably belonged to Building Phase 5 (Kalaitzoglou, Lichtenberger, Raja, this volume).

Ayyubid/ Mamluk HMGPW	0.23%
Ayyubid/ Mamluk undecorated	0.3%
Green Ware	0.03%
Islamic Glazed	0.005%
Grey Ware	20.75%
Painted Buff Ware	0.035%
Dark Brown Ware	0.005%
Reddish Red Brown Ware	0.023%
Jerash Bowls	0.2%
Orange Ware	0.04%
Red Slipped Fine Ware	0.2%
Other Ceramic Finds	78.128%

Trench I: Ceramic Finds

As can be seen from the table, there is a low percentage of fine wares, with a corresponding high proportion of Grey Ware. The material in the southern part of the trench was generally more worn, suggesting re-deposition of the material.

General Characteristics of Trench J

Trench J consists of a street ('Central Street') and several rooms, from which a rock-cut staircase descends into a cave complex, with one large cave to the south and two smaller caves to the north and to the west. Immediately south of the staircase, near the cave entrance, a further rock-cut shaft leads down to the cave.

The total number of registered objects is 104,665; of these, 959 (0.92%) were kept for further documentation. The number of clay objects (pottery, tile, brick, terracotta etc.) from Trench J is 100,085; of these, 542 pieces were kept. Although this is a small sample, the large fill layers encountered were very homogenous; hence, the objects which were kept from the total number registered are representative of the material as a whole[11].

As in all other trenches excavated in the Northwest Quarter, the number of fine ware

7. Cf. also Lichtenberger, Raja and Sørensen 2013 and 2017, for references and material.

8. Cf. for earlier reports: Lichtenberger, Raja and Sørensen 2013 and 2017.

9. Some objects from Evidences 32, 35, 40 have not been completely registered at this point. A number of objects from some Evidences appear in the statistics but have not been completely registered (Evidences 13, 14, 35, 36, 39, 40, 50, 59, 60, 75).

10. Deco.: Franken *et al.* (1975), p. 180; fig. 7; Shape: Avissar (1996), p. 170; fig. 1-2.

11. Objects from some Evidences (8, 13, 32, 35, 36, 39, 42, 43, 48, 50, 55, 58, 60, 61, 62, 65, 66, 67) remain unregistered in the archaeological camp at Jerash; they will be registered during the 2015 campaign. A number of objects from some Evidences appear in the statistics but have not been completely registered (Evidences 13, 29, 55, 60, 61, 62, 66, 67, 68, 69, 72, 73, 77, 82, 84, 87).

sherds was low. Red slipped fine wares (Jerash Bowls, ARS, local red slipped and ESA) amount to only 0.25% of the total number of objects from the trench.

Ayyubid/Mamluk HMGPW	0.003%
Ayyubid/Mamluk undecorated	0.01%
Islamic Glazed	0.002%
Sandy Buff Ware	0.002%
Dark Brown Ware	0.02%
Grey Ware	13%
Reddish/ Red Brown Ware	0.29%
Jerash Bowls	0.08%
ARS	0.05%
Local Red Slipped	0.11%
ESA	0.009%
Orange Ware	0.01%
Green Ware	0.05%
Other Ceramic Finds	86.364%

Trench J: Ceramic Finds

Trench J was characterized by large pottery depositions (Evidences 32, 35, 39, 43, 47-48) stemming from fill layers which sealed the staircase in the third building phase (Kalaitzoglou, Lichtenberger, Raja this volume). This fill material consisted of well-preserved pottery, primarily from the Late Roman era (3rd – 4th century AD) and is characterized by a few ARS imports, mainly Hayes Form 50 (cat. no. 2)[12] and a large number of locally produced, plain household wares of a pale yellowish-red fabric. The larger shapes and the cook pots were ribbed, but the table wares were not. Hayes Form 50 was also imitated within the repertoire of local red slipped wares (cat. no. 4)[13]. Grey Ware was found in the upper part of the fill from Evidence 32; frequency decreased in the lower layers. Grey Ware was probably produced from the Byzantine period[14] to the Abbasid period[15]. Grey Ware sherds can be explained as intrusions in the otherwise homogenous fill of the staircase shaft in Evidence 32. Additionally, a few Green Wares (which were produced during various periods) were also found in Evidence 32. Only a very few, tiny pieces of Grey Ware were found in the lower fill layer of the staircase shaft (Evidence 35). None of the typical Byzantine local products, such as Jerash Lamps or Bowls, were found in this large fill. Furthermore, no white painted Grey Ware sherds were found. The general nature of the fill layers in the staircase shaft can thus be described generally as containing well preserved Late Roman pottery of high quality. The cook wares have traces of use, and the radiocarbon dates of the tabun and fill support a Late Roman date for most of the material in the staircase shaft (cf. Kalaitzoglou, Lichtenberger and Raja, this volume, third building phase). Apart from the imported ARS wares, the fill also yielded a Late Roman stamped amphora handle (cat. no. 68)[16].

Grey Ware sherds were detected within the first blocking wall (Evidence 71) of the cave (Evidence 49), as well as local red slipped fine wares. A Jerash lamp fragment was found in the second blocking wall, stemming from the fourth building phase (Kalaitzoglou, Lichtenberger, Raja, this volume) of the large cave (Evidence 75). Also, Jerash Bowls and white painted Grey Ware pottery were found in the fill behind Evidence 75 and in the fill layer Evidence 77. Chronological markers were detected in the lower layers (Evidences 88 and 89, 95, 96 and 97), including ribbed and white painted Grey Ware, Jerash Bowls and Jerash lamps. The cave fill (Evidence 80) thus seems to be slightly later than the redeposited fill layers in the staircase shaft; these results were confirmed by ^{14}C dates (Cf. Kalaitzoglou, Lichtenberger, Raja, this volume). No Ayyubid-Mamluk wares were present in any of the fills discussed here. The cook wares from all Evidences, both from the staircase fill and in the larger cave, showed traces of use over open fires.

Trench J yielded the first inscription finds within the current excavations of the Northwest Quarter. Two Roman period inscription fragments (cat. nos. 68 and 180) were uncovered, as well as one *dipinto* on an amphora (cat. no. 74)[17]. Another possible red *dipinto* of a similar type was found in Trench K (Evidence 73; J14-Ke-73-1).

HMGPW was scarce, and occurred only

12. Dentzer (1986), p. 247; pl. 8, no. 2; Hayes (1972), ARS Form 50, Type A; Hayes (2008), p. 220; no. 986-987; fig. 31.

13. The Byzantine Jerash Bowls likewise copy later ARS shapes and imitate it to a certain degree. Shape: Dentzer (1986), p. 247; pl. 8, no. 2; Hayes (1972), ARS Form 50, Type A; Hayes (2008), p. 220, no. 986-987; fig. 31.

14. Cf. Watson 1992, 237; Uscatescu 1996, p. 46; Clark *et al.* 1986, pp. 249-250; Schaefer 1986, pp. 425-429.

15. As suggested by Watson 1992, 237.

16. Cf. Smith (1973), pl. 44, fig. 1255. The handle and stamp require further study.

17. Shape: Smith (1973), pl. 85. For dipinti, see: (5th – 6th century AD) Segal *et al.* (2013), p. 275-276, fig. 341; (8th century AD) Walmsley *et al.* (2008), p. 131, fig. 25.19.

in the Evidences close to the surface, and no intrusions beyond a few Grey and Green Wares were found in the northern fill. These fills on either side of the blocking walls were homogeneous, and had been filled in antiquity, although not at the same point in time.

General Characteristics of Trench K

11,860 objects were registered from Trench K; this includes 10,651 ceramic objects. 991 (8.35%) objects were retained for further study, including 329 pottery sherds.

Ayyubid/ Mamluk HMGPW	0.23%
Ayyubid/ Mamluk undecorated	0.084%
Glazed	0.05%
Green Ware	0.19%
Dark Brown Ware	0.54%
Islamic Red painted pale; Yellowish Sandy, Painted Buff a.o. plain wares	0.56%
Grey Ware	17.95%
Reddish/ Red Brown Ware	0.45%
Jerash Bowls	0.084%
Red Slipped Fine Ware (ESA, Local fine)	0.056%
Other Ceramic Finds	79.806%

Trench K: Ceramic Finds

The material from Trench K consisted of material from cooking installations, with associated pottery in the lower levels on top of the kitchen; a thick homogenous context covering all sectors. It is a closed context which is of special importance, as it belongs to the destruction which was probably caused by the earthquake of AD 749. Many well preserved finds were uncovered; among them was a Byzantine and Arab-Byzantine coin hoard[18]. The number of tiles found in the trench was low; thus the roof of the building was not tiled (cf. also the report by Kalaitzoglou, Lichtenberger and Raja this volume). Grey Ware finds fit the same pattern as those of the trenches described above; however, they were primarily found in relation to kitchen installations, and were used as cooking vessels. The use of Grey Ware for cooking may indicate a change in general usage during the later Umayyad period; a transformation from primarily being used for storage to being used to prepare food. The general appearance of Grey Ware likewise seems to change during the latter part of the Umayyad period[19]; a new feature within the repertoire being the bi-ansulate cook pot (cat. no. 64).

Most of the objects were found in the collapsed room excavated towards the west, in Evidences 3 and 34. From the upper floor of this house, tools connected with textile production were encountered, including scissors (cat. no. 96)[20], a heckling comb (cat. no. 97)[21], spindle whorls of bone, steatite and rock crystal (cat. nos. 154-158)[22], as well as jewelry (cat. nos. 159-172)[23], consisting of beads of semi-precious stones, glass and bone. Furthermore, a bronze ring with a glass bead was found (cat. no. 173)[24], as well as fragments which possibly belong to a lead mirror frame (cf. the report by Eger below) and a possible bone mirror handle (cat. nos. 112-113, 152)[25]. Many of the metal objects were concentrated in a small area, and might have belonged to the contents of a wooden box (Evidence 34, the report by Eger below).

The lamps from Trench K display late Umayyad to early Abbasid period traits, such as a channel nozzle (cat. no. 36)[26], figuratively decorated bases (cat. nos. 40-42)[27], a hybrid-lamp combining the upper part of a Jerash lamp (without, however, the “cross” at the handle) and an Umayyad/Abbasid lamp base (cat. no. 35)[28]. Red Painted Pale Ware and Yellowish Sandy Ware also point to a late Umayyad/early Abbasid date. As already observed in our 2013

18. Lichtenberger and Raja (forthcoming).
19. The statistical appearance of Grey Ware may be slightly distorted due to the large quantity of glass and metal in the trench.
20. Patrich (2008), p. 448, 458; no. 229; from Late Roman context: Künzl and Weber (1991), p. 89-90; fig. 5.
21. Gaitzsch (2005), p. 42; pl. 58, 75, no. 1-2.
22. Riis (1969), fig. 39, no. 8; Riis and Buhl (1990), fig. 97, no. 752-765; McNicoll *et al.* (1982), pl. 132, no. 7; (1992), pl. 69, no. 8; Platt and Ray (2009), fig. 11.5, no. 6-11; Lichtenberger, Raja and Sørensen (2012 report, 2013), no. 158, 159; (2017), no. 143, 144; Dever, Lance and Bullard (1986), pl. 56, no. 4; pl. 59, no. 9; McNicoll *et al.* (1992), pl. 46, no. 3, 9.
23. Ploug (1985), 209; Riis (1948), fig. 203, 204; Smith (1973), pl. 80.
24. Ploug (1985), fig. 54 I.
25. Patrich (2008), p. 425, 430; no. 73-79; McNicoll *et al.* (1992), pl. 72, no. 6; Findlater *et al.* (1998), fig. 7, 9; Ayalon (2005), fig. 1, no. 1-3; Wapnish (2008), fig. 34.5; Kotter and Ray (2009), fig. 9.27, no. 8; Panitz-Cohen, Yahalom-Mack and Mazar (2009), fig. 16.12, no. 2; Lichtenberger, Raja and Sørensen (2017), no. 152.
26. Al-Khouly (2001), fig. 1, no. 196; ‘Amr *et al.* (1998), fig. 9.
27. ‘Amr *et al.* (1998), fig. 10, 12, 15; Al-Khouly (2001), fig.4, no. 196; Day (1942), pl. XIV, fig. 1.
28. Kehrberg (2005), fig. 64; Da Costa (2001), p. 255, fig. 2; Zayadine (1986), pl. VI, no. 11.

Campaign Registration Report, it is clear that some shapes continued into the Abbasid period. However, due to stratigraphic reasons, the objects excavated during the 2014 campaign clearly belong to the Umayyad period.

The collapse (Evidence 3) of Trench K includes Ayyubid/Mamluk HMGPW; a join was found between the surface and Evidence 3 (cat. no. 23)[29]. However, Ayyubid/Mamluk pottery, both painted and unpainted, were concentrated in Sector G. As the few glazed objects were located in Sector H (cat. nos. 19-20)[30], these factors together indicate a slight disturbance of the stratigraphy in these sectors. This disturbance may be ascribed to the activity of rodents or other animals moving the soil and the objects within it.

General Characteristics of Trench L

There are 27,139 registered objects, 573 (2.1%) of which were kept for further analysis; 26,423 objects were ceramic (pottery, tile, bricks, terracotta etc.), of which 290 were kept. Some of the material from Trench L awaits further registration[31]. The material in Trench L was, in general, worn and lime incrusted.

Ayyubid/ Mamluk Undecorated	0.01% ?
Buff Painted Ware	0.02%
Yellowish Sandy Ware	0.008%
Green Ware	0.04%
Dark Brown Ware	0.008%
Grey Ware	16.62%
Reddish/ Red Brown Ware	0.7%
Jerash Bowls	0.2%
Red Slipped Fine ware	0.19%
Other Ceramic Finds	82.2%

Trench L: Ceramic Finds

There is a smaller number of objects from the early Islamic period, apart from Grey Ware. As described below, Grey Ware underwent a transition in the later phase of the Umayyad period. However, in Trench L, Grey Ware from the Byzantine and early Umayyad period is present, whereas types from the late Umayyad are absent. No HMGPW or Ayyubid/Mamluk fragments were detected, apart from a few very small fragments in Evidence 2, 29 and 34, which have tentatively been assigned to this period. Trench L thus fits into the general picture of the southern slope, as it appears it was not used for domestic purposes during the Ayyubid/Mamluk period.

General Characteristics of Trench M

Trench M was first excavated in 1983 by J. Schaefer, in order to trace the course of the possible North Decumanus. It was decided to re-investigate this trench in 2014 (cf. report by Kalaitzoglou, Lichtenberger and Raja, this volume).

The total number of registered objects was 1,911; 48 (2.5%) were kept for further analyses. This included 1,862 ceramic objects, 13 of which were kept for further analyses.

The finds from Evidences 0, 8-9, 11-12, 14, 17-18 in Trench M were registered fully, whereas Evidence 16 was only partially sorted for statistical purposes. The material from this trench was not processed further than statistical collection; for this reason, none of the objects has been catalogued and the notes given here are based on the statistics only.

Ayyubid/ Mamluk HMGPW	0.05%
Grey Ware	15.84 %
Reddish/ Red Brown Ware	0.16%
Jerash Bowls	0.16%
Red Slipped Fine Ware	0.32%
Other Finds	83.63%

Trench M: Ceramic Finds

Grey Ware was found in all Evidences, and the assemblages can be roughly dated to the Byzantine period.

Observations on Ware Types

The contexts of Trench K yielded reduced amounts of Grey Ware, primarily in the shape of flat based handmade basins. Unlike the Grey Ware described and found during the 2012 and 2013 campaigns, some Grey Ware basins found in Trench K had been used as cooking vessels (cat. nos. 82)[32], and have traces of secondary firing, which has made the clay flaky and dark. In these contexts, the Grey Ware is rougher and darker. Furthermore, a bi-ansulate Grey Ware cook pot was introduced in this period;

29. Deco.: Franken *et al.* (1975), p. 186; fig. 39; Lichtenberger, Raja and Sørensen (2017), fig. 34; Shape: Franken *et al.* (1975), p. 189; fig. 1; p. 191; fig. 19; Thuesen (1988), p. 220; fig.3.

30. Walker (2012); p. 551; fig. 4.14, no. 9; Milwright (2008), p. 317, no. 13.

31. Objects from Evidences 2, 43/47, 50, 61, 70, 77, 80, 81 await further registration.

32. Deco.: Smith (1973), fig. 1192; shape: McNicoll *et al.* (1992), pl. 114; fig. 8.

this variant of Grey Ware was also found in the North Theatre, and was described as Ware B from the 8th century AD[33]. New decorative patterns are likewise found, such as a pie crust lip decoration (cat. no. 78)[34], which is also known from the 8th century AD repertoire from the North Theatre[35], and a combination of combed decoration with white paint (cat. no. 79)[36], which is also tentatively placed in the later part of the Umayyad period. All these traits, along with the remaining material in the contexts, point to a later phase of Grey Ware production as well as an altered use of the ware from its onset, probably in the Byzantine period.

Ribbed cooking and storage vessels were both found in Trench K. Based on the cook pot repertoire of Jerash, it can be observed that the ribbing becomes more decorative than functional over time. Due to the general date of the finds and Evidences in Trench K, it can be proposed that this development takes place during the late Umayyad period.

A characteristic red painted ware, which is painted red on a pale buff/white slip, was first detected in Trench K; the decoration mainly consists of parallel bands or wavy lines. This ware and decoration is well known from the Umayyad Houses and the North Theatre in Jerash; it is described as Ware D from the 8th century AD in the latter[37]. We have provisionally called it Red Painted Pale Ware (cat. nos. 12-14, 18)[38].

A Green Ware was described and noted as belonging to the early Islamic periods in the 2013 Report. However, during the analyses from the 2014 campaign, it has become clear that a Green Ware was also in use during the Late Roman period, although the Late Roman Green Ware is of a different fabric to the early Islamic variant. So far, Green Ware has not been found in Evidences connected with the Byzantine phase. Further studies in Jerash Green Wares are required, in order to establish firm conclusions about the chronology of types represented in the Northwest Quarter[39]. The overall number of sherds for this ware is low, and almost exclusively found as small fragments in fill layers.

Dark Brown Ware

New wares were described during the 2014 campaign. Among these was a Dark Brown Ware, which was found in Trench K, and used for ribbed wheel-made cooking pots (cat. no. 65)[40]. The clay is flaky and dark brown on the surface, with few to some golden mica, golden flakes, quartz, lime, a few red brown pebbles and a few black inclusions. The core is fired reddish brown/dark brown, although some examples are 'sandwich layered', with a reddish-brown to grey core. There are many air pockets in the clay, which occasionally appear as bubbles on the surface.

Munsell: Surface: ext. 5YR 5/4 – 2.5 YR 5/4; int.: 5YR 5/6; Core: ext.: 5 YR 4/4 – int./ centre: 2.5YR 5/6-4/8 – 5/8.

The core can be either red in the centre and brown in the outer core, or vice versa. The appearance of Dark Brown Ware seems to primarily coincide with the darker and rougher variant of Grey Ware in Trench K. The largest quantity of this ware was found in trench K, primarily as cook pots.

Yellowish Sandy Ware

A distinct but fairly rare ware in the 2014 repertoire was Yellowish Sandy Ware, with very sandy, yellowish clay which is finely levigated, with a few reddish brown and black inclusions. It was fired at a low temperature, and is rather crumbly. Known examples are all wheel made. (cat. nos. 52-53).

Munsell: core: 10YR 7/4; Surface: ext.: 2.5 Y 8/3; int.: 10YR 8/2.

33. Clark and Falkner 1986, 251.
34. Clark and Falkner 1986, fig. 21.5; deco.: Smith (1973), fig. 1192; McNicoll *et al.* (1992), pl. 115; fig. 1.
35. Clark and Falkner 1986, fig. 21.5
36. Deco.: Smith (1973), fig. 1192; shape: McNicoll *et al.* (1992), pl. 114; fig. 8.
37. Gawlikowski 1986, pl. XII-XIII; Clark 1986, 251
38. Deco.: Walker (2012), p. 517; fig. 4.4, no. 20; p. 510-511; fig. 4.1, no. 27; fig. 4.2, no. 1, p.517; fig. 4.5, no. 1; Rasson and Seigne (1989), p. 127, no. 7; fig. 5, 5; Najjar (1989), p. 314, fig. 5, no. 4; 'Amr (1988), p. 247-254, fig. 1, no. 7, 11; Walmsley, Macumber and Edwards (1993), p. 213, Ware II; p. 215; fig. 23, no. 3-4; Smith (1973), pl: 91, C; shape: Gawlikowski and Musa (1986), pl. XII, second top on right column; Walker (2012), p. 512; fig. 4.1, no. 13-18, p. 517; fig. 4.4, no. 22; Walmsley, Macumber and Edwards (1993), p. 213, Ware II; p. 215; fig. 23, no. 3-4; Schaefer and Falkner (1986), p. 314; fig. 13, 7.
39. Cf. Kenkel 2012 for descriptions of the Green Wares from Tell Zirā'a.
40. Shape: Kenkel (2012), Taf. 43, group 7, no. 23.9a.; taf. 63, kt. 25.

This ware was primarily found in Trench K, and may belong to an early Islamic repertoire.

General Remarks on the Material

As occurred in previous project seasons, HMGPW was rarely found on the southern slope. It is more frequent on the northern slope, but in general medieval glazed wares are remarkably scarce. Trench K (on the eastern terrace) yielded considerably more evidence for the late Umayyad period, with quantities and closed contexts hitherto unknown in the Northwest Quarter.

Trench J (in the Northwest Quarter) yielded large quantities of Late Roman material, providing more information about Roman period activity in that area. Roman period activity in this quarter was evidenced by the material from Trench A in the 2012 campaign; however, the staircase fill in Trench J, which was excavated in 2014, has significantly enhanced our knowledge of the Roman period occupation in the quarter[41]. Moreover, the past three excavation campaigns have yielded large amounts of Late Roman to Early Umayyad material in this quarter. Pottery wasters have been found across the area, and unfired clay lumps or clay lining, as well as rough flat tiles with traces of firing were found in Trench J, particularly in Evidence 35. These objects may have been used to line kilns, ovens or fireplaces.

Although the 2014 campaign in general added valuable evidence about Late Roman and Late Umayyad material culture, the closed context from the AD 749 destruction layers in Trench K need to be singled out. Furthermore, our previous theories regarding the spread of Ayyubid/Mamluk material in the Northwest Quarter have been confirmed by the 2014 excavation. Finally, Byzantine-Early Umayyad material still appears to be significantly present throughout the Northwest Quarter.

Some Metal Objects from the Northwest Quarter in Jerash

Christoph Eger

The 2014 Danish-German excavation campaign produced a remarkable number of metal objects, of which 45 are presented in the catalogue below (cat. nos. 91-135). Most of the objects are made of iron, with smaller numbers made from either lead or copper alloy (which includes all kinds of copper base alloys such as bronze, amongst others). Due to the poor state of preservation, particularly of the iron artefacts, it is difficult to determine the exact shape or function of a number of the items, although future restoration or X-ray examination may assist in interpretation. However, other objects or fragments are easier to identify, as they belong to well-known types; at this stage of analysis we can divide the metal objects into several functional groups:

- Architectural fittings
- Casket fittings and locks
- Cosmetic implements
- Dress accessories
- Horse trappings (?)
- Household appliances and tools
- Locks and keys
- Weighing equipment

There are additional objects which cannot be clearly assigned to a specific group, as well as objects of unknown function.

Architectural Fittings

Two objects (nos. 91 and 92) are both made from copper alloy, and have an almost identical shape; an oblong bar with one rectangular end, while the other end narrows to a small peg and bends upwards to form a hook. Although they differ in size (length: 7.1 and 8.9 cm), they belong to the same category of fitting, the so-called revetment pegs, which were used to clamp marble slabs to the wall behind. They are known from Roman-Byzantine contexts in, amongst others, *Caesarea Maritima*[42]. Two other objects from the 2014 campaign in Jerash are of similar shape, with lengths of 7 cm and almost 10 cm; however, no. 93 is made of iron, which was not commonly used for this type of fitting. All four artefacts were definitely not used as revetment pegs for the building in which they were finally deposited, as their context indicates a secondary usage. They were found close together, along with some other objects, which were all probably contained in a box (below).

41. See Lichtenberger, Raja and Sørensen, 2013; Lichtenberger and Raja, forthcoming b.

42. Patrich (2008), p. 441, 456; no. 101-107; Waldbaum (1983), p. 66-67; pl. 19, no. 266-277.

Household Appliances and Tools

The largest artefact among the objects assigned to "household appliances" is an iron ladle, c. 70 cm in length, with a plain, oval bowl. Similar objects have been found in Olympia, Greece, and interpreted as coal ladles, which were used to heap up glowing coals in the cooker. Scissors, knives, and different sized sewing needles were used in every household; therefore, their appearance is not a surprise. However, large iron scissors (such as the fragments from no. 96), which have a total length of 31 cm, are much bigger than one would expect for daily use. Scissors of this size were more likely used for agricultural or manufacturing activities, especially sheep-shearing. Another find has yielded even more evidence for textile production activities. Although broken into many fragments, object no. 97 can be identified as a comb (or heckling comb) for either wool or flax, because of the typical design of two rows of long, needle-shaped teeth. This instrument is used to remove the fibrous core and impurities from flax, or to untangle wool fibres prior to further treatment. A good parallel for a wool comb has been found in Pergamon, Turkey[43].

Locks and Keys

Beside the casket´s lock (see below) three objects which are categorised as locks and keys have been found, which is not unusual within the spectrum of household findings. Circular keyhole plates of copper alloy (such as no. 103), which are thought to be of Byzantine and Late Byzantine date, are also known from Sardis in Turkey, as well as Olympia and Isthmia in Greece[44]. They would have covered rotary locks, which were opened and closed by rotary keys. In fact, the 2014 campaign yielded one example of this type of key; a key with a ring (no. 104), which can be dated to the same period[45]. The dolphin shaped ends of the ring are typical of the Byzantine period. In contrast to this type of key, object no. 105 is a large slide key, which was created for a tumbler lock. Similar to nos. 101 and 102, which are probably casket locks. Slide keys are a standard form in the Roman period, but appear in even larger quantities throughout Late Antiquity.

Weighing Equipment

The most striking evidence for weighing equipment in the area excavated during the 2014 campaign is a flat, square commercial weight. Incised Greek letters (Gamma and Alpha) indicate the standard weight of one ounce, ca. 27 g. The square type is one of three standard, differently shaped Byzantine weights, and was the principal type in the Byzantine and Late Byzantine period[46]. Two other items are components of a balance; nos. 110 and 111, which are suspensions. They belong to fairly small, slender balances, which have a horizontal beam; the movable suspension has two long legs, which are attached to the centre of the beam. Complete preserved examples of this type of balance were found in the Byzantine period shops in Sardis, Turkey, which were destroyed in the early 7th cent. AD, perhaps during the Persian attack in AD 616[47].

Horse Trappings (?)

There is no clear evidence for horse trappings. However, two items could possibly be assigned to such a use. An iron buckle (no. 118) has a pivot-mounted axis, which is quite unusual for belt buckles from the Byzantine and Late Byzantine periods. Buckles of this type were more often used for saddle girths or other parts of a horse harness. A related item is a fragment with missing axis (no. 119), made of copper alloy. Quite similar buckles have been dated to the 6th – 7th cent. AD, and were rarely used for belt buckles[48].

Cosmetic Implements

There are some cosmetic implements among the metal objects of the 2014 campaign, although jewellery is largely absent (only one finger ring and a small number of beads, made from gold, carnelian, and glass have been found [cat. nos. 159-173]). Fragments (cat.

43. Gaitzsch (2005), p. 42; pl. 58, 75, no. 1-2.
44. Waldbaum (1983), p. 72-73; pl. 24, no. 385; Baitinger and Völling (2005), p. 138-142; pl. 56, no. 634; Jantzen (2004), pl. 32, no. 1184.
45. Patrich (2008) p. 422 and 428; no. 16; Waldbaum (1983), p.76; pl. 25, no. 403-407; Jantzen (2004), pl. 33, no. 1189.
46. Bendall (1996), p. 29-38.
47. Waldbaum (1983), p. 82-84; pl. 29, no. 448 and 460.
48. Jantzen (2004), pl. 20, no. 748; similar buckles of copper alloy, with only one pivoted axis: Patrich (2008), p. 458, no. 211-212.

nos. 112 and 113) of an open work, wheel-like frame made of lead were found; it is not clear if all of the fragments originate from a single frame. They were very probably part of a now lost glass mirror, which was attached to the frame. Parallels of such open work lead frames, spanning a wide chronological range, from the Byzantine to the Crusader periods, were uncovered in Caesarea Maritima, but the precise function of these pieces is unclear[49]. However, lead mirror frames are often found in Roman and Byzantine contexts. A single kohl stick (cat. no. 115), made of copper alloy, is a double-ended variant with a moulded centre. Almost a dozen good parallels have been found at Tell Hesban in the same vicinity, dated to the Islamic period[50]. Finally, a copper alloy lid, (cat. no. 114)[51], is assigned to this category, as it might may have been part of a needle or kohl tube.

Dress Accessories

Two strap ends from separate belts, (cat. nos. 116 and 117), were found during the 2014 campaign, both of which can be dated to the Late Byzantine period. The decorated strap end (no. 116) deserves particular attention. It was probably part of a composite belt; a distinctive belt type which was fashionable in the Byzantine world and its surrounding regions from the mid-6th century AD onwards[52]. The stylized vegetable ornamentation of no. 116 is typical of a series of belt plates which are well known from Langobardic Italy, although the ornamental style is clearly Byzantine. However, there has previously been little evidence for such belt plates in the Near Eastern provinces.

Casket Fittings and Lock

Some 30 metal objects were found close together, some of which were fused together by corrosion. This feature was interpreted by the excavators as a box and its contents (cf. Kalaitzoglou, Lichtenberger and Raja this volume). Among the metal finds are several items which can possibly be interpreted as the box fittings, such as a box-like hinge (cat. no. 106). Furthermore, fragments of a probable tumbler lock and its closing device were also discovered (nos. 101 and 102)[53]. The reconstruction of the box, however, still remains to be done. No firm decision regarding the function of the box has been made so far; therefore, a contextualised interpretation of its contents is not possible at this stage. The objects assigned to the box include weighing instruments as well as tools and dress accessories. However, none of the objects appear to be complete or to belong to a complete unit; they are comprised of a single weight, a single suspension from a balance/scale, a single strap end, and even more astonishingly, some revetment pegs which would have originated from monumental buildings. Hence, the ensemble of artefacts looks more like a collection of recycled, unimportant metal objects than a box of useful instruments for household and/or handicraft use.

The Faunal Remains from the Northwest Quarter, 2012-2014

Pernille Bangsgaard

The faunal remains presented in this report include materials excavated during the 2012 and 2014 campaigns. The remains originate from four distinct excavation areas (Trenches A, B, J and K). The majority of the material was analysed on site in Jerash during the 2014 field campaign. A small selection of faunal material was, however, taken to Denmark and analysed at the Natural History Museum of Denmark, using the large comparative skeleton collections available there. The exports were mainly comprised of various game and bird species, which are not currently represented in the small comparative collection available on site in Jordan.

All faunal material was identified to skeletal element and species, or to the nearest possible taxon (*order, family* or *genus*). The registration of each bone fragment includes section of bone, side and observation of various changes, whether human induced or other, such as cut-marks, fire damage and evidence of pathology. The bones are quantified by the number of fragments, NISP (*number of identified specimens*) and weight. When possible, all long bone fragments

49. Patrich (2008), p. 425-430; no. 73-79.
50. Platt and Ray (2009), p. 209-211; fig. 12, no. 7-8.
51. Waldbaum (1983), p. 108; pl. 41, no. 644.
52. Schulze-Dörrlamm (2009), p. 268-270; Kazanski (2003), p. 122; fig. 14, no. 37.
53. Waldbaum (1983), pl. 23.

were registered with age categories (*foetal, pullus, unfused and fused*), and all mandibles were registered with ontogenetic age if the information was available.

The Faunal Material

The material studied so far represents only a small selection of the entire faunal collection from the 2012-2014 excavations; as a consequence, the results presented here are preliminary.

2,426 fragments in total were registered (weight: 16.17 kilograms). A small selection of material has been analysed from the 2012 season, originating from Trenches A and B; material from 22 of the 27 Evidences has been included from Trench A, whereas material from only 30 of the 66 Evidences from Trench B which contained faunal remains has been identified. A total of only 475 fragments are included here, and thus the results are of limited statistical value at the present.

A larger selection of material was analysed from the 2014 season, originating from Trenches J and K; the majority of faunal material from these contexts are represented. 1,951 fragments in total were identified, including material from 38 recorded Evidences from Trench J[54]. The material from trench K is comprised of 84, from a total number of 106 Evidences. The limited number of bones, particularly from the 2012 contexts, has resulted in limitations to the analysis and statistics.

Faunal remains were hand collected during excavation, with little sieving or flotation in the majority of contexts. Only two individual cases, when two complete pots were found, were the contents sieved to increase the likelihood of retrieval for small bones. It is therefore possible that there has been some loss of small bones as a result, in particularly in terms of retrieval for fish, bird and rodent bones, along with the minor bones of various small mammal species. State of preservation is generally very good, meaning that most of the original bone surface has been preserved. Additionally, post- and pre-excavation fragmentation is limited, which means that cut marks and other minor changes are still visible on the surface of the bone.

Bones with traces of burning or calcinated fragments are extremely rare, and in total only 22 fragments were identified in the entire collection, which account for just under 0.9% of the collection. The group includes 11 fragments which were burnt black to some extent, 8 which were completely burnt black, and only 3 which were burnt white; this implies that the bones were mainly exposed to low temperatures, or exposure was limited to short intervals. The limited amount of burning could indicate that preparation of meat either did not include the bones, or that foods prepared primarily included dishes where the meat would not have been directly exposed to a fire, such as a pot of meat and other ingredients simmering in liquid; the latter type of dish is well represented in the Early Islamic cookbooks known from the 9th century AD onwards[55]. Bones with cut- and chop-marks are slightly more common in the collection, including 204 fragments. The marks represent over 40 different locations and types, but the majority are typically associated with the skinning and dismembering process. They are mainly found on bones of domesticates, such as sheep, goat, cattle and pig, but fish is also represented.

The Species

More than twenty species were identified in the collection; all of which are quantified in (**Table 1** and **Fig. 189)**, according to their trench of origin. A general overview of the entire identified collection, including the percentage of total NISP, is presented in Figure 190. Domesticates are by far the most common group of animals, and include sheep, goat, pig, cattle and chicken as the main contributors. These species generally contribute as much as 95% or more of all identified bones (NISP), although in the case of Trench K, it is limited to c. 92 %, mainly due to a small collection of fish bones.

The small remaining group of wild species includes mammals, birds, fish and tortoise. Some of these are probably more likely to be commensal species rather than a food source,

54. Material from a few further Evidences from Trench J have not been analysed yet (cf. registration report above). However, the faunal material from one of these Evidences has been analysed, which brings the total count of analysed Evidences from Trench J to 39.

55. See for example Nasrallah (2007).

Table 1: Mammals, bird and rodent species found at Jerash, according to trenches

	Trench A	Trench B	Trench J	Trench K
Domesticated Animals				
Dog, *Canis familiaris*	2	-	31	-
Pig, *Sus* sp. *	9	56	37	36
Donkey, *Equus asinus*		1	26	
Horse/donkey, *Equus* sp.	4	1	115	-
Dromedary, *Camelus dromedarus*	-	-	1	1
Cattle, *Bos Taurus*	-	3	14	6
Goat, *Capra hircus*	2	2	11	12
Sheep, *Ovis aries*	2	5	10	34
Goat/sheep, *Capra hircus/ Ovis aries*	13	37	48	171
Chicken, *Gallus gallus domesticus*	8	6	10	8
Wild Animals				
Red fox, *Vulpes vulpes*	-	-	-	3
Gazelle, *Gazella* sp.	-	-	2	-
Cape hare, *Lepus capensis*	-	-	-	1
Rat, *Rattus* sp.	-	1	1	2
Mice, *Muridae* sp.	-	-	1	-
Rodents, *Rodentia* sp.	-	-	7	1
Tortoise, *Testudo* sp.	-	-	1	-
Chukar partridge, *Alectoris chukar*	2	-	1	4
Partridge and francolins, *Phasanidae* sp.	9	7	14	24
Pigeon and doves, *Columba* sp.	-	1	-	1
Ostrich, *Struthio* sp. #	-	-	-	1
Bird, *Aves* sp. #	44	7	6	50
Fish, *Pisces* sp.	-	-	-	12
Molluscs, *Mollusca* sp.	-	-	-	56
Ungulate, *Ungulata* sp.	3	6	131	42
Unidentified	89	155	598	477
Total number of fragments	187	288	1065	942
Total weight of fragments	442	1742	9771	4668

* Two mandible and one maxilla fragments have been identified as Sus domesticus based on the size of the third molar.
# The single ostrich and 51 of the avian fragments are eggshell fragments. The latter were found in Trenches A and K.

for example, the small group of rodents. However, many of the remaining species would almost certainly have been consumed by humans, including gazelle, cape hare and the chukar partridge. Apart from the fish, all of the wild species identified are still found in the general vicinity today[56]. Unfortunately, the fish bones included mainly smaller fragments and other non-diagnostic elements, which could not be identified to family. Thus it is not currently possible to attribute these remains, not even to freshwater or marine species.

Overall, sheep and goat are the most common species in the collection, although percentages vary significantly between trenches. Generally, sheep are more than twice as common as goat, which corresponds well with the typical pattern of traditional sheep and goat husbandry in the Middle East and elsewhere[57]. Due to the higher number of fragments from these two species, it was possible to generate a small amount of data for age categories and body-part distribution. The time of death distribution, based on fusion of the long-bones, can be seen in (**Table 2).** Trenches A and B have been combined, due to the very small amount of data available from each. The table clearly identifies similar distribution for age-categories across all three areas, suggesting that most of the animals were butchered at an age of 2 years or older. All three areas also include a small group of animals which were killed before the age of 1-1½ years. Body-part distribution is illustrated in Figure 191, and some variation can be discerned between the trenches. Most of the meat would have been sourced from the upper leg and central body; hence, they also represent the majority of the cuts, whereas the head and lower leg would typically be separated from the rest of the carcass during the initial butchering and dismembering[58].

Most of the dog remains originate from two Evidences in Trench J, amounting to 25 of a total of 33 fragments[59]. Three complete long-bones indicate that the dog had a shoulder height of c. 50 cm[60]. With no duplicates of any individual bones among the dog remains from Trench J Sector C, it is likely that the fragments originate from a single individual. All long bones are fused and the animal would therefore have been more than two years of age when it died[61]. Among the remaining 8 fragments from dogs, three are metapodiums with excessive new bone deposition, which thus fused three otherwise separate bones together; an x-ray of the material in Copenhagen revealed clear fractures of all three, with bone regrowth stabilising the fractured remains and dislocating the bones into a permanent position (see Figure 192)[62].

The overwhelming majority of the equid remains originate from two Evidence numbers in Trench J Sector C (140 fragments of a total of 147)[63]. Among these 140, 26 could be identified as donkey (*Equus asinus*) based on a series of distinct morphological markers[64]. As no elements could positively be assigned to any other equid species, it must be considered likely that the remaining fragments were also from donkey. Five measurements from the collection can be used to calculate the shoulder height of the animals[65]; they indicate a shoulder height between 115 and 133 cm. Also included in the collection are 19 fragments which display signs of various pathologies, none of which appear to be from a traumatic origin. Rather, all are consistent with old working animals; see Figure 193 for an example. It could therefore be suggested that the bones were from old caravan donkeys which had been retired as pack animals.

Domesticated chicken is the main avian species in the collection, with both bones and eggshells represented. Additionally, both the *Phasanidae* family and the 'general' bird categories are likely to contain mainly elements from chicken that were simply too fragmented to be assigned to a more specific category. Apart from representing a significant addition to the daily diet in Jerash, it is worth noting that chicken were considered a good and light form

56. Harrison-Bates (1991); Porter-Aspinall (2010).
57. Dahl-Hjort (1979).
58. Loyet (1999).
59. From Evidences Jc-67 and 68.
60. Two radii with GL: 147 mm and 171.4 mm and one femur with GL: 170.1 mm. These and all other measurements in this report are based on von den Driesch (1979).
61. Based on Silver (1969).
62. Trench J, Evidence 35.
63. Trench J from Evidences 67 and 68.
64. Johnstone (2004).
65. Two metatarsals with GL: 230 mm and 217.4 mm, two tibia with GL: 305 mm and 280 mm and one radius with GL: 288.5 mm.

Table 2: Distribution of goat and sheep bones which could be aged, according to trench[1].

	Time of fusion (months)	Trench A and B		Trench J		Trench K	
		Unfused	Fused	Unfused	Fused	Unfused	Fused
Early Fusion							
Metapodium, proximal	At birth		3		3		14
Radius, proximal	3-10				2	1	1
Humerus, distal	3-13		1	2	2	2	5
Scapula	5-13			1			2
Pelvis, acetabulum	6-10	2	1	1	4		7
2. Phalanges	6-16		2		1		5
1. Phalanges	6-16		1		3		6
Early Fusion total		2	8	4	15	3	40
Middle Fusion							
Tibia, distal	15-24		1			2	8
Metapodium, distal	18-36		4		3	1	4
Middle Fusion total		0	5	0	3	3	12
Late Fusion							
Tibia, proximal	23-60			1		5	
Calcaneus	23-60		1	1		2	2
Femur, distal	36-60	1		1			1
Femur proximal	23-84			2		3	1
Radius, distal	33-84		1			2	
Vertebrate		7	1	1	4	14	8
Late Fusion total		8	3	6	4	26	12

1. Reitz -Wing (1999).

of meat in both Byzantine and early Islamic written sources[66].

Comparative Faunal Collections at Jerash

During two brief seasons in 2010 and 2012, another collection of faunal remains was studied within the context of the Islamic Jerash Project, directed by Alan Walmsley. Excavations in the central part of the city, at the junction of two main streets (the Cardo and the South Decumanus) revealed the remains of a Byzantine bathhouse, shops along the cardo and a large midden. The latter was located among private houses to the west of the bathhouse, and is of a later date than the early Islamic congregational mosque. Distribution of main species for each of these areas is illustrated in Figure 194. Variation between the areas is significant, but is clearly not area specific. For example Trench K, the E shops and the Bathhouse have a similar distribution, being comprised mainly of sheep and goat, whereas Trench A is clearly distinctive from the remaining areas, with a significant amount of chicken and bird remains. It would appear there is some potential for distinguishing even smaller units from one another with regards to food preferences and use pattern, although the apparent high resolution may relate to a local pattern of waste disposal, with nearby empty ground used for convenience.

The low quantity of burnt bones (under 0.9%) mentioned previously contrasts with the evidence from the central area, where c. 6% of the bones were affected by burning. The pattern generally fits well with slightly later textual evidence from early Islamic cook books, where meat dishes cooked in a pot with water predominate, thus the bones are not burnt. The higher quantity of burnt fragments in the central area of the town could perhaps be related to a higher presence of public food outlets, where foods such as grilled meats were likely to have been more predominant[67].

Concluding Remarks

The small collection of 2,426 fragments, from four excavation areas, was analysed during a single week of fieldwork and more than 20 species were identified. The preliminary results testify to the potential output of a detailed faunal analysis, with significant diversity of data regarding species, body part preferences and food preparation. This diversity is evident, both within the four areas in the Northwest Quarter and when compared to results from the central town, thus verifying the presence of a diverse and multicultural population. Significantly, not one single human bone was identified in the material from the Northwest Quarter.

Although a significant number of species has been identified in the collection analysed so far, it would both enhance the validity of the results, and probably expand the list of identified species, if a program of targeted flotation was carried out in selected contexts during future excavations.

XRF Analysis of Selected Artefacts from the Northwest Quarter

Peter Fink-Jensen

Introduction

The work presented in this report was carried out between 5th and 10th August 2014 with a hand held XRF scanner (Innov-X Alpha-8000 LZX Handheld X-Ray Fluorescence scanner). This report consists of two parts: text and a table (**Table 3**), which include both data results and data interpretations for each artefact which has been analysed.

During the field work in Jerash, a large number of artefacts (pottery, glass, sculptures, coins and metallic objects), which had been collected during the 2012, 2013 and 2014 campaigns, were analysed by X-ray fluorescence scanning, in order to determine the content of a number of metallic elements. The instrument which was used only measures concentrations for elements ≥ 22 in the Periodic Table (element 22 is titanium). Thus, concentrations of a number of common elements, e.g. hydrogen, oxygen, carbon, silicon, calcium, sodium, potassium and magnesium, are not included in the results. The scanner is, however, useful for detecting most metals, which, apart from metal objects, are typically present as minor or trace elements. The analyses included in this report are:

- Compositional analysis of a large number of pottery samples, which appeared to be

66. Dalby (2010), 71, 143; Nasrallah (2007), 104.

67. Nasrallah (2007); Dalby (2010).

Table 3: XRF analysis of selected artefacts.

Description	Find no	Reading nr	Scan location	Fe	Mn	Ti	Pb	Co	Cu	Ni	Zn	Zr	Sn	As	Sr	Ag	Other elements	Date

Table 3

Xrf analysis of selected artefacts found at the Nortwest Quarter of the ancient city of Jerash, Jordan

The Danish-German Jerash Northwest Quarter Project, 2014

By Peter Fink-Jensen, Finkjensenpeter@gmail.com.

All measurements are done with an Innov-X Alpha-8000 LZX Handheld X-Ray Fluorescence scanner, which has a scanning field of 10x10 mm. Elemental concentrations are measured on outer surfaces, but the scanner does penetrate somewhat through most materials. The penetration depth differs for different materials, based on factors such as elemental composition and matrix (e.g. evenness, hardness and porosity). The scanner should i.e. penetrate deeper into rock surfaces than metal alloy surfaces.
For each artefact it has been attempted to locate areas with fairly homogeneous compositions, so that the scanning field to the extend possible measured just one type of material during a measurement. However, this was not possible in all cases.

All concentrations are in ppm (points per million), except metal artefacts, including coins, which are in %.

Data from pottery and glass can be found in the "Soil iPAQ" data. Data from metal artefacts can be found in the "Alloy iPAQ" data.

Limit of Detection (LOD)

Fields with blank concentration values are measurements where the concentration of this element was too low for the scanner to positively detect. For each element this depends on the instruments Limit of Detection (the lowermost concentration range for which the scanner can detect that element) and the scan duration. I.e., long scan times of several minutes may be required to detect titanium concentrations lower than 4000 ppm, whereas for other elements, concentrations of <20 ppm are detected within 10-20 seconds. The LOD's for elements analysed in this study are listed below:

Innov-X Alpha-8000 LZX Handheld X-Ray Fluorescence scanner

LOD's for selected elements:

Main elements	Fe	Mn	Ti	Pb	Co	Cu	Ni	Zn	Zr	Sn	As	Sr	Ag
LOD (in ppm)	10-100	10-100	10-100	10-100	10-100	10-100	10-100	10-100	10-100	50-150	10-100	10-100	50-150

Other/trace elements	Cd	Mo	Y	Sb	Hg	Rb	Bi	Nb	W	Cr
LOD (in ppm)	50-150	10-100	10-100	50-150	10-100	10-100	10-100	10-100	10-100	10-100

Please note that there are a some uncertainties regarding measuring arsenic (As) and silver (Ag) with the used scanner. Arsenic concentrations show a tendency of being high when lead (Pb) concentrations are high, which can probably be attributed to overlap in the KeV-spectrums used by the scanner to interpret elemental concentrations. It is unknown if this could also be an issue with other elements. Silver concentrations are generally too high for most measurements with which I think may be due to contamination in an inner chamber from the scanners Ag source.

Data results with comments

For average concentration values of elements in the sedimentary rocks shale, sandstone and limestone see Table 4 . For average values of elements in igneous rock types, such as mafic rocks, see Table 5.

Description	Find no	Reading nr	Scan location	Elemental concentrations in ppm (% for metals)														Date
				Fe	Mn	Ti	Pb	Co	Cu	Ni	Zn	Zr	Sn	As	Sr	Ag	Other	

Soil Analysis (see Soil iPAQ)

All values in ppm

Pottery etc.

Year 2012

Cut bowl	J12-Abe-22-14	06-08 52	Ext, reddish surface	29794	278	7790	29	317	20		48	316	76		198	56		
		06-08 53	Ext, "black" surface	27839	252	7602	30	345	16		57	298	74		188	88		
High titanium and cobalt content suggests that the clay could be made from an igneous rock (magmatic or volcanic). Quite similar to J12-Cd-42-16 & J12-Cd-42-17, which could indicate that the clays were made from the same type of material.																		
Islamic, green glaze	J12-cbd-1-159	05-08 08	Green surface	24544			78959	335	4233		151	453	182	9950	64		Cd: 118	
Very high lead concentration in this glaze. Also high cobber and arsenic, although the high arsenic concentration is partially an error related to the high lead content. Relatively high cadmium is also significant.																		
Mamluk unpainted	J12-Cd-42-17	06-08 51	Ext, reddish surface	25496	184	4548		304	21		57	135	59		352	139		26-08-2012
	J12-Cd-42-16	06-08 44	Ext, reddish surface	26375	229	4582	23	326	15		50	144			347	119		
		06-08 46	Ext, brown surface	27795	254	4314		231	16		47	165	72		340	138		
		06-08 49	Raw side	21656	268	<4000	14	279	16		49	130	46		291	103		
		06-08 50	Int red surface	29320	327	5292	20	306	29		76	140			333	100		
Very uniform values, both for red/brown colours and raw clay, indicates that the colouring does not contain anything different. Relatively high titanium- and cobalt content suggests an igneous signature. Quite similar to J12-Abe-22-14, which could indicate a common origin for the clay, although according to Sr- and Zr-conc. not necessarily from the exact same location.																		

Year 2013

HMGPW	J13-D-9-3	05-08 26	Int, no paint	10052			14	421			32	128			156	20		
		05-08 27	Int, red/brown	82524	860		19				60	132			161	57		
		05-08 28	Ext, red/brown/light	36130	275		13				53	135			160	18		
The red-brown colouring contains both iron and manganese. High cobalt concentration on unpainted surface indicates an igneous signature in the clay																		
HMGPW	J13-D-9-4	05-08 29	Ext, red/brown/light	45025	558		18				101	121			290	20		28-07-2013
		05-08 30	Piece with hole	25518	209		32	220	40		48	141			128	17		
For both J13-D-9-3 and J13-D-9-4, the red-brown colour appears to contain more Fe-, Mn and Zn, but less Co than base material.																		
HMGPW	J13-D-9-9	06-08 29	Ext, redbrown colour	43403	1427	8414	13	745	114		149	297	103		231	95		29-07-2013
		06-08 33	Ext, white colour	8333	264		11	438	26		64	218			242	115	Mo: 6	
		06-08 15	Raw	55503	878	10100	22	759	33		91	299			214			
Relatively high titanium and cobalt content suggests an igneous signature in the clay. The red-brown colour has higher Mn, Cu, Zn and Sn than the clay. The white colour layer shows lower conc. of most measured elements, metals. Perhaps a calcite or silicate layer?																		
Abbasid	J13-Dab-13-70	06-08 18	Raw, black	16242		6775	27	188			50	228	100		165			04-08-2013
		06-08 19	Outer white surface	19511		10300	35	266	18		54	241			172	83		
Abbasid	J13-Dab-13-71	06-08 22	Ext	27398	180	3904		448	9		42	170	67		132	58		04-08-2013
		06-08 23	Int	33461	252	5606		337			32	175			118	45		
Relatively high titanium and cobalt content indicates an igneous composition of the clay for both J13-Dab-13-70 & 71. White surface has values similar to clay and thus does not appear to contain vastly different metallic content.																		
Amphoriskos - import from Asia Mir	J13-Dab-13-76	06-08 03	Ext	43616	205		17	452	18		48	174		11	116			04-08-2013
		06-08 04	Int	43430	434		19	530			54	161			116			
High iron and cobalt content suggests that the material perhaps has an ultramafic origin.																		
Spindle whorl	J13-D-25-7	06-08 05	Ext	72917	800	17600		859	31		58	114			418	92		17-08-2013
		06-08 06	Raw	83044	993	17100		953			72	109			395	71		
High iron, titanium and cobalt content suggests that the material has an igneous origin.																		
Bronze Age	J13-D-25-8	06-08 42	Ext with waves	33914		9609	27	327			81	240			253			17-08-2013
		06-08 08	Raw	32846	322	9244	27	538	16		68	231			231	56		
Bronze Age Egyptian import?	J13-D-25-9	06-08 39	Grey-green spotting	38303		10100	37	417	14		49	350			186			17-08-2013
		06-08 40	Light brown surface	23854		5939	25	394			45	305	63		181	74		
		06-08 41	Mostly reddish, raw	32668		7778	32	422			44	319			185	51		
High iron, titanium and cobalt content suggests that the material has an igneous origin. Uniform values in both coloured and non-coloured areas indicate that the measured values stem primarily from the clay. J13-D-25-8 and J13-D-25-9 have very similar values, which could indicate a common origin, however due to different Zr and Sr concentrations not necessarily from the exact same location.																		
Grey Ware	J13-Ed-18-5	06-08 43	Ext, grey surface	25051	224	8024		237			41	302			151	67		04-08-2013
High titanium and cobalt content suggests an igneous composition. Similar in composition to analysed green ware and the gray mold (J13-Fi-53-17).																		
Green Ware tile	J13-Fd-40-13	06-08 36	White weathering surface	26687	352	5688	12	301	17		38	287	87		236	98	Y: 27	18-08-2013
		06-08 35	Greenish (raw) surface	31652	289	6672	16	300	14		59	268	88		207	115	Y: 20, Mo:8	
Amphora - compare with Green Wa	J13-Ed-18-84	06-08 34	Ext greenish surface	33660	529	5090		290	34	58	63	125		55	532	81	Y: 19	06-08-2013
		06-08 37	Int, white surface	24583	353			390	20		54	114	57	13	460	96	Y: 21, Mo: 5	
Items J13-Fd-40-13 J13-Ed-18-84 have similar compositions. My guess would be that the material in these artefacts is derived from a metamorph rock, such as a greenschist, based on the colour and apparent layering. Typically of green ware it has retained a lot of the original rock structure, as a consequense of only being exposed to low temperatures. Zr and Sr content suggests that the two samples do not necessarily have the exact same origin. White layer differs slightly from raw, green surface.																		

Islamic - white/buff	J13-Ed-18-86	06-08 59	Ext, light	20830	386	6198		234	11		120	277	60		321	90		06-08-2013
Islamic - white/buff	J13-Ed-18-87	06-08 54	Ext, light	17261	298	4178	10	165	20		104	268	85		346	74		06-08-2013
Somewhat high titanium and cobalt concentrations indicate an igneous signature in the clay.																		
Sandy/white	J13-Ed-19-23	05-08 09	Exterior	15432	545		12	222	19	54	139	232			318			07-08-2013
		05-08 15	Interior	11197	189		12	158			44	170			305			
Slight igneous signature.																		
ARS	J13-Ec-27-12	05-08 24	Red surface	42546		6543	36	375	26		71	278	91		266			12-08-2013
	J13-Ec-27-13	05-08 23	Red surface	38364		7192	30	564	20		81	272	118		260			
	J13-Ec-27-15	05-08 22	Red surface	44777		8062	33	404			66	300			259			
		06-08 57	Raw	44810		6952	39	507	20		81	308			277			
The high iron-, cobalt- and titanium concentrations indicate an igneous origin in the clay. Red colour is either made from the same material or the measured elements come from the clay underneath.																		
Jerash Lamp	J13-Fd-40-45	05-08 31	Ext. Bottom, red	21416	263	9242	10		19		43	491			193	53		20-08-2013
		05-08 32	Ext. Top, light brown	7296			10	257			36	359			198	89		
		05-08 33	Ext. Top, light brown	7155			9	173	14		40	347			198	84		
Interestingly, the bottom and top sections of this lamp exhibit quite different elemental concentrations. The high iron- and titanium concentrations in the bottom part could stem from the red colouring.																		
The top has concentrations not far removed from those of sandstone (albeit with slightly high Co). This might be a lamp made from sandstone, that had a red colouring containing an igneous mateiral applied to the top.																		
Grey Ware mould	J13-Fi-53-17	10-08 15	Dark grey surface	25343	331	7236	50	350	21		54	339	71		168			
		10-08 16	Dark grey w. metallic specks	26978	434	7703	69	318	31		74	334	103		179			
		10-08 17	Mostly red-brown surface	22612	194	5239	68	302	39		99	306			167			
The elemental concentrations in this mold are strikingly similar to those of the green ware tile (J13-Fd-40-13). It is my guess that these two pieces are made from the same material, but that this mold has been exposed to higher temperatures,																		
thus "destroying" the green ware texture. The high titanium content is probably responsible for the tiny metallic specks that can be spotted in some places. Red-brown colour does not distinct itself from the gray mold.																		
ESA	J13-Ha/Ha1-13-26	05-08 34	Ext. Surface, red	42686	522			533	29	221	60	85			330	123		
		05-08 35	Int. Surface, light	35969	383		22	483	35	190	74	91	102		344	138		
High cobalt content suggests a non-local material. The colouring does not appear change concentrations significantly.																		

Generally, the above artefacts (J12-Abe-22-14 to J13-Ha/Ha1-13-26) are characterized by a high iron, cobalt and, for the most part, titanium content. The measured concentrations of particularly cobalt and titanium indicate that the material has a mafic/ultramafic origin; that is dark volcanic or magmatic rocks, such as basalts, dolerite, gabbro etc. Nickel content is generally low for mafic/ultramafic rocks (see Table 5), The values listed in Tabke 5 are world averages, and there are variations in elemental content in such rock types. Rocks found locally at or near Jerash are primarily either sandstones or limestones, which would not have such Co- and Ti-concentrations. However, volcanic regions exist north of Jerash, which could perhaps be the origin of the igneous signature seen here, whether the materials were imported or transported here suspended in the local river and deposited in river beds. A petrological/geochemical study of the local geology and the volcanic regions could perhaps shed light on the provenance.

Plain Ware with glass int.	J13-Ha/Ha1-13-27	06-08 32	Glaze	7932	13300		2007		182				159	167	243		Sb: 59	22-08-2013
Mn and Pb were most likely added as a temper to lower the melting point of the silicate (which probably comprises most of the glass), so that the glass																		
mass wouldn't melt/alter the pottery surface. Mn and Pb could also have been added as colourants. The glass also contains antimony.																		
	J13-Ha/Ha1-13-48	05-08 07	Bottom flat surface	2704			21		33		83	18			684		Hg: 10	
			Limestone	420							10				222	173	Hg: 9	
Typical low metal concentrations in the limestone. The bottom surface has higher iron, zinc and strontium values. This could indicate a surface layering or perhaps just be due to heterogenousness in the limestone.																		
Palmette	J13-Ha/Ha1-13-31	05-08 17	Bottom exterior	47444	955		54		19	78	113	255		21	154		Rb: 191	
		05-08 18	Interior edge	44219	864		53			113	132	256			159		Rb: 199, Hg: 11	
		05-08 20	Interior inside surface	41665	827		42				117	242		16	147		Rb: 185	
		05-08 21	Raw surface	35675	855		44	327	20		109	263		17	169	78	Rb: 214	
Relatively uniform values all over this palmette, both on coloured surfaces and on raw surface. The colour contains nothing significant.																		
Lime stone Palmette	J13-0-5	07-08 18	Limestone	420							10				222		Hg: 9	24-08-2013
		07-08 24	Limestone w. black specks	1177			12		14		11	6	103		262			
		07-08 25	Limestone	646					12		13		101		561			
		07-08 17	Yellow/brown, high amount	9180	279		139		14		89	8		28	391			
		07-08 19	Y/b, very high	7222	334		94		14		81		62	23	416			
		07-08 20	Y/b, very little	802			15		22		26				278			
		07-08 21	Y/b, high	4511	270		51				52			12	353			
		07-08 22	Y/b, medium	2837	237		124		14						302			
		07-08 23	Y/b, high	3765			60		17		32				273		Hg: 12	
Typical low concentrations in the limestone. The yellow/brown layer probably has it's colour from it's content of Fe, which could indicate that it's yellow ochre. Traces of Pb, Mn, Zn and As can also be found in the this layer, which are																		
probably due to trace minerals in the ochre. Concentrations of iron and manganese correlate very well with amounts of colouring.																		

Year 2014

Glass slag	J14-Lg-2-18				31600	399	6176	31	237	26	39	38	318			150		
Glass slag made from (or having been added) a volcanic or magmatic material. Perhaps it can be referred to as an obsidian slag. It has a composition similar to analysed Green Ware and Grey Ware, and thus could be a waste product related to them.																		
Green Ware handle	J14-Jb-11-7		09-08 16	Gw with brown weathering	26900	407	<4000	5	389	24		70	107		23	308		
Green Ware fragment	J14-Jd-18-21		09-08 17	Gw with brown weathering	31200	493	5249	14	279	21		31	137		9	235		
These samples are quite similar to the other sampled green ware (J13-Fd-40-13, J13-Ed-18-84). The spectrum from reading 09-08 16 shows that J14-Jb-11-7 does contain titanium, but below the measurements LOD, somewhere around 3500 ppm.																		
Raw, black rock fragment	J14-Kc-3	06/08-14	10-08 19	Blackish surface	2061					15	54	15				140		
The low metal values could perhaps indicate a burned limestone fragment. It is not a piece of a volcanic or magmatic rock																		
3 glass: white, red (ball), blue	J14-lab-1-1		06-08 62	Red ball, modern	1269	90		214		13		78		61	1782			Cd: 32
Modern glass ball. Very high As.																		
Plaster	J14-lab-1-1		07-08 27	Mortar	5606	241		15			41		42	(55)		163		
			07-08 29	Mortar	7272	156		12		11		24	46			179		
			07-08 28	Plaster layer	3600			8		12	30	20	27			135		
Elemental concentrations resemble those of a sandstone or similar.																		
Mamluk plaster, painted	J13-Da-10-31		07-08 30	Purple/blue colour	4464	226		11		9	44	16	56			136		
			07-08 55	Traces of dark blueish col.	4555	158				16		13	36			142		
			07-08 56	Green/blue colour	4769	app 150		8		13		17	49			133		
			07-08 49	Green colour 1	8861	167		36		11		12	31			134		
			07-08 54	Green colour 2	6165			23					21			121		
			07-08 57	Purple colour	7691	176		8				13	21			151		
			07-08 58	Dark blue/gray	4034	414		12		9	36	13	30			164		
			07-08 34	Green and blue colour	7585	131		27		15	41	21	31		(6)	184		
			08-08 03	Green colour	6052	178		34		12		13	19		(11)			
			07-08 32	Blue-ish colour	11332	170		56		12	69	41	23	66	(12)	212		
			07-08 33	Red/brown colour 1	68309	505		74			84	8	35		(15)	197		
			07-08 52	Red/brown colour 2	87475	509		85			82		32		(18)	174		
			08-08-02	Red/brown colour 3	94859	668		110			91		25	85	(27)	147		
			07-08 35	Yellow/brown colour 1	24925			38		12	139	86	30	70	(14)	164		
			07-08 53	Yellow/brown colour 2	23587	289		33		18	120	79	24		(14)	153		
			08-08 05	Orange/brown	30450			98		18	191	108	27		(27)	159		
			08-08 04	Y/b w. r/b specks, sparse	11173	175		28			60	32	25			219		
			07-08 50	Pinkish colour 1	8089			5783		11	52	18	40	76	(541)	207		
			07-08 51	Pinkish colour 2	9130			6702		19		14	25		(623)	243		
	J14-Kd-3-76		10-08 25	Red, painted surface	8426	187		16		11	35	34	19			250		
			10-08 26	Mortar	9412	318		20		26		29	44			243		
Colouring on the Mamluk murals (J13-Da-10-13) show a variety of elemental concentrations. Green, blue, purple and gray colour has values resembling those of uncoloured mortor, indicating none of the measured elements coming from the colour. The red colour has high concentrations of iron, manganese, lead and nickel, which could indicate a red ochre, or another metal-rich compound. The yellow colour also has higher concentrations of iron, nickel and zinc, indicating a yellow ochre. The pinkish colour has a very high lead content. Perhaps this is a mixture of red lead and lead white pigments.																	
No igneous signature in this these plasters. Raw mortar surfaces resemble sandstone composition.																		

Terracotta

Terracotta head	J12-Aa-4-1x		08-08 34	Top of head, red-brown col.	8113	178	low	16		20	39	24	38			250		17-08-2013
			08-08 35	Back of head, light brown col.	8674	194	low	18	81	11		83	36			365		
			08-08 37	Left cheek, brown colour	8268	192	low	29	50-100	20		53	35	84		330		
There are no significant concentrations variations on the 3 measured areas. Differences in colour do not appear to influence these elemental concentrations. Could originate from a sandstone.																		
Terracotta fragment	J13-Gb-9-?		10-08 04	Ext. Red-brown surface	13647	411	app 2000	17	199	31		46	106			211		17-08-2013
			10-08 05	Int. Light brown surface	13177	744	low	12	158	25		72	91			194		
Relatively uniform values throughout, despite the exterior exhibiting a reddish colour, wheres the interior does not appear to have been coloured. Could the difference be a result of burning technique or weathering?																		
Terracotta fragment	J13-Gb-12-56		10-08 12	Ext	27574	246	< 2000	46	234	112		44	79	69		267		06-08-2013

		10-08 14	Int	22754	144	< 2000	6	168	27			74			242			
	Uniform values externally and internally																	
Terracotta fragment	J13-Gd-28-17	10-08 06	Ext. Red-brown surface	26116	223	5799	42	272	34		74	204	70		241			04-08-2013
		10-08 07	Int. Red-brown surface	27048	216	5791	33	205	34	41	62	194			226			
	This piece contains more iron and titanium than the terracotta pieces above. This suggests an igneous signature in the clay.																	
Terracotta foot	J13-Ga-12-22	10-08 08	Ext. Red-brown surface	28445	374	4910	104	287	23		123	178			281			06-08-2013
			Raw fracture surface	18090	280	4118	27	278	21		38	162			199			
	The clay itself (raw surface) has a lower iron content (and a more neutral colour) than the red-brown surface. This could indicate that a red ochre was applied to the red-brown surface, but since the values are not that much higher it could just be a matter of burning technique or weathering. The titanium and cobalt content indicates an igneous signature in the clay.																	
Terracotta piece with flowers	J13-Ga-28-18	10-08 11	Ext red-brown surface	28150	319	6497	92	294	362	37	71	203			203			
Terracotta fragment	J13-Gb-12-55	10-08 13	Ext red-brown surface	30986	266	5344	37	233	26		40	85	74		374			

Generally, the above 6 Terracotta pieces do not exhibit significant differences in composition based on colour variations. Colour variations may be due to burning techniques or weathering.

Terracotta pieces J13-Gd-28-17, J13-Ga-12-22, J13-Ga-28-18 and J13-Gb-12-55 all exhibit similar elemental concentrations. Their titanium and cobalt content suggest that the clays are derived from mafic sources, as opposed to Terracotta pieces J12-Aa-4-1x, J13-Gb-9 and J13-Gb-12-56, that have a lower titanium content, and could be made from a different material. This could be an issue of the first-mentioned pieces being subjected to an additive to added to the clay, perhaps as a hardener, or it could simply be a question of these clays having a mafic origin.

Statues

Artemis, marble	J13-Da-10-2x															
		07-08 07		975										23	67	18-08-2013
		07-08 08		945			34						7	30	47	
		07-08 09		873			16							26		
		07-08 10		525			22							26	61	
		07-08 11		383			16		9					26	60	
		07-08 12		2223					21		34	5	7	15		
		07-08 13		7770							27	15		60		
		07-08 14		1770										120	107	
	Measurements 07-11 have low concentrations of the shown elements, which is typical for pure carbonate materials, such as white marble. Measurements 12-14 have higher iron concentrations, which could very well stem from a red iron pigment. In regards to provenance of the marble, It is unknown to me if marble exists in the vicinity of Jerash.															
Limestone	J11-B01															
		07-08 37		5309	174		14				147	12		178	193	
		07-08 38		4323						41	89	6		142	177	
		07-08 39		1376						61	28	7		155	185	
		07-08 40		2791	157		9				63			176	166	
		07-08 41		5682			11			58	128	7		152	143	
		07-08 42		6920							109	13		154	158	
		07-08 43		2479			10			56	141	5		139	174	
		07-08 44		2542			14			49	80	6		147	203	
		07-08 45		4102						45	176	7		151	130	
		07-08 46		5749	153		9		15	42	53	9		170	177	
		07-08 47		4386							86	9		156	187	
	The limestone statue has relatively high iron-, nickel-, zinc- and silver concentrations in some areas, but unfortunately the compositions of the limestone rock is not known. There are some variations in the concentrations of the mentioned elements, which could be due to surface colouring. In regards to provenance of the limestone, analysis of local limestone is required.															

Alloy Analysis (see alloy iPAQ)

All values in %

Metal

Metal	J14-Ic-3-1	07-08 07		85.73		3.76	4.24		3.24			3.03			Yes		Nb: Low, Cr: Low
	J14-Ja-3-3	07-08 08		4.15		0.39	0.69		77.22		5.49		11.48			0.20	Sb: 0.39

	J14-Le-2-12	07-08 09		99.39				0.29	0.14				0.18				W: Low, Cr: Low
	J14-L-1-4	07-08 10		99.08		0.14		0.78									Mo: Low
	J13-Da-10-31	07-08 11		98.21	0.70					0.66						0.18	Mo: 0.25
	J14-K6-9-4	10-08 02		98.09		0.35		1.14			0.42						Mo: Low
Metal lump	J14-Ka-3	10-08 17		98.78				1.22									Mo: low
6 iron alloys and 1 copper alloy.																	
Metal slag	J14-Kc-3	10-08 19	Light brown weathering	84.99		3.41	2.77					2.83	low				Mo: low
These values are actually lower as there is also some aluminium in this piece, but probably not a whole lot																	
		10-08 20	Partly red-brown weathering	98.82		0.13		0.85	0.20								Mo: low, Cr: low
These are 2 measurements from opposite sides of the same piece of metal slag. It is interesting that the metallic concentrations differ on each side. It would seem that this is a heterogenous iron alloy.																	
Metal slag	J14-Ja-8-5	10-08 21	Grey-brown surface	92.69	0.70	4.49	low			0.55		1.58					
These values are actually lower as there is also some aluminium in this piece, but probably not a whole lot																	
Metal slag	J14-Iac-18-7	10-08 22	Grey surface	92.07	0.88	5.69						1.35					Nb: low, Cr: low
The 3 metal slags presented above (J14-Kc-3, J14-Ja-8-5, J14-Iac-18-7) are all fairly similar iron alloys, with minor titanium and zirconium content. I doubt the zirconium or the titanium were added intentionally, but rather indicate that these are slags of and from the same material. Perhaps they are related to the same production, and could very well be composed of material from the same iron ore.																	
Metal key	J13-Db-19-15	10-08 23	Where the handle meets the "blade"	98.81				0.61	0.12							0.42	Mo: low
Large metal "blade"	J13-Da-22-1	10-08 24	Near the "thick" end"	99.60				0.40									Mo: low
		10-08 25	Near the "thin" end	99.71				0.29									W: low, Cr: low

The analysed metal artefacts, apart from J14-Ja-3-3, all have iron as their primary component. This differs from the coins, where cobber and lead are the main components.

different from the majority of material which has been found in Jerash. It was suspected that these samples contained material from a non-local source.
- Two sculptural fragments (one marble, the other limestone).
- A few metal objects.

Methodology

All measurements were executed using an Innov-X Alpha-8000 LZX Handheld X-Ray Fluorescence scanner, which has a scanning field of 10x10 mm. The instrument detects the concentration of elements within the field specified above; that is, elements ≥ 22 in the Periodic Table. Elemental concentrations are measured on the outer surfaces, but the scanner may penetrate somewhat through most materials, although the degree of penetration varies for different materials, based on factors such as elemental composition and matrix (e.g. evenness, hardness and porosity). This means that sediment surfaces, such as sandstone or limestone, should be more easily penetrated than metal surfaces.

All concentrations are in ppm (points per million), except for metal artefacts, including coins, which are given as percentages (%). The scanner has two different settings, a "Soil Mode" and an "Alloy Mode". "Alloy Mode" was used for materials with a high metal concentration (in this case coins and metal objects), while "Soil Mode" was used for materials which contained less than 10% metal (pottery, glass, limestone sculptures).

Results

Concentration data and data interpretations for all samples are provided in Table 3. Raw data from pottery, limestone and glass is provided in the "Soil iPAQ" datasets. Raw data from metal artefacts is provided in the "Alloy iPAQ" datasets of **Table 3**.

Summary of Interpretations

Below are the main points which can be drawn as conclusions, based on the results from the data which was provided:

Pottery/Ceramics:

The pottery which was analysed were 'special samples' for the most part, which were thought to have been produced in another location, rather than in Jerash, because of the material, shape or inclusions. Thus, the results do not reflect the composition of typical Jerash pottery. Most of the samples contain high concentrations of elements which are indicative of an igneous rock signature (magmatic, volcanic), particularly titanium (Ti) and/or cobalt (Co). Only a handful of the samples which were analysed do not have this igneous signature, such as some plaster and terracotta fragments, which appear to have an elemental signature more in line with sandstone, and some limestone pieces which have low concentrations of metal. Some Green Ware samples could have a metamorphic origin, as indicated by their texture.

Tables 4 and 5 show average elemental concentrations in some sedimentary rock types (shales, sandstones, carbonates) and in igneous rocks. It is worth noticing the higher levels of Ti in mafic rocks and Co in ultramafic rocks (**Table 5**), compared to the levels in sedimentary rocks (**Table 4)**. The sedimentary rock type "shale" may exhibit relatively high titanium concentrations, but has relatively low cobalt concentrations.

Comparison of measured titanium and cobalt concentrations with the table (**Table 5**) indicates a mafic/ultramafic signature. Mafic rocks are volcanic or magmatic, magnesium and iron rich igneous rocks, such as basalt, dolerite and gabbro, which contain a large proportion of dark minerals (e.g. olivine, amphibole, pyroxene and biotite). Ultramafic rocks contain even higher concentrations of iron and magnesium and low silica content (< 45%). Mafic and ultramafic rocks are not believed to occur in the local geological landscape at Jerash, which consists primarily of sandstones and limestone bedrock; it is unlikely that the observed Ti and Co concentrations originate from these sandstones or limestones. However, volcanic regions are found north of Jerash, and are perhaps the origin of the igneous signature. It is possible that volcanic minerals were transported fluvially along the local river, and deposited along the riverbeds in Jerash. Another option is that these are imported materials/artefacts.

The measured concentrations do not

Table 4: Rough average concentrations of selected minor elements in shales, sandstones, and carbonate rocks (in parts per million): (Basedon: Values from Kraus Kopf and Bird, 1995).

	Shales	**Sandstones**	**Carbonates**
Mn	850	1-100	1100
Ti	4600	1500	400
Pb	20	7	9
Co	20	0.3	0.1
Cu	50	1-10	4
Ni	80	2	20
Zn	90	16	20
Zr	180	220	19
As	10	1	1
Sr	400	20	610

Table 5: Rough average concentrations of ions of selected elements in igneous rocks (in parts per million): (Basedon: Values from Kraus Kopf and Bird, 1995).

	Ultra-mafic rocks	**Mafic rocks**	**Intermediate rocks**	**Felsic rocks**
Fe^{2+}& Fe^{3+}	99000	86000	59000	27000
Mn^{2+}	1500	2000	1200	600
Ti^{3+}	300	9000	8000	2300
Pb^{2+}	<1	8	15	20
Co^{2+}	200	45	10	5
Cu^{+}	20	100	35	20
Ni^{2+}	2000	160	55	8
Zr^{4+}	30	100	260	180
Sr^{2+}	10	440	800	300

completely mimic the average values for mafic and ultramafic rocks listed in Table 5, as significant compositional variations exist within the various igneous rocks. One also has to take into consideration that the clays which have been analysed may be composed of a mixture of different rock types. In general, relatively high concentrations of cobalt, nickel (Ni) and zinc (Zn) are indicative of mafic rocks. Nickel is not abundant in the analysed pottery and in most cases it falls below the scanner's limit of detection (**Table 3**). Furthermore, cobalt concentrations are often higher in the analysed pottery than the average values for mafic and ultramafic rocks. However, high Ti and Co concentrations are solid indicators of an igneous rock signature. This is also supported by the fact that some of the analysed pottery fragments are composed of darker clay than that of most Jerash pottery.

Sculptural Fragments

Two sculptures found respectively during the 2011 and 2013 campaigns were analysed by XRF. The first was a marble sculpture (1), depicting Artemis[68], which had red/brown colouring on the surface in areas belonging to the clothing. The second was a limestone sculpture (2), which also contained red/brown colouring on some surface areas, also belonging to the clothing[69].

(1) The Artemis sculpture had low metallic concentrations, which is typical of pure limestone, such as this marble. Iron-content was slightly higher in certain areas, which could indicate the use of an iron-based colour, such as red ochre.

(2) The limestone sculpture had relatively high iron, nickel, zinc and silver concentrations. The type of limestone is not known. There is some variation in the concentrations of the elements mentioned above, which possibly indicates that the surface colouring contains these elements.

Metal Artefacts

The analysed metal artefacts were all, apart from one sample, composed of almost pure iron.

Conclusions

This study provides an overview for some of the compositional variations which exist in the artefacts found in Jerash:

Based on the sample size selected, the clay objects can be divided into three elemental signatures: sandstone, limestone and igneous rock signatures. This indicates the use of different rock types for pottery/ceramic production.

It was hoped that this study could not only identify the range of materials used for production of pottery and metal objects in Jerash, but also the provenance of these materials. However, it became apparent that in order to make sound conclusions on provenance, a thorough petrological and geochemical study of Jerash and its hinterland is required. The origin of the igneous signature found in most of the analysed pottery can perhaps be revealed by geochemical analysis of local river sediments and volcanic rocks from the volcanic regions north of Jerash.

Analyses of the two carbonate rock sculptures are not conclusive in terms of identifying the composition of colored surfaces. Red-brown coloring on the Artemis sculpture could be red ochre, while it is unclear whether the red-brown color on the limestone sculpture contains any of the measured metals. A study of the local carbonate bedrock could perhaps shed some light on whether the carbonates have a local origin.

Chronology

Hellenistic: 332 – 63 BC
Roman: 63 BC – early 4th century AD
Byzantine: early 4th century AD – late 5th century AD
Late Byzantine: late 5th century AD – mid-7th century AD
Umayyad: 7th century AD – mid. 8th century AD
Abbasid: mid. 8th century AD – 10th century AD
Fatimid: 11th century AD – 12th century AD
Ayyubid: 12th century AD – mid. 13th century AD
Mamluk: mid-13th century AD – 15th century AD

68. Lichtenberger, Raja and Sørensen, 2017, cat. no. 146.

69. Lichtenberger, Raja and Sørensen, 2013, addendum, pl. 1.

Arrangement of the Catalogue:
Inventory number
Title
Figure
Measurements (in cm)
Munsell
Description (incl. material)
References
Date

Catalogue Abbreviations:
AE: copper-alloy (‘bronze’)
D.: depth
Diam.: diameter (in cm)
ext.: exterior
FE: iron
H.: height
int.: interior
L.: length
PB: lead
T.: thickness
W.: width
Wt.: weight (in g)

All measurements are given in cm.

Catalogue Authors
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PE – Philip Ebeling
RR – Rubina Raja
SBK – Signe Bruun Kristensen
SR – Sara Ringsborg
SK – Signe Krag

CATALOGUE

Fine Ware
Slipped Fine Ware (PE)
Eastern Sigillata A (ESA)/ (Çandalı Ware)

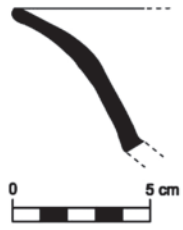
Rim
1.
J14-Ih-60-5
Bowl, rim, fragmented.
Fig. 1.
H.: 6.8; T. (max.): 0.5; (min.): 0.3.
Munsell: core: 7.5YR 7/6; int.: 7.5YR 7/6; ext.: 7.5YR 7/6; slip: 10R 4/8.
Bowl, hard fired, rather finely levigated, including a few air pockets, lime and black spots. Thick, lustrous but worn slip on int. and ext.
References: Hayes (1985), p. 39, forma 58; tav. VII, 11; p. 40, forma 60b; tav. VII, 14.
Roman (1st half of 2nd cent. AD).

African Red Slip (ARS)
Rims
2.
J14-Jd-32-191
Bowl, intact profile, fragmented.
Fig. 2.
Diam. 23; H.: 4; L.: 7.4; T. (max.): 0.4; (min.): 0.3.
Munsell: core: 2.5YR 5/8; slip: 2.5YR 5/8.
Bowl, hard fired and very finely levigated clay with only a very few lime and black inclusions, covered in a thick, lustrous, but worn slip. Rounded rim with slightly curved body and flat base.
References: Dentzer (1986), p. 247; pl. 8, no. 2; Hayes (1972), ARS Form 50, Type A; Hayes (2008), p. 220; no. 986-987; fig. 31.
Late Roman (2nd half of the 3rd – 1st half of the 4th cent. AD).

3.
J14-Jcd-32-87
Plate rim, fragmented.
Fig. 3.
Diam.: 16; H.: 2.6; L.: 8.8; W.: 4; T.: 4.
Munsell: core: 10R 4/6 – 10R 5/6; slip: 10R 4/6.
Plate, hard fired and rather finely levigated clay with some lime and a few black and reddish brown inclusions. Slipped on both sides.
References: Hayes (1992), pl. 43, no. 28; Hayes (2008), p. 219, no. 976 (P21685), fig. 31.
Late Roman (Late 3rd – early 4th cent. AD).

Local Fine Ware
Rims

4.
J14-Jcd-32-65
Bowl, rim, fragmented.
Fig. 4.
Diam.: 28; H.: 3.1; L.: 7.9; T.: 0.6.
Munsell: inner core: 2.5YR 5/8; outer core:

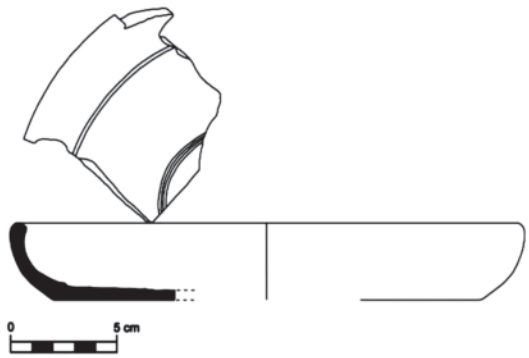


1

2

3

4



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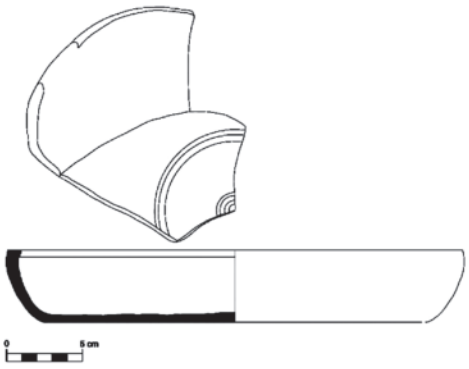


6

7.5YR 5/3; ext.: 2.5YR 5/6; int.: slipped: 10R 5/4.
Bowl, imitating ARS. Hard fired and medium finely levigated clay including many lime inclusions, some smaller stone grits and a few quartz particles. Thick but worn slip covering the surface.
References: shape: Dentzer (1986), p. 247; pl. 8, no. 2; Hayes (1972), ARS Form 50, Type A; Hayes (2008), p. 220, no. 986-987; fig. 31.
Late Roman (AD 230/ 240 – AD 325).

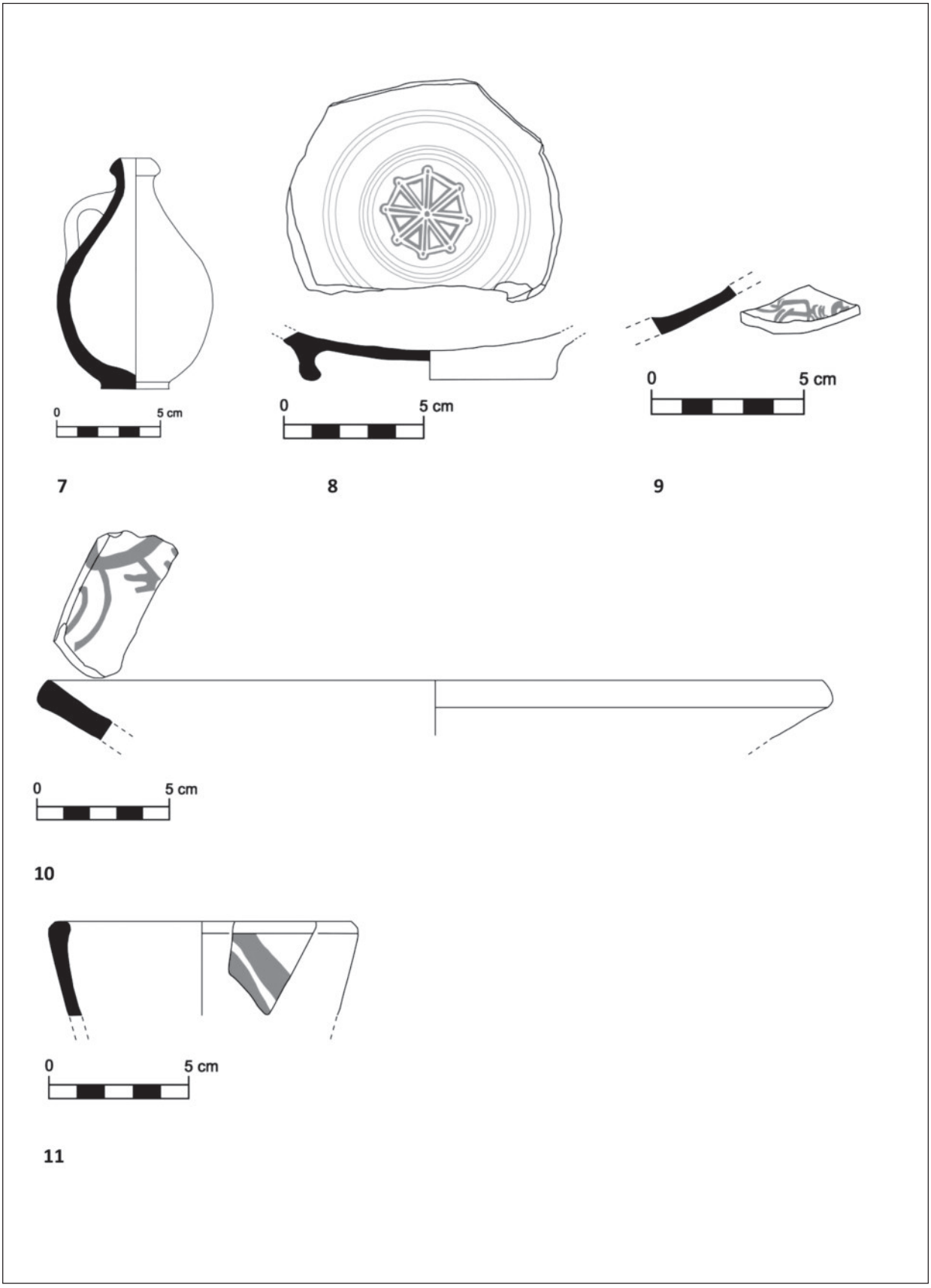
5.
J14-Jd-32-193
Bowl rim and base, fragment.
Fig. 5.
Diam.: 24; H.: 3.5; L.: 8.1; T. (max.): 0.7; (min.): 0.4.
Munsell: core: (inner): 2.5YR 5/4; (outer): 2.5YR 5/6; int.: 5YR 6/6; ext.: 2.5YR 5/6; slip: 5YR 4/3.
Bowl, imitating ARS form. Hard fired and medium finely levigated clay including air pockets, many lime, some quartz and occasionally black spots.
Flat base and rounded, thickened rim. Covered in a thin, matt and worn slip. Two incised circular grooves close to centre and a little ledge at the connection between rim and base.
References: Rasson (1986), p. 67, no. 2; fig. 17; Shape: Hayes (1972), ARS, Form 181.
Late Roman (3rd cent. AD).

6.
J14-Jd-32-163
Bowl rim, base, fragmented.
Fig. 6.
Diam. (max.): 30; H.: 4.8; L.: 14.9; T.: 0.6.
Munsell: core: 2.5YR 5/8; int.: 10R 5/8; ext.: 2.5YR 6/4; slip: 10R 5/8.
Bowl, local imitation of ARS. Hard fired and finely levigated clay including a few lime spots partly erupted during firing. Covered in a thick matt slip. Inwards rounded rim, flattened on top, with triple incised grooves surrounding the centre of the base. Ca. 4 cm from the centre another set of two incised concentric grooves are seen.
References: Shape: Uscatescu (1992), p. 246, no. 114; fig. 44; Parker (1994), p. 385f.; fig. 5.
Late Roman – Early Byzantine (1st half of the 4th cent. AD).

7.
J14-Jd-32-99
Juglet, almost intact.
Fig. 7.
Diam. (max.): 7.8; (base): 3.4; H.: 11.1; L.: 7.8; T.: 0.4.
Munsell: core: 7.5YR 8/4; int.: 7.5YR 8/4; ext.: 10YR 8/3; slip: 7.5YR 4/1.
Juglet, hard fired and rather finely levigated clay including a few air pockets, some lime spots. Covered in a thin, matt but worn slip. Two pieces (one handle and quite intact body, standing on a flat disc base) forming an almost complete juglet, with some burning on ext.
References: (resemblance in shape, but smaller) Uscatescu (1992), p. 257, no. 440; fig. 78; (form of the lip) Uscatescu (1992), p. 257, no. 445; fig. 78; (slight resemblance) Palumbo *et al.* (1993), fig. 9, no. 1.
Roman.

Painted Fine Ware (PE)
Jerash Bowls

Base
8.
J14-Jb-8-16A
Base, fragmented.
Fig. 8.
Diam.: 9; H.: 1.5; L.: 9.7/ 7.2; T.: 4.8.
Munsell: core: 5YR 6/8; int.: 5YR 6/8; ext.: 5YR 6/8.
Hard fired and finely levigated clay including some air pockets, a few black and red-brown spots. Stamped octagonal motif in centre, evocative of a spider web, which is surrounded by concentric circles. Covered in lime.
References: deco.: The deco. is known as a common motif for painted Jerash Bowls. See: Uscatescu (1992), fig. 26, no. 19C; fig. 48, no. 152; Watson (1989), Motif IIb-1, p. 252; fig. 7, no. 2.
Shape, ring base: Uscatescu (1996), p. 251, no. 239; fig. 59; Uscatescu (1995), p. 398, no.: 17; fig. 16; General shape, except the ring base, imitates: Hayes (1972), ARS Form 105, 2; 17.
Late Byzantine – Early Umayyad (Late 6th – 2nd half of 7th cent. AD).


0
5 cm
7
0
5 cm
8
0
5 cm
9
0
5 cm
10
0
5 cm
11

Body
9.
J14-Kb-78-2
Body, fragmented.
Fig. 9.
L.: 3.33; H.: 3.17.
Munsell not available.
Body fragment of a Jerash Bowl. Hard fired and finely levigated clay, with some lime inclusions. Deco.: Painted fine lines in dark red on a pale whitish background may resemble a bird.
References: deco. technique: Uscatescu (1996), p. 251, no. 263; fig. 62; (for an example of the deco. technique on a pale-ocre background) Uscatescu (1996), p. 249, no. 183; fig. 53; p. 251, no. 264; fig. 62.
Late Byzantine.

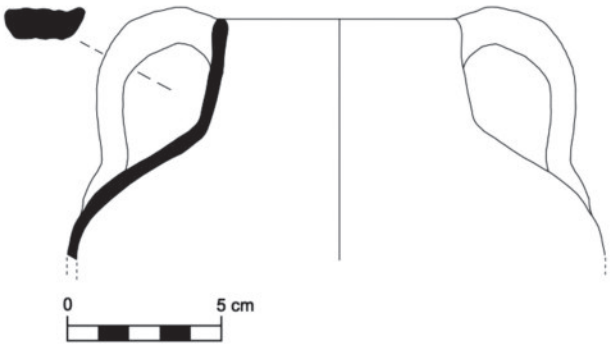
Other Painted Fine Wares

Rims
10.
J14-Kh-3-490
Bowl rim, fragmented.
Fig. 10.
Diam.: 30; H.: 2.3; L.: 5.5; T.: 1.
Munsell: core: 5YR 6/9; int.: 10YR 8/3; ext.: 5YR 6/6; deco.: 2.5YR 5/6.
Bowl, hard fired and finely levigated clay. Flat rim fragment, painted deco. on ext.: two red half circles, hanging down from rim top like garlands, under them red connected lines (floral motif?).
References: deco.: Uscatescu (1996), p. 188, no. 9b,d; fig. 26, no. 9a, b, d; p. 189, no. 13a, 14c, 14d; fig. 26; Shape: Uscatescu (1996), p. 249, no. 196; fig. 54.
Late Byzantine – Umayyad.

11.
J14-Kg-3-381
Jug rim w. handle, fragmented.
Fig. 11.
Diam.: 8; H.: 8.19; L.: 8.78; T. (min.): 0.343; (max.): 0.531.
Munsell: core: (inner): GLEY1 5/N; (outer): 2.5YR 6/8; int.: 2.5YR 6/8; ext.: 2.5YR 5/4; deco.: white 7.5YR_/ 8.5/.
Jug, hard fired and medium finely levigated clay, occasionally including air pockets. Rounded rim with flat handle vertically attached. White deco. on ext.: wavy lines on body, diagonal lines on rim, forming no distinctive motif.
References: Ball *et al.* (1986), fig. 1, 6; Clark (1986), p. 251, no. 8; fig. 21; pl. XVII, 2; Schaefer and Falkner (1986), fig. 12, 2.
Umayyad (8th cent. AD).

Red Painted Pale Ware
12.
J14-Kh-3-549
Bowl rim, fragmented.
Fig. 12.
Diam.: 11; H.: 3.3; L.: 3.3; T.: 0.4.
Munsell: core: (inner): 7.5YR 6/4; (outer): 7.5YR 7/4; int.: 7.5YR 6/4; ext.: 10YR 7/2; deco.: 2.5YR 5/4.
Hard fired and medium finely levigated clay, including a few air pockets. Wheel-made rim fragment with red painted deco. on ext.: two thick, diagonal lines.
References: deco.: Walker (2012), p. 517; fig. 4.4, no. 20; p. 510-511; fig. 4.1, no. 27; fig. 4.2, no. 1; Rasson and Seigne (1989), p. 127, no. 7; fig. 5, 5; Najjar (1989), p. 314, fig. 5, no. 4; ‘Amr (1988), p. 247-254, fig. 1, no. 7, 11; Walmsley, Macumber and Edwards (1993), p. 213, Ware II; p. 215; fig. 23, no. 3-4; shape: Gawlikowski and Musa (1986), pl. XII, second top on right column; Walker (2012), p. 512; fig. 4.1, no. 13-18; Walmsley, Macumber and Edwards (1993), p. 213, Ware II; p. 215; fig. 23, no. 3-4.
Umayyad (7th – 8th cent. AD).

13.
J14-Kh-44-25
Bowl rim, fragmented.
Fig. 13.
Diam.: 10; H.: 2.9; L.: 2.8; T.: 0.3.
Munsell: core: 7.5YR 6/4; int.: 7.5YR 6/4; ext.: 10YR 7/4; deco.: 10YR 4/3.
Bowl, hard fired and rather finely levigated clay, including a few air pockets. Flattened rim fragment with red painted zig-zag lines.
References: deco.: Walker (2012), p. 517; fig. 4.4, no. 20; Najjar (1989), p. 312; fig. 5, no. 4. Rasson and Seigne (1989), p. 127, no. 7; fig. 5, 5; Walmsley, Macumber and Edwards (1993), p. 213 Ware II; p. 215; fig. 23, no. 3-4; Walmsley, Macumber and Edwards (1993), p. 213, Ware II; p. 215, no. 3-4; fig. 23; shape:



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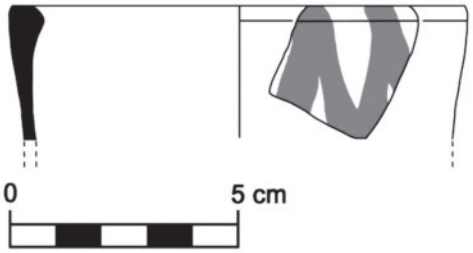

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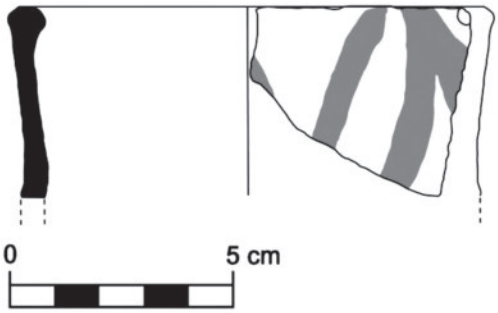

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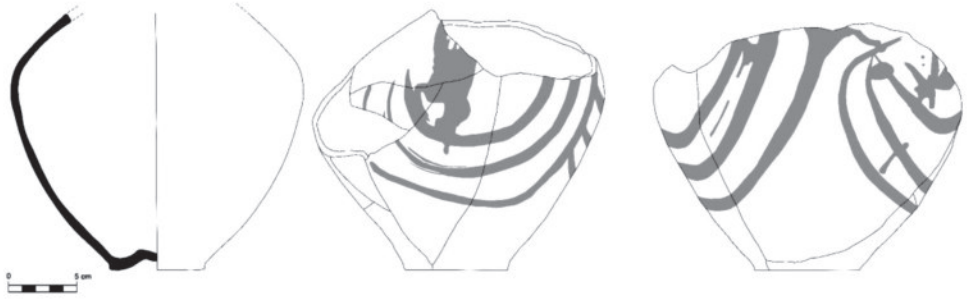

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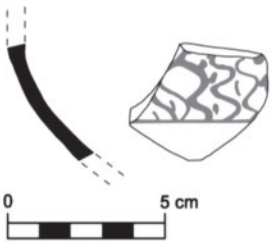

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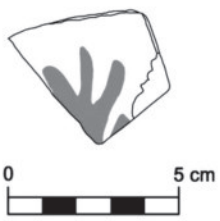

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Walker (2012), p. 512, no. 13-16; fig. 4.1; Gawlikowski and Musa (1986), pl. XII, second top on right column; Walmsley, Macumber and Edwards (1993), p. 213, Ware II; p. 215, no. 3-4; fig. 23.
Umayyad (7th – 8th cent. AD).

14.
J14-Kh-3-439
Bowl rim, fragmented.
Fig. 14.
Diam.: 10.6; H.: 4.25; L.: 4.8; T. (min.): 0.3; (max.): 0.7.
Munsell: core (inner): 10YR 7/4; (outer): 7.5YR 7/6; int.: 7.5YR 7/4; ext.: 7.5YR 7/6; deco.: 10R 4/4; wash: white 2.5Y_/18/.
Crispy fired, medium fine levigated clay, including some air pockets, many lime (a few erupted) and many brown spots. The thin, matt and worn red paint is put onto a matt and worn white wash which is covering the surface.
References: deco.: Walker (2012), p. 517; fig. 4.4, no. 20; p. 510-511; fig. 4.1, no. 27; fig. 4.2, no. 1; Rasson and Seigne (1989), p. 127, no. 7; fig. 5, no. 5; Najjar (1989), p. 312, fig. 5, 4; 'Amr (1988), p. 247-254; fig. 1, no. 7, 11; Walmsley, Macumber and Edwards (1993), p. 213, Ware II; p. 215 no. 3-4; fig. 23.
Shape: Walker (2012), p. 512; fig. 4.1, no. 13-16; Gawlikowski and Musa (1986), pl.: XII, top on right column; Walmsley, Macumber and Edwards (1993), p. 213, Ware II; p. 215, no. 3-4; fig. 23.
Umayyad (7th – 8th cent. AD).

Painted Buff Ware

Base
15.
J14-Kh-3-243
Jar, base, fragmented.
Fig. 15.
Diam. (max.): 21.4; (base): 6.8; H.: 18.8; T. (min.): 0.413; (max.): 0.576.
Munsell: core: 7.5YR 8/2; int.: 7.5YR 7/3; ext.: 7.5YR 7/4; deco.: 10R 4/1 – 5YR 6/4.
Jar with disc-base, crispy fired but rather finely levigated clay, including some air pockets; deco.: Painted brown, semi-circles intertwined and other lines crossing the semi-circles or running parallel to them. A star-like form appears in one of the semi-circles.
References: (slight resemblance in form and roughly the deco.) Gawlikowski and Musa (1986), p. 149; fig. 8, 2; (the earliest piece published with indistinct spots in any places on body) Walker (2012), p. 532; fig. 4.10, no. 5.
Umayyad (7th – 8th cent. AD).

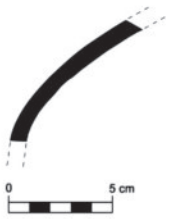
Body

16.
J14-Iac-11-8
Goblet body, fragmented.
Fig. 16.
H.: 2.8; L.: 4.6; W. (max.): 0.52; (min.): 0.47.
Munsell: core: 5YR 5/8; ext.: 7.5YR 8/4; deco.: 5YR 4/3.
Goblet, hard fired and finely levigated clay. Small stem broken off, break still visible. Wheel-made. Red-brown paint on whitish background on int. and ext.
References: deco: Dornemann (1990), p. 155; pl. III, 1, no. 10.
Umayyad (7th – 8th cent. AD).

17.
J14-Kf-3-357
Bowl body, fragmented.
Fig. 17.
L.: 4.1; W.: 4.1; T.: 0.6.
Munsell: core: 2.5YR 5/8; int.: 10YR 8/2; ext.: 10YR 7/2; deco.: 7.5YR 5/8; wash: 10YR 8/2.
Bowl, hard fired and finely levigated clay; deco. ext.: 4 light red painted lines, connected in a corner of the sherd on whitish wash.
References: deco.: Dornemann (1990), p. 155, pl. III, 1, no. 17; Walmsley, Macumber and Edwards (1993), p. 213, Ware II; fig. 23; Walker (2012), p. 532; fig. 4.10, no. 8; Joguin (2001), p. 644; fig. 7.
(Dornemann - Walker) "Umayyad, 7th – 8th cent. AD"; (Walmsley, Macumber and Edwards) "Abbasid".
Umayyad (7th – 8th cent. AD).

Red Painted Pale Ware

18.
J14-Kh-3-548 + J14-Kh-3-544
Jar, body.
Fig. 18.



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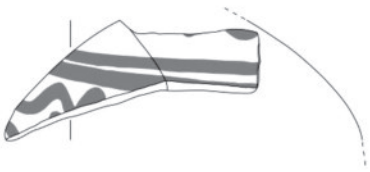

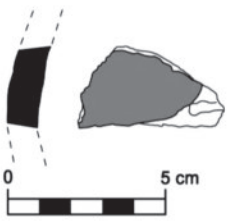

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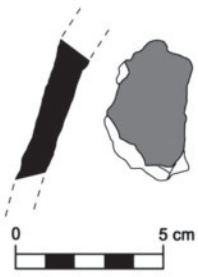

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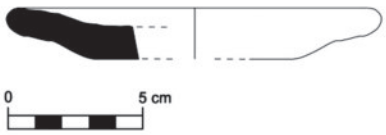

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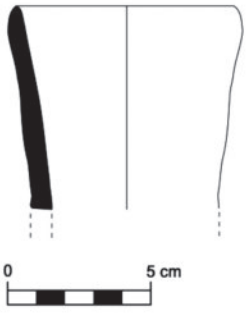

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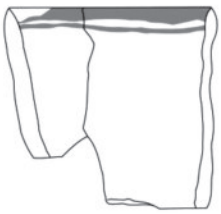


Diam.: 2.8; H.: 5.4; L.:12.2; T.: 0.8.
Munsell: core: (inner): 5YR 7/1; (outer): 5YR 7/6; int.: 7.5YR 7/4; ext.: 10YR 8/2; deco.: 2.5YR 5/6.
Pear-shaped jar. Hard fired and rather finely levigated clay, including a few air pockets. Thin whitish slip; deco.: two red horizontal lines, two wavy lines below and remains of another red paint above.
References: deco.: Walker (2012), p.517; fig. 4.5, no. 1; Smith (1973), pl: 91, C.
Shape: Walker (2012), p. 517; fig. 4.4, no. 22; Schaefer and Falkner (1986), p. 314; fig. 13, 7.
Umayyad (7th – 8th cent. AD).

Glazed Ware

19.
J14-Kh-3-441
Body, fragmented.
Fig. 19.
L.: 4.51; W.: 2.55; T.: 1.01.
Munsell: core: 5YR 8/2-5Y 8/3; glaze (int.): White 2.5Y_/18.5/; (ext.): GLEY1 5/5G_/2.
Indistinct form, medium hard fired and rather coarse clay, including some air pockets. Turquoise glaze on int. and ext.
References: Walker (2012); p. 551; fig. 4.14, no. 9; Milwright (2008), p.317, no. 13.
Late Ayyubid – Mamluk (13th – 14th cent. AD).

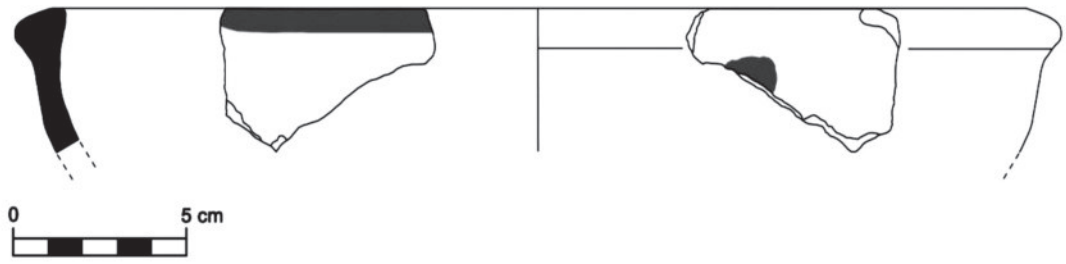
20.
J14-Kh-3-442
Body, fragmented.
Fig. 20.
L.: 5.31; W.: 2.97; T.: 0.94.
Munsell: core: (inner): 5Y 8/3; (outer): 2.5Y 8/3; glaze (int.): GLEY1 4/N; (out.): GLEY1 5/5G_/2.
Indistinct form, medium hard fired and rather coarse clay including many air pockets, a few lime and black spots. Turquoise glaze on int. and ext.
References: Walker (2012), p. 551; fig. 4.14, no. 9; Milwright (2008), p. 317, no. 13.
Late Ayyubid – Mamluk (13th – 14th cent. AD).

Handmade Geometric Painted Ware (HGPW) (CBH)

Rims
21.
J14-Icd-25-2
Plate rim, fragmented.
Fig. 21.
H.: 1.9; L.: 5.2; T.: 0.9.
Munsell: core: (inner): 10YR 5/1; (outer): 10YR 7/3; int.: 10YR 7/2; ext.: 10YR 8/2.
Plate, rounded rim, flattened base, concave sloping body; deco.: painted: dark line covering rim; int. deco.: nine horizontal lines, circulating body; ext. deco.: two horizontal lines framing a triangular pattern.
References: deco.: Franken *et al.* (1975), p. 187; fig. 26; p. 182; fig. 7.
Late Ayyubid – Mamluk (13th – 15th cent. AD).

22.
J14-Icd-29-7
Lid, fragmented.
Fig. 22.
Diam.: 12.5; H.: 4.2; L.: 12.5; T.: 1.2-1.5.
Munsell: core: 5YR 6/0; int.: 7.5YR 7/4; ext.: 2.5Y 7/3; deco.: 10R 3/2, 5YR 4/3.
Lid, convex sloping neck/body, rounded lid rim. With handle fragment attached almost in the depressions centre; deco.: Painted: ext.: thin line, triangular pattern; deco. int.: geometric pattern, five triangles part of star form, around square in centre, dark dots in some triangles; rim: broad dark line covering rim.
References: deco.: Franken *et al.* (1975), p. 182, fig. 7; p. 194; fig. 26; Shape: Franken *et al.* (1975), p. 184; fig. 16; p. 195; fig. 15; Lichtenberger, Raja and Sørensen (2013, forthcoming), fig. 35.
Late Ayyubid – Mamluk (13th – 15th cent. AD).

23.
J14-Kefg-1-60 + J14-Kg- 3N-366
Jug rim, fragmented.
Fig. 23.
J14-Kefg-1-60: Diam.: 8; H.: 7; L.: 7.3; T.: 0.6.
J14-Kg- 3N-366: Diam.: 8; H.: 5.4; L.: 4.6; T.: 0.5.
Munsell: core: 2.5Y 8/3; int.: 2.5Y 8/3; ext.: 2.5Y 8/3; deco.: 2.5YR 3/3.
Jug, slightly out sloping neck/body. Rounded, straightened rim; deco.: painted: ext.: three sections of deco. at neck; geometric-, triangular- pattern and pointed lines circulating neck, triangular pattern on neck; deco. int.: one straight horizontal line; rim: dark line covering rim.
References: deco.: Franken *et al.* (1975), p. 186; fig. 39; Lichtenberger, Raja and Sørensen



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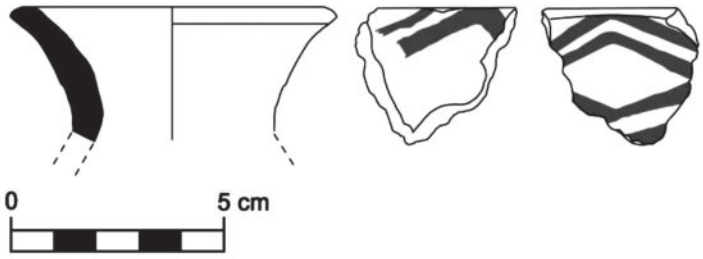

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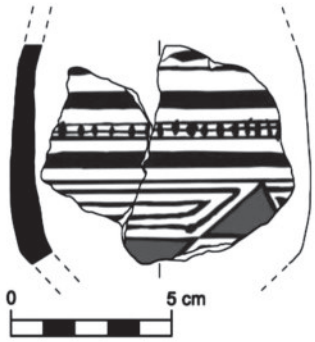


27

(2013, 2017), fig. 34; Shape: Franken *et al.* (1975), p. 189; fig. 1; p. 191; fig. 19; Thuesen (1988), p. 220; fig.3.
Late Ayyubid – Mamluk (13th – 15th cent. AD).

24.
J14-Kg-31-2
Bowl rim, fragmented.
Fig. 24.
Diam.: 30; H.: 4.1; L.: 6.
Munsell: core. 10YR 6/4; int.: 10YR 8/2; deco. slip: 2.5YR-2.5YR 6/6.
Bowl, convex sloping neck/body. Rounded rim. Deco.: Painted: ext.: thick horizontal line on upper rim; int. deco.: circular.
References: deco.: Franken *et al.* (1975), p. 184; fig. 9.
Shape: Franken *et al.* (1975), p. 184; fig. 20.
Late Ayyubid – Mamluk (13th – 15th cent. AD).

25.
J14-Kf-29-2
Jug rim, fragmented.
Fig. 25.
Diam.: 7; H.: 3.21; L.: 3.58; W.: 3.42; T.: 0.71.
Munsell: core: (inner): 10YR 7/3; (outer): 2.5YR 6/6; int.: 5YR 6/6; deco.: 10R 4/4; slip: 5YR 6/6.
Jug, inwards sloping rounded rim, with convex neck/body; deco.: painted: two parallel running lines continuously forming up- and downwards pointing obtuse angles on both ext. and int. surface.
References: deco.: Franken *et al.* (1975), p. 178; fig. 16; Shape: McQuitty *et al.* (1997-98), p. 211; fig. 8.
Late Ayyubid – Mamluk (13th – 15th cent. AD).

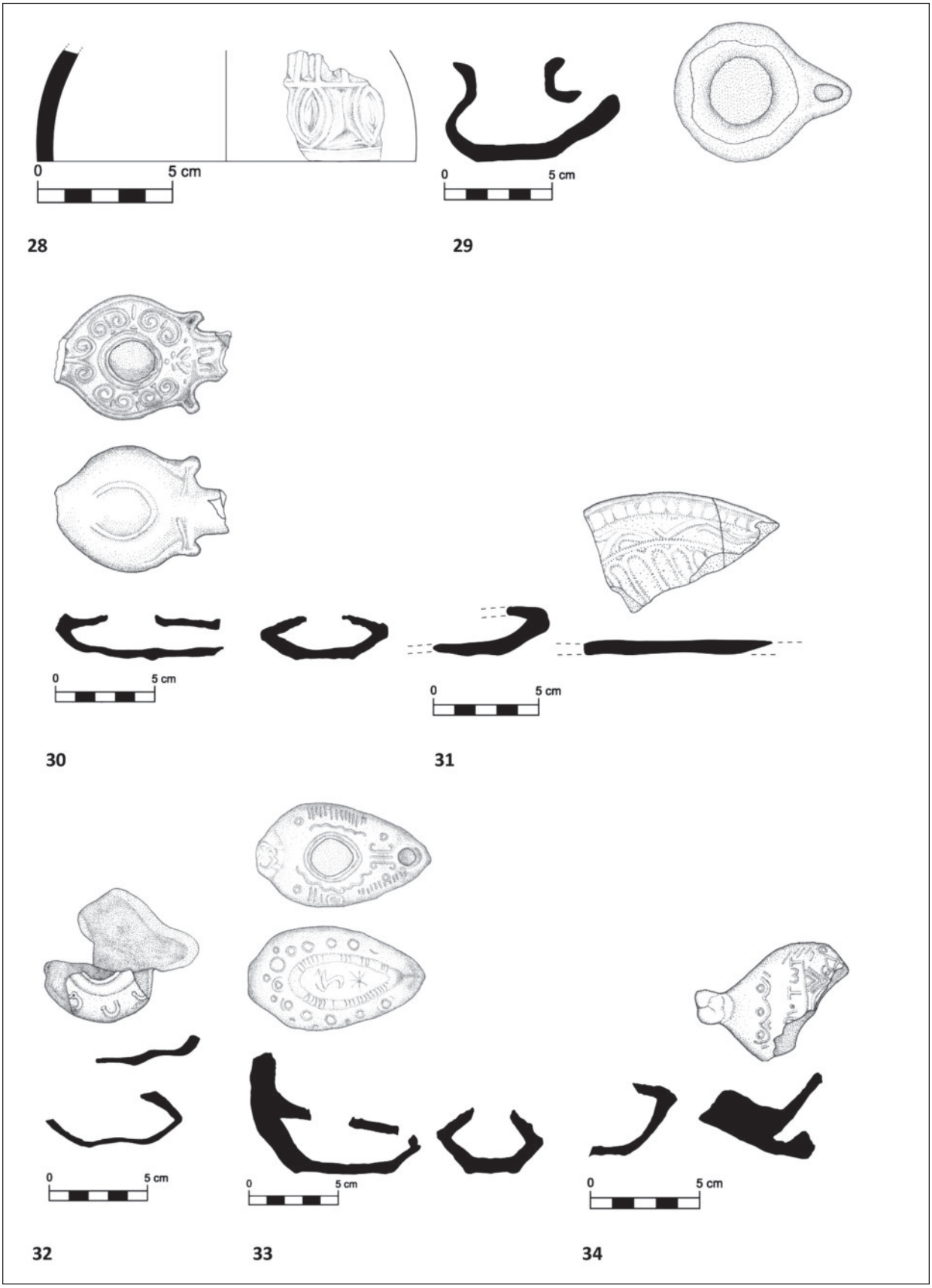
Base

26.
J14-Ic-29-1x
Jug base.
Fig. 26.
Diam.: 15; H.: 12.5; L.: 14.2; T.: 0.4.
Munsell: ext.: 2.5Y 8/3; deco.: 10R 4/3. Lime incrusted on other surfaces.
Jug, ring base concave at centre, with angular body. Oval handle fragment at one side of upper body/shoulder. Dark brown slip on white: deco. ext.: two sections, upper section in panels, divided by lines straight and wavy, containing diagonally geometric bands, with zig-zag and spiral pattern. Lower section with rectangular spiral pattern. Base: dark line covering base.
References: deco.: Franken *et al.* (1975), p. 180; fig. 7; shape: Avissar (1996), p. 170; fig. 1-2.
Late Ayyubid – Mamluk (13th – 15th cent. AD)

Body
27.
J14-Ib-13-8 + J14-Iac-11-4
Body, fragmented.
Fig. 27.
Diam. Max: 8.4; H.: 7.7; T.: 0.7
Munsell: core: 10YR 2/8; int.: 10YR 2/8.5; deco.: 2.5Y 2/9 + 7.5R 3/2.
Closed shape, presumably from neck, horizontal convex body fragment; deco.: painted: ext.: two horizontal lines. One horizontal band with small vertical lines, with three horizontal lines running over, under and in centre. A broad band. Triangular pattern; int.: white slip.
References: deco.: Franken *et al.* (1975), p. 183; fig. 5; shape: Franken *et al.* (1975), p. 197; fig. 13; McQuitty *et al.* (1997-98), p. 220; fig. 32.
Late Ayyubid – Mamluk (13th – 15th cent. AD)

Object With Cut Decoration (Lantern ?) (PE)

28.
J14-Ke-3-173
Lantern or bowl rim (?), fragmented.
Fig. 28
Diam. (base): 14; H.: 4.1; L.: 3.4; T.: 0.5.
Munsell not available.
Lantern or bowl fragment with incised decoration; hard fired, rather finely levigated clay, including a few erupted and non-erupted lime particles.
The incised deco. visible: two bands of different repetitive motives. The upper one shows a smaller ovoid with pointy ends ("eye form") in a bigger one. The band below shows a repetitive sequence of a slim, rectangular "funnel"-impression, followed by a slightly bigger one. The decorated bands are separated by a thin line in positive.
References: same ware but differently decorated: Bonifay (2004), p. 301, 2.3.9; fig. 168; Lichtenberger, Raja and Sørensen (2013),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0
5 cm
34

no. 56, Uscatescu (1996), p. 266, no. 755; fig. 108.
Late Byzantine – Umayyad.

Lamps (NSL)

Rims
29.
J14-Kef-3-239
Rim, fragmented.
Fig. 29.
H.: 4.7; L.: 6.5; T.: 0.6.
Munsell: core: 10YR 1/6; surface (int.): 5YR 4/1; (ext.): 7.5 YR 4/1.
Wheel made with outwards flattened round rim; round filling hole; oval wick hole.
References: Adler (2004), fig. 137.
Roman (1st – 3rd cent. AD).

30.
J14-Le-2-7
Rim, almost intact.
Fig. 30.
H.: 2.2; L.: 8.7.
Munsell: core: 10YR 5/2; surface (int.): 10YR 6/2; (ext.): 10YR 6/2-6/3.
Mould made with circular filling hole and base ring; wick hole not preserved; deco.: volutes around edge of body; two ears attached near wick hole with flower-like deco. in between.
References: Da Costa (2001), fig. 1, no. 5.
Roman (2nd – 3rd cent. AD).

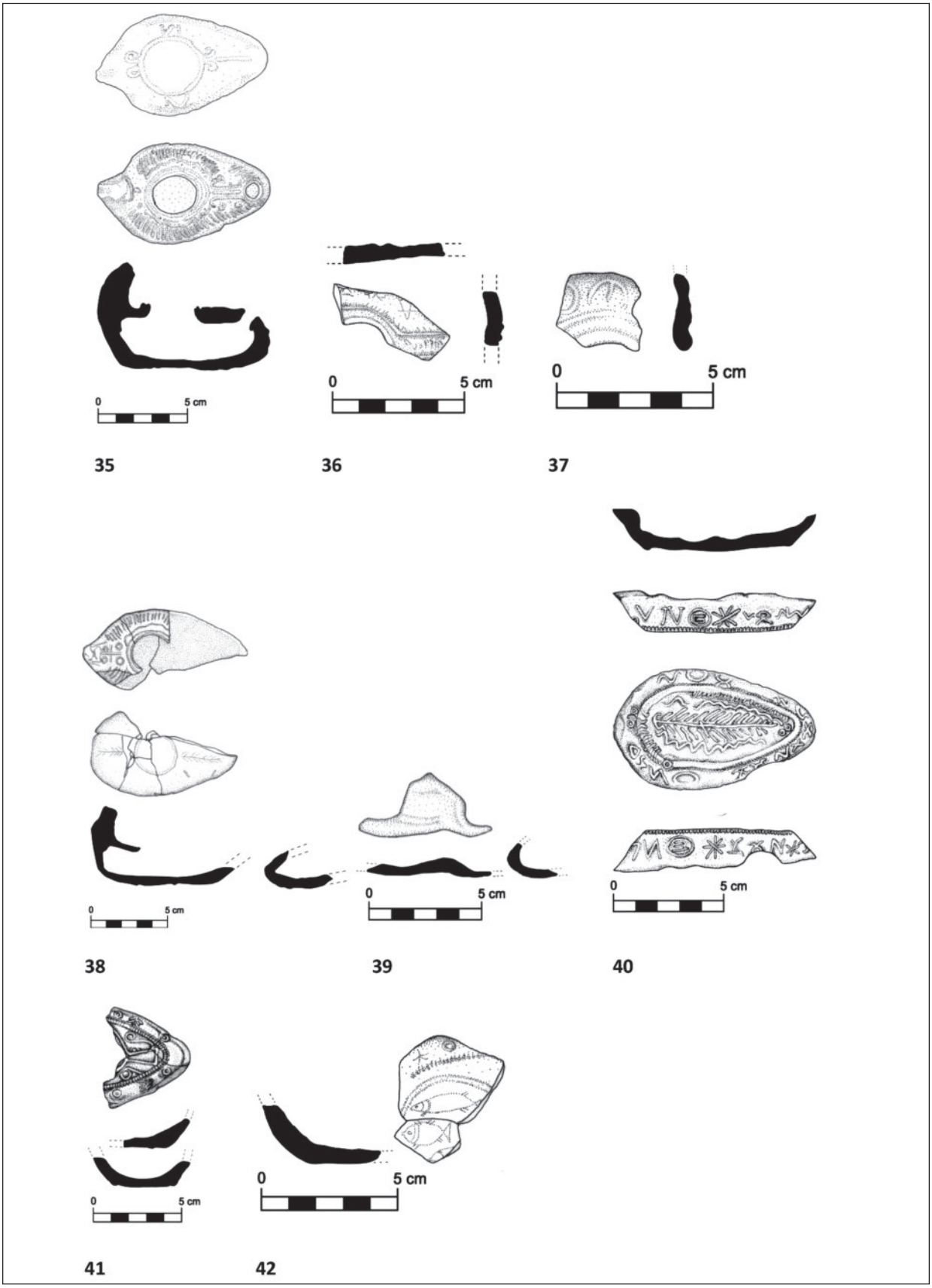
31.
J14-Jd-32-208
Rim and fill hole, fragmented.
Fig. 31.
Diam.: H.: 2.2; L.: 9; T.: 0.9.
Munsell: Not available.
Mould-made with decorative oval pattern around edge of body, on shoulder flower-like pattern; diagonal grooves towards filling hole.
References: Mlynarczyk (2013), fig. Gr 4 Q 22.
Late Roman (3rd – 4th cent. AD).

32.
J14-Jd-32-166
Rim, fragmented.
Fig. 32.
Diam. (base): 3.8; H.: 2.6; L.: 8; T.: 0.37.
Munsell not available.
Mould made with circular body, base ring, and rounded nozzle; ledge running around shoulder of body; deco.: horseshoe pattern around edge of body.
References: Kehrberg (2005), fig. 19, 22; Kennedy (1963), type 15; Da Costa (2010), fig. 3b; Zayadine (1986); pl. V, no. 19.
Late Roman – Byzantine (4th – 5th cent. AD).

33.
J14-Kc-3-202
Jerash lamp, intact.
Fig. 33.
H.: 6.6; L.: 9.4; T.: 0.6.
Munsell: core: Gley 1 2.5/10/4; surface (int.): Gley 1 4/N; (ext.): Gley 1 4/N.
Mould made with a wavy ledge on upper surface; continuous diagonal lines running around edge of body, round fill hole. Above wick hole a vertical line is flanked with volutes and two circles; two ledges around fill hole; straight zoomorphic handle and oval base ring; diagonal lines running on ring base; inside base ring, deco. of bird and star.
References: Al-Khouly (2001), fig. 4, no. 196; Khairy and ‘Amr (1986), fig. 12, 15; Day (1942), p. 65-79; pl. 12.
Late Byzantine – Umayyad.

34.
J14-Kh-3-491
Handle, fragmented.
Fig. 34.
H.: 5.5; L.: 5.6; T.: 0.4.
Munsell: core: Gley 1 3/N; surface (int.): Gley 1 4/N; (ext.): Gley 1 3/N.
Mould made; zoomorphic handle; diagonal lines running along edge of body; towards fill hole Greek letters: “T ω T” on upper surface between filling hole and handle; below letters triangular deco; below handle wavy pattern and three circles.
References: Khairy and ‘Amr (1986), fig. 15; Day (1942), pl. XIII; fig. 2.
Umayyad.

35.
J14-Kg-3-372
Hybrid Jerash lamp, intact.
Fig. 35.
H.: 5.87; L.: 9.61; T.: 0.7.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0 5 cm
36
0 5 cm
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0 5 cm
38
0 5 cm
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0 5 cm
41
0 5 cm
42

Munsell: core: 5YR 6/6; surface (int.): 5YR 5/3; (ext.): 2.5YR 5/6-5YR 5/3.
Mould made and on upper surface diagonal lines are running around edge of body; one ledge and one wavy line encircling the fill hole; small handle with squeezed top; base ring with volutes on each side of base towards filling hole and handle; letter "N" on each side of upper base. The lamp combines an upper part of a Jerash Lamp (without the 'cross') with an Umayyad/Abbasid lamp base.
References: Kehrberg (2005), fig. 64; Da Costa (2001), p. 255, fig. 2; Zayadine (1986), pl. VI, no. 11.
Umayyad (8th cent. AD).

36.
J14-Kc-3-152
Rim, fragmented.
Fig. 36.
H.: 1; L.: 4.6; T.: 0.55.
Munsell: core: 2.5 YR 6/8; surface (int.): 2.5 YR 6/8; (ext.): 5 YR 6/6.
Mould made, channel nozzle lamp; deco.: stars on upper side; diagonal lines on top of channel nozzle; Ledge running around fill hole.
References: Al-Khouly (2001), fig. 1, no. 196; Khairy and 'Amr (1986), fig. 9.
Umayyad (7th – 8th cent. AD).

37.
J14-Lh-9-22
Rim, fragmented.
Fig. 37.
H.: 1.7; L.: 6.2; T.: 0.4.
Munsell: core: 7.5YR 7/4; surface (int.): 7.5YR 6/4; (ext.): 7.5YR 7/4-7/6.
Mould made; fragment of upper part; deco: two ledges around fill hole; "ω"-pattern running around edge of body.
References: Day (1942), pl. 6, fig. 1; pl. XIV, fig 1; Kennedy (1963), pl. XXVIII, fig. 761; Khairy and 'Amr (1986), pl. XLI, fig. 12.
Umayyad (7th – 8th cent. AD).

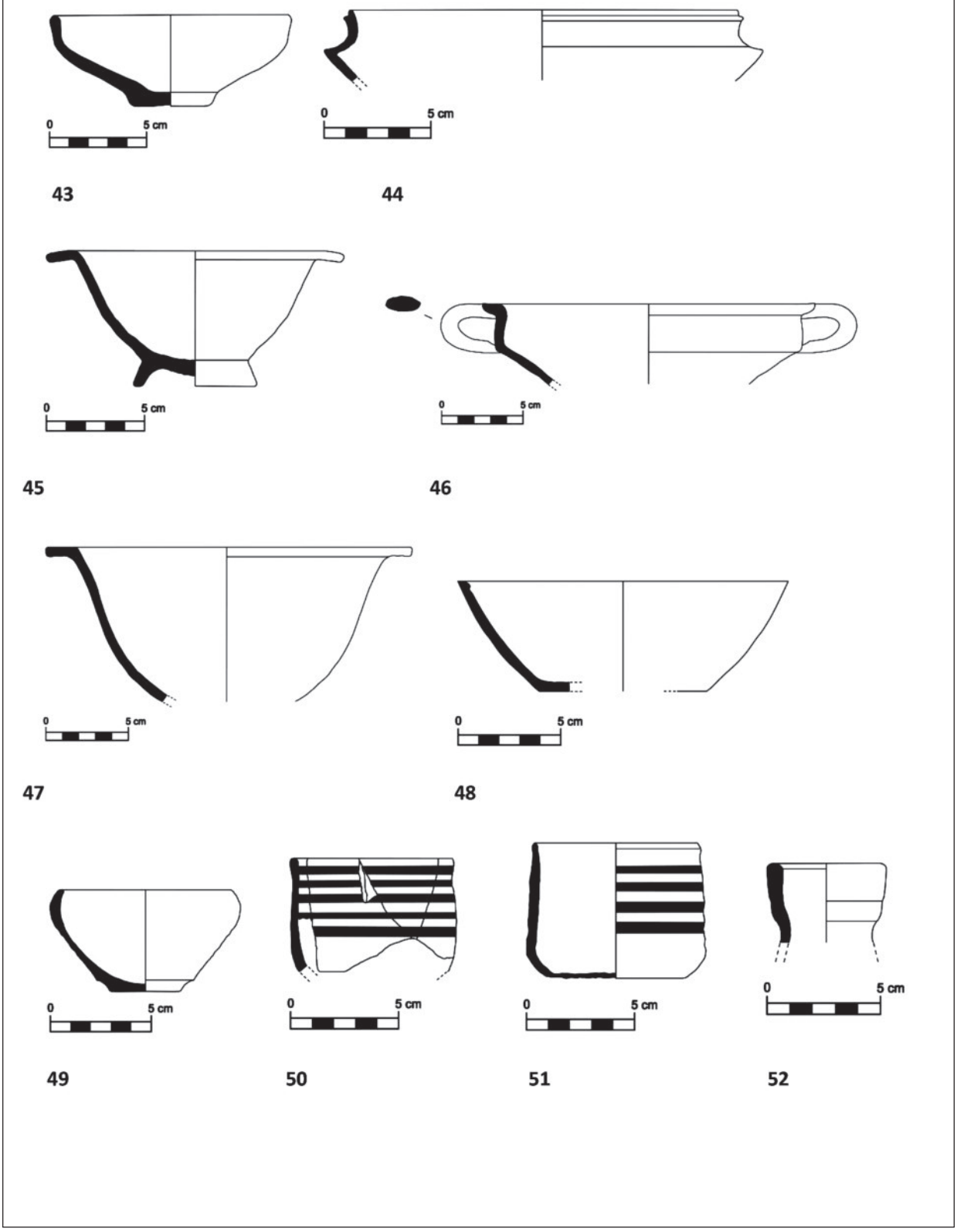
38.
J14-Ke-3-203
Jerash lamp rim, fragmented.
Fig. 38.
H.: 5.2; L.: 9.2; T.: 0.7.
Munsell: core: 5YR 3/3; surface (int.): 5YR 6/4; (ext.): 5YR 7/3.
Mould made; handle: small with squeezed top; deco.: diagonal lines running around edge of body; one ledge and one wavy line encircling the fill hole; under handle "cross" and four circles; base ring; on each side of base ring two leaves.
References: Kehrberg (2005), fig. 64; Da Costa (2001), p. 255; fig. 2; Lichtenberger, Raja and Sørensen (2013), no. 53; Lichtenberger, Raja and Sørensen (2017), no. 48 and 49.
Late Umayyad (8th cent. AD).

39.
J14-Lb21-7
Rim, fragmented.
Fig. 39.
H.: 1.5; L.: 7.5; T. (max.): 0.7, (min.): 0.2.
Munsell: core: 7.5YR 8/4; surface (int.): 10YR 8/2; (ext.): 10 YR 7/3.
Mould made; round wick hole; smooth surface; traces of fire at wick hole; no deco.
References: Adler (2004), fig. 85.
Not datable.

Bases

40.
J14-Kac-3-81
Complete base.
Fig. 40.
H.: 1.8; L.: 9.2; T. (max.): 0.95; (min.): 0.15; W.: 5.27.
Munsell: core: 5YR 5/4; surface (int.): 10R 3/1; (ext.): 2.5YR 5/6.
Mould made, drop shaped base; inside the drop shaped stand ring leaf deco; diagonal lines running around stand ring; stars and Greek letters [N X] on upper side of base. Int. traces of use and fingerprints.
References: Khairy and 'Amr (1986), fig. 10.
Umayyad (7th – 8th century AD).

41.
J14-Kc-3-20+26+66
Base, fragmented.
Fig. 41.
H.: 1.5; L.: 5; W.: 5.7.
Munsell: core: 2.5YR 6/8; surface (int.): 5YR 7/8; (ext.): 5 YR 6/6-5YR 6/3.
Mould made; deco.: vase like depiction in base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ring; around edge of base: stars, leaves and circles.
References: Al-Khouly (2001), fig. 4, no. 196; Khairy and ‘Amr (1986), fig. 12, 15.
Umayyad (7th – 8th cent. AD).

42.
J14-Kg-44s-12
Base, fragmented.
Fig. 42.
H.: 2.2; L.: 4.5; T.: 0.7.
Munsell: core: 2.5YR 6/6-6/8; surface (int.): 2.5YR 7/6-6/6; (ext.): 5YR 6/6.
Mould made; deco.: at base centre two complete fish and parts of a third fish; one star and one circle on upper base part.
References: Khairy and ‘Amr (1986), pl. XLI, fig. 15; Day (1942), pl. XIV, fig. 1.
Umayyad (7th – 8th cent. AD)

Household Wares (SBK)
Table Wares
Bowls

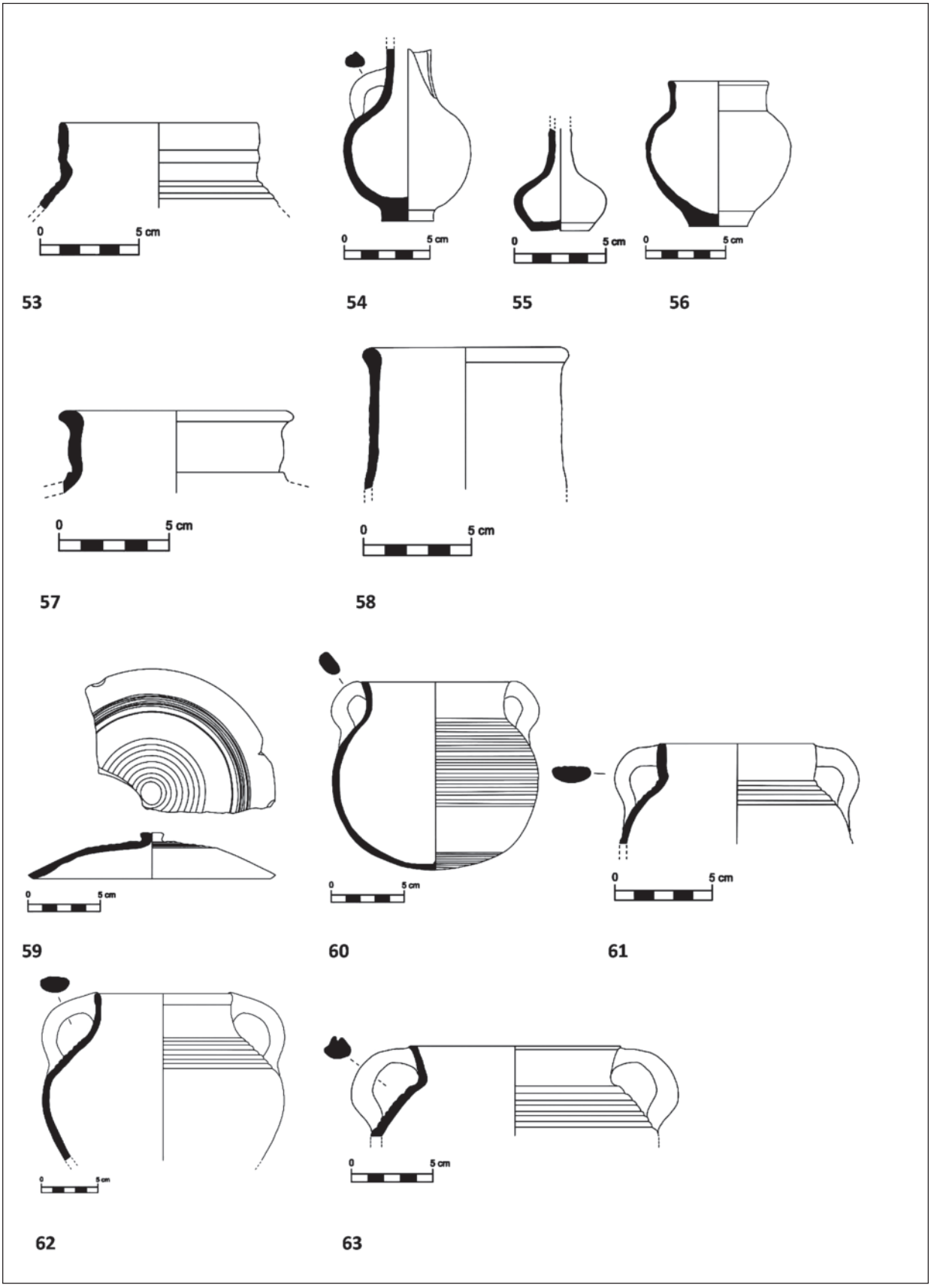
Rims
43.
J14-Jd-32-204
Bowl, almost intact.
Fig. 43.
Diam. (rim): 12.5; (base) 4; H.: 4.7; T.: 0.5.
Munsell: ext.: 2.5YR 5/6; int.: 2.5YR 5/8; slip: 2.5YR 5/6.
Bowl with rounded thickened rim, straight neck, steep, rounded body, disk base. Hard fired. Levigation: medium with air pockets; inclusions: many lime, some erupted, few quartz, some black spots. Slip: thick and covering, lustrous but worn.
References: shape: Parker (2014), p. 213; fig. 15, no. 2; Kenkel (2012), taf. 14, group 6, no. 1.4; Uscatescu (1996), p. 282; fig. 12, group V, no. 1.; slip: Gervasini (2005), p. 283; Tav. 1a, no. 3, 7; Mazar (2006), p. 367; pl. 17, no. 7; Johnson (2008), p. 21, no. 62.
Early Roman – Byzantine (1st – 5th cent. AD).

44.
J14-Jcd-32-74
Bowl rim, fragmented.
Fig. 44.
Diam.: 18; H.: 3.3; L.: 7.2; T.: 0.4.
Munsell: ext.: 2.5YR 5/6-6/4; int.: 2.5YR 6/6; core: (inner): 10YR 4/3; (outer): 2.5YR 6/6.
Bowl with outwards flaring, rounded rim. Incised groove in rim (double rim). Distinct convex shoulder, steep body with shallow ribbing, secondarily fired ext. at rim. Hard fired. Levigation: medium; inclusions: some lime and stone grits, much quartz.
References: Uscatescu (1986), p. 254, no. 322; fig. 37; p. 254, no. 323, 326; fig. 68; London (2012), p. 664; fig. 5.66, no. 126; Mazar (2006), p. 479; pl. 73, no. 3.
Roman – Byzantine.

45.
J14-Jd-32-196
Bowl, intact profile.
Fig. 45.
Diam.: 15.3; H.: 6.9; T. (min.): 0.4, (max.): 0.5.
Munsell: ext.: 2.5YR 5/8; int.: 2.5YR 7/6; core: 2.5 YR 6/8; deco.: 2.5YR 5/6.
Bowl with outwards-flattened rim, rounded body and ring base; slip covering ext. and rim. Hard fired. Levigation: Rather finely; inclusions: some lime, few quartz, many black; deco.: slip: thick and lustrous but worn.
Not datable.

46.
J14-Jd-35-5
Bowl/casserole rim and handle, fragmented.
Fig. 46
Diam.: 18; H.: 5.1; L.: 6.1; T.: 0.6.
Munsell: ext.: 5YR 6/4; int. 5YR 5/3; core: (inner): 5YR 4/3; (outer): 7YR 5/4.
Flattened rim, rounded out-turned lip. Straight neck and steep body. Vertical strap handle attached at rim and shoulder. Hard fired. Levigation: medium with air pockets; inclusions: many lime, many erupted, some black and some red-brown spots.
References: Uscatescu (1996), p. 244, no. 22-24; fig. 38; fig. 16, group XVI, no 5; Lichtenberger, Raja and Sørensen (2013, 2017), fig. 54.
Late Roman (3rd – 4th cent. AD).

Orange Ware
47.
J14-Jd-32-95
Bowl, almost complete profile.
Fig. 47.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Diam.: 22; H.: 9.4; L.: 16; T.: 0.4.
Munsell: ext.: 2.5YR 6/8; int.: 2.5YR 6/8; core: (inner): 2.5YR 5/8; slip: 2.5YR 4/6.
Bowl. Outwards flaring, flattened rim, rounded lip. Steep dome shaped body. Hard fired. Levigation: medium; inclusions: many lime, many eruptions; slip: thin, matt and worn.
References: Cowie (2007), p. 173; fig. 15.12, no. 2; Johnson (2008), p. 50, no. 160.
Roman.

Reddish/Red-Brown Ware
48.
J14-Kb-3-35
Bowl, intact profile.
Fig. 48.
Diam. base: 8; H.: 5.3; L.: 5.4; T.: 0.4.
Munsell: ext.: 2.5YR 4/1; int.: 2.5YR 5/6; core: 2.5YR 6/8.
Bowl, cut rim; straightened body and neck, ribbed body, disk base. Hard fired. Levigation: fine; inclusions: occasional lime, a few have erupted.
Not dateable.

Cups
Rims

49.
J14-Kg-3-291
Cup, almost intact.
Fig. 49.
Diam.: 7.6; H.: 5.2; L.: 7.6; T.: 0.4.
Munsell: ext.: 2.5YR 5/4; int.: 2.5YR 5/3; core: 7.5 YR 4/2; deco.: white page 10YR 2/6.
Cup with rounded rim, concave ledge under lip. Straightened neck and body, base not preserved. Five whitish horizontal lines at ext. body. Hard fired. Levigation: medium. Inclusions: many lime, some black and many red-brown spots.
References: Walker (2012), p. 510; fig. 4.1, no. 1-2; Uscatescu (1996), p. 254, no. 330; fig. 15, group XIII, no. 11a; fig. 68.
Late Byzantine – Early Umayyad.

50.
J14-Kh-3-25x
Cup, intact.
Fig. 50.
Diam. (rim): 8.26; (max.): 9.13; (base): 3.23; H.: 5.08; T. (min.): 0.40; (max.): 0.84.
Munsell: ext.: 5YR 6/4; int.: 5YR 5/3; core: (inner): 5YR 4/3; (outer): 7YR 5/4.
Rounded inwards turned rim, thickened convex shoulder, steep body. Ledge at lower body. Disk base. Hard fired. Levigation: medium with air pockets; inclusions: many lime, occasionally erupted, some black spots.
References: Uscatescu (1996), p. 254, no. 332-335; fig. 68; fig. 15, group XIII, no. 11c; Kenkel (2012), Taf. 14, group 6, no. 1.4.
Late Byzantine – Early Umayyad.

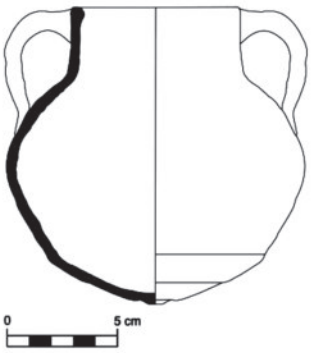
51.
J14-Kg-3s-456
Cup, intact.
Fig. 51.
Diam. (rim): 7.7; (max.): 8.68; (base): 7; H.: 6.23; T. (min.): 0.21; (max.): 0.51.
Munsell: Ext.: 2.5YR 5/6; int.: 2.5YR 5/8; core: (inner): GLEY 1 4/N; (outer): 2.5YR 6/8. deco.: White page N9/.
Rounded rim, straightened body and neck, slightly sloping inwards. Ribbed ext. surface. Disc base. Deco.: five whitish horizontal lines ext., crisp fired. Levigation: Medium with some air pockets; inclusions: abundant lime, many erupted, some quartz.
Not datable.

Jugs
Rims

Yellowish Sandy Ware

52.
J14-Kc-3-154
Jug rim, fragmented.
Fig. 52.
Diam.: 4.8; H.: 3.44; L.: 3.93; T. (min.): 0.36; (max.): 0.57.
Munsell: ext.: White 2.5Y -/2 8.5/; int.: White 2.5Y -/2 8.5/; core: 5Y 8/4.
Jug with rounded rim, straightened neck. Soft fired. Levigation: medium, some air pockets; inclusions: some tiny stone grits, and black spots.
Not datable.

53.
J14-Kc-3-63
Jug rim, fragmented.



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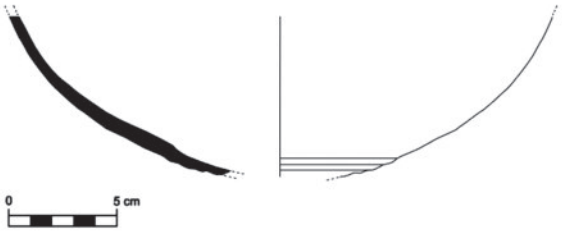

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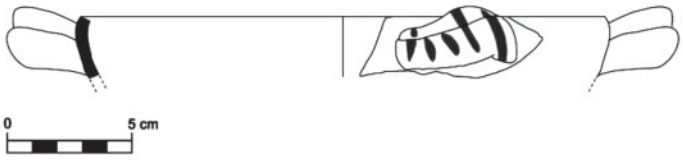

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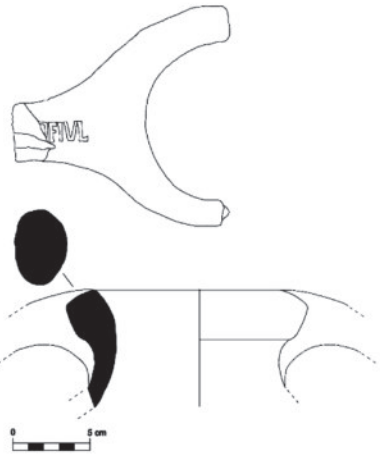

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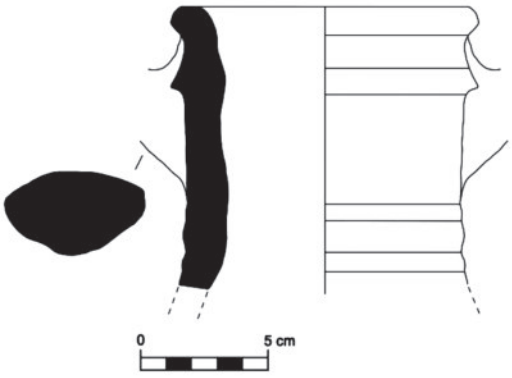


69

Fig. 53.
Diam.: 10; H.: 4.3; L.: 6.5; T. (rim): 0.47; (body): 0.45.
Munsell: ext.: 2.5YR 8/2; int.: 5Y 8/2; core: 2.5YR 8/2.
Jug with rounded rim and straightened neck. Two broad and shallow ribs circulating the neck. Slimmer and even shallower ribs at shoulder. Soft fired. Levigation: medium with air pockets; inclusions: a few lime, many small lime eruptions, a few red/brown.
References: Mazar (2006), p. 367; pl. 17, no. 5.
Not datable.

Juglets
Bases

54.
J14-Jd-32-167
Juglet, almost intact.
Fig. 54.
Diam. (base): 3; (body): 7.1; H.: 10; T.: 0.3; W.: 7.1.
Munsell: Ext.: GLEY 1 3/N; Int.: GLEY 1 3/4.
Tall, straightened neck, globular body, disk base. Handle attached at mid neck and on shoulder. Hard fired. Levigation: Rather finely; inclusions: Some lime, some erupted.
References: Kenkel (2012), taf. 20, group 29, no. 8.9, 8.10; Parker (1987), p. 593; fig. 111, no. 169; Stern (1995), p. 65; fig. 2.11, no. 5.
Early Roman – Early Byzantine.

55.
J14-Kg-39-1
Juglet, almost intact.
Fig. 55.
Diam. (base): 3.3; (max.): 5.2; H.: 5.5; L.: 5.2; T.: 0.4.
Munsell: Ext.: 7.5YR 4/3; core: 7.5YR 5/4.
Straightened, elongated neck; compressed, globular body; disk base. No handle attachment visible. Secondarily fired ext. Hard fired. Levigation: Rather finely with air pockets; inclusions: some lime, many erupted, some black and red-brown spots.
Not datable.

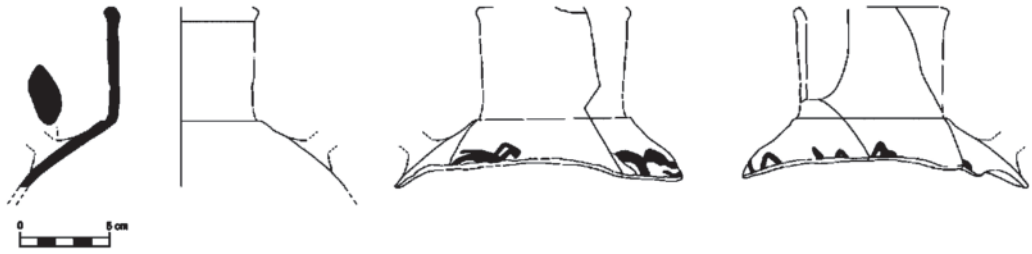
Jars
Rims

56.
J14-Jd-32-187
Handleless jar, intact.
Fig. 56.
Diam. (rim): 6.2; (base): 3.7; H.: 9.02; T.: 0.389; W.: 9.1.
Munsell: ext.: 2.5YR 5/8; int.: 10R 5/8.
Small jar with rounded rim, straightened neck, globular body, disk base. Shallow, sharp ribbed neck and body, matt ext. surface, crisp fired. Levigation: medium with air pockets; inclusions: a few lime, a few erupted, some black and red-brown spots.
References: Uscatescu (1986), p. 256, no. 425-427; fig. 17, 3A-3B; fig. 77; pl. IX, a-b; Gerber (2012), p. 288; fig. 3.28, no. 22, 31, 32; p. 250; fig. 3.19, no. 20; Frangie and Joly (2014), p. 97, fig. 14.
Late Roman – Byzantine.

57.
J14-Lb-72-3
Rim, fragmented.
Fig. 57.
Diam.: 10.6; H.: 3.2; L.: 6.9; T. (min.): 0.4; (max.): 0.7.
Munsell: ext.: 2.5YR 6/4; int.: 2.5YR 5/4; core: 2.5YR 5/4.
Jar or amphora with outwards sloping, rounded rim. Bulging neck. Convex ledge on shoulder. Hard fired. Levigation: medium; inclusions: abundant lime, occasionally erupted, some pebbles, many black spots.
References: Kenkel (2012), taf. 37, fig. 7, no. 4.7; taf. 41, group 7, no. 22.1d; Taf. 42, group 7, no. 23.5a; Zissu (2002), p. 21; fig. 13, 3-18.
Late Roman – Byzantine.

Green Ware

58.
J14-Jc-32-1
Jar/Amphora rim.
Fig. 58.
Diam.: 9; H.: 6.54; L.: 5.85; T. (min.): 0.28; (max.): 0.70.
Munsell: ext.: 5YR 7/3; int.: 7,5YR 7/4; core: (inner): 10YR 7/3; (outer): 5Y 7/3; slip: 5YR 7/6.
Bowl with outwards turned, thickened, rounded rim. Straight neck and body, hard fired. Levigation: medium with some air pockets. Inclusions: some lime, many pebbles, abundant



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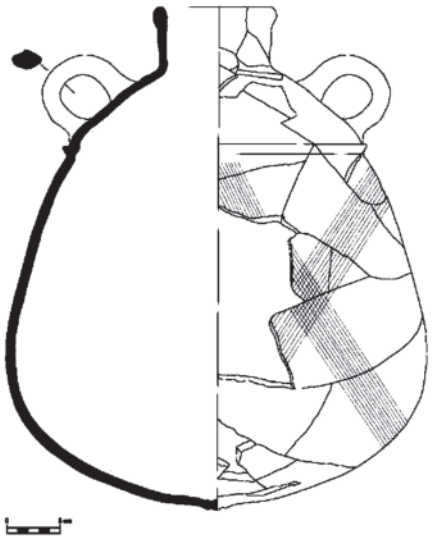

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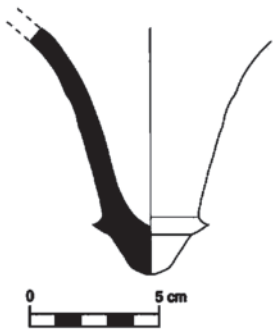

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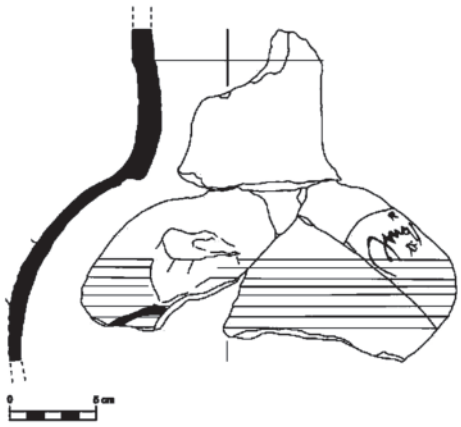

74

black spots.
Not datable.

Lids
Rims

59.
J14-Jd-32-190
Lid profile, fragmented.
Fig. 59.
Diam.: 17; H.: 3.2; L.: 14.8; T. (min.): 0.4, (max.): 0.9.
Munsell: ext.: 5YR 7/4; int.: 10R 6/8; core: (inner): 2.5YR 5/4; (outer): 2.5YR 5/4.
Lid with flattened dome shaped body, flattened/cut rim. Ribbed ext. surface. Round, cylindrically shaped knob in centre. Combed deco. on rim. Mottled surface, hard fired. Levigation: medium with air pockets; inclusions: many lime, few pebbles, some quartz, many black spots.
References: Parker (2010), p. 209; fig. 7, no.2; Gerber (2012), p.385; fig. 3.61, no. 4; p. 327; fig. 3.41, no. 3; p. 288; fig. 3.28, no. 1; McNicoll *et al.* (1992), pl. 108, no. 6.
Late Roman – Early Byzantine.

Cook Wares
Cook Pots
Rims

60.
J14-Jd-32-97
Cook pot, almost complete.
Fig. 60.
Diam.: 10; H.: 12.9; T.: 0.4.
Munsell: core: (inner): 5Y 4/4; (outer): 5Y 5/1; ext.: 5Y 4/1; int.: 5Y 6/1-4/1.
Cook pot with cut rim, incised groove on rim. S-curved neck. Globular body, ribbed at shoulder, upper body and base, leaving an un-ribbed frieze on lower body. Two oval handles attached vertically at rim and shoulder. Rounded base. Hard fired. Levigation: medium.
References: Reynolds (2014), p. 58; fig. 5, a.2; Gordon (2007), p. 167; fig. 15.8, no. 11.
Mid-1st cent. AD (Roman).

61.
J14-Jcd-32-72
Cook pot rim and handle, fragmented.
Fig. 61.
Diam.: 8; H.: 5.1; L.: 5.9; T. (min.): 0.3; (max.): 0.4.
Munsell: ext.: 10R 4/1 + 3/1; int.: 5YR 5/3; core: 5YR 5/7.
Rounded rim with inside groove at lip. Short bulging neck, ribbed globular body. Broad, compressed handle, attached at neck and shoulder. Mottled ext. surface. Hard fired. Levigation: medium with air pockets; inclusions: many lime, many erupted, some black.
References: Uscatescu (1986), p. 265, no. 716; fig. 104; pl. XIII; fig. b.
Late Roman – Byzantine.

62.
J14-Kc-3-53
Cook pot rim and handle, fragmented.
Fig. 62.
Diam. (rim): 12; (max.): 21.4; H.: 14.7; T. (rim): 0.5; (handle): 1.5; (body): 0.54.
Munsell: core: 2.5 Y 4/1; ext.: GLEY 1 4/N; int.: GLEY 1 3/N.
Cook pot with rounded, thickened rim, straight neck. Bag-shaped body, base not preserved. Traces of use over fire from shoulder to mid body. Shallow and broader ribs on lower part of body. Sec. fired, worn flaking ext. surface. Shallow carinations at handle, attached at shoulder and over folded rim. Hard fired. Levigation: rather coarse with air pockets; inclusions: a few lime, a few erupted, many pebbles, a few quartz, many black and red-brown spots.
References: Gerber (2012), p. 21; fig. 3.85, no. 21; p. 405; fig. 3.67, no. 6; Uscatescu (1996), p. 265, no. 715; fig. 103.
Byzantine – Umayyad.

Reddish/Red-Brown Ware

63.
J14-Jc-35-41
Rim, handle fragment.
Fig. 63.
Diam.: 13; H.: 5.5; L.: 15.27; T. (min.): 0.26; (max.): 0.47; W.: 10.68.
Munsell: core: (inner): 7.5YR 6/3; (outer): 2.5YR 6/8; slip: 2.5YR 4/3; ext.: 2.5YR 6/6; int.: 2.5YR 6/4.
Cook pot with cut rim, straight outwards sloping neck, ribbed sloping shoulder, indicating a

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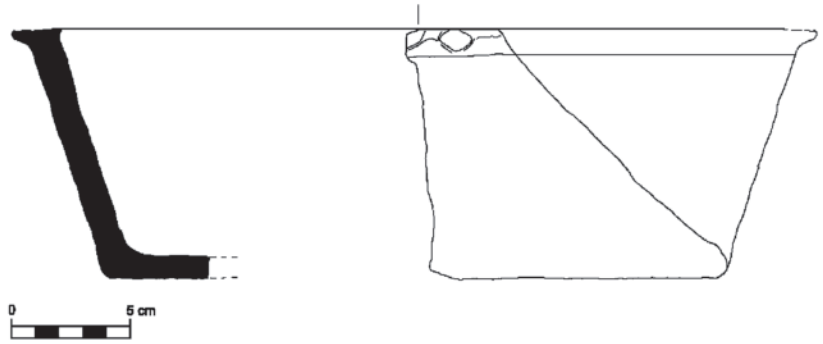

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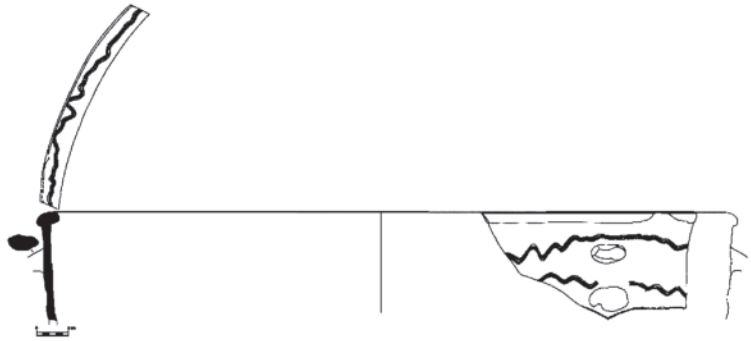

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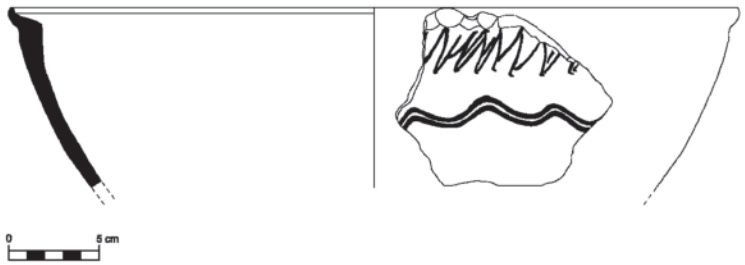

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globular body shape. Pinched handle, attached at neck and top shoulder. Hard fired. Levigation: medium, some air pockets; inclusions: many lime, some erupted, some black and a few red-brown spots.
References: shape: Parker (1987), p. 575; fig. 102, no. 99-103; p. 571; fig. 100, no. 82, 83; Gerber (2012); p. 298; fig. 3.31, no. 11; Zissu (2002), p. 19; fig. 12; Mazar (2007), p. 161; fig 15.3, no. 24.
Early Roman – Early Byzantine.

Grey Ware

64.
J14-Kh-3-444
Cook pot, almost intact.
Fig. 64.
Diam.: 7.6; H.: 13.4; T. (min.): 0.22; (max.): 0.64.
Munsell: core: (inner): 7.5YR 5/2; (outer): 7.5YR 6/1; surface (ext.): 2.5Y 2.5/1; (int.): 2.5Y 5/1.
Rounded, thickened rim, out-curving neck. Vague shoulder, ribbing on neck and body. Rounded base. Flattened vertical handle, attached at upper neck and mid body. Hard fired. Levigation: medium with some air pockets; inclusions: few lime and pebbles, many black spots.
References: Uscatescu (1996), p. 258, no.499; fig. 82; fig 20, no. 3g-11.
Late Byzantine – Umayyad.

Bases

Dark Brown Ware

65.
J14-Kc-3-160
Cook pot base, fragmented.
Fig. 65.
Diam.: (max.) 24; H.: 7.3; T.: 0.59.
Munsell: core: (inner): 10R 6/8; (outer): 5YR 5/4; surface (ext.): 5YR 5/3; (int.): 5YR 6/3.
Cook pot, lower body, base not preserved. Ribs circulating base, not lower body. Ext. surface very flaky and worn. Medium fired. Levigation: medium with air pockets; inclusions: some lime, pebbles, quartz, black and red-brown spots.
References: Kenkel (2012), Taf. 43, group 7, no. 23.9a.; taf. 63, kt. 25.
Roman – Byzantine.

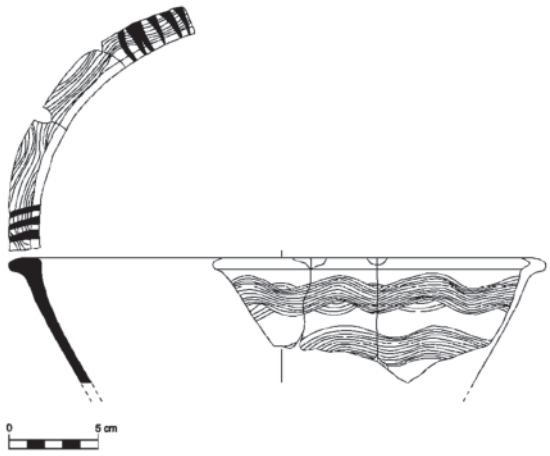
Casseroles
Rims

66.
J14-Iabcd-13-40
Casserole rim, handle, fragmented.
Fig. 66.
Diam.: 30; H.: 3.31; L.: 6.1; T. (min.): 0.58; (max.): 0.79.
Munsell: ext.: 5YR6/8; int.: 5YR 6/6; core: 2.5YR 5/8.
Casserole with rounded, thickened rim; inward sloping body. Handle: rounded, attached as vertical loop against wall; seems mostly decorative and of little practical use. Crisp fired. Levigation: rather coarse with air pockets; inclusions: few lime, many pebbles and black spots and some red-brown.
References: Lichtenberger, Raja and Sørensen (2017), fig. 105; Ferguson (2010), p. 183; fig. 6, no. 17.
Early Roman (15 BC – AD 100).

67.
J14-Kef-3s-325
Casserole rim, handle, fragmented.
Fig. 67.
Diam.: 21; H.: 2.8; L.: 7.6; T.: 0.4.
Munsell: ext.: 2.5YR 5/6; int.: 2.5YR 6/8; core: 2.5YR 6/8; deco.: 2.5YR.
Casserole with cut rim, double folded handle, inward sloping rim and body; deco.: white painted lines on handle. Inclusions: many lime and many erupted lime particles.
References: Uscatescu (1996), p. 255, no. 383-385; fig. 73; p. 255, no. 389-390; fig. 74.
Late Byzantine.

Storage Vessels (NBH)
Amphorae
Rims

68.
J14-Jd-32-173
Rim, fragmented.
Fig. 68.
Diam. (rim): 10; H.: 7.6; L.: 7.8; T.: 0.9.
Munsell: core: 5YR 6/4; int.: 10YR 7/4; ext.:



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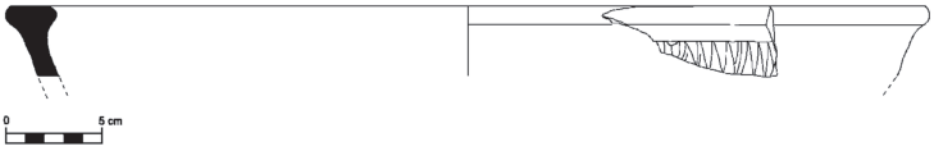

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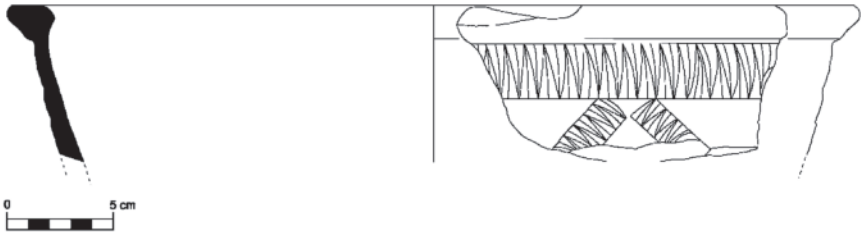

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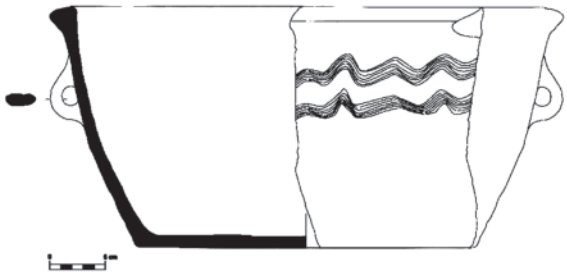


82

10YR 7/4.
Fragment of handle, attached over rim, with stamp on top: /FIVL.
References: shape: Smith (1973), pl. 44, fig. 1255.
Late Roman.

69.
J14-Kg-3s-503
Rim, fragmented.
Fig. 69.
Diam. (rim): 12; H.: 11; L.: 9.7; T. (min.): 1.2; (max.): 1.7.
Munsell: core: 5YR 5/8; int.: 5YR 7/4; ext.: 5YR 6/6.
Out-turned, thickened rim with smooth neck and circular ledge. Handle attached at ledge, presumed oval shape.
Byzantine (?).

70.
J14-Kg-3-232
Rim, fragmented.
Fig. 70.
Diam. (rim): 8.5; H.: 10.1; L.: 16.2; T.: 0.6.
Munsell: core: 2.5YR 5/8; int.: 2.5YR 6/6; ext.: 2.5YR 4/4; deco.: 2.5Y 8/2; wash: 2.5YR 4/4.
Flattened rim with handle fragment attached. White painted deco. in a wavy pattern running horizontally on body.
References: Shape: Smith (1973), pl. 44, fig. 1319; McNicoll *et al.* (1992), pl. 40, fig. 288.
Byzantine – Umayyad.

71.
J14-Kh-3-445
Rim, fragmented.
Fig. 71.
Diam. (rim): 15; H.: 8.33; T. (min.): 0.29; (max.): 1.21.
Munsell: core: 5YR 6/8; int.: 2.5YR 6/6; ext.: 2.5YR 6/8; deco.: White 7.5 _/1 8.5/.
Thickened rim with flattened vertical handle attached on shoulder. White wavy pattern deco. across shoulder and belly.
Byzantine – Umayyad.

72.
J14-Kh-32-1-3 + Kh-32-1-2
Rim, intact profile.
Fig. 72.
Diam. (rim): 10.8; H.: 47; T.: 0.6-1.
Munsell: core: (inner): 2.5YR 3/1; (outer): 2.5YR 5/8; int.: 2.5YR 5/8; ext.: 10R 5/8.
Baggy shaped amphora with intact profile. Outwards thickened rim and oval tilted handle. Baggy ribbed body and pointed base. Ledge around shoulder. White strip deco.
References: Smith (1973), pl. 85; fig. 281; Clark (1986), pl. XIII.26.
Byzantine – Umayyad.

Bases

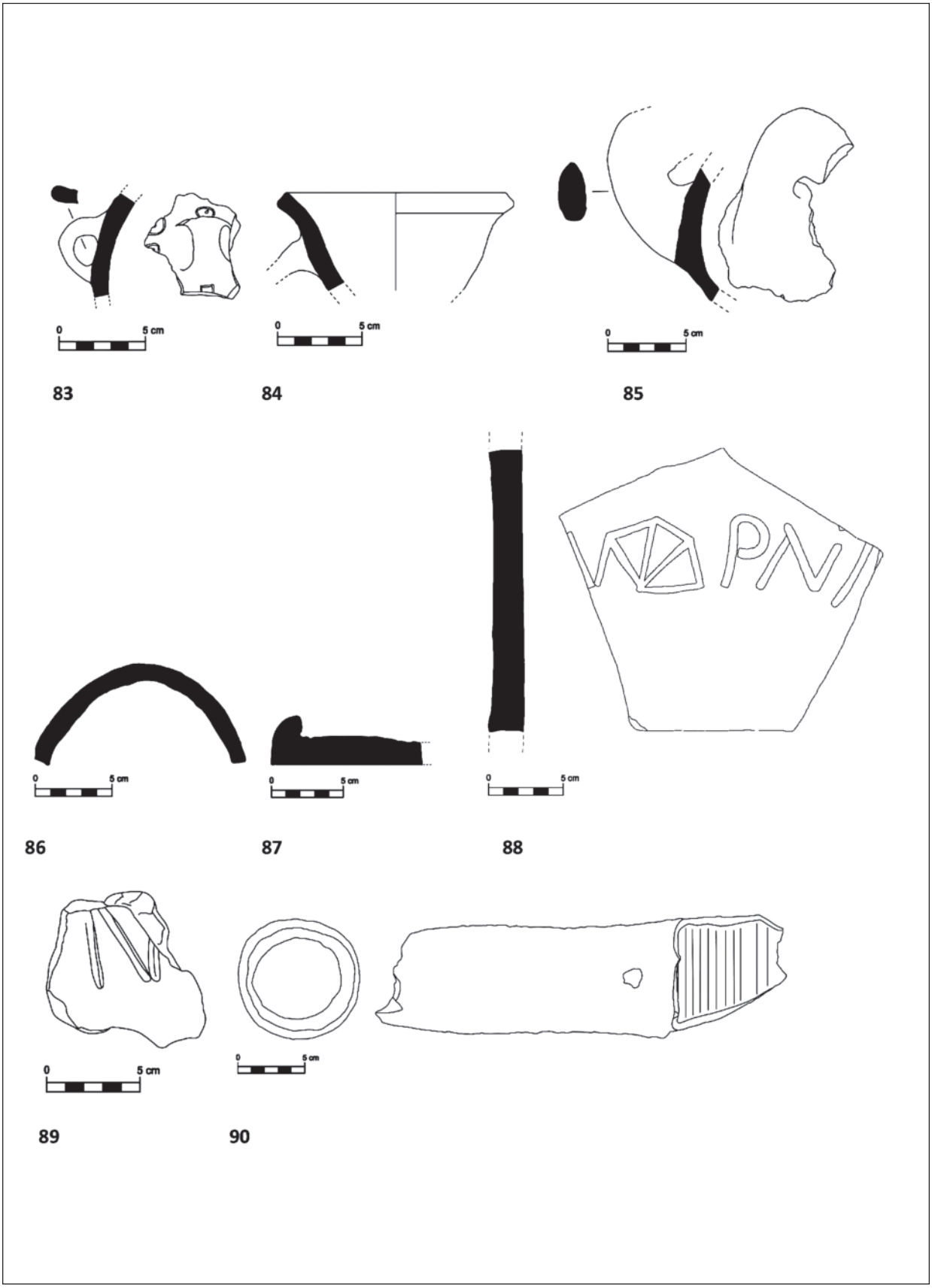
73.
J14-Jd-32-172
Base, fragmented.
Fig. 73.
Diam. (max.): 7.2; H.: 9.1; L.: 8.1; T.: 0.7.
Munsell: core: 5YR 7/4; int.: 5YR 7/4; ext.: 10YR 7/4.
Circular ledge towards the bottom; Possible LRA shape.
Late Roman.

Body

74.
J14-Jb-11-8+Jb-8-28
Body, fragmented.
Fig. 74.
Diam. (max): 25.4; (neck): 5.4; H.: 19.3; L.: 22; T. (min.): 0.8; T. (max.): 1.4.
Munsell: core: 5YR 6/6; int.: 5YR 6/6; ext.: 10YR 8/2 - 10YR 7/3; deco.: 2.5YR 5/6.
Ripples on belly and down. Handle attached on upper belly. Dipinto just below the handle in circular shape. Red dipinto above first ripple.
References: shape: Smith (1973), pl. 85. For dipinti, see: (5th – 6th cent. AD) Segal *et al.* (2013), p. 275-276; fig. 341; (8th cent. AD) Walmsley *et al.* (2008), p. 131, fig. 25.19.
Umayyad (7th – 8th cent. AD).

Basins
Handmade
Rims

75.
J14-Jc-32-3
Rim, fragmented.
Fig. 75.


0 5 cm
83
0 5 cm
84
0 5 cm
85
0 5 cm
86
0 5 cm
87
0 5 cm
88
0 5 cm
89
0 5 cm
90

Diam: 41; H.: 6.58; L.: 12.47; T. (min): 0.529; (max): 1.518.
Munsell: inner core: 5YR 4/1, outer core: 2.5YR 4/8; int: 2.5YR 5/4; ext: 10YR 5/1.
Flattened rim with finger pressed deco. below rim.
References: deco.: Smith (1973), pl. 44; fig. 1248; Lichtenberger, Raja and Sørensen (2017), fig. 104; shape: Lichtenberger, Raja and Sørensen (forthcoming a), fig. 101.
Byzantine – Umayyad (Late 5th – mid-7th cent. AD).

Grey Ware

76.
J14-Jb-10-12
Rim, intact profile.
Fig. 76.
Diam: 34; H.: 10.59; T.: 1.17.
Munsell: core: 10YR 4/1; int: 10YR 6/1; ext: 10YR 5/1.
Basin, flattened base. Flattened out-turned rim with finger made impressed decoration.
References: deco.: Lichtenberger, Raja and Sørensen (2017), fig. 114.
Byzantine – early Umayyad.

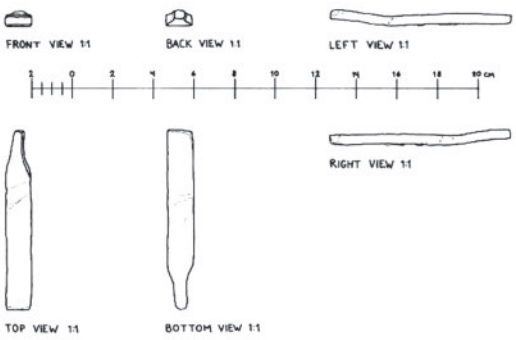
77.
J14-Kg-3-253
Rim, fragmented.
Fig. 77.
Diam: 106; H.: 16.4; L.: 31.2; T. (min.): 0.7; (max.): 3.2.
Munsell: core: 2.5Y 5/1; int: 2.5Y 6/1; ext: 2.5Y 6/1.
Basin with wheel-made, flattened rim and handmade body. Handle fragment. Wavy combed line deco. on ext. and on rim.
References: deco.: Smith (1973), pl. 44; fig. 1301, 1243. Shape: McNicoll *et al.* (1992), pl. 114; fig.
8.
Byzantine – Umayyad.

78.
J14-Kac-3-84
Basin rim, fragmented.
Fig. 78.
Diam. (rim): 40; H.: 9.4; L.: 11.9; T. (min.): 0.11; (max.): 0.77.
Munsell: core: GLEY 4/N; int.: GLEY 4/N; ext: GLEY 4/N.
Basin with flattened rim; combed and "pie crust" deco. Diagonal triangular incisions, made by a tool below rim. Two wavy lines on lower part (combed deco).
References: Clark and Falkner 1986, fig. 21.5; deco.: Smith (1973), fig. 1192; McNicoll *et al.* (1992), pl. 115; fig. 1.
Umayyad.

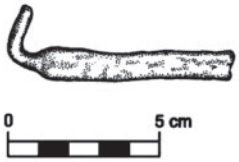
79.
J14-Kh-44-27
Basin rim, fragmented.
Fig. 79.
Diam: 30; H.: 7; L.: 17.5; T.: 0.5.
Munsell: core: (inner) 5Y 3/1; (outer): 2.5Y 7/1; int.: 5Y 3/1; ext.: 7.5YR 4/1; deco.: White Page 7.5YR _/2/8.5/.
Combed deco. ext. and on the rim. White painted lines crossing the combed grooves on the rim.
References: deco.: Smith (1973), fig. 1192; shape: McNicoll *et al.* (1992), pl. 114; fig. 8.
Umayyad.

80.
J14-Ka-3-95
Basin rim, fragmented.
Fig. 80.
Diam: 48; H.: 3.6; L.: 8.6; T.: 0.8.
Munsell: core: GLEY1 3/N; int: GLEY1 3/N; ext: GLEY1 3/N; slip: GLEY1 3/N.
Basin with flattened rim. Triangular diagonal tool made pattern under rim on ext., int. slipped.
References: deco.: McNicoll *et al.* (1992), pl. 115; fig. 1; Lichtenberger, Raja and Sørensen (2017), fig. 113; shape: Lichtenberger, Raja and Sørensen (2017), fig. 113.
Byzantine – Umayyad (Late 5th – late 8th cent. AD).

81.
J14-Kg-3s-502
Basin rim, fragmented.
Fig. 81.
Diam: 40 H.: 7.3; L.: 15.2; T. (min): 1 T. (max): 2.2.
Munsell: core: GLEY 4/N; int.: GLEY1 5/N; ext.: GLEY1 3/N.
Outturned flattened rim with finger marks


FRONT VIEW 1:1
BACK VIEW 1:1
LEFT VIEW 1:1
RIGHT VIEW 1:1
TOP VIEW 1:1
BOTTOM VIEW 1:1

91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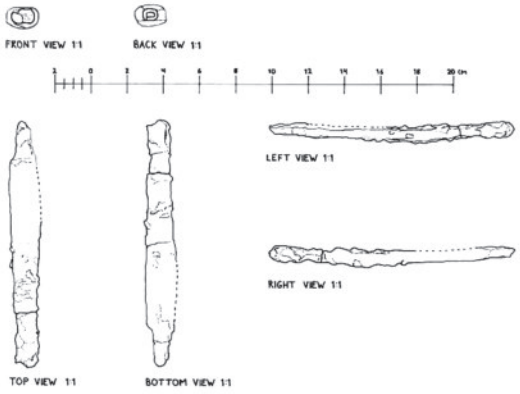
5 cm

92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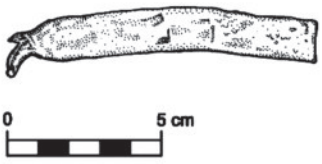
BACK VIEW 1:1
LEFT VIEW 1:1
RIGHT VIEW 1:1
TOP VIEW 1:1
BOTTOM VIEW 1:1

93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5 cm

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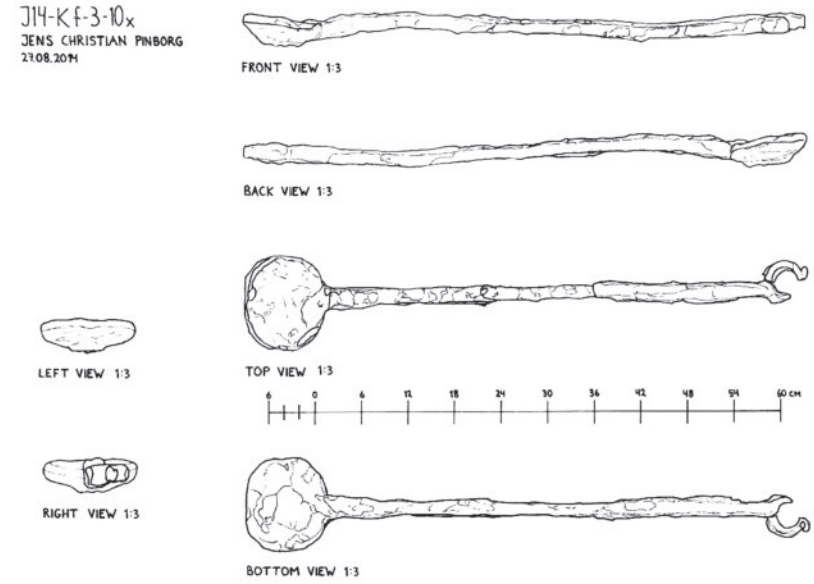

J14-K f-3-10x
JENS CHRISTIAN PINBORG
27.08.2014
FRONT VIEW 1:3
BACK VIEW 1:3
LEFT VIEW 1:3
TOP VIEW 1:3
RIGHT VIEW 1:3
BOTTOM VIEW 1:3

95

visible on interior. Triangular diagonal tool made pattern as decoration running under the rim on exterior.
References: deco. and shape: Lichtenberger, Raja and Sørensen (forthcoming b), fig. 113.
Byzantine – Umayyad (Late 5th – late 8th cent. AD).

82.
J14-Kg-40-7
Basin, intact profile.
Fig. 82.
Diam (rim): 46; (base): 30; H.: 21.6; T. (min.): 0.80; T. (max.): 1.64.
Munsell: core (inner): GLEY1 6/1; (outer): 2.5Y 6/2; int.: 7.5 YR 5/1; ext.: GLEY1 4/N.
Thickened rim. Combed decoration on exterior body. Flattened vertical handle.
References: deco.: Smith (1973), fig. 1192; shape: McNicoll *et al.* (1992), pl. 114; fig. 8.
Byzantine – Umayyad.

Handles
Grey Ware

83.
J14-Ka-18-5
Handle, fragmented.
Fig. 83.
H.: 6.10; L.: 6.39; W.: 5.51; T. (min.): 0.682; (max.): 0.729.
Munsell: core: GLEY1 4/N; int.: 10YR 5/1; ext.: GLEY 4/N.
Handmade circular flattened handle piece. Circle-dot/simple eye incised deco.
References: Smith (1973), pl. 29; fig. 313.
Byzantine – Umayyad.

Unpainted Handmade Coarse Ware (CBH)
Rims

84.
J14-Ib-13-5
Rim, jug, fragmented.
Fig. 84.
Diam.: 14; H.: 5.8; T.: 0.95-1.
Munsell: core: 7.5YR 7/4; int.: 10R 5/6; ext.: 2.5YR 5/6.
Jug, outward tilted square rim, handle attachment on neck. Suggesting handle sloping downwards. Crudely made.
References: shape: McPhillips and Walmsley (2007), p. 150; fig. 1; Franken *et al.* (1975), p. 192; fig. 31.
Late Ayyubid – Mamluk.

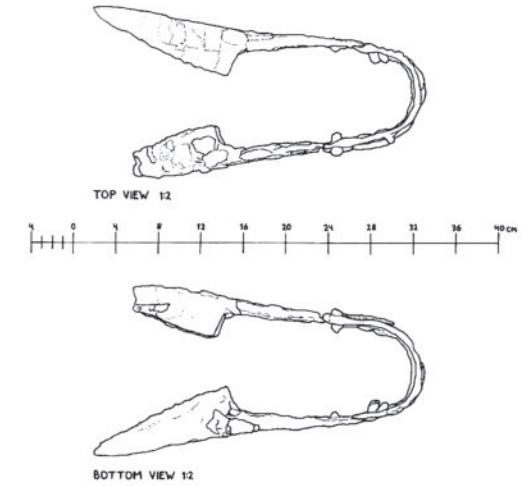
Handles

85.
J14-Ib-6-5
Elephant ear handle, fragmented, unpainted.
Fig. 85.
Diam.: not measurable; H.: 12.8; L.: 6.61; T.: 1.44; Handle W.: 5.07; T.: 1.33.
Munsell not available.
Horizontal, oval handle, elephant ear-type. Secondarily fired. Unpainted. Crudely made.
References: Shape: Walmsley-Grey (2001), p. 156; fig. 10, no. 10; Lichtenberger, Raja, Sørensen catalogue, 2013), fig. 133.
Late Ayyubid – Mamluk.

Tiles (PE)
Rims

86.
J14-Igh-37-3
Imbrex, fragmented.
Fig. 86.
H.: 9.3; L.: 12.7; T.: 1.
Munsell: core: (inner) 2.5YR 5/8; core (outer): 2.5YR 6/1; int.: 10YR 8/3; ext.: 10YR 8/3.
Hard fired and rather coarse clay, including air pockets, some lime, pebbles and many black spots. Some plaster still sticking on top.
References: Clark (1986-1), p. 317; pl. XV.
Late Roman – Byzantine.

87.
J14-Kc-3-136
Tegula, fragmented.
Fig. 87.
L.: 10.6; W.: 8.5; T.: 3.3.
Munsell: core: 2.5YR 6/4; int.: 2.5YR 7.6 – 7.5YR 6/4; ext.: 5YR 7/6.
Hard fired and rather coarse clay, including some red-brown spots, chaff and chamotte, as well as a few lime and pebbles. The drawn and rounded tegula rim is bent, running partly along the tile's long side, to be smoothed back down onto the flat top of its base again. Two finger drawn lines running along the rim as deco.



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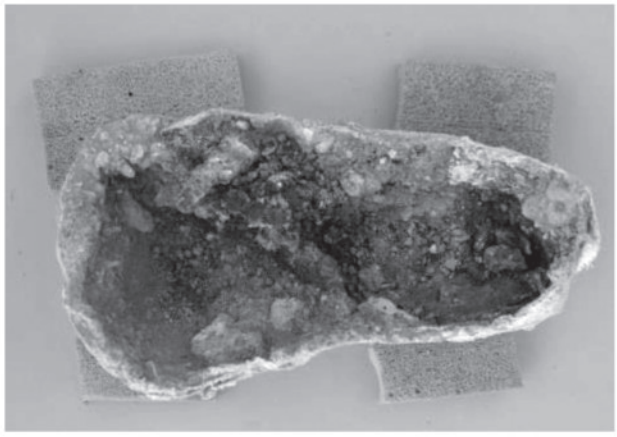

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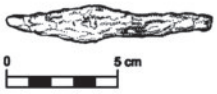

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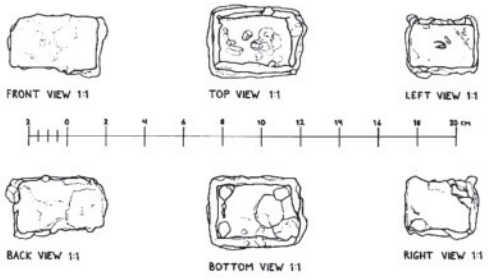

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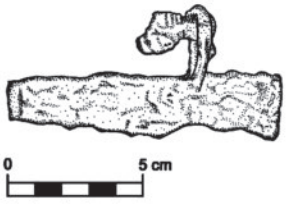

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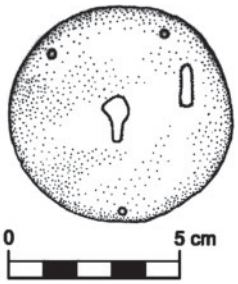


103

104

References: Melkawi, Whitcomb and ‘Amr (1994), p. 461; fig. 11, no. 1; Leonard Jr. (1987), p. 606; pl. LX, no.1, Konrad (2001), p. 119F; taf. 80, no. 7; Vriezen and Mulder (1997); p. 326f.; fig. 18, no. 17.
Late Roman – early Byzantine.

Body

88.
J14-Jd-32-174
Tile, fragmented.
Fig. 88.
H.: 18.8; L.: 21.5; T.: 1.8.
Munsell not available. Brownish/ Reddish colour.
Broken on all sides. Probably a tegula fragment, hard fired, coarse tile, including air pockets, many lime (a few erupted) and red-brown spots, as well as an abundant number of black spots. Surface mostly covered in lime.
Finger-drawn inscription still partly readable: / PN (T; I)/.
Not datable.

89.
J14-Kef-3s-331
Laterculus (suspensorium), fragmented.
Fig. 89.
H.: 5.5; L.: 7.6; W.: 7.1.
Munsell not available. Brownish/reddish colour.
Suspensorium, broken on all sides, but on top still a single finger-drawn “N” clearly visible.
References: Barnes *et al.* (2006), fig. 17, no. 1-2; Lichtenberger, Raja and Sørensen (2017), p. 119; fig. 119 (both referred pieces show the letter “K”).
Byzantine.

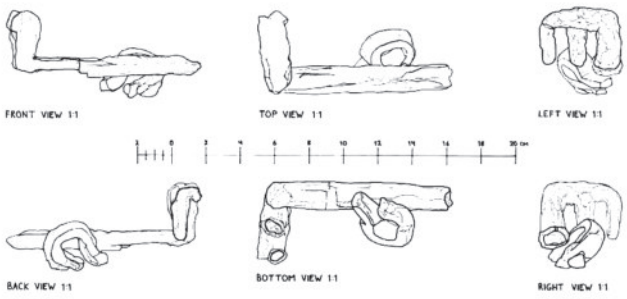
Water Pipes (PE)
Body

90.
J14-Ka-3-17
Water pipe, fragmented.
Fig. 90.
Diam. (min.): 6.9; (max.): 8.9; L.: 30.5; W. (min.): 7; (max.): 8.8; T. (min.): 0.3; (max.): 0.7.
Munsell: int: 2.5YR 6/8; ext.: 2.5YR 6/6.
Hard fired and medium to finely levigated clay including many air pockets, lime (a few erupted), some pebbles, quartz and black spots. Grey mortar spots sticking on its ext. surface, including white lime lumps and charcoal spots. The ext. surface is softly ribbed while the int. surface has spiralled lines, much more extreme in profile.
References: ‘Amr *et al.* (1998), p. 525; fig. 14; p. 524; fig. 13 (undated. Associated pottery is ‚Nabataean’); ‘Amr and al Momani (2001), p. 271; fig. 24 (for a local and rough scheme of pipe development in general in southern Jordan); Kerner, Krebs and Michaelis (1997), p. 267f.; fig. 3a, 3b (dated Late Roman); Segal *et al.* (2009), p. 9; fig. 74, 76 (possible dating not explicitly given. See the pottery on p. 102f. = mostly Late Roman, Byzantine and some Umayyad. No repairs in wall recorded = Pipe must be part first phase); Segal *et al.* (2010), p. 223; fig. 304 (very likely to be late Byz./early Umayyad, but the diam. is bigger: 12); Silberstein (2000), p. 462, fig. 21 (dated between 30 BC and 1st - 2nd cent. CE); Daviau (2010), p. 125; fig. 6.3, no. 1, 4; p. 284f.; fig. 8.19, no. 1 (diam. is much wider but in terms of body shape is still the closest to ours. The referred example was used as drainage and is probably Late Byzantine/Early Islamic).
Pre-Umayyad.

Metal Objects (CE)
Architectural Fittings

91.
J14-Kh-34-5
Revetment pin.
Fig. 91.
AE.
L.: 8.9; W.: 1.2; T.: 0.45.
Oblong rectangular bar, ingot-shaped; with a curved peg at one end.
References: Patrich (2008), p. 441, 456; no. 101-107; Waldbaum (1983), p. 66-67; pl. 19, no. 266-277.
Hellenistic/Roman or later.

92.
J14-Kh-34-25
Revetment pin.
Fig. 92.
AE.



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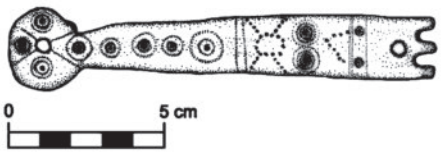

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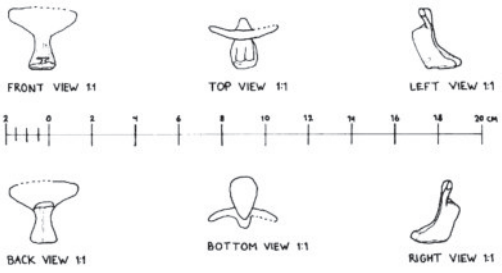

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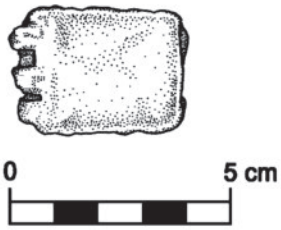

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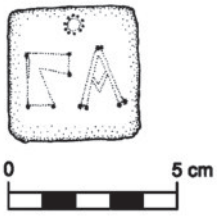

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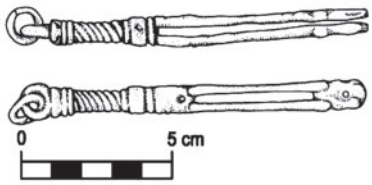

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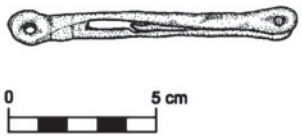

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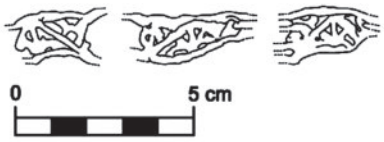

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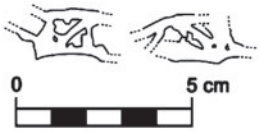

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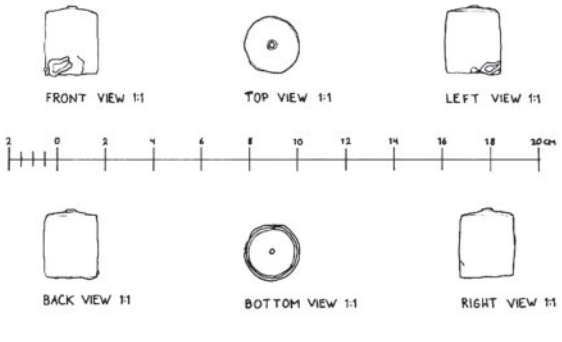


114

L.: 7.1; W.: 1.
Oblong rectangular bar with a curved peg at one end.
References: Patrich (2008), p. 441, 456, no. 101-107.
Hellenistic/Roman or later.

93.
J14-Kh-34-13
Revetment pin (?).
Fig. 93.
FE, badly corroded.
L.: 7; W.: 1.7; T.: 0.8.
References: Patrich (2008), p. 441, 456, no. 101-107; Waldbaum (1983), p. 66-67; pl. 19, no. 266-277.
Hellenistic/Roman or later.

94.
J14-Kh-34-23
Fragment of unknown function/revetment pin (?).
Fig. 94.
AE.
L.: 9.9; W.: 2.2; T.: 1.4.
Long bar with one rectangular end and one rounded end with a small peg.
Hellenistic/Roman or later.

Household Appliances and Tools

95.
J14-Kf-3-10x
Ladle/scoop.
Fig. 95.
FE, badly corroded.
L.: 72.6; W.: 12.3; W. eye: 5.7.
Long handle with almost rectangular section; plain, oval bowl; at the opposite end a broken, circular eye.
References: Waldbaum (1983), p. 60; pl. 16, no. 220-221; Baitinger and Völling (2007), p. 92; pl. 31, no. 376.
Hellenistic/Roman or later.

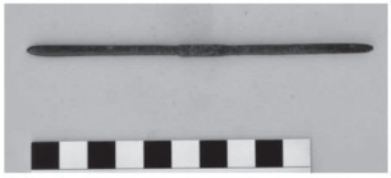
96.
J14-Ke-3-17x+Kef-3s-343
Fragmented scissors.
Fig. 96.
FE, badly corroded.
L.: 31; W.: 16.
Triangular blades; the handle is made of a curved band. The top of one blade is missing.
References: Patrich (2008), p. 448, 458; no. 229; from Late Roman context: Künzl and Weber (1991), p. 89-90; fig. 5.
Hellenistic/Roman or later.

97.
J14-Kg-3-13x
Fragments of a wool comb or heckling comb with dozens of teeth.
Fig. 97.
FE, badly corroded.
L. (max.): teeth 12.1.
Long iron band with needle-shaped teeth, arranged in at least two rows.
References: Gaitzsch (2005), p. 42; pl. 58, 75, no. 1-2.
Hellenistic/Roman or later.

98.
J14-Kh-3-515
Needle.
Fig. 98.
AE.
Diam.: 0.2; L.: 6.
Short needle with an oblong eye.
References: Patrich (2008), p. 448, 458, no.221-224; 467, no. 221; Waldbaum (1983), p. 61; pl. 17, no. 230-234.
Hellenistic/Roman or later.

99.
J14-Kh-34-9
Needle.
Fig. 99.
FE, badly corroded.
L.: 19.3; W.: 0.85.
Long shaft with another small iron fragment adherent; an oblong eye is pierced through the flattened end.
References: Platt and Ray (2009), p. 177-178, 181; fig. 11.10, no. 1-3; Waldbaum (1983), p. 61-62; pl. 17, no. 231.
Hellenistic/Roman or later.

100.
J14-Kh-34-8
Small knife (?).
Fig. 100.
FE, badly corroded.



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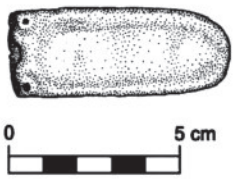

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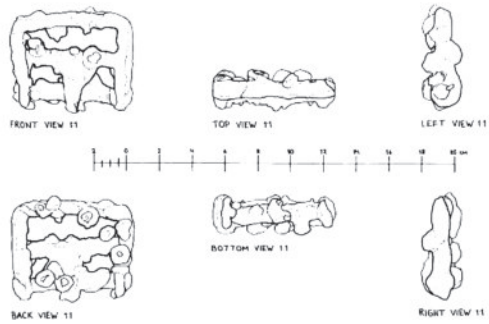

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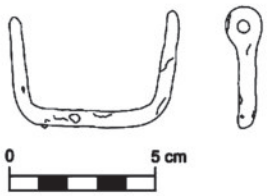

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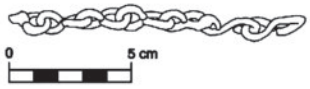

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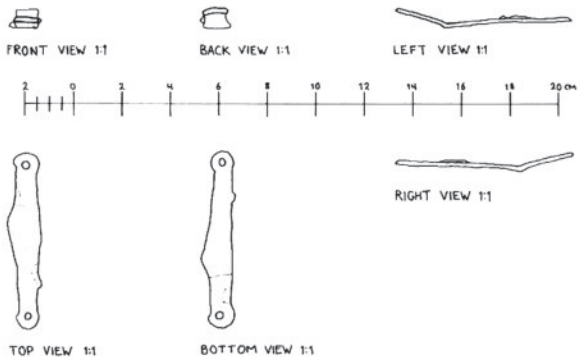

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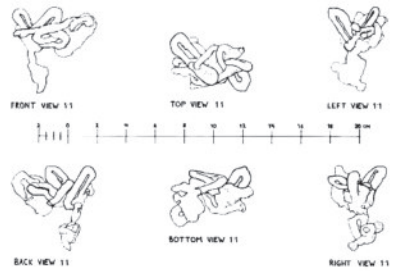

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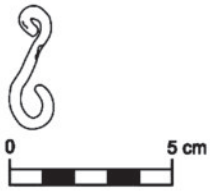


124

125

L.: 9.2; W.: 1.9; T.: 1.1.
Oblong, slightly conical handle; short triangular blade.
References: Waldbaum (1983), pl. 15, no.199.
Hellenistic/Roman or later.

Locks and Keys

101.
J14-Kh-34-15
Small, casket-shaped object, probably a lock.
Fig. 101.
FE, badly corroded.
H.: 3.6; L.: 4.9; W.: 2.5.
Rectangular casket, open on one side; a big hole on the front; each corner has a small hole through which a rivet is passed.
References: Waldbaum (1983), pl. 23.
Hellenistic/Roman or later.

102.
J14-Kh-34-16
Fragment of the closing device (?).
Fig. 102.
FE, badly corroded.
L.: 10.2; H.: 4.9; T.: 0.8.
Rectangular band with an oblong eye, which is attached on the upper ridge of the band.
Hellenistic/Roman or later.

103.
J14-Kg-3-14x
Keyhole plate.
Fig. 103.
AE.
Diam.: 6.5.
Circular plate with a central keyhole and a small rectangular hole on the upper right.
References: Waldbaum (1983), p. 72-73; pl. 24, no. 385; Baitinger and Völling (2005), p. 138-142; pl. 56, no. 634; Jantzen (2004), pl. 32, no. 1184.
Byzantine/Late Byzantine.

104.
J14-Kh-3-21x
Ring with movable key.
Fig. 104.
AE.
L.: 2.9; Diam.: ring 2.5; L.: key 2.6.
Ring with two dolphin head-shaped ends; small key with an eye at one end, which is linked to a short axis between the dolphin heads.
References: Patrich (2008) p. 422, 428; no. 16; Waldbaum (1983), p.76; pl. 25, no. 403-407; Jantzen (2004), pl. 33, no. 1189.
Late Byzantine.

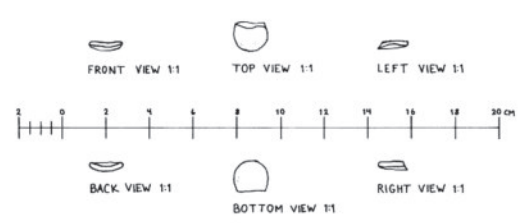
105.
J14-Kh-3-27xa
Slide key.
Fig. 105.
FE, badly corroded.
L.: 11.5; W.: 4.6.
Key with long shaft and orthogonal bit with three teeth; the annular end of the handle is broken and fixed to the shaft.
References: Gaitzsch (2005), pl. 43, S12; Baitinger and Völling (2007), p. 132-134; pl. 54; Seigne *et al.* (1986), 98 pl. 14.1.
Hellenistic/Roman or later.

Casket Fittings

106.
J14-Kh-34-22
Hinge/hinge-plate.
Fig. 106.
AE.
L.: 12.8; W.: 2.5.
Flat bar with a knuckle at one end and a rounded, perforated extension at the other. Face decorated with chased geometrical ornament (concentric circles and small dots).
References: Waldbaum (1983), p. 76-78; pl. 26, no. 417-418; Jantzen (2004), pl. 31, no. 1159-1163.
Byzantine/Late Byzantine.

107.
J14-Kh-34-12
Small attachment, probably a stand/foot of a casket.
Fig. 107.
AE.
H.: 3.1; W.: 3.3; T.: 1.6.
Massive “foot” with triangular extension.
References: Davidson (1952), pl. 52, no. 560; pl. 62, no. 837.
Roman – Late Byzantine.

108.



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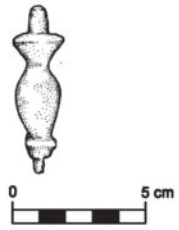

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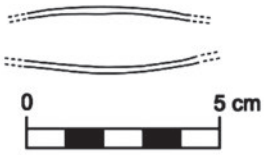

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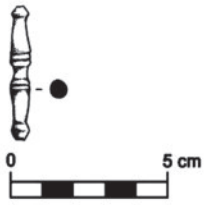

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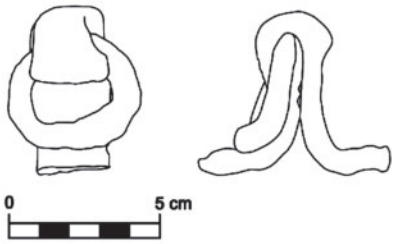

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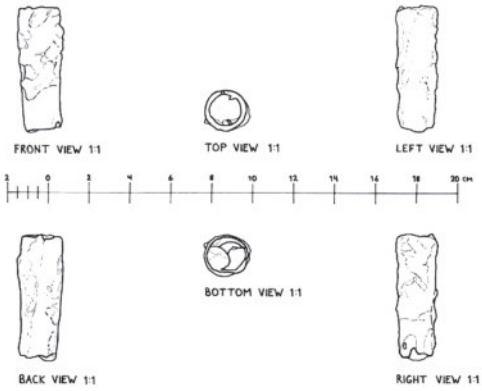

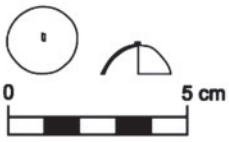

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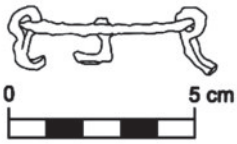

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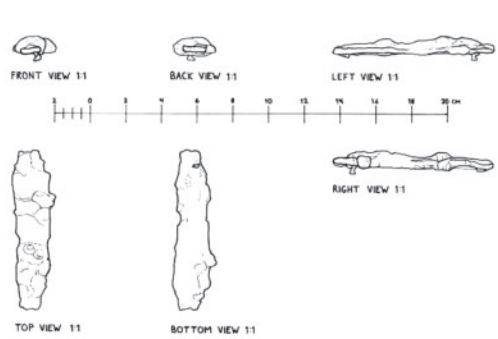

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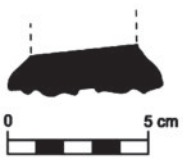

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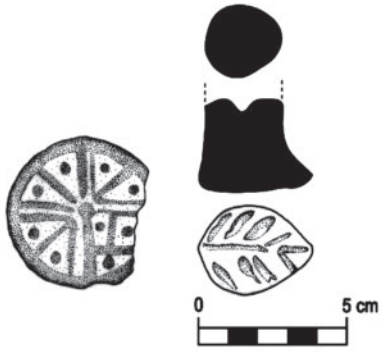


137

J14-Kh-34-18
Hinge.
Fig. 108.
FE, badly corroded.
L.: 3.8; W.: 2.8; T.: 1.2.
Rectangular plate with three eyes of the knuckle.
Hellenistic/Roman or later.

Weighing Equipment

109.
J14-Kh-34-1
Weight.
Fig. 109.
AE.
L.: 4; W.: 3.9; T.: 0.25.
Flat rectangular plate; face incised with two letters, Gamma and Alpha (=standard one ounce weight), and a small, dotted circle.
References: Cat. München (2004), p. 362-363; Bendall (1996), p. 29-38.
Late Byzantine.

110.
J14-Kh-24-4
Suspension for a balance.
Fig. 110.
AE.
L.: 6.8; W.: 0.6.
Solid upper part with pseudo-torsion profile ending in a loop with movable ring; the lower part is divided into two flat legs.
References: Waldbaum (1983), p. 82-84; pl. 29, no. 448, 460.
Hellenistic/Roman or later.

111.
J14-Kh-34-26
Suspension, probably from a balance.
Fig. 111.
AE.
L.: 9.7; W.: 1.
Short, solid upper part with a loop; the lower part is divided into two long, flat legs; each is perforated through the lower end.
References: Waldbaum (1983), p. 82-84; pl. 29, no. 448, 460.
Roman and later.

Cosmetic Implements

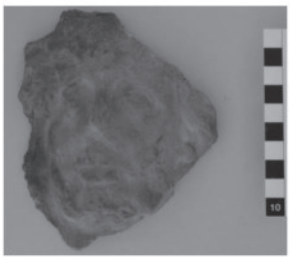
112.
J14-Kef-3s-339
Rim fragments from a mirror (?).
Fig. 112.
PB.
L.: largest fragment 3.3; W.: 1.2.
Six fragments of an openwork frame with zigzag ornament; probably parts of the same frame like fragments Khg-3s-311.
References: Patrich (2008), p. 425, 430; no. 73-79.
Hellenistic/Roman or later.

113.
J14-Kgh-3s-311
Rim fragments from a mirror (?).
Fig. 113.
PB.
L.: largest piece 2.7; W.: 1.3.
Three fragments of an openwork frame with zigzag ornament; probably parts of the same frame like Kef-3s-339.
References: Patrich (2008), p. 425, 430; no. 73-79.
Hellenistic/Roman or later.

114.
J14-Kh-34-11
Lid of a cosmetic tube.
Fig. 114.
AE.
H.: 2.7; Diam.: 2.2.
Cylindrical hull, closed at one end; with a little hole in the centre.
References: Waldbaum (1983), p. 108; pl. 41, no. 644.
Hellenistic/Roman or later.

115.
J14-Icd-35-3
Double-ended kohl stick.
Fig. 115.
AE.
L.: 11.7; T.: 0.4.
Rod with thickened, moulded centre and tapered, but rather blunt ends.
References: Platt and Ray (2009), p. 209-211; fig. 12, no. 7-8.
Umayyad or later.

Dress Accessories



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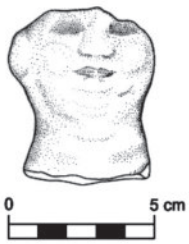

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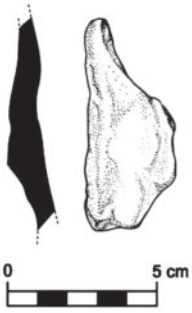

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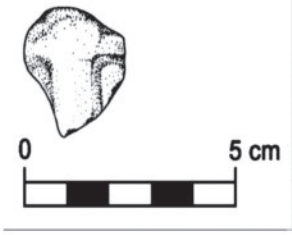

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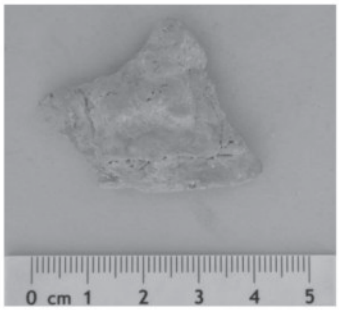

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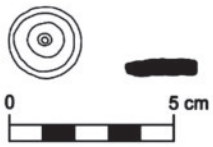

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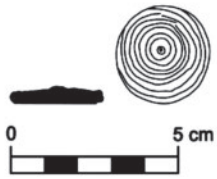

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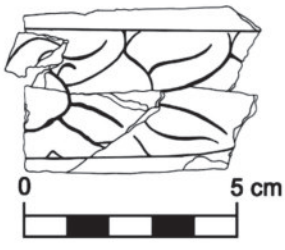

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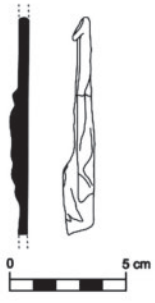


151

152

116.
J14-Ke-3-211
Strap end.
Fig. 116.
AE.
L.: 3.4; W.: 1.1.
U-shaped plate; face with engraved ornament of stylized vegetable character.
References: Schulze-Dörrlamm (2009), p. 268-270.
Late Byzantine.

117.
J14-Kh-34-27
Strap end.
Fig. 117.
AE.
L.: 6; W.: 2.5.
U-shaped; upper end slightly fluted, with two small perforations for lost rivets.
References: Kazanski (2003), p. 122; fig. 14, no. 37.
Late Byzantine.

Horse Trappings (?)

118.
J14-Kh-34-2
Buckle.
Fig. 118.
FE, badly corroded.
L.: 4.4; W.: 5.2; T.: 1.6.
Almost rectangular loop, with eyes at the end of both arms which hold a pivoted axis; a triangular tongue is linked with the central, fixed axis.
References: Jantzen (2004), pl. 20, no. 748; similar buckles of copper alloy, with only one pivoted axis: Patrich (2008), p. 458, no. 211-212.
Roman – Late Byzantine.

119.
J14-Ke-3-7x
Loop of a buckle (?).
Fig. 119.
AE.
L.: 5.6; B.: 3.7.
Almost rectangular loop with extended rounded ends, each perforated to hold a pivoted axis which is lost.
References: Patrich (2008), p. 458, no. 211-212.
Roman – Late Byzantine.

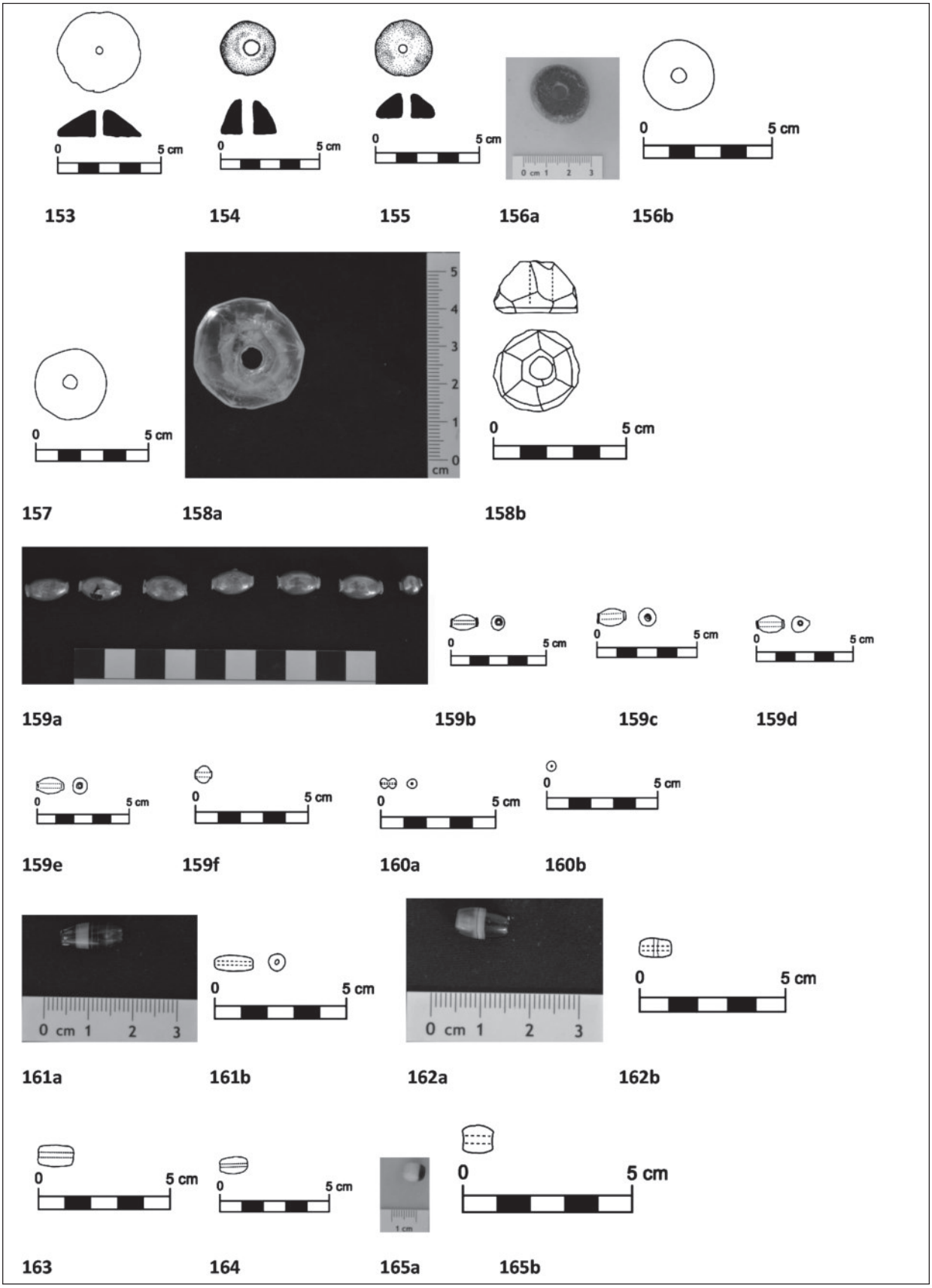
Chains and Hooks

120.
J14-Ke-3-255
Fragment of a chain.
Fig. 120.
AE.
L.: 12.2; W.: 0.9.
Chain of small figure-of-eight-shaped links, which may have belonged to a glass lamp suspension.
References: Patt (2009), p. 279; fig. 13.23, no. 2; (iron example of the 4th to 8th cent. AD): Clark (1986-2), p. 269; pl. XXXII, 1; (a bronze example): Segal *et al.* (2007), p. 84; fig. 129.
Hellenistic/Roman or later.

121.
J14-Kh-34-7
Fragment from a chain.
Fig. 121.
FE.
L.: 4.9; W. (hook): 1.9.
Two chain links, each with two different sized loops, like a distorted figure-of-eight.
References: Patt (2009) p. 278-279; fig. 13.23, no. 9.
Hellenistic/Roman or later.

122.
J14-Kh-34-10
Bracket, probably from a chain.
Fig. 122.
AE.
L.: 7.3; W.: 1.4.
Flat plate of oblong triangular shape. Two extended, rounded ends; each perforated.
References: Waldbaum (1983), p. 101-102; pl. 38, no. 591-592; Jantzen (2004), pl. 1, no. 1-2.
Byzantine/Late Byzantine.

123.
J14-Kh-34-14
Fragment from a chain.
Fig. 123.
FE, badly corroded and contaminated with other material.
L.: single link ca. 3.6; W.: 1.35.


153
154
155
156a
156b
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158a
158b
159a
159b
159c
159d
159e
159f
160a
160b
161a
161b
162a
162b
163
164
165a
165b

A cluster of several oblong oval chain links.
Hellenistic/Roman or later.

124.
J14-Ke-3-5x
Hook.
Fig. 124.
AE.
L.: 3.6; W.: 1.3.
S-shaped hook, probably from a chain or a balance.
References: Patrich (2008), p. 460, no. 264; Platt (2009), p. 276, 279; fig. 13.23, no. 5; Gawlikowski and Musa (1986), p.152; fig. 10.
Hellenistic/Roman or later.

125.
J14-Ke-3-215
Fragment from a hook.
Fig. 125.
AE, badly corroded, contaminated with other material.
L.: 2.5; W.: 1.1.
Probably S-shaped; one end is missing.
References: Patt (2009), p. 275-279; fig. 13.23.
Hellenistic/Roman or later.

Nails and Rivets

126.
J14-Kh-34-4
Button/head of a rivet (?).
Fig. 126.
PB (?).
Diam.: 1.6; T.: 0.15.
Flat, slightly concave and discoid piece of metal.
Roman – Late Byzantine.

127.
J14-Kh-34-21
Boss or decorated head of a rivet (?).
Fig. 127.
AE.
L.: 5.9; Diam.: 1.6.
Solid, oblong, vase-shaped.
References: Waldbaum (1982), p. 64-65; pl. 18, no. 260.
Hellenistic/Roman or later.

128.
J14-Kh-34-31 + 32
Two small nails/rivets.
Fig. 128.
FE, badly corroded.
L 1.5 and 1.
Each has a round, slightly convex head.
References: Patrich (2008), p. 439, 455, no. 61-68.
Hellenistic/Roman or later.

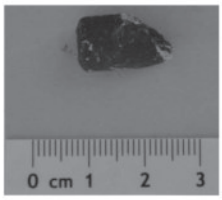
Various

129.
J14-Ke-3-214
Fragment of unknown function.
Fig. 129.
AE.
Diam. (max.): 1.7; L.: 4.8.
Oblong, bi-conical, barrel-shaped tube; delicate horizontal grooves.
Hellenistic/Roman or later.

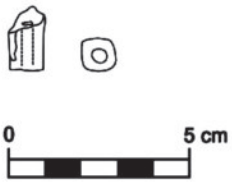
130.
J14-Kefgh-3-166
Bolt.
Fig. 130.
AE.
Diam. (max.): 0.6; L.: 4.2.
Oblong, bi-conical bolt with narrow central section and thickened, spherical ends.
Hellenistic/Roman or later (?).

131.
J14-Kf-3-167
Cramp.
Fig. 131.
FE, badly corroded.
L.: 5.1.
Angled band with open ends which bend upwards.
References: Raubitschek (1998), pl. 87.
Hellenistic/Roman or later.

132.
J14-Kf-3-360
Conical object of unknown function, bell (?).
Fig. 132.
AE.
Diam.: 1.9; H.: 1.
Conical husk, made of sheet.
Hellenistic/Roman or later (?).



166a



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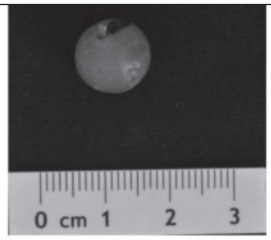

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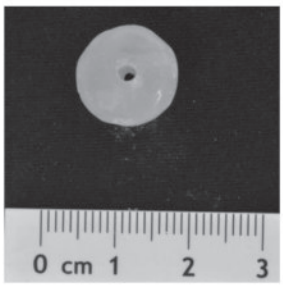

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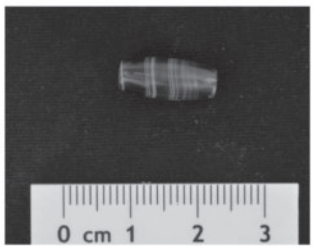

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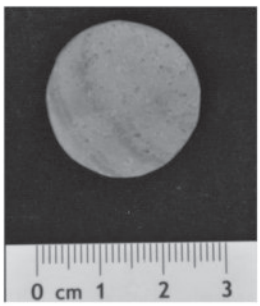

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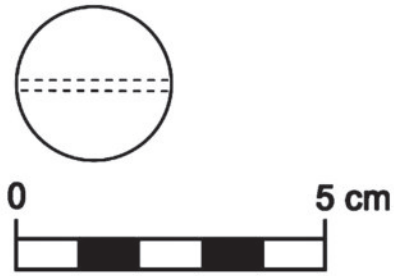

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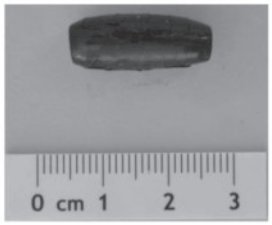

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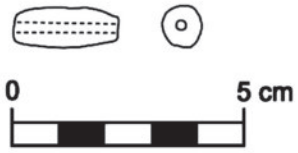

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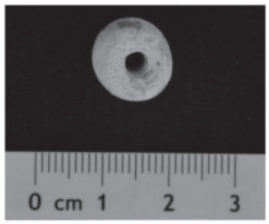

172a

172b

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133.
J14-Kg-3-20x
Plate with rivets.
Fig. 133.
AE.
L.: 5.4; W.: 1.1.
Flat plate with expanded, rounded, perforated ends; two hooks are attached in the eyes.
Hellenistic/Roman or later.

134.
J14-Kh-34-3
Tube/hull of unknown function.
Fig. 134.
AE, heavily corroded and contaminated with other material.
Diam. (max.): 2; L.: 6.2.
Almost cylindrical tube.
Hellenistic/Roman or later.

135.
J14-Kh-34-6
Fitting.
Fig. 135.
FE, badly corroded and contaminated with other material.
L.: 9.1; W.: 2.4; T.: 1.25.
Oblong, originally rectangular bar with eyeholes at the ends; a small rivet passes through each.
Hellenistic/Roman or later.

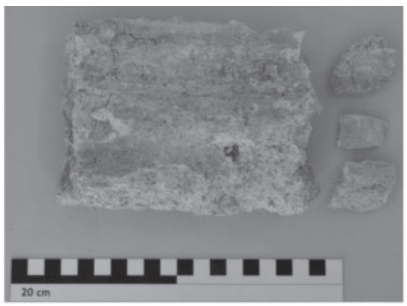
Miscellaneous
Stamps (CBH)

136.
J14-Kb-10-2
Stamp, fragmented.
Fig. 136.
Diam.: 5.3; H.: 1.8; T.: 1.8.
Munsell: core: 5YR 5/1; ext.: 5YR 5/1.
Circular bread (?) stamp. The stamp face is divided by 7 lines which pass through the fix point in the central hole, dividing the face into triangles/cunei, each with a dot. Four of the lines are thicker, forming a cross; one area is divided by horizontal and vertical lines. The design is carved "in negative".
References: Kakish (2014), p. 5; fig. 4-5; p. 7; fig. 9; Calavaris (1970), p. 83, fig. 41.
Umayyad (7th – end of 8th cent. AD).

137.
J14-Kf-3-477
Stamp, almost intact.
Fig. 137.
H.: 3.1; L.: 3.8; W.: 2.9; T.: 2.2.
Munsell: 10YR8/2.
Bread (?) stamp; Stamp surface is leaf shaped. The design is carved "in positive". Top of handle is broken off; indications that a hole pierced through one side.
References: Shape: Calavaris (1970), p. 61, fig. 29.
Late Byzantine – Umayyad.

Terracotta (AL, RR)

138.
J14-0-6
Relief fragment of a bearded head (giant or barbarian).
Fig. 138.
H.: 13; W.: 10.5; D.: 3.5.
Munsell: core: 2.5 YR 5/4; int.: 2.5 YR 7/4-5/4; ext.: 2.5 YR 6/4-5/4.
Head of a bearded male turned in an expressive movement to the right. The hair and beard are uncombed and fall in thick locks, the skin surface is expressive and has a vivid plasticity. The eyes are big and deeply set. The eyebrows are contracted in an expression of agony. On the left side, under the hair line, are two rounded knobs. The lips are full. It may depict a fighting/dying giant or barbarian.
The rear is plain; two small iron sticks were inserted for suspension at the top.
The mould made object was lying on the surface and had been exposed to fire; hence, the surface is worn, and it is broken on all sides. The left side of the hair is missing, as well as the lower part of the hair on the right side at ear level. There is a cut on and under the nose.
The object was a stray surface find, close to the transportable housing of the "Archaeologists' Camp" in Jerash. It is probably of Roman date. There are no direct comparisons known from the region, but the type "bearded barbarian male" occurs in Iliffe (1944) as type no. 16. However, since this piece is not a known Jerash figurine, and does not stem from an archaeological context, it cannot be ruled out



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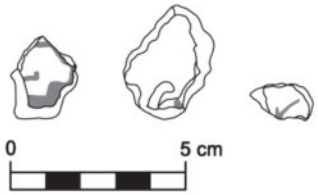

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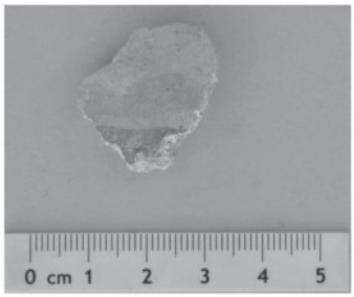
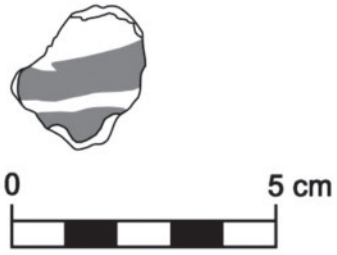
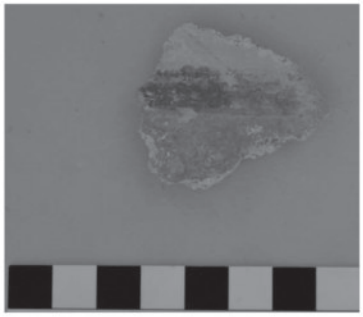


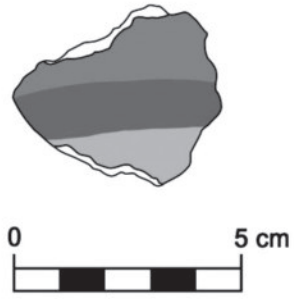
176a



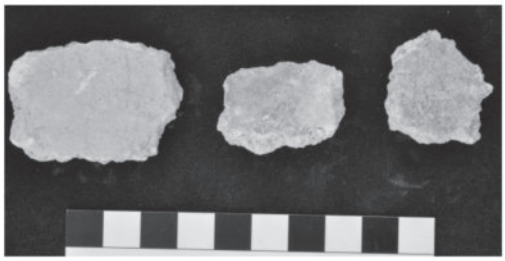
176b



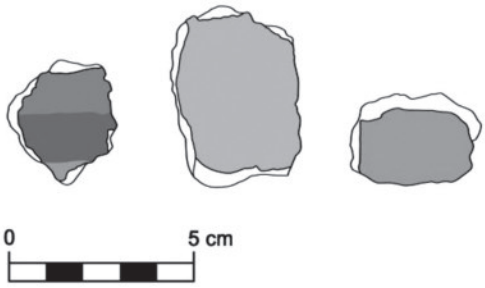
177a



177b



178a



178b

that it is a modern object.
References: (likely) Illife (1944), no. 16.
Probably Roman.

139.
J14-Lb-39-4
Human head, fragmented.
Fig. 139.
H.: 6; W.: 5; D.: 3.
Munsell not available.
Only the lower part of the face is preserved, from above the nose and the right ear. The back of the head is missing, and the surface is covered in lime.
Mould made head of a human figure, with the neck turned slightly upwards to the left in an expressive pose. The left eye and ear are large, as well as the nose. The mouth is small. The face is chubby, with a full, short neck. It is not possible to say whether the head had hair or was bald.
The figurine belongs to a group of Jerash figurines, and may be compared to no. 33 in Illife (1944).
References: Illife (1944), no. 33, 41; Lichtenberger, Raja and Sørensen (2017), no. 139.
Roman (2nd cent. AD).

140.
J14-Jc-35-67
Fragment of a figurine.
Fig. 140.
H.: 3.0; W.: 3.0; D.: 0.8.
Munsell: core: 5YR8/3; int.: 10YR8/2; ext.: 10YR8/2.
Rather finely levigated terracotta clay. Fingerprints made during production of the terracotta are visible on the rear. The mould made fragment is broken on all sides, and depicts a piece of drapery, which falls in thick, heavy folds. It is possible to deduce that the person depicted was moving towards the right, as a piece of the limb is visible to the very right of the fragment.
Roman (2nd cent. AD).

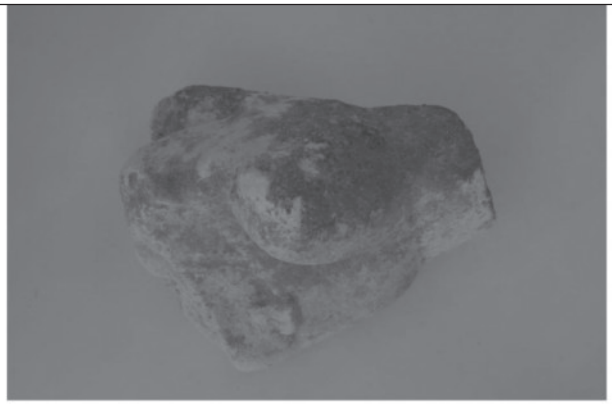
141.
J14-Jc-47-1
Fragment of a terracotta arm.
Fig. 141.
H.: 7; W.: 3.5; D.: 2.
Munsell: core: 2.5YR6/6; int.: 7.5YR8/3; ext.: 7.5YR8/3.
Rather finely levigated clay with a whitish slip. The piece is a limb fragment, which is broken at the top and bottom. It probably belonged to a left arm; this has been deduced from the angle in which the arm is bent.
Roman (2nd cent. AD).

142.
J14-Jd-36-4
Small fragment of terracotta.
Fig. 142.
H.: 3; W.: 2.5; D.: 1.3.
Munsell: all: 5YR 8/4.
Small mould made fragment with voluminous T-shaped lines. Finger imprints caused by shaping are visible on the back.
Probably Roman.

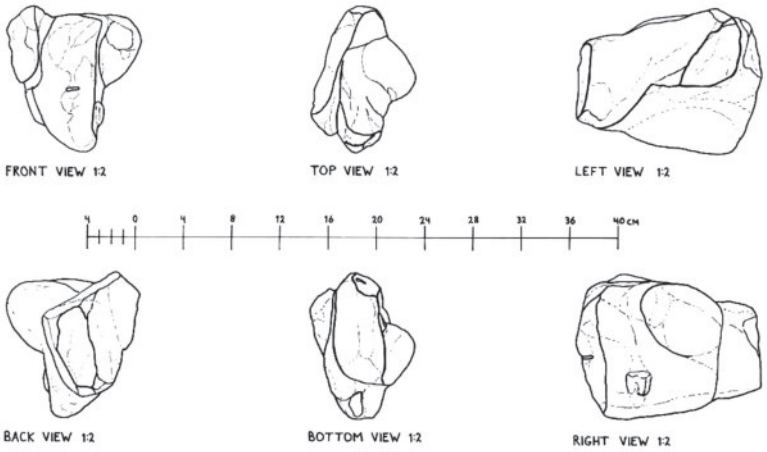
143.
J14-Jd-32-207
Fragment of a figurine.
Fig. 143.
H.: 5; W.: 3; D.: 1-2.
Munsell not available.
The lower right side of a mould made figure, possibly showing some drapery. Heavily worn and fragmented.
Roman.

144.
J14-Ih-42-27
Fragment of a figurine.
Fig. 144.
H.: 3; W.: 1.3-1.8; D.: 1.1.
Munsell not available.
Terracotta fragment of a right hand, with six fingers. It is broken off at the wrist, and both the thumb and the index finger are damaged. The hand is grasping an object, which cannot be identified due to the state of preservation. (Solid clay extremities were often added after the molding of the main parts of the figure.)
Roman (2nd cent. AD).

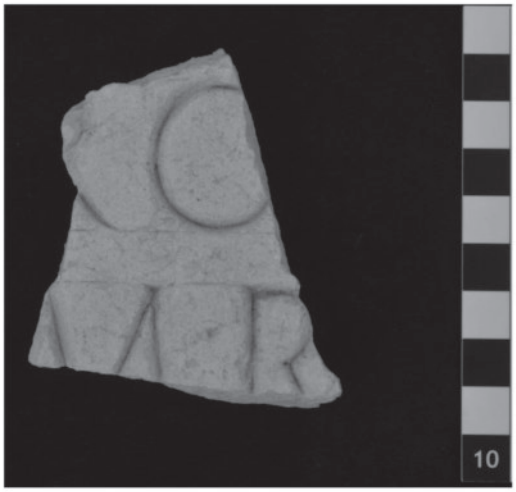
145.
J14-Jcd-32-62
Terracotta fragment.
Fig. 145.



179a



179b



180a

H.: 4.1; L.: 3.1; D.: 0.5.
Munsell: all: 2.5YR 7/6.
The mould made fragment is decorated, and has an irregular knobby structure; it possibly belongs to the depiction of a rocky landscape, but is broken on all sides.
Roman.

146.
J14-Jc-35-60
Fragment of a figurine.
Fig. 146.
H.: 3.2; W.: 2.3; D.: 0.65.
Munsell: all: 2.5YR 7/6.
This mold made fragment most likely depicts the frontal top right corner of a female face and hair do. Only a small part of the face is visible, with a slight impression of the right eye. The hair is arranged in two tiers, with thick locks.
Roman (2nd cent. AD).

Bone Utensils (SK)

147.
J14-Kh-34-24
Worked bone disc, intact.
Fig. 147.
Diam.: 2; T.: 0.43.
Circular worked bone disc, with eight incised circles along outer edge; each circle has a central incised dot, from which incised lines are connected to the circles along the outer edge. Possibly a game piece.
References: Macalister (1912 Vol. II), p. 303, fig. 443, (1912 Vol. III), pl. CXXXII, no. 45, 47, 49; pl. CXCV, no. 61, 61a, 72; Ayalon (2005), fig. 28, 29; Kotter and Ray (2009), fig. 9.27, no. 11; fig. 9.28, no. 1, 5.
Not datable.

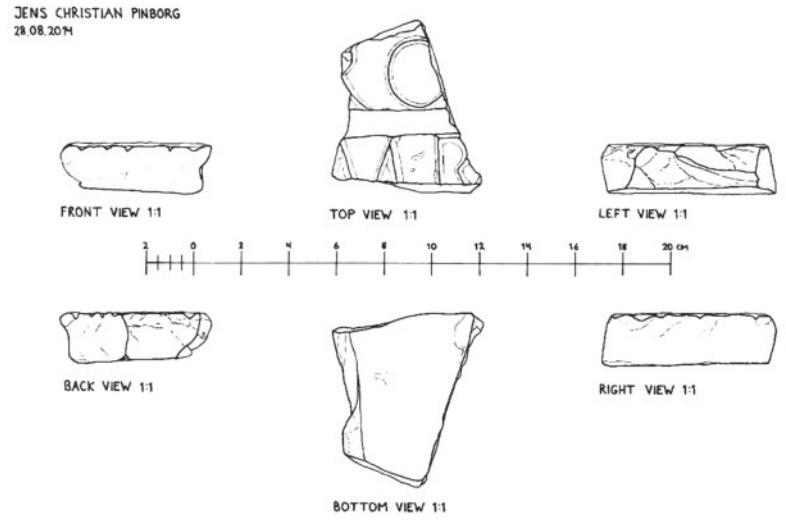
148.
J14-Kgh-3c-323
Worked bone disc, intact.
Fig. 148.
Diam.: 2.13; H.: 0.54.
Circular worked bone disc; centrally incised dot, which is surrounded by three concentric incised circles, continuing to the outer edge. Possibly a game piece.
References: Macalister (1912 Vol. II), p. 303, fig. 443, (1912 Vol. III), pl. CXCV, no. 61, 61a, 72; Ayalon (2005), fig. 28, 29; Kotter and Ray (2009), fig. 9.27, no. 11; fig. 9.28, no. 1, 5; Vincenz (2010), pl. 12.1, no. 12.
Not datable.

149.
J14-Kg-3D-408
Worked bone disc, intact.
Fig. 149.
Diam.: 2.8; T.: 0.41.
Circular worked bone disc; centrally incised dot from which eight incised concentric circles continue to the outer edge. Possibly a game piece.
References: Macalister (1912 Vol. II), p. 303, fig. 443; Macalister (1912 Vol. III), pl. CXCV, no. 61, 61a, 72; Ayalon (2005), fig. 28, 29; Kotter and Ray (2009), fig. 9.27, no. 11; fig. 9.28, no. 1, 5; Vincenz (2010), pl. 12.1, no. 12.
Not datable.

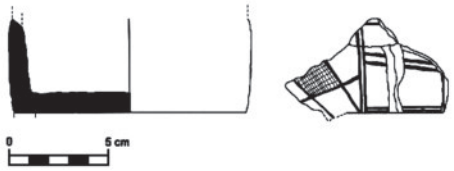
150.
J14-Kg-3-16x
Worked bone inlay, fragmented.
Fig. 150.
H.: 4; L.: 5.7.
Inlay with incised pattern; to the left is a half circle from which curving, oblique lines run to the right; possibly from a box.
References: For function, see: McNicoll *et al.* (1992), pl. 37; Kotter and Ray (2009), fig. 9.27, no. 1.

151.
J14-Ke-3-351A+J14-Kef-3s-334
Worked bone drapery, fragmented.
Fig. 151.
L.: 5.96; T.: 0.48 ; W.: 1.28.
Bone fragments which form part of a figure; drapery is preserved with soft oblique and curving folds; possibly lower part of clothing of a full figure.
References: Ayalon (2005), fig. 35, no. 336-338; fig. 59, no. 564.
Roman – Late Byzantine.

152.
J14-Kh-3-26x
Worked bone cylinder, intact.
Fig. 152.
Diam.: 2.84; L.: 10.91; T.: 0.54.



180b



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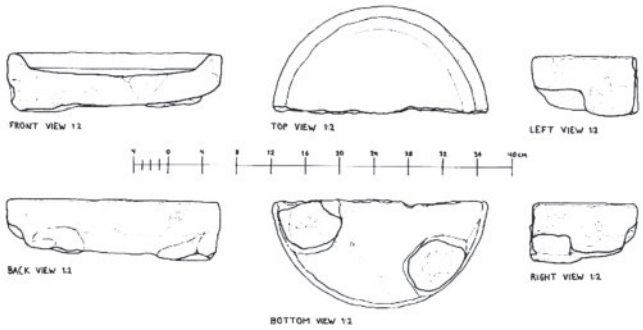
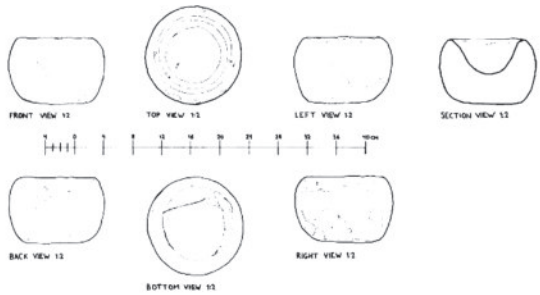
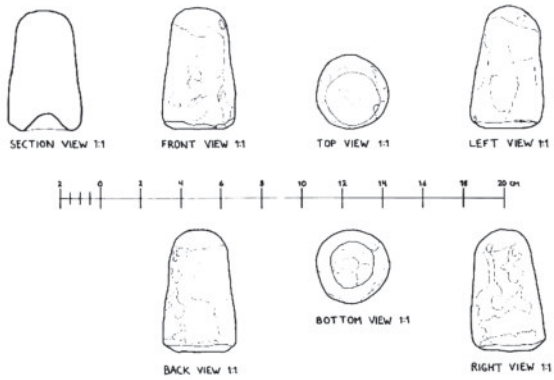


182



183



183

Worked bone cylinder, six incised lines at both ends; slightly ribbed surface; possibly a container or (mirror?) handle.
References: McNicoll *et al.* (1992), pl. 72, no. 6; Findlater *et al.* (1998), fig. 7, 9; Ayalon (2005), fig. 1, no. 1-3; Wapnish (2008), fig. 34.5; Kotter and Ray (2009), fig. 9.27, no. 8; Panitz-Cohen, Yahalom-Mack and Mazar (2009), fig. 16.12, no. 2; Lichtenberger, Raja and Sørensen (2017), no. 152.
Late Roman – Mid Byzantine.

Spindle Whorls (SK)

153.
J14-Jd-32-205
Fig. 153.
Diam. (min.): 0.4; Diam. (max.): 3.9; H.: 1.2.
Almost intact, cone-shaped spindle whorl with central hole; bulging sides; flat base with circular grooves; sand stone, reddish brown.
References: Riis (1969), fig. 39, no. 8; Riis and Buhl (1990), fig. 97, no. 752-765; McNicoll *et al.* (1982), pl. 132, no. 7; Platt and Ray (2009), fig. 11.5, no. 6-11; Lichtenberger, Raja and Sørensen (2013), no. 158 and 159; (forthcoming b), no. 144.
Not datable.

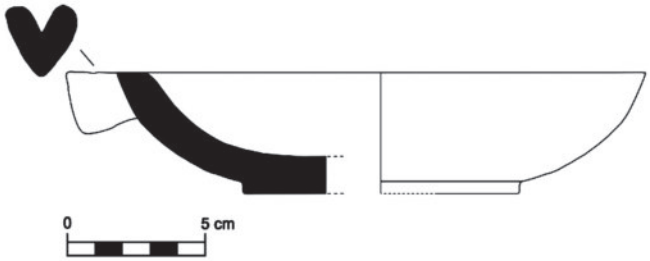
154.
J14-Kh-34-19
Fig. 154.
Diam. (min.): 0.5; Diam. (max.): 2.7; H.: 1.74; W.: 0.89-2.7; Wt: 17.
Almost intact cone-shaped spindle whorl with central hole; flat base; steep sides; slight circular depression at the top; dark bluish-black stone.
References: Riis (1969), fig. 39, no. 8; Riis and Buhl (1990), fig. 97, no. 752-765; McNicoll *et al.* (1982), pl. 132, no. 7; (1992), pl. 69, no. 8; Platt and Ray (2009), fig. 11.5, no. 6-11; Lichtenberger, Raja and Sørensen (2013), no. 158, 159; (2017), no. 143.
Not datable.

155.
J14-Kh-34-20
Fig. 155.
Diam. (min.): 0.5; Diam. (max.): 2.5; H.: 1.15; W.: 0.60-2.68; Wt: 11.37.
Almost intact cone-shaped spindle whorl with central hole; flat base; curving sides; dark greenish-black stone.
References: Riis (1969), fig. 39, no. 8; Riis and Buhl (1990), fig. 97, no. 752-765; McNicoll *et al.* (1982), pl. 132, no. 7; (1992), pl. 69, no. 8; Platt and Ray (2009), fig. 11.5, no. 6-11; Lichtenberger, Raja and Sørensen (2013), no. 158, 159; (2017), no. 144.
Not datable.

156.
J14-Kh-3s-303
Fig. 156a-b.
Steatite.
Diam. (min.): 0.86; Diam. (max.): 2.56; H: 2.7; T.: 0.86; Wt: 11.87.
Almost intact cone-shaped spindle whorl with central hole; flat top and base, black steatite.
References: Riis (1969), fig. 39, no. 8; Riis and Buhl (1990), fig. 97, no. 752-762; McNicoll *et al.* (1982), pl. 132, no. 7; McNicoll *et al.* (1992), pl. 69, no. 8; Platt and Ray (2009), fig. 11.5, no. 6-11; Lichtenberger, Raja and Sørensen (2013), no. 158 and 159; (2017), no. 144.
Not datable.

157.
J14-Ke-3-210
Fig. 157.
Bone.
Diam. (min.): 0.7; Diam. (max.): 3.1; H.: 1.2; Wt: 9.23.
Almost intact cone-shaped spindle whorl with a central hole; flat base, curving sides; bone.
References: Dever, Lance and Bullard (1986), pl. 56, no. 4; pl. 59, no. 9; McNicoll *et al.* (1992), pl. 46, no. 3, 9.
Not datable.

158.
J14-Kgh-3s-309
Fig. 158a-b.
Rock crystal.
Diam. (min.): 0.68; (max.): 2.9; H.: 1.97; L.: 3.19; W.: 3.08; Wt: 22.17.
Intact trapezoidal spindle whorl with a central hole; flat base; curving sides; upper surface is worked in trapezoidal patterns; worked hexagon around central hole; rock crystal, clear.
Not datable.



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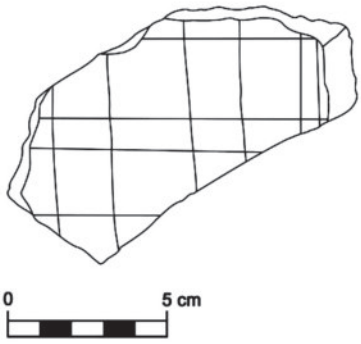

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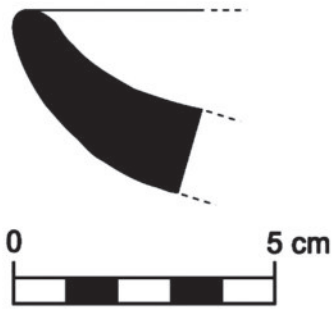

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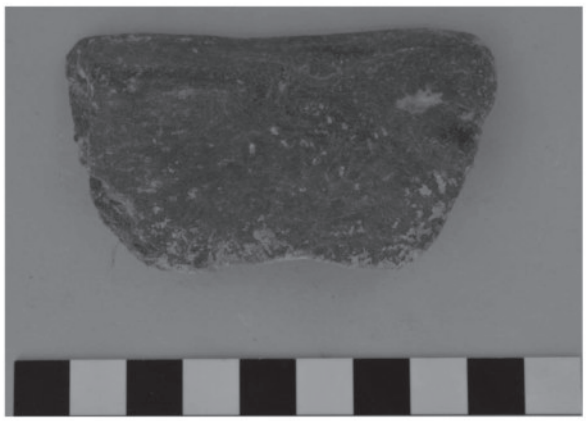

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Jewellery (SR)

159.
J14-Kgh-3s-315, 316, 317, 318, Kg-3N-419, J14-Kg-39-6, 7
Metal beads.
Fig. 159a-f.
Kgh-3s-315: L.: 1.43; W.: 0.85/ Kgh-3s-316: L.: 1.29; W.: 0.80/ Kgh-3s-317: L.: 1.27; W.: 0.87/ Kgh-3s-318: L.: 1.44; W.: 0.84/ Kg-3N-419: L.: 0.76; W.: 0.70/ Kg-39-6: L.: 1.4; W.: 0.7/ Kg-39-7: L.: 1.4; W.: 0.8.
Cylindrical shape (419 is globular shaped) lead beads, coated with golden foil, pierced through lengthwise.
References: Riis (1948), fig. 203.
Not datable.

160.
J14-Kf-3-476
Two metal beads.
Fig. 160a-b.
No. 1: L.: 0.33; W.: 0.38/ No. 2: L.: 0.65; W.: 0.78.
No. 1: AE. Circular, bronze plate, central hole; No. 2: AE. Two circular bronze beads, corroded.
Not datable.

161.
J14-Kgh-3s-320
Stone bead.
Fig. 161a-b.
L.: 1.39; W.: 0.61.
Agate.
Cylindrical shape, agate stone bead, pierced through the small sides, coloured in stripes of dark brown, white and light brown.
References: Ploug (1985), 209; Riis (1948), fig. 203.
Not datable.

162.
J14-Kgh-3s-321
Stone bead.
Fig. 162a-b.
L.: 1.07; W.: 0.62.
Agate.
Cylindrical shape, agate stone bead, pierced through the small sides, coloured with a dark brown part, which is separated from a very light brown part by a white line.
References: Ploug (1985), fig. 209; Riis (1948), fig. 203.
Not datable.

163.
J14-Kg-3D-412
Stone bead.
Fig. 163.
L.: 1.34; W.: 0.77.
Cylindrical shape carnelian bead, pierced through the small sides.
References: Ploug (1985), fig. 209; Riis (1948,) fig. 203.
Not datable.

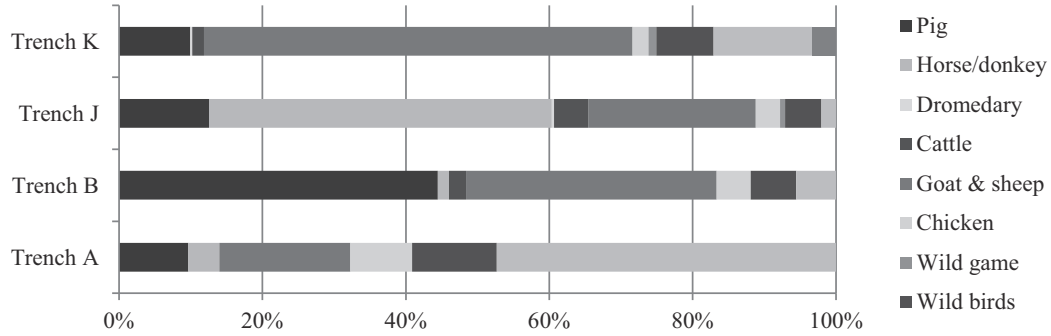
164.
J14-Kg-3D-413
Stone bead.
Fig. 164.
L.: 1.22; W.: 0.76.
Carnelian.
Cylindrical bead, pierced through the small sides.
References: Ploug (1985), fig. 209; Riis (1948), fig. 203.
Not datable.

165.
J14-Kg-3N-419
Stone bead.
Fig. 165a-b.
L.: 0.89; W.: 0.77.
Ovoid-shape, white and dark brown/ black coloured semi-precious stone bead. Pierced through on the short sides.
References: Riis (1948), fig. 203.
Not datable.

166.
J14-Kh-3-520
Stone bead.
Fig. 166a-b.
L.: 1.65; W.: 0.9; Diam. (hole): 0.34.
Cylindrical, blackish-brown stone bead. Pierced hole in the centre of the small sides.
Not datable.

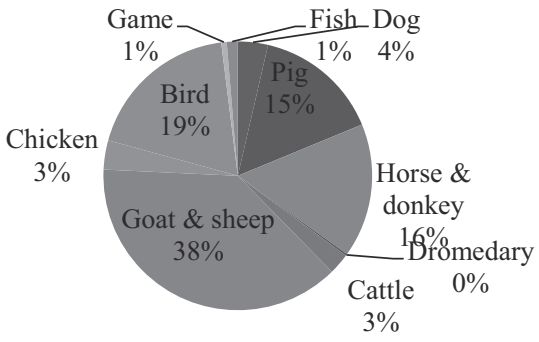
167.
J14-Ke-41s-7
Stone bead, almost intact.
Fig. 167a-b.

	Trench A	Trench B	Trench J	Trench K
Pig	9	56	37	36
Horse/donkey	4	2	141	-
Dromedary	-	-	1	1
Cattle	-	3	14	6
Goat & sheep	17	44	69	217
Wild game	-	-	*2*	4
Chicken	8	6	10	8
Wild birds	11	8	15	29
Birds	44	7	6	50
Fish	-	-	-	12



189. Distribution of the main species at Jerash, according to the trench of origin.

	Total
Dog	33
Pig	138
Horse & donkey	147
Dromedary	2
Cattle	23
Goat & sheep	347
Chicken	32
Bird	171
Game	6
Fish	12



190. Distribution of the main species found at Jerash, with percentage of total NISP.

H.: 1.03; Diam.: 1.17.
Carnelian.
Circular reddish-brown carnelian stone, partly broken off. Remains of a bronze wire in the pierced hole.
References: Ploug (1985), fig. 209; Riis (1948), fig. 203.
Not datable.

168.
J14-Kg-39-8
Stone bead.
Fig. 168a-b.
L.: 1.35; W.: 1.0.
Circular, white stone bead, possibly made of quartz, pierced through on the small sides.
References: Riis (1948), fig. 203, 204; Smith (1973), pl. 80.
Not datable.

169.
J14-Kg-39-9
Semi-precious stone bead.
Fig. 169.
L.: 1.5; W.: 0.7.
The red brown/light brown bead is cylindrically elongated (thicker in the middle) and has white stripes running around it. Pierced through on the small sides.
References: Riis (1948), fig. 203.
Not datable.

170.
J14-Kh-3-450
Stone pendant.
Fig. 170a-b.
T.: 0.60; Diam.: 2.43.
Flat disc pendant. Yellowish stone with light brown stripes. Pierced hole in centre.
References: Riis and Buhl (1990), fig. 107.
Not datable.

171.
J14-Kgh-3s-322
Bone bead.
Fig. 171a-b.
L.: 2.15; W.: 0.88.
Black bone bead, secondarily burned, drilled hole through the small sides. Surface cracked and flaking off.
References: Riis (1948), fig. 203; Smith (1973), pl. 80.
Not datable.

172.
J14-Kh-3-523
Glass bead.
Fig. 172a-b.
H.: 1.03; Diam.: 1.13; (hole): 0.27.
Opaque, white/light blueish glass bead, hole in centre of the small sides.
References: Riis (1948), fig. 203; McNicoll *et al.* (1992), pl. 73; Smith (1973), pl. 80.
Not datable.

173.
J14-Kh-3-514
Finger ring, fragmented.
Fig. 173.
Measurements not available.
Half a bronze ring, very corroded, with a whitish/blue glass pearl (weathered) inserted in depression on top.
References: Ploug (1985), fig. 54 I.
Not datable.

Stucco (CBH)

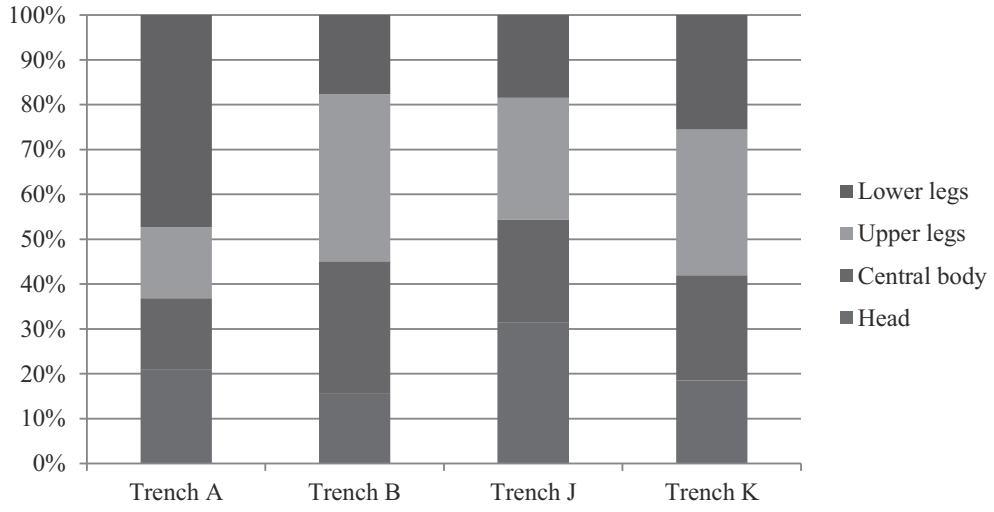
174.
J14-Kg-39-12
Stucco fragments.
Fig. 174.
Measurements and Munsell not available.
Unpainted.
Stucco panel, with three horizontal ledges, forming two horizontal grooves. The three small fragments are from the same panel.
References: Ploug (1985), p.164; fig. 32.
Late Roman – early Umayyad (early 4th – mid-7th century AD).

Wall Painting (CBH)

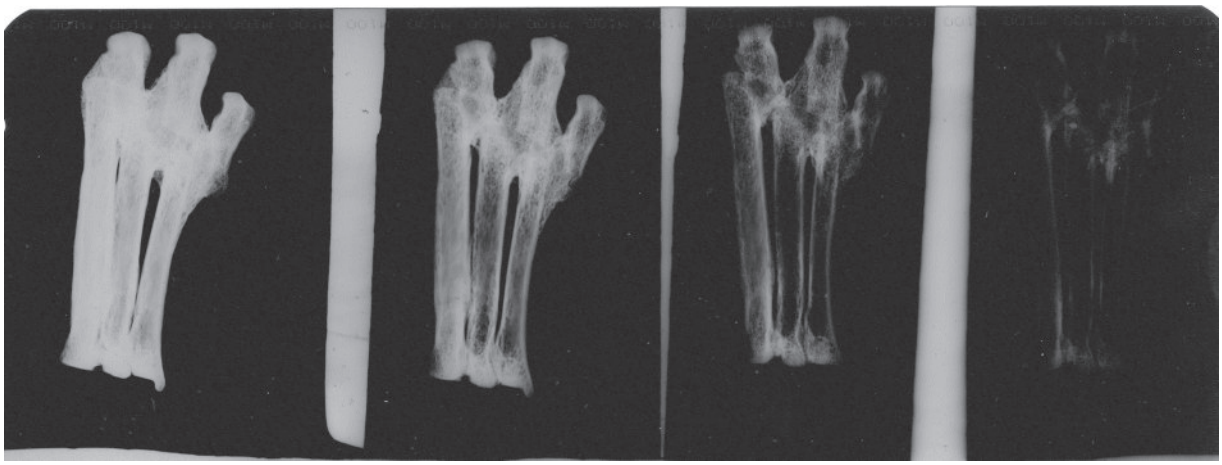
175.
J14-Ke-73-3
Plaster, fragmented.
Fig. 175.
Measurements not available.
Colours: White and red.
Three fragments with irregular painted deco. The base colour is white, various irregular lines are applied with red paint. The fragments

Body-part distribution

	Trench A	Trench B	Trench J	Trench K
Head	4	8	29	45
Central body	3	15	21	57
Upper legs	3	19	25	79
Lower legs	9	9	17	62



191. The distribution of sheep and goat remains, according to body part representation.



192. X-ray of three joined dog metapodiums, with clear fracture and regrowth stabilising the bones.

consist of two plaster layers: coarse plaster covered by a very finely levigated and thinner layer of lime. Painting technique not analysed.
References: Lichtenberger, Raja and Sørensen (2013, 2017), fig. 149; Ettinghausen (1962); Cruikshank Dodd (1997-98); Fowden (2004).
Umayyad.

176.
J14-Ke-3-540
Painted plaster, fragmented.
Fig. 176a-b.
Measurements not available.
Colours: White, yellow and blue.
The deco. appears to have mainly consisted of parallel coloured bands of varying width. The fragment consists of two plaster layers: coarse plaster covered by a very finely levigated and thinner layer of plaster. Painting technique not analysed.
References: Lichtenberger, Raja and Sørensen (2017), fig. 149; Ettinghausen (1962); Cruikshank Dodd (1997-98); Fowden (2004).
Umayyad.

177.
J14-Kg-3s-378
Painted plaster, fragmented.
Fig. 177a-b.
Measurements not available
Colours: Green, black and white.
Munsell: 10Y-5GY 6/5GY; 2.5Y 3/1; 2.5Y 8/2.
The deco. seems to have mainly consisted of parallel bands of colours of varying width. The fragment consists of two plaster layers: coarse lime covered by a very finely levigated and thinner layer of lime. Painting technique not analysed.
References: Lichtenberger, Raja and Sørensen (2017), fig. 149; Ettinghausen (1962); Cruikshank Dodd (1997-98); Fowden (2004).
Umayyad.

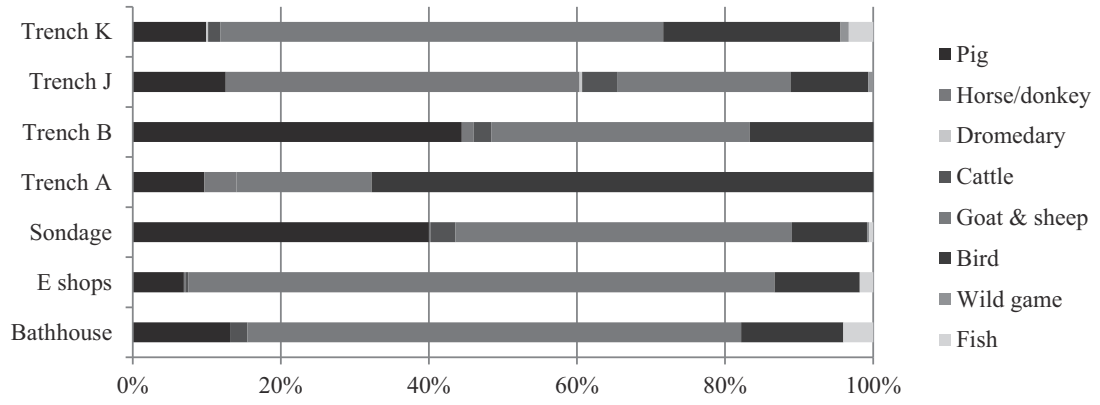
178.
J14-Ke-3-258
Painted plaster, fragmented.
Fig. 178a-b.
Measurements not available.
Colours: Red and green.
Munsell: 10R 4/6; 10Y-5GY 4/2.
On one fragment, red and green deco. appears to have parallel coloured bands of varying width. Two fragments have only one colour. The fragments consist of two plaster layers: coarse plaster covered by a very finely levigated and thinner layer of plaster. Painting technique not analysed.
References: Lichtenberger, Raja and Sørensen (2017), fig. 148; Ettinghausen (1962); Cruikshank Dodd (1997-98); Fowden (2004).
Umayyad.

Stone Objects
Sculpture (AL, RR)

179.
J14-Kc-3-133
Over-life sized white marble hand, fragmented.
Fig. 179a-b.
H.: (broadest place, incl. fragment on top of the hand): 11; H.: (from lower part of thumb to upper part of hand): 8; L.: (from end of broken-off wrist to broken-off fingers: 14.5; W.: (across back of hand at the broadest place): 13; W.: (across the wrist): 8; Traces of an attribute running along the back of the hand: 6 (broad).
The fragment is of a larger than life sized right hand, made of white, finely grained marble. It is preserved from the middle of the wrist until the beginning of the fingers. An object/attribute ran along the top of the back of the hand. All breaks are clean and straight, which may indicate that the piece had been reworked for secondary use. The smooth surface of the stone is well preserved in the areas which are not broken, and is well done. There are some lime-spots on the marble, which have not been cleaned off.
Palm (inner side) of the hand: The lower joint of the thumb is preserved, and is broad and almost egg-shaped. The line which separates the wrist from the hand is visible, beginning immediately below the thumb joint. The line indicating the beginning of the fingers is also visible, beginning app. 2 cm from where the upper part of the lower thumb joint ends. On the right side of the palm, stretching across the line indicating the beginning of the fingers, is a fragment of a square piece of marble (2 by 2 cm), which may have been the beginning of a support for another part of the sculpture.
Upper (outer) side of the hand: On the upper

193. Two equid cervical vertebrates (6.-7. V.ce.) with significant osteoarthritis in the joint.

	Bathhouse	E shops	Sondage	Trench A	Trench B	Trench J	Trench K
Pig	39	38	146	9	56	37	36
Horse/donkey	0	1	1	4	2	141	-
Dromedary				-	-	1	1
Cattle	7	2	12	-	3	14	6
Goat & sheep	198	435	166	17	44	69	217
Bird	41	63	37	63	21	31	87
Wild game			1	-	-	*2*	4
Fish	12	10	2	-	-	-	12



194. The distribution of species from a series of contexts in Jerash; from the North West Quarter and the town centre.

side of the hand, lines which indicate muscles and sinews are visible. There is a long break along the hand from above the index finger until the wrist, which stems from an attribute which cannot be identified. It is shaped as a 13 cm long wedge, which is 3 cm wide at the top and 8 cm wide at the other end.
The hand is massive, and heavy in its expression.
References: Weber (2002), p. 406-407; pl. 17; Taf. 45, A,B.
Roman (2nd – 4th cent. AD).

Inscription (AL, RR)

180.
J14-Jd-32-216
Fig. 180a-b.
Inscription, fragmented.
D.: 2.3; H.: 6.5 (longest preserved stretch); W.: 6 (widest preserved strip).
Letters:
Upper line: H.: 3; W.: 2 (preserved width, not complete); depth of letter cutting: 0.3.
Lower line: H.: 2.2 (preserved height, not complete); W.: 1.5 (broadest place); depth of letter cutting: 0.3.
Smoothly worked limestone. Two incised horizontal lines mark the separation of the letter lines. Fragments of five letters, arranged on two lines, are preserved. In the upper line an R as well as an O may be reconstructed. In the lower line, at least an M and an R. There are traces of intense red paint in all letters.
Roman (2nd cent. AD).

Stone Vessels (SR)

181.
J14-Keg-57-4 + J14-Kh-70-6
Base, stone vessel, fragmented.
Fig. 181.
Kh-70-6: L.: 3.17; W.: 2.88/ Keg-57-4: H.: 4.7; L.: 8.1; Diam.: 12.
Soft greyish-green stone vessel, with incised deco. of vertical, horizontal and diagonal lines and a net-pattern.
Not datable.

182.
J14-Jcd-32-60
Basalt mortar, fragmented.
Fig. 182.
H: 6.6 L: 24.5.
Black-bluish stone; rounded rim; standing on two feet.
References: Clarke (1986-1), fig. 24; Riis (1990), fig. 77, 78; Thuesen (1988), pl. 51.12.
Not datable.

183.
J14-Ke-23-1
Mortar with pestle, intact.
Fig. 183a-b.
Mortar: H.: 9.0; W.: 13.2; indentation: 4.8; W.: 8.4; Pestle: H.: 6.0; W. (min.): 2.6; W. (max): 3.6; indentation: 1.8.
Small grey-yellowish limestone mortar with pestle. Slightly weathered.
References: McNicoll *et al.* (1992), pl. 6.
Not datable.

184.
J14-Jd-32-180
Marble mortar, fragmented.
Fig. 184.
H.: 4.4; W.: 8.7; Diam.: 18.0.
Fragmented mortar in white marble. Rim, handle and base are preserved.
Not datable.

Game Board and Game Pieces (SR)

185.
J14-Kc-3-130
Marble game board, fragmented.
Fig. 185.
L.: 10.9; W.: 8.0; T.: 1.5.
White marble game board. Some very shallow incised lines on the upper surface.
Not datable.

186. (4 game pieces)

J14-Ka-3-102
Game piece.
H.: 0.96; L.: 2.49; W.: 1.77.
White-yellowish quartz stone. Rounded.
Not datable.

J14-Kc-3-131
Game piece.
H.: 1.2; L.: 0.3; W.: 0.2.

White quartz stone, rounded.
Not datable.

J14-Ke-3-207
Game piece.
H.: 1.0; L.: 2.0; W.: 1.4.
Light amber coloured quartz stone, rounded.
Not datable.

J14-Kefgh-3s-302a
Stone (game piece?)
H.: 0.7; W.: 0.3.
Sand coloured stone, round and flat. Probably a game piece.
Not datable.

Varia (SR)
187.
J14-Kgh-3s-310
Marble plate, fragmented.
Fig. 187.
H.: 3.5; L.: 5.2; W.: 4.7.
Worked piece of white marble.
Not datable.

188.
J14-Ke-3-179
Whetstone, fragmented.
Fig. 188.
H.: 7.3; L.: 4.0; T.: 1.5.
Trapezoidal black stone. Surface full of scratches.
Not datable.

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THE BĪR MADHKŪR PROJECT 2015: SITE REHABILITATION, CONSERVATION AND LAND ROUTES

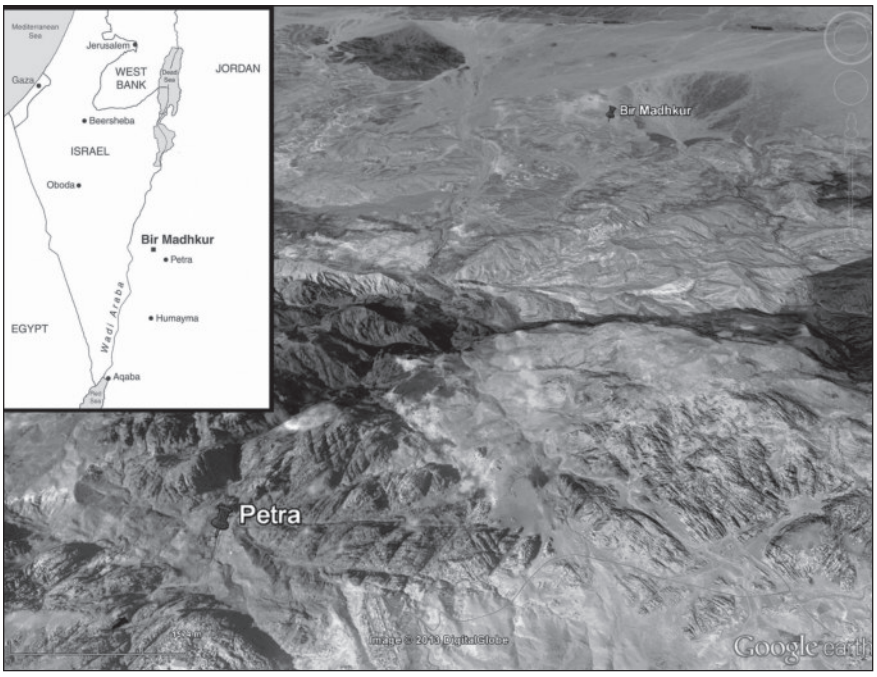
Andrew M. Smith II and Andrea Kay

Abstract

This report details the results of site rehabilitation and conservation work at Bīr Madhkūr conducted between 22 July and 20 August 2015. With the permission of the Department of Antiquities of Jordan, specific goals in 2015 were: (1) to carry out an assessment of damage caused by bulldozing when the modern village was constructed adjacent to the ancient site; (2) to produce and implement a landscape design plan that included site improvement work such as cleaning debris and rubbish from the area, removing spoil heaps from prior excavation seasons, taking steps necessary to prevent further damage to the bulldozed areas of the site, and architectural conservation. In addition to this site rehabilitation work at Bīr Madhkūr, another important goal of the 2015 season was to conduct a feasibility study to explore how to integrate Bīr Madhkūr and the region into Jordan's broader tourism network, specifically as it relates to Petra. This focused on examining and documenting one of several land routes between the two sites and assessing this route in terms of its cultural and natural heritage value. This Bīr Madhkūr Incense Route Project (BMIRP) operated as a heritage component of the Bīr Madhkūr Project (BMP) and was supported by a generous grant from USAID - SCHEP.

Introduction

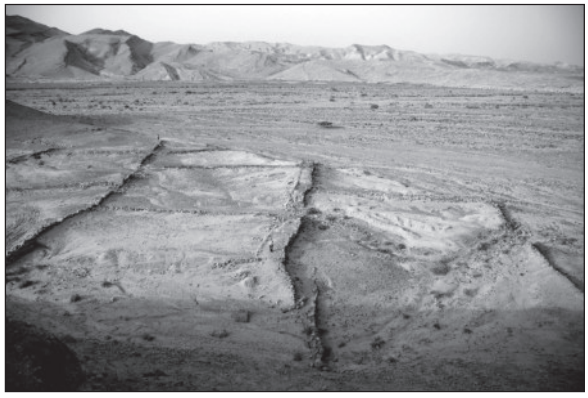
Bīr Madhkūr lies nestled in the foothills of Wādī 'Araba in southern Jordan (**Fig. 1**). The main feature at the site is a third century



1. General regional map showing location of Bīr Madhkūr.

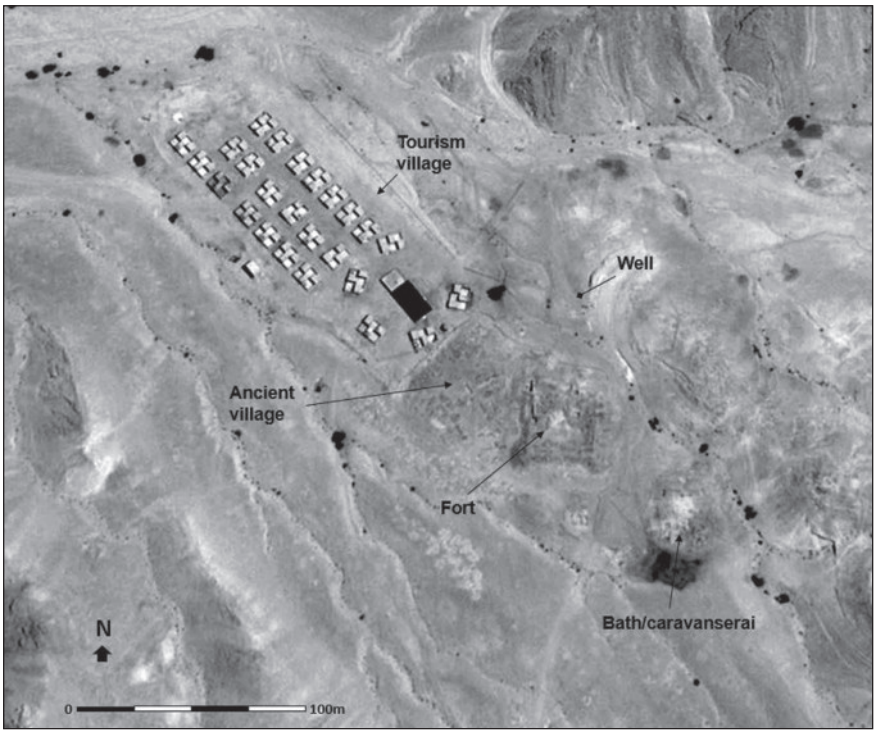
AD Roman / Byzantine fort, which measures just over 30 × 30 m (**Fig. 2**; Smith 2005, 2010a, 2010b). The fort has been but partially excavated, so it still appears mainly as a large mound of stone debris. Other features at Bīr Madhkūr that highlight the prominence of the site in antiquity include a bath building, a civilian settlement west of the fort, cemeteries and numerous other structures in outlying areas, especially on the ridge that divides the fort from the local spring (Perry 2007). The main source of water at Bīr Madhkūr is the well just north of and adjacent to the fort.

Bīr Madhkūr was not an isolated settlement. The surrounding territory, particularly in the direction of Petra, is replete with archaeological remains, which range from the more apparent caravan stations and farmhouses to smaller cairns and graves. Most impressive are the extensive remains of a vast agricultural system dating to the Classical period (**Fig. 3**; Ramsay and Smith 2013), which is comparable to the agricultural activity exhibited at Faynan to the north (Barker *et al*. 1997, 1998, 1999, 2000; Barker, Gilbertson and Mattingly 2007). Also, the ancient incense route once coursed through the region, along which Bīr Madhkūr itself served as a major way-station. As a regional, administrative hub in the Greek, Roman and Byzantine periods, situated securely in the hinterland of Petra, Bīr Madhkūr hosted soldiers who watched over and monitored the movements of a mixed population of farmers, pastoralists and transient merchants.



3. Ancient agricultural fields along the north bank of Wādī Musa.

The Bīr Madhkūr Project seeks largely to explore the complex social and economic relationships among and between these various population groups in antiquity. This is a multi-disciplinary field project in Jordan that examines the historical geography of Wādī ʻAraba through archaeological and ethnographic research. A key goal is to understand the long-term settlement history of the region, inclusive of the activities of present-day *bedouin*, so



2. Bīr Madhkūr from the air.

as to achieve a deeper understanding of how these human communities in antiquity defined themselves in relation to their environment and to one another. In a broader context, the project examines the economic relationship between Petra and its hinterland from a rural perspective.

While the Bīr Madhkūr Project is focused on investigating and preserving the cultural heritage of Jordan, the project is also designed to respond to royal initiatives to promote the economic development of Wādī ʻAraba. This is manifested, first and foremost, in our site rehabilitation and conservation efforts. In 2015, for example, we focused on integrating the ancient site with the tourism village, developing interpretive paths through the site and preserving structures along the edge of the site that were damaged when the modern village was constructed in the 1970s (see below). This is manifested also in the project's study of ancient agricultural systems in central Wādī ʻAraba, especially in analyzing the prospects for reviving ancient methods of water usage and conservation for local use. Lastly, this is manifested in our efforts to document and preserve one of several routes that connect Bīr Madhkūr with Petra, in conjunction with the development of a tourist park in Wādī ʻAraba. This work is now supported by a USAID - SCHEP grant from the American Center of Oriental Research (ACOR). Further support for this work has been provided by the Hashemite Fund for the Development of Jordan Badia, the Antiquities Coalition and The George Washington University.

Objectives and Outcomes: The 2015 Study Season

As noted, the project returned to the field for four weeks in 2015 in order to carry out site rehabilitation work at Bīr Madhkūr. Our focus was on: (1) assessing damage caused by bulldozing when the modern village was constructed; (2) developing a landscape design plan based on this assessment with an eye to future economic development; (3) the rehabilitation of one of the routes between Bīr Madhkūr and Petra. All of this work was done in close collaboration with the local community and the Department of Antiquities. A discussion of project outcomes follows.

Site Rehabilitation and Conservation

In the 1970s, when the modern village was initially built adjacent to the ancient site, a large section of the edge of the archaeological site of Bīr Madhkūr was removed. This section lies along the border of the Roman village settlement; the debris pile from the destroyed house-sections was pushed to the south-west corner of the site (**Fig. 4**). Two important observations were made immediately upon reviewing the damage caused by this activity. One was that the bulldozer destroyed nearly half of all of the rooms of the houses along the edge of the site; another was that the bulldozer undermined the structures by at least half a meter, which led to the eventual erosion of the unbulldozed sections. In order to mitigate against further erosion damage, we began construction of a terraced pathway along the edge of the site (**Fig. 4**). This had the added benefit of contributing to the landscape design by adding a section to the interpretive paths through the site (see below). Simultaneously, we began preserving the wall sections that had been exposed previously (**Fig. 5**).

4. Edge of ancient site disturbed by bulldozing in the 1970s. Note debris pile in the background.

5. Consolidation of wall sections exposed by the bulldozer cut.

Beyond general site clean-up, we also worked to remove spoil heaps from previous seasons of excavation, which had been completely sifted, in addition to the debris pile caused by the bulldozing activity along the edge of the Roman settlement. This was successful, although it was clear that the bulldozed debris pile from the 1970s could not be removed without assessing the quantity of cultural remains within it (though these remains were clearly not in any stratified context). Accordingly, we sifted some of the soil from the debris pile and discovered large amounts of pottery and other remains, but only the coins were registered. For the soil that we did not sift, we created a stone-lined container adjacent to the debris pile and had the material transferred to it for future sifting. We anticipate this serving as a training unit for student visitors to the site to learn excavation methods and techniques.

Lastly, in terms of site improvement, we began the development of pathways through the site and the creation / repair of a low-lying stone perimeter wall around the archaeological features. This will protect the archaeological features by directing the pedestrian traffic through and around the site (see below).

Landscape Design Plan for Bīr Madhkūr

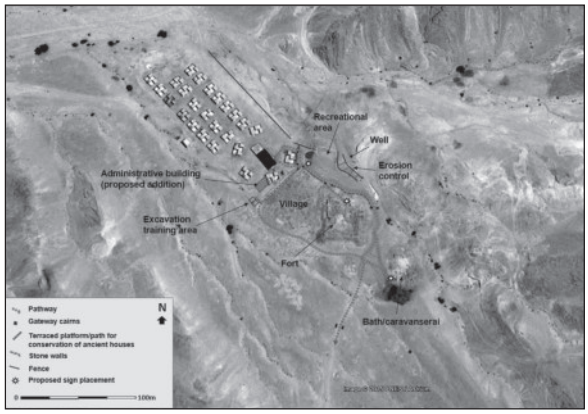
Several factors had to be considered in the landscape design plan for Bīr Madhkūr. The most important of these dealt with site preservation and the need to address ongoing threats to different elements of the site. Other factors concerned how best to integrate the ancient site with the adjacent renovated village, which was originally built in the 1970s, and how best to facilitate and direct pedestrian traffic around and through the site.

Two major threats were identified in our initial assessment and were addressed immediately. The first was erosion north of the fort that threatened the artesian well and the only tree on the site; the second was erosion along the western edge of the site where an entire section of the ancient settlement was bulldozed in the 1970s. The first threat was addressed by expanding and redirecting a drainage channel, so as to ease the runoff away from threatened areas (**Fig. 6**). This included the installation of check-dams, with the entire system following

6. Depiction of the drainage channel and check-dams to redirect water flow away from the ancient well.

the natural contours of the landscape. For the damaged section along the ancient settlement, as mentioned, it proved necessary to build an elevated terrace that could also serve as a footpath.

In building the terraced walkway along the western edge of the site, we were able to address the other two factors, *viz*. the integration of the ancient site with the tourism village and the establishment of pathways through the site. (**Fig. 7**) shows the alignment of paths established through and around the site. In terms of integrating the ancient site with the tourism village, gateways cairns were installed to direct the flow of pedestrian traffic between the two (**Fig. 8**). These cairns also serve to restrict the use of vehicles in the area (now confined to the area of the modern village) so that the area north of the site can be allocated solely to pedestrian use. Lastly, the consolidated wall of the elevated terrace enhances the aesthetic of the ancient site when viewed from the tourism village.



7. Site map of Bīr Madhkūr showing the pathways and proposed placement of signage at the site.

8. Overview of north-west corner of the site where site rehabilitation efforts focused. Note terraced pathway along the edge of the ancient site to prevent further erosion as well as the gateway cairns in the foreground.

Heritage Trail Between Bīr Madhkūr and Petra

In addition to the site rehabilitation work at Bīr Madhkūr, another important goal of the 2015 season was to conduct a feasibility study to explore how to integrate Bīr Madhkūr and the region into Jordan's broader tourism network, specifically as it relates to Petra. This involved, first and foremost, examining one of the several land routes between the two sites and assessing this route in terms of its cultural and natural heritage value. Several factors had to be considered, including: (1) route selection; (2) methods of documenting and mapping the route; (3) strategies for maintaining the route; (4) (not a direct concern in 2015) strategies for marketing the route.

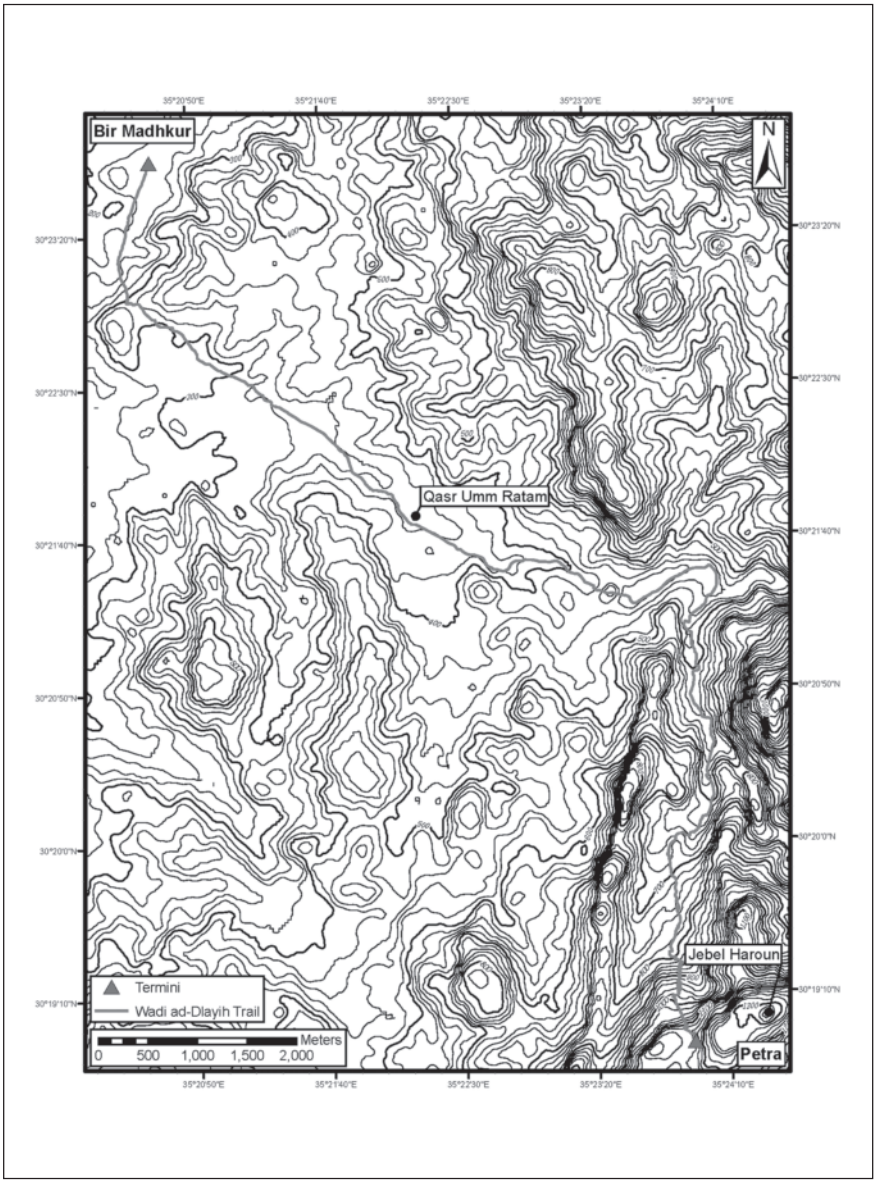
Route Selection

There are many trails that link Petra and Bīr Madhkūr. The three most prominent are: (1) the route from Petra to Khirbat Sufaysif, which is a Nabataean caravan station along the south bank of Wādī Musa (a branch of this route leads north to Qasr Umm Ratam at the confluence of Wādī Musa and Wādī Umm Ratam); (2) the route from Petra to Bīr Madhkūr *via* Umm Ratam through Wādī ad-Dlayih; (3) the route from Beidha to Bīr Madhkūr. The most accessible trail, still used today by the local population at Bīr Madhkūr, is that which passes through Wādī ad-Dlayih; it is this trail that the project plotted, described and assessed. This is also one of the more direct trails to the ancient site of Bīr Madhkūr.

Documentation and Assessment: Strategy and Methods

In terms of documenting and mapping a route between Bīr Madhkūr and Petra, an important goal was to develop a procedure that could be standardized and easily implemented. The idea was to design a template for the future documentation and assessment of additional routes in the region, and then eventually linking these routes to other prominent sites in the region (e.g. Faynan, in addition to Petra). Accordingly, a standardized form was created with which we could consistently plot the route and document features and transitions along it. Guiding this work was the decision to employ the US Forestry Service's methodology for conducting trail inventory and condition assessment, *viz*. the Trail Assessment and Conditions Survey (TRACS). According to the methods of the US Forestry Service, trail fundamentals include five key concepts that are cornerstones of trail management: trail type, trail class, managed use, designed use and trail design parameters (http://www.fs.fed.us/recreation/programs/trail-management/trail-fundamentals/). These were incorporated into our design plan; it proved useful that the US Forestry Service has a standardized TRACS - Trail Management Objectives (TRACS - TMO) form with which to capture this data. With the TRACS - TMO form as an initial template, we began designing a comparable form that was more orientated to the project area. This was a work in progress, with the form going through four iterations over the course of four weeks. Appendix A shows the final version of the form used by the project (BMIRP - TMO v4).

In terms of documenting the route, it was necessary to account for the various landforms across which the route passed (**Fig. 9**). Accordingly, the entire route was divided into 15 sections and a form was completed for each. This allowed for an assessment of the risk factors along each section, as well as the levels of difficulty and the value of each section (measured in terms of historic, scientific, aesthetic, natural and social interest). Each section was carefully plotted, with markers (i.e. stone cairns) being set up at the ends of each section as well as along the course of each section where the visibility of the trail was in



9. Map showing the trail between Bīr Madhkūr and Petra documented in 2015.

question (**Figs. 10, 11**). In addition to the trails, the markers themselves were also carefully plotted and numbered, which should facilitate future inspection and maintenance of the route.

Training Program in Trail Assessment, Repair and Maintenance

The training program in trail assessment, repair and maintenance lasted a total of four weeks, which was concurrent with the documentation and mapping of the trail itself. This training program, which followed a general presentation on mapping and mapping techniques to everyone, met with some successes. One important aspect of the training program was the successful plotting and mapping of the trail itself, which the trainees themselves

10. Trail marker on route between Petra and Bīr Madhkūr.

11. Gateway cairns for the beginning of the trail at Bīr Madhkūr.

identified. Since the forms were in English, the survey team managed the descriptions and most of the technical details. Meanwhile, the trainees assisted with the assessment of value markers along the trails (e.g. historic; scientific; aesthetic; natural; social), which was a component of their training as future guides. A significant amount of time was also spent in identifying sections that required repair and conducting hands-on work to demonstrate how the trail should appear once fully developed. This was very successful; most of the trail from Bīr Madhkūr to Wādī Musa was cleared in the four-week period. The remaining section was completed by the trainees in the months following the four-week field season. Lastly, the trainees were taught how to differentiate between trail sections, as well as being trained to set up appropriate markers to delineate the course of the trail.

There was some trial and error in the design and implementation of the training program. Several factors had to be considered beforehand and many more had to be dealt with once the training began. The most limiting factor was the lack of choice of participants from the local community. Essentially, the Bīr Madhkūr *jam'iyya* selected the pool of candidates available to us. Fortunately, many of those candidates had worked on the project in previous seasons, so there was some level of awareness of what we were doing and why. There were also varying levels of education and commitment to the goals that had to be addressed. All of these factors will be taken into consideration as we move forward with the training initiative, when future goals will be: (1) to develop an Arabic version of the BMIRP - TMO form; (2) to work with the local community on using the form; (3) to devise a training initiative that will facilitate the training of some members of the local community in the use of portable GPS surveying equipment.

Conservation Management Plan

An important projected outcome of the Bīr Madhkūr Project is to have drafted an approved conservation management plan for Bīr Madhkūr and sites in the territory of Bīr Madhkūr. This will be a collaborative effort with the Department of Antiquities of Jordan and the local community. Other, anticipated stakeholders will be the Jordan Valley Authority, the Hashemite Fund for Development of Jordan Badia, The George Washington University, the Antiquities Coalition and, through its USAID - SCHEP initiative, ACOR.

A central aspect of the conservation management plan will be to integrate Bīr Madhkūr with the numerous sites in its hinterland. The Bīr Madhkūr Project has already documented more than a thousand sites of various types after several seasons of intensive survey. An important motivation for this previous work was to get ahead of several impending development plans that threaten the cultural landscape of Wādī 'Araba, in order to be better able to assess potential impacts. These include the planned development of the Red - Dead water conveyance project, current agricultural projects initiated by the Jordan Valley Authority (already vast portions of the alluvial fan north of Bīr Madhkūr have been bulldozed), the planned development of a dam in Wādī Musa that will destroy (potentially) many hundreds of archaeological sites, and prospective mining based on recent land concessions to the east. There is also extensive looting at several regional sites as well as damage caused by erosion and other natural factors. At this time, the conservation management plan continues as a work-in-progress.

Acknowledgements

The authors of this report are especially thankful to Dr. Monther Jamhawi, director-general of the Department of Antiquities for his encouragement and support of this project, in addition to all of the staff of the department,

especially Jihad Haroun, Aktham Oweidi and Ahmad Lash. We are also very thankful to Dr Barbara Porter, Director of ACOR, for sharing her expertise and guidance as the project focused in 2015 on community engagement and heritage development. Likewise, we acknowledge the patience and support of Dr Erin Addison, Dr Glenn Corbett and Abed al-Rahman Nasarat. Also very supportive was Dr Raed al-Tabini, director of the Hashemite Fund. The staff in 2015 included Steve Ellwood, Dr Jennifer Ramsay, Stephen Chadwick, Ahmad Dhaher, Naef Zaban, Ahmad al-Hasanat and Yehya Suleiman al-Hasanat. They are to be commended for their hard work, dedication to the goals of the project and their endurance for having survived a record-breaking heat wave in Wādī ʻAraba in August.

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REPORT ON THE ḤUMAYMA EXCAVATION PROJECT'S 2014 SURVEY OF PETROGLYPHS AND QUARRIES

M. Barbara Reeves, Craig A. Harvey and Brian Seymour

Introduction

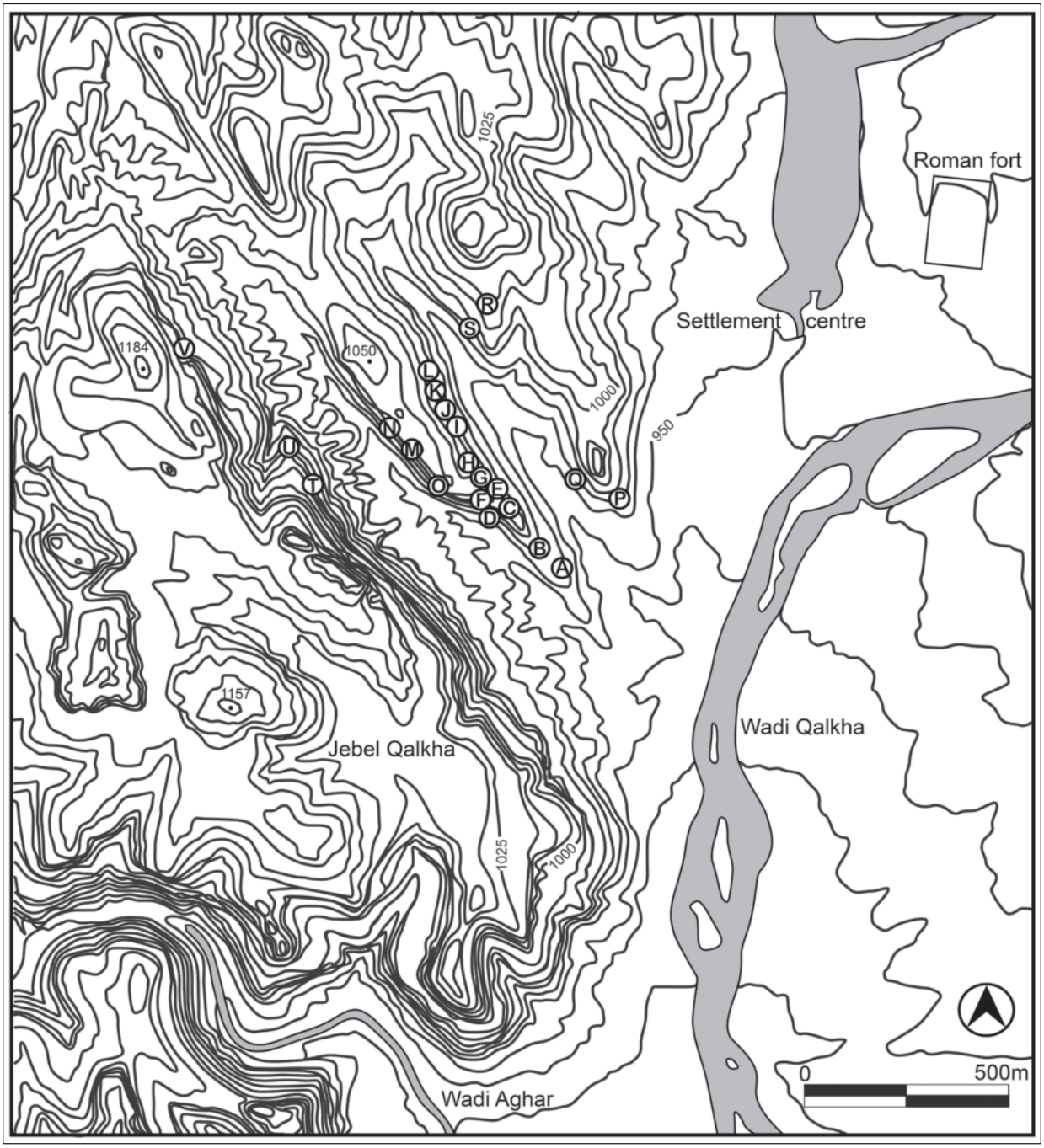
In May 2014 the Ḥumayma Excavation Project (HEP) conducted a short survey in the sandstone hills and ridges to the west of Ḥumayma's Nabataean to early Islamic settlement (**Fig. 1**). The incentive for the survey was the discovery during HEP's 2012 season of a petroglyph depicting a religious ceremony on one of the ridges. Subsequent analysis suggested that the petroglyph dates to the Roman period and depicts a Roman officer, a god (likely Jupiter - Ammon - Serapis) and the local topography (Reeves in 2015). A Greek inscription and a couple of Nabataean inscriptions were also noted on the same cliff face as this petroglyph, suggesting that the area held special significance for some of Ḥumayma's ancient inhabitants. The goal of the 2014 survey was to gain a better understanding of how this area had been used by Ḥumayma's past occupants by documenting other human activity areas on this ridge (especially petroglyphs and quarries) that had not been documented by previous scholars[1].

Survey Area and Methodology (Fig. 1)

The survey area was located west of the plain on which Ḥumayma's ancient settlement was situated, near to the notched peak of Jabal Qalkha which is Ḥumayma's most prominent landmark. Prehistoric run-off from Jabal Ḥumayma to the north and Jabal Qalkha to the west has carved out two *wadi*s here, with towering dendritic ridges of sandstone on either side. Both *wadi*s and ridges fall off from the north-west to south-east, where they merge into the desert north of Wādī Qalkha and the hypothesized route of the *Via Nova Traiania* (Oleson 2010: fig. 2.7). For the purposes of this survey, we designated the ridge closest to the settlement as Ridge 1 and the ridge between Ridge 1 and Jabal Qalkha as Ridge 2. The *wadi* between Jabal Qalkha and Ridge 2 is called Wādī Ḥumayma on maps and is also known locally as Wādī Abū Ṣuwwānah; the *wadi* between Ridge 1 and Ridge 2 is known locally as Wādī al-Burqa.

The two ridges and eastern flank of Jabal Qalkha have been the focus of several surveys since the 1980s. John Oleson has published the hydraulic structures, rock cut tombs, a church, and some betyls and inscriptions from Ridge 1 and Jabal Qalkha (Oleson 2010; Oleson and Schick 2013). David Graf has collected ancient inscriptions carved into the rocks in this area; he has published one Nabataean inscription from Jabal Qalkha (Graf 1992) and has indicated his intention to publish the others soon (Graf pers. comm., July 2014). Finally Donald Henry has published Upper Paleolithic and Epipaleolithic sites across all three of these landmasses (Henry 1995). Although the published surveys have contributed much to our understanding, some ancient remains (e.g. petroglyphs and quarries) have only received cursory mention in previous publications.

1. The survey took place from 18 to 21 May 2014. Funding was provided by the Senate Advisory Research Committee of Queen's University. The project director was Dr M. Barbara Reeves of Queen's University, Canada. Craig A. Harvey was the associate director, Brian Seymour was the draughtsman and Manal Basyoumi served as representative from the Department of Antiquities. Swaylem al-Manaja, a local resident, assisted in locating and recording sites. The Ḥumayma Excavation Project is accredited by the Archaeological Standards Committee of the American Schools of Oriental Research and licensed by the Department of Antiquities of the Kingdom of Jordan. The team is very grateful to Dr Monther Jamhawi, director-general of the Department of Antiquities, and to Dr Barbara Porter and all the staff at ACOR for their assistance with the project.



1. Topographic map of Ḥumayma with 2014 survey locations marked.

The discovery of the religious ceremony petroglyph in 2012 provided the incentive for a four-day survey in 2014 whose goal was to put the petroglyph into its regional context by documenting other unpublished ancient features on Ridge 2, with a special emphasis on other petroglyph sites. A five-person team walked along Ridge 2 noting the location of ancient features. Each feature was then documented via written descriptions, photographs, measurements and GPS coordinates. Measurements of up to 5 m were recorded by tape measure; measurements over 5 m were recorded by pacing. Context was assessed by recording the views from each site and recording where each site could be viewed from. Although Ridge 1 and Jabal Qalkha lay outside our intended survey area, some petroglyph sites there came to our attention during the field

season. These particular sites were documented, but no systematic survey of either Ridge 1 or Jabal Qalkha was attempted. In order to keep track of the sites' location during the survey, sketch plans of Ridge 2 and the Eastern Cascading Plateau Site on Jabal Qalkha and photographic panoramas of each landmass were created. The sites were later plotted onto a topographic map (**Fig. 1**) prepared from the 1:25,000 Jordanian Ministry of Economy map (sheet 180-925).

Sites Documented

The survey documented 15 sites and 17 sub-sites across the three landmasses. For convenience, each site was given a name based on both its cardinal location on the landmass and a prominent feature. For simplicity, the cardinal locations were abbreviated to "Eastern", "Western" and "Southern", referring to each site's relative location on the flank of its landmass. **Table 1** lists the features documented at each site. As the survey was done quickly and no overburden was removed from the surface of sites, the numbers of features should be viewed as minima. Also, owing to time constraints and modern occupation, only rock shelters obviously associated with ancient features were documented.

Table 1: Summary of Survey Results.

Landmass	Site	Sub-site	Fig. 1 Label	Features
Ridge 2	Southern Tip of Ridge Activity Area		A	Two large bedrock holes
Ridge 2	Southern Knob Activity Area		B	Two large bedrock holes; many sets of linear scratches; many inscriptions (modern)
Ridge 2	Southern Flat Top Activity Area		C	One large and three small bedrock holes; one petroglyph (footprint)
Ridge 2	Western Scratches below Southern Flat Top Activity Area		D	Three sets of linear scratches
Ridge 2	Eastern Commemoration Cliff		E	Eight petroglyphs; three inscriptions (one Greek; two Nabataean)
Ridge 2	Eastern Quarry	Section 1	F	Quarry faces; quarry platforms; two petroglyphs (modern); many inscriptions (modern); two clusters of linear scratches above quarry
Ridge 2	Eastern Quarry	Section 2	G	Quarry faces; rock shelter
Ridge 2	Eastern Quarry	Abandoned Quarry Section	H	Quarry separation trenches
Ridge 2	Eastern Quarry	Section 3	I	Quarry faces; quarry platform
Ridge 2	Eastern Quarry	Section 4	J	Quarry faces; quarry platform; 12 linear scratches above quarry; one betyl in niche
Ridge 2	Eastern Quarry	Section 5	K	Quarry faces; one petroglyph (bovid); three inscriptions (modern)
Ridge 2	Eastern Quarry	Section 6	L	Quarry faces; quarry platforms; abandoned quarry area
Ridge 2	Western Footprint Site		M	Rock shelter; four petroglyphs
Ridge 2	Western Bovids Site		N	Rock shelter; six petroglyphs
Ridge 2	Western Big Quarry		O	Quarry faces

Landmass	Site	Sub-site	Fig. 1 Label	Features
Ridge 2	Western Little Quarry			Quarry
Ridge 1	Tomb Complex A104.T1		P	Tomb, stairs; quarry; one betyl
Ridge 1	Western Quarry		Q	Quarry
Ridge 1	Western Isolated Petroglyph on Rock		R	One petroglyph
Ridge 1	Western Rock Shelter Site	Upper	S	Rock shelter; 16 petroglyphs; one inscription
Ridge 1	Western Rock Shelter Site	Lower		Three sets of petroglyphs; one set of linear scratches
Jabal Qalkha	Eastern Cascading Plateau Site	Burial site	T	Two - three burials
Jabal Qalkha	Eastern Cascading Plateau Site	Panel 1		No visible features
Jabal Qalkha	Eastern Cascading Plateau Site	Panel 2	U	80 petroglyphs; 15 inscriptions (Greek; Nabataean; Thamudic; Arabic)
Jabal Qalkha	Eastern Cascading Plateau Site	Panel 3		Semicircular feature; linear and curvilinear grooves; seven petroglyphs
Jabal Qalkha	Eastern Cascading Plateau Site	Panel 4		Steps; one modern inscription (Arabic)
Jabal Qalkha	Eastern Cascading Plateau Site	Panel 5		Five petroglyphs
Jabal Qalkha	Eastern Cascading Plateau Site	Panel 6		12 petroglyphs; one inscription (Greek)
Jabal Qalkha	Eastern Cascading Plateau Site	Panel 7		No visible features
Jabal Qalkha	Eastern Niche and Petroglyphs Site		V	One niche; several petroglyphs

The rest of this report will describe the individual sites, organized by landmass.

Ridge 2 (R2) (**Fig. 1**)

Ridge 2 is sandstone ridge located west of Ḥumayma's ancient settlement between Jabal Qalkha and Ridge 1. It is a dendritic ridge that has been cut by Wādī al-Burqa running along its eastern side and Wādī Ḥumayma running along its western side. This ridge emerges from the landmass to the north-west of the ancient settlement at a high elevation. It then slopes gradually down to the south-east for *ca* 1,500 m until it disappears into the desert at ground level. Along its top and upper sides are outcrops of exposed sandstone, whose relatively flat tops and straight sides have been used by humans for a variety of activities. In the region of the Eastern Quarry, the outcrops are *ca* 100 m wide, whereas further south they diminish to less than 15 m wide. Below these sandstone outcrops the ridge slopes down into the *wadi*s on each side. The sides of these slopes are covered in soil, loose cobbles and pebbles.

R2 Southern Tip of Ridge Activity Area (**Fig. 1.A**)

The southernmost sign of human activity on Ridge 2 is a large hole (diam. 0.32 m; depth 0.2 m) carved into horizontal bedrock *ca* 10 m north of where the ridge disappears into the desert surface. The ridge here is only *ca* 15m wide and the hole is situated on the eastern side, *ca* 5 m west of the eastern edge. There is a second large hole (diam. 0.24 m; depth 0.18 m) in horizontal bedrock *ca* 90 m north of the southern hole, 4 m

2. Southern end of Ridge 2 viewed from the Southern Flat Top Activity Area; the Southern Knob Activity Area is in the centre.

3. R2 Southern Flat Top Activity Area with Quarry Section 1 and Commemoration Cliff at rear.

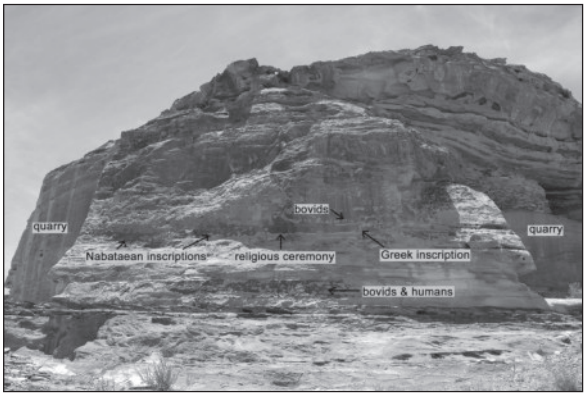
east of the western edge of ridge (which is *ca* 25 m wide at this point). No GPS coordinates were recorded at these locations so the label on (**Fig. 1**) is only an approximation.

R2 Southern Knob Activity Area (**Figs 1.B and 2**)

This natural, *ca* 18 m-long × *ca* 15 m-wide sandstone knob with a flattish top sticks up *ca* 2 m above the surrounding area of Ridge 2 on the ridge's southern quarter. The ridge is only 20 m wide here, with this prominent knob riding the centre of its spine. Its elevation is far below that of the Southern Flat Top Activity Area to the north, but above the continuation of the ridge to the south. Natural steps on the north side lead up to a relatively flat ancient activity area. A large hole (diam. 0.22 m; depth 0.15 m) has been incised into the horizontal surface on the top of the knob near the centre of the southern edge. Another large hole (diam. 0.34 m; depth 0.2 m) has been incised into the horizontal bedrock near the centre of the knob on the western side. There are also many sets of linear scratches in the dark patina / desert varnish covering the eastern side of the top surface. The sides of the knob are covered in scratched and spray-painted modern Arabic graffiti; a mortar-covered block beside the knob has an incised Arabic graffito.

R2 Southern Flat Top Activity Area (**Figs 1.C and 3**)

This large, flat sandstone surface (*ca* 115 m long by a maximum of 35 m wide) is located at the southern end of the high outcrop on which the Eastern Quarry and the Commemoration Cliff are located. It is directly south of Eastern Quarry Section 1 and shares its ground level. Its southern end is demarcated by a steep drop down to the southern continuation of the ridge. The northern section has been created by quarrying away the good tan and friable yellow sandstone, stopping at the level of the less useful dark purple sandstone. There are no obvious signs of quarrying on the southern section, but the possibility cannot be ruled out. The extant surface is relatively flat and consists of a vein of dark purple sandstone (*ca* 0.08 m thick) with patches of tan sandstone overlying in places. Pebbles and soil cover obscure much of the surface. Some exposed areas of the dark purple sandstone are breaking off in cobble-sized chunks, but the section in the approximate centre of surface seems stable. Near the centre of this stable area, a large hole (diam. 0.17 m; depth 0.24 m) has been carved. Nearby are three smaller holes: (1) diam. 0.09 m; depth 0.06 m; (2) diam. 0.1 m; depth 0.04 m; (3) diam. 0.11 m; depth 0.07 m. There is also a carving of a right foot (0.19 m × 0.11 m) that faces towards the southern end of the ridge. This large, windswept, flat surface that was elevated above the more southerly sections of the ridge would have been very visible from the surrounding landmasses, as well as from the desert and *Via Nova* below. The site also provided excellent views of Jabal Qalkha, Ridge 1, three *wadi*s, the southern desert and *Via Nova*, Quarry Section 1, the end of the Commemoration Cliff and the southern continuation of Ridge 2. It is likely that this large, elevated, flat area with excellent visibility was used for a variety of activities.



4. R2 Eastern Commemoration Cliff.

R2 Western Scratches below Southern Flat Top Activity Area (**Fig. 1.D**)

This site is located just below the western side of Southern Flat Top Activity Area on a vertical, west-facing section of natural cliff face behind a small, low-lying bedrock ledge. There are three clusters of lines incised into the desert varnish here in a 4 m-long × 0.5 m-high area which begins 1.5 m above the ledge.

R2 Eastern Commemoration Cliff (**Figs. 1.E, 3 and 4**)

The Eastern Commemoration Cliff is a *ca* 10 m-long natural, vertical cliff face that is covered with petroglyphs and inscriptions. It is located on the eastern side of Ridge 2, immediately north of the Southern Flat Top Activity Area, at the southern end of the Eastern Quarry on the corner between Quarry Section 1, which faces south, and Quarry Section 2, which faces east. While standing in front of the cliff and facing it, the Southern Flat Top Activity Area and desert, Wādī Qalkha and (hypothesized location of) the *Via Nova* can be seen to the left (south). While standing with one's back to the cliff, there are good views of Ridge 1 (and its tombs), Wādī al-Burqa, Wādī Qalkha, the southern desert and the *Via Nova*. It is not possible to see over Ridge 1 to the settlement or fort. The surrounding Eastern Quarry and the Southern Flat Top Activity Area can be seen when viewing the Commemoration Cliff from the sloped sides of Ridge 1.

5. R2 Eastern Quarry - Sections 4 - 6 with Wādī al-Burqa in foreground and eastern flanks of Jabal Qalkha in background.

The rock carvings seem to be restricted to the more easily accessible bottom half of the cliff and to extant patches of dark desert varnish. In many places, sections of desert varnish have eroded away, eliminating portions of extant carvings and likely entire carvings as well. The surviving rock carvings are restricted to three bands of desert varnish.

The lowest band is immediately above the vein of dark purple sandstone that forms the top surface of most of the Southern Flat Top Activity Area. This section would have been easily accessible to the carver. However, it has also been easily accessible to other humans, sheep and goats, which, combined with wind and rain, have eroded away most of the desert varnish and carvings. The extant band of varnish is 5.4 m long and 0.65 m high, and contains at least seven widely spaced figures. From south to north, these figures are: an indeterminable set of figures (0.18 m wide × 0.2 m high); a horned bovid in profile, facing left (0.15 m wide × 0.07 m high); a horned bovid in profile, facing left (0.13 m wide × 0.11 m high); a horned bovid in profile, facing left with its face looking out (0.12 m wide × 0.14 m high); two interacting, standing humans (fighting, dancing or in *orant* poses) (0.13 m wide × 0.12 m high); a standing human with half-raised arms facing out (0.1 m wide × 0.12 m high).

The middle band (0.24 m high) is approximately one-third of the way up the cliff. It contains two long panels of Nabataean inscriptions to the south, the petroglyph showing a religious ceremony at the centre of the band and a short, isolated Greek inscription beginning with the word *MNESTHE* ("Remember") on the north side. The first Nabataean panel is 1.93 m wide and 0.13 - 0.17 m high. The second Nabataean panel is 1.2 m wide and 0.08 - 0.22 m high. The petroglyph is 0.21 m wide and 0.16 m high. The Greek inscription is 0.27 m wide and 0.16 m high, with letters 0.08 m high. These inscriptions, and all others on the landmasses,

are not discussed further here in deference to David Graf who is preparing his own publication on the inscriptions in Ḥumayma's hills.

The only carving on the highest band is immediately above and south of the Greek inscription. It is 0.14 m wide and 0.11 m high, and shows two ibexes butting horns.

R2 Eastern Quarry (**Fig. 1.F - L**)

The Eastern Quarry is a long, multi-sectioned sandstone quarry cut into the eastern face of a high, wide sandstone outcrop in the central section of Ridge 2. The Eastern Quarry begins with a south-facing section immediately behind the Southern Flat Top Activity Area and then extends for more than 300 m along the eastern face of the ridge. The quarry seems to have produced mostly tan sandstone blocks, as well as some yellow blocks and possibly light purple blocks. The presence of a betyl on one of the quarry faces indicates that the quarry was used in the Nabataean period. When it ceased to be used is not clear, but sections were abandoned with quarrying projects still in progress. After it was abandoned, environmental factors eroded some of its faces and allowed desert varnish to form in some places. Also after abandonment, humans added Arabic graffiti and petroglyphs.

For ease of recording, the quarry was divided into six quarry sections and one unquarried section. These are not intended to represent the ancient subdivisions of this quarry.

R2 Eastern Quarry - Section 1 (**Figs. 1.F and 3**)

Quarry Section 1 is the southernmost section of Ridge 2's Eastern Quarry. It faces south-east and provides a back to the Southern Flat Top Activity Area. Adjacent to it on the east is the Commemoration Cliff; there is a natural rock shelter just beyond its western edge. Quarry Section 1 is *ca* 35 m wide and was sub-divided into several discrete areas for quarrying. The western areas are more than double the height of the eastern areas. From west to east, there are three right-angled, flat-backed stepped areas, then a convex-backed area and finally a concave-backed area. A flat, cube-shaped quarry platform (2.7 m long × 1.6 m wide × 0.6 - 0.7 m high) has been left in the western corner of the third stepped area from the west, and a shorter square quarry platform in the westernmost stepped area. Modern Arabic inscriptions and petroglyphs of a dagger (*bedouin* [?]) and curved sword have been carved into the concave-backed face of the quarry.

Two clusters of scratches are located *ca* 2 m above the highest extent of the tall quarry face on this section's eastern side. They are scratched into the desert varnish covering a small, flat ledge that measures *ca* 2 m by *ca* 6 m. The ledge looks over the southern end of Ridge 2 (providing views of the town, fort, southern end of Ridge 1 and Wādī al-Burqa), Wādī Qalkha, the southern desert and the presumed path of the *Via Nova*. The southernmost cluster consists of four separate scratches, whereas the second concentration, 0.2 m to the west, consists of two sets, one of which is very deep and large, and has removed a great deal of the desert varnish. It is possible these marks are related to the quarry below. No other features were found above the quarry in this area.

R2 Eastern Quarry - Section 2 (**Figs. 1.G and 6**)

The second quarry section from the south end of the Eastern Quarry is also the southernmost section on the east face of Ridge 2. It is *ca* 40 m long and consists of two quarry bays with a small, unquarried cliff face in between. Its southern edge abuts the Commemoration Cliff; its northern edge abuts a long section of unquarried stone. Bands of diagonal pick marks cover the quarried face. Black desert varnish is forming in some places over these pick marks. The area seems to have been quarried in sections.

The narrower, southern bay has a rock shelter on top that is currently used by local *bedouin* to pen their sheep and goats at night. The current

6. R2 Eastern Quarry - Section 2: southern bay.

7. R2 Eastern Quarry - Abandoned Quarry Section adjacent to north end of Section 2: overview of separation trenches.

east wall of fieldstone and mud is *ca* 100 years old, according to local informant Swaylem al-Manaja. There is black soot staining in the area around the entrance. A quick inspection provided no definitive signs of ancient use. The rock shelter does not extend behind the Commemoration Cliff.

R2 Eastern Quarry - Abandoned Quarry Section (**Figs. 1.H and 7**)

The unquarried section of cliff directly north of Quarry 2 contains four parallel trenches that demonstrate that this section was intended to be quarried but, after these preliminary trenches were carved, no further quarrying took place. The southernmost separation trench (which is closest to the northern bay of Quarry Section 2) is parallel with Quarry 3's northern face. This trench is 2.73 m long and its width ranges from 0.22 m to 0.15 m. The bottom of this trench was carved in five levels resembling steps. Five carved steps form the bottom of this trench. The second trench to the north measures 2.6 m long and 0.22 m wide. It is 0.29 m deep and has three internal steps. The third trench to the north is 3.15 m long and 0.22 m wide. As it is now filled with dirt and rock, it is not possible to determine its depth nor how many internal steps it might have. The fourth and northernmost trench measures only 1.1 m long and 0.23 m wide. It is also filled with dirt and rock, and thus its depth is not known. The spaces between these separation trenches and between the quarried section of Quarry 3 and the first trench are, from south to north: 1.71 m, 1.76 m, 1.73 m and 1.7 m.

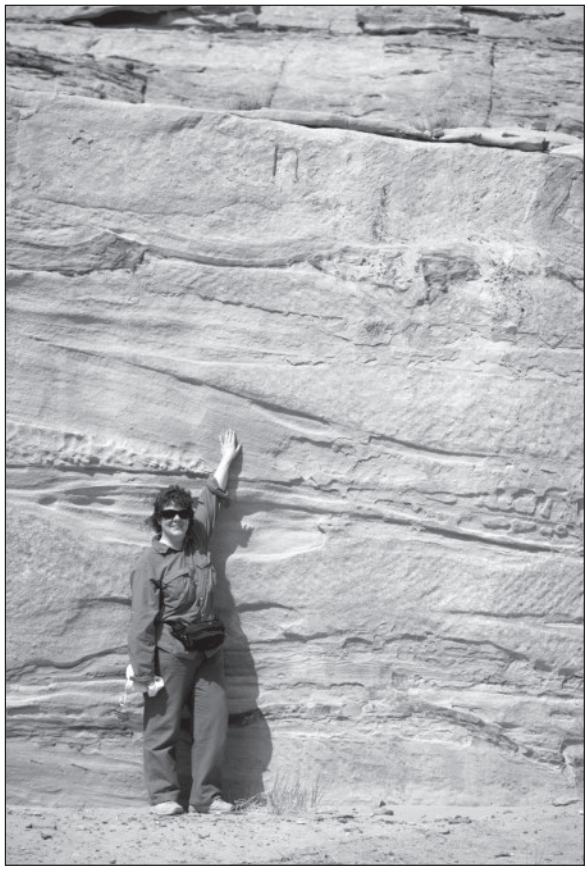
While it is not conclusive, it is possible to suggest that the spacing of these trenches was based on the Roman foot (0.295 or 0.296 m). The average distance between the centres of the trenches is 1.752 m, which equals 5.94 Roman feet. The use of the Roman foot may, but need not, indicate that this quarrying was done after the Roman annexation.

R2 Eastern Quarry - Section 3 (**Fig. 1.I**)

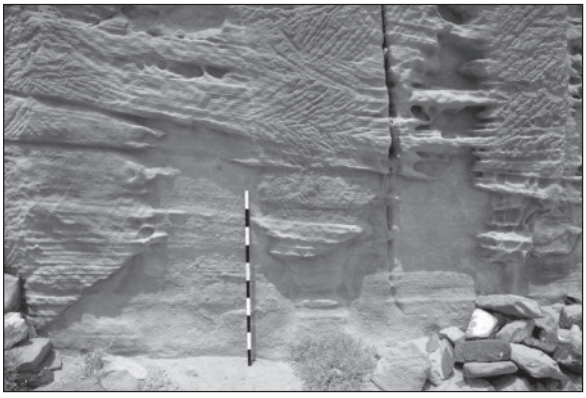
Quarry Section 3 begins *ca* 85 m north of Quarry Section 2 and marks the beginning of a continuous stretch of quarrying that extends all the way to Quarry Section 6. The southern end of Section 3 abuts the natural cliff face and begins with a stepped ramp; the northern end is separated from Quarry Section 4 by a thick protruding section of stone. Section 3 is *ca* 60 m long and has many major quarry bays.

*R2 Eastern Quarry - Section 4 (***Figs. 1.J, 5 and 8***)*

Quarry Section 4 is bordered on the south by a thick protruding section of stone and on the north by a triangular wedge of quarried rock protruding from the quarry face. It is *ca* 40 m long and has



8. R2 Eastern Quarry - Section 4: betyl on quarry face.



9. R2 Eastern Quarry - Section 5: ibex carved over worn quarry face.

three major bays. Tan and yellow sandstone was quarried in this section. An east-facing betyl in a rectangular niche (0.16 m wide × 0.23 m high) has been carved into the back face of the first bay, 0.25 m below the top of the quarry. It is now very eroded. The betyl faces towards the ancient settlement, but from the walkway above it neither the town nor the fort can be seen. Just above it to the north, on an unquarried rock face coated in dark desert varnish, are 12 evenly spaced vertical scratches in a 0.1 × 0.1 m area. It is possible that these marks have something to do with the quarry below.

R2 Eastern Quarry - Section 5 (**Figs. 1.K, 5 and 9**)

Quarry Section 5 is bordered on the south by a triangular wedge of quarried rock protruding from the quarry face, and on the north by a tall quarried outcrop. It is *ca* 60 m long and consists of several quarry bays. Several trenches from the quarrying process are visible at the top of the face. The quarry faces (with diagonal chisel marks) are now very worn. After the chisel marks had worn down, someone carved an ibex petroglyph (0.18 m long × 0.21 m high) into the southern face of the northernmost quarry section wall, 4.31 m from its end. The ibex is shown in profile with its feet tipped towards the *wadi*. It has big haunches and horns that curve past its back. Modern Arabic graffiti have also been carved onto the quarried walls of this section.

10. R2 Eastern Quarry - Section 6: abandoned quarry area.

R2 Eastern Quarry - Section 6 (**Figs. 1.L, 5 and 10**)

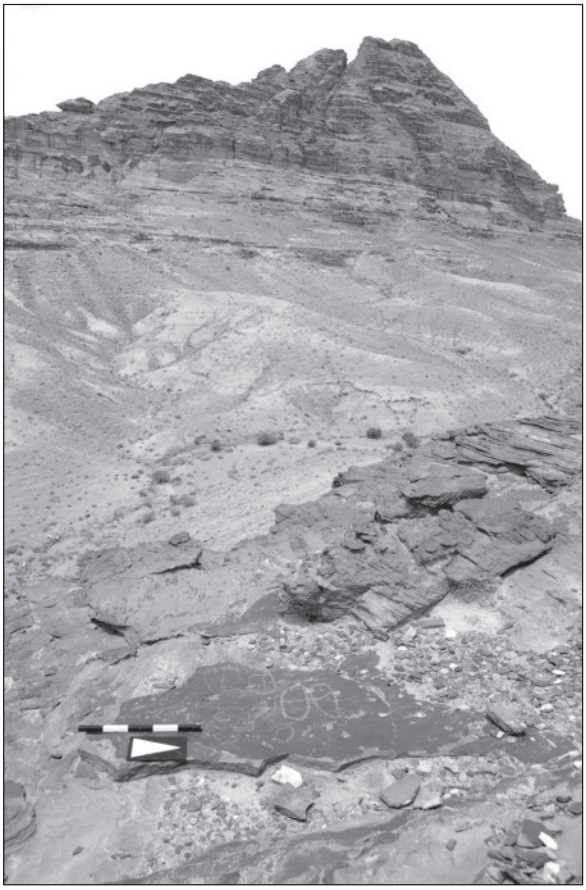
Quarry Section 6 is the northernmost quarry section on the eastern side of Ridge 2. It is 30 m long. At its northern edge is a quarried wedge; at its southern edge is a tall, quarried outcrop. It was quarried in several bays. Much of the quarry face is worn and dark desert varnish has formed over sections. A large hole dug against the quarry face suggests the original quarry may have extended down below the level of the current surface.

One bay has only been partially quarried, with the result that blocks have only been partially freed; the quarry trenches along their sides are still visible. Given the symmetry of the resulting 'feature', it is possible that it was put to some use, perhaps as a raised platform. This area has an internal length of 6.77 m. Quarry trenches are 0.17 m, 0.18 m, 0.2 m, and 0.23 m wide. Partially quarried blocks are 1.7 m and 2.83 m wide.

R2 Western Footprint Site (**Figs. 1.M and 11**)

This activity area is located on the western side of Ridge 2, almost at the very top of the ridge and directly at the edge of a cliff face. The area overlooks Wādī Ḥumayma and provides an excellent view of Jabal Qalkha and the Jabal Qalkha - Eastern Cascading Plateau Site. This area is also located close to the Western Bovids Site, which is to the north.

The activity area consists of a horizontal bedrock surface covered in desert varnish, into which have been carved three sets of feet on a common orientation and a smaller ovoid (perhaps a single human or animal foot, or an egg) on a different orientation. All of the carved footprints face west towards the peak of Jabal Qalkha and Jabal Qalkha's Eastern Cascading Plateau Site. Two sets of footprints are outlines of feet (one possibly with toes), while the



11. R2 Western Footprint Site with Jabal Qalkha in background.

third set of footprints is bisected by a line. The footprints were not measured, but the entire area measures less than 1 m × 1 m.

A few meters to the north of these footprints is a rock shelter used by local *bedouin* to store grain and other supplies. It is possible that the overhanging rocks that form part of the shelter's roof also attracted people to this area in ancient times.

R2 Western Bovids Site (**Figs. 1.N and 12**)

The Western Bovids Site is located on the western face of the high middle section of Ridge 2 at the northern end of a large natural circular alcove facing Wādī Ḥumayma and the flanks and notched peak of Jabal Qalkha. There is a natural rock shelter just below the carvings. Above this site on the ridge top nearby is the Western Footprint Site and another rock shelter. An Epipaleolithic activity area (J407) surveyed by Henry (1995: 216, fig. 9.1) is also nearby.

The rock carvings are situated on two desert varnish-covered registers of a vertical, natural rock face. When standing on a rock shelf

12. R2 Western Bovids Site: overview with rock shelter; stars indicate location of bovid petroglyph panels.

before them, they are at head and knee height. The upper register shows from north to south: a bovid with long horns parallel to its back in profile, facing right (0.13 m wide × 0.11 m high), and another bovid, now partially broken off, with long curved horns extending up into the air in profile, facing right (extant width 0.09 m; 0.12 m high). The lower register shows from left to right: a horned bovid in profile, facing left (0.13 m wide × 0.12 m high), the left side of a horned bovid facing outwards (0.13 m wide × 0.12 m high) and two horned bovids in profile, facing right ([1] 0.18 m wide × 0.11 m high; [2] 0.11 m wide × 0.08 m high). The relative lightness of these petroglyphs in contrast to the surrounding desert varnish makes it unlikely that the petroglyphs are contemporaneous with the Epipaleolithic site noted above.

R2 Western Big Quarry (**Fig. 1.O**)

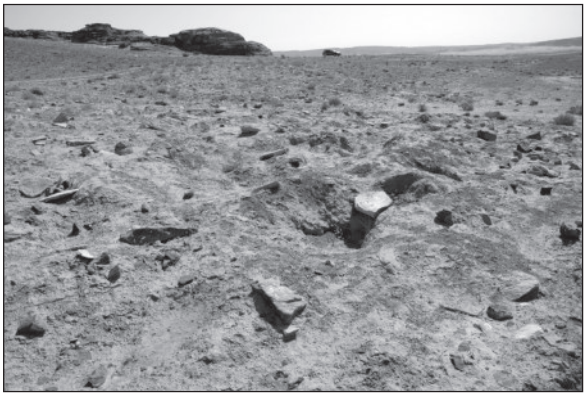
This quarry is located on the western side of Ridge 2 immediately opposite the south end of Eastern Quarry Section 3. It is *ca* 7 m wide × *ca* 5 m deep × *ca* 2 m high. At the base of the quarry, the ridge slopes down to Wādī Ḥumayma via a *ca* 45-degree slope. No petroglyphs or inscriptions were visible on its walls.

R2 Western Little Quarry

This small section of quarried cliff face is located at the northern section of the western side of Ridge 2, at the base of the ridge on the floor of Wādī Ḥumayma. This quarry was not examined in detail.

RIDGE 1 (R1) (**Fig. 1**)

Ridge 1 is the dendritic ridge running

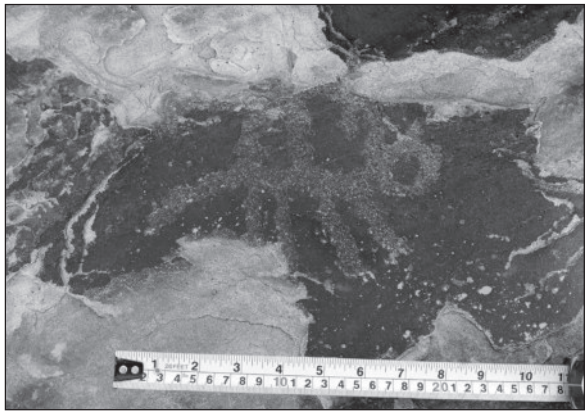


13. Looter disturbance south of Tomb Complex A104.T1 on Ridge 1.

along the western side of Ḥumayma's ancient settlement. Wādī al-Burqa runs along its western flank, separating Ridge 1 from Ridge 2. Oleson has documented several cisterns, rock cut tombs and a small Byzantine church on this ridge, as well as the betyl associated with Tomb Complex A104.T1 (Oleson 2010; Oleson and Schick 2013), and Henry documented an Upper Paleolithic activity area at a rock shelter (1995: 137, Site J412). In contrast, no documentation has been previously carried out on any petroglyphs or quarries on this ridge. Although this area was outside our planned survey area, we did document some petroglyphs and quarry sites we came upon by chance while taking photographs of Ridge 2.

R1 Tomb Complex A104.T1 (**Figs. 1:P and 13**)

This tomb complex on a prominent knob near the southern end of Ridge 1 has been catalogued by Oleson, who described it as "one of the... largest and visually most prominent tombs in the Hawara area" (Oleson and Schick 2013: 55). It is also notable for its vertical rock-cut betyl which faced south towards the desert, Wādī Qalkha and the *Via Nova*. From the surface fronting the betyl, there are good views of the desert, Wādī Qalkha, the *Via Nova*, Ridge 2 (including the Commemoration Cliff, Southern Flat Top Activity Area, Eastern Quarry and Southern Knob Activity Area), Wādī al-Burqa and the ancient town. This year we looked (and failed) to find bedrock holes similar to those found at the front of the knobs on Ridge 2. We also noted that the area immediately south of the knob has recently been disturbed by looters; there is no indication that they found anything.



14. R1 Western Isolated Petroglyph on Rock.

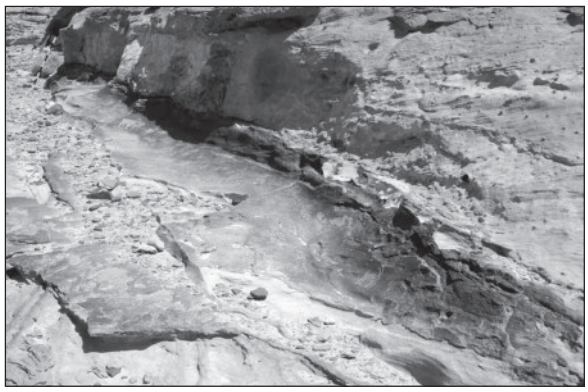
R1 Western Quarry (**Fig. 1.Q**)

This small quarry is on the western side of Ridge 1 between Tomb Complex A104.T1 and the Western Rock Shelter Site. Although it was not fully documented, a quick scan did not reveal any petroglyphs or inscriptions.

R1 Western Isolated Petroglyph on a Rock (**Figs. 1:R and 14**)

This site consists of a single petroglyph carved into desert varnish on a rock outcrop at the top of Ridge 1. The petroglyph faces south-west and overlooks Wādī al-Burqa and Ridge 2. This area also provides good views of Jabal Qalkha. As this site is on the very top of Ridge 1, there is no sheltered area in the immediate vicinity, but directly in front of the petroglyph there is a small, flat ledge above the western slope of the ridge. This site is situated above the Western Rock Shelter Site, but the two sites cannot be seen from each other.

The extant petroglyph measures 0.2 m long by 0.13 m high. It is poorly preserved and difficult to see owing to the weathering of the



15. R1 Western Rock Shelter Site: petroglyphs to right of rock shelter.

rock on which it was carved. Its visibility is further reduced by the subsequent formation of dark patina over the carved outline. The extant sections of the petroglyph show a four-legged animal in profile, facing right; it has a long tail, circular head, possibly a backward curved horn, and a large bump on its back. Its identification is unknown; perhaps it is an imaginary creature.

R1 Western Rock Shelter Site (**Figs. 1:S and 15**)

This activity area is located roughly halfway up the west side of Ridge 1, across from the peak of Jabal Qalkha and just north of the end of the Eastern Quarry on Ridge 2. It is below the Western Isolated Petroglyph on a Rock. From this site one has good views of Ridge 2, Jabal Qalkha and Wādī al-Burqa. The site includes upper and lower activity areas that are probably related to each other.

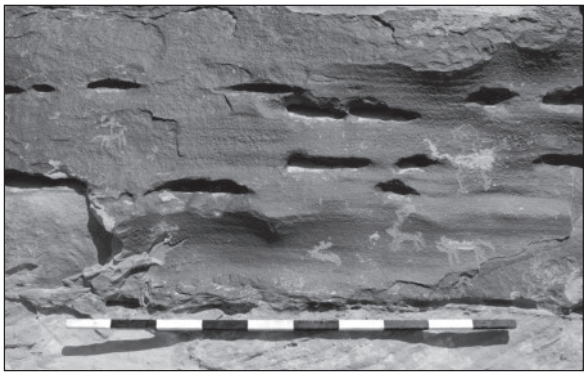
The upper activity area is dominated by a large rock shelter formed by an overhanging rock shelf that provides shade in the morning and at midday. Modern rubbish and the ashes of a recent fire indicate that the rock shelter is still used today. Petroglyphs to either side confirm its use in the past. There is also a small, ovoid niche with a blackened interior at shoulder height on the south side of the rock shelter that might have been used to hold an oil lamp or betyl. Ceramic sherds found in this area were produced from the first to third centuries AD and may represent use of the site at that time, although they might also have been displaced from tomb complexes or other structures on this ridge.

On the north side of the rock shelter there is a small, horizontal rock surface covered in desert varnish into which one pair of footprints and one individual footprint have been carved. The entire area of this carved surface measures 0.51 m by 0.5 m. The pair of footprints was not measured but face in a northerly direction, while the single footprint (0.2 m long × 0.1 m wide) faces easterly, in the direction of Jabal Qalkha. Although these footprints were presumably carved into desert varnish, the formation of a new layer of patina over the carvings has made them very difficult to see. They are possibly much older than the lighter petroglyphs to the south of the rock shelter.

To the south of the rock shelter, petroglyphs have been carved into a panel covered in desert varnish that curves from ground level to the beginning of a vertical cliff face. This panel of petroglyphs has a total length of 8.13 m. From north to south, the extant carved figures consist of a horned bovid facing left (0.11 m wide × 0.1 m high), two bovids butting horns (0.3 m wide × 0.1 m high), a faint horned bovid facing right (0.2 m wide × 0.12 m high), two horned bovids facing each other (0.36 m wide × 0.16 m high), two horizontal rectangles (likely with something in them) joined by a horizontal line (0.64 m wide × 0.1 m high), four horned bovids facing right (0.8 m wide × 0.16 m high), a possible inscription (0.37 m wide × 0.19 m high), a worn set of unidentifiable figures (0.38 m wide × 0.12 m high), two unidentifiable four-legged animals (0.26 m wide × 0.13 m high) and a horned bovid facing right (0.09 m wide × 0.12 m high). The darkness of the patinas varies between these petroglyphs, suggesting they were not all carved at the same time. Some images also overlap and have lighter sections, indicative of later additions.

The lower section of this activity area is immediately below the upper section, although the vertical cliff face between them prevented direct access. The petroglyphs here are carved into a band of the surrounding vertical cliff face that is covered in desert varnish. There is no ledge immediately before the petroglyphs, but their light colouring against the dark desert varnish allows them to be seen easily from below.

Clockwise from left to right are several rock carvings: a man on horseback with a weapon in his raised right hand (0.08 m wide × 0.09



16. R1 Western Petroglyph Set below the Rock Shelter Site.

m high) chasing a small animal with big ears and no tail (possibly a hare), a compact set of horizontal scratches, a human or deity standing with arms raised above the shoulders, holding a weapon in the right hand (0.21 m wide × 0.18 m high), a carnivore chasing a horned bovid (0.27 m wide × 0.15 m high) towards an open-sided triangular feature (0.08 m wide × 0.06 m high).

Jabal Qalkha (JQ) (Fig. 1)

The western flanks of Jabal Qalkha towered over the ancient settlement and are very visible from the settlement and the two ridges. The ancient hydraulic works here, including three cisterns and a dam, have been published by Oleson (2010); some prehistoric activity areas have been published by Henry (1995). Oleson (2010) and Graf (1992) also recorded the existence of some Nabataean, Thamudic and Greek inscriptions and betyls associated either with these hydraulic works or with ancient sandstone quarries. When local resident Swaylem al-Manaja offered to guide us to some rock carvings on Jabal Qalkha in 2014, we assumed it would be to one of the previously published sites. Instead, he led us to two new sites that were obviously very important in antiquity.

JQ Eastern Cascading Plateau Site (**Figs. 1: T,U, 17, 18 and 19**)

This site consists of several horizontal bedrock surfaces that cascade from south to north down the slope of Jabal Qalkha in a topographically impactful location. Beneath the southern end of the site is the juncture of Wādī Raqabat as-Samrā (Black-Neck Wadi), which runs along the site's north-west side, with Wādī Ḥumayma, which runs along its north-east side. To the north-west, across the open expanse carved by Wādī Raqabat as-Samrā, the notched peak of Jabal Qalkha towers dramatically above the site's cascading surfaces. There are also excellent views down into Wādī Raqabat as-Samrā and Wādī Ḥumayma, across Wādī Ḥumayma to the western side of Ridge 2, and south into the desert towards Wādī Qalkha and the *Via Nova*. From the top of the site it is also possible to look over Ridge 2, with clear views of Ḥumayma's Roman fort, Abbasid *qasr* and much of the ancient town. The site can also be seen from all of the aforementioned places. It is also worth noting that the footprints found at the top of Ridge 2 point towards this site and the adjacent peak of Jabal Qalkha. Two of the Epipaleolithic activity areas (J406a; J406b) surveyed by Henry (1995: 217, 251) should be located just south-west of this site, but they were not visited by our survey team.

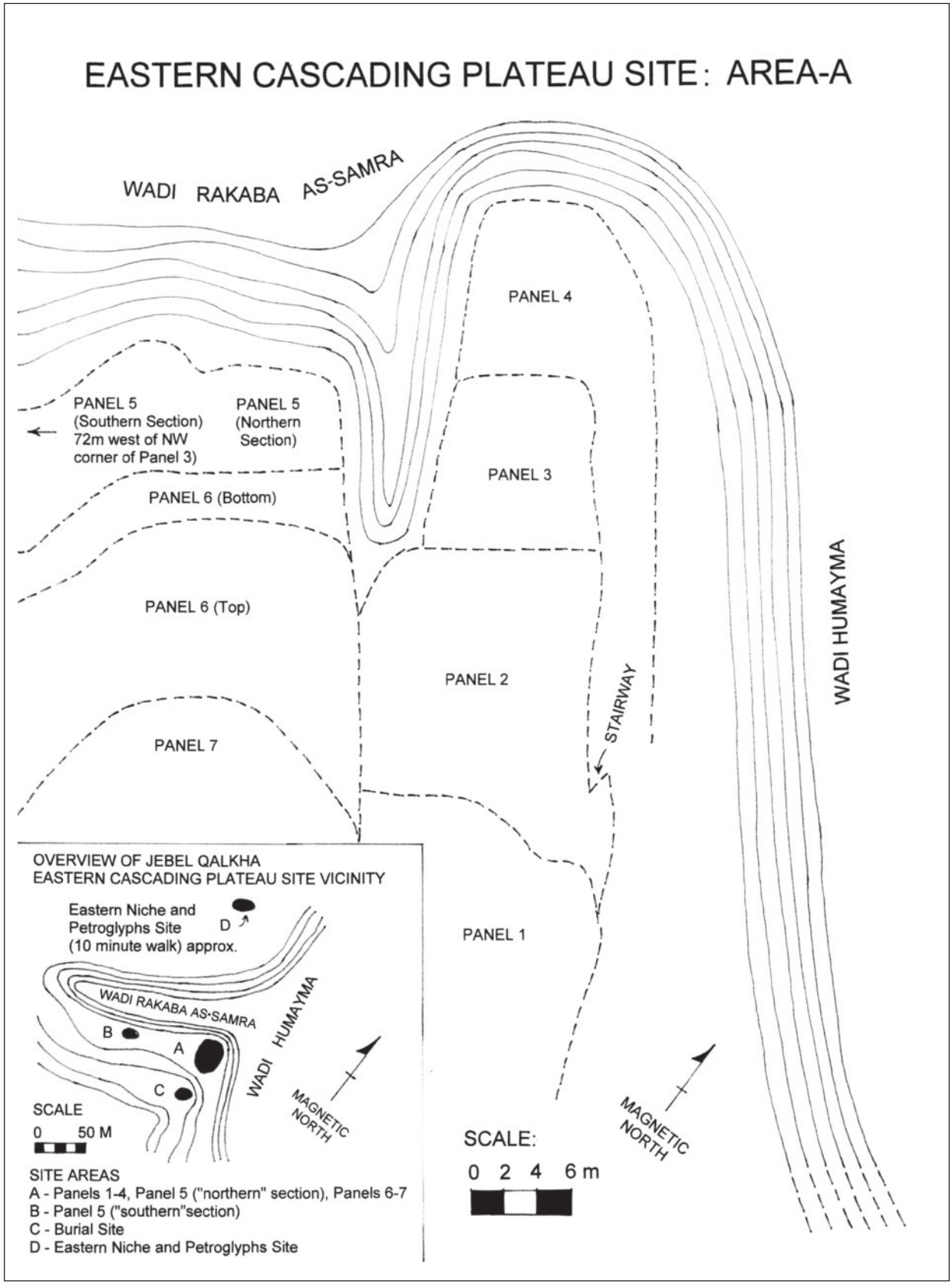
This site consists of seven natural surfaces (**Fig. 17**). Each of these was documented separately, although they all form part of a cohesive whole.

JQ Eastern Cascading Plateau Site - Burial site (**Figs. 1:T and 17**)

At the highest point surveyed on this plateau (although not at its top), two probable intact burials were found abutting on their long side. The continuation of one external wall suggests the possibility of a third burial. Others might be buried under the thick layer of soil and surface cobbles that cover the plateau side. The two visible features are rectangular and lined with upright sandstone slabs, one set of which is of light purple sandstone and *ca* 0.04 m thick. There is no sign of covering slabs, but some of the surrounding cobbles might once have been placed on top. The features have an internal length of 1.18 m and an internal width of 0.86 - 0.87 m. They are aligned north-west to south-east, seemingly oriented towards the peak of Jabal Qalkha although it is also possible that they are oriented towards Mecca. From this site, there are dramatic views of the notched peak of Jabal Qalkha, the rock carvings below, the two *wadi*s, the west side of Ridge 2, the desert, Wādī Qalkha, the *Via Nova* to the south, the Roman fort, the Abbasid family's *qasr* and parts of the town. It would be a prime location for a prominent person's tomb.

JQ Eastern Cascading Plateau Site - Panel 1 (**Figs 17 and 18**)

This flat surface, *ca* 14 m long × *ca* 14 m wide, is below the burial site and immediately above Panel 2 on the south-east side of the cascading plateau. The desert varnish has worn off the exposed surface and the remaining surface (at the south-east end) is obscured by a



17. JQ Eastern Cascading Plateau Site sketch plan.

18. JQ Eastern Cascading Plateau Site from north-west; Ridge 2's Southern Flat Top Activity Area and Southern Knob Activity Area visible behind on left.

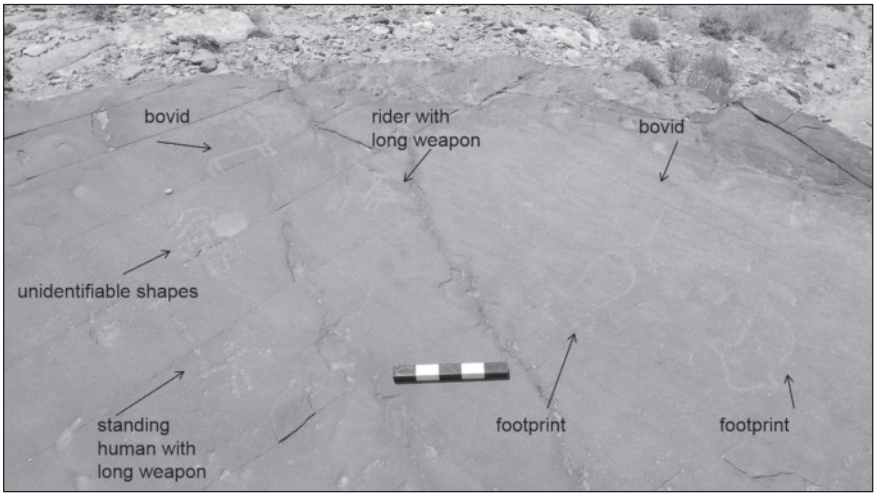
covering of soil, pebbles and cobbles. There are no visible petroglyphs or worked rocks.

JQ Eastern Cascading Plateau Site - Panel 2 (**Figs. 17 - 20**)

This flat surface is located below Panel 1 and above Panel 3, and faces towards the peak of Jabal Qalkha. Steps lead up to its eastern side from a path that currently leads down into Wādī Ḥumayma. Its maximum dimensions (including stairs) are *ca* 18 m long × *ca* 14 m wide. The back half has been eroded away and there is a shallow eroded crevice across the centre. The natural, flat surface of this panel is coated in a layer of black desert varnish into which almost one hundred petroglyphs and inscriptions have been carved. The images include at least 43 horned bovids (including a carnivore attacking a bovid), 18 footprints and shoeprints, seven humans riding animals (camels or horses), a standing human, a solitary carnivore and possibly a camel. There are also four ovoids and at least seven curvilinear symbols (including stars, suns, infinity symbols and circles within circles), as well as at least 17 sets of linear symbols (including crosses, Xs, Vs and hatch marks). Some of these symbols may be *wasm*s. There are also *ca* 15 inscriptions on this panel: one Greek inscription, three Nabataean or Thamudic, four Nabataean, two Arabic and five other possible inscriptions. Some of these inscriptions accompany images, including a very light-coloured carving of a foot that bears an Arabic inscription dating to 1952. Over the

19. JQ Eastern Cascading Plateau Site, facing north from Panel 7; people are standing on Panel 2.

20. JQ Eastern Cascading Plateau Site: (foreground) Panel 2 with numerous petroglyphs and inscriptions; (background) Panel 3 with semicircular feature at centre back and petroglyphs to left.



21. JQ Eastern Cascading Plateau Site: petroglyphs on Panel 3.

panel, a great many variations are visible in the lightness of the carvings relative to background desert varnish, in the styles of the feet and bovids, and in other details. These variations, in conjunction with the overlap of carvings, might help to date human activity at this site.

JQ Eastern Cascading Plateau Site - Panel 3 (**Figs. 17-21**)

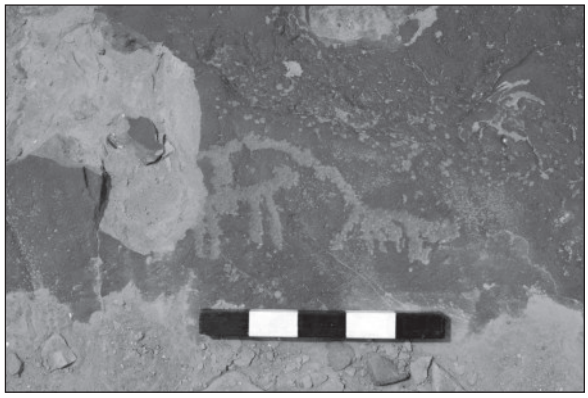
This flat surface (*ca* 15 m long × *ca* 9 m wide) is located below Panel 2 and above Panel 4. It faces towards the notched peak of Jabal Qalkha. There are several carved linear or curvilinear grooves (0.07 - 0.14 m wide), with peck marks inside, at various locations on the surface. Two linear grooves / channels stick out from the rock face at the back. There is also a semicircular carved or natural indentation at the front (facing the peak). As this is the only panel with any visible features beyond petroglyphs and inscriptions, a special activity, possibly a religious ceremony, likely took place here. Most of the panel's surface is now worn or carved down. On the extant desert varnish some petroglyphs remain: an ibex with exaggerated horns, another horned bovid, one unknown animal, two single shoeprints, a standing human holding up a long spear or lance, and a human on horseback wielding a long spear or lance.

JQ Eastern Cascading Plateau Site - Panel 4 (**Figs. 17-18**)

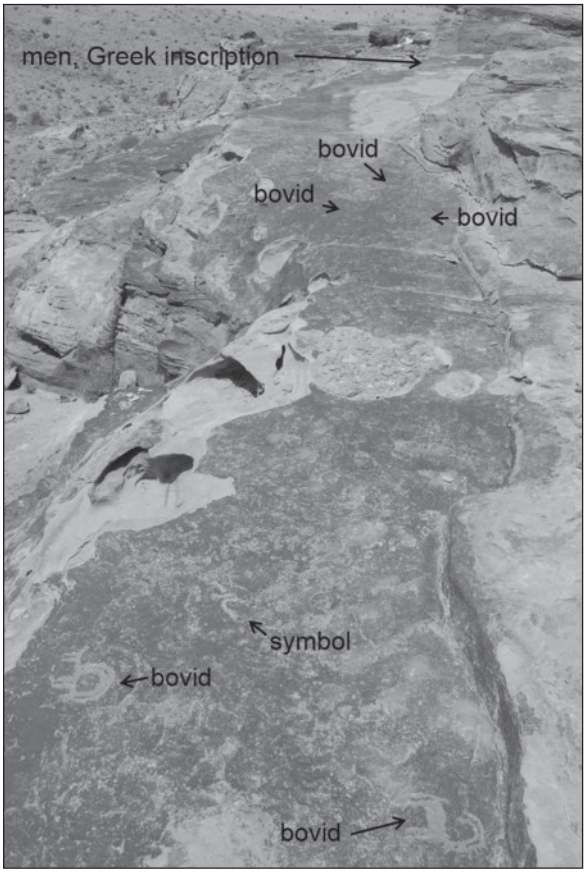
The northern end of this flat surface is located below Panel 3, at the front of the cascading plateau, directly over Wādī Raqabat as-Samrā and beneath Jabal Qalkha's notched peak. The back half of the northern end is obscured by soil, pebbles, cobbles and boulders. The surface wraps around below the sides of Panels 3 and 2 to the bottom of the steps leading up to Panel 2. No petroglyphs or inscriptions are visible on any of Panel 4's exposed surfaces. Just south of the steps (and at the top of the path leading to the site from the *wadi* below), an Arabic name has recently been carved into the vertical rock below Panel 1.

JQ Eastern Cascading Plateau Site - Panel 5 (**Figs. 17, 18 and 22**)

This naturally flat surface is south-west of Panel 4 and roughly at the same elevation. It extends for dozens of meters to the south, around the edge of the plateau overlooking Wādī Raqabat as-Samrā, and faces the notched peak of Jabal Qalkha. In front of Panel 6 it is at least 23 m wide and up to 8 m long. No petroglyphs or other man-made features are visible on the majority of the exposed surface,



22. JQ Eastern Cascading Plateau Site: petroglyph of headless horseman and large feline on Panel 5.



23. JQ Eastern Cascading Plateau Site: petroglyphs on bottom section of Panel 6.

except for a section far to the south. This *ca* 5 m × 5 m southern section, which is *ca* 72 m from the north-west corner of Panel 3 on a bearing of 345 degrees, contains a cluster of petroglyphs carved into the black desert varnish: a (headless?) man on a horse spearing a large animal (feline?), a standing camel, two horned bovids walking in a row and two unidentified shapes. Additional petroglyphs may exist in this area beneath a wind-blown accumulation of red sand.

JQ Eastern Cascading Plateau Site - Panel 6 (**Figs. 17, 18, 22, 23 and 24**)

This natural two-level surface is located above the northern section of Panel 5 and below Panel 7. Its curved front faces the notched peak of Jabal Qalkha. The bottom (front) layer is 2.3 m long and 4 m wide. The top (back) layer is 2.3 m long × 6 m wide. Both layers are covered in black desert varnish that is worn down in places. No petroglyphs or man-made features are visible on the top layer. The bottom layer is partially obscured by dirt and very worn, which makes it difficult to see all potential carvings. The petroglyphs that are visible include seven horned bovids, two men with shields in their left hands and swords in their right, another human (?), two footprints and a symbol (*wasm*?). There is also a Greek inscription.

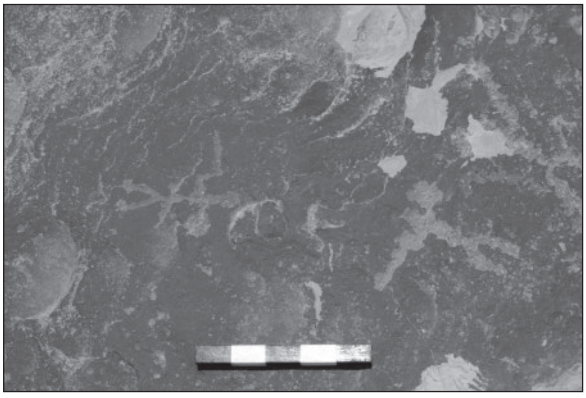
JQ Eastern Cascading Plateau Site - Panel 7 (**Figs. 17 and 18**)

This surface above Panel 6 and west of Panel 4 extends up and back into the hillside. The burial site is located to its south-east. Panel 7 is very big - more than 8 m long and ca 20 m wide. The exposed section of its surface is highly eroded with only small patches of desert varnish remaining. No petroglyphs or other man-made features are visible on the exposed surface.

JQ Eastern Niche and Petroglyphs Site (**Figs. 1:V and 25**)

This ancient activity area is located in a large, flat-sided alcove directly below the prominent groove in Jabal Qalkha's peak, at the location where the natural cliff meets a soil-, rock- and shrub-covered surface approximately halfway up the face of the *Jabal*. It is just north of Wādī Raqabat as-Samrā at the approximate elevation of the Cascading Plateau Site, from which it can be reached via a 10-minute hike. There is a slope down to Wādī Ḥumayma directly in front of the alcove and no sign of any structures or artifacts. Probably the combination of the peak above and accessibility to the Cascading Plateau Site provided a justification for this site's occupation, as the views from it are not particularly interesting, at least to a modern viewer.

The signs of ancient human involvement at this site consist of a betyl niche and several petroglyphs. The betyl niche has been carved into the back wall of this activity area, at a height of 1.1 m above the surface, and faces Wādī Ḥumayma. The upright niche is rectangular and contains another sunken upright rectangle inside it, which likely either represents a betyl or the recess into which a portable betyl was placed. The exterior dimensions of the larger rectangle are 0.5 m high by 0.35 m wide, while its interior dimensions are 0.43 m high and 0.33 m wide. This larger rectangle is carved



24. JQ Eastern Cascading Plateau Site - Panel 6: petroglyphs of men with swords and round shields; another possible human at right centre.

to a depth of 0.2 m. The smaller rectangle set in the larger one measures 0.31 m high by 0.18 m wide, and is a further 0.05 m deep. The combined depth is thus 0.25 m. There are four circular holes surrounding the niche, which were possibly used for attaching a covering. These holes are 0.05 - 0.09 m deep and 0.54 - 0.67 m apart from each other. The feature resembles other betyl niches found at Ḥumayma and Petra. A hole, now topped by sand, has been dug into the ground beneath the niche. Several petroglyphs have been carved on the northern wall of the alcove, *ca* 3 m north of the betyl niche. Unlike most of the petroglyphs discovered at Ḥumayma, these ones have been carved directly into the tan-coloured sandstone, rather than into a layer of black desert varnish. These petroglyphs are very difficult to decipher. One set seems to show two butting bovids.

People appear to have been digging in this area recently. Holes have been dug and left open *ca* 40 - 50m south-east of the activity area.

Conclusion

This short survey by Ḥumayma Excavation Project staff succeeded in collecting a great deal of information about the landmasses to the west of Ḥumayma's Nabataean to early Islamic settlements. Our original plan, to only survey Ridge 2, was amended to include some sites on the western and southern faces of Ridge 1 and on the western flanks of Jabal Qalkha whenever it was brought to our attention (either by a local resident or during distance photography) that there were important sites on those landmasses in need of documentation. We documented a total of 15 sites and 17 sub-sites, and collected data on 11 quarry areas, one new burial area, eight bedrock holes and several other features. We also documented more than 150 petroglyphs, 20 Greek, Nabataean or Thamudic inscriptions, two carved betyl niches and numerous recent Arabic inscriptions. Analysis of all the sites, features and petroglyphs is in progress and has already resulted in one publication (Reeves 2015). Analysis of the inscriptions is temporarily on hold to allow David Graf to publish those that he collected during his own surveys.

Although the sites documented have been quite well preserved because of their relative isolation from modern population centres, they

25. JQ Eastern Niche and Petroglyphs Site with location of petroglyphs marked.

can all be easily accessed by people without any specialised climbing abilities. Their future survival is, therefore, at risk from humans climbing or carving graffiti over the ancient features. Already a great deal of recent graffiti has been carved or painted over ancient features at some of the sites. In addition, some of the sites are near rock shelters that are still used by local shepherds for penning their animals or storage. This means that petroglyphs carved onto the very thin desert varnish are extremely vulnerable to being rubbed off by climbing goats and sheep. For example, an access route to the rock shelter above Ridge 2's Eastern Quarry Section 2, where animals are currently penned, is up the unquarried rock faces adjacent to that quarry. In addition, probably because these sites are largely out of sight of Ḥumayma's main archaeological site (on the plain) and the modern military base to its north-west, there are indications that people have been digging holes near some of these sites or on the slopes of the *wadi*s between them, presumably looking for buried remains. This illicit excavation represents an ongoing threat to the survival of the sites. Especially vulnerable are the three intact burials at Jabal Qalkha's Eastern Cascading Plateau - Burial Site. It should be noted that human involvement in and around all of the documented sites is also likely to increase in future years owing to traffic from the nearby military base and tourist interest in the newly discovered petroglyphs. It should also be noted that, just as all of this human activity threatens the survival of the ancient features, so too does the continuing erosion of the exposed sandstone by wind, rain and wild animals.

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GLASS FINDS FROM BAYT RĀS, ANCIENT CAPITOLIAS OF THE DECAPOLIS: RECENT DISCOVERIES

Mariusz Burdajewicz

Introduction

The assemblage of approximately 60 diagnostic glass fragments retrieved during the first season of excavation at Bayt Rās date from the Late Roman to Byzantine - Umayyad periods (late fourth to eighth centuries) (Burdajewicz 2015). The repertoire of types is rather limited, consisting chiefly of table vessels that included fragments predominantly of bottles, drinking vessels (beakers; goblets), bowls and bowl-lamps. They are well known types with parallels coming from a wide geographical area, initially that of the Early Roman-period Decapolis which later became the provinces of *Palaestina Prima*, *Secunda* and *Tertia*. These were superceded by the Byzantine Diocese of the East, which eventually became the territory of Bilad ash-Sham.

Fifty-one pieces from the excavated areas were selected to illustrate this assemblage. The present paper also includes thirty-seven fragments collected during the 2014 survey of the area immediately west of the Roman theatre, which measured 120 m east - west by 40 m north - south (Burdajewicz 2014; Mlynarczyk 2014).

The dating of glass finds proposed in this paper is based both on pottery contexts of individual baskets (Mlynarczyk 2015, this volume) and on published comparanda from elsewhere. All dates are AD.

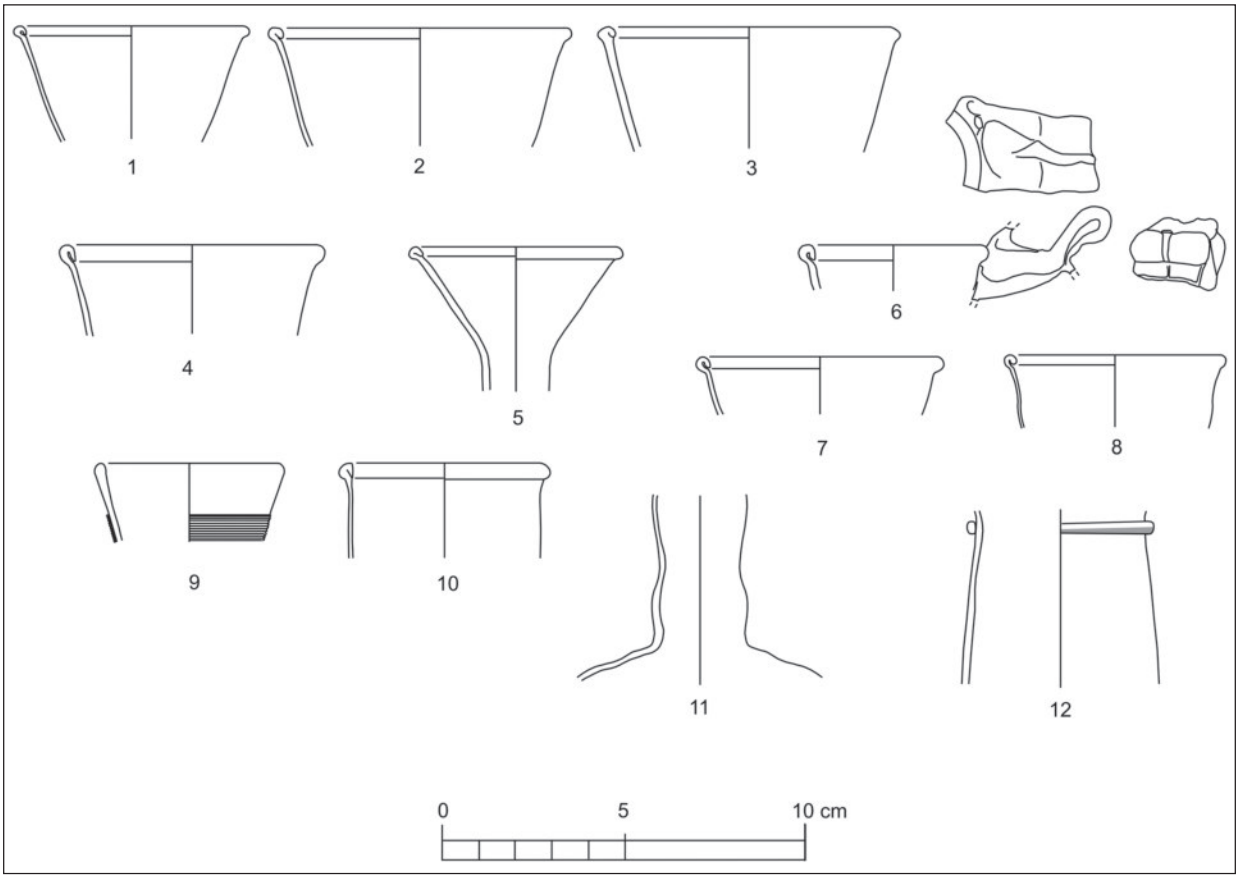
Presentation of the Finds

Closed Shapes: Bottles, Fasks, Jugs and Flagons (**Figs. 1, 5: 52-57**)

Fragments 1 - 5 belong to vessels with funnel mouths and infolded, rounded rims. One fragment (5) also preserves the upper part of a cylindrical, narrow neck. Pieces 6 - 8 represent a funnel mouth variant with a convex neck and infolded, rounded rim. Fragment 6 is apparently part of a jug with an attached broad handle rising above the rim. Fragment 9 is a single example of downward-tapering neck with rounded rim and fine trails wrapped tightly around the neck. The pottery context allows these vessels to be assigned to the period between the fifth / sixth and sixth / seventh centuries.

Funnel-shaped mouths, associated with various body shapes (globular; cylindrical; pear-shaped), are a hallmark of mass-produced glass vessels during the Byzantine and Umayyad periods. They correspond to Dussart Type BX "flacons" (1998: 18-19, 128-158). Numerous parallels can be cited: Bosra; Amman (Dussart 1998: 128-158); Jerash (Kehrberg 1986: fig. 9: 11, 32-33, 43-44; Meyer 1987: 202, fig. 9: O-S); 'Ayn az-Zara / Callirrhoe (Dussart 1997: pl. 27: 4-6, 13-15); Hammat Gader (Cohen 1997: 419-425, pls VI, VII: 1-6); Beth Shean, Byzantine and Umayyad periods (Hadad 2006: fig. 19.3: 34, 38-45, 2005: pl. 7: 114-124, 132-138, pl. 8: 157-164); Khirbat al-Ni'ana (Gorin-Rosen and Katsnelson 2007: 98-103, figs 11-13 and further parallels therein); Beirut, sixth - seventh centuries (Jennings 2006: 159, figs 7.4 and 7.5).

Fragment 10 is a cylindrical neck with upright infolded and thickened rim. Parallels can be found at Horbat Qastra Cave 1071, late sixth - seventh centuries (Gorin-Rosen 2013: fig. 25: 16), Burial Caves 1 and 2 at Khirbat al-Shubeika, sixth century (Gorin-Rosen 2002: 297-298, fig. 6: 43, 306-307, fig. 2: 9 and references therein). Fragment 11 is part of a bottle with a narrow neck and probably a globular body; it has a constriction between



1. Bayt Rās 2015 Excavations. Glass Bottles / Flasks / Jugs (drawing D. Mazanek; Computer Rendering: M. Burdajewicz).

the body and neck, and in the middle of the preserved height of the neck. Fragment 12, an upward-tapering neck, is decorated with a single trail. These last three vessels are dated by context to the sixth / seventh centuries.

Fragments 52 - 56, which come from the survey, illustrate more variants of funnel mouths with infolded rims. Rim fragment 57, owing to its small diameter, may belong to an *unguentarium*-type vessel. They can be attributed to the same date as fragments 1 - 12, discussed above.

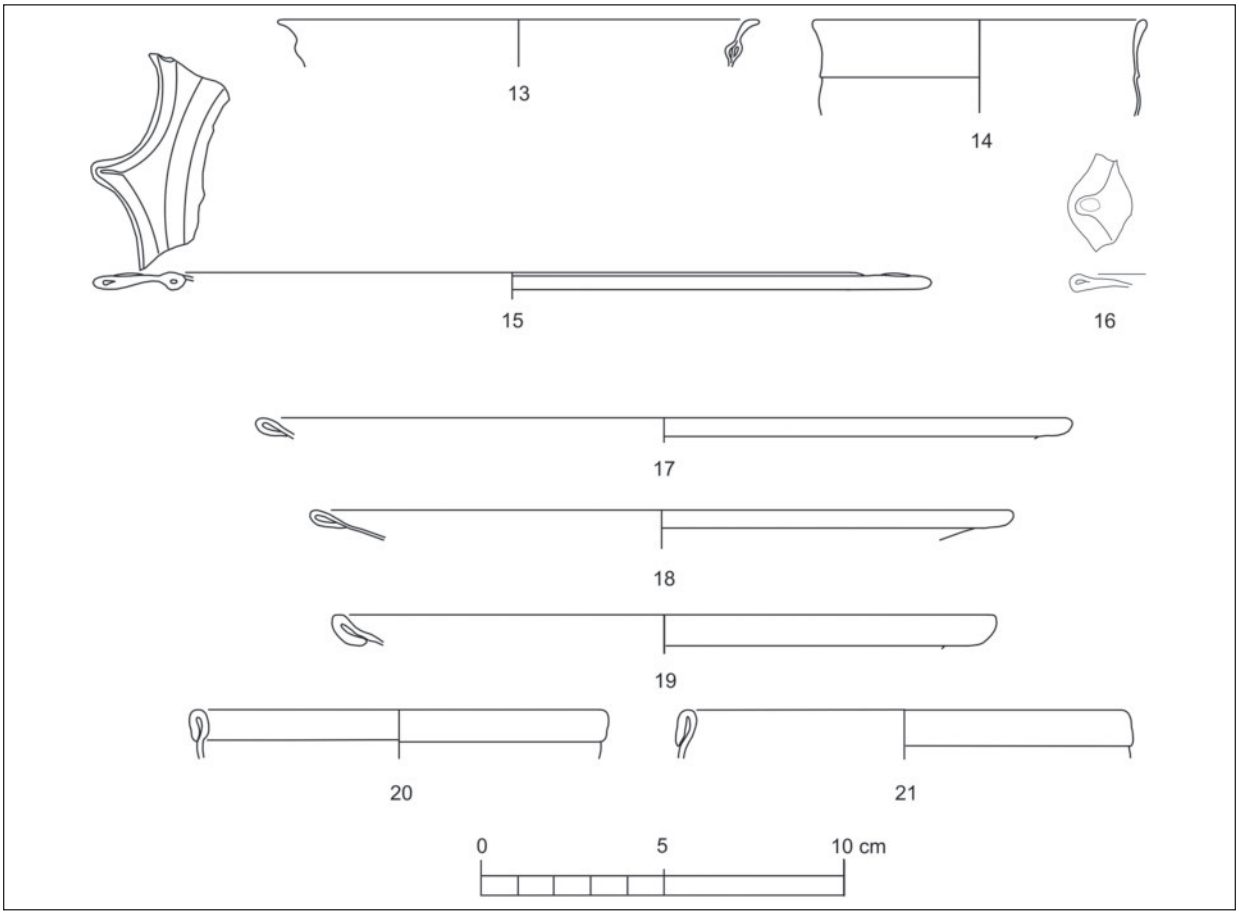
Bowls (**Figs. 2, 5: 58-69**)

Deep bowl number 13 (from topsoil) is characterized by a double fold placed below a rounded, flaring rim. Such bowls are known from the Early Roman period up to the early fifth century. They correspond to Dussart type BI. 4213a22 (1998: 67, pl. 6). A similar bowl fragment unearthed at ‘Ayn az-Zara / Callirrhoe is firmly dated to the second century by its stratigraphic position (Dussart 1997: 97, pl. 22: 7). The Sanctuary of Zeus at Jerash yielded a double-fold rim dated by context to the fifth - sixth centuries (Dussart 1998: 67, pl. 6: 23). A similar rim comes from a mid-second / third to fourth century context at Beirut Souk 2 (Jennings 2006: 76, fig. 4.8: 1). Other published close parallels come from Meiron, late fourth century (Meyers *et al*. 1981: pl. 9.10: 6); Khirbat al-Ni‘ana, fourth century (Gorin-Rosen and Katsnelson 2007: 82, fig. 3: 3-4); Khirbat al-Shubeika, fifth century (Gorin-Rosen 2002, fig. 1: 2).

Bowl 14 has a thickened, rounded out-turned rim and convex wall with a delicate horizontal rib or bulge in the middle of its preserved height. Pottery material associated with the bowl is dated to the sixth / seventh centuries.

Fragment 15 belongs to a bowl with a wide, pinched horizontal rim shaped like a scallop shell. The pottery context in which it was found associates it with the fifth century.

This bowl represents a relatively uncommon type of vessel; only a very small number have



2. Bayt Rās 2015 excavations. Glass bowls (Drawing D. Mazanek; Computer Rendering: M. Burdajewicz).

been published to date. Parallels for this type can be found in a late fourth / early fifth century assemblage from Beirut (Jennings 2006: 77, fig. 4.9: 1). A similar fragment (probably with a polygonal rim) was unearthed in a fifth century context at Hippos / Sussita (Burdajewicz forthcoming). Another close parallel, from a Byzantine monastery at Khirbat aṣ-Ṣuyyagh, is dated to the Late Byzantine / early Umayyad period (Taxel 2009: 145, fig. 1: 1). A similar rim was also recovered from En-Gedi strata II - III, which date to the Late Roman - Byzantine period (Jackson-Tal 2007: 483, pl. 6:1 and additional parallels therein). Other examples are known from Karanis in Egypt, dated to the fourth - fifth centuries (Harden 1936: pl. XIV: 259); Ayios Philon in Cyprus, Roman period (du Plat Taylor and Megaw 1981: fig. 46: 7); Carthage and Rome, fourth century (cited by Jennings 2006: 77). From the topsoil comes another small pinched rim fragment (16), which probably represents the same kind of vessel as that discussed above.

The characteristic feature of bowls 17 - 19 is a flattened rim folded outwards and down. The ceramic material associated with them has been dated to the sixth - eighth centuries. These bowls belong to a large group of vessels widespread in the eastern Mediterranean. They can vary considerably in the size and form of the body (deep; shallow), thickness of walls and even type of base. Some parallels can be cited from Beth Shean, Byzantine - Umayyad periods (Hadad 2005: pl. 3: 51-71, 2006: fig. 19.1: 11-14); Hippos / Sussita, Byzantine - Umayyad periods (Burdajewicz 2006: 133, fig. 1-30, 2011: figs 2-B: 26-28, 4: 8, 10, forthcoming); Jalame, fourth century (Weinberg and Goldstein 1988: 41-44, figs 4-3); Hammat Gader, end of the Roman period (Cohen 1997: 396-398, pl. I: 1-3). They were also common in Cyprus around the third / fourth centuries (Vessberg 1956: 132, fig. 42: 10-13, Type IIα) and at Karanis in Egypt (Harden 1936: pl. XI: 1-29).

Fragments 66 and 67 from the survey are deep vessels with out-turned, rounded rims and slightly sloping walls. They are classified here as bowls, but one cannot exclude the possibility that they might belong to bottles or flasks.

Fragments 20 - 21 and 68 - 69 represent variants of the same general type of bowl as 17 - 19. Upright (instead of horizontal or diagonal) flattened rims are folded upwards and downwards. These bowls were deeper and, to judge by the preserved parts of their walls, had a convex or conical body profile. One of them (69) preserves a vertical D-shaped suspension handle attached to the rim and body (originally there were almost certainly three handles). It doubtless served as a hanging oil lamp suspended by three metal chains. We can assume that at least three other bowls (20, 21 and 68) were also used as hanging oil lamps. The pottery context of bowls 20 - 21 suggests a sixth - seventh century date.

These suspended bowl-lamps made their first appearance in the fifth century and were, alongside stemmed bowl-shaped lamps, the most common form of lighting throughout the Byzantine and Umayyad periods, and even later (Gorin-Rosen and Winter 2010: 172-175). Among the many parallels one may refer to the following examples: Jerash (Meyer 1987: 205, figs 11: N-Q, 12: P-Q); Hammat Gader (Cohen 1997: 402-403, pl. II: 13-15; Hippos / Sussita (Burdajewicz 2011: 33-35, figs 2-B: 31, 5: 29); Beth Shean (Hadad 2005: pl. 22: 413-422). Such lamps belong to Dussart Type BVI (1998: 78-86 with further parallels therein).

Fragment 64 found in the survey is a medium sized, shallow or deep bowl with an incurving, rounded and slightly thickened rim, a very thin wall and blowing spirals. The closest parallels to the shape can be found amongst plain bowls dated to the Byzantine and Umayyad periods at Beth Shean (Hadad 2006: fig. 19.1: 3, 2005: pl. 1: 4, 2: 34-36). A deep bowl with a similar rim found at Khirbat al-Ni‘ana (Gorin-Rosen and Katsnelson 2007: 84, fig. 4: 2) has been dated to the same period. An example from Tiberias has been broadly dated to the Umayyad and Abbasid - Fatimid periods (Hadad 2008: fig. 5.1: 13). An earlier example of a comparable bowl comes from a mid-third century context at the Athenian agora (Weinberg and Stern 2009: 100, no 214, fig. 15 and pl. 20).

Bowls of this type could equally be used as oil lamps; a fragment of a vessel identified as such and dated to the fifth - seventh centuries was found in the Northern Church at Rehovot-in-the-Negev (Patrich 1988: 139, fig. 14: 32).

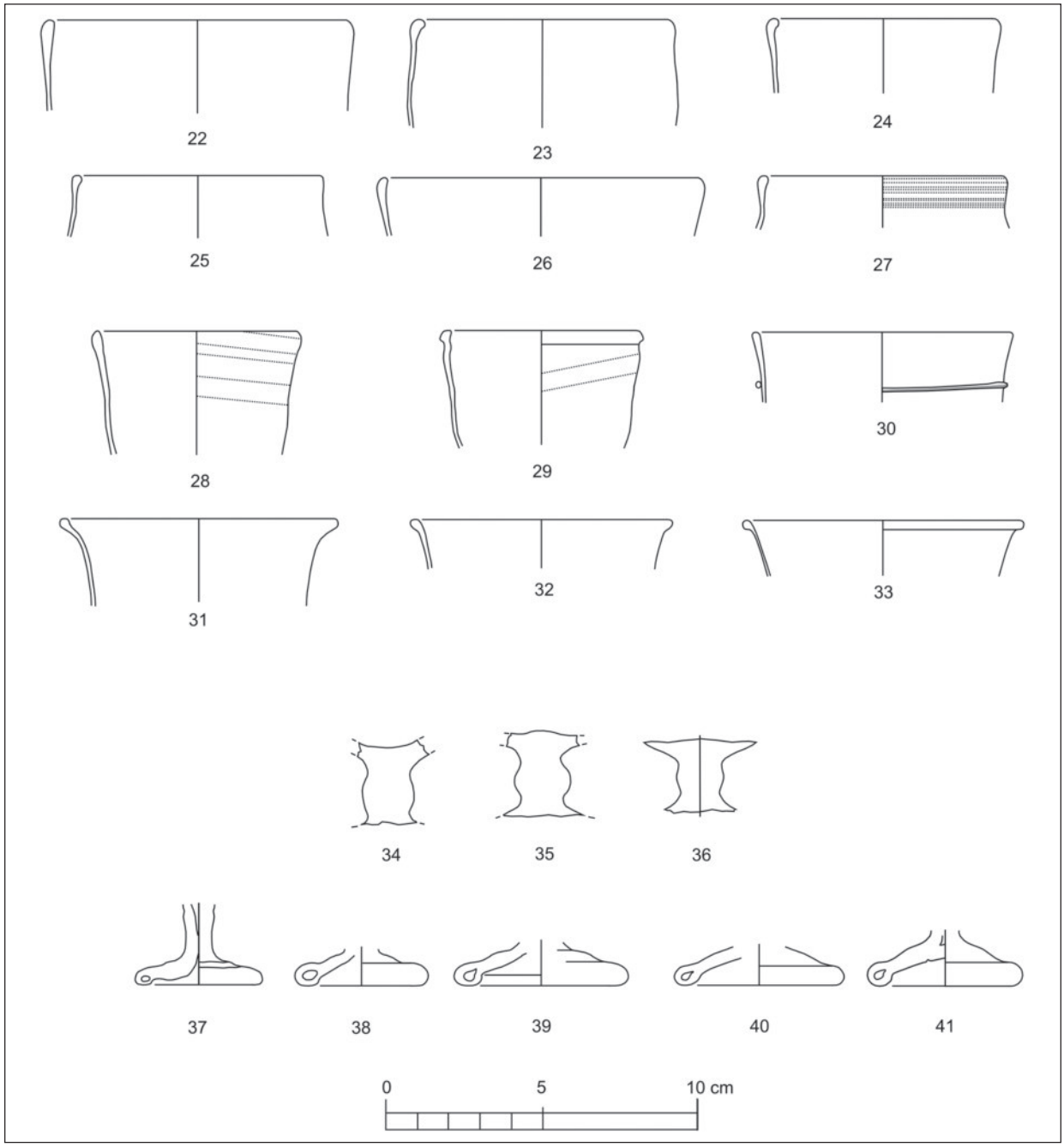
It should also be noted that the general profile of the example under discussion here closely resembles earlier shallow bowls which, however, have cracked-off rims instead of the rounded rim of bowl 64. This type was very popular in the fourth and fifth centuries, but largely disappeared over the course of the sixth century. Numerous examples of such vessels were found, amongst others, at Beirut (Jennings 2006: 92-95, figs 5.8: 2, 5.9: 12, 15-19). Bowls of this type are sometimes referred to as hanging lamps, in that they could be placed in metal rings and be suspended by three chains (Jennings 2006: 92).

Drinking Vessels: Beakers or Goblets / Wine Glasses (**Figs. 3, 6: 70-83**)

In the case of drinking vessels, there is some difficulty with the exact identification of a given type. Usually a beaker is defined as a vessel with a flat bottom, whilst a goblet has a stem and base. However, both beakers and goblets may share a common type of rim. Therefore, in the case of small rim fragments and the upper parts of vessels, precise classification is almost impossible in most cases. Since the majority of bases discovered at Bayt Rās are stemmed, it has been assumed that most rims likewise belong to goblets rather than to beakers. Additionally, the possibility that some of the simple rims, particularly those of small diameter, may represent bottles or flasks cannot be excluded.

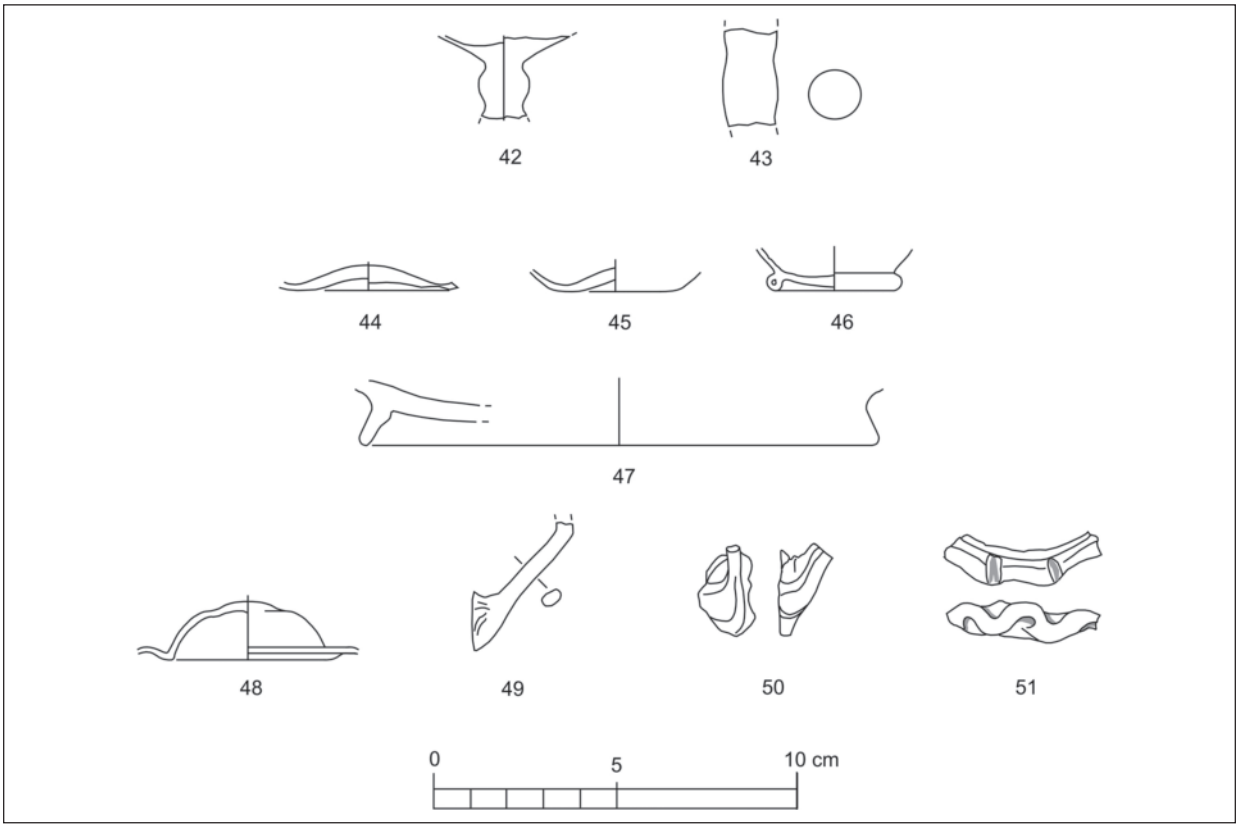
Simple bowls, probably beakers, are represented by fragments 22 - 27 and 58 - 63. They have upright, simple, rounded or triangular (and sometimes slightly incurving) rims. Bowl 30 additionally has a single trail below the rim. Such bowls were quite common during the Late Roman, Byzantine and Umayyad periods.

Fragments 28-29 are characterised by their flaring, rounded and slightly thickened rims. They belong to a large family of drinking vessels that used to be classified as goblets, wine goblets or wine glasses. They correspond to Isings Form 111 (1957: 139-140) and Dussart



3. Bayt Rās 2015 Excavations. Glass Drinking Vessels (Drawing D. Mazanek; Computer Rendering: M. Burdajewicz).

type B.VIII.3321 (1998: 114, pl. 26). There are several variants of rim (simple; rounded), body profile (U-shaped; bell-shaped; conical), stem (hollow; solid; knobbed) and base (pushed-in; tubular ring; flat disk; slightly concave disk). A great number of such vessels have been found at various sites of the Byzantine and Umayyad periods. Here we refer just to parallels from Beirut (Jennings 2006: figs 1.6-1.9); Pella (Smith and Day 1989: pl. 60: 9); Jerash (Kehrberg 1986: 375, fig. 9: 25-28; Meyer 1987: fig. 10: V, X-Z), Amman (Dussart 1998: 114, pl. 26: BVIII.332, 27-33 with further parallels therein); Hammat Gader (Cohen 1997: 405-407, pl. III: 1-4); Beth Shean (Hadad 2005: pl. 21: 400-411); Horbat Castra (Gorin-Rosen 2013: 99, fig. 24: 7). Examples from the first half of the eighth century have also been found



4. Bayt Rās 2015 Excavations. Glass - Varia (Drawing D. Mazanek; Computer Rendering: M. Burdajewicz).

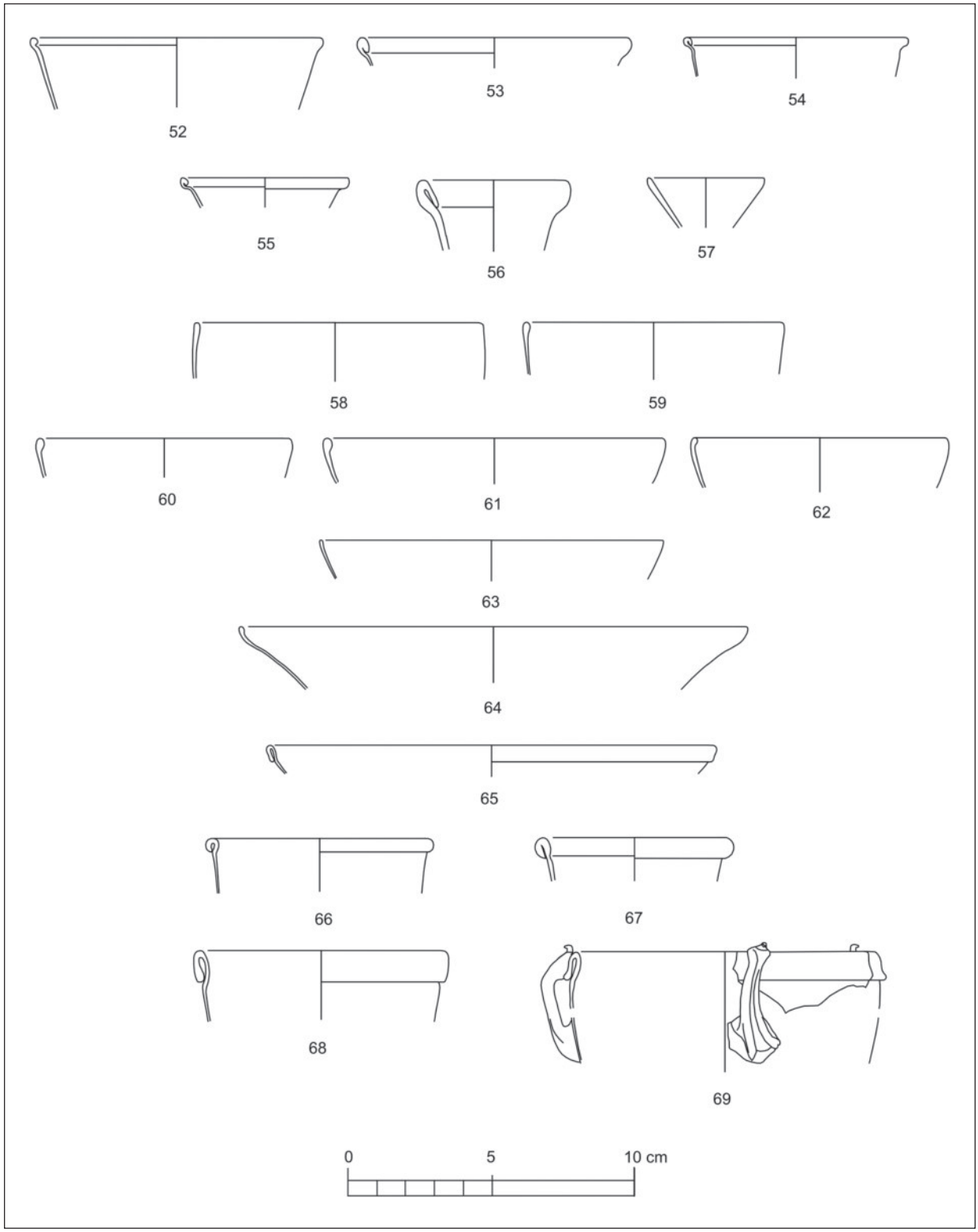
at Hippos / Sussita. One of them is a goblet with a flaring rounded rim, simple solid stem, flat bottom and bell-shaped body adorned with shallow mould-blown rhomboids (Burdajewicz 2011: 38, fig. 9, 2006: 129-130, figs 1: 12, 13, 15, 5). Outside the Syro-Palestinian region, stemmed goblets are known from, amongst other locations, Karanis (Harden 1936: pl. XVI: 479-484) and Sardis (von Saldern 1980: 53-60).

Two kinds of stem were unearthed at Bayt Rās: (a) knobbed (34 - 36) and (b) plain and slightly concave (76). Amongst the bases, three types can be distinguished: (a) pushed-in (37 - 41, 77), (b) tubular ring (78 - 79) and (c) flat disc, sometimes with a concave centre (80 - 83).

Owing to their very fragmented state of preservation, it cannot be stated whether stems 42, 43 and 75 belong to stemmed goblets or to stemmed bowl-lamps.

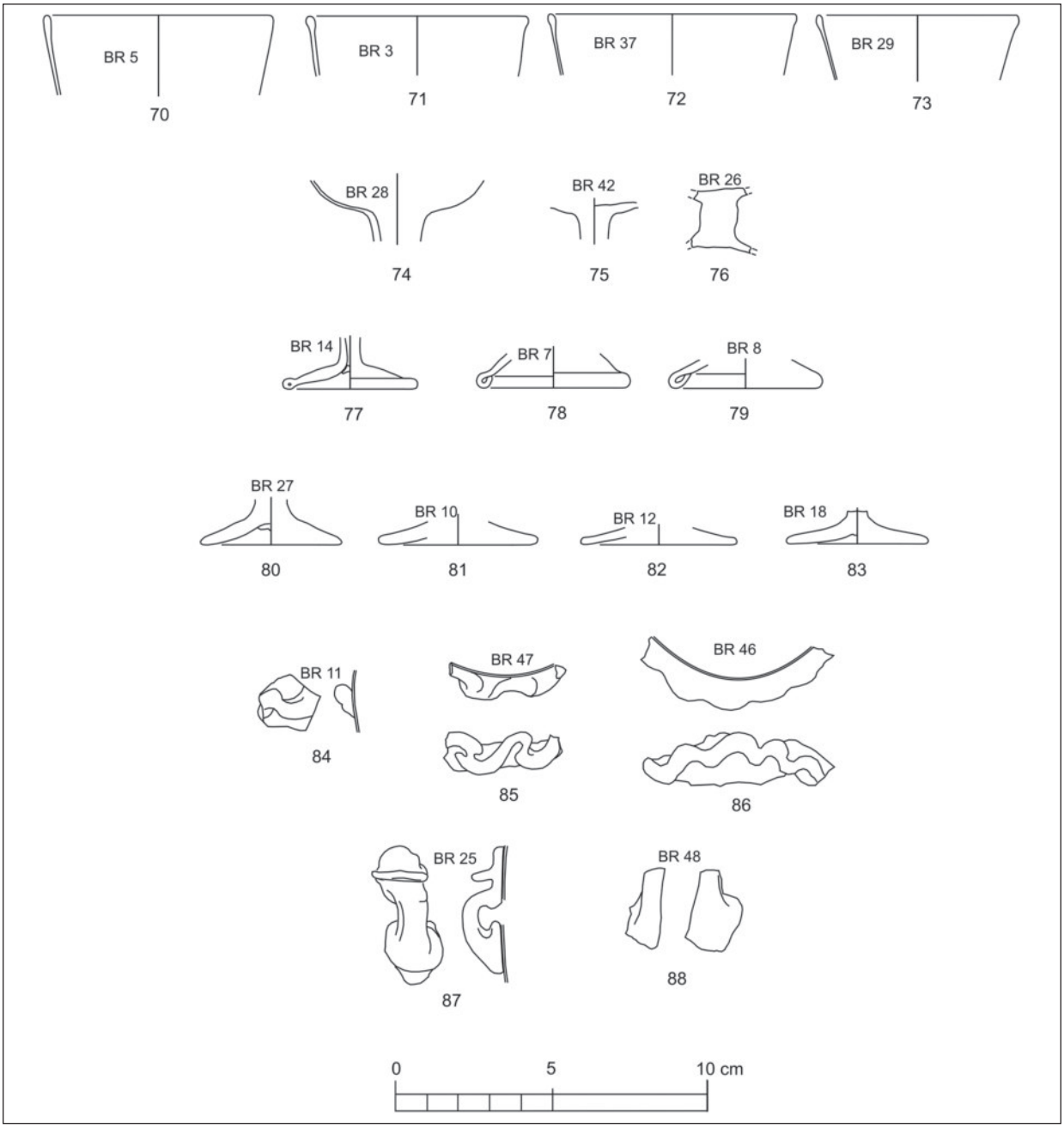
It should be noted that some of the goblet-type rims discussed above could be associated with stemmed lamps. An example of at least one such lamp was found. It is a fragmentarily preserved bowl with a convex wall and sloping hollow stem (74). Alongside three-handled hanging bowl-lamps, such as 69, stemmed lamps were in common use during the Byzantine and Umayyad periods. While the bowl had usually convex walls and a simple upright and rounded rim, stems were more differentiated. They were either long or short, hollow or solid. The solid stems could be either smooth or multi-knobbed. Examples of stemmed lamps dating to the Byzantine and Umayyad periods have been published, e.g. from Umm Qays; Jerash; Amman (Dussart 1998: 86-88, type BVI.2); Hammat Gader (Cohen 1997: 403-404, pl. II: 16: 16-22); Hippos / Sussita (Burdajewicz 2011: 32-33, figs 2-B: 32-38, 4: 13-14, 26, 5: 7, 13, 26-27); Beth Shean (Hadad 2005: pl. 22: 424-442).

Stemmed lamps were placed in the openings of metal chandeliers, *viz*. multiple-lamp holders (*polycandela*; *palamai*; *stephanitai*) equipped with tree chains and suspended from ceilings. Many such lighting devices have been found in churches, synagogues and other buildings, e.g. the Bishop Marianos Church at Jerash (Gawlikowski and Musa 1986: 153, figs 9-10); North-Western Church at Sussita (Burdajewicz



5. Bayt Rās 2014 Survey. Glass Bottles and Bowls (Drawing and Computer Rendering: M. Burdajewicz).

2011: 36, fig. 8); synagogue at Beth Shean (Zori 1967: fig. 11.5); House of the Fountains, Beirut (Jennings 2006: figs 6.27-6.28). Another way of using stemmed lamps was to place them in metal holders attached to the wall (Hadad 2003: 194).



6. Bayt Rās 2014 Survey. Glass Drinking Vessels and Varia (Drawing and Computer Rendering: M. Burdajewicz).

Miscellanea

A single example of what appears to be a glass lid (48) was found in a sixth / seventh-century context. It has a dome-like shape, with a slightly rounded section on top and a wide flange (edge not preserved) around the bottom. It belongs to a large group of domed glass lids corresponding to Isings Form 66a (1957: 85) and Vessberg Type II (1956: 173), among which some variants can be distinguished. Somewhat similar lids dated to the third to mid-fourth century were found in Hanita Tomb XV (Barag 1978, 31-32, fig. 15: 68-69 and further parallels therein). Numerous lids of various kinds, probably from the third century, are known from Cyprus (Vessberg 1956: 172-173). An interesting example of a domed lid associated with a cinerary jar, probably from Italy, is in the collection of the Royal Ontario Museum (Hayes 1975: 148, 185, fig. 20: 615).

The glass assemblage from the site also includes a few bases. Two of them, with concave bottoms (44 - 45), probably belonged to bottles. A ring base fragment (47) could be part of a large, shallow bowl. Thick wavy trails (51, 84 - 86) are decorative elements, which doubtless once adorned the necks of bottles or flasks. Fragment 49 represents a simple vertical rod handle, while fragments 50 and 88 are suspension handles from bowl-lamp type vessels. Rod handle 87 has horizontal pinched thumb rest.

Glass Chunks (**Fig. 7**)

In addition to the fragments of glass vessels, a considerable number of small and medium-sized (up to 5 *cm*) raw glass chunks were unearthed. The chunks are of bluish green, bluish and greenish hues. Numerous glass chunks were also found at the site during the 2014 survey (Burdajewicz 2014). These new finds are additional to the glass chunks recovered previously from the nearby area of the Roman theatre during archaeological work

7. Bayt Rās 2014 and 2015. Chunks of Raw Glass.

conducted by the Irbid / Bayt Rās Project and Department of Antiquities of Jordan (Abd-Allah 2010; Juma al-Shami 2005: fig. 4). All of these finds are suggestive of the presence of a glass workshop somewhere in the vicinity.

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Catalogue

Finds from the 2014 Excavations (B = Basket)

Fig. 1

1. B 004.01. Bottle / flask. Funnel mouth with infolded rim. Light bluish green.
2. B 021.01. Bottle / flask. Funnel mouth with infolded rim. Light blue.
3. B 026.01. Bottle / flask. Funnel mouth with infolded rim. Colourless with light green tinge.
4. B 021.03. Bottle / flask. Funnel mouth with infolded rim. Light blue.
5. B 016.01. Bottle / flask. Funnel mouth with infolded rim. Light blue.
6. B 028.01. Bottle / flask. Convex mouth with infolded rim. Broad handle rises above rim. Light blue.
7. B 026.02. Bottle / flask. Convex mouth with infolded rim. Light green
8. B 003.02. Bottle / flask. Convex mouth with infolded rim. Light bluish green.
9. B 021.04. Bottle / flask. Funnel shaped neck with thickened, out-rounded rim. Thin trails on the neck. Light blue glass; olive green threads.
10. 024.02. Bottle / flask. Cylindrical neck with thickened, infolded rim. Light greenish blue.
11. 016.02. Bottle / flask. Fragment of neck and body. Light blue.
12. 026.03. Bottle / flask. Fragment of upward-tapering neck with single trail. Colourless with yellowish green tinge; light greenish trail.

Fig. 2

13. B 001.01. Bowl. Flaring rim with double fold below. Light blue.
14. B 003.03. Bowl. Collar bellow rim. Light bluish green.
15. B 051.01. Bowl. Pinched rim. Light bluish green.
16. B 011.01. Bowl. Pinched rim. Bluish green.
17. B 023.01. Bowl. Out-folded rim. Light greenish blue.
18. B 038.01. Bowl. Out-folded rim. Light greenish blue.
19. B 025.02. Bowl. Out-folded rim. Light green.
20. B 035.03. Bowl. Out-folded rim. Colourless, light green tinge.
21. B 036.01. Bowl. Out-folded rim. Colourless, light green tinge.

FIg. 3

22. B 022.02. Drinking vessel. Thickened, upright rounded rim. Light blue.
23. B 024.01. Drinking vessel. Thickened, incurving rounded rim. Light greenish blue.
24. B 022.04. Drinking vessel. Thickened, incurving rounded rim. Light bluish green.
25. B 032.02. Drinking vessel. Thickened, incurving rounded rim. Light bluish green.
26. B 022.03. Drinking vessel. Thickened, upright rounded rim. Light greenish blue.
27. B 021.02. Drinking vessel. Thickened, slightly incurving rounded rim. Light blue. Yellowish trails on and below rim.
28. B 003.01. Drinking vessel. Thickened, upright rounded rim. Light greenish blue.
29. B 025.01. Drinking vessel. Thickened, upright triangular rim. Light bluish green.
30. B 008.01. Drinking vessel. Simple, upright rounded rim. Light blue; opaque trail below rim.
31. B 032.01. Goblet. Thickened, flaring rounded rim. Light greenish blue.
32. B 040.01. Goblet. Thickened, flaring rounded rim. Light greenish blue.
33. B 027.01. Goblet. Thickened, flaring rounded rim. Light blue greenish.
34. B 008.02. Goblet. Solid knob stem. Light blue.
35. B 031.01. Goblet. Solid knob stem. Green.
36. Area 3-S, surface. Goblet. Solid knob stem. Green.
37. B 015.01. Goblet. Pushed-in base with hollow ring and lower part of solid stem. Olive green.
38. B 004.03.Goblet. Pushed-in base with

hollow ring. Green.
39. B 015.02. Goblet. Pushed-in base with hollow ring. Light blue.
40. B 022.05. Goblet. Pushed-in base with hollow ring. Light blue.
41. B 025.03. Goblet. Pushed-in base with hollow ring and lowest part of stem. Light blue.

Fig. 4
42. B 039.01. Solid knob stem and lower part of bowl. Light green.
43. B 001.04. Solid stem. Light blue.
44. B 022.06. Slightly concave base. Light blue.
45. B 026.04. Concave base. Light green.
46. B 027.02. Foot ring base. Light blue.
47. B 016.03. Ring base. Green.
48. B 001.03. Lid. Dome-shaped. Yellowish green.
49. B 012.01. Plain rod handle. Light green.
50. B 028.02. Handle. Green.
51. B 034.01. Thick wavy trail applied to a neck. Green.

Finds from the 2014 Survey (A = Area)
Fig. 5
52. A 6-N. Downward-tapering neck. Infolded rounded rim. Light blue.
53. A 5-N. Funnel neck. Infolded rounded rim. Light greenish blue.
54. A 4-S. Downward-tapering neck. Infolded rounded rim. Light blue.
55. A 4-N. Funnel neck. Infolded rounded rim. Light greenish blue.
56. A 1-S. Downward-tapering neck. Infolded rounded and flattened rim. Green.
57. A 4-N. Funnel neck. Simple rounded rim. Greenish (sea-green).
58. A 5-N. Bowl. Straight wall. Simple rounded rim. Light blue.
59. A 2-N. Bowl. Straight wall. Slightly thickened rounded rim. Greenish blue.
60. A 4-3. Bowl. Thickened, slightly incurving rounded rim. Light greenish blue.
61. A 3-S. Bowl. Thickened, slightly incurving rounded rim. Light greenish blue.
62. A 2-N. Bowl. Thickened, slightly incurving rounded rim. Greenish (sea-green).
63. A 4-S. Bowl. Downward tapering wall. Colourless with bluish tinge.
64. A 5-S. Bowl. Downward tapering wall. Thickened, slightly incurving rim. Colourless with bluish tinge.
65. A 4-S. Bowl. Diagonal walls. Out- and down-folded, flattened rim. Greenish (sea-green).
66. A 3-S. Bowl? Straight wall. Out-curving, rounded rim. Greenish blue.
67. A 2-S. Bowl? Straight wall. Out-curving, rounded rim. Light bluish green.
68. A 4-S. Bowl. Concave wall. Out- and-down folded, flattened rim. Light green.
69. A 6-N. Bowl. Concave wall. Out- and down-folded, flattened rim. Light green.

Fig. 6
70. A 5-N. Drinking vessel or bottle / flask / jug. Light blue.
71. A 6-N. Drinking vessel or bottle / flask / jug. Light blue.
72. A 6-S. Drinking vessel or bottle / flask / jug. Greenish blue.
73. A 2-S. Drinking vessel or bottle / flask / jug. Greenish (sea-green).
74. A 3-N. Lower part of bowl and hollow stem. Bluish green.
75. A 4-S. Lower part of bowl and solid stem. Greenish blue.
76. A 4-S. Solid knob stem. Bluish green.
77. A 5-N. Goblet. Pushed-in base with hollow ring and lower part of stem. Bluish green.
78. A 4-N. Goblet. Tubular ring base. Olive green.
79. A 4-N. Goblet. Tubular ring base. Olive green.
80. A 4-S. Goblet. Circular foot, concave on underside. Annular pontil scar. Greenish blue.
81. A 6-N. Goblet. Circular foot, concave on underside. Light blue.
82. A 6-S. Goblet. Circular foot, concave on underside. Light blue.
83. A 4-S. Goblet. Circular foot, concave on underside. Sea-green.
84. A 6-N. Thick wavy trail applied to a neck. Greenish blue.
85. A 2-N. Thick wavy trail applied to a neck. Olive green.
86. A 4-S. Thick wavy trail applied to a neck. Green.
87. A 6-N. Rod handle with horizontal pinched thumb-rest. Green.

88. A 1-S. Simple suspension handle from bowl-lamp. Greenish blue.

Fig. 7
Chunks of raw glass

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ARCHAEOLOGICAL INVESTIGATIONS IN BAYT RĀS, ANCIENT CAPITOLIAS, 2015: PRELIMINARY REPORT

Jolanta Mlynarczyk

Abstract

The team from the Polish Centre of Mediterranean Archaeology conducted the excavations at Bayt Rās in May 2015, in the area directly to the west of the Roman theatre on the northern slope of the plateau. The objective was to verify if the results of a non-invasive research carried out at the same site a few months earlier were correct, and to establish chronological phases for the utilization of this area of ancient Bayt Rās. Wall remains were uncovered in all three of the trenches opened, the course of which confirmed most of the results of the electric resistivity research. In addition, a sequence of floors were found, dating from the Late Roman (fourth-fifth centuries AD) and Umayyad periods, with evidence of destruction by the earthquake in the mid-eighth century AD. Most of the architecture and installations appear to be for domestic use. The evidence also points to some re-use of this area in a later period, probably the Fatimid/Ayyubid.

Introduction

The team from the Polish Centre of Mediterranean Archaeology, University of Warsaw, conducted archaeological excavations at the site of Bayt Rās (MEGA no. 2760, JADIS 2322001) in the Irbid Governorate, under permit no. 2015/19 from the Department of Antiquities of Jordan, between 3rd and 27th May, 2015. The team was directed by Prof. Jolanta Mlynarczyk (Institute of Archaeology, University of Warsaw), and included Dr. Mariusz Burdajewicz (Institute of Mediterranean and Oriental Cultures, Polish Academy of Sciences: Deputy Director), Dr. Mariusz Drzewiecki (Adam Mickiewicz University in Poznań: trench supervisor), Ms. Dorota Mazanek (University of Warsaw: trench supervisor and registrar), Ms. Iwona Laskowska (freelance: draftsperson) and Mr. Rafał Bieńkowski (graduate student, University of Warsaw: trench supervisor). The DoA Representative was Eng. Amjad Batayneh.

The decisions for where to open the trenches had been dictated both by the local conditions (that is, the space available for excavations between the trees in the olive grove and consultations with private landowners), and by the results of the non-invasive research carried out in November 2014 (DoA Permit no. 2014/79). The previous year's work had also been conducted under the auspices of the Polish Centre of Mediterranean Archaeology; the team consisted of Prof. Jolanta Mlynarczyk, Dr. Mariusz Burdajewicz, Mr. Jakub Ordutowski and Ms. Iwona Laskowska, and with Eng. Amjad Batayneh as the DoA representative.

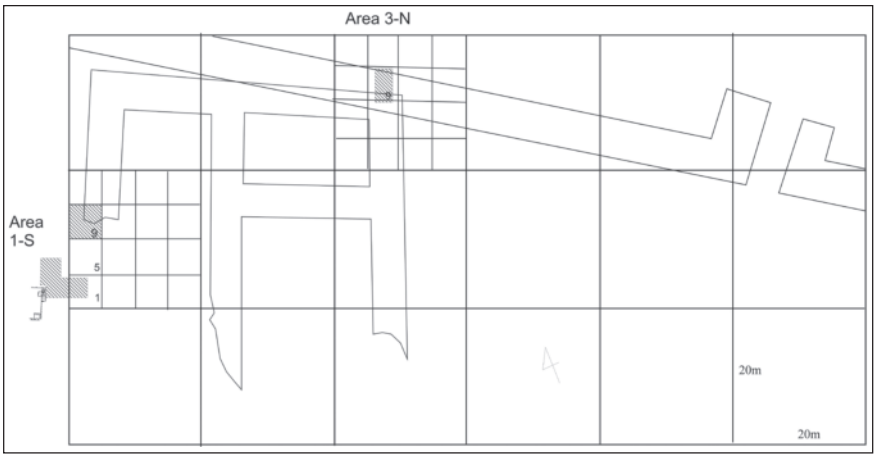
The area investigated was between the Roman theatre to the east (Al-Shami 2005) and the "vaults" (the so-called "Roman Forum") to the south-west, (Lenzen, Gordon and A. McQuitty 1986; Lenzen and Knauf 1987; Lenzen and Mc Quitty 1988). A grid of squares 20 m by 20 m was established, covering an area 40 m north-south by 120 m east – west. Six pairs of squares were marked as S. (Square) 1-N (north) and 1-S (south) through to S. 6-N and 6-S. Within this grid, a geophysical survey based on the electric resistivity method was conducted, together with a surface survey for archaeological features and artifacts. While the geophysical research evidenced the presence of architectural remains, a variety of surface finds ranging from the first/ second centuries AD through to the twelfth/ thirteenth centuries

AD suggested that this area had been used for artisanal workshops in the Byzantine and Umayyad periods.

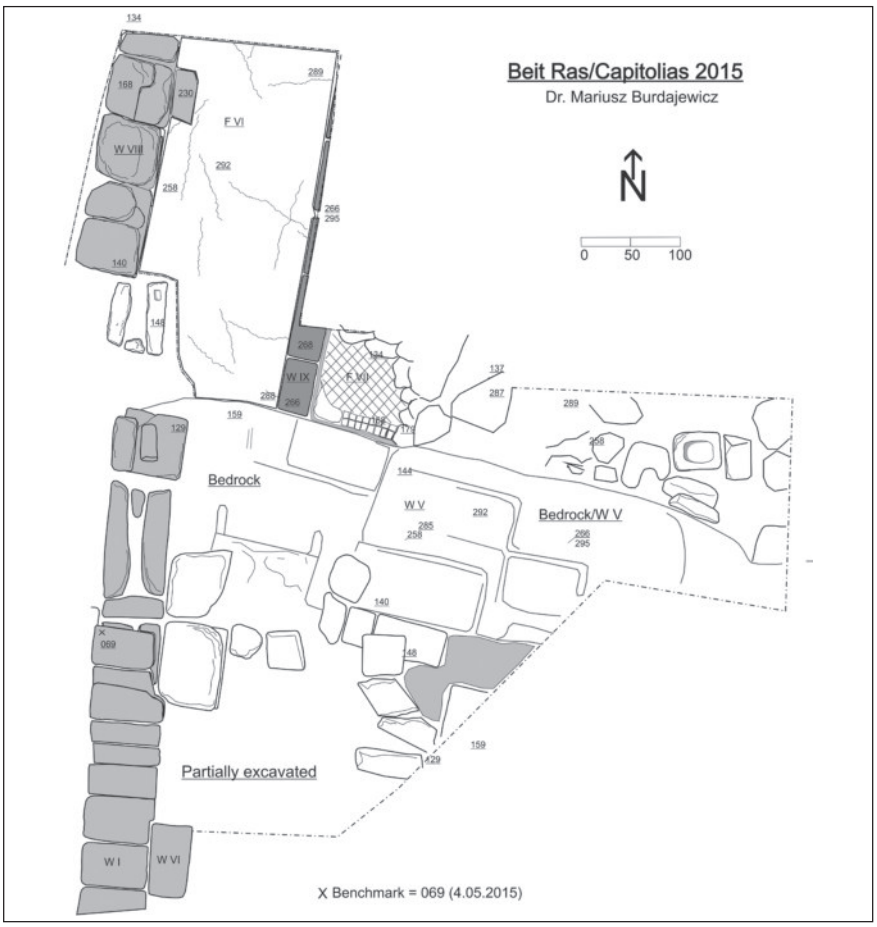
The objectives of the field season in May 2015 were to verify if the results obtained during the survey were correct, and to establish chronological phases for utilization of this part of ancient Capitolias. The grid of 12 areas, each 20m by 20m, was then subdivided into 5m by 5m squares. Of the three trenches opened at the site, one was situated directly to the west of Area 1-S (Squares 1 and 5), another in Area 1-S (Square 9), and the third in Area 3-N (Square 9) (**Fig. 1**).

Description of the Results

The main part of the first trench (**Fig. 2**), which was also the richest in architectural remains,



1. Excavated squares in relation to the results of the 2014 electric resistivity survey (photo: Mariusz Burdajewicz).



2. Trench in Area 1-S/Sq. 1, 1-S (W)/ Sq. 1(W), and Sq. 5(W) (photo: Mariusz Burdajewicz).

was designated as 1-S(W), Sq. 1 (W), and was located directly to the west of the south-western corner of Area 1-S (or of Square 1-S of 2014 survey). It was opened in order to explain the extent and chronology of the N-S wall marked as W I in the 2014 survey, which appears on the plan published by the Joint Excavations Project of 1985 as "Wall 4" (Lenzen and Knauf 1987, 33, Fig. 5). The western face of this wall, whose lowest course rested on the bedrock with clear traces of quarrying, had been cleaned during the 2014 survey, and revealed three phases of relative chronology tentatively attributed to the Late Roman-Byzantine, Byzantine-Umayyad and Mediaeval periods (according to the Preliminary Report submitted to the DoA in December 2014). In 2015, the work began by cleaning the area on the eastern side of W I in order to determine its width (0.65-0.75 m), and the nature of deposits abutting its eastern face. The trench was then enlarged towards both the north and the east, and in its final extent assumed an L-shaped outline, covering most of Sq. 1(W) and part of Sq. 5(W), both which were located in Area 1-S, as well as the south-western corner of Sq. 1 in Area 1-S.

A rock-cut foundation for wall W V, perpendicular to W I, runs along the E-W axis of the trench. With the exception of a few blocks still *in situ* at its western end, W V has been completely robbed out, leaving a negative impression (Loc. 002) consisting of a thin layer of earth with pale grey spots (ashes?) (**Fig. 3**). Exploration of the negative impression revealed a series of cuts, possibly evidence of stone quarrying which had been carried out before the bedrock was used as a foundation for the wall. The northern edge of Loc. 002 is a floor surface of whitish earth (mortar or eroded limestone?). This poorly preserved floor (F III) continues to the north in Sq. 5(W) (**Fig. 4**), limited on the west by the remains of a wall (W VIII), which only approximately continues the line of W I. Stratigraphically part of the same utilization phase in Area 1-S, Sq. 1 appears to be represented by a concentration of rubble (Loc. 003) with a small trough for domestic animals (?) carved out of a limestone block (**Fig. 5**).

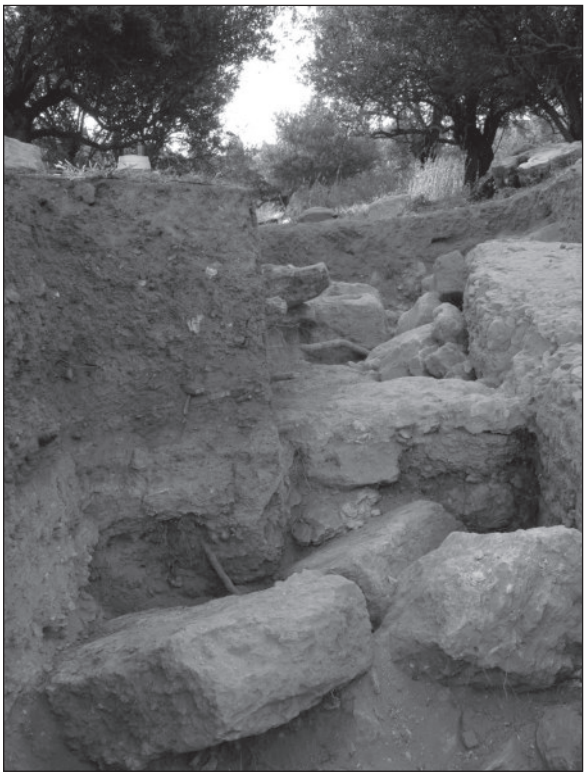
3. Negative from W V facing south, with W I to the right (photo: Dorota Mazanek).

4. Late floor (F 3) and extant top of W VIII, facing west (photo: Mariusz Burdajewicz).

5. Late habitation level (F III) on the northern side of W V, facing west (photo: Mariusz Burdajewicz).

In terms of absolute chronology, while the fill of the W V negative impression contained Late Byzantine and Umayyad potsherds (**Fig. 31: 1-3**), the removal of F III in Sq. 5(W) yielded two fragments of Islamic glazed pottery of presumably Ayyubid and Fatimid date (**Fig. 31**: **4-5** respectively); that is, from the eleventh to the thirteenth century. This agrees with the results of the Joint Excavation Project (1985), who in nearby Cave A4 found a deposit of eleventh century pottery (Lenzen and Knauf 1987, 44) and may indicate some kind of domestic activity in the area during the Medieval period.

F III rests upon dense debris, mostly regular limestone blocks collapsed to the north, which are almost certainly from W V, and which are probably the result of an earthquake (**Figs. 6,7**). The blocks lie on a compacted earthen floor, F IV, ca. 0.65 m below F III. The ceramic material found between the collapsed blocks (**Fig. 32: 19-24**) may include intrusive potsherds from later periods, but the material sealed below F IV seems to be uncontaminated and dates from the late Byzantine to the Umayyad period (**Fig. 32: 25-27**). Therefore, one may assume that the earthquake evidenced by the collapsed blocks was that of AD 749.



6. Blocks collapsed from W V, with part of F III above them, facing east (photo: Jolanta Mlynarczyk).

7. Blocks collapsed from W V lying on F IV, with later floor(s?) sealing them, facing north (photo: Jolanta Mlynarczyk).

The underlying, earlier floor (F V) in Sq. 5(W) lies ca. 0.52 m below F IV. It is a layer of dark orangey brown earth which contains some ashes, small burnt limestone pieces, and the remains of a destroyed clay *tabun*. Two architectural elements were also found lying in a horizontal position, and apparently marking the floor level (**Fig. 8**). One of them is a fragment from a small limestone column, and the other

8. Elements of architectural decoration from a church, lying on F V, with traces of a tabun; facing north (photo: Mariusz Burdajewicz).

part of a marble columnette (BR 2015/19/20) from a church's chancel (**Fig. 9**), of a type

9. Fragmentary marble columnette from a church chancel; BR 2015/19/20 (photo: Mariusz Drzewiecki).

common from the sixth to seventh centuries. (For use of identical columnettes, see a lateral chancel, dated to the sixth/seventh centuries, at the Northwest Church in Hippos of the Decapolis: Mlynarczyk and Burdajewicz 2013: 207, figs. 279a-279b). Their presence here, out of the original context, is probably the result of destruction of a nearby church; possibly the one found close to the Vaults on the northern edge of the plateau above our site (Lenzen 1995: 330). This destruction may have occurred during the Sassanian invasion of Palestine in AD 614, or slightly later. In the layer directly above F V, a Byzantine *follis* of the sixth (or early seventh?) century was found (BR 2015/19/4), confirming this date. A N-S wall (W VIII) also rests on F V, whose slightly sloppy eastern face (*ca*. 1.20 m high), consisting of three layers of blocks, gives it the appearance of a retaining wall (**Fig. 10**).

The earliest floor reached in this trench, F VI, *ca*. 0.20 m below F V, lies directly over the bedrock. This is a very hard, level earthen floor, with large patches of lime mortar (**Fig. 10**). It borders W IX to the east, one row of carefully constructed, beautiful ashlars 0.30-0.32 m wide, which lie directly on the bedrock (**Fig. 11**). Judging by the preserved height of the plaster, W IX had at least two rows of ashlars. The plaster also extends to the vertical rock-cut surface of the foundation for W V (**Fig. 13**), although it is difficult to ascertain if the vertical surface *ca*. 1.30 m high was already crowned with a wall at that time, or was perhaps only a rock-cut platform. Wall W IX, visible in the

10. Floor F VI and wall W VIII, the latter resting on F V; facing west (photo: Jolanta Mlynarczyk).

11. Floor F VI and western frame of basin Loc. 004, with floors F V and F IV sealing it; facing east (photo: Jolanta Mlynarczyk).

trench's section, runs at least 3.5 m northwards, and could probably be traced to its north end in the future.

This structure provides the frame for a shallow basin (Loc. 004), paved by a plain mosaic of large *tesserae* (the "industrial" mosaic type). Only the south-west corner of the basin was uncovered, lined inside with a white plaster of excellent quality (**Fig. 12**). Neither the size nor the nature of the basin can be determined.

12. South-west corner of the basin (piscina or wine treading floor?) Loc. 004, viewed from above (photo: Dorota Mazanek).

13. South-west corner of the basin Loc. 004, viewed against rocky terrace of W V, facing south-east (photo: Jolanta Mynarczyk).

The basin did not yield any finds; the explored corner was filled with a very compacted, very hard, pure clay sediment. This seems to discount identifying it as the treading floor of a winery; was it perhaps a kind of *piscina*? Judging by the few pottery finds from overlying F VI, which obviously pertains to the same phase as basin Loc. 004, and was dated to the Byzantine period (sixth century?), either is possible, as both these elements were used during this time.

A rather different stratigraphy was found on the southern side of W V. This area formed an upper terrace, related to the earliest floors F VI and F VII on the north side. Floor F I had initially been identified as the latest floor surface (**Fig. 14**). It consisted of small, irregular stones in pale brown earth, with some extant lime mortar and larger stone paving. The layer (up to 0.5 m thick) which covered this floor

14. Floor F I, with W I to the right, facing south (photo: Mariusz Burdajewicz).

was particularly rich in pottery (**Fig. 31: 6-11**). Most potsherds were "Beisan" type jars, a few of them with a circular hole drilled through the shoulder, probably in order to ensure safe fermentation of the wine. Here, one should bear in mind a number of references to the production of, and trade in, wine at Bayt Rās during the sixth/seventh centuries and probably later (Lenzen and Knauf 1987: 35 and notes 61-62). Indeed, these jars represent the shape and decoration characteristics of the seventh century, rather than the late seventh to eighth centuries (**Fig. 31: 9-11**). **(**For the seventh century "Beisan" type jars from Hippos – Susita, see Mlynarczyk 2013: 480-481 and 484-485, Figs. 15-32).

The Byzantine period date for this deposit is confirmed by single examples of fine wares such as **no. 6 (**early to mid-seventh century; **Fig. 31**), **no. 8** (mid-sixth to early seventh century), and terracotta lamp BR 2015/19/1, of the so-called "North Jordan type", dated fifth/sixth century (Da Costa 2010: 75-76 and Fig. 15), which were found on F I itself (**Fig. 15**). However, it is perhaps possible to detect a still later floor, or rather walking level, which we would mark as F "0", immediately above F I. It appears to be marked by flat-positioned blocks, possibly collapsed from W I (**Fig. 16).** The topsoil above the blocks in question yielded very mixed ceramic material, including two pieces of glazed (Islamic) pottery and a fragment of an Eastern Sigillata "A" ware *lagynos* jug from the first century BC/first century AD; thus the presumed late walking level(?) cannot be dated precisely. Moreover, the chronology of construction for

15. Terracotta oil lamp (BR 2015/19/1), found on F I, sixth century AD (photo: Jolanta Mlynarczyk).

16. Fragments of presumed walking level ca. 0.70-0.80m above the level of F I; facing south, with W I to the right (photo: Jolanta Mlynarczyk).

remains discovered on the eastern side of W I remains obscure. Specifically, removal of the debris accumulated against the eastern face of W I (Loc. 001) revealed two additional elements; W VI which was preliminarily described as a "pillar" supporting W I, and W VII which appears to be a blocked opening (**Fig. 17)**. Since exploration in this spot could be continued neither to the south nor to the east, it is not clear if there was another wall running east-west, which might have contained the blocked opening. All three vertical elements (W I, W VI and W VII) were built on F I, suggesting they are more recent than the floor in question.

F I almost certainly dates to no later than the sixth century AD, as the finds from the layer below it included, in addition to ceramic vessel fragments (**Fig. 32: 14-17**), Late Roman bronze coins (BR 2015/19/5, 6 and 7; fourth/fifth century?), and five terracotta oil lamp fragments (such as lamp BR 2015/19/1 found on F I; see **Figs. 18, 19**), all of the same "North

18. Fragmentary terracotta lamps (026.7 and 026.8) from the deposit under F I (photo: Jolanta Mlynarczyk).

17. Walls W I, W V and W VI resting on the level of F I; facing south (photo: Jolanta Mlynarczyk).

19. Three terracotta lamp fragments (026.9, 026.11 and 026.10) from the deposit under F I (photo: Jolanta Mlynarczyk).

Jordan type", which are dated to the fifth/sixth century (Da Costa 2010: 75-76 and Fig. 15). This means that F I is probably contemporary with F V on the north side of W V; the difference in the height of their respective floor levels, amounting to *ca*. 2 m, is another proof of the terrace arrangement of the area on the northern slope of Bayt Rās.

An earlier floor of tamped earth, F II, was found *ca*. 0.50 m below F I (**Fig. 20**), overlying a thin layer of earth immediately above the bedrock. Very few potsherds were found (**Fig. 32:18)**, but they were accompanied by Roman coin BR 2015/19/8, probably from the mid-third century AD. F II, therefore, may date to as early as the fourth century AD, which is earlier than any of the other floors to the north of W V.

The second trench (**Fig. 21**) was opened in Area 1-S, Sq. 9, a short distance (*ca*. 6 m) to the north of the first one (**Fig. 1**). A rock-cut foundation for an east-west wall (W II) was found, running parallel to the northern edge of the trench (**Fig. 22)**. W II is similar in appearance to the rock foundation for W V, which is *ca*. 12 m to the south. The two walls (W II and V) are not only parallel to each other, but are also the same width (*ca*. 1.15 m), and both were built directly on the bedrock, which bore traces of previous stone quarrying. At the western end of W II, where it intersects with another wall (W III), some of the ashlar blocks were still *in situ*. W III runs north, and is also built on a rock-cut foundation.

20. Two successive floor levels: F I and F II, with W I to the right; facing south (photo: Jolanta Mlynarczyk).

22. Trench 1-S, Sq. 9, with W II in the background, W IV to the left and Loc. 006 in the foreground, facing north-west (photo: Jolanta Mlynarczyk).

The north-eastern part of the trench, between Ws II and III, revealed a layer of ashlars collapsed from the wall(s). The pottery

21. Trench in Area 1-S/Sq. 9 (photo: Mariusz Drzewiecki).

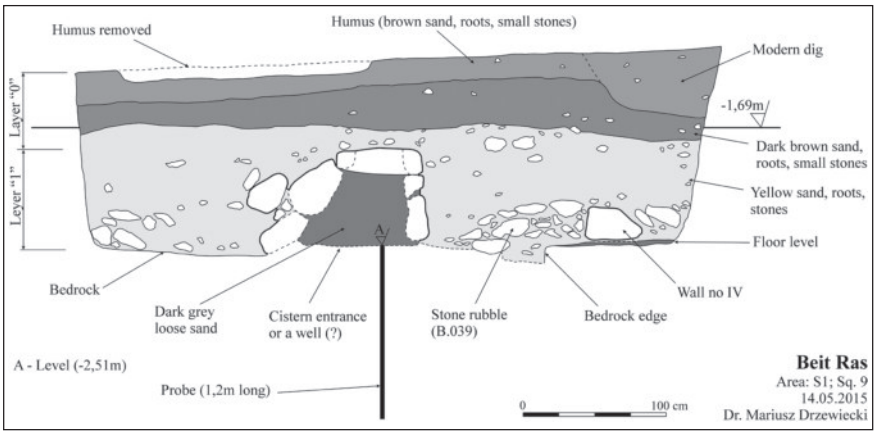
collected between them (**Fig. 32: 28-32**) leaves no doubt that we are dealing with evidence for the earthquake destruction of 749 AD. The debris was unsealed, which means there is a possibility that some of the finds are intrusive. The lack of any overlying floors proves that, after the earthquake in question, this particular area was not been inhabited again. Excavation of the floor below the layer of collapsed ashlars was postponed to the next season.

To the south of W II, the line of W III was continued by another north-south wall; W IV. However, unlike W III, which was built on a rock-cut foundation, W IV, of careless construction and only 0.35 m wide, rested on a compacted clay floor (F IX; **Fig. 23)**. It lay directly on the bedrock, and must have been contemporary with W II. However, no sealed layers were found in this part of the trench; even the trench sections did not reveal any definite levels. Most of the ceramic material from the trench was chronologically consistent, and dated to between the late Byzantine and early Islamic (Umayyad) periods (sixth/eighth centuries AD); hence this part of the site was probably occupied during these periods.

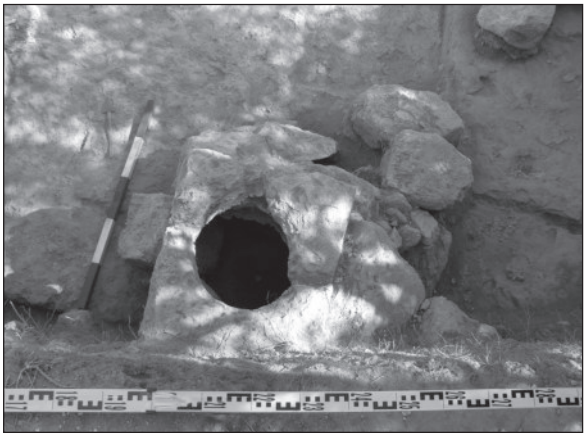
In the middle of the southern edge of the trench, a heap of both dressed and irregular blocks (Loc. 006, **Fig. 22**, foreground) was initially interpreted as part of a dismantled wall. However, it soon became evident it was a makeshift covering for a water cistern (rather than a well); Loc. 006. The original opening was cut into the bedrock, most probably during the first habitation period, when W II was built, and F IX was made. However, it is clear that the cistern was re-used some time after its abandonment, which was almost certainly caused by the earthquake of AD 749. Not only is the present well-head placed *ca*. 0.70 m above F IX, without any floors in between (**Fig. 24**), but also its cover lacks any true construction (**Fig. 25)**. The well-head frame, with a diameter of *ca*. 0.30 m (**Fig. 26)**, simply rests on top of

23. Trench 1-S, Sq. 9, with W II in the background, W III in the far background and W IV to the left, resting on F IX; facing north (photo: Jolanta Mlynarczyk).

25. Cistern cover (Loc. 006) with the well-head on top of earthquake debris, ca. 0.70 m. above the level of F IX; facing south-east (photo: Mariusz Drzewiecki).



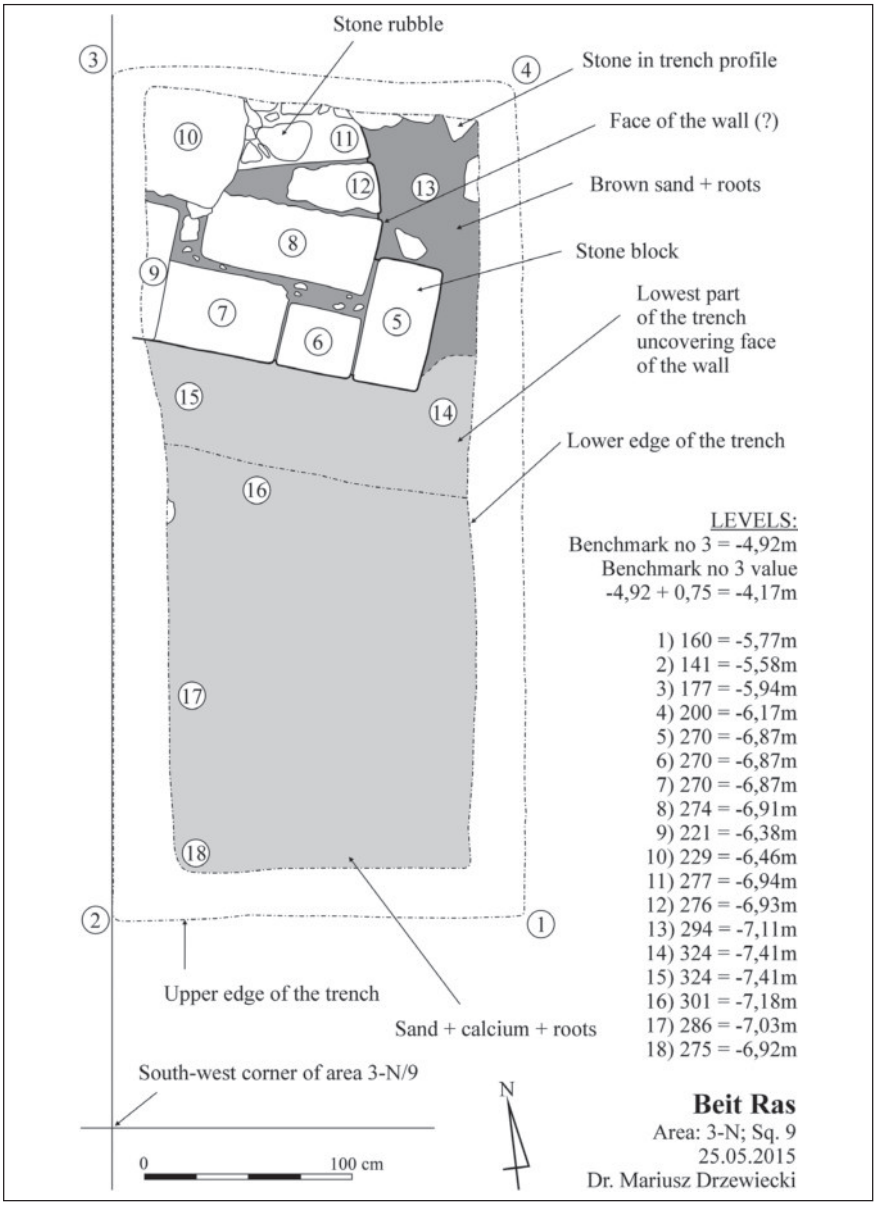
24. Southern section of trench in Area 1-S/ Sq. 9 (photo: Mariusz Drzewiecki).



26. Well-head of cistern in 1-S/ Sq. 9; seen from above (photo: Mariusz Drzewiecki).

what appears to be remains of the earthquake debris. Logically, this well-head level must have corresponded to a walking level, even if no specific floor has been noted around it. It may be related to the same chronological phase as makeshift wall W IV (a field wall?) and F III in the trench in Area 1-S (W), Sq. 5 (W); that is, to the Fatimid/Ayyubid (?) period. On the other hand, the very presence of a water cistern (or well) means that the space to the south of wall W II was unroofed, serving as a courtyard(?) both in the Byzantine-Umayyad and the late (Medieval?) periods.

The third trench (**Fig. 27**) was opened in the western part of Sq. 9 in Area 3-N, ca. 40m



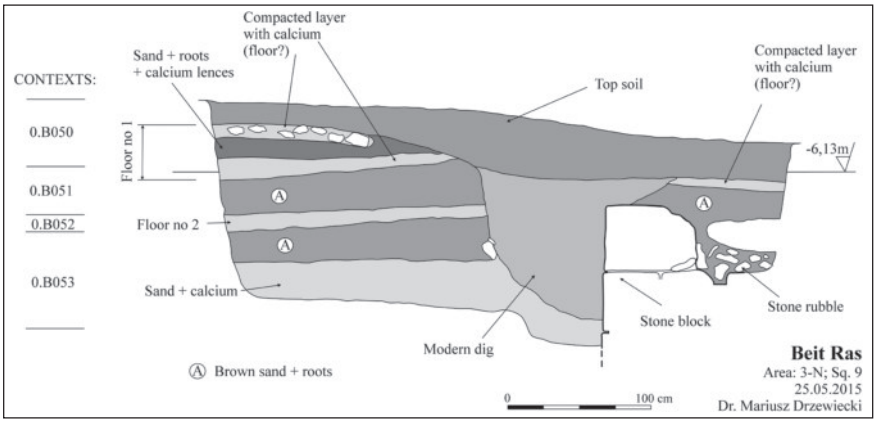
27. Trench in Area 3-N/ Sq. 9 (photo: Mariusz Drzewiecki).

to the north-east of the trenches in Area 1-S (**Fig. 1**). Two successive lime mortar floors, Fs I and II, were uncovered **(Figs. 28, 29)** before the exploration was halted *ca*. 1.40m below the modern surface, without reaching bedrock. Both floors originally abutted on the east-west wall (W I) constructed of ashlars (**Fig. 30)**. Its southern face was exposed to a maximum of *ca.* 1m of its actual height, while its northern face appears to be curvilinear. The wall no longer continued to the east at the depth reached by the end of the season; however its foundation was not reached.

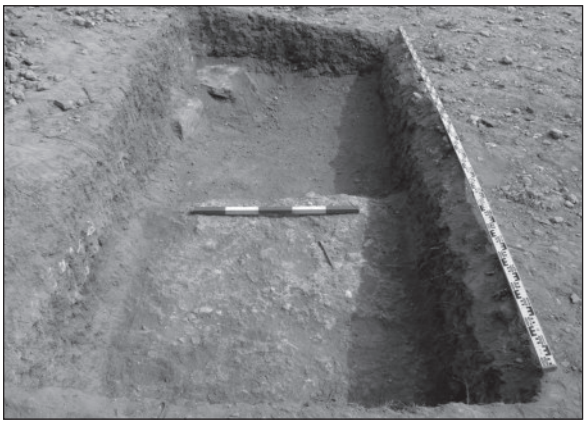
The chronology of the floors in this trench appears to be very different from that evidenced in the two trenches on the west. In the trench in Area 3-N Sq. 9, the latest ceramic material does not seem to post-date the fifth century AD. The potsherds (**Fig. 33: 34-42** from under F I, **Fig. 34: 43-44** from F II, and **34: 45-48**, from under F II) are exclusively Roman or Late Roman. Moreover, two bronze coins (BR 2015/19/9 and 10) found sealed under F I should be dated to the late fourth or fourth-to-fifth centuries AD. However, one should bear in mind that the upper layers of blocks in W I were robbed out (in antiquity? in modern times?), and the robber trench completely removed the northern parts of both Fs II and I. This, of course, means there is possibly intrusive material, as a result of dismantling the wall. To completely understand the nature of W I, it would be necessary to deepen the trench and expand it to the east and west.

General Conclusions

The earliest utilization phase of the area covered by the trenches in Area 1-S (W), Sq. 1(W) and Sq. 5(W), Area 1-S, Sq. 1 and Sq. 9, must have been stone quarrying, as evidenced by the incisions in the bedrock of both W II and W V. This activity may have taken place during either the Roman or Late Roman (Early Byzantine) period.

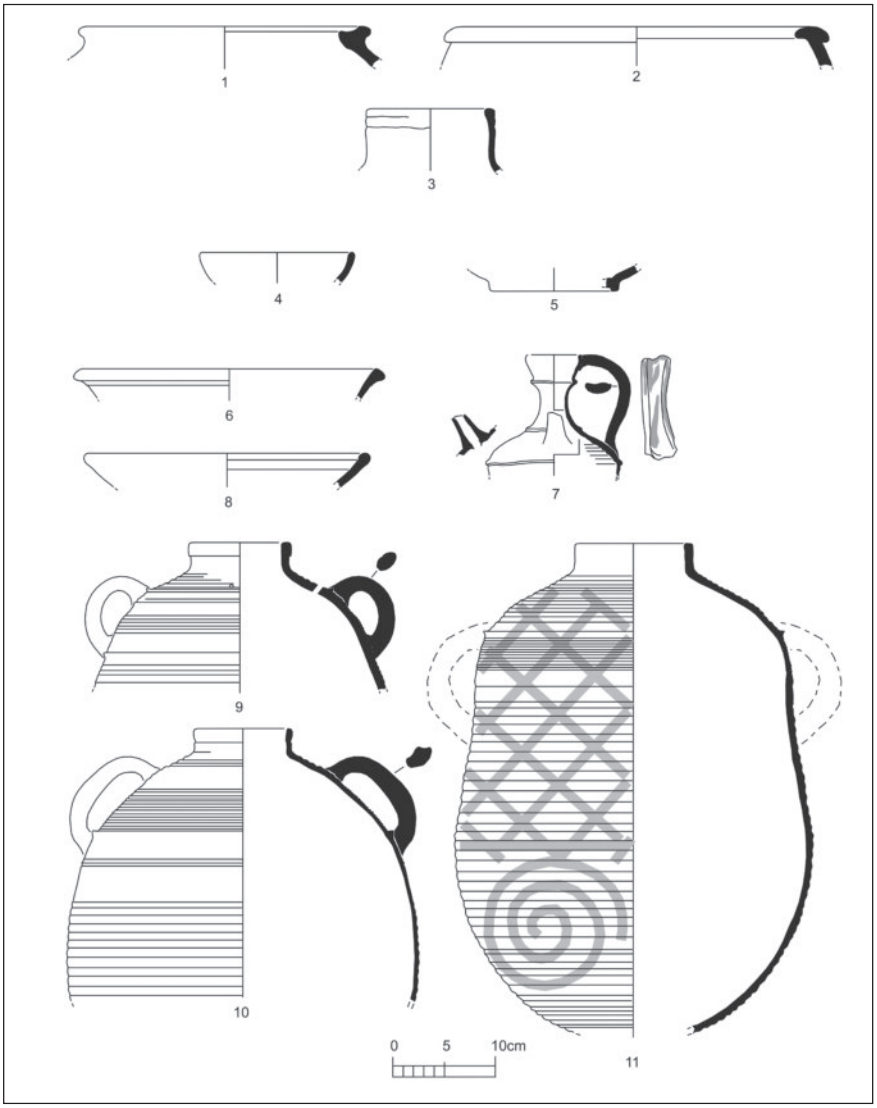


28. Western section of trench in Area 3-N/ Sq. 9 (photo: Mariusz Drzewiecki).



29. Lime mortar floor (F II) in Area 3-N, Sq. 9 trench, facing north. Note the robber trench in the northern part and at the very top of W I at the far end on the left (photo: Mariusz Drzewiecki).

30. Wall W I in Area 3-N, Sq. 9 trench, facing north-west (photo: Mariusz Drzewiecki).

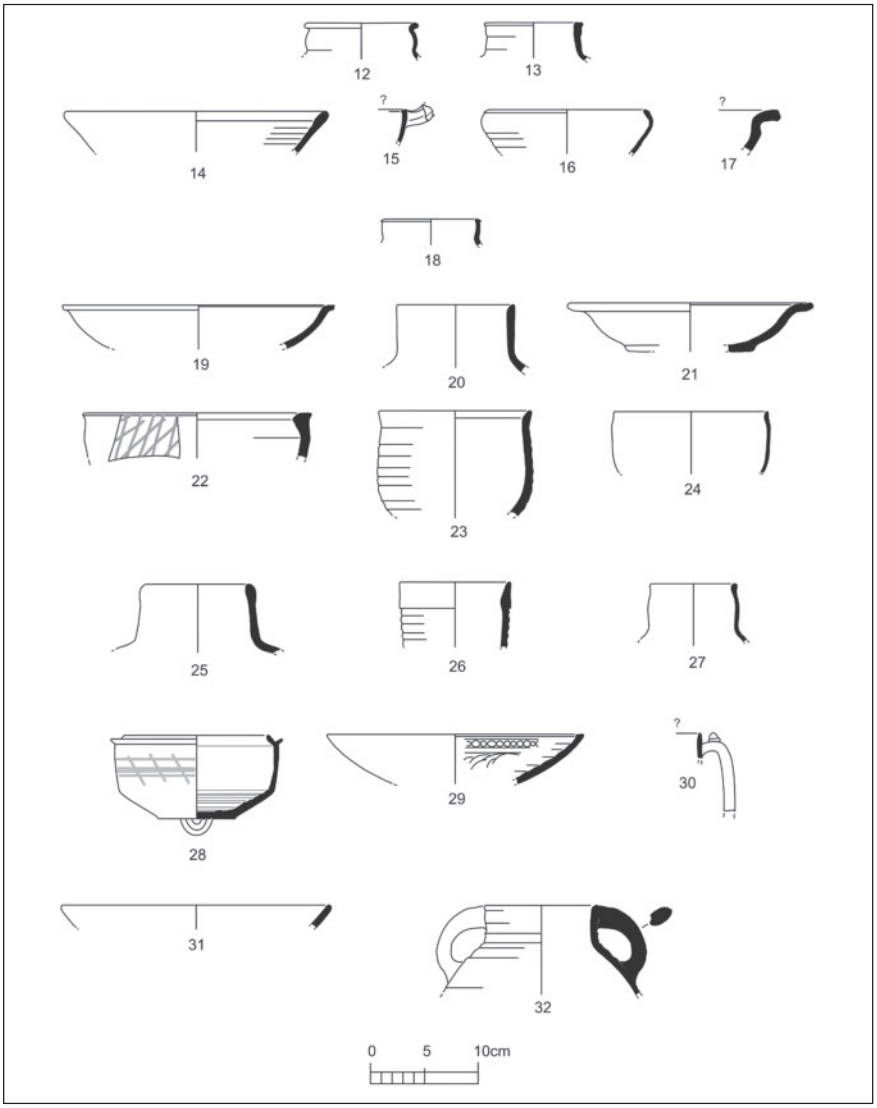


31. Pottery nos. 1-3: robbery fill of W V; nos. 4-5: under and inside F III; nos. 6-11: deposit above F I (photo: Mariusz Burdajewicz).

The second phase, pertaining to the Late Roman and/or Early Byzantine period, is evidenced by F II, and perhaps by the construction of W V, to the north of which a basin (Loc. 004) and the mosaic floor (FVII) were built. F VI must have belonged to the same phase, because of the stratigraphy connected with the basin.

At a slightly later period in the third phase is F V, a modest earthen floor, probably with a domestic context, judging by the remains of the *tabun*. Two architectural fragments, most probably originally from a church, were found on that level; they possibly testify to destruction caused by the Sassanians in AD 614 or soon after that. A piece of a marble *mensa* (BR 2015/19/19; a church table or tray), which may have been connected to the same event, was found in the neighboring trench (1-S/Sq. 9). F I, on the southern side of W V, may date from the same chronological phase.

The next (fourth) architectural phase is represented by floors F IV and F IX, which were covered by the debris of an earthquake, doubtlessly that of AD 749. This destruction seems to mark a period of temporary abandonment of the site, until the fifth phase which occurred during the Middle Ages (Fatimid/Ayyubid?period), as evidenced by makeshift floors on roughly leveled debris from the mid-eighth century; Fs VIII, III, and perhaps also F 0(?). The topsoil layer above these floors contains only a few datable ceramics, most of which are residual potsherds from the Byzantine/Umayyad period.

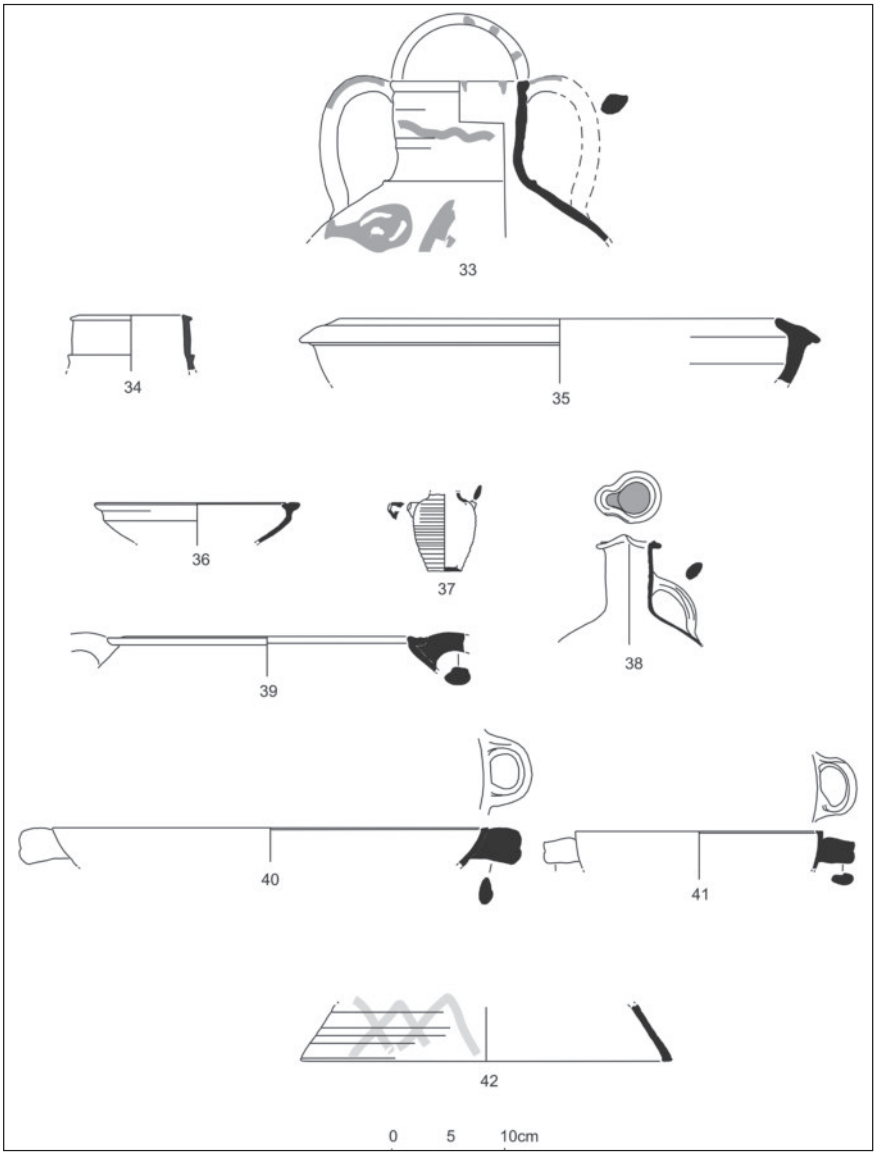


32. Pottery nos. 12-13: exploration of F I; nos. 14-17: under F I; no. 18: under F II; nos. 19-24: between the blocks collapsed from W V; nos. 26-27: under F IV; nos. 28-32: between the blocks collapsed from W II (photo: Mariusz Burdajewicz).

Regarding the small trench in Area 3-N, two habitation levels, represented by Fs I and II, have been examined so far. They were followed by a partial dismantling of the east-west wall (W I) at an undetermined date (Byzantine?). F II appears to be middle Roman, while F I is Late Roman (fourth century, perhaps fifth century).

It should be added that an important result of the surface survey in 2014 was to record evidence of artisanal activity in the area directly to the west of the Roman theatre. This evidence was concentrated in the 2015 season's Areas ("Squares") 4-S, 5-S and in part of 6-S (**Fig. 1**). It consisted, apart from the kiln/furnace remains collected around the mouth of a cistern found in the south-western corner of Area ("Square") 4-S, of at least two elements. First, many small fragments were collected which belonged to hand-made clay rings, which almost certainly served as "dividers" to separate vessels placed in the potter's kiln for firing. Secondly, local production of glass, which has already been discussed in the literature (Abd-Allah 2010), was confirmed (Burdajewicz, M.: this volume).

The results of the geophysical research in 2014 strongly suggested the existence of an east-west wall, continuing from the Roman theatre for some 150m westwards, where it appeared to turn southwards. Therefore, one could forward a working hypothesis that we may be dealing with a northern section of the Byzantine-period fortifications of Capitolias. During the same period, on the southern (inner) side of the wall, there could have been an area



33. Pottery no. 33: fill on the eastern side of W IV; nos. 34-42: under F I in the Area 3-N trench (photo: Mariusz Burdajewicz).

of industrial activity, with kilns and furnaces for glass and perhaps pottery production, including oil lamps (?).

Acknowledgments

We are very grateful to our Jordanian representative of the DoA, Eng. Amjad Batayneh, for his very friendly and useful cooperation, as well as to Prof. Nabil Bader, Dean of the Faculty of Archaeology and Anthropology, Yarmouk University (Irbid), for his unfailing help. During our stay in Jordan, we also received invaluable support from H.E. the Ambassador of the Republic of Poland, Dr. Krzysztof Bojko. Many thanks are due to our Polish colleagues, who assisted us to identify the Islamic glazed pottery (Dr. Malgorzata Redlak, National Museum in Warsaw) and the bronze coins (Mr. Tomasz Wiecek, Institute of Archaeology, University of Warsaw). We are also grateful to the DoA employees in the Bayt Rās office for their friendly attitude towards our team, as well as to our local neighbors and workers, who greatly contributed to the unforgettable atmosphere during the fieldwork season.

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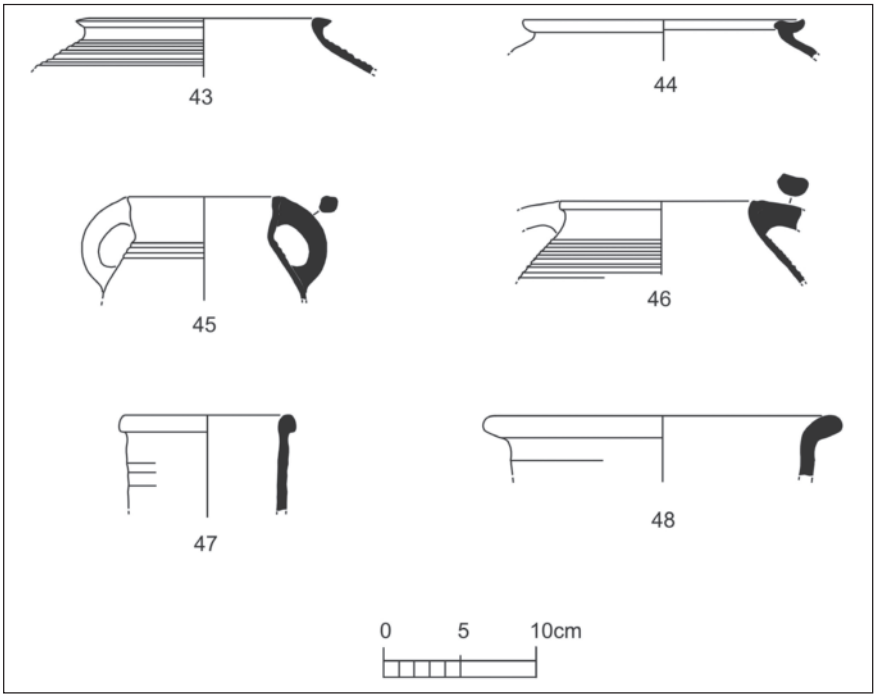

34. Pottery nos. 43-44: from removal of F II; nos. 45-48: from the layer under F II (photo: Mariusz Burdajewicz).

Appendix

Catalogue of illustrated pottery, diagnostics for the interpretation of the site's chronology. (Jolanta Mlynarczyk).

I. Trenches in Area 1-S (W) and Area 1-S

Pottery From the Fill Connected with the Robbing out of W V

1) 002.1. Rim of pithos in grey ware, hand-made. Umayyad.
2) 002.2. Flanged rim of deep basin. Fabric: light red (5 YR 6/6: reddish yellow), very dense with some very tiny white and dark (or voids?) grits. Surface near 7.5 YR 6/2 ("pinkish gray") with darker horizontal brush(?) marks. Wheel-made. Umayyad?
3) 002.3. Neck/rim of "Beisan" style jar. Fabric hard fired, orange-brown (5 YR 5/4 reddish brown), dense with medium-sized white grits; surface dark grey (7.5 YR 6/0 "gray"). Umayyad.

Pottery Dating the Execution of F III (from under and inside the floor)

4) 009.2. Rim of glazed bowl. Bluish green to "white" glaze inside, pale yellow to "white" outside. Ayyubid, twelfth/thirteenth century.
5) 010.1. Ring base of bowl and unconnected body sherd of the same vessel. Fabric reddish yellow (7.5 YR 7/6) with reddish brown grits. Interior with eroded greenish blue glaze. Exterior unglazed, fired pale brown (beige). So-called Fatimid Underglaze Painted ware, mid-eleventh/mid-twelfth century.

Pottery deposit above F I (wine jar deposit, seventh century AD)

6) 002.6. Rim of Jarash(?) bowl imitating LRC bowl, profile of Hayes form 10C (Hayes 1972: 343-346, fig. 71:13), dated early to mid-seventh century AD. Fabric orange-red (2.5 YR 6/8 light red), slightly paler surface (2.5 YR 6/6 light red), with very uneven break, some tiny white grits; interior very eroded.
7) 002.9. Fragments of spouted "cook ware" juglet; painted decoration in transparent white. Fabric gritty red (2.5 YR 6/8 light red), fairly clean; exterior fired brown (5 YR 5/3 reddish brown with dark brownish grey spots); white sediment inside.
8) 003.1. Rim of ARSW bowl/dish, form Hayes 104C (Hayes 1972: fig. 30:23) dated to ca. 550-625 AD.
9) 002.8. Fragments from the upper part of a jar with a circular hole in lower shoulder. Fabric red with small to large white grits and fewer dark (brown) ones; surface fired brown with very pale brown ("white") slip partly worn; seventh century AD.

10) 003.2. Fragments of "Beisan" jar. Fabric red, dark grey "skin" outside, with white painted decoration; seventh century AD.
11) 003.5. Fragmentary "Beisan' jar, recomposed from many smaller fragments. Greyish brown exterior with remains of white painted decoration; seventh century AD.

Exploration of F I

12) 007.2. Rim of cook pot. Fabric dark pink (5 YR 6/6 reddish yellow) with tiny white and reddish brown grits; surface fired light reddish brown (7.5 YR 6/6 reddish yellow).
13) 025.1. Rim of "Beisan" jar. Fabric gritty light red (5 YR 6/6 reddish yellow), with some small white grits and voids; surface fired grey (5 YR 5/1).

Under F I

14) 026.1. Rim of "Galilean bowl". Fabric red (2.5 YR 5/6) with rounded black grits and smaller (fewer) white ones; same surface, with black eruptions.
15) 026.2. Casserole rim. Fabric with "sandwich" firing (orange exterior, light brown interior), dark brown grits and fewer white ones; surface fired pale orange inside, greyish brown outside, smoothed.
16) 026.4. Fragment of bowl with in-turned rim, slightly flanged on exterior. Fabric "orange" (5 YR 7/8 reddish yellow), rather dense, with small white grits. Surface baked unevenly from reddish brown to brown and dark greyish brown, with white eruptions.
17) 026.5. Rim of basin (lekane). Fabric whitish (10 YR 8/3 very pale brown) with tiny orange grits; the same surface, very smooth (see the fabric of 053.7).

Under F II

18) 027.1. Rim of cook pot; fabric granular red (5 YR 6/8).

Collapsed Stone Blocks (earthquake 749 AD) from W V, overlying F IV (may contain intrusions from above?)

19) 012.2. Rim of cook ware lid. Fabric "sandwiched" (dark brown outside, orange-brown inside), granular, with white and black grits. Surface yellowish brown inside (10 YR 5/4), discoloured to light brownish grey (2.5 Y 6/2) outside; remains of soot on rim.
20) 012.3. Rim fragment of jar rather than cook pot (?). Fabric yellowish red (5 YR 5/6) with brown and white grits. Surface fired light brown (7.5 YR 6/4).
21) 012.4. Full profile of bowl with extended rim, joining 006.1. Fabric light red (2.5 YR 6/6) with many small white grits and occasional larger light grey ones. Surface reddish yellow inside (remains of slightly flaky self? slip), light red outside, with many small white grits and occasional large ones.
22) 012.5. Rim of large bowl. Fabric extremely hard, dense pale red (5 YR 6/6 reddish yellow) with tiny brown grits. Surface of similar colour (5 YR 7/6 reddish yellow) outside, near beige-pink (7.5 YR 7/4) inside. Lattice ornament deeply incised on the outer surface.
23) 012.6 (and a fragment from B. 017!). Two joining and four unconnected pieces from rim and body of deep bell-shaped bowl. Fabric reddish yellow (5 YR 7/6), rather dense, with some white (oblong) grits. Surface un-slipped, fired from reddish yellow to pale yellow (10 YR 8/4 very pale brown).
24) 012.7. Two unconnected fragments of deep hemispherical (?) bowl, thin-walled (Jarash ware?). Section ash-grey; self-slip in horizontal bands from very pale brown to brown and dark greyish brown, inside and out.

Under F IV

25) 021.2. Rim of jar (?). fabric pale pink with some deep voids; "white" surface.
26) 021.3. Rim of jar or big jug. Fabric very pale brown with voids; exterior fired to "bricky" brown with white and dark eruptions.
27) 022.1. Rim of cook ware jug. Light reddish brown fabric with some small white grits; exterior brown with brownish red spots.

Between the Stone Blocks Collapsed from W II (earthquake 749 AD)

28) 031.3. Deep bowl with lid device (pyxis); fabric reddish yellow (5 YR 6/6) with ash grey core, very hard and clean. Surface

paler reddish yellow (5 YR 7/6); exterior decorated in semi-transparent white.

29) 031.4. Three joining parts of rim and wall of plate ("Jarash bowl" type). Jarash ware: hard fired, with ash grey section; orange (5 YR 6/6 reddish yellow) self-slip with light brown concentric bands applied with brush. Below rim on interior there is a guilloche ("chain") pattern in faint "black" with some schematic sprigs (?) below.
30) 031.5. Rim and handle of flask/juglet. Fabric very pale brown (10 YR 8/4) with brown grits; surface fired white (ca. 2.5 Y 8/2).
31) 031.6. Rim of bowl. Green glaze inside, green to blue glaze outside.
32) 031.7. Rim of cook pot with handle, burnt through. Fabric dark reddish brown, exterior fired to very dark grey, smoothed.

Fill on the Eastern side of W IV

33) 038.8. Fragments of large table amphora in Umayyad Painted ware. Fabric very granular, near 7.5 YR 6/6 (reddish yellow) with many tiny reddish brown grits and some small white ones. Exterior discoloured to greyish brown (10 YR 5/2), with darker ornament (intended as red).

II. Trench in Area 3-N

Under F I (the latest potsherds date from the seventh century AD: e.g., Beisan jars, grey-ware hand-made basins, but there is a strong prevalence of fifth century ceramics)

34) 051.1. Rim of dark skinned (Beisan) jar. Fabric hard, red with some lime inclusions; surface ("skin") very dark grey.
35) 051.2. Rim of coarse-ware basin (mortarium?). Fabric red, with pale brownish grey core, white grits, dark grey pebbles, traces of straw; pale pinkish beige slip.
36) 051.3. Fragment of handled (?) bowl. Fabric orange-red with medium-sized white inclusions and larger eruptions, un-slipped.
37) 051.5. Miniature juglet lacking neck and rim, as well as handle and rim of spout; string-cut base. Orange fabric (5 YR 7/8 reddish yellow), rather dense, with small white grits. Surface baked unevenly, from reddish brown to brown and dark greyish brown, with white eruptions. The same ware as nos. 16 (026.4) and 38 (051.6).
38) 051.6. Rim/neck/handle of juglet with oinochoe-type "trefoil" mouth. The same ware as no. 37 (051.5).
39) 051.9. Rim of cook pot. Fabric reddish brown, exterior fairly smooth.
40) 051.10. Rim of casserole. Fabric with "sandwich" firing (orange exterior, light brown interior), with dark brown grits and fewer white ones; surface fired pale orange inside, greyish brown outside, smoothed.
41) 051.11. Casserole rim and handle, very thin-walled. Fabric light red (2.5 YR 6/6) with many white grits; exterior reddish yellow (5 YR 6/6), interior greyish brown.
42) 051.12. Fragment of cook ware lid. Fabric very gritty, red banded dark grey; exterior very dark brownish grey with traces of white ornament (?).

Removal of F II

43) 052.2. Rim fragment of cook pot. Fabric orange-red with some medium-sized white grits. Fourth/fifth century AD.
44) 052.3. Rim fragment of casserole. Brownish red fabric, lime mortar (?) sediment on surface.

Layer under F II

45) 053.2. Rim of cook pot. Fabric brown/dark brown with white grits; surface dark brown.
46) 053.3. Rim of cook pot. Fabric orange-red (2.5 YR 6/6 light red); similar surface (2.5 YR 5/6 red) with dark grey spots.
47) 053.4. Rim of jar or jug. Fabric light red with partial light grey core, dense, with some white grits; surface pink (5 YR 7/4).
48) 053.7. Rim of deep bowl. Fabric whitish (10 YR 8/3 very pale brown) with tiny orange grits; the same surface, very smooth.

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JABAL JUHAYRA, 2014-2015: EXCAVATIONS OF THE POST-PPNB LAYER

Sumio Fujii, Takuro Adachi and Kazuyoshi Nagaya

Introduction

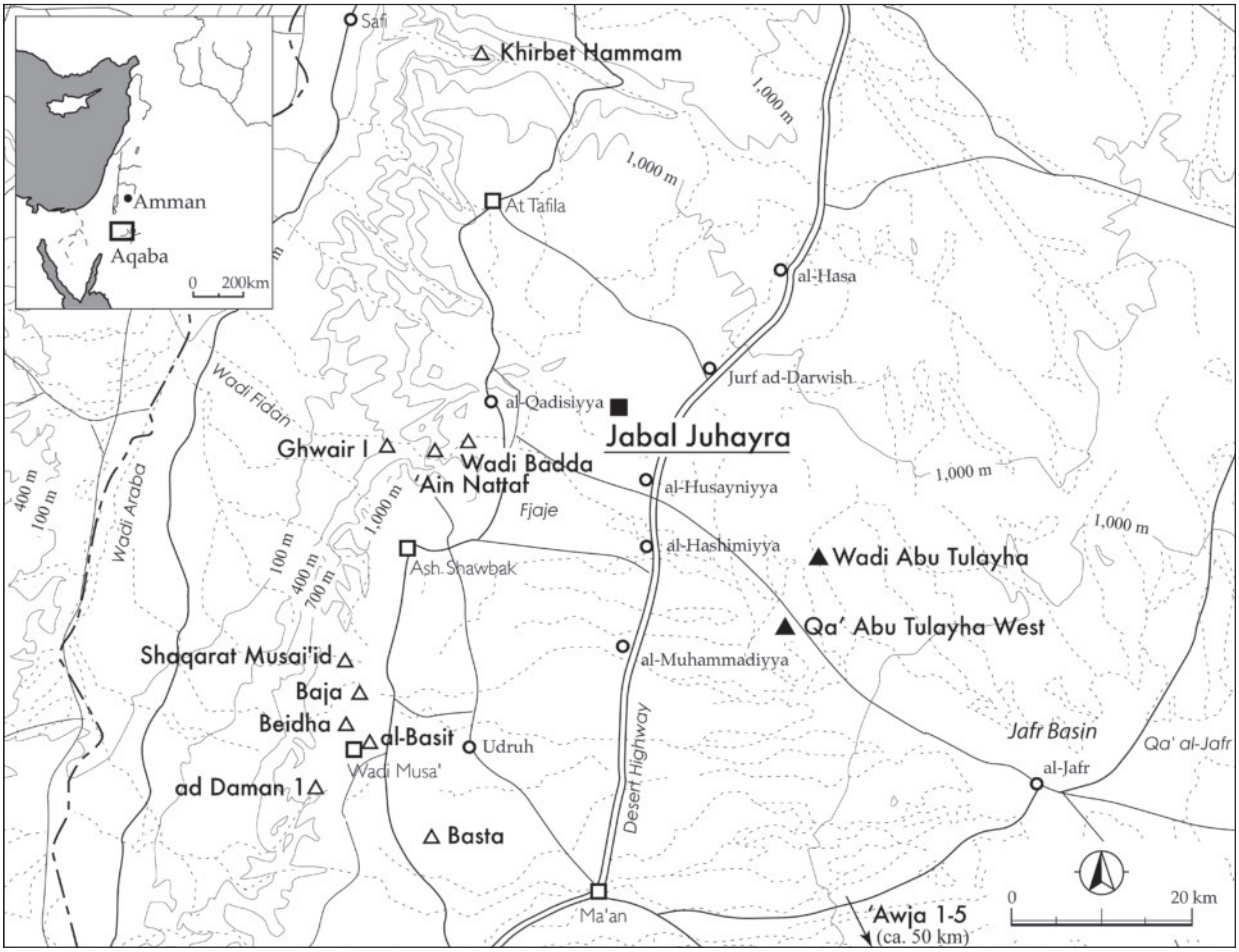
Our long-term research project (JBPP: the Jafr Basin Prehistoric Project) commenced in 1997, with a view to tracing the process of pastoral nomadization in southern Jordan. Since then, we have investigated a few dozen archaeological sites varying in both date and character. The first target of the project was Qa' Abu Tulayha West, a Late Neolithic (hereafter LN) to Early Bronze Age (EBA) open sanctuary located in the northwestern part of the basin (e.g. Fujii 2003). The excavations, which took place over six years (from 1997 until 2002), provided the first insights into the later prehistory of the Jafr Basin, our main research field. The second phase (2003-2004) dealt with several EBA burial fields, which allowed us to refine the second half of the chronological perspective suggested at Qa' Abu Tulayha West (e.g. Fujii 2005a). The third (2005-2008), and fourth (2009-2013) phases made an about-turn, to address comprehensive excavations at the Pre-Pottery Neolithic B (PPNB) outpost of Wādī Abu Tulayha (e.g. Fujii 2006a, 2006b, 2009a) and its surrounding Neolithic barrage systems (e.g. Fujii 2007a, 2007b, 2010a, 2010b, 2014b; Fujii, Adachi, Endo *et al*. 2012, 2013; Fujii, Adachi, Quintero *et al*. 2011; Fujii, Adachi, Yamafuji *et al*. 2013b). The series of research outcomes was synthesized to produce the *Jafr chronology*, which then enabled us to roughly sketch the formation process of nomadic society in southern Jordan (Fujii 2013).

Phase 5 of the project commenced in the spring field season of 2014. The research objective of the latest phase is to scrutinize socio-cultural correlations between sedentary farming communities to the west and nomadic societies to the east and, in so doing, develop the details of the Jafr chronology; to date, we have conducted three field seasons. The first one, which took place in March 2014, was devoted to a survey and test sounding at the Tor Ghuwayr sites, EBA burial fields at the northeastern edge of the basin (Fujii *et al*. in this volume). The second field season, implemented in August the same year, first continued a previous excavation at the remote burial fields, and then a preliminary excavation at Jabal Juhayra, our main concern here. The third season in March 2015 embarked on a fully-fledged excavation at the latter site, and confirmed the existence of a stratified prehistoric settlement. The excavation is still unfinished, and expected to take at least another season to complete. This interim report summarizes the research outcomes of the first two seasons, which mostly dealt with a post-PPNB layer.

The Site and Site-Setting

The site of Jabal Juhayra (N: 30˚39′01.20″/ E: 035˚45′41.34″/ Elevation: *c*. 1212 m) is located in the hilly limestone terrain at the northwestern corner of the Jafr Basin, southern Jordan (**Figs. 1, 2**). In terms of topography, the site occupies the southeastern flank of an isolated volcanic hill of the same name, extending in a NW-SE direction along a north-facing steep slope, which is sandwiched between a two-tiered scoria terrace and a small gully (**Figs. 3, 4**). What differentiates it from other Neolithic sites in and around the basin is its location on a scoria bedrock layer, which is the key to understanding the unique character of the site.

The site was located for the first time during our general survey in December 2001 and has



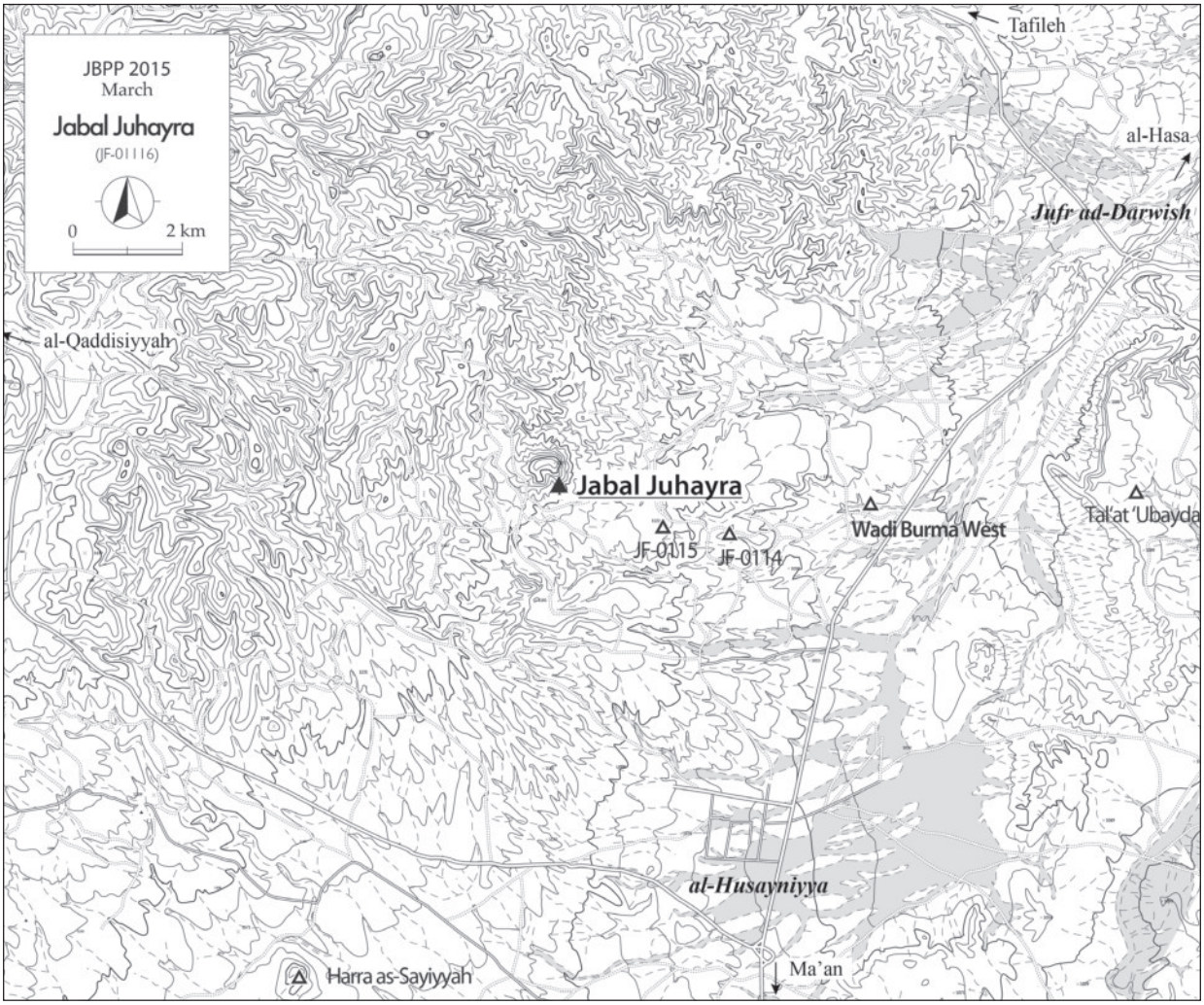
1. Jabal Juhayra: Neolithic sites in and around the Jafr Basin.

been briefly reported elsewhere (Fujii 2002a; Fujii and Abe 2008). Since then, we have repeated the surface survey, in preparation of a future fully-fledged investigation, but more than ten years passed before we started the excavation. The reason for the long delay was that we unexpectedly spent much more time investigating Wādī Abu Tulayha and its surrounding Neolithic barrage systems than we expected, and we have only recently noticed that the site is in danger of disappearing, due to industrial-level scoria mining. It is for this reason that we finally embarked on the excavation.

The setting of Jabal Juhayra is a little more favorable in comparison with other Jafr sites. For instance, the average annual rainfall around the site is *c*. 100 mm, which is nearly twice as much as the central part of the basin (Jordan National Geographic Center 1984: 114). Another point of significance is the fact that stands of wild pistachio trees still survive in a small valley *c*. 10 km west of Jabal Juhayra (Nasu 2013). Both facts suggest that the site is (and probably was) located in an intermediate zone, between the sedentary cultural sphere and nomadic society. In this sense, the site has great significance for the main issue of the current phase, namely, the socio-cultural correlations between the two areas, which is another reason we started the rescue excavation.

The Excavation

To begin, we set up an arbitrary benchmark (BM-1) at the presumed northwestern corner of the site, and covered the major distribution range of surface finds, especially flint artifacts, with a 10 m by 10 m major grid system (**Fig. 5**). The excavation began in the southeastern part of Area 1, where a few intermittent wall alignments were exposed on the present ground surface. We opened a 20 m long by 2

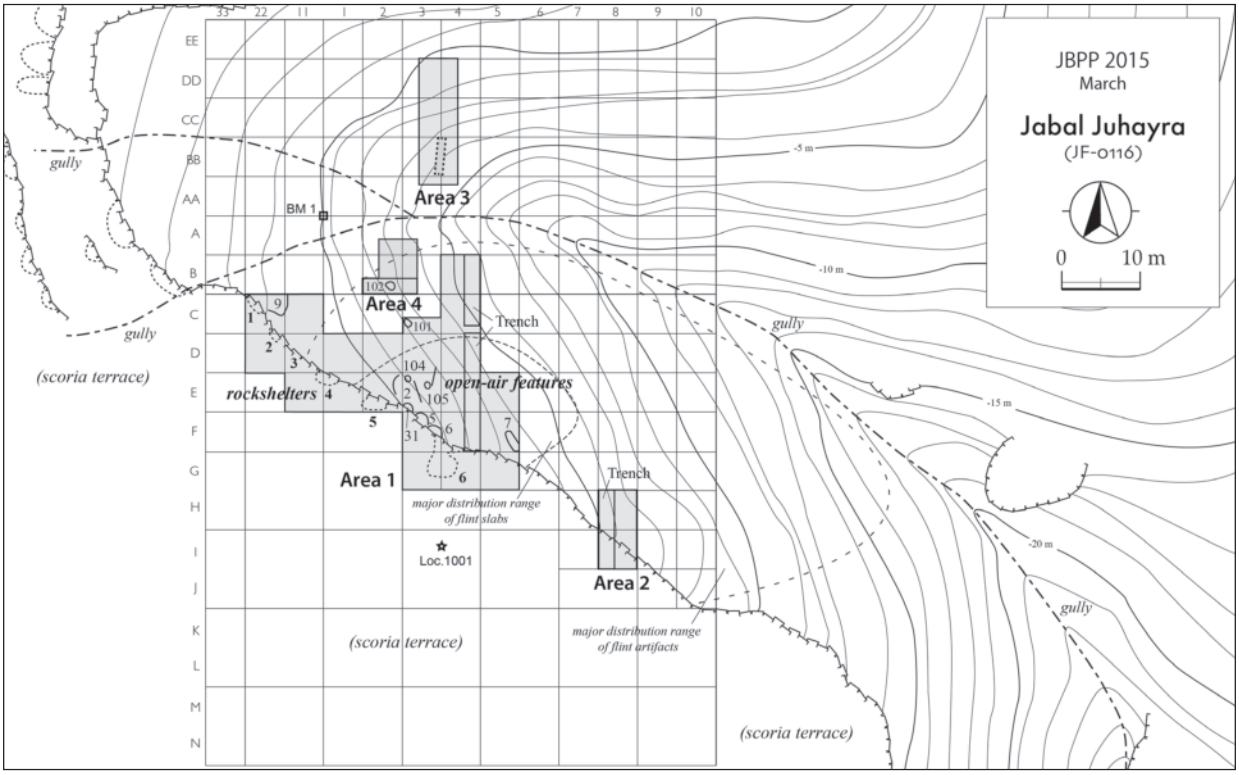


2. Jabal Juhayra: Topographic map around the site.

3. Jabal Juhayra: Distant view of the site (looking W).

4. Jabal Juhayra: General view of the site (looking W).

m wide test-trench across the steep slope, and examined the general site stratigraphy. Then, we gradually enlarged the main operation area northwestward, following the continuation of structural remains. In parallel with this work, we opened Area 2 in an effort to define the southwestern limit of the settlement. In addition, we also set up another two operation areas (Areas 3 and 4) across the gully, both of which aimed to trace the extension of a barrage-like



5. Jabal Juhayra: Site contour map and operation areas.

masonry wall slightly exposed on the northern slope of the gully.

The first two seasons focused on the excavation of Areas 1 and 2. Area 3 was merely surface-cleaned, and Area 4 was trench-excavated at its southern edge. The excavations used a 5 m by 5 m minor grid system, which subdivided the major one. The excavated zones of Areas 1 and 2 total 605 sq. meters (= 24. 2 minor squares), with the volume of excavated soil estimated at *c*. 100-150 cubic meters. Due to time constraints, only some of the floor deposits and hearth contents were subjected to a 3 mm mesh dry sieving.

The general site stratigraphy disclosed at the two operation areas, especially the long trench in Area 1, is summarized as follows:

Layer 1 or the surface layer (*c.* 3-50 cm thick) consists of light-brown in color, loose in texture, silty-sand deposits, including numerous scoria pebbles and cobbles;

Layer 2 (*c.* 5-70 cm thick) contains grayish-brown, slightly compact, silty-sand deposits, including scoria pebbles to a lesser extent;

Layer 3 (up to *c.* 130 cm thick) represents dark brown, compact silty-sand deposits, sparsely including scoria pebbles;

Layer 4 (*c.* 2-10 cm thick) contains yellowish orange, relatively compact silty deposits, which are occasionally replaced by a blackish sand layer, probably of scoria origin; and

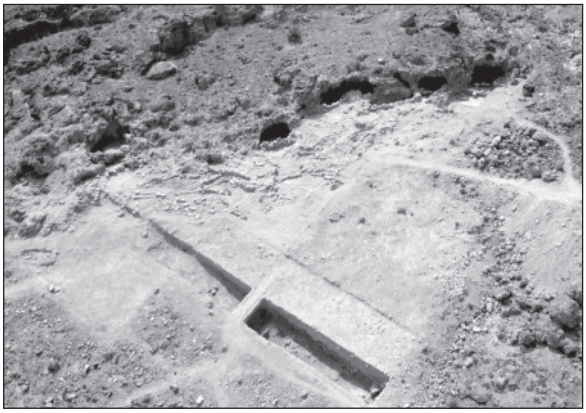
Layer 5 is a scoria/basalt bedrock layer.

Incidentally, Layer 4 was not always present, with Layer 3 directly overlying Layer 5 in some locations. In addition, an ashy layer of pyroclastic flow origin (*c*. 50-100 cm thick) blocked the rear of the rockshelters referred to below. Overall, the deposits inside the rockshelters were thick, whereas those on the slope were relatively thin due to erosion. It is for this reason that the thickness of each layer has such a wide range of variation.

Aside from a few intermittent wall alignments found in Layer 1, all the excavated structural remains were founded on the lower surface of Layer 2 or 3. We designated them Layer 2 or 3 structures/features, respectively. As mentioned above, the first two seasons focused on the excavation of Layer 2, but a few underlying structures/features were partly exposed in the course of the excavation.

Layer 2: Structural Remains

Area 2 included no structural remains, but the excavation of Layer 2 in Area 1 revealed two distinct types of structural remains: scoria rockshleters and miscellaneous open-air features (**Figs. 6, 7**). The latter were found in the trench of Area 4 as well.



6. Jabal Juhayra: Aerial view of Area 1 (looking SW).

Rockshelters

A total of six semi-circular or amorphous rockshelters (Rockshelters 1-6) were aligned along the lower scoria terrace at an interval of *c*. 1-10 m (**Fig. 8**). They all opened to the northeast, facing the open-air features in front of them. (Incidentally, the term '*rockshelter'* may be arguable, since a few of them are more like a simple 'rock shadow'. The reason we adopted it was that scoria boulders of various sizes, which had probably fallen from original eaves, were piled up in front of the rock shadows.)

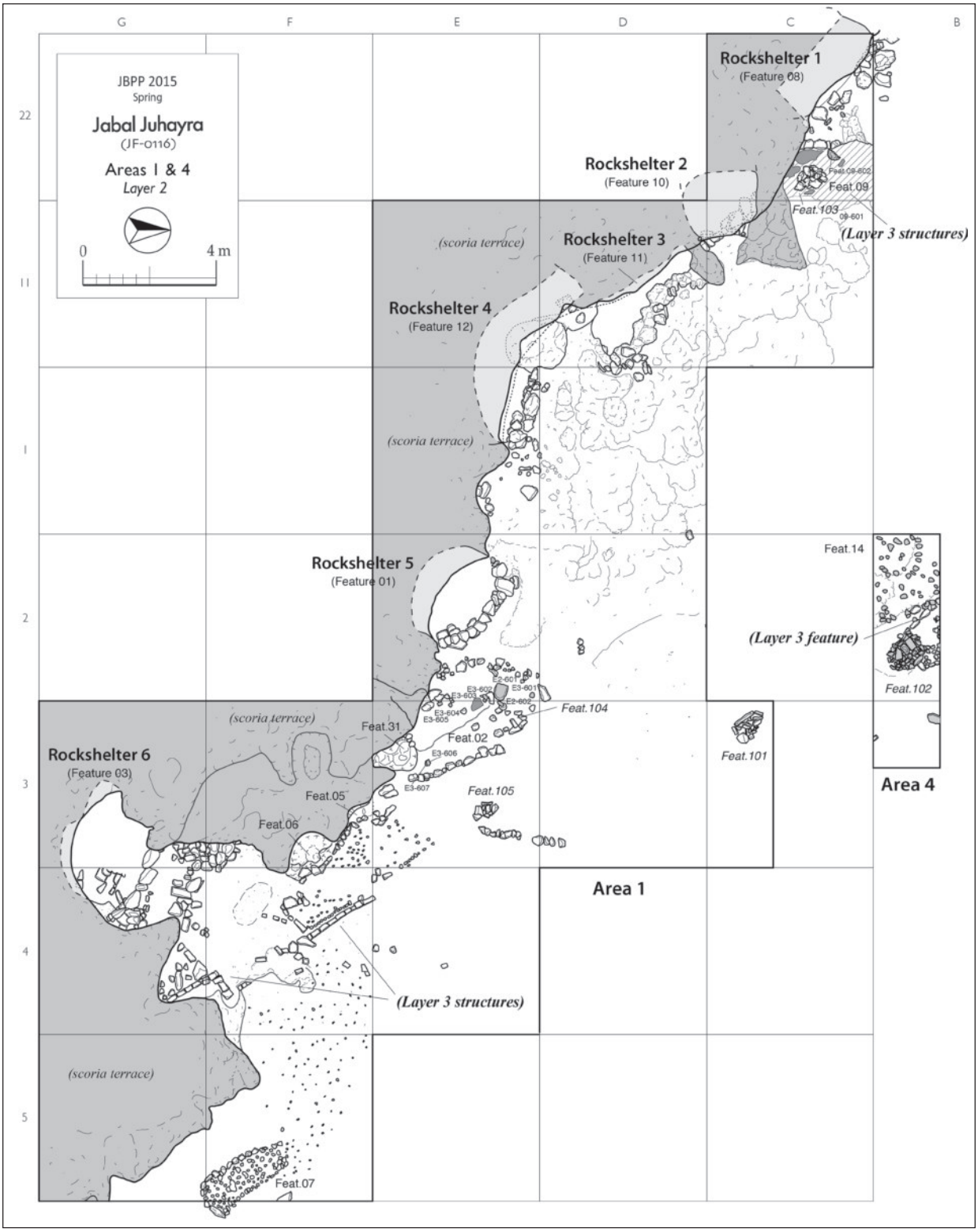
All six rockshelters were small in scale, with frontage *c*. 2-4.5 m, depth *c*. 0.5-2 m, and preserved ceiling height up to *c*. 1.5 m. As mentioned above, the rears were blocked with pyroclastic flow layers, which formed an alternate layer together, with upper and lower scoria layers. It would follow that the series of rockshelters were formed by the erosion of the intermediate soft layer. Thus, there is no doubt that the rockshelters themselves are natural features, but a few of them have traces of anthropogenic modification on their sidewalls and ceiling.

Another reason we identified them as prehistoric dwellings was that they not only yielded flint artifacts and animal bones, but also were equally equipped with a curvilinear masonry wall at their entrance space (**Figs. 9-11**). The front walls were a single row wide and up to a few courses (or *c*. 0.5 m) in preserved height, and constructed of undressed scoria cobbles and boulders *c*. 20-50 cm long. They were very simple in structure, and no traces of clay mortar were recognized. Nevertheless, small rubble was occasionally inserted into a gap between the cobbles as *ad hoc* adjustment material. In terms of stratigraphy, all the front walls (and the floors inside them) were founded on the lower surface of Layer 2. Thus, it is conceivable that the simple masonry walls were added as protection or windbreak for the rockshelter dwellings behind them. Seeing that no entrance was incorporated, the dwellers probably entered and left the dwellings by stepping across the low walls. It is possible, however, that temporary entrance sealing makes it difficult to distinguish an entrance (Fujii n.d.).

The inside space of the rockshelter dwellings was empty and, apart from a few questionable stone alignments, no small features were found. However ashy deposits, including charcoal remains, were sparsely dotted on the floor of a few rockshelters, suggesting that the dwellers occasionally made a fire for cooking and/or heating. The existence of the hearth-like ashy deposits, coupled with the occurrence of numerous flint artifacts and faunal remains, demonstrates that the rockshelters were used as dwellings rather than animal pens.

Open-Air Features

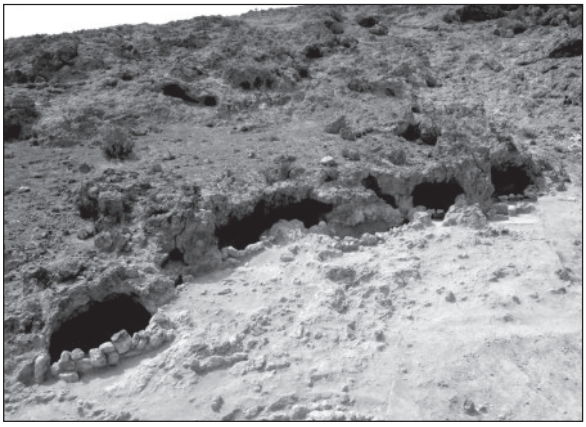
A dozen open-air features occupied the upper edge of the steep slope, a narrow belt in front of the rockshelters (**Figs. 12-15**). They were founded on the lower surface of Layer 2, sharing the same stratigraphy as the rockshelter dwellings behind them. The locational relationship between the two is significant. Most of the open-air features avoided the wide space in front of Rockshelters 1-4 and, instead, were concentrated on a narrow block diagonally in front of Rockshelters 5 and 6 (**Fig. 7**), which means they chose the only place which did not impinge on access to any of the rockshelters. Only Feature 07 was separate from the feature cluster, located at the southeastern corner of Area 1; but, as with the others, it was arranged not to block the approach to Rockshelter 6.



7. Jabal Juhayra: Plan of Areas 1 and 4 (Layer 2).

Such careful location choice is suggestive of functional compartmentalization between the two contemporary structural entities.

Overall, the open-air features were poorly preserved, so precise plans were often difficult to define. It appears, however, that they fall



8. Jabal Juhayra: General view of Rockshelters 1-5 (looking SW).

into the following two types: rectangular or oblong features *c*. 3-5 m wide and *c*. 1-2 m deep (Features 2, and 4-7), and round to oval small features, *c*. 0.5-1 m in diameter or major axis (Features 101-105). In addition, several intermittent wall alignments, probably remnants of either of the two types, were dotted in and around the feature cluster.

The rectangular/oblong features were constructed from undressed scoria cobbles *c*. 10-30 cm long, with their major axis understandably following the contour lines of the steep slope. The walls had entirely collapsed, leaving the foundation course only. However, as fallen stones were sparse, and the foundations were uneven, it is possible that the features were neither walled nor roofed. Given that their walls were a single, or at most a few, course(s) high from the beginning, it would follow that the features were of symbolic, or at least impractical, character. Neither entrance nor hearths were incorporated, but a few of them (e.g. Feature 07) were paved with scoria pebbles; sporadically, traces of floor pavement were also recognized at the remaining features. Our first impression was that the rectangular/oblong features were sparse in traces of day-to-day life. This was reinforced by the scarcity of *in situ* artifacts as well. Although hundreds of flint artifacts were found in and around the features, many of them occurred in secondary contexts and, therefore, can be taken as stray finds which had probably drifted from the adjacent rockshelters. Several grinding implements were also found, but most of them were used, together with the scoria pebbles, as floor-pavement material.

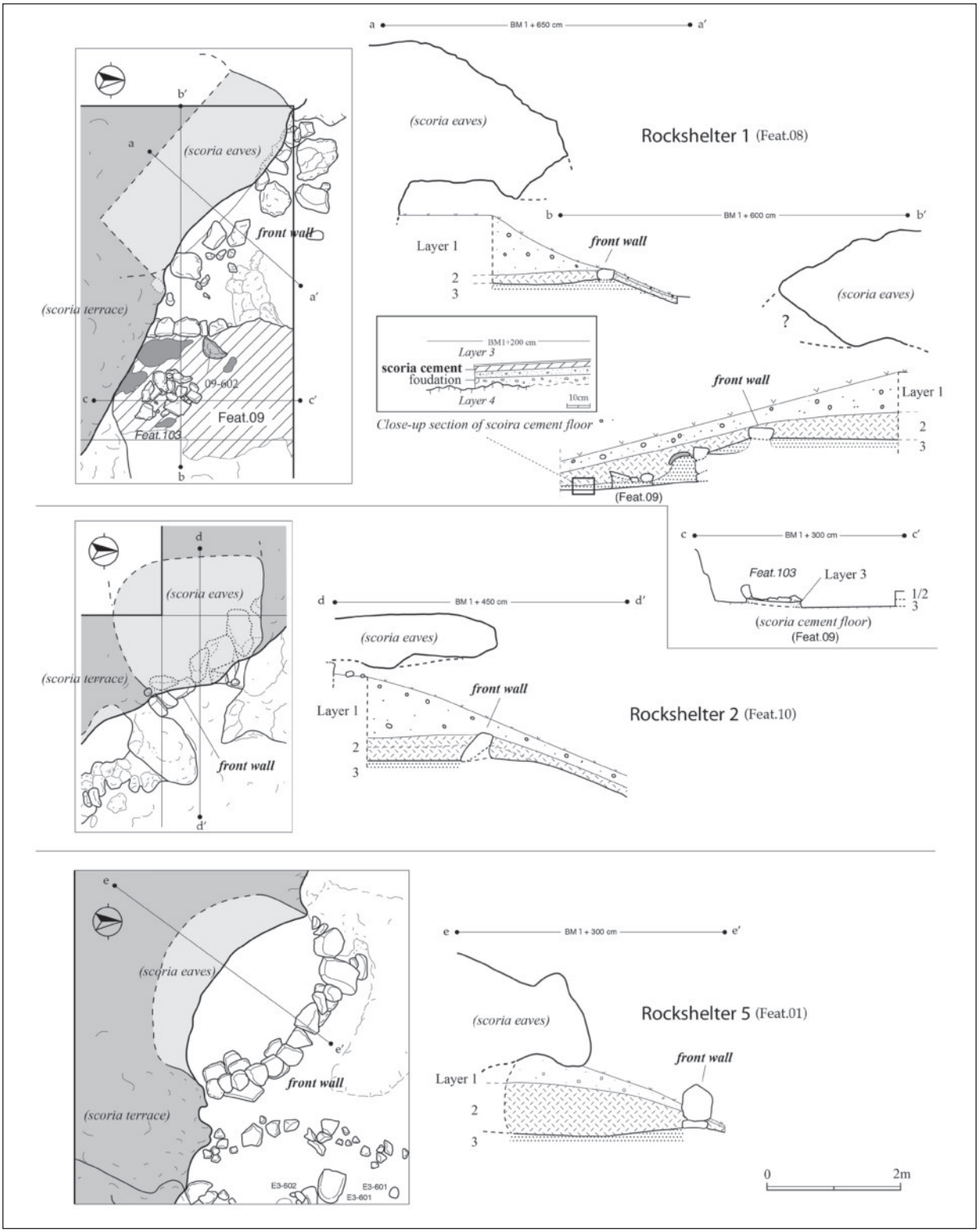
Meanwhile, the round/oval features were relatively well-preserved, and still retained the original walls, lined with upright scoria slabs (**Fig. 14:6-8**). They were capped and/or paved with slabs, but nothing was uncovered inside. Hence, their specific use is still unknown. It should be noted, however, that they are often incorporated into the front wall of a rectangular/oblong feature to form a composite unit. Most typical are Features 104 and 105, both of which were built-in at the observer's right front corner of Features 02 and 04, respectively (**Fig. 13**). Although a few meters apart from each other, a similar combination is recognized between Features 101 and 13, on the one hand, and Feature 07 and a partly exposed stone concentration in front of it, on the other hand (**Fig. 7** ; **Fig.14: 5**). In addition, two features in Area 4 also appear to form a similar unit. Thus, it is conceivable that composite units were the norm for the Layer 2 open-air features. Another point of great importance is the fact that the minor components of the units were more carefully constructed and, for this reason, in better condition than the major ones. This possibly means that the former, rather than the latter, formed the core of a composite unit. This tentative interpretation becomes important when discussing the function of the unique units.

Layer 2: Small Finds

Small finds from the Layer 2 deposits were scarce in both number and variety considering the large excavation area, limited to approximately one thousand flint artifacts, a dozen grinding implements, and a few hundred faunal remains only. The scarcity in artifact variety is characteristic of the Layer 2 settlement.

Chipped Stone Artifacts

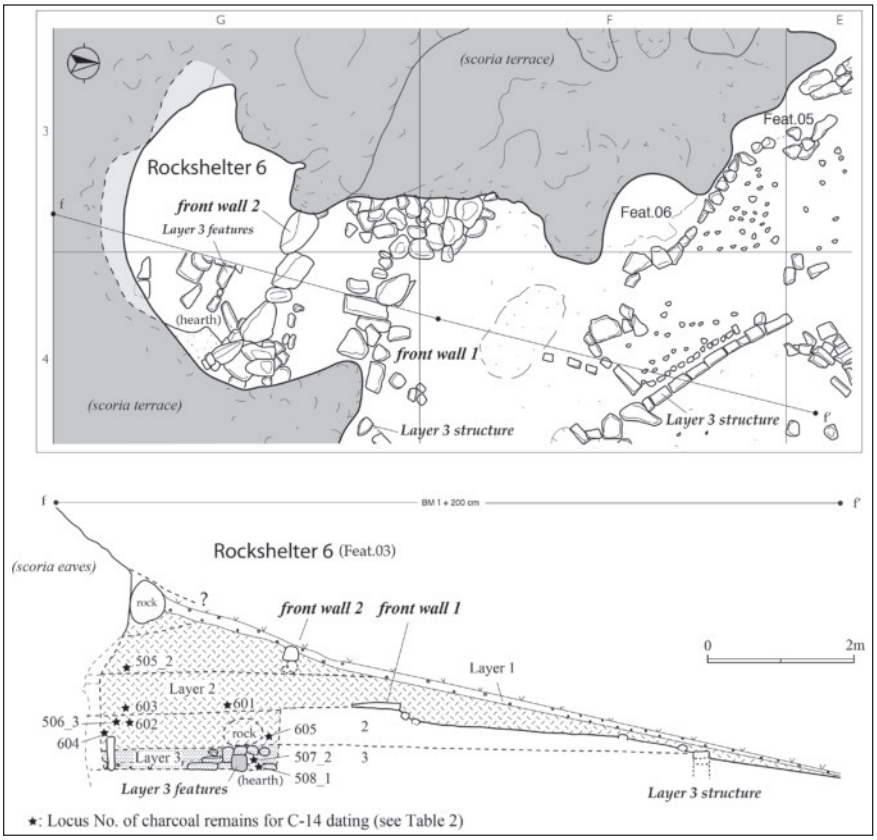
A total of 1,119 chipped stone artifacts were recovered from the Layer 2 deposits in Area 1. (Several dozen flints were found in Area 3, but are omitted from the following discussion.) The finds from the open-air features slightly outnumbered those from the rockshelters. However, as noted above, *in situ* finds concentrated on the latter, being rare in



9. Jabal Juhayra: Plans and sections of Rockshelters 1, 2, and 5.

the former. In terms of raw material, the vast majority of the artifacts were made of high-quality Eocene flint ubiquitous in the Jafr Basin, with exceptions limited to two calcite flake/blade blanks and two heavy-duty digging tools made of coarse basalt.

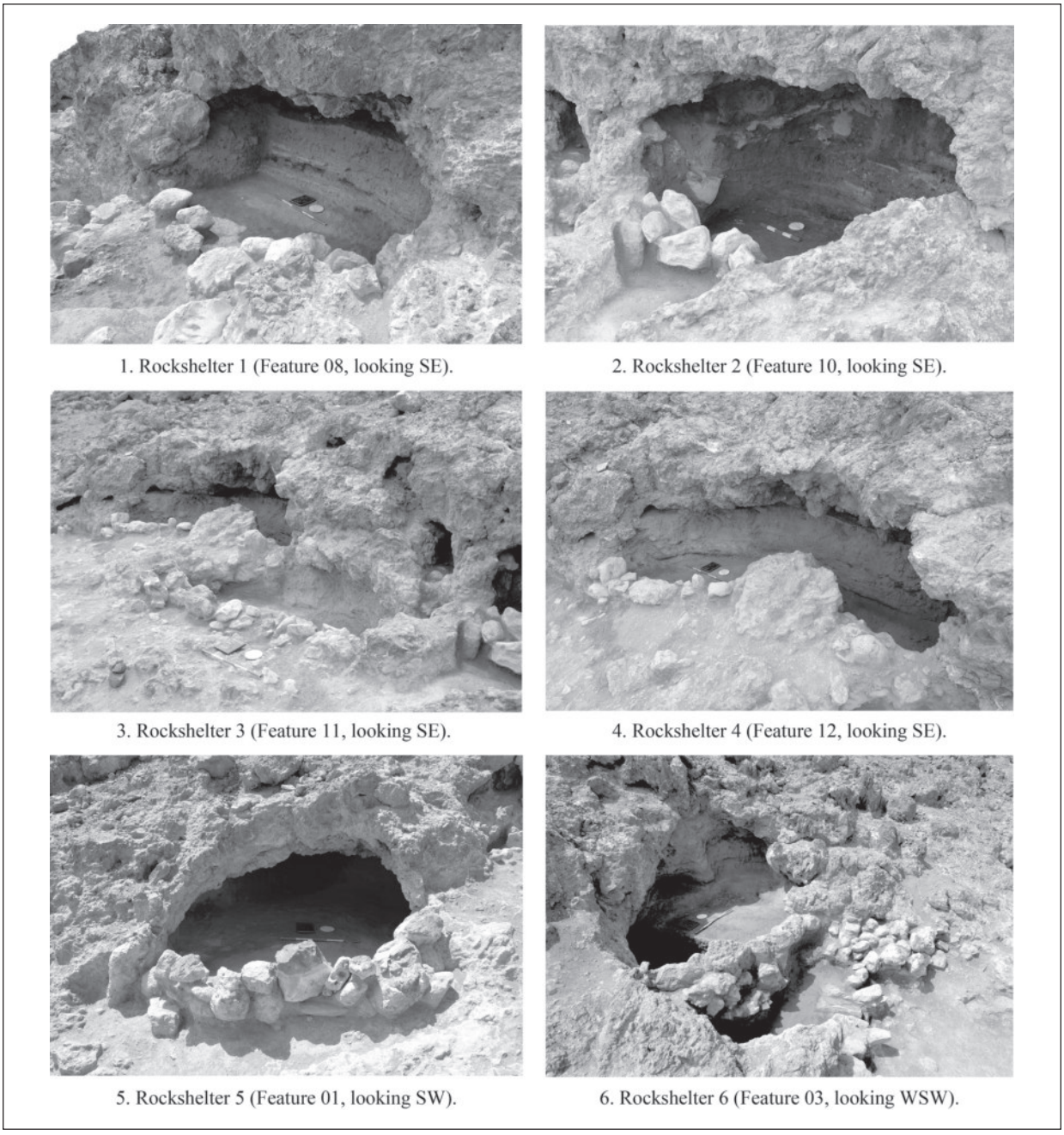
The assemblage consisted of five cores, 1084 debitage class samples, and 28 retouched tools (**Table 1**). In addition, two small hammer stones made of cortical flint were also included. Overall, the assemblage is flake-oriented, suggesting a post-PPNB date for the Layer 2 settlement. Another remarkable trait of the assemblage is the scarcity of cores and primary



10. Jabal Juhayra: Plan and section of Rockshelter 6.

Table 1: Jabal Juhayra: Inventory of chipped stone artifacts from Area 1 (Layer 2).

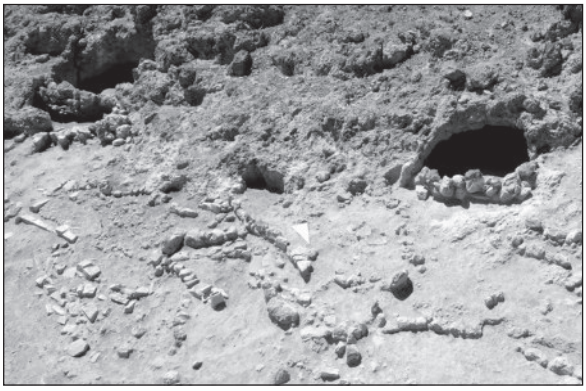
	Rockshelters			Open-features			Total		
	N	%	(%)	N	%	(%)	N	%	(%)
Hammer stone	**0**	**0.0**	-	**2**	**0.3**	-	**2**	**0.2**	-
Core	**3**	**0.7**	-	**2**	**0.3**	-	**5**	**0.5**	*100.0*
Naviform (blade core)	0	0.0	*0.0*	1	0.2	*50.0*	1	0.1	*20.0*
Opposed platform (blade core)	1	0.2	*33.3*	0	0.0	*0.0*	1	0.1	*20.0*
Remnant (flake core)	2	0.5	*66.7*	1	0.2	*50.0*	3	0.3	*60.0*
Debitage	**383**	**95.3**	*100.0*	**586**	**97.8**	*100.0*	**969**	**96.8**	*100.0*
Crested piece	1	0.2	*0.3*	5	0.8	*0.9*	6	0.6	*0.6*
Core tablet	1	0.2	*0.3*	2	0.3	*0.3*	3	0.3	*0.3*
Burin spall	1	0.2	*0.3*	0	0.0	*0.0*	1	0.1	*0.1*
Flake	294	73.1	*76.8*	365	60.9	*62.3*	659	65.8	*68.0*
Blade	86	21.4	*22.5*	212	35.4	*36.2*	298	29.8	*30.8*
Chip/ Chunk	0	0.0	*0.0*	2	0.3	*0.3*	2	0.2	*0.2*
Tool	**16**	**4.0**	*100.0*	**9**	**1.5**	*100.0*	**25**	**2.5**	*100.0*
Points	2	0.5	*12.5*	3	0.5	*33.3*	5	0.5	*20.0*
Cortical knife	3	0.7	*18.8*	0	0.0	*0.0*	3	0.3	*12.0*
Borer	0	0.0	*0.0*	2	0.3	*22.2*	2	0.2	*8.0*
Burin	0	0.0	*0.0*	1	0.2	*11.1*	1	0.1	*4.0*
Denticulate	0	0.0	*0.0*	2	0.3	*22.2*	2	0.2	*8.0*
Notch	1	0.2	*6.3*	0	0.0	*0.0*	1	0.1	*4.0*
Scraper	2	0.5	*12.5*	0	0.0	*0.0*	2	0.2	*8.0*
Adze	1	0.2	*6.3*	0	0.0	*0.0*	1	0.1	*4.0*
Digging tool	2	0.5	*12.5*	0	0.0	*0.0*	2	0.2	*8.0*
Retouched flake	4	1.0	*25.0*	1	0.2	*11.1*	5	0.5	*20.0*
Retouched blade	1	0.2	*6.3*	0	0.0	*0.0*	1	4.0	*4.0*
Total	**402**	**100.7**	-	**599**	**100.3**	-	**1001**	**100.5**	-



11. Jabal Juhayra: General view of Rockshelters 1-6.

elements such as core tablets (**Fig. 16:3**). This fact, coupled with the absence of flint nodules as raw material, suggests that initial core preparation took place somewhere else, probably near flint outcrops in the Jafr Basin. Interestingly, two robust flake/blade blanks were found side-by-side in the southeastern floor of Feature 02 (**Fig. 16: 1, 2**). They were probably used, together with surrounding scoria pebbles, for floor pavement of the feature.

Tool classes include points/arrowheads (**Fig. 16:4-6**), cortical knives (**Fig. 16:7-9**), and retouched flakes (**Fig. 17:6-7**) as major components. The points/arrowheads were the most frequent of the three (21.4 percent of the corpus), but the possibility of contamination from underlying Layer 3 deposits cannot be completely ruled out. Unlike other post-PPNB assemblages in the Jordanian Badia (e.g. Betts 1998, 2013; Cropper 2011), neither Haparsa/



12. Jabal Juhayra: General view of the open-air features in Area 1 (looking SSW).

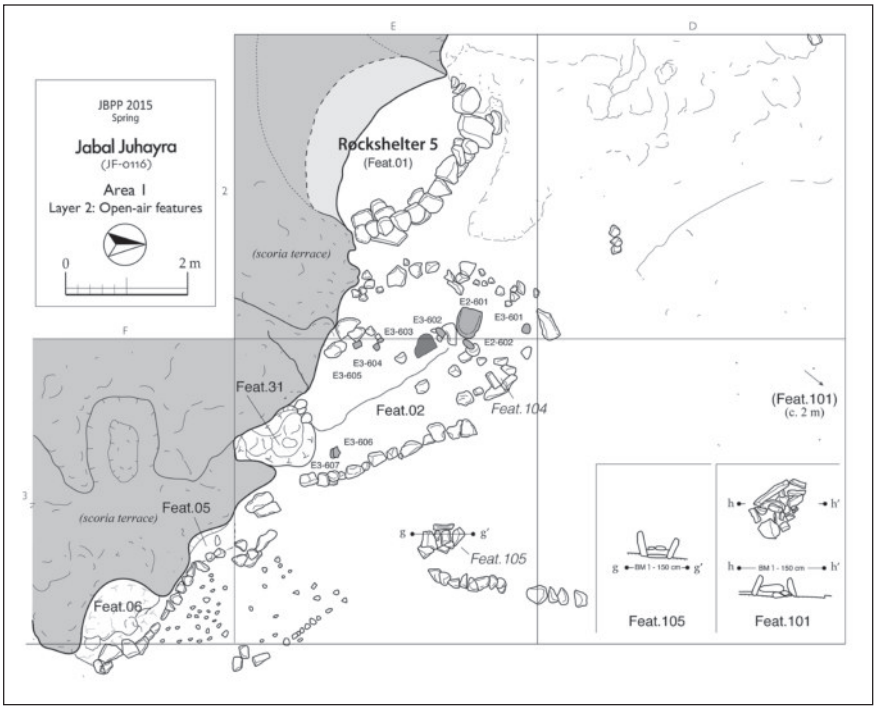
Herzliya/Nizzanim points, nor transverse arrowheads, were included. Meanwhile, cortical knives are common tools in every post-PPNB assemblage in Jordan, but our samples are relatively small in dimension (< 7-8 cm long) and irregular in profile. Other tools included robust denticulates (**Fig. 17:1, 2**), end- or sidescrapers (**Fig. 17:3, 4**), burins (**Fig. 17:1**), drills, a notch, and an adze-like tool. Burins (and burin spalls) centered on angle type examples, but their frequency is lower than for other desert assemblages. In addition, two heavy-duty digging tools, with remarkable edge damage, were found in a lower fill layer of Rockshelter 5 (**Fig. 18**). They were probably used for leveling the uneven floors of the rockshelters and/or preparing their jaggy walls. Their size and unique morphology reminded us of "*diagonally truncated stone bars"* common to Neolithic sites in the Jafr Basin (e.g. Fujii 2009a: Fig. 19).

Overall, the Layer 2 flint assemblage is marked by the predominance of hunting weapons and butchering tools, with scarce evidence for other subsistence activities. Another point of significance is the frequency of *ad hoc* tools which often retain a cortical surface. Both traits mean techno-typological retrogression from the PPNB flint industry, suggesting the involvement of post-PPNB pastoral nomads.

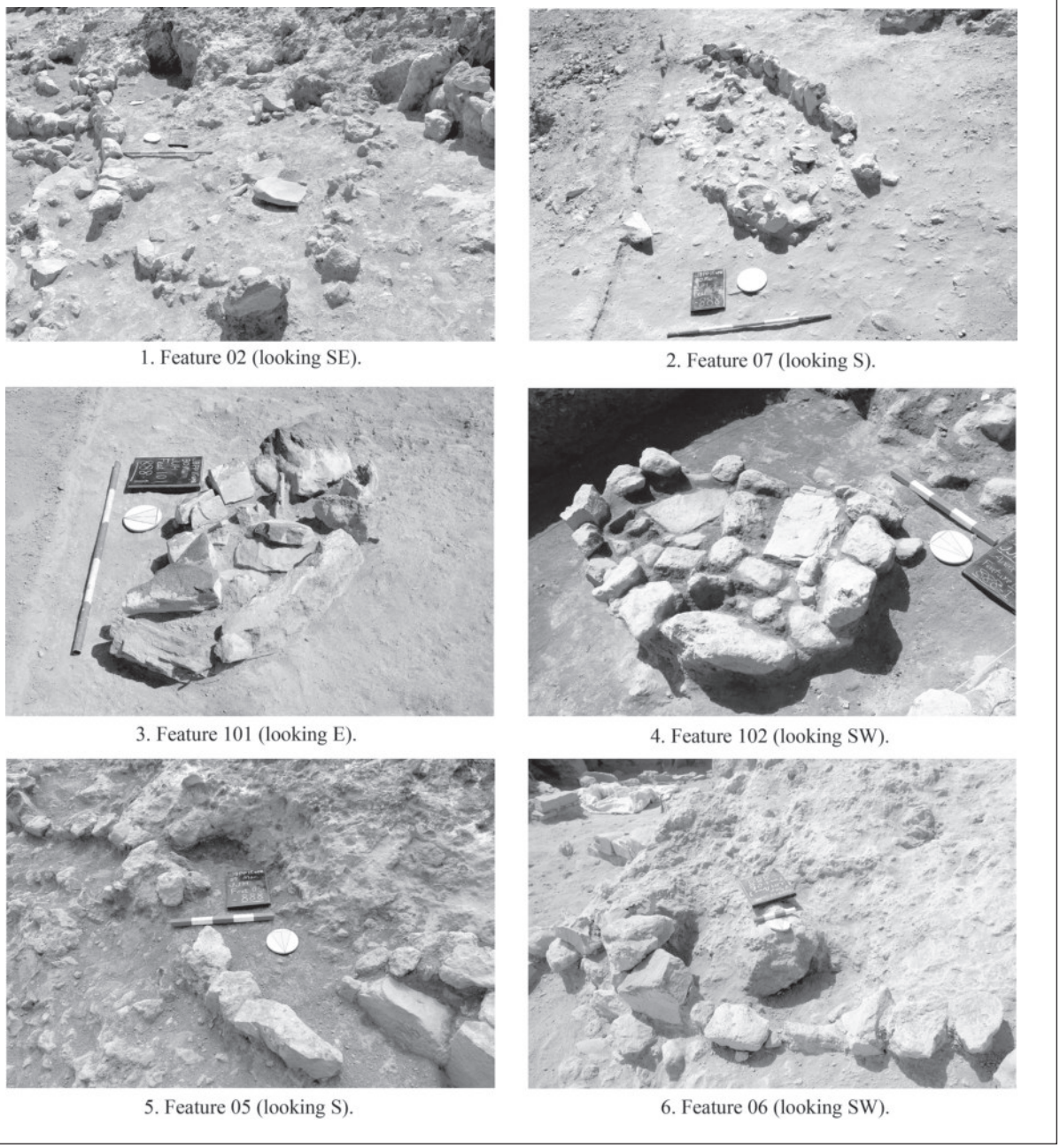
Grinding Implements

Grinding tools consist of eight limestone querns (**Fig. 19**) and six grinding slabs, made from sandstone or scoria/basalt (**Fig. 20**). As noted above, many occurred as floor-pavement materials in the rectangular/oblong features and, therefore, could be taken as stray finds.

The querns vary in morphology from a trough type object more than 45 cm long (**Fig. 19:1**), basin-like *c*. 43 cm in diameter (**Fig. 19: 3**), to small, flat examples *c*. 20 cm in width (**Fig. 19:2- 4**). No remarkable use-wear was recognized, but one of them retain orthogonal scratches and traces of reddish material,



13. Jabal Juhayra: Plan and sections of the open-air features in Area 1 (Layer 2).



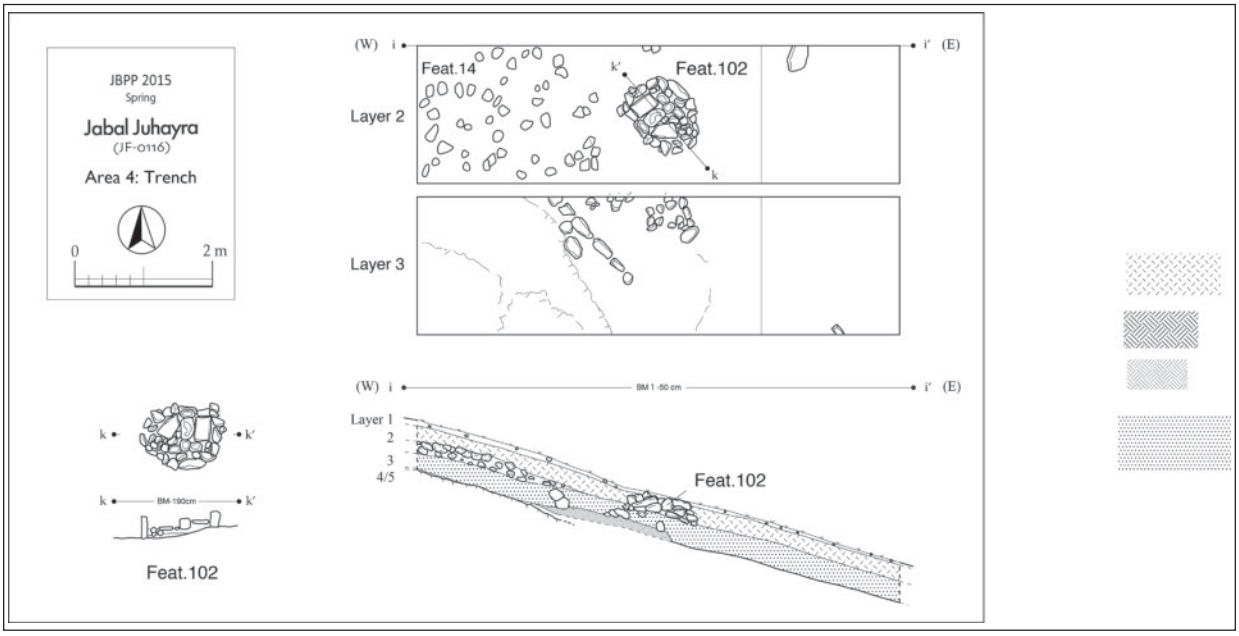
14. Jabal Juhayra: General view of the open-air features in Areas 1 and 4 (Layer 2).

probably scoria grains, on their slightly concave working surface (**Fig. 19: 4**).

Meanwhile, grinding slabs vary from small, elongated examples (**Fig. 20: 1, 2**) to relatively large, oval objects (**Fig. 20: 3-6**). As with the flat querns referred to above, one of them was stained red, probably with scoria grains (**Fig. 20: 5**). Suggestive in this regard is the existence of a cistern-like feature in Layer 3. As described below, its floor was paved with scoria cement (i.e. Portland cement including minute scoria grains as major admixture). This implies the possibility that the two red-stained objects (or, possibly, all the grinding tools) are derived from the underlying layer. Their conversion to floor-pavement materials may also be understood in this context.

Faunal / Floral Remains

A few hundred faunal remains were recovered



15. Jabal Juhayra: Plans and sections of Area 4 trench.

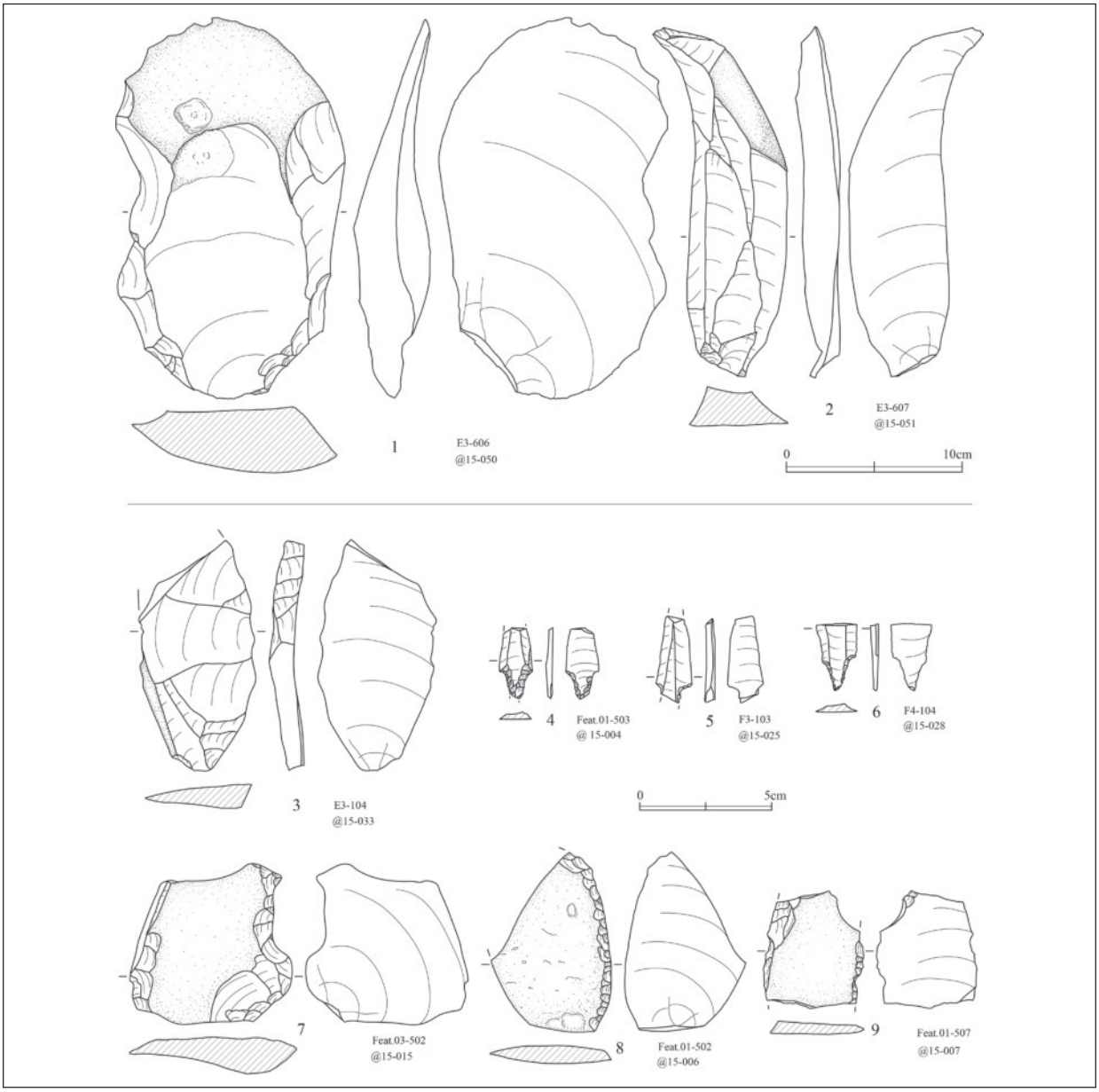
from the Layer 2 deposits, especially those in the rockshelters, but no analysis has taken place yet. In addition, litter from a few dozen floor deposits and hearth contents of the rockshelter dwellings has been stored for future water flotation. These analyses are expected to provide insights into the exploitation strategy of animal and plant resources at the Layer 2 settlement.

Layer 3: Structural Remains and Small Finds

Three kinds of structural remains which probably belong to Layer 3 were confirmed to be in association with overlying Layer 2, one of which was a few intermittent masonry wall alignments exposed at the southeastern part of Area 1 (**Fig. 7; Fig. 21: 1, 2**). Unlike the overlying structural remains, this feature was constructed from standardized cortical flint slabs *c*. 20-30 cm long and *c*. 5-10 cm thick, forming a rectangular structure (probably of a ground type). There is little doubt that the fully-fledged structure dates back to the PPNB period. Small finds in and around it included chipped flint/calcite artifacts (**Fig. 22: 1-17**), grinding implements, stone vessels, animal bone tools (**Fig. 22: 18**), adornments made from snail shell, and faunal remains. The flint/calcite assemblage centered on naviform core-and-blade components, corroborating the chronological perspective suggested above. The use of semi-transparent reddish calcite as raw material, the frequency of points/arrowheads, and the absence of cortical knives, also support the tentative dating. The occurrence of a few small *flint/scoria bowlets* (**Fig. 22: 19**) is important, as these certify dating of the Layer 3 settlement to the PPNB (Fujii 2009b, 2012; Gebel 1999; Gubenko and Ronen 2014; Wilke *et al.* 2014).

The second feature is a cistern-like installation, which was found in front of Rockshelter 1, *c*. 20 cm below Feature 103 from Layer 2 (**Fig. 9; Fig. 21: 3**). This unique feature was not only cut *c*. 50 cm into a scoria bedrock layer, but was also partly edged by a mortared masonry wall, and carefully paved with scoria cement. Thus, it was probably used as a small-scale water storage facility which supplied drinking water to the inhabitants of the Layer 3 settlement. Incidentally, a similar cement floor was found at Askli Höyük, a large PPNB settlement in central Anatolia (Hauptman and Yalcin 2000). Both examples can be understood to be a local variant of plastered floors in volcanic areas. Mineralogical analysis currently in progress is expected to shed new light on the technological innovation.

No less important is a masonry wall slightly exposed on the present ground surface of Area 3 (**Fig. 21: 4**). This wall, *c*. 1 m wide and at least *c*. 10 m long, was constructed using the rubble core technique; its location and orientation

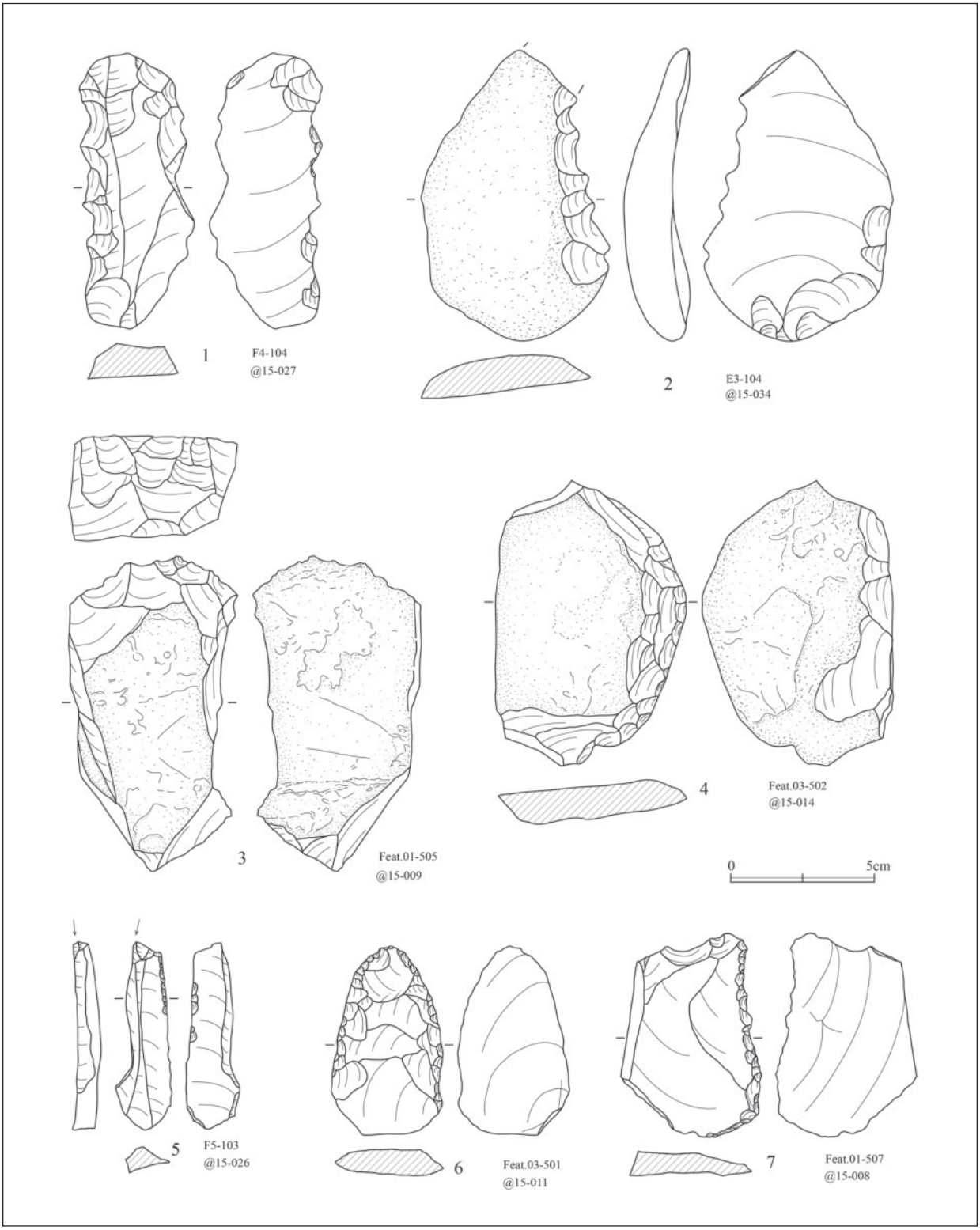


16. Jabal Juhayra: Chipped flint artifacts from Layer 2.

is of particular interest. Unlike all other wall alignments, including those in Layers 2, only this robust wall was located near the gully (more precisely, at a point slightly downstream of the convergence of two tributaries) and stretched orthogonally across the converged gully (**Fig. 5**). Hence, its use is self-evident. Although its southern extension is yet to be confirmed in Area 4, there is no doubt that the wall represents part of a small-scale barrage which collected seasonal runoff water flowing down the scoria slope. A similar example has been found at Wādī Badda, a contemporary settlement c. 15 west of Jabal Juhayra (Fujii 2007c: Figs. 4 , 5; Fujii 2010a: Figs. 13 , 14), suggesting that, unlike more remote outposts, such small-scale wadi/gully barriers were standard for PPNB settlements in the hilly terrain to the west. Subsequent excavations are expected to shed light on the overall picture of the Layer 3 settlement.

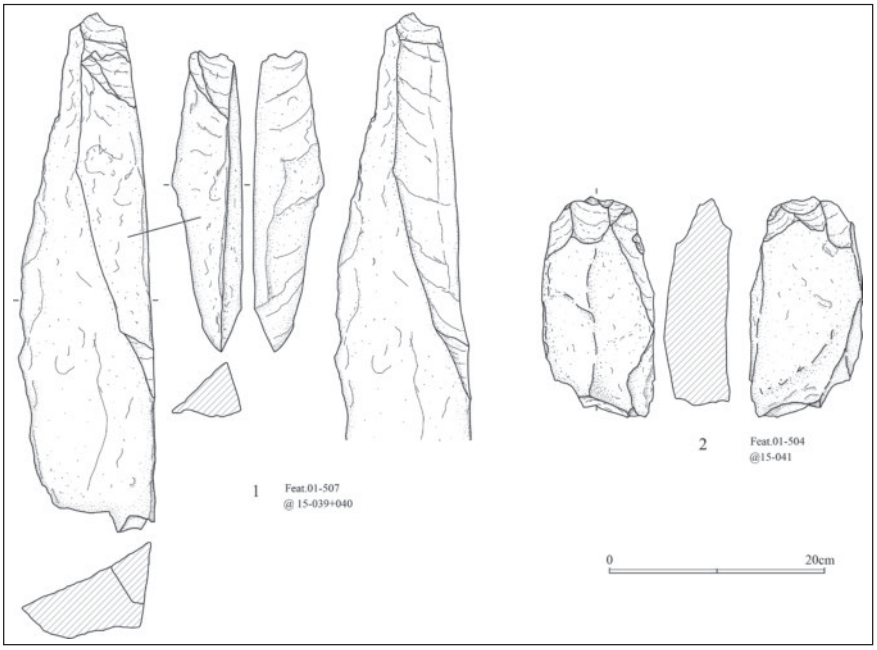
Discussion

Excavation of the Layer 2 settlement at Jabal Juhayra provided valuable insights into the post-PPNB Jafr Basin, which had thus far been



17. Jabal Juhayra: Chipped flint artifacts from Layer 2.

poorly understood. The following discussion deals with its date, function, and archaeological implications. We would like to point out in advance that the following perspectives may be subject to minor revision, depending on subsequent research outcomes.



18. Jabal Juhayra: Chipped flint artifacts from Layer 2.

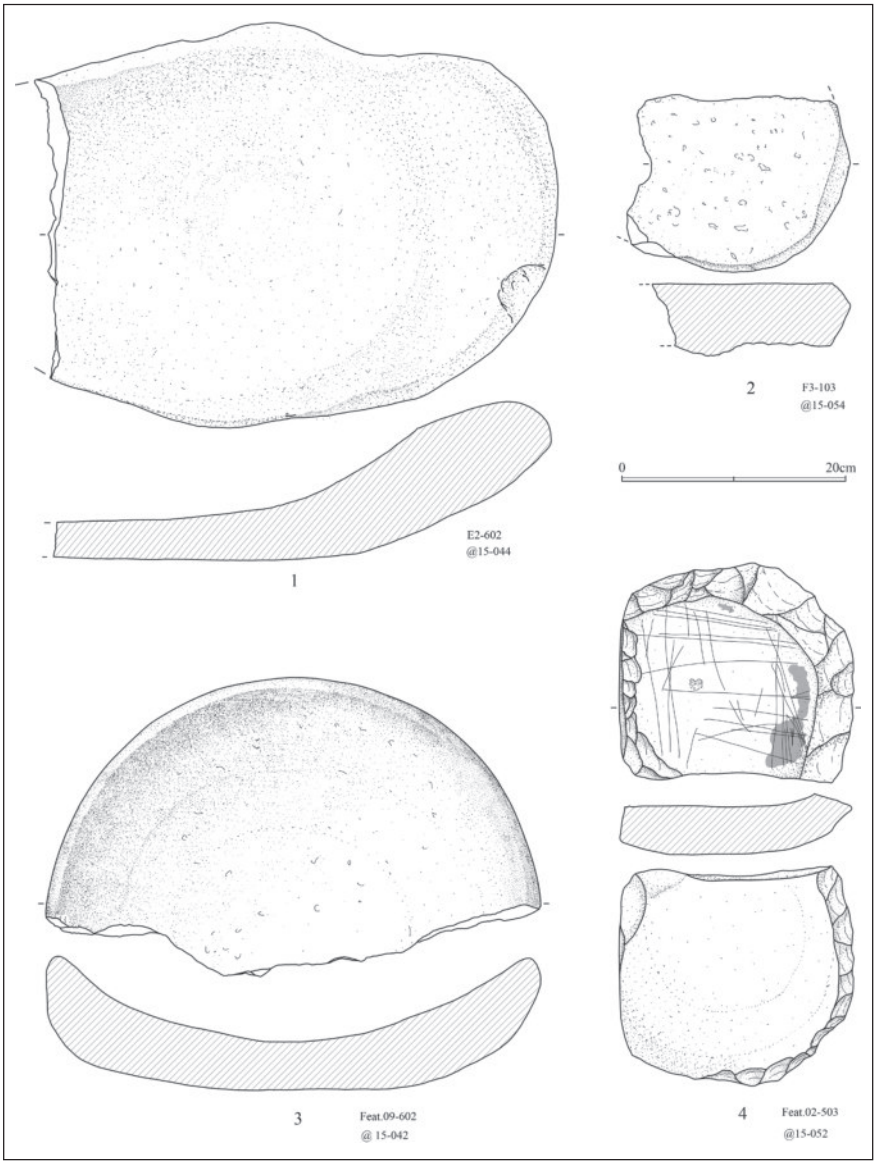
Date

A total of six C-14 dates are available for the stratified settlement (**Table 2**). To begin with, two dates from the Layer 2 deposits converge on a limited time range *c*. 6600-6500 *cal.* B.P, suggesting that the upper settlement falls into a threshold stage between the LN and the Chalcolithic. The small finds, especially the flake-oriented flint assemblage centering on the cortical knives, are compatible with this chronological perspective. However, two dates are not enough to draw a final conclusion. This is even more apparent when we consider that periodization of the few millennia subsequent to the PPNB is still controversial (e.g. Garfinkel 2009; Gilead 2009; Goring-Morris and Belfer-Cohen 2014; Levis 2014; Lovell and Rowan 2011; Rowan and Golden 2009). (It is for this reason that we have used the somewhat cryptic term *post-PPNB*.) It is safe to say, however, that the Layer 2 settlement at Jabal Juhayra follows Khashm al-'Arfa, a final LPPNB to initial LN encampment recently excavated in the eastern Jafr Basin (Fujii, Adachi, Yamafuji *et al*. 2013a).

Incidentally, the remaining four C-14 dates (all from the Layer 3 deposits), fall equally within a time range of 9500-9100 cal. B.P. It then follows that the lower settlement dates back to the LPPNB, probably to the first half. The aforementioned observations (the existence of fully-fledged rectangular structures, the predominance of naviform core-and-blade components, and the occurrence of the small flint/scoria bowlets) are also in agreement with the tentative dating. Therefore, our present understanding is that the Layer 3 settlement at Jabal Juhayra is roughly coeval with the western half of Wādī Abu Tulayha (Fujii 2009: Table 1).

Site Function

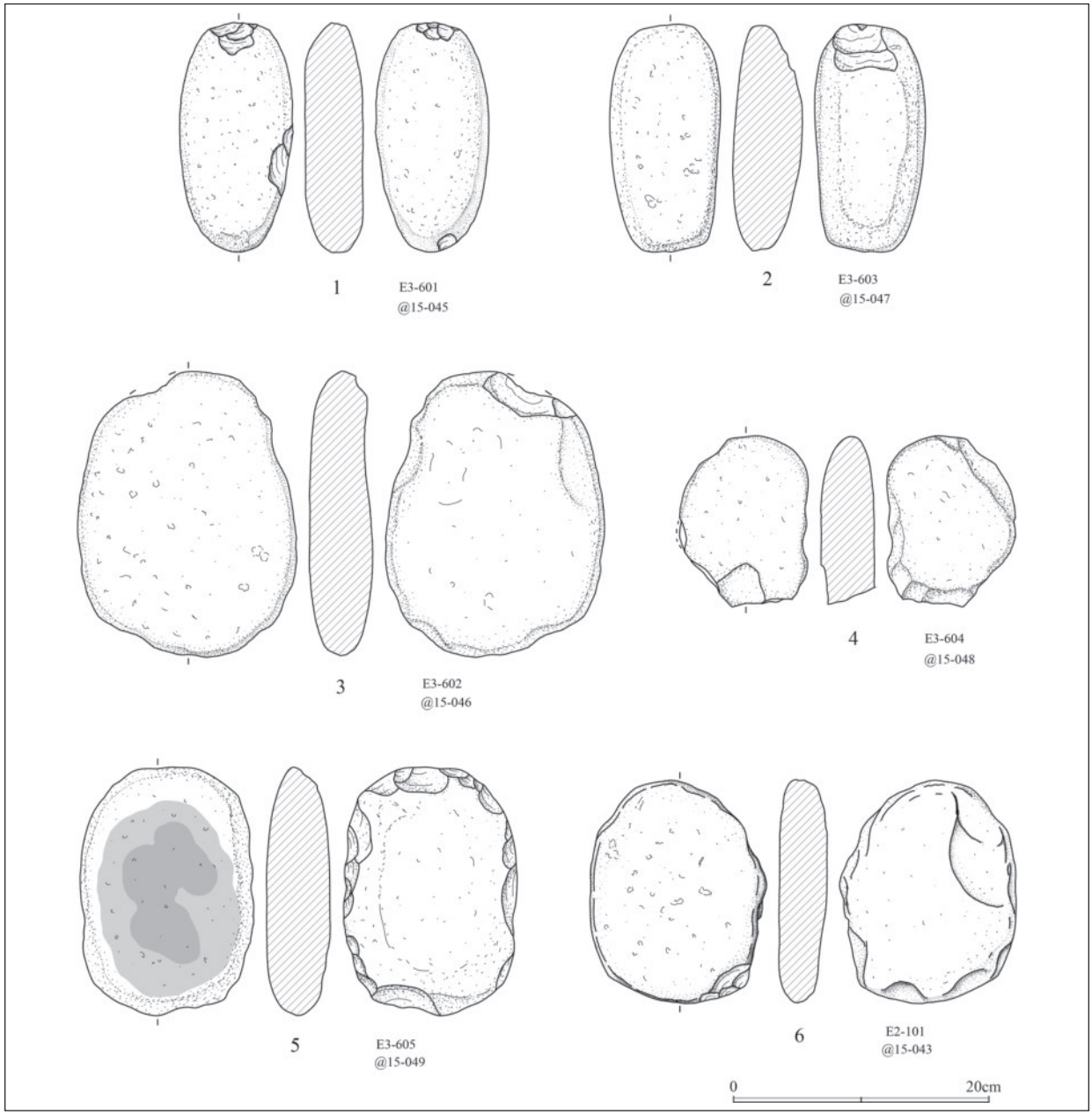
The Layer 2 settlement consists of six rockshelters and a dozen open-air features. Assuming that both edges of this elongated settlement are marked by Rockshelter 1 and Feature 07, respectively, its total area would be estimated at *c*. 0.05 ha or less (= *c*. 40-50 m by *c*. 5-10 m). This value is approximately one-tenth of the standard settlement size of preceding PPNB farming communities, but roughly equivalent to that of post-PPNB desert encampments. It is indisputable that the settlement was used by a small group with high mobility; namely, pastoral nomads. The location in the arid terrain, the *ad hoc* nature of the structures, and the lack of artifact variety, also support this interpretation. Although faunal analysis has not yet begun, it is intriguing to hypothesize that the small settlement was used as a summer camp by initial pastoral nomads who, as with modern local nomads, made a round trip on a seasonal basis between the steppe/desert to the east and the hilly terrain to the west.



19. Jabal Juhayra: Groundstone artifacts from Layer 2.

The question is the relationship between the rockshelters and the open-air features. How should we understand the coexistence of the two distinct types of structural entities? This admits of various interpretations. It is most unlikely, however, that a minor (i.e. stratigraphically indiscernible) chronological gap between the two causes the inexplicable phenomenon, because the techno-typological differences between them is too large to be taken as change or development in such a short period. Instead, in view of the careful spatial compartmentalization noted above, it is more reasonable to assume that the two structural entities coexisted and were used for different purposes.

How, then, were they used? A possible explanation would be that, while the open-air features were used as seasonal dwellings by prehistoric pastoral nomads, the rockshelters were utilized as *ad hoc* corrals for their livestock. This seems all the more plausible, due to the fact that modern local nomads often use the rockshelters for the same purpose. However, we should also recall the aforementioned fact that traces of day-to-day life (i.e. the number of *in situ* artifacts, the frequency of animal bones, and the existence of hearth-like ashy deposits) are much denser in the rockshelters than the open-air features. This fact leads us to the opposite interpretation; namely, an assumption that the rockshelters functioned as temporary dwellings



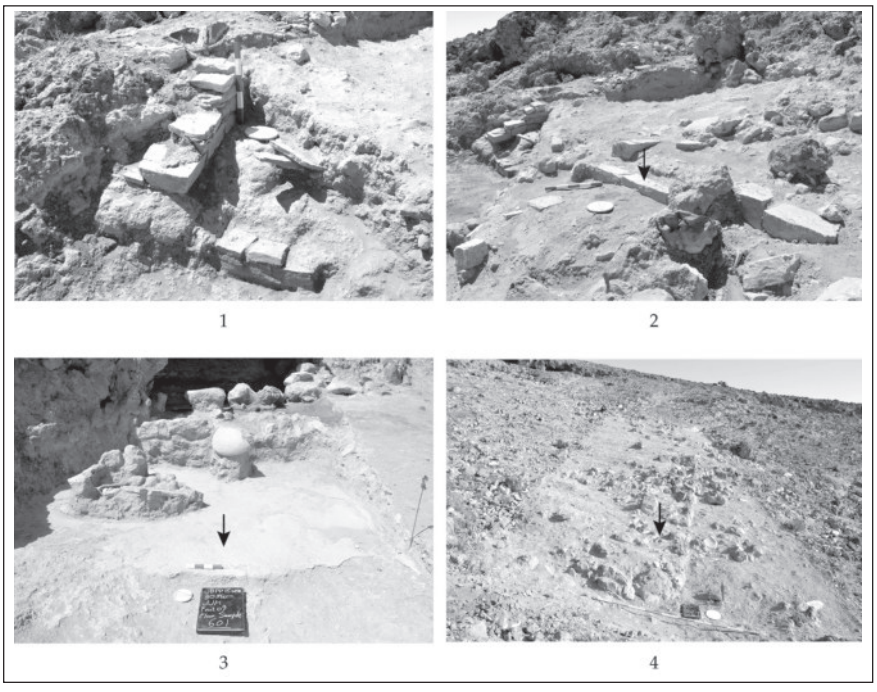
20. Jabal Juhayra: Groundstone artifacts from Layer 2.

rather than animal pens. The existence of similar examples at Tall al-Hibr, a late Chalcolithic/ EBI site in the eastern Jordanian Badia (Betts 1992; Betts *et al*. 2013: 143-155), suggests that rockshelter dwellings were commonly used by the initial pastoral nomads in Jordan.

What, then, were the open-air features used for? It is most unlikely that such distinctive types of features were equally used as dwellings. Thus, the remaining possibility is that they were limited to use as workshops or storehouses, or even perhaps as facilities for some impractical purpose. However, it is difficult to make any definite decisions regarding use, because the available evidence is restricted to monotonous artifacts. A hint, if any, is the fact that an oblong feature and a small feature are often combined to form a composite unit. Another point of significance is the fact that the units thus formed are laterally connected, or arranged in parallel with each other. These unique traits (and the scarcity of traces for day-to-day life) are shared with post-PPNB, pseudo-settlement types of open sanctuaries at Harrat al-Juhayra (Fujii

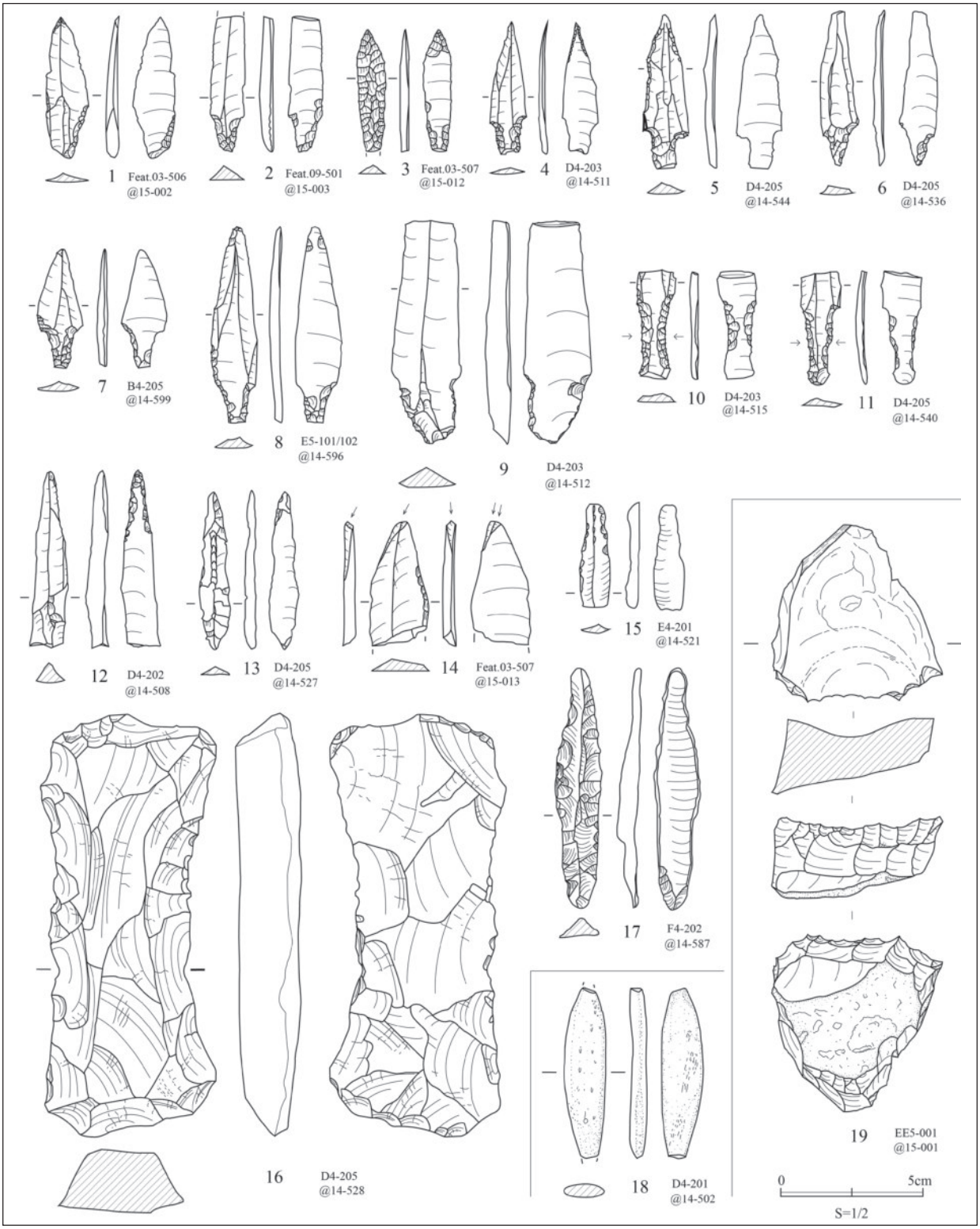
Table 2: Jabal Juhayra: C-14 data from the Layer 2 and 3 settlements (as of June 2015).

Sample No.	Material	Area	Structure/Feature	Locus	Context	uncal. B.P.	cal. B.C. (2σ)	Probability
Layer 2 settlement								
IAAA-150202	chacoal	I	Rockshelter 5	507_5	floor deposits	5703 ± 28	**6564 - 6407**	95.4
IAAA-143894	chacoal	I	Rockshelter 6	505_2	floor deposits	5763 ± 29	**6650 - 6489**	95.4
IAAA-143895	chacoal	I	Rockshelter 6	506_3	lower fill layer	5751 ± 29	**6639 - 6471**	95.4
IAAA-150532	chacoal	I	Rockshelter 6	601		6048 ± 30	**6977 - 6797**	95.4
IAAA-150533	chacoal	I	Rockshelter 6	602		6102 ± 31	**7030 - 6886**	80.2
							7156 - 7099	12.3
							7070 - 7045	2.2
							7085 - 7078	0.6
IAAA-150534	chacoal	I	Rockshelter 6	603	floor deposits	5926 ± 28	**6798 - 6671**	93.2
							6831 - 6819	2.2
IAAA-150535	chacoal	I	Rockshelter 6	604	floor deposits	6065 ± 29	**7003 - 6846**	92.5
							6815 - 6800	2.9
IAAA-150536	chacoal	I	Rockshelter 6	605	floor deposits	6181 ± 29	**7169 - 6992**	95.4
Layer 3 settlement								
IAAA-143896	chacoal	I	Rockshelter 6	507_2	hearth fill	8351 ± 33	**9465 - 9292**	95.4
IAAA-143897	chacoal	I	Rockshelter	508_1	hearth fill	8371 ± 33	**9473 - 9302**	95.4
IAAA-143898	chacoal	4	Trench	502_1	lower fill layer	8225 ± 32	**9299 - 9076**	92.4
							9055 - 9032	3.0
IAAA-143899	chacoal	4	Trench	104_2	lower fill layer	8534 ± 32	**9545 - 9485**	95.4



21. Jabal Juhayra: Partly exposed structural remains of Layer 3.

2005b), Qa' Abu Tulayha (Fujii 2000, 2002b), and 'Awja sites (Fujii 2014a; Fujii, Yamafuji *et al*. 2012; Fujii, Adachi, Endo, Yamafuji *et al*. 2013). It appears that the composite units of Jabal Juhayra had something to do with them. It is our present interpretation that the Juhayra open-air features represent a subsequent form of the 'Awja 4 open sanctuary, which are dated



22. Jabal Juhayra: Small finds from Layer 3.

to the latter half of the LN; namely, one of the final forms of the pseudo-settlement type of open sanctuaries unique to arid peripheries of the southern Levant (Fujii, Adachi, Endo, and Yamafuji 2013: Fig. 34; Fujii 2014c: Fig. 13).

The discussion above leads us to a belief that

the Layer 2 population group, probably pastoral nomads, encamped in the rockshelter dwellings and took part in communal ritual(s) at the unique open sanctuary in front of them. Given this, it would follow that the Layer 2 settlement at Jabal Juhayra is a composite site, used for day-to-day activities as well as for ritual ceremonies, but further verification is required to substantiate the hypothetical perspective.

Archaeological implications

Jabal Juhayra is a very important site in regards to tracing the initial process of pastoral nomadization in southern Jordan, firstly because it is located in an intermediate zone between the desert and the sown, and secondly because it includes both PPNB and post-PPNB settlements. Wādī Abu Tulayha meets the first condition, and ‘Ain Ghazal clearly meets the second (e.g. Rollefson and Rollefson 1993); however, for the time being, only Jabal Juhayra fulfills both requirements. In this sense, the significance of this unique site cannot be too strongly emphasized. Although an in-depth discussion must await the excavation of Layer 3, the following two points deserve continued attention.

To begin with, excavation results from Jabal Juhayra probably revalidate our previous perspective that the initial stage of pastoral nomadization in southern Jordan is traceable through the process of replacing the PPNB triple set (a substantial agro-pastoral outpost, a barrage, and a cistern) with the post-PPNB small encampment and open-air sanctuary (Fujii 2013). Unlike other Neolithic sites in the basin, Jabal Juhayra appears to contain all three structural entities and, for this reason, makes it possible to trace key episodes more sequentially; this applies equally to the small finds. The excavations highlight the decrease in artifact variety during the course of the transition, which probably mirrors a reduction in group size and an increase in group mobility. In this double meaning, Jabal Juhayra would be the third core of the Jafr chronology, after Wādī Abu Tulayha and Qa‘ Abu Tulayha.

In a broader context, research outcomes from this study have the potential to shed new light on the regional variation of pastoral nomadization in the Jordanian Badia. To cite one example, while the post-PPNB (yet pre-EBA) Jafr Basin is characterized by the existence of unique open sanctuaries, the absence of small points and transverse arrowheads, and the infrequency of burins and drills, the opposite is probably the case at Azraq and its surrounding areas during the same period (e.g. Betts *et al*. 1998, 2013; Rollefson 2013; Rollefson, Rowan *et al.* 2012, 2014; Rollefson, Wilke *et al.* 2014). Nevertheless, both the unique settlement pattern (centering on ephemeral encampments including rockshelters) and the techno-typological shift into the flake-oriented flint industry (including cortical knives) are common to both regions. These two contradictory facts probably suggest that pastoral nomadization in the Jordanian Badia proceeded in local contexts with individual aspects, yet in a similar framework as a whole.

Concluding Remarks

The first two excavation seasons at Jabal Juhayra have provided valuable insights into the post-PPNB culture in the Jafr Basin. Of particular interest is the coexistence of rockshelter dwellings and open-air features. The former have attested to the high-mobility settlement pattern of initial pastoral nomads, whereas the latter have offered a glimpse into their ritual life. Once complete, the series of research outcomes from this study will enable us to trace the formation of nomadic society in southern Jordan in more detail; however, the excavation is still incomplete, with subsequent field seasons expected to clarify the overall picture of the stratified settlement.

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TOR GHUWAYR 1-3: SURVEYS AND EXCAVATIONS OF TAILED TOWER TOMBS IN THE NORTHEASTERN EDGE OF THE JAFR BASIN, SOUTHERN JORDAN

Sumio Fujii, Takuro Adachi, Masatoshi Yamafuji and Kazuyoshi Nagaya

Introduction

As referred to elsewhere in this volume, the first three field seasons of the Jafr Basin Prehistoric Project (Phase 5) aimed to refine the Jafr chronology, a basic framework which traces the process of pastoral nomadization in southern Jordan (Fujii 2013). Two sites were examined; Jabal Juhayra, a small Neolithic settlement at the northwestern corner of the basin (Fujii *et al*. in this volume), and Tor Ghuwayr 1-3, Early Bronze Age (hereafter EBA) burial fields in the northeastern edge of the basin. This report focuses on the latter sites. A series of surveys and excavations at these sites has proved that the EBA eastern Jafr Basin witnessed the penetration of the tower tomb culture, which probably originated in the Arabian Peninsula. What follows is a brief summary of the research outcomes for the unique burial fields.

The Sites and Site-Settings

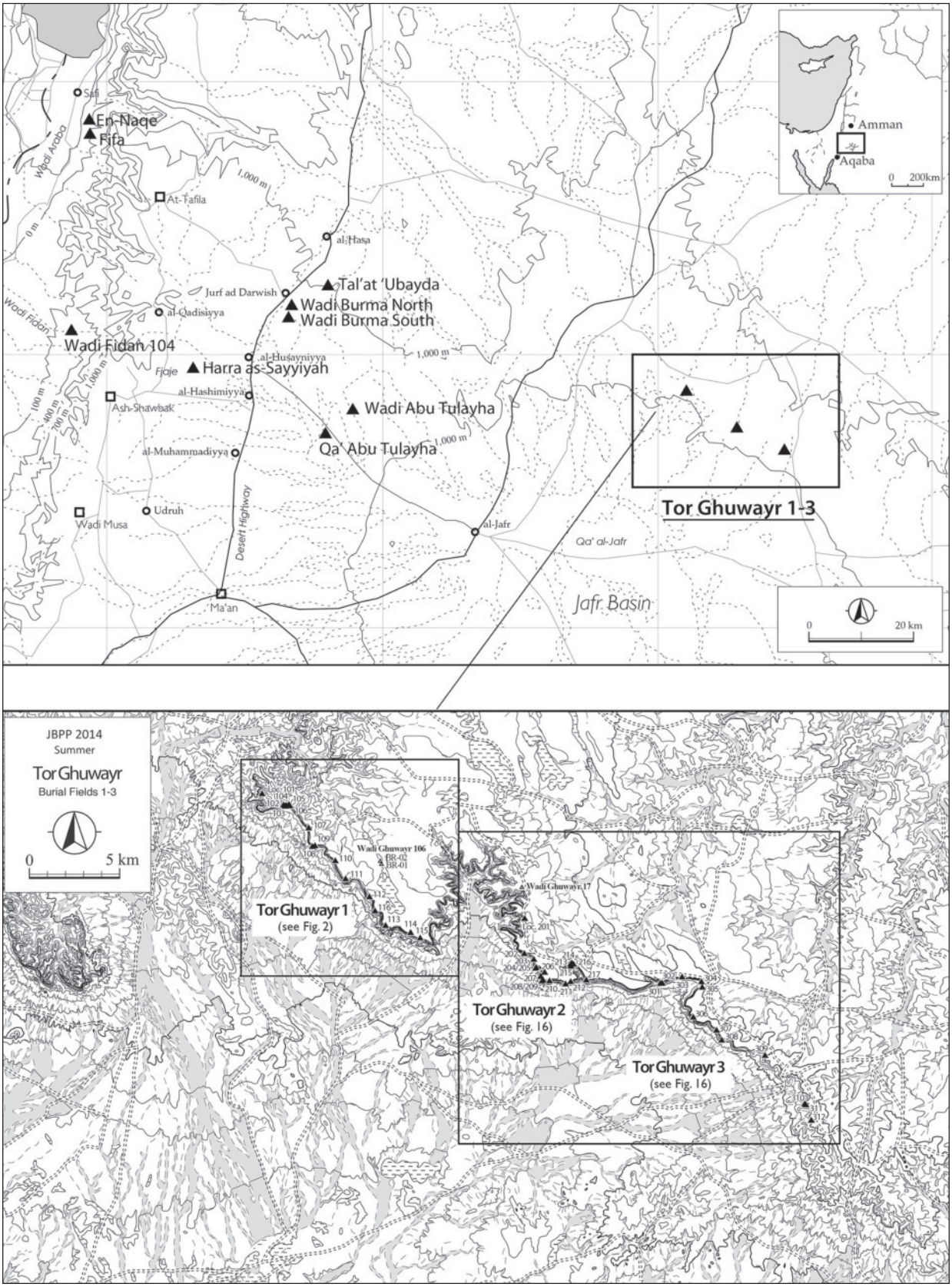
Tor Ghuwayr 1-3 are located at the northeastern edge of the Jafr Basin, a large-scale highland depression whcih occupies the southern half of the Transjordanian Plateau (**Fig. 1a**). The three sites extend east to west along an escarpment, constituting an elongated composite burial field *c*. 40 km in total length (**Fig. 1b**). The sites were found for the first time in 2010, during excavations at the nearby PPNB barrage system of Wādī Ghuwayr 106 (Fujii, Adachi *et al*. 2011) and a contemporary outpost of Wādī Ghuwayr 17 (Fujii, Quintero *et al*. 2011). The area was previously surveyed by an American team who focused on lithic study (Quintero and Wilke 1998a, 1998b; Wilke and Quintero 2014), and our discovery was its extension.

To date, the investigation has been conducted twice. The first survey and excavation were carried out in March 2014, and the second in August the same year. The surveys covered the whole range of the three sites; however, the excavations focused only on Tor Ghuwayr 1, which is easier to access from the Azraq-Ma‘an Highway. The sites’ stratigraphy was roughly identical with that of the neighboring two sites referred to above, and no repetition is needed, except for the fact that, while the two PPNB sites belonged to Layer 3, the two excavated tower tombs described below were equally included in Layer 2. This means that the Tor Ghuwayr sites postdate the PPNB in terms of area stratigraphy.

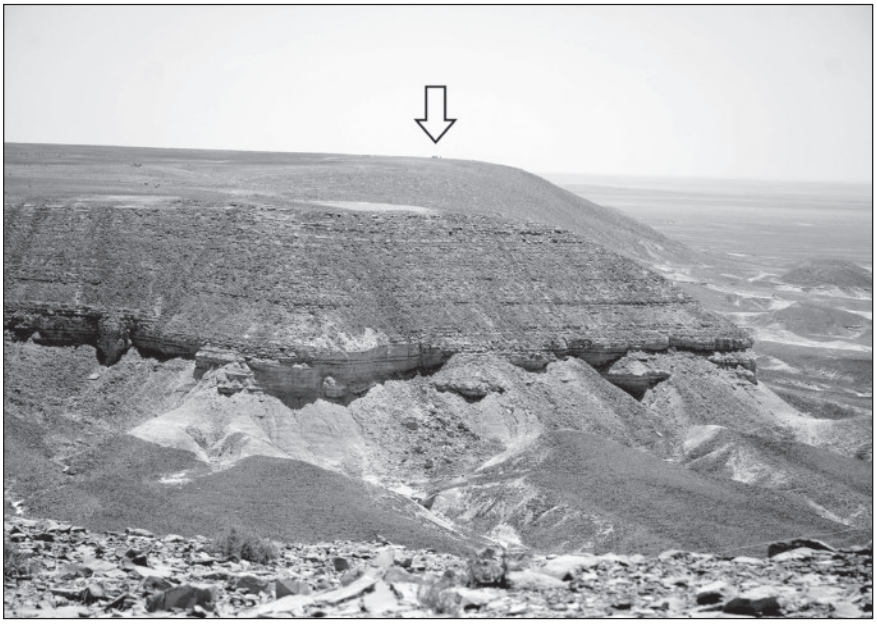
The site-setting of Tor Ghuwayr 1-3 is similar to other Jafr sites’, being characterized by a hyper arid climate and consequent poor vegetation. Understandably, no traditional settlements exist around the sites, and local land use has been limited to sporadic pasturing, taking advantage of perennial shrubs and annual grass plants dotted on the wadi beds. What differentiates the Tor Ghuwayr sites from other Jafr sites (excluding Tal‘at ‘Ubayda: Fujii 2005), is their unique location on the top of the escarpment, and the elongated site form stretching along it, both of which are probably attributable to their site function as communal burial fields of prehistoric pastoral nomads.

Survey and Excavation at Tor Ghuwayr 1

Tor Ghuwayr 1 is the westernmost of the three sites, having a total length of *c*. 12 km (**Figs. 2 , 3**). The surveys recorded a total of sixteen localities associated with a tower tomb or a collapsed stone concentration probably



1. Tor Ghuwayr 1-3 and Early Bronze Age sites in and around the Jafr Basin.



2. Tor Ghuwayr 1: Partial view of the site (looking towards Loc. 111 from Loc. 108/109).

derived from it. We designated them as Loc. 101 to Loc. 116, starting from the northwest. Five of them (i.e. Locs. 102-106) concentrated on a flat terrain in the northwestern part of the elongated burial field, but the others were aligned along the escarpment at an interval of *c*. 0.5-1.5 km. Two of them were excavated.

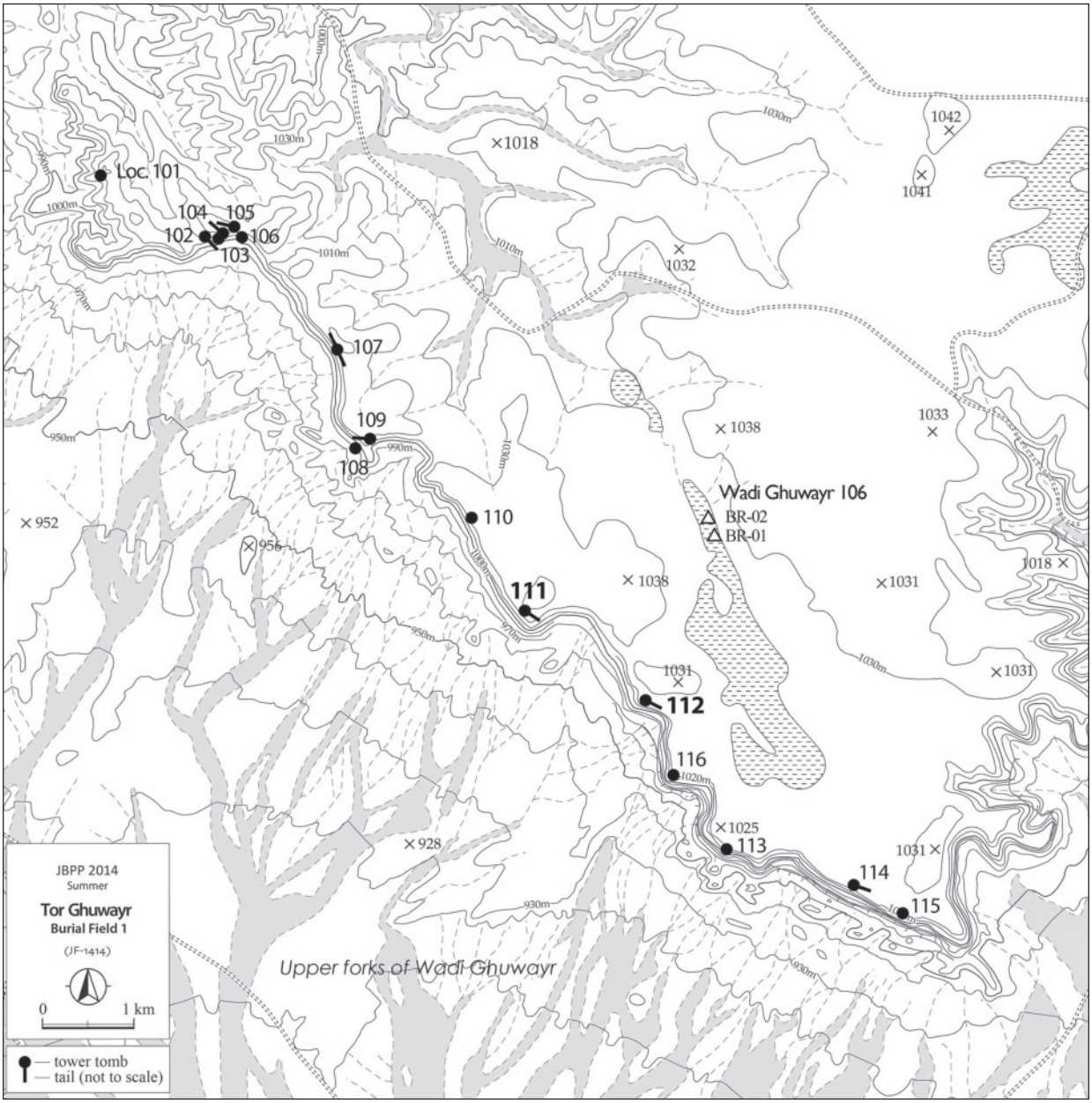
Locality 111

Locality 111 (N: 30˚33′46.20″/ E: 036˚29′29.22″/ Elevation: *c*. 1043 m) lies roughly in the middle of the elongated burial field, occupying the tip of a cape-like protrusion which commands an extensive prospect of the upper reaches of Wādī Ghuwayr. Though partly disturbed by illicit digging, this locality proved to contain a typical tailed tower tomb complex.

The tower tomb, the main body of the complex, had a cylindrical profile, measuring *c*. 2.5 m in outer diameter, *c*. 1.6 m in inner diameter, and *c*. 0.9 m (five to six courses) in maximum preserved height (**Figs. 4-6**). In view of the volume of fallen stones, it is presumed that the cylindrical masonry wall was originally at least a few courses higher than the present state. Flat limestone boulders, *c*. 50-70 cm long, were used as major construction materials. They were probably procured from limestone layers exposed at the edge of the escarpment. Some were partly trimmed at both ends, indicating that constructors attempted to adjust the size of building materials.

The wall of the tower tomb was consistently one stone-row wide from top to bottom, but two different masonry techniques were used in combination (**Fig. 7**). The lower courses, including the foundation, used larger limestone cobbles and boulders, arranging them in a stretcher bond. In addition, limestone and flint rubble were often inserted into gaps between stones as adjustment materials. Meanwhile, preserved top courses arranged smaller slabs in a header bond, which probably formed (together with many slabs removed by illicit digging) a corbelled ceiling to cover the tower tomb. Given this, it would follow that the present top course represents the lowest course of the corbelled ceiling. What attracted our attention in this regard was a long limestone boulder that was found leaning on the northwestern corner of the tower tomb (**Fig. 8**). The length of the boulder was roughly equivalent to the presumed wall height of the tower tomb, and was trimmed flat at both ends. Both facts suggest that it was originally used as a central pillar to support the corbelled ceiling. As referred to below, a similar stone pillar was found *in situ* at Loc. 205 of Tor Ghuwayr 2 (**Fig. 17: 3**), suggesting that a semi-corbelled technique using a central pillar was standard practice for the Tor Ghuwayr tower tombs.

Aside from the semi-corbelled ceiling, the tower tomb was very simple in structure, with no additional features such as an entrance

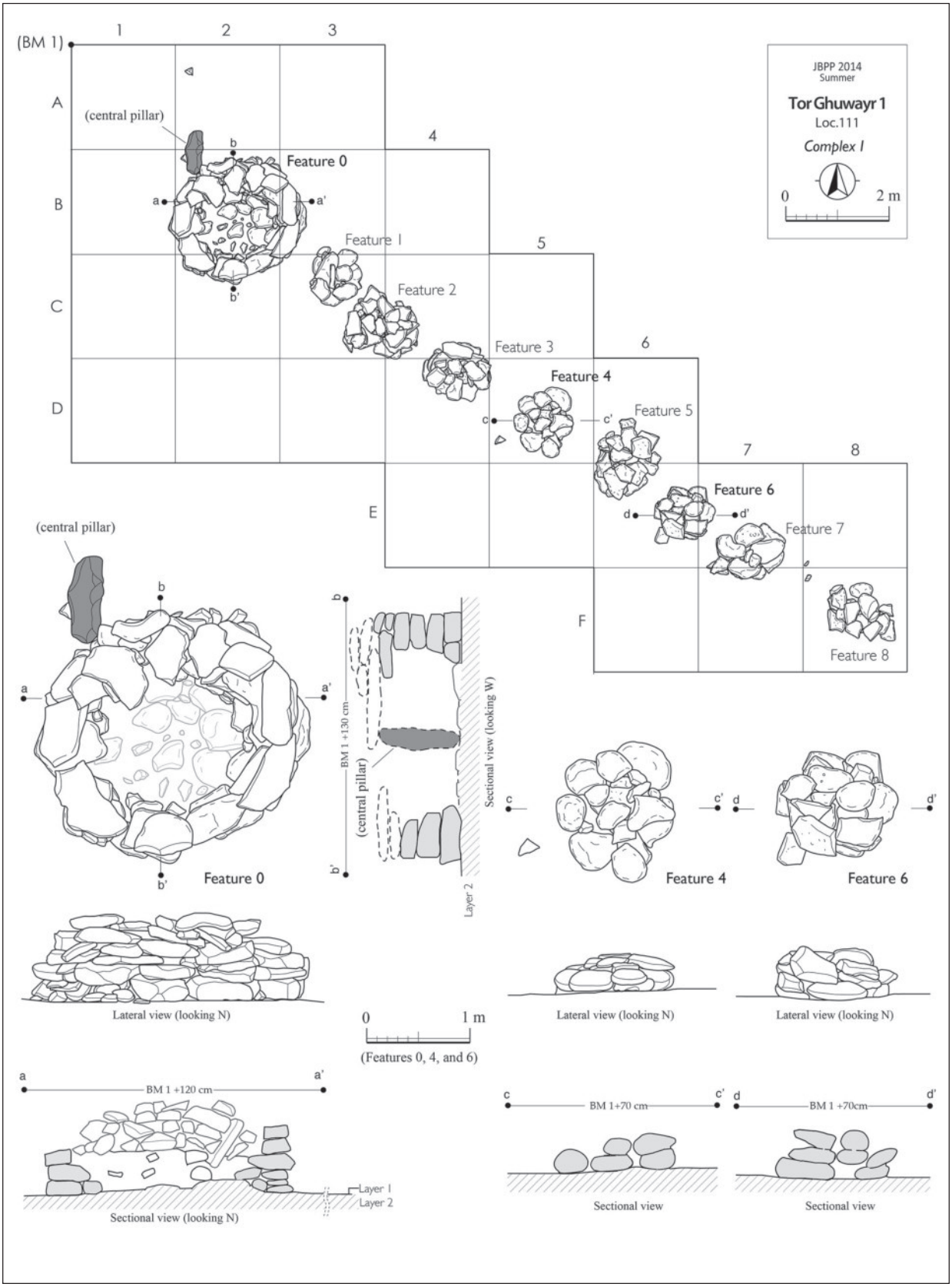


3. Tor Ghuwayr 1: Site map.

or stone-lined sepulcher. The absence of a built-in entrance was common practice, and characterizes the tower tombs at the Tor Ghuwayr burial fields. Meanwhile, the floor utilized the upper surface of Layer 2, without any additional treatment.

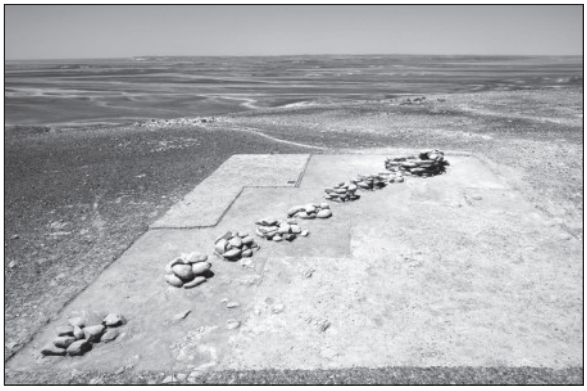
The tower tomb was empty; neither human skeletal remains nor burial gifts were found. As even small fragments were not discovered in disturbed fill layers, it is possible that nothing existed from the beginning. This makes sense when we consider that symbolic interment without human bones was the norm of initial pastoral nomads who migrated a long distance (e.g. Haiman 1992). A few Jafr blades (**Fig. 14: 1**) and tabular scraper cores (**Fig. 14: 2**) were collected around the tower tomb, but the contextual correlation between the two is uncertain.

The tail, or minor component of the complex, stretched in a linear fashion from the southeastern corner of the tower tomb. This composite feature consisted of a total of eight small stone concentrations *c*. 1 m in diameter

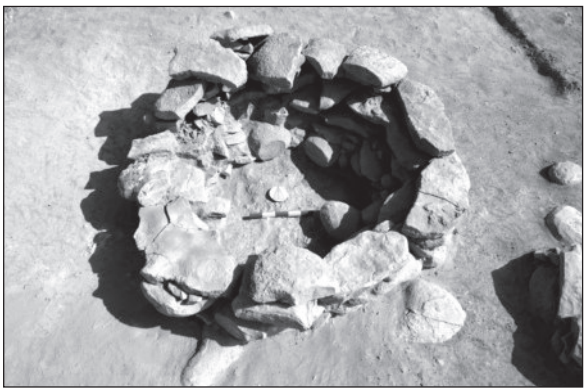


4. Tor Ghuwayr 1: Plan and section of the tailed tower tomb complex at Loc. 111.

5. Tor Ghuwayr 1: General view of the tailed tower tomb complex at Loc. 111 (looking E).



6. Tor Ghuwayr 1: General view of the tailed tower tomb complex at Loc. 111 (looking W).

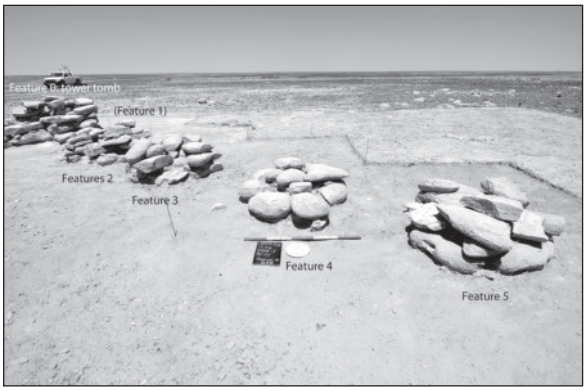


7. Tor Ghuwayr 1: Bird's-eye view of the tower tomb at Loc. 111 (looking N).

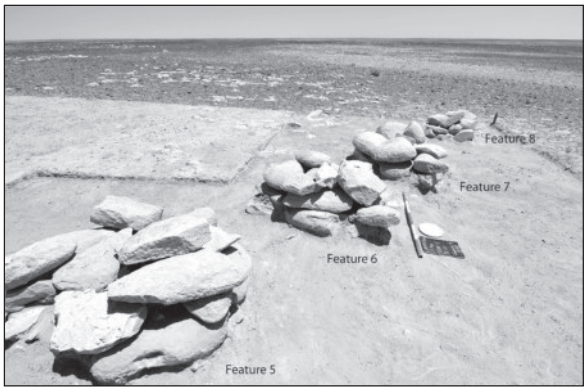
8. Tor Ghuwayr 1: Lateral view of the tower tomb complex at Loc. 111 (looking SE).

and *c*. 0.5 m in preserved height, respectively. They were arranged regularly at an interval of *c*. 0.5-1 m and formed, as a whole, a feature alignment *c*. 16 m in total length (**Figs. 9 , 10**). Unlike the main body of the complex, untrimmed roundish limestone cobbles up to *c*. 50 cm long were used as the chief construction material. Most of the features were simply a stone pile, but a few (e.g. Feature 4) formed a pseudo stone circle, with the center filled with smaller cobbles. Nothing was found in and around the eight features.

Having established that the tower tomb and the tail shared the same site stratigraphy, and that a similar combination was ubiquitous at the three sites, it is indisputable that the two components combined to form a tailed tower tomb complex. Incidentally, the main component of the complex was generally called *namus* (or *nawamis* in the plural form;



9. Tor Ghuwayr 1: Partial view of the tail at Loc. 111 (looking N).



10. Tor Ghuwayr 1: Partial view of the tail at Loc. 111 (looking E).

e.g. Avner 2002; Bar-Yosef *et al*. 1977, 1986), a beehive tomb (e.g. Doe 1983: 47-51), or simply *tumuli* (e.g. Zarins 1992: 50) in earlier publications. We refer to it as a (tailed/untailed) tower tomb following the recent terminology of Arabian and Jordanian archaeology (e.g. Abu-Azizeh 2014; Rollefson *et al*. 2011; Rollefson 2013; Steimer-Herbet 2004; Weeks 2010). As described below, tailed/untailed tower tombs and their variants constituted the core of the Tor Ghuwayr burial fields.

Locality 112

Locality 112 (N: 30˚33′20.76″/ E: 036˚30′09.90″/ Elevation: *c*. 1027 m) was situated *c*. 1.5 km southeast of Loc. 111 and, again, occupied the tip of a cape-like protrusion where sebveral layers of limestone and flint are exposed. Though seriously damaged by recent looting, the excavation revealed a tailed tower tomb complex similar to that of Loc. 111 (**Figs. 11-13**).

The tower tomb had a slightly oval plan, and its major axis was oriented NW-SE. It was slightly larger in dimension than the core feature of Loc. 111, measuring *c*. 3.5-4.0 m for the outer diameter and *c*. 2.2–2.8 m for the inner diameter. The wall had entirely collapsed, leaving the foundation course only, which was constructed using a two-rowed upright slab wall technique common to prehistoric desert sites in the southern Levant (e.g. Garrard *et al*. 1994; Fujii 2013). In view of the volume of collapsed or removed stones scattered around the foundation wall, it is assumed that the tower tomb originally had a wall height of at least several courses or *c*. 1 m. Limestone and flint rubble, *c*. 10-20 cm long, filled the narrow space inside the dual wall. The stone pile scattered around the foundation included a few long boulders, one of which was possibly used as a central pillar for supporting a semi-corbelled ceiling. No clear evidence of a built-in entrance was recognized.

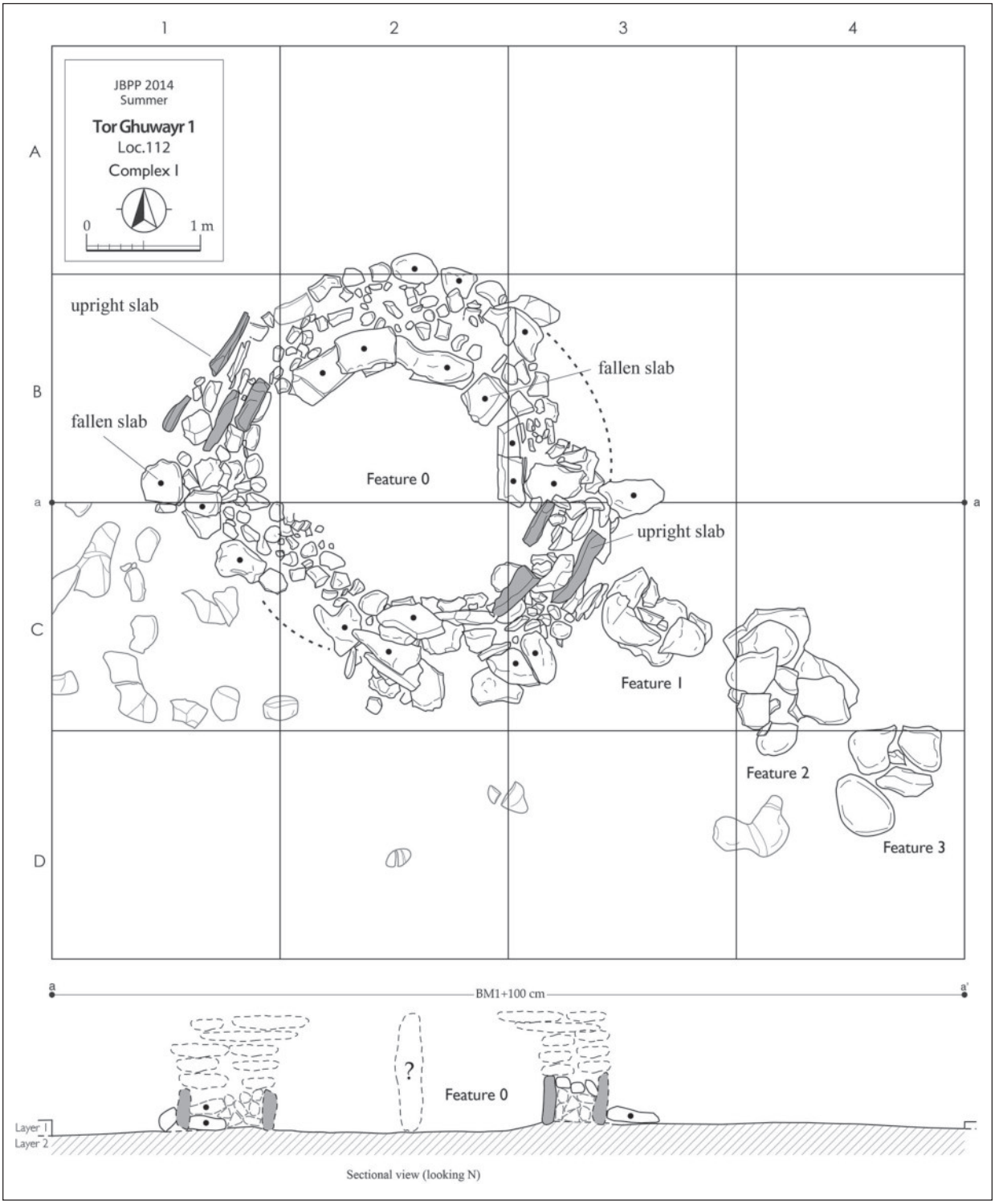
The tail of this complex was very short (*c*. 3 m in total length), consisting of only three stone concentrations *c*. 1m in diameter, respectively. As with the case of Loc. 111, it was attached to the southeastern corner of the tower tomb, and stretched southeastward in a linear fashion. Here again, untrimmed roundish limestone cobbles were used as major construction materials. This case exemplifies that there is no dimensional correlation between the scale of a tower tomb and the total length or element number of an attached tail.

A small number of human skeletal remains were recovered from disturbed fill layers left inside the tower tomb. This means that practical interment took place in this case, although it does not always represent primary burial when the tower tomb was constructed. In addition, a flat carnelian bead with a central hole (**Fig. 14: 12**), a small stone disc with a (natural ?) central hole (**Fig. 14: 11**), a neck fragment from a small pot (**Fig. 14: 9**), and a few base and body fragments of a medium-size bowl with a handle-like protrusion (**Fig. 14: 10**) were also found in the same context. The pottery sherds are suggestive of an Iron Age date, or slightly later. It is possible however, that together with the scattered human bones, they represent later reuse of the tower tomb. Meanwhile, the surface collection around the complex included a dozen Jafr blades (see **Fig. 14: 3-6**), a Jafr blade core (**Fig. 14: 7**), and a few tabular scraper cores (**Fig. 14: 8**).

The Other Localities

The remaining fourteen localities also included a tower tomb or a disturbed stone pile similar to it. Most of them consisted of only a single complex, but Loc. 115 appeared to contain a few complexes. It would follow that a minor gap intervenes between the total number of localities and that of tower tomb complexes, but this issue has been left for future reinvestigation.

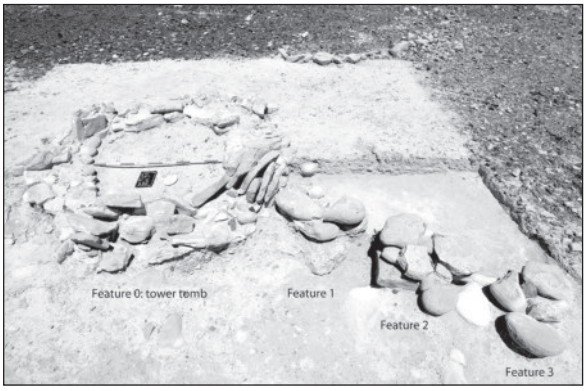
Six of the fourteen localities contained a typical tailed tower tomb complex analogous to the two excavated examples (**Fig. 2; Figs. 15: 2-4, 6-8**), whereas a few localities had an untailed tower tomb (**Fig. 15: 1, 5**). The others were seriously disturbed and, therefore, unidentifiable for details. The tailed/untailed tower tombs varied in scale from locality to locality, with a wide variety of outer diameters ranging from *c*. 3.5 m to *c*. 6.5 m. The attached tails also varied in dimensions; the longest example (*Loc*. 105) was *c*. 25 m in total length. However, there is no doubt that the sixteen localities (including *Locs*. 111 and 112)



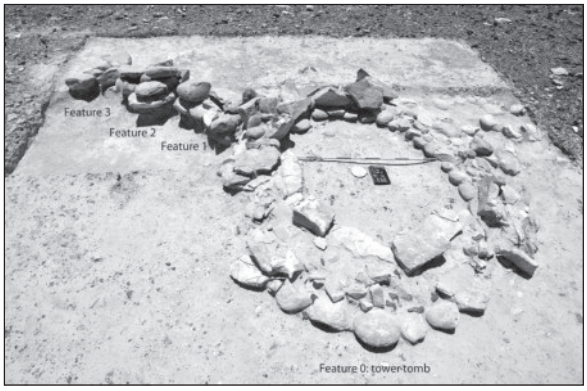
11. Tor Ghuwayr 1: Plan and section of the tailed tower tomb complex at Loc. 112.

constitute a unified burial field. Incidentally, the tails varied in orientation depending on locality but were consistent in the sense that they followed the general direction of the adjacent escarpment in every case (**Fig. 2**). As described below, the same was also true with the other two sites. Thus, it is likely that tail orientation, at least at the Tor Ghuwayr burial fields, had no special ritual meaning.

Surface finds from the other localities were



12. Tor Ghuwayr 1: General view of the tailed tower tomb complex at Loc. 112 (looking N).



13. Tor Ghuwayr 1: General view of the tailed tower tomb complex at Loc. 112 (looking S).

limited to a white bead made of unidentified material (**Fig. 14: 13**) and a handful of reddish, wheel-made ware sherds probably of the Iron Age or later. They were recovered from disturbed deposits around tower tombs and, therefore, do not always represent the precise date of the adjacent complexes. In addition, a certain number of tabular scraper cores and Jafr blades were collected around several complexes.

Surveys at Tor Ghuwayr 2 and 3

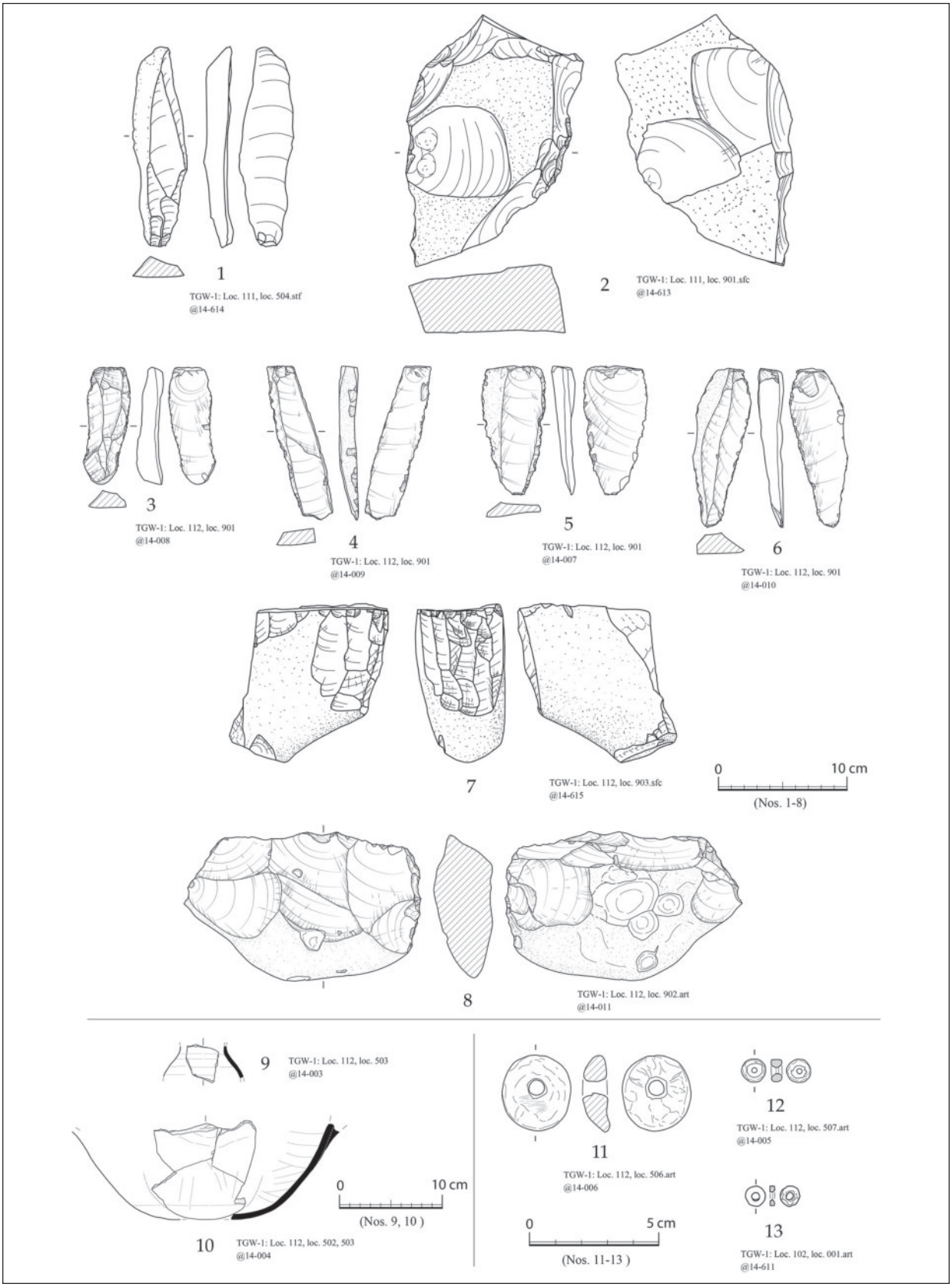
We repeated an intermittent survey in the neighboring two burial fields between the excavations at Tor Ghuwayr 1. The surveys registered a few dozen tower tomb complexes or disturbed stone concentrations (**Fig. 16**). Since surface finds were limited to ubiquitous tabular scarpers and Jafr blades, the following description will deal only with the structural remains.

Tor Ghuwayr 2

Tor Ghuwayr 2 extended in a southeasterly direction, a distance of *c*. 5 km from Loc. 115, the easternmost component of Tor Ghuwayr 1. This small-scale burial field was relatively high in density, containing a total of seventeen localities. Again, tailed tower tombs or their supposed remnants accounted for the vast majority of registered complexes. Most typical were two complexes at *Locs*. 203 and 207, both of which were associated with a long tail consisting of six to eight stone concentrations (**Fig. 17: 2, 4**). Although seriously damaged, the other localities also appeared to contain a similar complex. The only exception was Loc. 206, where an ashlar-lined rectangular cist was exposed in the center of a large looters' pit. This feature was clearly different in character (and probably date) from the other complexes. It also differed from the others in that it was located on a plain *c*. 100 m behind the escarpment.

The following two cases attracted our special attention. One was the tower tomb complex at Loc. 201, which was associated with a very long (*c*. 60-70 m) tail stretching northward along the escarpment (**Fig. 17: 1**). Unlike the typical examples described above, this tail consisted of sporadic stones or vaguely delineated stone concentrations. This type of tail is probably a simplified version of the original form. Parallel examples were recorded at *Loc*. 214 of Tor Ghuwayr 2 and *Loc.* 312 of Tor Ghuwayr 3, indicating that such techno-typological simplification was not always exceptional. The existence of untailed tower tombs might also be understood as an extension. Such atypical examples were distributed at random within the three sites, suggesting they originated as a spontaneous idea rather than sequential change.

The other was the tower tomb at *Loc.* 205, which adopted the two-rowed upright slab wall technique, similar to the complex at *Loc.* 112 (**Fig. 17: 3**). Both examples indicate that the tower tomb constructors adopted different construction methods depending on the size and shape of available building materials. Surprisingly, the tower tomb preserved a central pillar still standing in its original position. There is little doubt that the flat-topped limestone boulder supported a semi-corbelled ceiling. This example corroborates our interpretation concerning the long boulder found beside the tower tomb at *Loc.* 111.

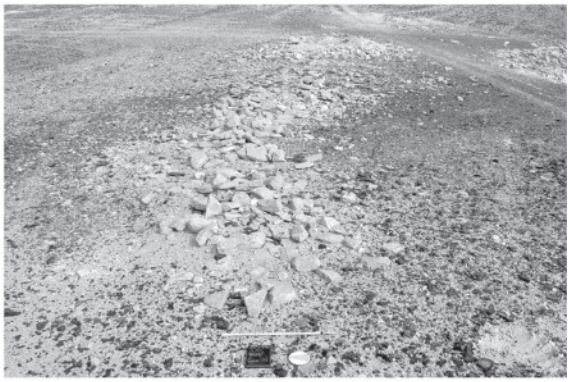


14. Tor Ghuwayr 1: Small finds from Locs. 102 (no. 13), 111 (no. 1-2), and 112 (no. 3-12).

1. Locality 101: Feature 0 (looking N).

2. Locality 102: Complex 1 (looking NW).

3. Locality 104: Complex 1 (looking E).



4. Locality 105: Complex 1 (looking E).

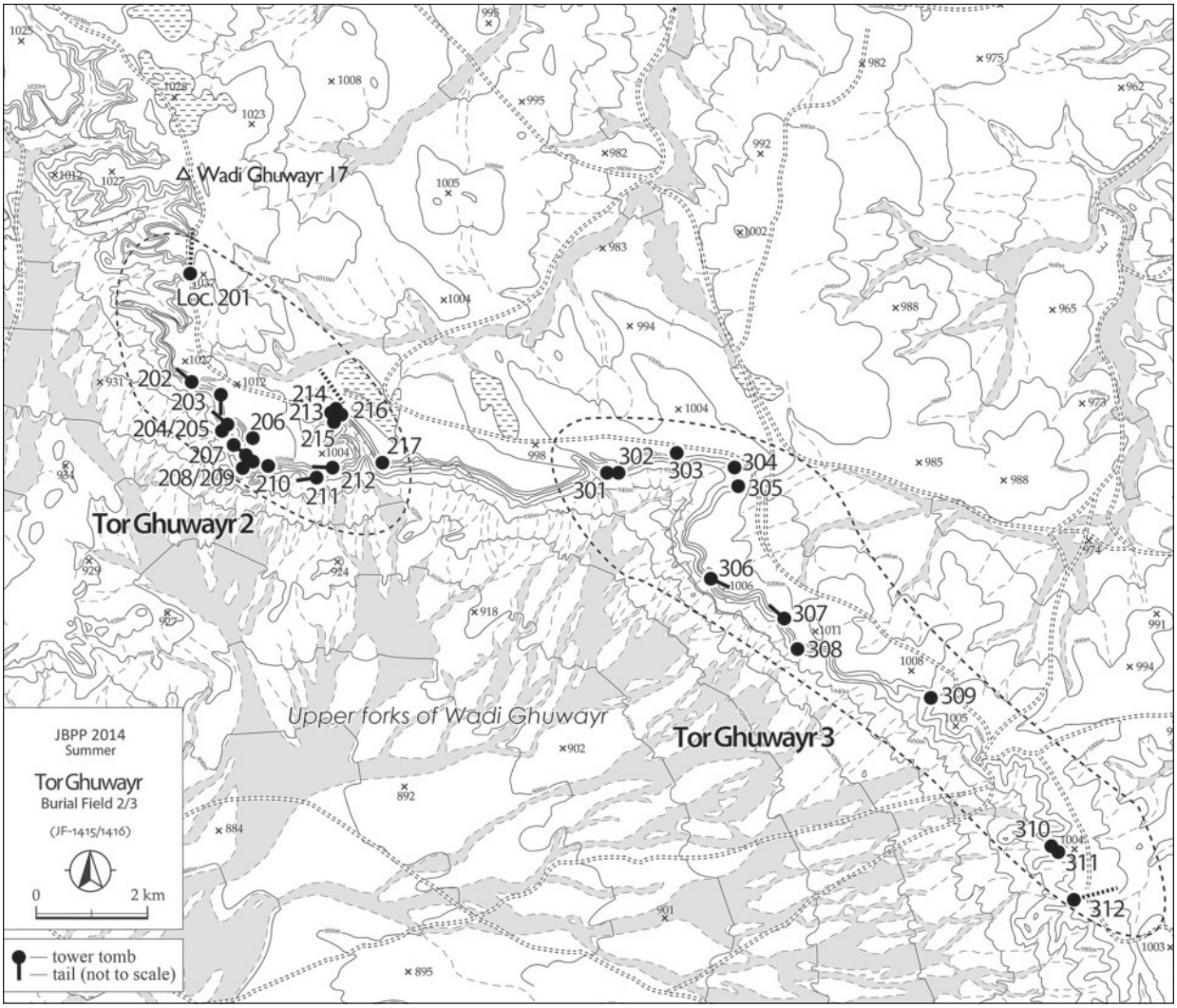
5. Locality 110: Feature 0 (looking N).

6. Locality 113: Complex 1 (looking N).

7. Locality 114: Complex 1 (looking W).

8. Locality 115: Complex 1/2 (looking N).

15. Tor Ghuwayr 1: General view of tower tomb complexes for the other localities.



16. Tor Ghuwayr 2 and 3: Site map.

Tor Ghuwayr 3

Tor Ghuwayr 3 is *c*. 4 km southeast of Tor Ghuwayr 2, and is an elongated burial field c. 12 km in total length. This burial field was less dense, consisting of twelve localities. Again, a variety of tailed or untailed tower tombs were recorded (**Fig. 17: 5 , 6**). Two locations were of special interest. To begin with, the tower tomb at Loc. 312 had a simplified version of a tail (**Fig. 17: 8**). Secondly, the complex at Loc. 309 included a square, platform-like feature, with each side measuring *c*. 2 m; neighboring Loc. 310 is a parallel example. Both of these demonstrate that a tower tomb complex can include miscellaneous features other than the two major components. The existence of a platform-like feature is important when discussing the relationship with tower tomb cultures in northern Arabia (Fujii n.d.; Fujii and Adachi n.d.) and southern Jordan (Abu-Azizeh 2014: 170-176).

The survey was interrupted in mid-course due to time constraints, but it was observed that similar features continued southeastward along the escarpment. Thus it is conceivable that several burial fields, most of which contain tower tombs, are a prominent feature of the eastern half of the Jafr Basin. This perspective becomes important when we discuss the overall picture of the EBA Jafr Basin.

Discussion

The series of surveys and excavations registered a total of forty-five localities: 16 at Tor Ghuwayr 1, 17 at Tor Ghuwayr 2, and 12 at Tor Ghuwayr 3. They are the first examples in

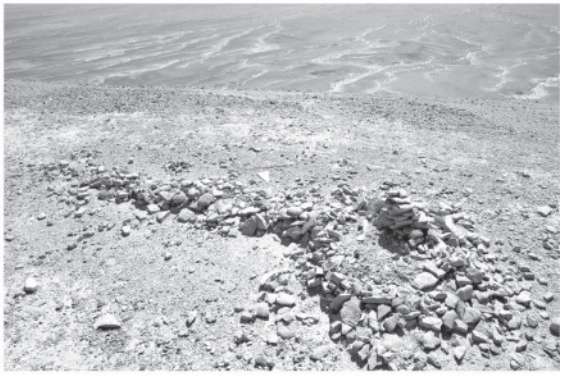
1. Locality 201: Complex 1 (looking E).

2. Locality 203: Complex 1 (looking SW).

3. Locality 205: Complex 1 (looking NE).

4. Locality 207: Complex 1 (looking N).

5. Locality 301: Complex 1 (looking E).



6. Locality 306: Complex 1 (looking SWS).

7. Locality 307: Complex 1 (looking SW).

8. Locality 312: Complex 1 (looking SW).

17. Tor Ghuwayr 2 and 3: General view of tower tomb complexes.

the Jafr Basin to be clearly identified as tower tomb complexes. The following discussion deals with their location, techno-typology, date, function, and archaeological implications in a broader context. We would like to point out in advance that the following perspectives are still tentative and require further verification.

Location

The location of the Tor Ghuwayr tower tombs has been repeatedly noted. They are aligned along the upper edge of the steep escarpment, and have a tendency to occupy the tip of a cape-like protrusion, advantageous in both the availability of construction material and visibility from a distance. This location requirement is consistent in every case (Excluding Loc. 206 mentioned above), corroborating that the three sites developed following the same principle.

Incidentally, the density of tower tombs lessens in a southeastward direction for all three sites. This is probably because the escarpment gradually changes into a moderate slope on its eastern side and, for this reason, progressively loses the two advantages essential for the construction of burial fields. In this sense, the gradual decrease in density highlights anew the unique location requirement of the Tor Ghuwayr tower tomb complexes.

Techno-Ttypology

In terms of technology, tower tombs are divided into two parts; a cylindrical masonry wall forming a round sepulcher, and a semi-corbelled ceiling supported by a central pillar. As noted above, the former adopts a stretcher bond masonry technique, whereas the latter uses a header bond masonry technique. Semi-corbelled ceilings have a certain degree of technical constraint, which in turn affects the dimensions of the lateral wall. It is probably for this reason that in contrast to the outer diameters (*c*. 2.5-6.5 m), the inner diameters converge on a relatively limited range (*c*. 2-3 m). The attached tails, on the other hand, are free from such technical restrictions, and vary a great deal in terms of total length and element number.

Little is known about the typological detail of the tower tomb complexes due to the absence of well-preserved examples. All we can say is that: 1) the Tor Ghuwayr tower tombs are round to slightly oval in general plan; 2) no small features are incorporated into their interior space; 3) no entrance is built in their lateral wall and, therefore, their general orientation is unidentifiable (*cf*. Bar-Yosef *et al*. 1983); 4) a single tower tomb and a single (or occasionally two) tail(s) are combined to form a composite unit; 5) nevertheless, the tail can be simplified into a long stone alignment or entirely omitted; and 6) the tail merely stretches along the escarpment and exhibits no specifc directionality (c.f. Abu-Azizeh 2014: Fig. 9). It should be added that several complexes are associated with a square or rectangular platform-like feature(s). Further scrutiny is required to develop the details of the issue.

Date

Since no C-14 data is available yet, the date of the Tor Ghuwayr sites cannot be determined. Some artifacts are suggestive of a date in the EBA or the Iron Age, but all were found in secondary contexts and require careful handling. We should also pay attention to the possible reuse of tower tombs at a later date, and the possible overlap between tower tomb sites and flint exploitation sites. These unfavorable conditions make dating even more difficult.

An alternative approach is to refer to the local chronology in neighboring areas, which commonly argues that the tower tomb culture dates back to the Chalcolithic or the EBA (e.g. Rollefson *op. cit*.: 213). There seems no particular reason to rule out the Tor Ghuwayr sites only. However, this chronological perspective is a very general framework dealing with post-Neolithic archaeological features in the Levantine arid peripheries, and requires further refinement. Tower tombs in the Sinai, for example, are dated to the EB I-II on the basis of diagnostic finds and several C-14 dates from adjacent structures (Bar-Yosef *et al*. 1977: 87-88, 1986: 164-165). The same is roughly true with those in Yemen (Braemer *et al*. 2001; McCorrison *et al.* 2011). Taking these cases into consideration, we have tentatively dated the Tor Ghuwayr tower tombs to the EBA, probably to its first half. In this regard, it is highly suggestive that flint exploitation in the

Jafr Basin was suddenly reactivated about this period (Abe 2008; Fujii 2013; Quintero *et al*. 2002; Wilke *et al*. 2007).

This is not to say, however, that all the tower tomb cultures are coeval with each other, because a few remarkable techno-typological differences are recognized between them. For example, while the Jafr tower tomb is devoid of a built-in entrance, the Sinai (and probably Azraq) tower tomb is usually equipped with a rectangular entrance supported by a long lintel (Bar-Yosef *et al. op. cit*.; Rollefson *op. cit*.). Conversely, while the Jafr (and probably Azraq) tower tomb has a semi-corbelling structure, the Sinai tower tomb appears to adopt a proper corbelling technique without a central pillar. In addition, while the former is often associated with a tail, the latter is rarely equipped with it. It is still unknown whether such contrasts are attributable to regional variation, a minor chronological gap, or both. The aforementioned tentative dating of the Tor Ghuwayr sites must be reviewed in such a broad framework.

Another question is the chronological relationship among the three sites. It is doubtful that they developed in sequence either southeastward or northeastward. Firstly because a major spatial gap always intervenes between any two adjacent burial fields, and secondly because no remarkable techno-typological differences are recognized among them. Thus, it seems more reasonable to assume that they developed in parallel with each other. Suggestive in this regard is the fact that, despite the remarkable difference in scale and density, the three sites are roughly equivalent in terms of the total number of localities. Both the techno-typological homogeneity and the existence of the in-between gap also argue for the second interpretation. A similar phenomenon has been observed at the Middle Bronze Age cemeteries in central Syria (Fujii and Adachi 2010), suggesting that multi-linear, synchronized development was the norm for Bronze Age burial fields in the Levantine Badia. This unique site formation process implies that several homogeneous, subordinate groups, possessing their own group identity, assembled to form a superordinate group sharing a unified higher-level identity. It is intriguing to hypothesize that the involvement of pastoral nomads based on a tribal system lay behind the phenomenon.

Function

The function of the three sites is evident. Most of the localities included a tower tomb or a collapsed stone concentration probably derived from it. In addition, though in a secondary context, the tower tomb at *Loc*. 112 actually yielded a small number of human skeletal remains. There is no doubt that the three sites constitute a composite burial field.

The owner of the communal cemetery is also obvious. The series of collateral evidence (the harsh environmental condition, the absence of neighboring settlements, the scarcity of burial gifts, and the synchronized development of plural homogeneous burial fields) strongly suggests the involvement of prehistoric pastoral nomads. It should be added, however, that the Jafr tower tomb is not always associated with practical interment and, in this sense, rather symbolic in character. Thus, it may be more correct to understand the sites as a type of sanctuary, combining a burial field and a ritual place. It appears that this unique trait is common to all the post-PPNB burial fields known to date in the Jafr Basin (Fujii 2013).

Unfortunately, nothing is known about the specific contents of the interment practice, because available information is limited to only a small number of human bones and artifacts, both recovered in secondary contexts. The following two points deserve continued attention, however. One is the fact that all the human bones occurred in a fragmentary state, which was not entirely caused by disturbance from illicit digging. Rather, it seems to be associated with secondary interment, which is common to high-mobility groups. The other point of significance is the absence of a built-in entrance, which suggests that subsequent interment, if any, was implemented by means of removing some of the capstones. The coexistence of heterogeneous artifacts at a tower tomb roughly retaining its original appearance demonstrates that the feature was reused in this way. It is suggestive that, in comparison with proper corbelling, a semi-corbelled ceiling (using a central pillar) is more flexible in term of post-construction handling. There may also have been a functional correlation between the

lack of a built-in entrance and the adoption of the semi-corbelling technique.

Archaeological Implications

Aside from ubiquitous flint mines and workshops, our information source on the EBA Jafr Basin was previously limited to several cairn fields concentrated in its western half. The discovery of the Tor Ghuwayr sites has changed this situation. It is now evident that EBA pastoral nomads secured their livelihood sphere over the whole range of the basin. It should be noted, however, that there is a remarkable difference in remains between the two areas. The western Jafr encompasses a variety of burial features, including the forecourt-type mound tomb at Wādī Burma South (Fujii 2004) and North (Fujii 2005), the corridor-type mound tomb at Talʻat al-ʻUbayda (Fujii 2005) and Wādī Abu Tulayha (Fujii 2006, 2008), the circularly connected pseudo-wall cairn at Qaʻ Abu Tulayha West (Fujii 1998, 1999, 2000), and their eclectic form at Ḥarra aṣ-Ṣayiyyah (Fujii 2004). Meanwhile, the eastern Jafr is devoid of these types and, instead, centered on the tailed/untailed tower tomb. The coexistence and segregation of various types of burial features suggest that the pastoral nomadization in the EBA Jafr Basin took a much more complicated course than previously thought.

Another point of significance is the possible correlation between the tower tomb sites and the flint exploitation sites. Although we have maintained a cautious attitude to the chronological correlation between the two, it is important to note that the two distinct site types perfectly overlap with each other in terms of location (e.g. Quintero *et al*. op. cit.: Fig. 3). Though in secondary contexts, a few of the tower tombs actually yielded tabular scrapers and Jafr blades. In addition, a corridor-type mound tomb at Talʻat al-ʻUbayda in the western Jafr included a few large tabular scrapers as votive offerings (Fujii 2005: Figs. 28 - 32). Thus, the possibility that the same group was involved in the two different activities cannot be ruled out. This new perspective, if firmly evidenced, would enrich our understanding of the EBA Jafr Basin.

This discussion has dealt with the east-west relationship within the basin. In terms of the north-south relations, including neighboring areas, the Tor Ghuwayr sites have the potential to bridge a spatial gap between the tower tomb culture in the Black Desert east of Azraq (Rollefson *et al*. 2012) and that in the al-Thulaythuwat area south of Maʻan (Abu-Azizeh *op. cit*.). It would follow that this unique burial feature penetrated deep into the whole range of the Jordanian Badia. In this sense, we can argue that the study of the tower tomb culture has entered a new stage.

In an even broader context, the new datasets from the three sites may provide a key to exploring the mutual relationship among various tower tomb cultures that cover the southern half of the Near East. As noted above, the Tor Ghuwayr tower tombs are characterized by the adoption of the semi-corbelling technique using a central pillar, the absence of a built-in entrance, and the frequent attachment of a long tail. Most, if not all, of these unique traits are shared with the al-Thulaythwart area in southernmost Jordan and northwestern Arabia, as well as the Black Desert to the north. This possibly means that the tower tomb culture in the Jordanian Badia developed through cultural contact with the south rather than the southwest; that is, the Sinai and Negev (Ingraham *et al.* 1981; Fujii and Adachi *op. cit.*; Fujii n. d.). In addition, the EBA eastern Jordanian Badia may have combined with contemporary northern Arabia to constitute a unified cultural sphere, marked by the tailed tower tomb. Nevertheless, basic data is critically deficient for in-depth discussion. A series of field researches undertaken recently or now in progress near the Jordan/Saudi border is expected to provide further insights into the issue (e.g. Gebel *et al*. 2011; Mahasneh and Gebel 2008; Müller-Neuhof 2014; Tarawneh and Abudanah 2013; Abu-Azizeh 2013, 2014; Wasse and Rollefson 2005, 2006).

Concluding Remarks

The surveys and excavations at the Tor Ghuwayr sites have enabled us to catch a glimpse of another aspect of the rich cultural landscape of the EBA Jafr Basin. Though still patchy, the new datasets suggest that the eastern half of the EBA Jordanian Badia was closely tied with contemporary northern Arabia in terms of burial practice. Thus, in future

discussions concerning the process of pastoral nomadization in southern Jordan, due attention should be paid to the relations with the south, as well as the west or southwest. The genealogy of the tower tomb holds a crucial key to the issue. The investigation results at the three sites will hopefully trigger in-depth discussion. However, much still remains to be determined, including the precise date of the Tor Ghuwayr sites themselves. We plan to rectify these deficiencies in future investigations.

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LOCATING JUBEIHAH

David Kennedy

Summary

The Amman suburb of Jubeihah (al-Jubayhah) is well-known to travellers passing the University of Jordan en route to Suwaylih. Jubeihah High Street runs along a ridge on the northeast of the highway, with olive groves still surviving in the intervening space. Nineteenth century western travellers frequently mentioned this place, some referring to the extensive remains of what was thought to be a large village/ small town of the Roman period. In 1976, house-building exposed a church, and salvage excavation was undertaken; however, there are significant problems. Firstly, the principal 19th century description of ancient remains explicitly identifies three places with this name, extending over a corridor of c. 3 miles, while the database in Jordan (MEGA-J) lists four. It becomes problematic, therefore, identifying exactly which 'Jubeihah' early travellers are describing. There are also difficulties in precisely locating where each of these places once lay. Early reports were often imprecise, and all localities now seem to be overlain by the sprawl of Amman. Inaddition to this, the 1976 excavation does not properly locate the church investigated, and now the remains are gone and the excavator is dead. MEGA-J entries offer little information, and the key entry is seriously mislocated. It seems that the remains and the locations of all the Jubeihahs are now lost. Close analysis of the sources provides more precise locations, and adds useful details to the growing picture of the disappearing human landscape in the hinterland of ancient Philadelphia.

Introduction

The north-western suburb of Jubeihah was well-known for a decade as the location of the British Institute in Amman. The name is also well-known for the frequent references in pre-1950s reports by travellers and scholars, beginning with Burckhardt in 1812 (below). Only a few refer specifically to ruins, and usually 'Jubeihah' (or one of many variants of the name; (**Table 1**)) is cited without precise location or qualification. One might suppose, therefore, that the place and any ruins are on the high-point where Jubeihah High Street lies (cf. Kennedy and Bewley 2010: 199). MEGA-J database records, which replaced the JADIS predecssor, are unhelpful. Four places are listed, and the most important, 'Jubeiha' (4972), is incorrectly located; and the other three records for 'Jubeiha' are all places recorded as part of the Archaeological Survey of Greater Amman 40+ years ago, and so of minimal interest or use (below).

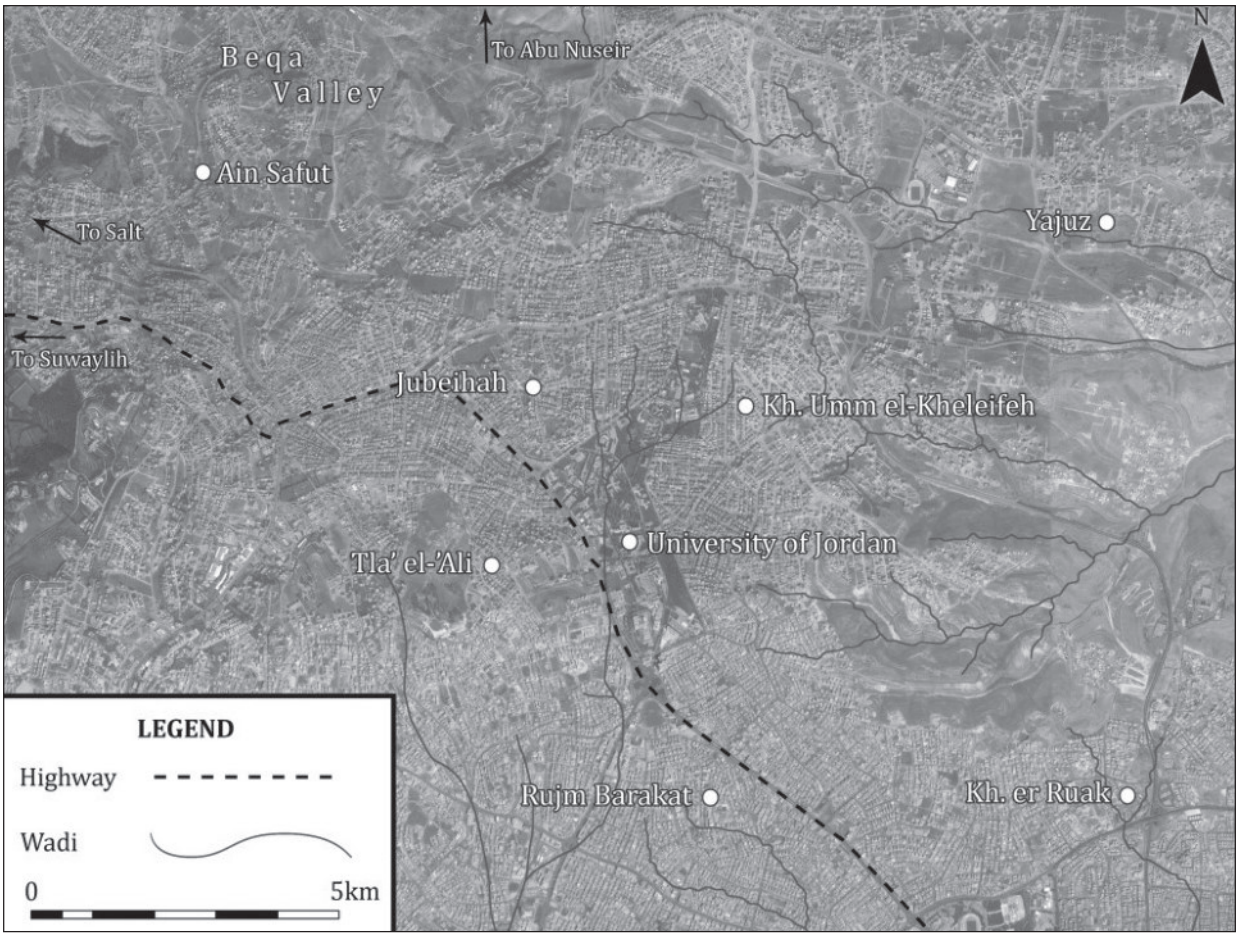
A close scrutiny of travellers' reports may help; e.g. Burckhardt says (Burckhardt 1822: 361-2):

We returned from Amman by a more northern route. At one hour and three quarters, we passed the ruined place called Djebeyha …; in two hours the ruins of Meraze … At two hours and a half are the ruins of Om Djouze … [= Yajuz], with a spring. Sources of water are seldom met with in this upper plain of the Belka [= Belqa], a circumstance that greatly enhances the importance of the situation of Amman. At three hours and a half is Szafout … [= Safut], where are ruins of some extent, with a spring; the gate of a public edifice is still standing.

The Balqa and Ṣāfūṭ are well-known locations and 'Om Djouze' is certainly Yajuz. As the map (**Fig. 1**) shows, Burckhardt's

Table 1: The Variant Spellings of Jubeihah.

Name	Date	Reference
Djebeyha	1812	Burckhardt 1822: 361
El Jebeiha	1838	Robinson E 1841: III, App. 2: 168
Aljabayyahat	1867	Warren 1869: 293, 296, 306, 309, 381
El Jabwaya	1871	Northey 1872: 67-8
Jubeiha	1876	Merrill 1881: 278; 404-5
Jubeihat (*Ajbeihah)*	1881	Conder 1889: 111-112
	1881	Conder 1889: 111-112
	1881	Conder 1889: 93
Chirbet Idschbeha	1906	Dalman 1907: 13
(Rujm el-Jebeihah)	1937	Glueck 1939: 172 Site 234
Ch. ed Dschbeha	1918	DPV Salt
ed Adschbehat	1918	DPV Zerka
Jbeyha	1975	Al-Muheisan 1976
Jubeihah/ Jbeiha	1980s	Gatier 1986: 34-35
El-Jubeiha	1990s	Schick 1996
Jubayhah	c. 2000	Michel 2001: 288
Jubaiha	2003	Hamarneh 2003: 293-4



1. Sketch Map of Sites Mentioned in the 'Jubeihah Corridor'.

'Djebeyha' cannot be where modern Jubeihah lies, or his route would involve then going *east* to Yajuz then back *west* through Jubeihah to reach Ṣāfūṭ. The first part of the solution is suggested by Warren, who mentions five times a place he calls 'Aljabayyahat' (Warren 1869: 293, 296, 306, 309, 381). Most useful is (Warren 1869: 296):

> *... we now turned north-west, passing er Rawâk [= Kh er-Ruak] on a spur at 9.45; at 10.10 we reached a high hill, Birkeh [=Bureikeh/ Barakat], from whence we had a good view in all directions, but especially to north. ... There is also a ruin to north, about one mile, called Halâlâfîyeh [=Kh. Umm el-Kheleifeh]. On this hill [i.e. Birkeh] are layers of flint and nodules cropping out. Left at 10.30 a.m., and passed to west-south-west along the southern ridge of hills, and at 10.50 to our right by one mile was Aljabâyahat, a ruin in valley with trees, and little farther on at one mile and half to right Telaût al Ali [=Tla' al-Ali], ...*

The names are all familiar – Kh. er-Ruak, Bureikeh, Kh. Umm el-Kheleifeh and Tla' al-Ali**.** Even if the precise location is not always certain, it is clear Warren is locating his 'Aljabâyahat' in the area south of the University of Jordan campus, and at least 2 miles from Jubeihah High Street.

The resolution is to be found in Conder's more detailed account of his exploration and mapping in 1881. Conder's map displays three places called, from north to south, el Jubeihat el Kebireh, el Jubeihat es Saghirah and Jubeihat. The same three, with variant spellings (**Table 1**), are recorded on the German DPV map of 1918 in the same locations, and with the heights given by Conder in feet reported in the exact metric equivalent (**Figs. 2 , 3**). Only the first of these places, modern Jubeihah, is inscribed on the 1: 100,000 map of c. 1954 and the 1: 50,000 map of 1974; i.e. the other two are unknown to all post-1918 maps.

The problem then is to determine what references in 19th and 20th century travellers to 'Jubeihah' (vel sim.) actually mean. For example Glueck, who visited in 1937, locates his 'Rujm el-Jebeihah' – plainly a *melfuf* ('cabbage'), one of the circular Iron Age towers found around Amman, "About 3.5 km. e. s. e. of Suweileh, and

2. Section of Map from Conder 1889.

3. Section of British Map of 1918 (Composite Map East of Jordan (Amman) 2nd ed. 19180426 (M 414_5_1918_1_SHEET1)) and Counterpart of the German Map of 5 August 1918 (DPV LQ62 and 63).

about 9 km. n. w. of 'Amman, on a rise on the n. side of the Suweileh - 'Amman road" (Glueck 1939: 172 Site 234), The point of intersection for those two approximate measures is in the vicinity of the highway intersection at the south end of the University of Jordan campus. On 6 October 1881, Conder visited the site of El Bureikeh just south of where the campus now stands, which he had previously (Conder, 1889: 111) said was a component of the multi-part site he calls Jubeihat (below):

> *El Bureikeh (… 'the little pool'). This name applies to two ruins, a mile apart, and west of Brikeh. The names of these two places may probably be connected. At the more northerly Bureikeh was found a ruined tower, built of fine rough blocks. It was round, and two jambs of its door, about 5 feet high, were observed to be carefully cut, but not dressed square. Foundations of flint and limestone with caves occur at both ruins, and on the north is a quarry.*

This is probably the round tower described by Glueck, c. 13 m in diameter, walls 2 m thick and with "two large door jambs, measuring respectively about 2.00 by 1.00 by .40 m" and marked by both Conder's map and the DPV map of 1918 as the 'R(uin)' just north of the road from Amman and at a height of 3295 feet/ 1004 m. The location is probably that marked on the 1:50,000 Suwaylih map sheet as 'RUINS' at the southernmost end of the University of Jordan campus, now extensively developed by the Faculty of Engineering and Medical Departments. Even on the aerial photographs of 1953 (HAS 5.031 and 032), the location has been extensively provided with modern terracing. It seems probable this is the place mentioned by Warren as "a ruin in valley with trees, and little farther on at one mile and half to right Telaût al Ali, …" (above).

Northey (Northey 1872: 67-8) travelled in 1871 from Amman to Yajuz, on to 'El Jabwaya' then north to where he could look down into the bowl of the Beqa Valley:

> *An hour or so beyond this (Yajuz), we reached El Jabwaya, where are some more ruins; sarcophagi, lintels, cornices lie strewn about; and from the hill a fine view is obtained over the Hauran, and the country towards Nablus and Tiberias. … Proceeding north we soon had a beautiful view across a valley called El Beja [= Beqa] …"*

The most likely interpretation of this report is that he has followed a route west from Yajuz to what Conder called 'el Jubeihat el Kebireh' and the map of 1918 'Ch. ed Dschbeha'. The place is plainly different from the previous site discussed and sounds 'Roman'.

Merrill arrived in 1876, also coming west from Yajuz and described what is probably the same place (Merrill 1881: 278):

> *We were four hours yesterday in reaching this place [As-Salt] from Yajuz. We spent some time examining the ruins of Jubeiha, which are extensive, showing a Roman town of importance. Very much of it appears to be buried beneath the surface. The place commands a wide prospect in all directions.*

Next to explore the area was Conder, whose report is by far the fullest and his map based on a systematic triangulation survey of the entire region. Although the German map of 1918 evidently used Conder's extensively, including locating three places incorporating the German form of the name (Dschbeha/ ed-Adschbehat), the latter includes a great deal not carried onto the former.

Conder's text begins by explaining there are three ruins which are collectively called 'Jubeihat', a plural, which, like many others, he identifies as the Biblical Joghbehah. His account of the most northerly, Great Jubeihah, is plainly the place described by Northey and Merrill (Northey and Merrill 1889: 111-112):

Jubeihat el Kebireh (… 'great Jogbehah'). - … This is the most northern of the group of ruined towns so called, and is the most important of them. It is an extensive ruin, standing on high ground west of the road, with a watch-tower at some distance on the north-east. A small building with massive walls and a round-arched vault occurs among the other ruins. There are bases and broken pillar-shafts - Roman or Byzantine - ruined walls, cisterns, and fallen lintel-stones. Sarcophagi also occur, showing that the town belongs to the Roman period; and on the south is a row of cave-tombs, apparently intended to hold one or two bodies,

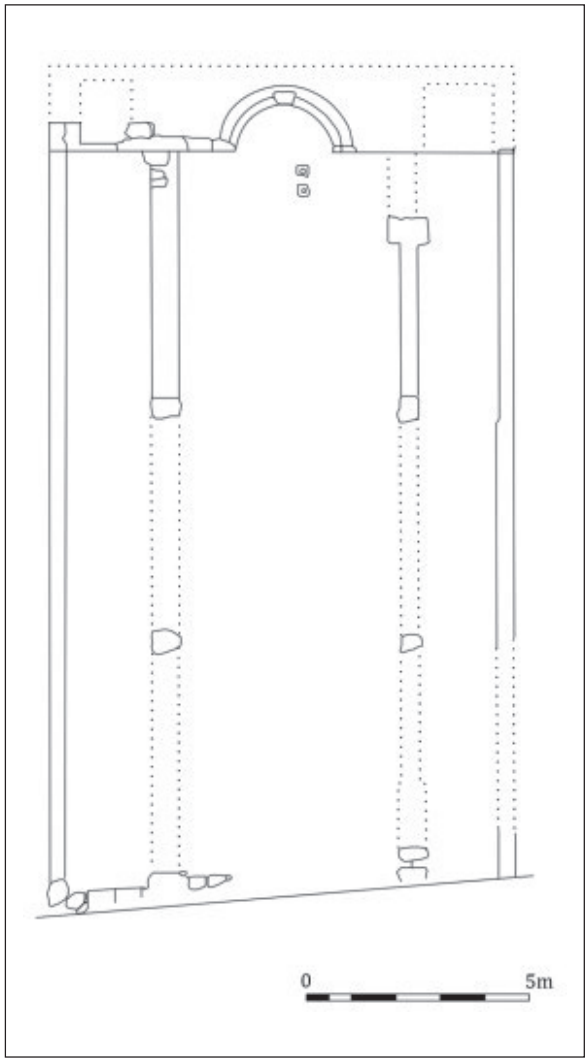
and shaped like sarcophagi. (Compare Umm el Hanafish.) These are cemented inside, like the eastern tomb at el Kahf, and like some Christian and also perhaps Jewish tombs in Western Palestine (Sheets VII. and X. 'Memoirs,' vol. ii., pp. 141, 362). Though Jogbehah is a Biblical city, the remains found appeared to be probably all later than the Christian era.

The road referred to is not that to Suwaylih, but the one now represented by Jubeihah High Street, which extends towards Abu Nuseir and the south-eastern rim of the Beqa Valley.

Fortunately the next visit was by archaeologists in 1976, to conduct salvage excavation on a church revealed by new house-building. As noted above, the MEGA-J entry (4972) which reports what is evidently this excavation locates it erroneously, the co-ordinates placing it a mile southwest of Jubeihah. The brief excavation report is very vague about the location: "There is a side road that lies to the north of the Jordan University and leads to the site which is parallel/alongside the main Jubaiha street. It is about 400m away from the Jubaiha mosque ..." (Mhaisin 1976). It is now confirmed to have been to the north (Sami Abu Dayyeh and Lutfi Khalil: pers. comm. 28 Oct. 2015) which implies it was at the approximate position of the major junction at the north end of the High Street, but on a side street to the west.

What was uncovered was a church, only published briefly (**Fig. 4**). It had already been damaged by house-building in the 1940s, and has now been totally destroyed. The church included elaborate mosaic floors belonging to the 'Byzantine' period. The human figures of the mosaic were apparently deliberately and carefully removed and not subsequently re-inserted. As there is evidence, though very unclear, of a thick layer of Umayyad occupation, it is inferred the church remained in use in this period but probably also went out of use then (Mhaisen 1976; Gatier 1986: 35-36; Schick 1996: 360-1; Michel 2001: 288).

MEGA-J (6067) records a site which was part of the Archaeological Survey of Greater Amman. It lies about 200 m north of the mosque, beneath a house on the west side of the High Street. It was identified as part of a 'settlement' with evidence of the Roman,



4. Plan of Church at Jubeihah (EoJ_HoP_Jubeihah_Church_20151029_TPH [after Michel 2001_Fig 275]).

Byzantine, Umayyad, Mamluk and Umayyad periods.

Finally, work on the major road junction at the north end of the High Street, about 500 m from the mosque, revealed "a Roman tomb … found next to the main roundabout and excavated by the DoA" (Khairieh 'Amr: pers. comm. 29 January 2008. Not listed in MEGA-J; (**Fig. 5**). Nineteenth century visitors had reported both sarcophagi and tombs, and Conder's map explicitly inscribes both for this site.

Conder's second site, Jubeihat es Saghireh, 'Little Jubeihah' (Conder 1889: 112):

A small ruin, probably of the same age as the last. Heaps of stones and foundations of walls only were found.

5. Jubeihah Roundabout where Tombs were Unearthed a few Years Ago. Jubeihah High Street Comes in from the Bottom Left, and the Possible Location of the Church is Marked as X. (APAAME_20080918_DLK-0018).

No site is known to MEGA-J in this location, and we can only place it roughly in the northern end of the University campus. A farm of the Roman-Umayyad period?

Finally, we return to the most southerly of the 'Jubeihat' sites discussed by Conder (Conder 1889: 111):

> *Under the name Jubeihat the Arabs include four ruins about a mile south of Jubeihat es Saghireh, and south of Jubeihat el Kebireh. These mark the remains of a large ancient village; foundations, ruined walls of rough masonry (probably Roman or Byzantine), cisterns and caves occur in all the ruins so named. In the north-eastern of the four was observed a vaulted roof, as at Kefeir el Wusta (see under that name). The ruins and quarry of el Bureikeh (see under that name) belong to the same site, and the ancient main road from 'Amman to es Salt passes by the place.*

We may define this set of four sites on Conder's map as the two marked as R(uin), that labeled as Bureikeh and perhaps the W(atch) T(ower) northeast of the latter. We have already seen that one component may well have been the *melfuf* seen by Conder and Glueck (above). At 'Kefeir el Wusta', Conder reported three vaulted structures which he suggested were well-built barrel-vaulted cisterns (Conder 1889: 137-9).

Table 2: Concordance of Places in the Jubeihah Corridor.

#	Conder	DPV	Features
1	el Jubeihat el Kebireh Great Jubeihah	Ch. ed Dschbeha	Vault; Sarcophagi; Tombs Height: 1057/ 3468
2	el Jubeihat es Saghirah Little Jubeihah	el Adschbehat ez Zrire	R(uin)
3	Jubeihat Jubeihah South	Adschbehat	R(uin) and R(uin) Height: 1004/ 3295
4	Bureikeh	Breke	Height: 3349/1021
5	Brikeh	Ch. Ardschan (= Irjan?)	
6	Kh Abu Sheriah	Ch. Abu Scheria	
7	Umm Haleilifeh	Umm Halelife	R(uin); Wachtt(urm)
8	Kh Ain el-Beida	Ch. Ain el Beda	
9	Kh er Ruak	Ch. er Ruak	Cistern Height: 908

Maps

Conder's map was the first based on a careful triangulation survey. There are two sets of sheets compiled during the First World War. The earlier includes sheets for 'As-Salt' and 'Amman', both at a scale of 1 inch to 1 mile. Notable is that the Salt sheet explicitly reports: "This map is compiled mainly from Armstrong, Wilson and Conder's 3/8" to mile map of Palestine, except the River Jordan, Wādī Shu'ayb and its tributaries, a small area around Na'aur, and the portion north of wadis Sheib and Ezrak, which have been put in from RAF photographs." It further adds in purple: "The detail overprinted in purple is from photographs taken by the R.A.F. 7th Field Survey Coy. R.E., G.H.Q. E.E.F. 26th April 1918". The date is 4 months before its German counterpart.

The two sheets of the Deutsche Palästina-Verein (DPV) covering the Jubeihah Corridor as defined here evidently also rely on Conder as well for some details, especially spot heights which are often the precise metric equivalent of Conder's feet. They are dated 5 August 1918. We should note that with the DPV maps, some details had been in part compiled from aerial photographs; in this case the Salt sheet (ergänzt nach eigenen Messungen und nach Luftbildern der Feldflieger Abt(eilung) ("supplemented from our own measurements and from aerial photographs of the Field Aviation Unit").

Both the British and German maps have a few more recent details, such as some newer roads, but are otherwise less detailed than Conder. However, the British ones explicitly show improved locations for major roads, the data derived from aerial photographs. The purpose was, of course, different and we need not be surprised that some archaeological traces were omitted. Indeed, Conder, too, explicitly noted that because of the limited space in some parts of his map he had had to omit many sites which were recorded on the ground.

The dominant feature of both maps is the wadi system, running approximately north to south, and along the main line of which lie the various Jubeihah sites. Cutting across obliquely on both maps is the line of the track/ road from Amman to Suwaylih, the predecessor of the multi-lane highway in the same area today. Notable is the branch that comes off this road to run almost due north; it begins where one now finds the north end of the University of Jordan and continues as the present Jubeihah High Street.

Aerial photographs

The aerial photographs from which the DPV maps were in part compiled are not specified, and those that survive from the German aerial photographic missions in 1917-18 tend to be oblique views of specific places, Amman, Salt etc. Likewise, what became of the aerial photographs from which the British maps of 1918 were supplemented is unknown.

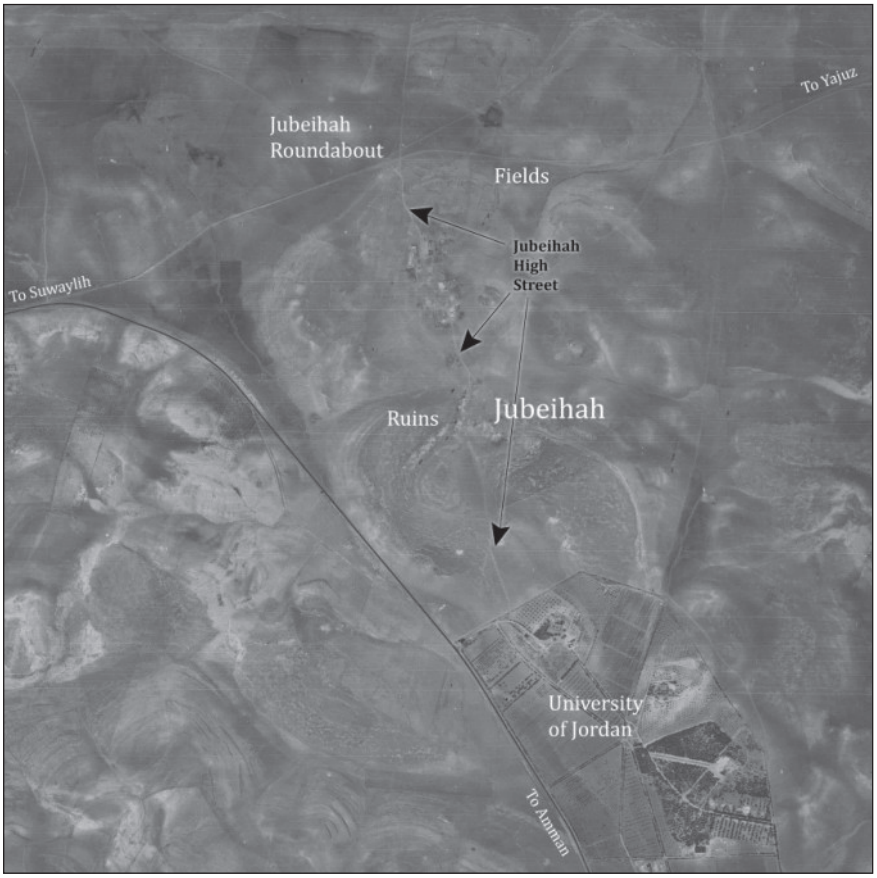
Easily accessible are the vertical survey photographs of 1953. The scale (1: 25,000) is poor but useful, as it shows the corridor before the massive sprawl of Amman overwhelmed much of the area. The campus of the University of Jordan is already laid out, and nothing of interest can be seen (**Fig. 6**). At the location of Great Jubeihah, however, the small scatter of recently built houses at the summit of the High Street are in an area of what may be ruins. Further north are traces of terraced fields (**Fig. 7**). As the recent Google Earth image shows, there are still areas of olive groves west of the High Street, which might be worth exploring if only for surface finds.

Discussion

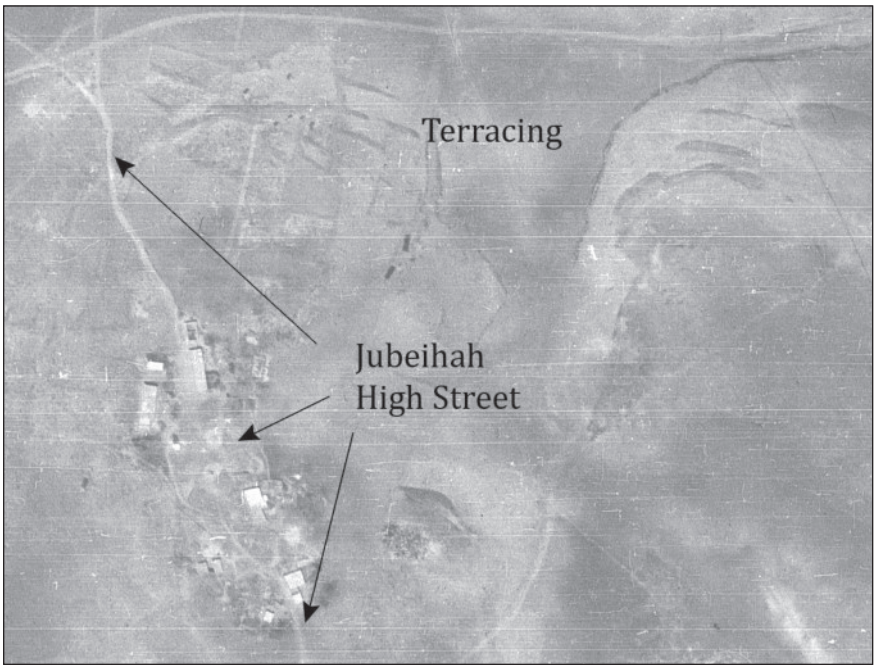
Until the 1930s, the name 'Jubeihah' was attached to at least three places, extending in a roughly north-south corridor of 4+ km. Nothing is now visible at any of them (**Fig. 8**).

Jubeihah (Great Jubeihah) is the most extensive, and includes a church with mosaics and a monumental cemetery with sarcophagi. It was probably a small Roman town, which continued to be occupied through at least part of the Umayyad period; long enough for the figured church mosaics to be deliberately disfigured. The observations of 19th century travelers, and the prominence of tombs and sarcophagi suggest a place of some size, and the location is amongst fertile soils around a fan-like wadi system (**Figs. 2 , 3**). Very few photographs were taken, and the few published in the brief preliminary report are monochrome (cf. Piccirillo 1993: 314).

Jubeihah (Little Jubeihah) is small, perhaps a Roman farmstead.

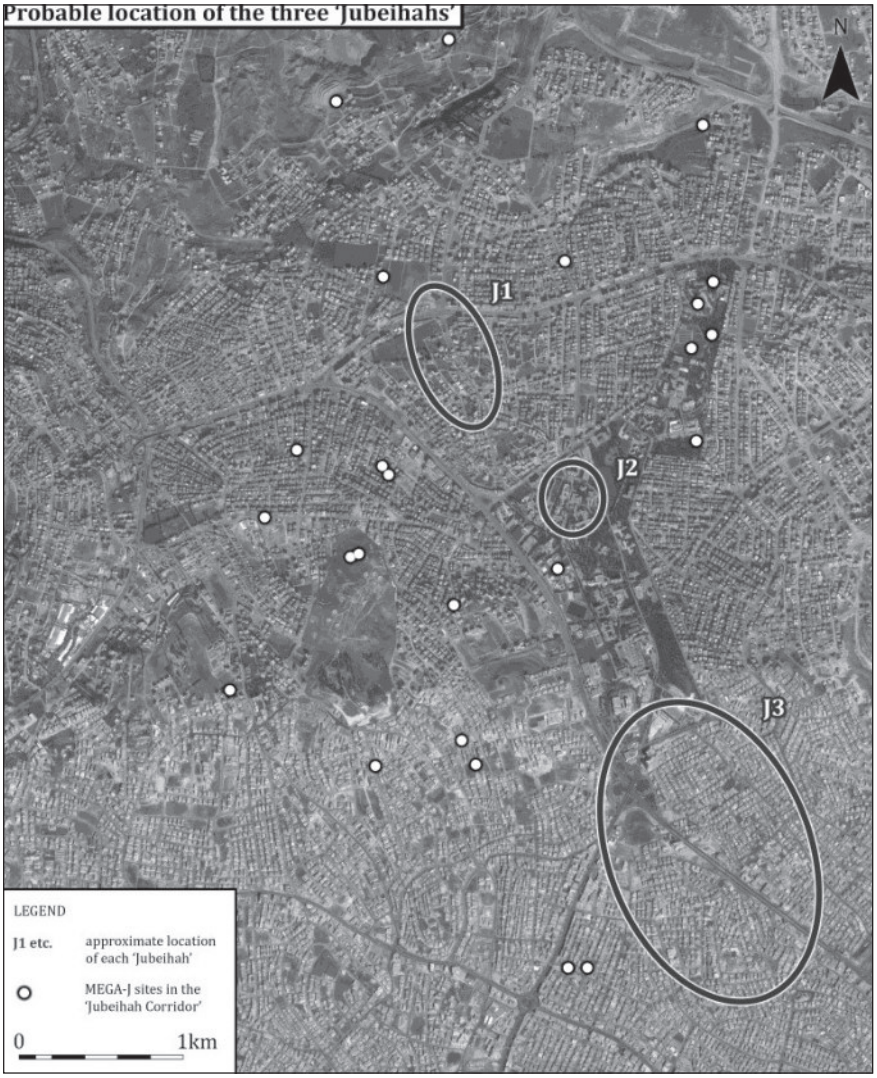


6. Aerial view of Jubeihah in 1953 (APAAME_19530606_HAS-5-030NE).



7. Great Jubeihah from the Air in 1953 (APAAME_19540606_HAS-5-029SE).

Jubeihah (South Jubeihah)/ Bureikeh is apparently a series of ruins of different periods, spread across an area of perhaps a mile square. One part probably consists of an Iron Age circular tower – a *melfuf*. More extensive is what Conder regarded as a 'large ancient village', with ruins, cisterns, caves and a quarry, which he thought might be Roman.



8. Probable Location of the Three Jubeihahs (J1, J2, J3) Overlain on Google Earth.

There is little likelihood of any new discoveries, although development work in the area may reveal surviving traces, as happened with the tomb at the highway intersection.

Acknowledgements

I am grateful to Travis Hearn, who prepared most of the illustrations, and the following in Amman who assisted with enquiries about the Jubeihah church excavations: Nadja Qaisi, Sami Abu Dayeh and Lutfi Khalil.

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Deutsche Palästina-Verein, "DPV LQ62 es Ṣalt (Nr 86)", 5 August 1918 at 1: 50,000

Deutsche Palästina-Verein, "DPV LQ 63 Kalaat ez Zerka (Nr 102)", 10 July 1918 at 1: 50,000.

LA TROBE UNIVERSITY'S 2014 SEASON OF GEOLOGICAL SURVEY AND ARCHAEOLOGICAL EXCAVATION AT THE NATUFIAN SITE OF WĀDĪ ḤAMMEH 27

Phillip C. Edwards, Louise Shewan, John Webb, Christophe Delage, Cristina Valdiosera, Rosemary Robertson, Eugene Shev and Adam M. Valka

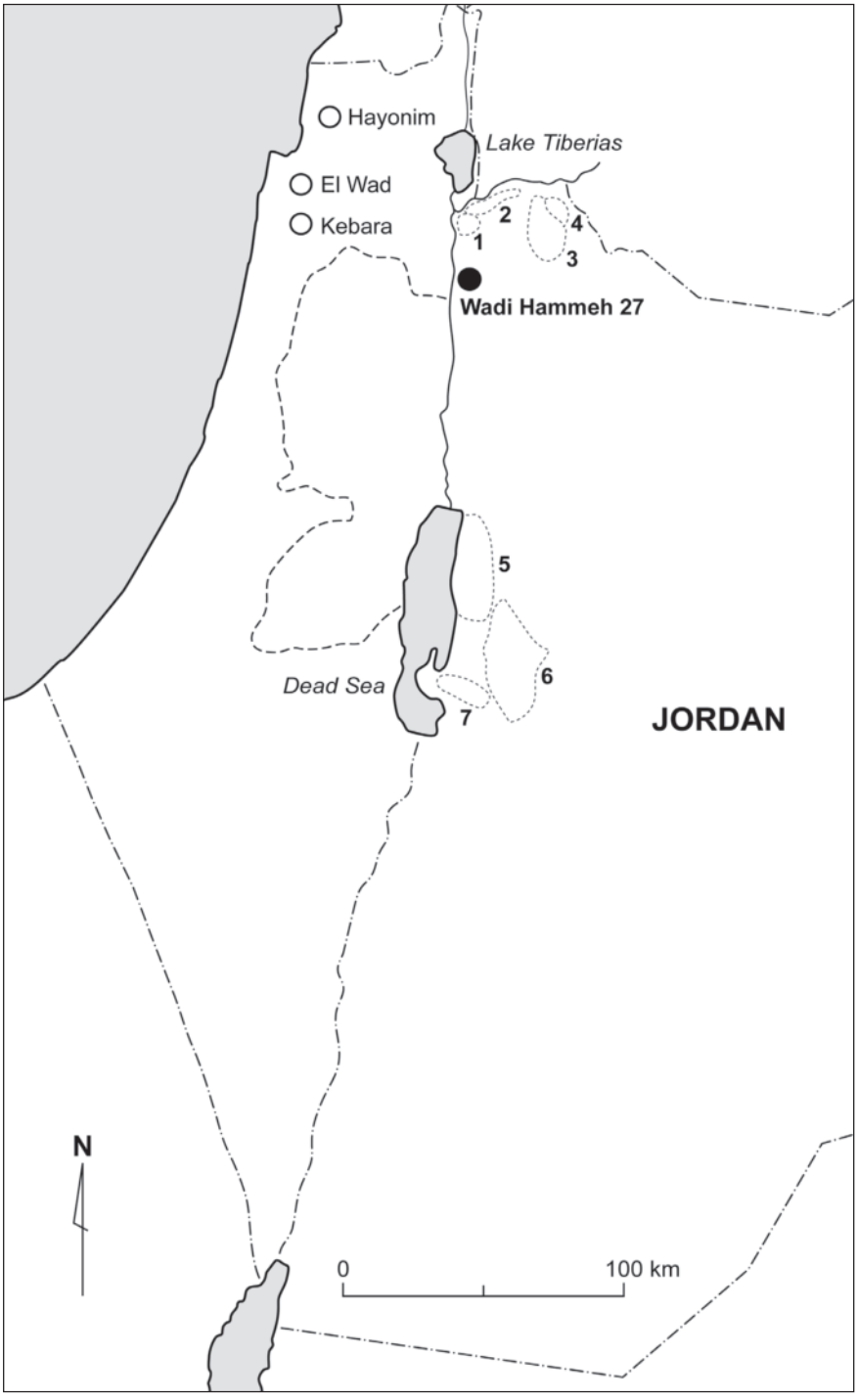
Introduction (PCE)

The initial field season of the *Ice Age Villagers of the Levant* project was undertaken by La Trobe University from 2 November to 21 December 2014[1]. The work involved geological survey along the east Jordan Valley and its hinterland, and new excavations at the Natufian site of Wādī Ḥammeh 27 (**Fig. 1**). The project is designed to investigate the archaeological correlates of early sedentary life and social connections in the Early Natufian period. One of its key objectives is to recover human skeletal remains from the basal phases of Wādī Ḥammeh 27 in order to provide materials for isotopic investigations of occupational persistence at the settlement and palaeogenetic testing of kinship structures (Edwards 2014). To this end, the new excavations were focussed on exposing a reasonably broad area of the basal travertine layer (Phase 4), which is known to hold human burials in rock-cut pits (Webb and Edwards 2013), by stripping away the overlying occupational deposits of Phases 2 and 3. Concurrently, wide-ranging geological surveys were made in the east Jordan Valley and flanking regions, extending from the southern end of the Dead Sea to the Syrian border region, to investigate the sources of Wādī Ḥammeh 27 flint and basaltic rock. Additionally, sediments were sampled for the purposes of assembling a map of strontium-isotope availability for Jordan.

Provenancing of Basaltic Artifacts (JW)

In order to determine the source areas where basaltic stone was quarried, an extensive program of basalt analyses was undertaken in December 2014 using a hand-held Olympus Delta X-Ray Fluorescence Analyzer. This device analyses the surface of a sample; it is non-destructive and quick to use (90 seconds per analysis). Initial testing has shown that multiple analyses on a single artefact give results that show little variability and that the concentrations of immobile elements like niobium, zirconium and yttrium show little difference between

1. The 2014 fieldwork season at Wādī Ḥammeh 27 and other localities in the Jordan Valley and adjacent areas was undertaken as part of the *Ice Age Villagers of the Levant: Sedentism and Social Connections in the Natufian Period* project, funded by a three-year, Australian Research Council (ARC) Discovery Project grant (DP140101049). The project is based at the Department of Archaeology and History, La Trobe University in Melbourne, Australia. The fieldwork was undertaken with the gracious support of Dr. Munther Jamhawi and assistance by the staff of the Department of Antiquities of Jordan. In-field departmental staff comprised representatives Imad Obeidat, Bashar Hassan Rashid Saleh and Ibrahim Rousan. Qutaiba Dasouqi conducted a theodolite survey and aerial photography. The team is also grateful for the support of the Tabaqat Fahl office departmental inspector, Muhammad Shalabi, and his team. Jordanian house staff at Tabaqat Fahl comprised Aladdin Madi (house manager and logistics), Khalid Jawahiri (chef), Jihad Mustafa (Umm Hamza, laundry), Salim Hmid (house guard) and house repair staff Khalal Khashashneh (Abu Khalid) and Ibrahim Sleiman. Local Jordanian excavation staff from Ṭabaqat Fahl and Masharia were Khalal Khashashneh (Abu Khalid), Noureddine Khalid, Ibrahim Tawfiq Muhammad, Nasr Hassan, Walid Khashashneh and site guard Yusuf Salim Hmid. Excavation work at Wādī Ḥammeh 27 was directed by Phillip Edwards and carried out by La Trobe University students Eugene Shev (field director / square supervisor), Rosemary Robertson and Adam Valka (square supervisors). Cathy Carigiet undertook drawing and artefact photography. Field scientific staff included Associate Professor (Dr) John Webb (project co-director, geology and basalt sourcing) of La Trobe University, Dr Louise Shewan (project co-director, geochemistry) of Monash University (Melbourne, Australia) / University of Warwick (UK) and Dr Christophe Delage (flint sourcing) of Le Musée de Préhistoire, Lussac-les-Châteaux, France.



1. Location of Wādī Ḥammeh 27 and other Natufian sites mentioned in the text. Identified basalt provinces are indicated by dashed grey lines: (1) Umm Qeis; (2) Yarmouk; (3) Irbid West; (4) Irbid East; (5) North-East Dead Sea; (6) al-Qasr; (7) Kerak.

weathered and fresh surfaces.

Several days were spent visiting all the significant basalt outcrops in north-west Jordan. Samples were collected from all outcrops and these were analysed at the Pella dighouse along with a number of basaltic artefacts stored there. Preliminary data analysis shows that the outcrops can be grouped into several clearly differentiated provinces (**Fig. 1**). Preliminary analysis of basaltic artefacts from Wādī Ḥammeh 27 housed at Tabaqat Fahl shows that these can be matched to some of the provinces. Prior analyses of some basaltic artefacts from Wādī Ḥammeh 27 (Edwards and Webb 2013) indicated their acquisition from Wādī al-Mujib and Kerak, areas quite distant from the northern

Jordan Valley. Some of the 2014 analyses also point to these regions, but more extensive analyses are required before any definitive provenance matches can be confirmed.

Provenancing of Cherts (CD)

During the 2014 season, a geoarchaeological survey was conducted along the east Jordan Valley in order to study chert and flint availability and to determine the range of cherts utilised at Wādī Ḥammeh 27. Six primary chert-bearing formations were the target of fieldwork (Abdelhamid 1995; Abu Qudeira 2005; Moh'd 2000). Dated to the Cenomanian, the Naur Limestone Formation (NL) is the oldest one containing cherts; it was noted as yielding very small and irregular chert nodules in Wādī Kufranja. These silicifications are sparsely dispersed in a hard limestone and are thus difficult to extract. Turonian flints of the Wādī as-Sir Limestone Formation (WSL) are found north of Kfar Abil and in Wādī Jirm. They are embedded in a hard dolomite as small, irregular nodules and quartzolites, and are also difficult to extract. Close to Ashrafiyya, a small outcrop dated to the Santonian yielded cherts of the Wādī Umm Ghudran Formation (WG). A single bed of these siliceous rocks is present in a hard limestone. The next chert-bearing geological stage, the Amman Silicified Limestone Formation (ASL), is dated to the Campanian. As opposed to the previous formations, where silicifications are quite rare, ASL cherts are abundant in the various outcrops visited in the Kfar Abil / Ashrafiyya area. Numerous silicified beds are present superimposed within a limestone matrix. The following stage, the Muwaqqar Chalk-Marl Formation (MCM), of Maestrichtian - Palaeocene age, is also very rich in silicifications in the various valleys of the region (e.g. Wādī al-Ḥammeh, Wādī al-Jirm and Wādī ash-Shallala). MCM cherts are present as sub-spheroidal nodules spread in limestone or superimposed beds; quartz veins were also noticed in Wādī al-Ḥammeh. The sequence of primary chert-bearing deposits ends with the Umm Rijam Chert-Limestone Formation (URC) of the Lower - Middle Eocene. The valley slopes where this formation outcrops are covered with an abundance of chert nodules and beds.

Secondary deposits were also monitored during the survey. Primary chert-bearing outcrops in the east Jordan Valley are usually located in the high foothills. These geological formations are cut by erosion that has rolled the siliceous pebbles and cobbles down the slopes. Intense erosional processes have taken place in the region since the Miocene and thus valley bottoms yield Miocene to Pleistocene conglomerate deposits, as well as recent loose sediments, including numerous eroded chert nodules of smooth, cortexless types. Thus, close to the site, in Wādī Ḥammeh, the stream bed is particularly rich in siliceous nodules. No *in situ* chert-bearing deposits outcrop in this section of the Jordan Valley. Overall, the Natufian inhabitants at Wādī Ḥammeh 27 had available to them a rich and diverse array of mineral resources, including chert nodules. These could be collected in both primary (upstream outcrops) and secondary (downstream conglomerates and *wadi* cobbles) deposition contexts.

In the course of the survey, numerous geological chert samples were collected in order to establish a reference collection that is currently stored at the Pella dighouse. A comparison of these geological chert types with the archaeological specimens will ultimately help to establish the origins of the lithic raw materials used at the site. Overall, the macroscopic approach implemented in this typological analysis has revealed its potential to differentiate chert types according to specific geological formations, and several were identified. A wide range of cherts was exploited by the inhabitants of Wādī Ḥammeh 27. The archaeological specimens examined during the 2014 season displayed an eroded and battered surface (= neocortex) reflecting secondary contexts of deposition whereas the rich, chert-bearing outcrops upstream were not represented. There was evidently a strong emphasis on the procurement of a few lithic types, especially one designated as Type 04. This is a yellow-brown chert, easily recognizable macroscopically, which is found in secondary deposits. However, it is not a type that is particularly abundant in Wādī al-Ḥammeh. At this stage, there does not seem to be any geological phenomenon to account for the unusual abundance of this specific type in the Wādī Ḥammeh 27 lithic assemblage.

Sampling Survey Towards a Bioavailable (^{87}Sr / ^{86}Sr) Isotope Map (LS)

In archaeological studies, strontium (Sr) isotope ratios are measured in human skeletal material to determine residential behaviour and resource acquisition strategies of past populations. The isotopic composition of the enamel of human teeth provides a signature of early life reflecting the geological regime where individuals spent their childhoods. In order to examine prehistoric residential behavior, a baseline reference map of bioavailable Sr isotope variation is required. Prior analyses (Shewan 2003, 2004) have demonstrated the distinctive isotopic signature of Wādī al-Ḥammeh sediments relative to surrounding geological provinces and indicated that some Wādī Ḥammeh 27 occupants had lived in the valley for extended periods while others had lived elsewhere.

Strontium isotope ratios vary in rock according to the age and composition of the material (Faure and Powell 1972). Through weathering, this variability is carried to the soils and ground and surface water, and is inherited by plants growing in the area to be absorbed into the bones and teeth of animals higher in the food chain (Capo *et al*. 1998; Ericson 1985). While geological maps are a useful starting point to assess this isotopic variability in the region, biologically available strontium may differ from whole rock and soil ratios as a function of preferential weathering, atmospheric deposition and mixing processes (Sillen *et al*. 1998). To address this issue 70 plant, soil and soil leachate samples were collected throughout north-west Jordan during the first season of fieldwork and will be analysed to produce a bioavailable Sr isotope map of the region. The samples are presently undergoing isotopic analysis at the Australian National University using a thermal ionisation mass spectrometer (TIMS).

Excavations at Wādī Ḥammeh 27 (PCE)

Aims and Methods

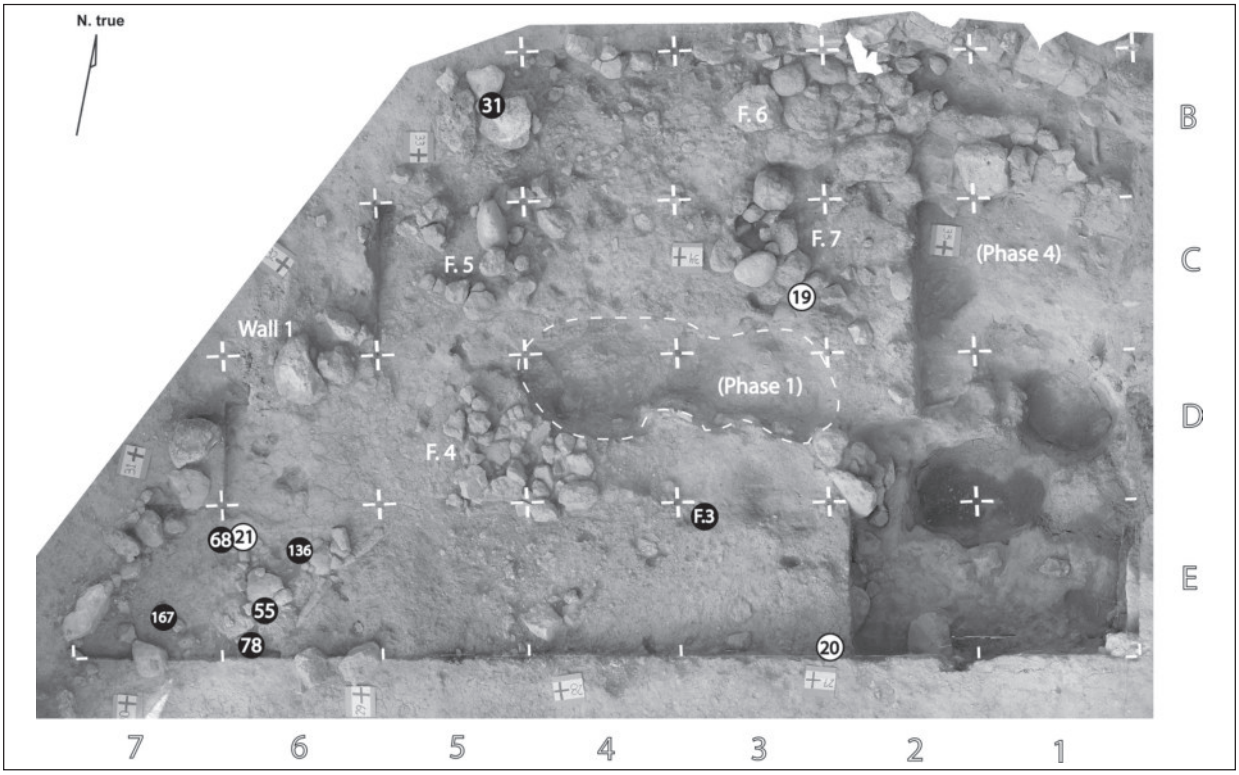
The first series of excavations at Wādī Ḥammeh 27, undertaken between 1983 and 1990, saw the clearance of a large exposure of the uppermost occupational deposits (Phase 1), with only a small pit (the Plot XX F sondage) reaching the base of the site (Edwards 2013a). The 2014 excavations were directed westwards from the Plot XX F sondage in order to remove sediments overlying the lower occupation surfaces, in a rectangular excavation plot 7.5 metres long by 3.5 metres wide superposed over the easterly parts of Plots XX F and the XX E/F baulk (**Fig. 2**). At the conclusion of the 2014 season, an area of 15.5 square metres of the Phase 2 occupation surface had been revealed under the northern half of Structure 1. The new excavations did not extend to all boundaries of this plot but were restricted within Structure 1's perimeter wall in order to preserve this significant example of Natufian architecture. To maintain continuity with the prior excavation system, the 'Locus / Level' terminology was employed for delineating natural stratigraphic distinctions, with a subordinate system of artificial units dug to a maximum depth of 0.2 metres (McNicoll 1992: xiii-xvii; Edwards 2013b). Horizontally, the excavation plot was divided into a grid of one-metre squares. All excavated matrix was dry-sieved and then wet-sieved through 1-millimetre mesh screens, and a series of oriented sediment samples with accompanying loose sediment samples was taken from the southern baulk of the Plot XX F sondage.

Excavation Results

The excavations of Phase 2 yielded a coherent and continuous earthen floor surface lying about 0.2 metres below the Phase 1 floor. The floor layer supported several stone features and artefact clusters, and the overlying deposit (Locus 2.5) produced a high density of finds, similar to the levels previously recorded for the uppermost Phase 1 (Edwards and Hardy-Smith 2013).

Constructed Features

The excavated areas within the square-metre grid belong to Phase 2 except where indicated in (**Fig. 2**), namely the Plot XX F sondage to the right of picture, previously excavated to bedrock (Phase 4), and an elongated pit (in Squares C-D / 2-4) dug from Phase 1. A broad wall segment (Feature 5a [=F. 5a]), which was first revealed in the XX F sondage, continued westwards (as Feature 6) for 2.82 metres across Squares B2 and B3; it is 0.87 metres wide (north - south axis). Based on the excavations in the



2. Aerial view of Phase 2 occupation surface (Plot XX F) excavated at Wādī Ḥammeh 27 in 2014; each grid square measures 1 metre by 1 metre. The earlier 'XX F sondage' (Phase 4) is located to the right and a pit dug from the later Phase 1 is indicated by a dashed line; white discs indicate the locations of 'Artefact Clusters'; black discs indicate the location of features and artefacts cited in the text.

XX F sondage, it had been surmised that F.5a was the Phase 2 predecessor of Structure 1's perimeter wall (Wall 1) and associated with the Phase 2 floor. However, excavations in Squares B2 and B3 revealed that this platform of large, jumbled stones slopes up to and abuts Wall 1. This feature was already in use in Phase 2 (Square B3), if discontinuously. It is associated with Phase 2 occupation surfaces in Squares B2, B3, B5 and C5, but not in Square B4 where its constituent stones are pedestalled above the Phase 2 floor.

Three principal features are located on the Phase 2 floor. Feature 7 (Square C3) is a stone ring built up two courses high. It is an early version of the same feature that continued in operation in Phase 1 (Edwards 2013c: 73). Feature 5 is a sinuous stone arrangement, a composite of adjoining stone arcs, opening respectively to the north (Square C5) and to the south (Square C4), bedded in mud mortar on the Phase 2 floor (Squares B5 - C4/5). Feature 4 (Square D5) is an oblong stone platform that extends east to Square D4 and south into Squares C4 and C5. It is partly truncated by the pit in the north-eastern corner of Square D5. A flat stone is placed at the centre of the stone group and the feature may have functioned as a post-support, as did several similar features in Phase 1 (Edwards 2013c: 71).

Artifact Clusters 19 - 21

The first series of excavations at Wādī Ḥammeh 27 brought to light caches of artefacts and materials, or 'artefact clusters' found in close and patterned association, indicating purposeful placement made synchronously or over a relatively short period of time (Edwards and Hardy-Smith 2013: 105). Artefact Clusters 1 - 17 occurred in Phase 1 contexts and Artefact Cluster 18 was found in Phase 2. The present season yielded three additional clusters on the Phase 2 floor (indicated as numbered white discs in Fig. 2).

Artefact Cluster 19 (Square C3-1, Locus 2.5) consisted of a pair of large flint blades (RN 140006 and RN 140007) nearly 10 cm long, an

unusually large size for Wādī Ḥammeh 27 (**Fig. 2:19**).

Artifact Cluster 20 (Square E3-2, Locus 2.5) was a pile of five stones (**Fig. 2:20; Fig. 3**), comprising three lightly reduced and apparently heat-treated flint cores (RN 140026, RN 140028 and RN 140029) and two limestone cobbles (RN 140025 and RN 140027).

3. Artefact Cluster 20: a pile of flint cores and limestone cobbles.

Artefact Cluster 21 (**Fig. 2:21; Fig. 4**) comprised a cache of 138 dentalium (*Antalis* sp.) fragments (not counting further fragments that may be discovered in the sieve residues) overlying a pair of retouched blade tools, including a Helwan-retouched awl. The allocation of these objects alone to Artifact Cluster 21 is a conservative assessment, given the agglomeration of other finds that Feature 10 nestled amongst in Square E6 (**Fig. 5**). They include a zoomorphic basaltic pestle (RN 140049; **Fig. 2:68**), a phalliform figurine (RN 140225; **Fig. 2:136**), a basaltic shaft-straightener (RN 140047; **Fig. 2:55**) and a basaltic handstone (RN 140048).

Bone Artifacts

Bone tools were few but significant, including the curved end of a sickle haft (RN 140001), the tip of a bone point (RN 140004) and a complete but fragmented bone polisher (RN 140005).

4. Artefact Cluster 21: a scatter of 138 dentalium (Antalis sp.) fragments overlying a pair of retouched blade tools.

5. View south across the Phase 2 floor, Square E6-1, indicating Artefact Cluster 21 - a cache of dentalium fragments - at lower right. Further to the right-hand corner is a zoomorphic basaltic pestle (RN 140049), then - proceeding clockwise - a basaltic handstone (RN 140048), a phalliform figurine (RN 140225) and a basaltic shaft-straightener (RN 140047).

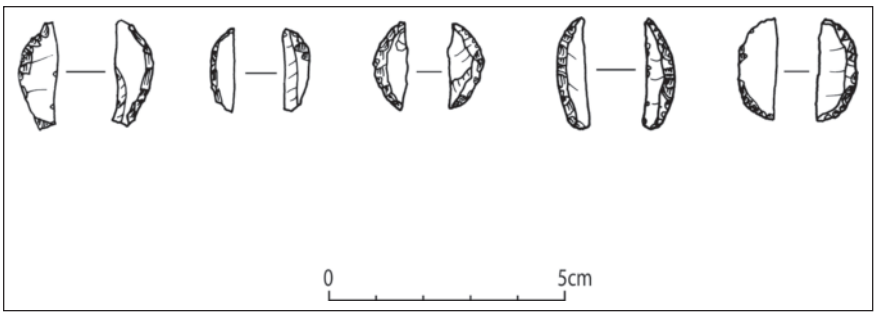
Flaked Stone Artifacts

While the flaked stone assemblage has not yet been sorted and catalogued in detail, all retouched specimens recovered during the season were consistent with the previously recovered lithic assemblage. Helwān (bifacial marginal) retouch is consistently applied to small tools, for example to lunates (**Fig. 6**).

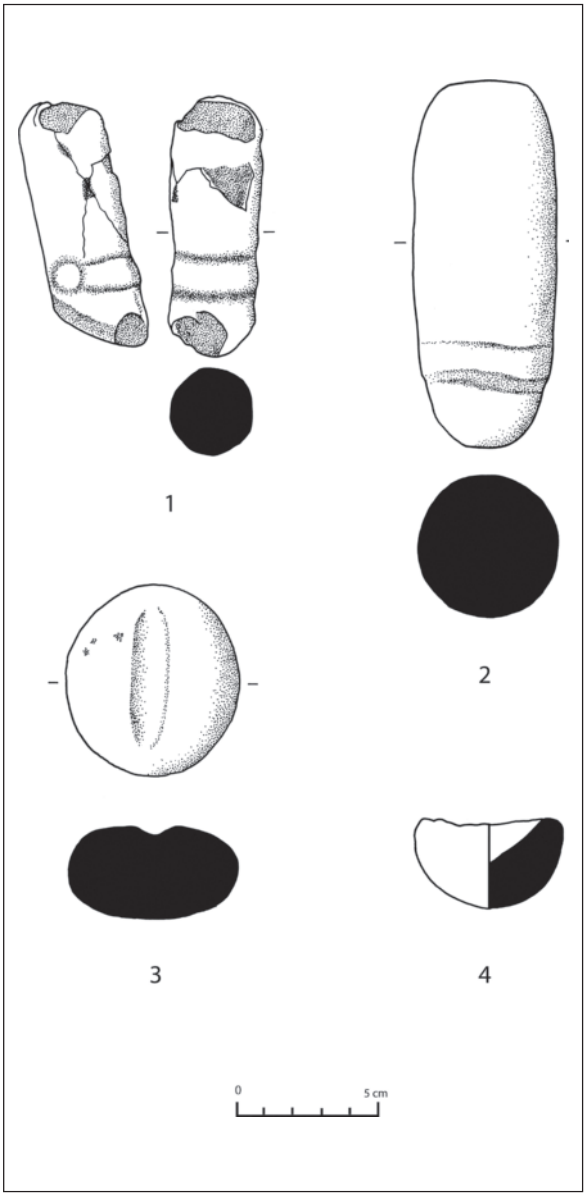
Groundstone Artifacts (AMV)

Pestles

Two intact and four broken pestles were recovered, all made from basaltic stone aside from one limestone medial fragment. The pestles are cylindrical in plan with spherical sections, except for RN140010, which has an unusual oblique termination. The termination of another broken pestle (RN140009) is slightly flaring, thus qualifying this artefact as a knobbed pestle (No. 69 in Wright's 1992 catalogue). Both this pestle and RN140010 were recovered on the Phase 2 floor within the same unit (Plot XX F, Locus 2.5, Square C2-1). The most notable finds in the class are two diminutive pestles (**Figs 7:1-2**): the first a zoomorphic pestle (RN140049) and the second a phalliform basaltic pestle (RN140053). These items are described in more detail below.



6. Helwān-retouched lunates from Phase 2.



7. (1) Zoomorphic basaltic pestle [RN 140049]; (2) phalliform basaltic pestle [RN140053]; (3) basaltic shaft-straightener [RN 140047]; (4) miniature basaltic bowl [RN 140022].

Handstones

Three intact handstones and one broken handstone were discovered. A basaltic handstone with lenticular section (RN140059) was recovered in Square E7-1, placed against the perimeter Wall 1, near to the phalliform pestle, RN 140053. Five smoothed flake scars are present along one margin; both faces of the object are coated in yellow ochre, with stains covering 95% of one face and 80% of the other, whereas the margins are completely free of them. Upon its removal from the Phase 2 floor, the area it had covered was also found to be stained yellow. Another broken limestone handstone (RN 140024) also bore traces of yellow colouration. RN 140048 is an unusual unifacial basaltic handstone with a wide ovate depression on its curved, upper surface. A flake scar lies adjacent to the depression.

Mortars and Large Vessels

A rim fragment of a large basaltic mortar (RN140215) was discovered in Square E5-1. The interior of this artefact is meticulously smoothed, whilst the exterior is less well-finished. The rim is ground flat. Another basaltic vessel fragment (RN140217), possibly from a mortar, was found in the same unit.

Miniature Bowls

Three miniature basaltic bowls were excavated. Only one, a globular bowl (RN 140022) found lodged between stones of Wall 1 in Square B5, is complete (**Fig. 2:31; Fig. 7:4**). Of the two other fragmentary vessels, RN 140054 has a globular body similar to the previous item whereas the other (RN 140227) features a much shallower cavity. All three objects display carefully manufactured rims, bases and interiors. Traces of drilled depressions, possibly pilot holes, are present at the deepest interior points of both RN 140022 and RN 140227.

Grooved Stone (Shaft Straightener)

A small basaltic shaft straightener (RN 140047) with discoidal shape and lenticular section was found on the Phase 2 surface in Square E6-1 (**Fig. 2:55; Fig. 7:3**). A U-shaped groove is worked into one face, 55 mm long, 12 mm wide and 7 mm deep. Neither end of the groove extends to the edge of the piece.

Varia

A small limestone spheroid (RN140060) was recovered in Square E7-1. Its use as a hammerstone is unlikely on account of the soft limestone it was made of, as well as the absence of pounding damage.

Worked Fragments

Ten worked limestone fragments, not identifiable to artefact type, were also found.

Art items (RR)

Five art items made from stone and bone, bearing representational and geometric motifs, were recovered from Phase 2:

RN 140049: Zoomorphic Pestle (Square E6-1; **Fig. 2:68; Fig. 7:1***)*

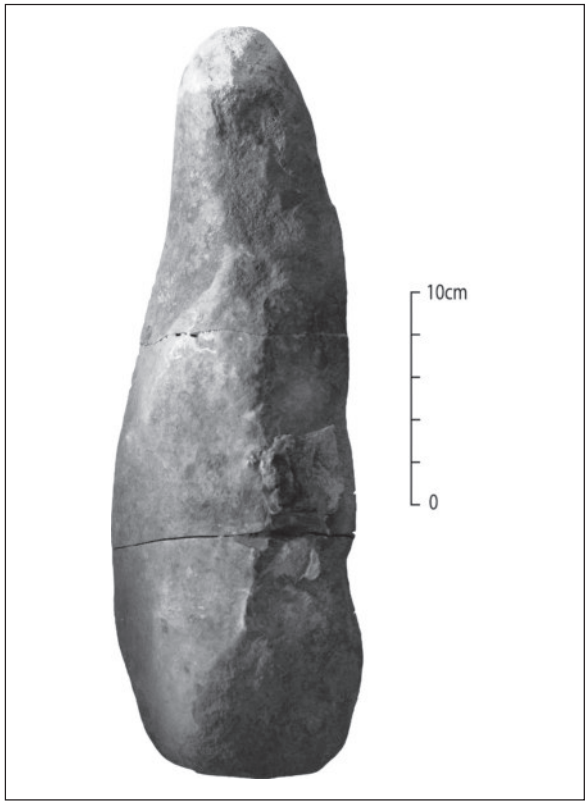
This piece is a relatively short (9.4 cm) and gracile (diameter = 3.1 cm) basaltic pestle with a convex proximal end and zoomorphic distal terminus, slightly fractured and exfoliated. Its key decorative features are a raised band, circumscribing the shaft near the distal end, approximately 1 cm in width and standing approximately 0.3 cm proud of the surface, and an obliquely shaped terminus. The features suggest an ungulate or equine hoof. The piece finds several Early Natufian parallels in objects from Mount Carmel and western Galilee, such as a basalt pestle with concentric raised bands and another with a hoof-shaped terminal from El Wad (Garrod and Bate 1937: pl. XV: 4; Major 2012: 226-228) and examples from Hayonim Cave (Belfer-Cohen 1991: fig. 7:1, 3, 5).

RN 140053: Phalliform Pestle (Square E7-1; **Fig. 2:167; Fig. 7:2***)*

This is a short (13.7 cm), robust, basaltic pestle with a raised band circumscribing the object near its distal end, approximately 0.5 cm proud of the shaft. The distal end of the piece is lightly grooved. Overall, the decorative embellishments convey the impression of a phallic object.

RN 140225: Phalliform Limestone Figurine (Square E6-1; **Fig. 2:136; Fig. 8***)*

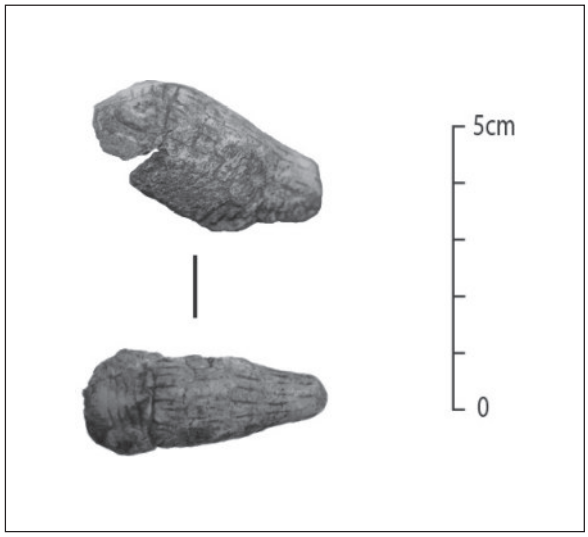
This long (33.5 cm), sub-conical piece of limestone tapers from 10.9 cm in width near the distal end to 5.2 cm near the proximal end. The piece was found complete, although cracked *in situ*, and consists of three conjoinable fragments. A natural white colouration caps the thinner proximal end of the piece, whereas the rest of the object is light grey to dark grey. In particular, a dark grey region extends below the white cap, down the right lateral margin. This area has been reduced by pecking, emphasising the white area above it. The manner in which the object has been shaped and its decoration suggests an intention to form a phallic symbol.



8. Phalliform limestone figurine (RN 140225).

RN 140226: Carved and Incised Bone Animal Head (Square E6-1; **Fig.2:78; Fig. 9)**

Apparently the terminal fragment of a larger object, this is a small (length = 4.2 cm), carved and incised, animal-headed figurine. The piece is broken at the 'neck'. It has been calcined through burning, resulting in breakage and extensive exfoliation at its base and along



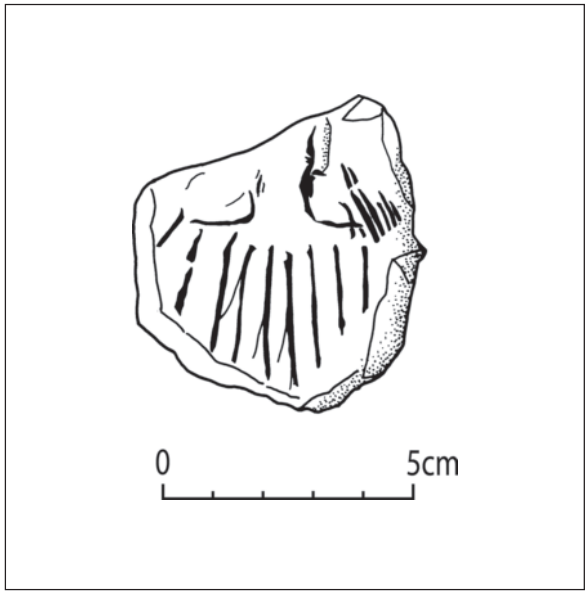
9. Carved and incised bone animal head (RN 140226).

the left and right lateral margins. Despite the extensive damage caused by burning, the fine modelling of the piece is evident and the form of the head of an ungulate animal, probably a gazelle, is compelling. The ears are represented by two bumps, the left one complete but the right one damaged. The eyes are also rendered by two raised areas which grade into a narrow muzzle. The snout is slightly everted, terminating in a disc that represents the nostrils. The base of this feature is defined by an incised line which continues around the left side of the muzzle. Below this, a more deeply incised line represents the mouth. The frontal region of the head is marked between the ears by opposed sets of short strokes, the left set comprising four strokes and the right set five strokes. The face is demarcated from the frontal region by a deeply incised line that runs across and cuts through the lower margin of the left ear. Surface damage interrupts the line slightly before it reaches the right ear. The muzzle is marked by five rows of longitudinal, incised strokes running all the way to the snout. They comprise sets of ten, seven, six, eight and five. Incised strokes were originally more extensive over the piece, but fire damage has removed them.

RN 140226 has parallels with objects from Kebara Cave and El Wad Cave. Layer B (Plot XXVII) of the former site yielded a complete bone sickle haft with a zoomorphically rendered terminal, fashioned to resemble an ungulate (Turville-Petre 1932); Layer B2 of the latter site produced an animal figurine surmounting a haft, described as a 'young deer'. The body of this image also bears sets of short, parallel strokes like those on RN 140226 (Garrod and Bate 1937: pl. XIII: 3).

RN 140052: Incised Limestone Piece (Surface Find; **Fig. 10***)*

This is a smoothed, roughly pentagonal limestone fragment with one incised face and the other left blank, smoothed by abrasion and polishing. The key features of the decorated face comprise nine deeply incised longitudinal lines descending from a broad, shallow band located about two-thirds of the way up the field. Lighter and finer diagonal lines run between the third and fourth, fourth and fifth, and fifth and sixth heavy lines. The upper register is dominated by two raised oblong panels; on the right-hand one, six successively finer lines have been carved on the diagonal leading towards but not meeting the right lateral margin. Short, irregular vertical strokes also appear on the left-hand panel and in between the two panels. The decoration appears as a geometric pattern; however, viewed the other way up, the piece suggests an anthropomorphic theme, with hair or a headdress surmounting a nose and two eyes.



10. Incised limestone piece (RN 140052).

Human Skeletal Remains (PCE)

An isolated human molar was found in Square E4-1.

Palaeogenetic Analysis (CV)

Studies of ancient DNA (aDNA) from well-dated contexts potentially enable a precise understanding of past human genomes, origins, genetic variation, migrations and extinctions. However, it is well-known that not only age but also environment affects the preservation of aDNA. The samples under study in this project are expected to be highly degraded, not only as a result of their antiquity (12,000 - 12,500 cal BC) but also as a result of the seasonally wet and dry environments they have been exposed to over time. Preliminary results on a human third molar from the Plot XX J burial at Wādī Ḥammeh 27 (Webb and Edwards 2013a) determined the presence of

endogenous (non-contaminant) human DNA, validated with the observation of damage patterns unique to ancient molecules (Sawyer *et al*. 2012). As with many ancient human DNA studies, a great amount of exogenous DNA (contamination) was obtained in this analysis. Of the 7,537,168 DNA sequences retrieved from the sample, only 0.19% were mapped to the human genome (Hg19). However, the damaged patterns observed, together with the presence of human DNA, are indicative that small amounts of endogenous DNA are still present in the sample. These preliminary results are encouraging for further analysis on samples from the site of Wādī Ḥammeh, using methods and technologies available in the fields of aDNA and molecular biology to recover and sequence highly degraded DNA.

Avian (Stork) Pes (Feature 3) (ES)

During the 2014 excavation season, an articulated distal portion of an avian pes (F. 3) was recovered from Square E3-2 (Locus 2.5). The specimen included several phalanges articulated with the fragmented distal end of a tarsometatarsus (**Fig. 11**). The arrangement and preservation of these remains permitted osteometric analysis. The breadth of the tarsometatarsus, phalanx length and the osteomorphology of the specimen suggest a ciconid (stork) attribution. The breadth (Bd) of the distal tarsometatarsus is 20 mm, similar to Ciconiidae specimens B.30249 *Ciconia* sp. (Bd = 19.5 mm) and B14141 *Ciconia ciconia* (Bd = 18 mm) in the avian collection at Melbourne Museum. The largest phalanx (proximal third) yielded a greatest length (GL) of 39 cm in the Wādī Ḥammeh 27 specimen and GL = 38 cm in specimen B.30249, indicating *Ciconia* sp. (Driesch 1976: 121, 129). The fragmented remains of trochleae II and IV also appear to be flattened anteriorly rather than rounded - a Ciconiidae trait (Haarhoff 1988). Two species of Ciconiidae have seasonal migration routes that pass through the Levant (Porter *et al*. 1996: 20-21): *Ciconia nigra* (black stork) and *Ciconia ciconia* (white stork). Notably, the white stork was the most abundantly represented bird species in previous analyses of faunal material from Wādī Ḥammeh 27 (Edwards and Martin 2013: 340). The modern migration route of the species passes through parts of the Levant, including the Jordan Valley.

11. Articulated avian pes (Ciconia sp.) lying on the Phase 2 floor in Square E3-2.

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LA TROBE UNIVERSITY'S 2015 GEOLOGICAL SURVEY AND ARCHAEOLOGICAL EXCAVATION SEASON AT THE NATUFIAN SITE OF WĀDĪ ḤAMMEH 27

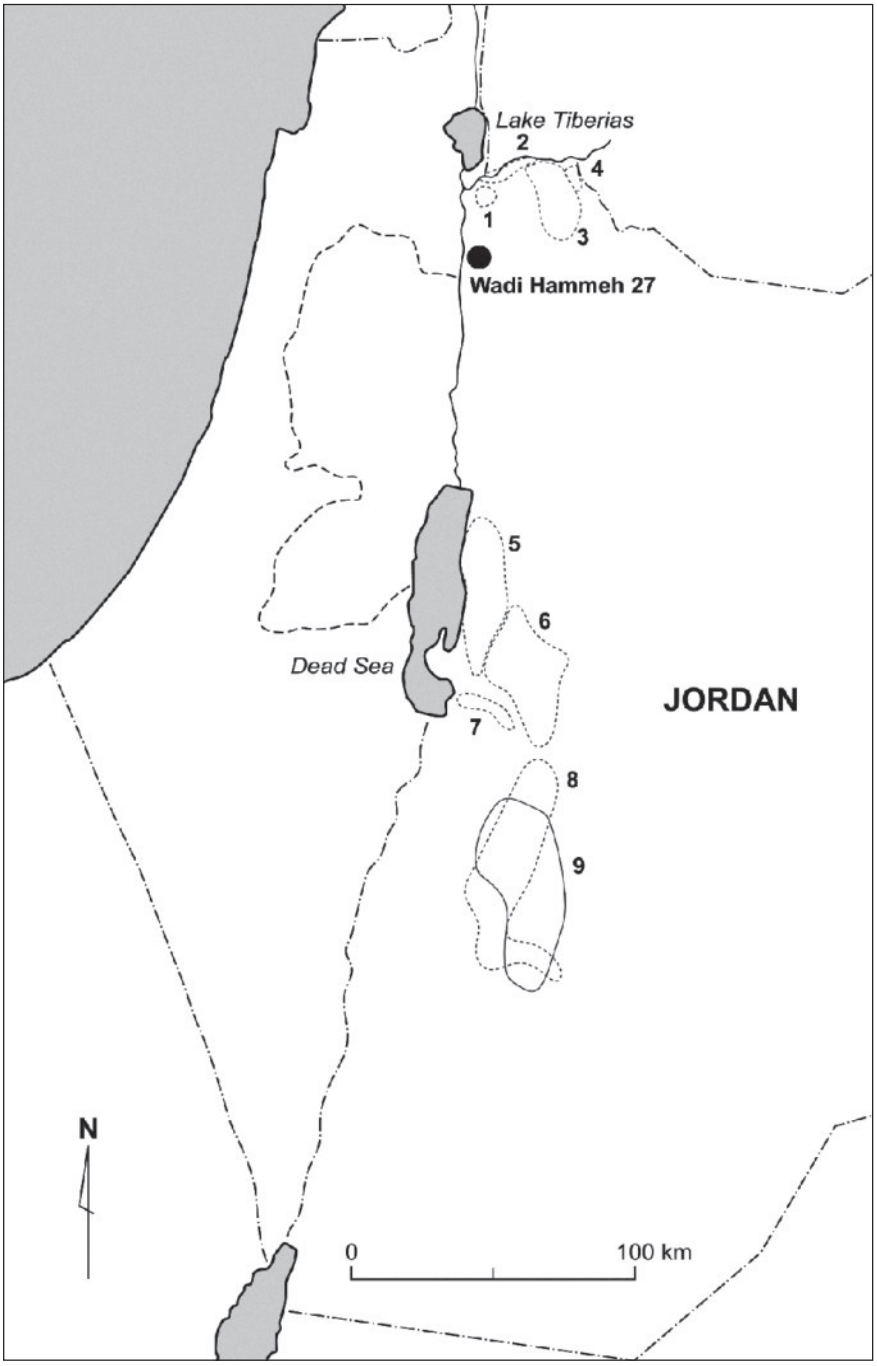
Phillip C. Edwards, Louise Shewan, John Webb and Christophe Delage

Introduction

The second field season of the 'Ice Age Villagers of the Levant: Sedentism and social connections in the Natufian period' project was undertaken by La Trobe University from November 2 to December 17, 2015[1]. The operations were based on excavations at the Natufian site of Wādī Ḥammeh 27 (**Fig. 1**), near Tabaqat Fahl (Pella). During the first season in 2014 (Edwards *et al*. 2018), a large area of the Phase 2 occupation surface in Plot XX F was revealed. In 2015, the underlying Phase 3 deposits were excavated over the same area, and work was begun on the basal Phase 4. Phase 3 excavations at Wādī Ḥammeh 27 yielded an oval house structure, smaller than houses previously excavated at the site, and two well-defined exterior stone features, in the form of a circular stone ring and a stone-ringed posthole. Key finds in 2015 were a number of bone tools, including points, hafts, and some new types of pendants. Important examples of miniature bowls and plates were also found, along with a number of small items in bone and stone, which were incised with geometric images.

In parallel, survey and sample collection operations away from the main site were continued. The survey of basaltic rock sources in western Jordan, commenced in 2014 by John Webb, was extended further south than previously (at Ḍana and Ṭafilah), and also continued near Umm Qays in the north of the country. Louise Shewan sampled additional areas to those from 2014, thus increasing data for the construction of a map of bio-available strontium. Christophe Delage completed his survey of chert (flint) resources, discovering the origins of all chert types used by the inhabitants of Wādī Ḥammeh 27. Luminescence dating samples were taken from the Natufian sites Wadi Khawwan 1 at Tabaqat Fahl (Edwards *et al*. 1998), and Wādī Ḥisbān 6 (as well as the underlying Epipalaeolithic sites of Wādī Ḥisbān 2 and Wādī Ḥisbān 5, previously excavated by Phillip Edwards between 1988 and 1994 (Edwards *et al*. 1999), in order to ascertain

1. The 2015 fieldwork season at Wādī Ḥammeh 27 and other localities in the Jordan Valley and adjacent areas was undertaken as part of the 'Ice Age Villagers of the Levant: Sedentism and social connections in the Natufian period' project, funded by a three-year, Australian Research Council (ARC) Discovery Project grant (DP140101049). The project is based at the Department of Archaeology and History, La Trobe University, in Melbourne, Australia. The fieldwork was undertaken with the gracious support of Dr. Munther Jamhawi and the assistance of staff from the Department of Antiquities of Jordan, under Excavation Permit 2015/67. In-field Department of Antiquities' staff were representatives Mr Musa Malkawi and Ms Alia Khasawneh. Mr Ehab Jariri and Mr Qutaiba Dasouqi carried out a survey and assembled an aerial photographic mosaic image of the excavations at Wādī Ḥammeh 27. Our team is also grateful for support from the Tabaqat Fahl office departmental inspector, Muhammad Shalabi, and his staff. Jordanian house staff at Tabaqat Fahl was comprised of Alladīn Madi (house manager and logistics), Khalid Jawahiri (chef), Nawal Tawfiq (laundry), Salim Hmid (house guard) and finds processors Nasr Hassan and Tail Ayyad. Finds processors also included University of Jordan archaeology students Mohammad al-Attrash and Yusuf Barmawi, arranged by courtesy of Dr Maysoon al-Nahar. Local Jordanian excavation staff from Tabaqat Fahl and Masharia were Khalal Khashashneh (Abu Khalid), Noureddine Khalid, Ibrahim Tawfiq Muhammad, Nasr Hassan, Walīd Khashashneh and site guard Yusuf Salim Hmīd. Excavation work at Wādī Ḥammeh 27 was directed by Phillip Edwards and carried out by La Trobe University students Rosemary Robertson and Adam Valka (square supervisors). Cathy Carigiet undertook drawing and Isabella Capezio was the project photographer. Project field scientific staff included Associate Professor (Dr) John Webb (project co-director, geology and basalt sourcing) of La Trobe University, Dr Louise Shewan (project co-director, geochemistry) of Monash University (Melbourne, Australia)/ University of Warwick (UK); and Dr Christophe Delage (chert sourcing) of the Department of Prehistory, National Museum of Natural History, Paris, France.



1. Location of Wādī Ḥammeh 27 and basaltic rock provinces, indicated by dashed grey lines: 1) Umm Qays, 2) Yarmouk and Raqqad, 3) Irbid West, 4) Irbid East, 5) North-East Dead Sea, 6) Shihan 7) Karak, 8) Dana, 9) Juf ad-Darawish.

the temporal relationship of these small sites with the large Wādī Ḥammeh 27 'base-camp'. Several scientific samples of rock, sediments and vegetation were exported to colleagues in Australia, France and the U.K.
(P.C.E.)

Provenance of Basaltic Artefacts

In the 2014 field season, a portable Olympus XRF-Analyzer was used to characterise a sample of Natufian basalt artefacts from Wādī Ḥammeh 27 stored at the Pella dighouse, as well as outcrops of basalt in north-western Jordan and around the Dead Sea (Edwards *et al*. 2015). In the 2015 field season, further outcrops of basaltic rock were analysed south-west of the Dead Sea, as well as additional samples of the basalt around Umm Qays and the basalt artefacts recovered from the 2015 season of excavations at Wādī Ḥammeh 27. For

comparison, the basalt columns and the basalt used to construct the theatres and shop fronts at Umm Qays (Gadara) was analysed, and later period grindstones, columns, vessels and pestles at Pella were also analysed.

A close examination of the outcrop patterns and a review of previous studies on the basalts of the area verified that several basaltic provinces can be distinguished. There are three older shield volcanoes that have been strongly dissected by wadi erosion; these are (from south to north) Dana, Shihan and Irbid (**Fig.1**). In addition, the basalt outcrops at Umm Qays and east of Irbid represent the southern margins of separate shield volcano eruptions to the north on the Golan Heights and southern Syria respectively.

There are younger scoria cones with relatively limited lava flows in two areas; on the north-eastern margin of the Dead Sea and to the south-east around Jurf ad-Darawish. There are also two younger lava flows within the Yarmouk river valley; the topographically higher (older) Yarmouk flow and the Raqqad flow.

Plotting the Yttrium /Niobium ratio against the Zirconium/Niobium ratio for all outcrop samples demonstrated that it is possible to differentiate many of the basalt provinces, although there is often some overlap between them. In particular, the southern basalts have lower values of both ratios than the northern basalts. This new survey data has already modified the basaltic provinces plotted in the previous project report in this journal (Webb in Edwards *et al*., 2015: Fig. 1). Along with some revision, such as that the 'Yarmouk' flow is here relabelled as 'Yarmouk and Raqqad', 'al-Qaṣr' is relabelled as 'Shihan', and the new provinces of 'Dana' and 'Juf ad-Darawish' have been added.

Comparing the analyses of the Natufian basalt artefacts with the outcrop analyses shows that the artefacts have a greater spread of values than any single basalt province, i.e. they were derived from a variety of outcrops. Most of the artefacts are similar to the nearby basalts at Umm Qays and Irbid, but several were most likely obtained from basalt outcrops to the south around the Dead Sea.
(J.W.)

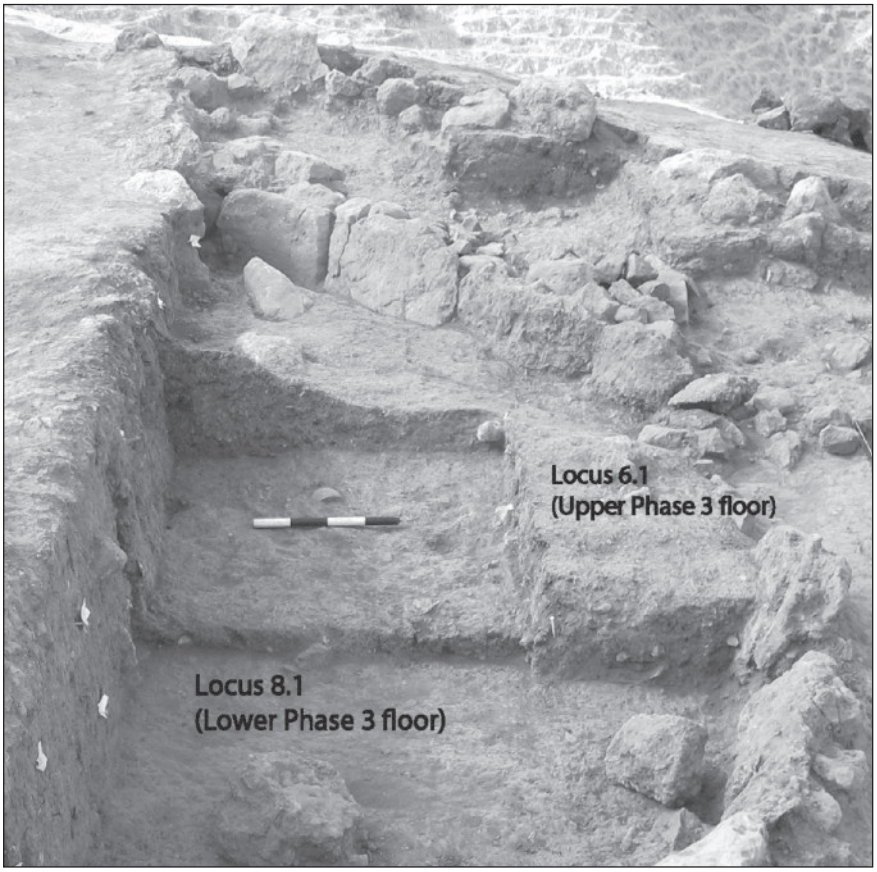
Provenance of Cherts Used At Wādī Ḥammeh 27

During the 2014 and 2015 field seasons, a geoarchaeological survey was conducted that enabled us to identify and observe numerous chert-bearing outcrops, as well as to collect samples of geological cherts. Following the analysis of these various lines of evidence, we are now in a position to draw conclusions on the potential of each *in situ* geological formation (**Figs. 2, 3**) and the lithic landscape (chert availability) for Wādī Ḥammeh 27 (**Fig. 4**).

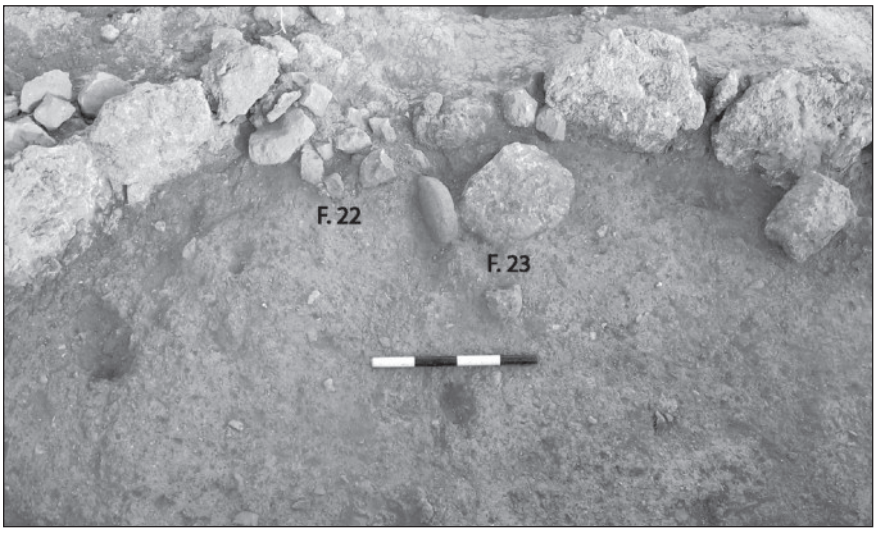
The Turonian period, represented by the Wādī as-Sir Limestone Formation (hereafter WSL), is characterized by several important features for our discussion. The WSL exposures visited during our survey all yielded small irregular chert nodules of coarse-grained texture embedded in a hard dolomitic sediment. If we extend this characterization to the whole formation, and to all of the WSL chert-bearing exposures, we may conclude that silicifications are rare, of poor quality for flint knapping, and difficult to collect directly at outcrops. Thus, we may argue that it holds only a minor position in terms of raw material availability in the picture we are trying to draw regarding the lithic landscape around Wādī Ḥammeh 27.

The Coniacian-Santonian (Wadi Umm Ghudran Formation [hereafter WG]) corresponds to small exposures of limited geographical distribution, usually located in our surveyed area at mid-elevation and along steep wadis. These outcrops are not easy to access. Even though small lenses of grey chert and dark-brown, compact beds are present, they are not a common feature within the soft-weathering matrix and are of rather poor quality. Overall, this lithology may also play a marginal role in the lithic landscape around Wādī Ḥammeh 27.

By contrast, the Campanian period (Amman Silicified Limestone Formation [hereafter ASL]) is typified by abundant silicifications within white outcrops throughout the southern Levant. Another positive point is the fact that the ASL exposures are quite extensively distributed geographically in the surveyed area, and are rather easy of access, located toward the bottom of steep wadis and at mid-elevation (**Fig. 2**). Moreover, various siliceous lithologies and colours may be observed. However, these



2. Distribution of the Amman Silicified Limestone Formation and location of survey visits for chart samples in the formation.



3. Distribution of the Muwaqqar Chalk-Marl Formation and location of survey visits for chert samples in the formation.

silicifications are rather difficult to extract directly at the outcrops, being embedded in a hard limestone matrix, and/or are usually of poor quality, especially the brecciated types. These latter cherts break easily through multiple fracture planes into small blocks (up to 5 cm in maximum length); in these cases, the texture appears very fine-grained and translucent, closely resembling chalcedony. Based on the variability and quantity of the siliceous rocks encompassed here, this ASL unit constitutes an important component in the lithic landscape around Wādī Ḥammeh 27, but the relative lack of suitability for flint knapping and the hard nature of the carbonate matrix for direct procurement may make these silicifications quite unattractive in their primary context.

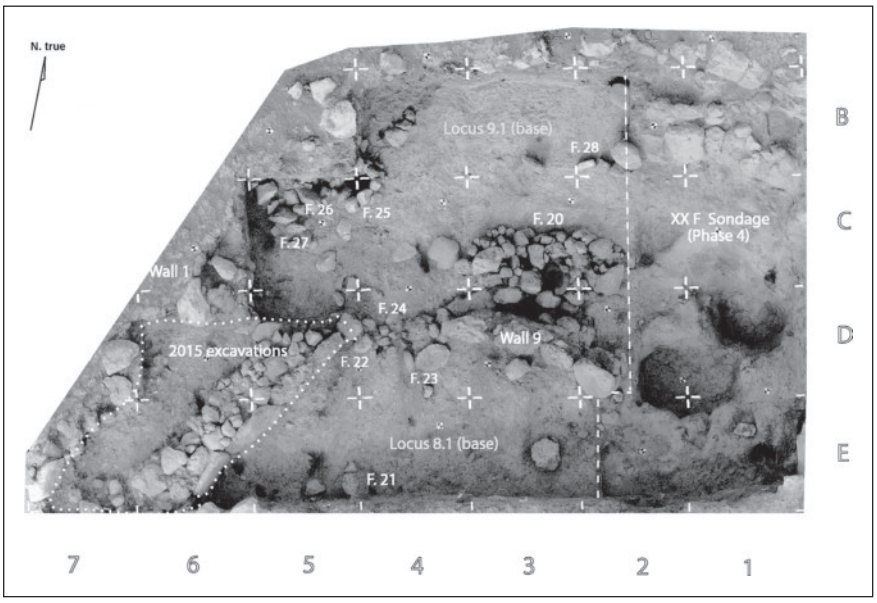
The same conclusions also apply to the

next two *in situ* chert-bearing formations in the sequence: the Muwaqqar Chalk-Marl Formation (hereafter MCM), at the Cretaceous-Tertiary boundary (Maestrichtian-Paleocene) and the Umm Rijam Chert-Limestone Formation (Lower Eocene [hereafter URC]). The MCM and URC units reveal a relatively extensive geographical distribution in the northern part of our map (**Fig. 3**), provide outcrops easy to access and yielding abundant silicifications (lenses and beds, as well as calcite veins in MCM). Nevertheless, even though these are mostly fine-grained materials very suitable for flint knapping, brecciated cherts of heterogeneous texture are also common in the outcrops. Furthermore, these silicifications are mostly hard to extract due to the nature of the embedding matrix; only a few MCM locations (MCM8, MCM16, MCM17, above Mashari'a) yield silicifications in soft-weathering sediments.

In sum, the WSL and WG formations should arguably be left out of the picture we are trying to reconstruct concerning suitable chert raw materials around Wādī Ḥammeh 27. At the same time, the following formations appear the most important *in situ* geological units to focus on: ASL, MCM, and URC. For most *in situ* geological formations, hard limestone/dolomite appears to be the dominant embedding matrix, which understandably would prevent direct exploitation at the exposures during Natufian times. The Wādī Ḥammeh 27 inhabitants should have ignored most of these primary sources. Yet, with a thorough knowledge of the local landscape and its mineral resources, as we may expect these prehistoric populations to have held, the MCM and URC outcrop distributions could still be considered as reasonable resources to visit and provide reliable chert sources (**Fig. 4**). By contrast, the secondary deposits, in the form of surface cobbles washed into wadi beds, are all easy to access and exploit, and provide good quality siliceous materials. Thus, they too constitute a major resource pool in the lithic landscape around Wādī Ḥammeh 27.
(C.D.)

Sampling Survey Towards A Bioavailable Strontium Isotope-Ratio Map

During the 2015 field season, collection of soils and grass/plant samples continued, in order to extend the baseline reference map of modern bioavailable strontium (Sr) isotope ratios. Sampling was conducted in the Jordan Valley and adjacent highlands to the east, from the vicinity of Tafila and surrounds, northwards to Umm Qays. The survey and sampling exercise resulted in 35 new samples, in addition to those gathered in 2014 (Shewan, in Edwards *et al*. 2018). Subsequent to their export to Australia in early 2016, samples were analysed at the Research School of Earth Sciences, Australian National University, Canberra. Following compulsory Australian Quarantine treatment, grass and soil samples were prepared for



4. Distribution of primary and secondary chert sources next to Wādī al-Ḥammeh in the east Jordan Valley.

Thermal Ionisation Mass Spectrometry (TIMS). Sample pre-treatment varied, according to the material analysed.

Grass/plant samples were placed in porcelain crucibles and ashed overnight at 800° Celsius. Twenty milligrams from each plant sample was placed in an acid-cleaned Teflon beaker and digested in ultrapure concentrated Nitric acid (HNO_3). Following digestion, samples were dried down, then dissolved in 2 Molar (2M) HNO_3 and Sr was separated and concentrated using Sr-Spec ion exchange columns.

Soils were placed in porcelain crucibles and ashed overnight at 800° C. Twenty milligram amounts from each soil sample were placed in an acid-cleaned Teflon beaker and digested in ultrapure (HNO_3) and Hydrofluoric acid (HF). Following digestion, samples were dried down, then dissolved in 2Mr HNO_3 and Sr was separated and concentrated using Sr-Spec ion exchange columns.

Soil leachates: For each sample, 1gram of soil was placed in a centrifuge tube with 1 millilitre (1ml) ammonium nitrate (NH_4NO_3), shaking the suspension overnight to extract the bioavailable Sr component. Following digestion, samples were dried down, then dissolved in 2M HNO_3 and Sr was separated and concentrated using Sr-Spec ion exchange columns.

Following Sr separation, all samples were loaded with Tantalum pentafluoride (TaF_5) onto degassed rhenium filaments and the $^{87}Sr/^{86}Sr$ ratio was measured on a TRITON multi-collector Thermal Ionisation Mass Spectrometer (TIMS).

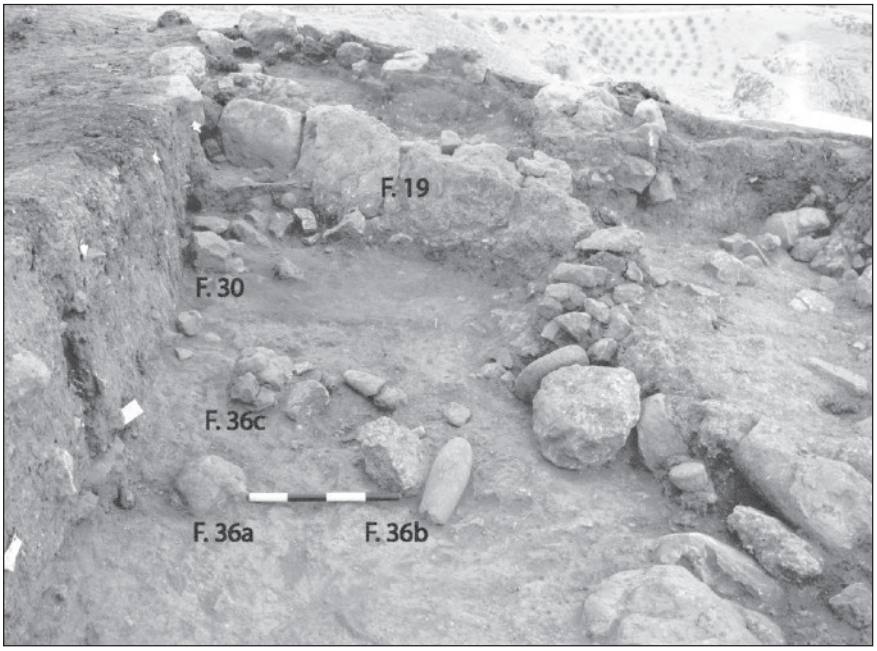
Biologically available strontium may vary from whole rock and soil ratios as a function of differential weathering, atmospheric deposition (e.g. dust and sea spray) and mixing processes. For this reason, our sampling protocol consists of selecting soil and grass/plant specimens from the same location in each sampling area to measure strontium isotopic ratios in the bulk soil, soil leachates and plants. Soil leachates (designed to extract the bioavailable Sr fraction) and plant samples from the same location should yield similar $^{87}Sr/^{86}Sr$ isotope ratios, though some variation may be observed. The range of Sr isotopic variability observed so far ranges from 0.70449 (Mukawir volcano) to 0.70916 (Kfar Rakib). This is a significant difference, as prior results indicated that the Wādī al-Ḥammeh locale should be more constrained in variability. As more samples are tested, we can begin to map isotopic variability in the region, which can then be used to compare the human and faunal archaeological skeletal material against, in order to explore prehistoric mobility. *(L.S.)*

Excavations at Wādī Ḥammeh 27

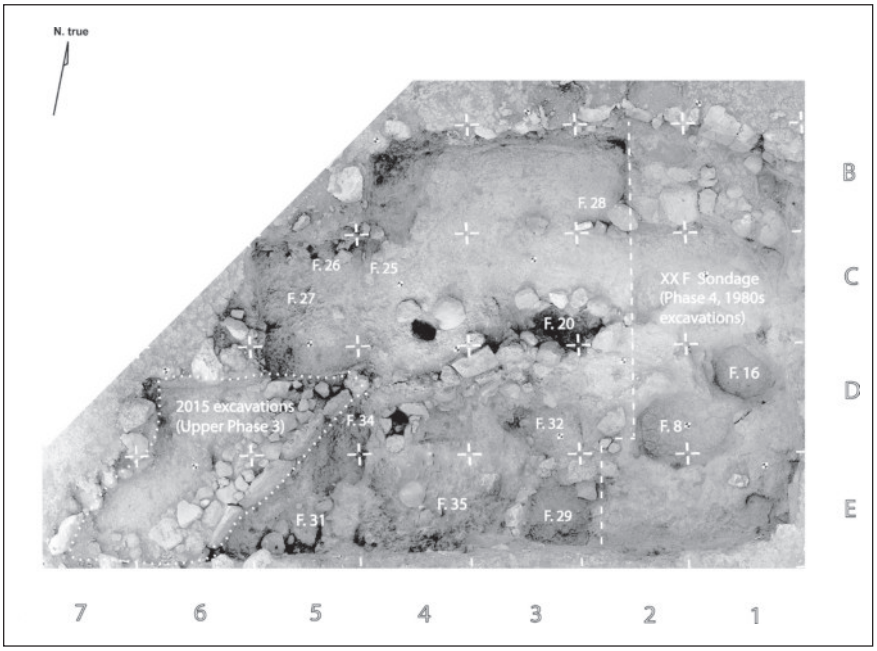
Excavation of Phase 3

In the 2014 season, the Phase 2 floor occupation surface was reached over the entirety of Plot XX F. Excavations continued during 2015 until the Phase 3 floor surface beneath was exposed over the same area (**Fig. 5**). The Phase 3 floor lay, on average, c. 20 centimetres below the Phase 2 one. The principal feature of the lower phase is an oval hut (Structure 3), defined by a substantial stone wall (Wall 9). The wall emerges from the south baulk of the trench in Square E6, and loops around in a semi-circle (**Fig. 6**), returning into the south baulk in Square E1 (the old Plot XX F Sondage, dug in the 1980s). The length of wall-arc is 6.2 metres. As it emerges from the baulk in Square E6, the inner face of the wall is lined by a row of shaped, rectangular limestone slabs, standing almost vertically (**Fig. 7**). The slabs are supported by a broad wall of small to medium sized limestone pieces. Here, Wall 9 is at its most substantial; two courses high and up to 0.78 metres wide. Beyond this, the wall tapers in Square C4, where it is marked solely by a few small, discontinuous stones trodden into the floor. This area may have served as an entrance to the dwelling. Beyond this, in the south of Square C4 and in Square C3, Wall 9 resumes as a single row of large stones, placed upright. The final section of Wall 9, which runs into the south baulk, was discovered in the XX F Sondage and excavated in the 1980s as Wall 2. Inside Structure 3, an earthen floor rises to a clump of large stones, set on a clay mound (F. 18).

Two well-defined circular stone features are placed to the north of Structure 3. To the north-west (in Square C5), a well-formed, discrete stone ring (Feature 17, **Fig. 8**) is built on the floor surface. This was positioned directly



5. Aerial view of the Phase 3 occupation surface (Plot XX F) excavated at Wādī Ḥammeh 27 in 2015; each grid square measures 1 metre by 1 metre. The earlier 'XX F sondage' (Phase 4) is located to the right.

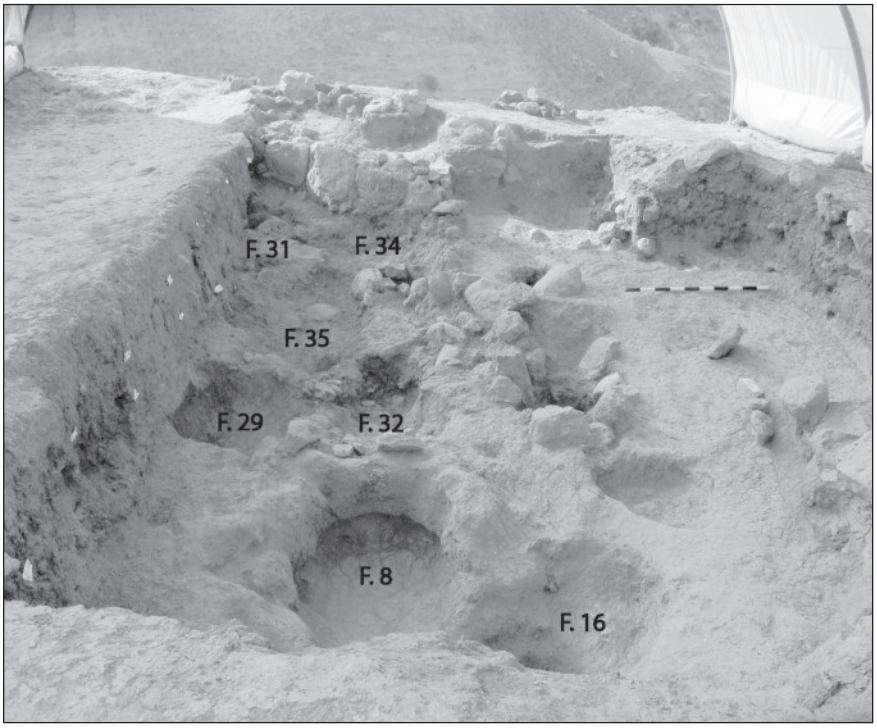


6. View west over the Phase 3 occupation surface (Plot XX F), showing Structure 3 and other features.

below a later circular feature in the overlying Phase 2, (F. 5), which was in turn positioned under a similar feature (F. 8) in the uppermost Phase 1. Feature 12 is a deep, stone-ringed posthole two courses high, located in the northeastern area of the excavation plot (Square C3, **Fig. 9**). It is positioned immediately north of Feature 13, which is a broad cluster of stones. Later versions of Feature 12 also continued throughout the life of the settlement, during Phase 2 as F. 7 and in Phase 1 as F. 6. The two Phase 3 curvilinear stone features (F. 12 and F. 17) are placed relatively symmetrically with respect to the suspected entrance to Structure 3 (**Fig. 5**).

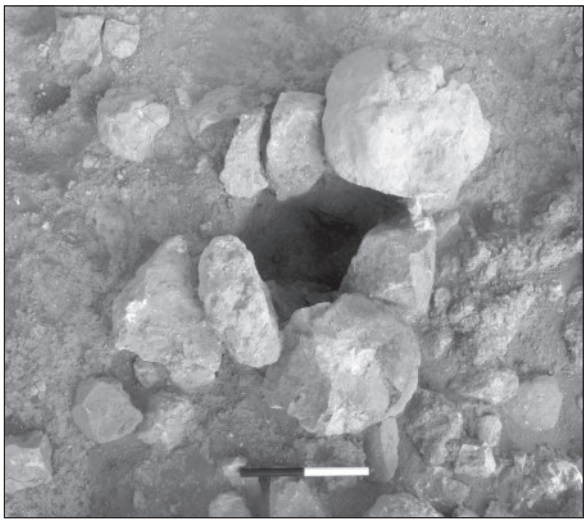
Excavation of Phase 4

Following the completion of Phase 3, the investigation of the underlying Phase 4 commenced. By the end of the excavation period, three squares in Phase 4 had been cleared to a floor surface (Squares C2, E2 and



7. The row of rectangular limestone slabs arrayed on the inner face of Wall 9 in Structure 3.

8. Aerial view of the stone ring (Feature 17), Phase 3.



9. Aerial view of stone-ringed posthole (Feature 12), Phase 3.

E3), while Square C3 remained in progress. The most interesting feature to emerge so far is an elongated oval of stone rubble (F. 19; **Fig. 10**), located in Squares C2 and C3, and evidently continuing into the unexcavated neighbouring Squares D2 and D3. The exposed segment of the feature appears to cap a pit filled with soft sediment. It may mark the location of an underlying human burial dug into the natural travertine rock, and thus figures as an important find with regard to the project aims.

Artefacts

The following descriptions apply on the whole to items retrieved during the excavation

10. View west over Feature 19, an elongated oval of limestone rubble fragments, Phase 4.

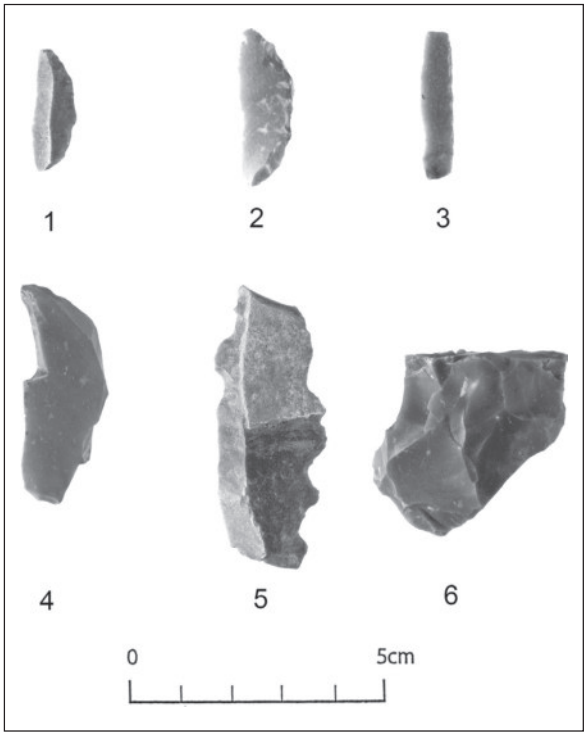
of Phase 3 deposits in 2015 (many bags of sieved residue from Phase 3 remain to be sorted and further small items may be discovered in that process). There were also a few notable items collected from the surface and two from Phase 4.

Flaked Stone Artefacts

Chert (flint) tools recovered from Phase 3 include characteristic types which have previously been described for other phases of the site, including burins (**Fig. 11:4**), Helwan bladelets (**Fig. 11:3**), Helwan-retouched lunates (**Fig. 11:2**), some backed lunates (**Fig. 11:1**), notched pieces and denticulated blades (**Fig.11:5**) and small bladelet cores (**Fig. 11:6**). A notable find was the recovery of a large tranchet axe (**Fig. 12**), a relatively rare type at Wādī Ḥammeh 27 and other Natufian sites (Edwards 2013a: 172).

Bone Tools and Ornaments

Few bone tools emerged from Phase 2 in 2014; however, there were several notable bone



11. Flaked stone (chert) artefact tools from Phase 3: 1) Backed lunate, 2) Helwan lunate, 3) Helwan bladelet, 4) Burin, 5) Denticulated blade, 6) Small bladelet core.

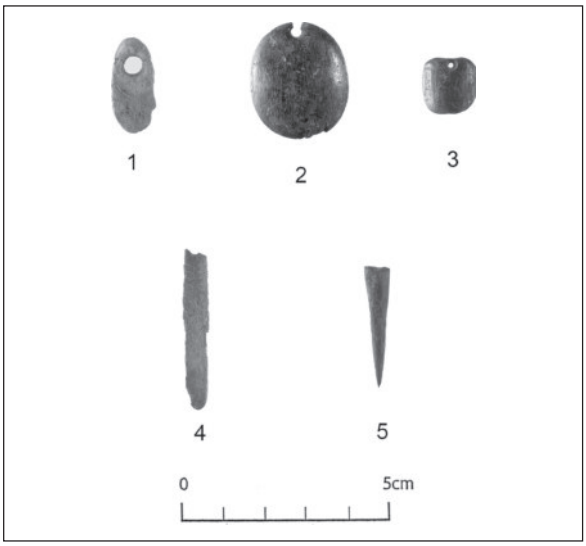
12. Large chert axe, Phase 3.

artefacts and ornaments excavated from Phase 3 and Phase 4 in 2015. A common type at Wādī Ḥammeh 27 has an oval or teardrop shape, and one of these was found on the surface of the site (RN 150002, **Fig. 13:1**). Several less common types emerged from Phase 3, including a broader spheroidal type (RN 150007, **Fig.13:2**), almost complete except for a damaged perforation, and a small, sub-rectangular type (RN 150054, **Fig. 13:3**), smaller than the one other rare rectangular pendant known from Phase 1 (Edwards and Le Dosseur 2013: 262). There is also an elongate artefact (RN 150172**, Fig. 13:4**) with a damaged proximal perforation and a rounded distal end, the use of which is unclear. The right lateral margin and the distal end exhibit high lustre and this item may have functioned as a polisher (*lissoir*), similar to an object (RN 90120) previously identified and of similar shape from Phase 1 (Edwards and Le Dosseur 2013: 251). RN 150172 is also decorated by a series of opposed short incised strokes, emanating from the left and right distal margins on the proximal section of the piece. Several broken bone shafts have previously been found with the opposed-stroke decorative scheme (Edwards 2013b: 302), but none so complete as to identify the artefact type.

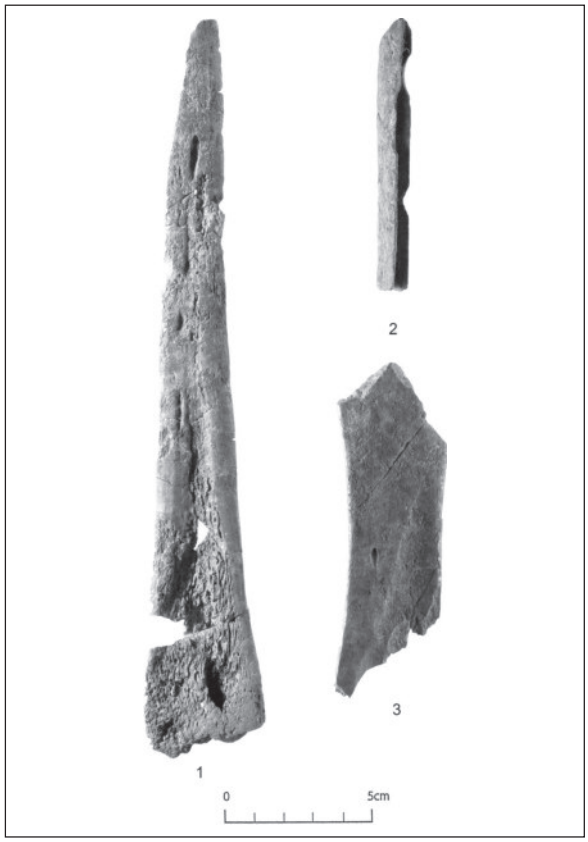
Utilitarian tools from Phase 3 ranged from small, sharp bone points (RN 150005, **Fig.13:5**) to large, broken sickle hafts, including a slender distal example (RN 150076, **Fig. 14:2**) and an angled medial fragment (RN 150019, **Fig. 14:3**). RN 150187 (**Fig. 14:1**) from the fill of Phase 4 is an enigmatic piece, because it resembles the sickles previously found at the site, yet lacks a hafting slot; perhaps it is unfinished, like the example RN 110073 found in Phase 1 during the 1980s (Edwards and Le Dosseur 2013: 261).

Basaltic Artefacts

A variety of basaltic artefacts familiar to Wādī Ḥammeh 27 were retrieved from Phase 3. They included two large mortar fragments, two other large vessel fragments, a complete pestle and three pestle fragments, a fragmentary miniature plate, and three fragmentary miniature bowls. A complete basaltic pestle, RN 150081 (**Fig. 15**), was found on the Phase 3 floor, near the circular stone feature, F. 17. Similar to other pestles from Phase 2, this example (at 15.9 centimetres long) is significantly smaller than some of the larger pestles found previously in Phase 1. An intact miniature plate was found on the surface of the site (RN 150157, **Fig. 16**). A

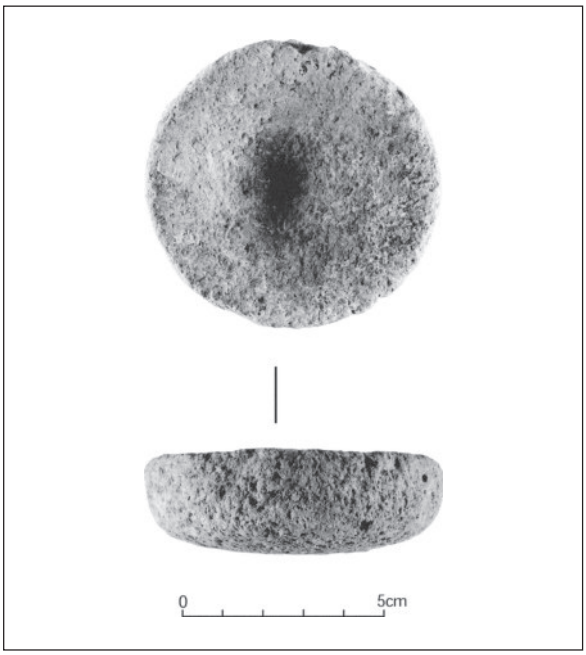


13. Bone pendants: 1) RN 150002; 2) RN 150007; 3) RN 150054; 4) RN 150172; 5) Bone point (RN 150005). RN 150002 is a surface find and the others are from Phase 3.



14. 1) Large bone tool (RN 150187, broken bone sickle haft); 2) RN 150076; 3) RN150019. RN 150187 is from Phase 4 and the other items are from Phase 3.

15. Basaltic pestle (RN 150081); Phase 3.

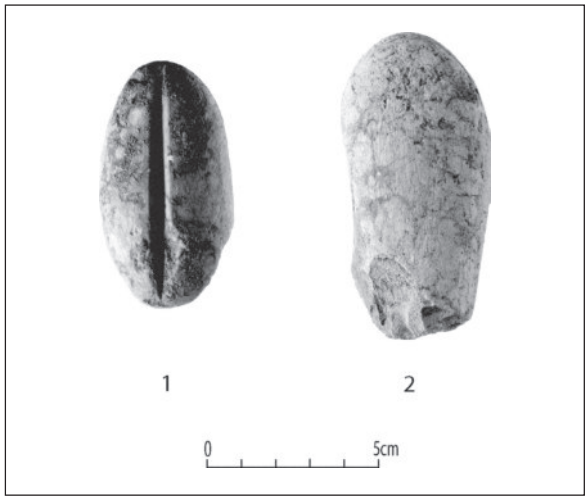


16. Miniature basalt plate (RN 150157); surface find.

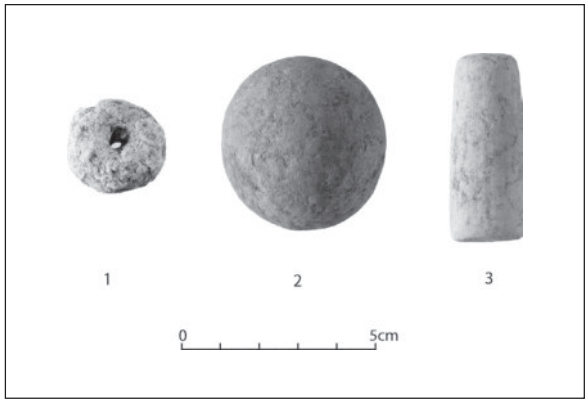
fragmentary miniature plate (RN 150125) was also recovered from Phase 3, along with three broken miniature bowls (RNs 150075, 150140, 150184). These examples add to the impressive corpus of miniature vessels, for which there are no readily obvious functions, and which are more or less restricted to Wādī Ḥammeh 27, among the Early Natufian sites.

Limestone Artefacts

A dozen limestone artefacts were recorded from Phase 3 deposits, with an additional limestone art item recovered from the surface, and a large mortar fragment from Phase 4. The Phase 3 finds are comprised of a large mortar fragment, a broken handstone (grindstone), two miniature plate fragments, a grooved oval stone (RN 150124; a shaft straightener or abrader; **Fig. 17:1**), and seven more unusual items. One of these is a small, drilled 'bead' of limestone (RN 150015, **Fig. 18: 1**). Similar items have been found before in Phase 1, although the examples in limestone are larger (Edwards 2013c: 240-241) and feasibly acted as some kind of implement(s). Most similar in general size



17. Limestone artefacts from Phase 3: 1) Grooved oval stone (RN 150124); 2) Shaped and smoothed stone (RN 150185).



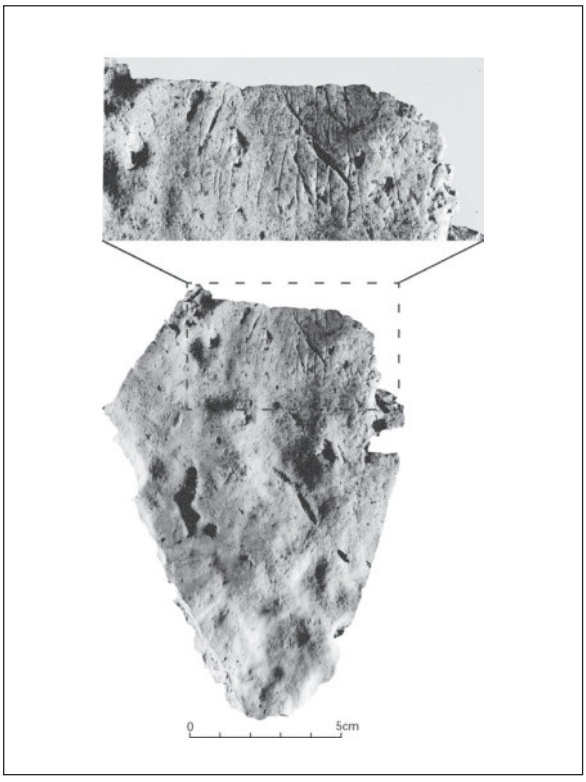
18. Limestone artefacts from Phase 3: 1) Circular piece of drilled limestone (RN 150015); 2) Shaped spheroid (RN 150020); 3) Shaped cylinder of stone (RN 150021).

and appearance is a basaltic piece designated as a 'bead' (Edwards and Webb 2013: 232).

There are two art fragments, dealt with in the next section, and four diverse objects grouped under the 'Various' category. RN 150185 (**Fig. 17:2**) is an elongated piece of shaped and smoothed limestone, with several flake scars marking one end. The remaining three items all came from a small area in the southeast corner of Square E 7 (Locus 7. 1 in Phase 3), situated immediately west of Structure 3's exterior Wall 9. They include a split cobble (RN 150018), perhaps also intended as an art 'canvas'; a limestone spheroid finished almost to a perfect sphere (RN 150020, **Fig. 18:2**); and an unusual small limestone cylinder (RN 150021, **Fig. 18:3**) resembling an artist's 'crayon' in form. This is a unique item for Wādī Ḥammeh 27.

Art items

Besides the incised bone tool described above, three limestone artefacts decorated with geometric or schematic motifs were recovered in 2015. One was collected from the surface near the excavation area (RN 150001, **Fig. 19**), and features a series of more than a dozen parallel, incised strokes marking one end of a travertine fragment. The margin appears to be broken, so the design may have originally been more extensive. There is also a grooved limestone pebble (RN 150022, **Fig. 20:1**) and an incised and drilled limestone fragment (RN 150139, **Fig. 20:2**).



19. Travertine fragment incised with pattern of short, parallel strokes (RN 150001); Surface find.

Various Finds

Over one hundred Dentalium (*Antalis* sp.) shell fragments were recovered from Phase 2 deposits in 2014, and many more specimens have accumulated from the sorting of Phase 2 sieve residues so far. By contrast, 79 Dentalium fragments have emerged from the Phase 3 deposits.

Conclusions

The 2015 La Trobe University project season was very successful. Excavation of the Phase 3 deposits has revealed a great deal about the evolution of architectural style in the Early Natufian period, as well as new and unusual material culture types. The key project aim to find human burials for strontium isotope testing was advanced by reaching the basal deposits of Phase 4 at Wādī Ḥammeh 27. It is planned to conclude the exploration of Wādī Ḥammeh 27's lower-phase deposits in a future season. *(P.C.E.)*

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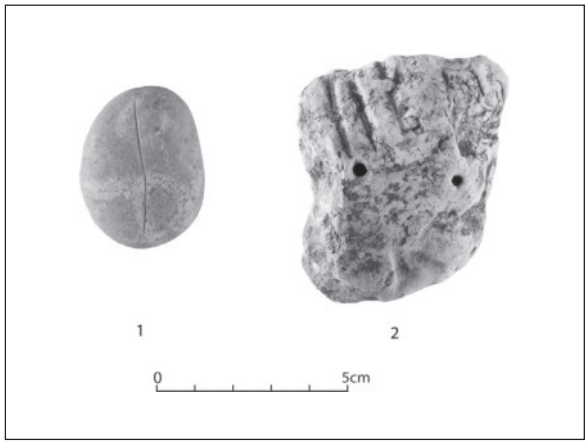

20. 1 Grooved limestone pebble (RN 150022); 2) Incised and drilled limestone fragment (RN 150139); Phase 3.

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LA TROBE UNIVERSITY'S 2016 SEASON OF FIELD SAMPLING AND ARCHAEOLOGICAL EXCAVATION AT THE NATUFIAN SITE OF WĀDĪ ḤAMMEH 27

Phillip C. Edwards, Marie Anton, Fanny Bocquentin, Ken J. McNamara, Lauren Prossor, Louise Shewan, Cristina Valdiosera and Adam M. Valka

Introduction

The third field season of the 'Ice Age Villagers of the Levant: Sedentism and social connections in the Natufian period' project was undertaken by La Trobe University from November 3 to December 17, 2016[1]. The operation was the third year of excavations (following two earlier seasons in 2014 and 2015) of the Early Natufian site at Wādī Ḥammeh 27, near Ṭabaqat Faḥl (Pella). It also included sampling programs in the field and analysis of stored collections. Fieldwork included micro morphological sampling of Wādī Ḥammeh 27 sediments (L. Prossor), further field sampling of vegetation in north-western Jordan in order to compile a map of bio-available strontium (L. Shewan), and sampling of human skeletal remains from Wādī Ḥammeh 27 and later period specimens stored at the Pella dighouse for ancient DNA analyses (C. Valdiosera). Meanwhile, cataloguing and analysis of Wādī Ḥammeh 27 materials continued, including lithics (A. Valka) and human skeletal remains (F. Bocquentin and M. Anton).

The 2016 excavations yielded key examples of previously known artefacts, entirely new types of artefacts, and important discoveries about the extent and character of Wādī Ḥammeh 27. In many cases, the new evidence forced revision of longstanding interpretations about the settlement. New discoveries and perspectives include:

- A possible doubling of the previous estimate of the site area.
- The first broad exposure of the basal Phase 4.
- Several new primary inhumations.
- Important examples of new bone artefact types in a mortuary context.
- The first evidence for on-site manufacture

1. The 2016 fieldwork season at Wādi Ḥammeh 27 and sampling programs were undertaken as part of the 'Ice Age Villagers of the Levant: Sedentism and social connections in the Natufian period' project, funded by a three-year, Australian Research Council (ARC) Discovery Project grant (DP140101049). The project is based at the Department of Archaeology and History, La Trobe University, in Melbourne, Australia. The fieldwork was undertaken with the gracious support of Dr Munther Jamhawi and the assistance of the staff of the Department of Antiquities of Jordan, under Excavation Permit 2016/72. In-field Department of Antiquities' staff were representatives Musa Malkawi and Muhammad Shalabi. Ehab Jariri undertook survey and assembled an aerial photographic mosaic image of the excavations at Wādi Ḥammeh 27. Jordanian house staff at Tabaqat Fahl were Alladīn Madi (house manager and logistics), Khalid Jawahiri (chef), Nawal Tawfiq (laundry), Salim Hmid (house guard) and finds processors Nasr Hassan, Tail Ayyad, Widad Hamdan, Naila Nawaf, Khalal Khashashneh, Ibrahim Tawfiq Maadi, Muhmmad Abdullah and Nasr Shaati, The local Jordanian excavation staff from Tabaqat Fahl and Masharia were Khalal Khashashneh, Ibrahim Tawfiq Maadi, Muhmmad Abdullah, Nasr Hassan, Nasr Shaati and Walīd Khashashneh. Yusuf Salim Hmid acted as site guard. Excavation work at Wādi Ḥammeh 27 was directed by Phillip Edwards and carried out by doctoral students Adam Valka (La Trobe University), Lauren Prossor (Australian National University), and Marie Anton (Université Paris 1 Panthéon-Sorbonne). Rosemary Coates (University of Newcastle, New South Wales) undertook drawing and planning, while Isabella Capezio (RMIT University and Photography Studies College, Melbourne) was the project photographer. Project field scientific staff included Dr Louise Shewan (project co-director, Monash University [subsequently University of Melbourne])), who conducted a bio-available strontium isotope survey, Dr Fanny Bocquentin (French National Centre for Scientific Research (CNRS), Maison Archéologie et Ethnologie René Ginouvès - UMR 7041, France), who supervised the excavation and analysis of human skeletal remains, and Dr Cristina Valdiosera (La Trobe University) who conducted a sampling program for ancient DNA analysis. Thanks are due to Dr Stephen Bourke for arranging the use of the Pella dighouse and permission to sample human bones from the Pella collection.

of basaltic artefacts.
- Examples of rare limestone and basaltic querns and mortars.
- Additional evidence for the production and discard of lithic types.
- A change in the types of pigmented earth (ochre) utilized.
- New examples of fossils
- Insights into the foundation of the Wadi Ḥammeh 27 settlement.

Excavations at Wādī Ḥammeh 27 in 2016

Introduction

The 2016 excavations in Plot XX F at Wādī Ḥammeh 27 reached the natural travertine bedrock. The 2014 excavations had cleared Phase 2 deposits over the entire targeted area (Edwards *et al.* 2015). The 2015 excavations reached the Phase 3 (Upper) deposits underneath that, revealing an oval house (Structure 3) in the south of the Plot, and some Phase 4 deposits in the north of the plot (Edwards *et al.* 2016). The 2016 excavations, which are the subject of this report, cleared Phase 3 (Lower) in Structure 3 and underlying Phase 4 deposits throughout the plot.

The 2016 excavations employed the same methodologies as used in 2014 and 2015. Operations proceeded in Plot XX F and the XXE/ XXF baulk, up to the perimeter wall of Structure 1 from Phase 1, marking out a zone of operations 7.5 metres long by 5.0 metres wide, with the long axis oriented east-west. Grid squares were laid out using surveyed points established by total station survey (by Ehab Jariri), and absolute elevations of each phase and significant features were recorded. Geo-rectified, overhead photograph mosaics of each phase, and baulk-section photographic mosaics, were also compiled by total station survey.

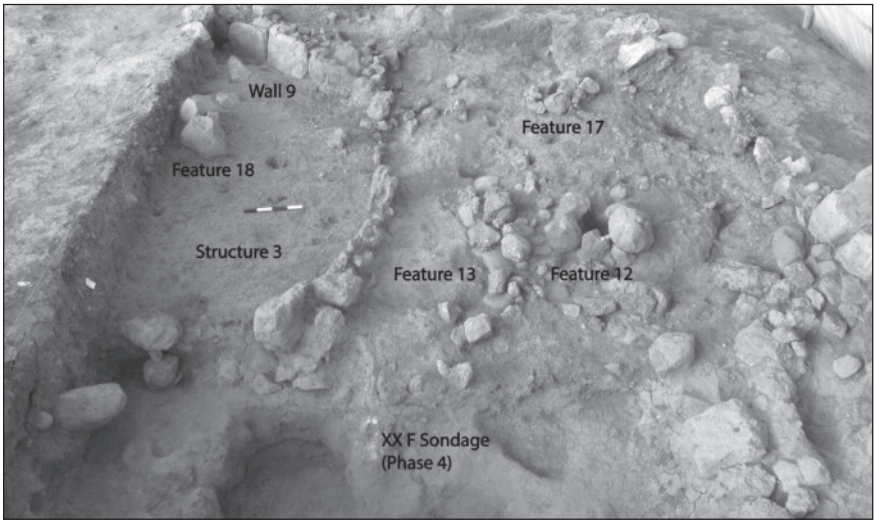
Excavation proceeded according to natural stratigraphy, supplemented by the square-metre grid (Squares B2 to E7) and arbitrary vertical units. All excavated matrix was dry-sieved through a 1-millimetre mesh, with residue returned to the Pella dighouse and wet-sieved through a 1-millimetre mesh. All wet-sieved finds from the three seasons were processed and sorted in 2016 by a team of local workers and foreign academic staff. The excavation trench was lined with plastic and backfilled at season's end.

The general run of operations, including the details of each grid-square, were described in field notebooks illustrated by plans and photographs. Stratigraphic layers were also recorded on context sheets and a measured section drawing was taken of the south baulk. Hand-drawn measured plans were made of Phase 3 (Lower) and Phase 4. Geo-rectified overhead digital photomosaics were also taken of Phase 3 (Lower) and Phase 4. Additionally, a geo-rectified, vertical photomosaic was made of the south baulk section. Significant finds were recorded in a registration book, with each find entered as a Book Number (BN. 300001 onwards). Finds considered to be of particular interest were also given a Registration Number (RN. 1600001 onwards). These objects were photographed, with some also drawn.

Excavation of Phase 3 (Lower)

Previous excavations in 2015 had revealed a house (Structure 3), defined by a substantial stone wall (Wall 9). This structure emerges from the south baulk of the trench in Square E6 and loops around in a semi-circle, returning to the south baulk in Square E1, further east (In the Plot XX F Sondage, dug in the 1980s). Structure 3 was the major constructed feature of Phase 3 and a floor (Locus 6.1) was associated with it, intercepting Wall 9 midway up and partially covering its wall stones (**Fig. 1**). An entrance was positioned in the northern side of the structure, and opposite this a stone cairn was placed on a raised clayey knoll (Feature 18 [F.18]).

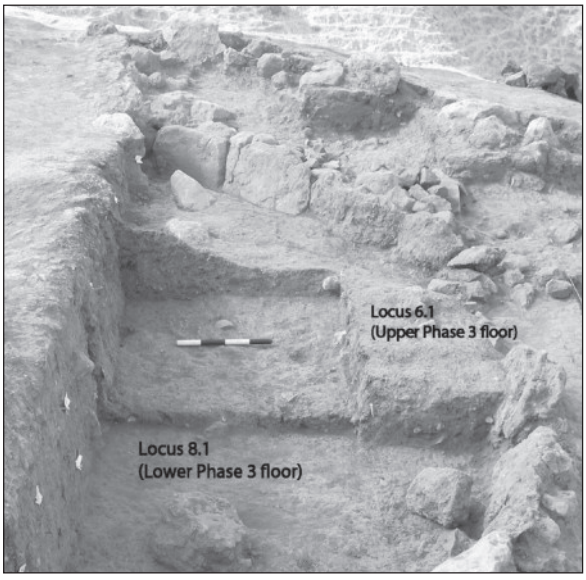
Excavations in late 2015 and in 2016 discovered an earlier, basal Phase 3 floor (Locus 8.1) within Structure 3, lying below the upper one (**Fig. 2**). This lower surface is the earliest floor of Structure 3, and articulates with the base of its enclosing Wall 9. Excavation of the lower floor also established Feature 24 (**Fig. 3**) as a clear, north-facing entrance to the house. Small packing stones supported or lay adjacent to the larger wall stones, framing each side of it. The house interior is lower than the outside surface (Locus 9.1). There is a small stone-lined posthole (F. 22) on the inside of the entrance near its western end. Towards its eastern end is Feature 23, a large stone that abuts a rounded basaltic artefact (RN 160420)



1. View west over the Phase 3 excavation in Plot XX F at Wadi Ḥammeh 27; conclusion of 2015 Excavations.

sitting vertically. Opposite the entrance, a stone construction (F. 21) directly underlay the larger stone cairn (F.18) founded on the Upper Phase 3 floor (**Fig. 4**). A single large stone was found on the floor at the eastern end of the structure. Sediment on the interior of Structure 3 during Upper Phase 3 and Lower Phase 3 accreted more thickly (and probably more rapidly) than on the exterior surfaces, which change very little over the same periods.

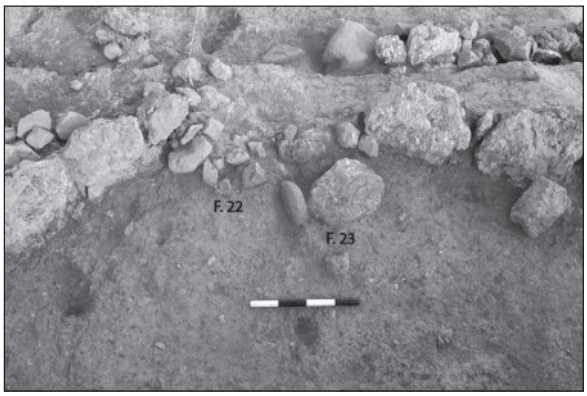
On the exterior, a large stone circle (F. 25) was positioned in Locus 9.1 at the north-west extremity of the excavations, directly underneath a similar feature (F. 17) built in the overlying Upper Phase 3. To the north-east of the excavation area, a short, single-coursed wall segment (F. 28) runs westwards from the easterly limit of excavation. This feature partially underlay an overlaying stone circle in Upper Phase 3 (F. 12). The largest feature on the exterior of Structure 3 is Feature 20, an oblong stone platform with a roughly circular cavity at its centre (**Fig 9**). Feature 20 is the original version of similar platforms which were built over the top of it, or nearby, in all succeeding constructional phases. A large, roughly circular cavity occurs at its centre, and the provision of a curved, basaltic vessel fragment (RN 160249) to frame its south-easterly margin reinforces the impression that it served as a support for a sizeable post.



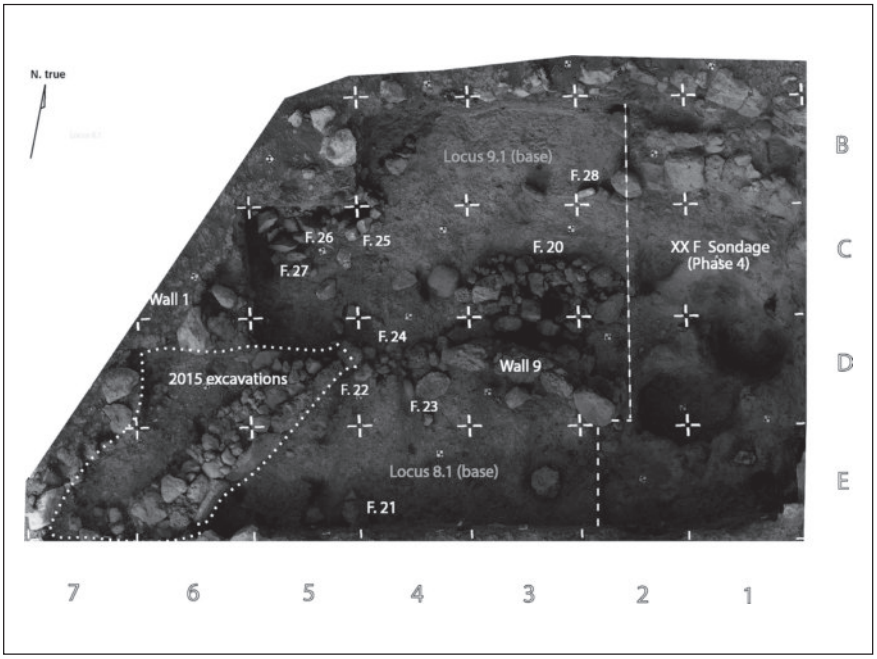
2. Upper Phase 3 and Lower Phase 3 floor layers of Structure 3; view west.

Excavation of Phase 4

After Lower Phase 3 was completed, the underlying Phase 4 was excavated. Phase 4 includes the deposits and features positioned on

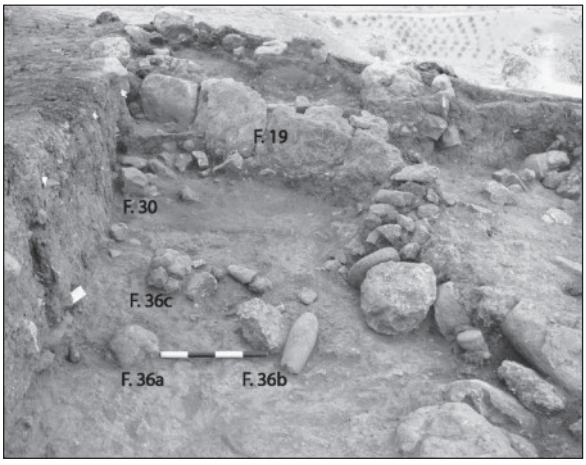


3. Entrance (F. 24) to the lower Phase 3 floor of Structure 3; view north. A small stone-lined posthole (F.22) lies near its western end, and an unfinished basaltic artefact (RN 160420) lies on its side near its eastern end.



4. Overhead view of Lower Phase 3 in Plot XX F.

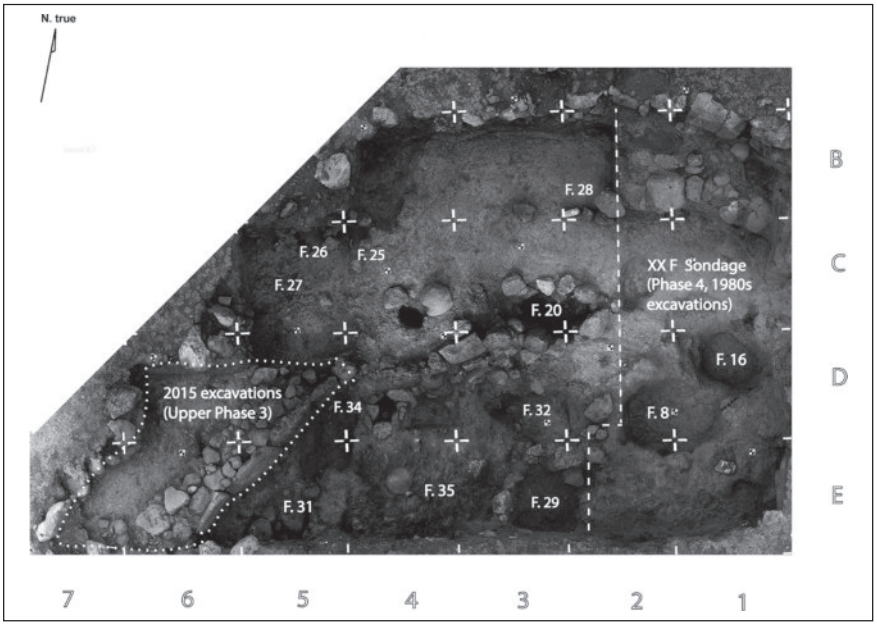
and dug into the basal travertine rock layer. The Phase 4 surface (Locus 8.3) ran underneath the major stones of the Structure 3 perimeter wall; for example, the squared slabs (F. 19) at the western end of the structure (**Fig. 5**), which are pedestalled above the surface. Numerous stone features, isolated rocks, and large and small artefacts lay strewn across the surface of Locus 8.3. In the western corner of the plot, near the intersection of Wall 9 and the south baulk, a stone cluster (F. 30) formed a third, successive version of those below Features 18 and 21 of Upper and Lower Phase 3 respectively. Towards the eastern end of Locus 8.3, several large stones (F. 36 a-c) lay intermingled with an assortment of artefacts and debris. These objects included a massive basaltic pestle (RN 160291), broken basaltic and limestone artefact pieces, chunks of both red and white ochre, and five Dentalium fragments.



5. Surface of Phase 4; view west.

Beneath the Phase 4 surface (Locus 8.3), a number of pits and stone features were dug into the natural travertine deposits (**Figs. 6, 7**). These are primarily clustered underneath the later Structure 3, and three of them contain human skeletal remains. The most important find in this regard was a burial (Feature 29) containing two primary child inhumations: *Homo 9*, found overlying Homo *10* (Bocquentin, below); numbering of the human remains commences at '9' because eight sets of human skeletal remains were unearthed in the 1980s excavations. Human remains were also discovered in two other pits, but time did not permit their excavation. The first was a human vertebra in Feature 32. This pit also yielded an unusual concentration of long gracile bone points (Edwards, below) of a type not previously found at Wādī Ḥammeh 27. Additionally, a human maxilla was found on the north-eastern slope of the large, partly stone-paved pit, Feature 35. Feature 34 (**Fig. 8**), the deepest stone-lined posthole as yet discovered at Wadi Ḥammeh 27, lay under the later stone-lined posthole (F. 22) in Phase 3.

There were other significant features located in the area outside Structure 3 (to its north). Excavation of the stone platform



6. Overhead view of the base of Phase 4 in Plot XX F; end of 2016 excavations.

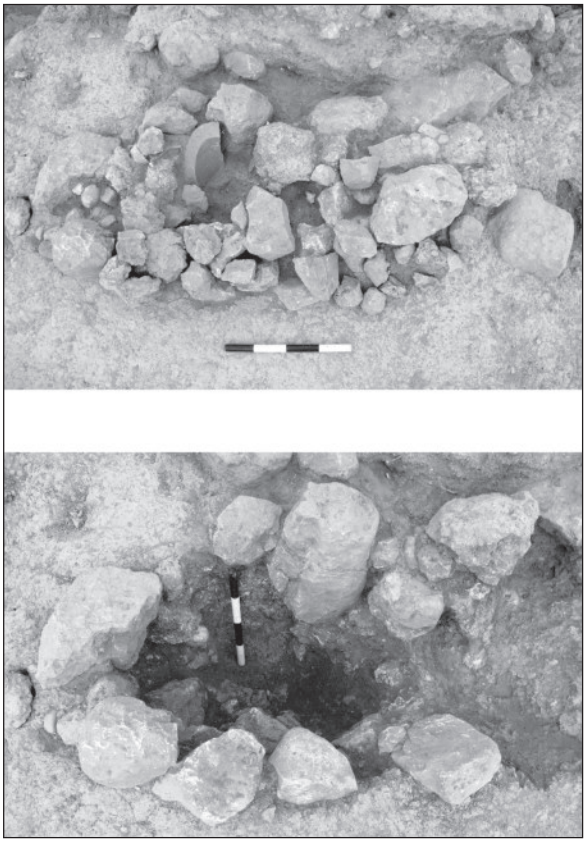
(Feature 20) revealed it as a deep, stone-lined pit (**Fig. 9**) with a significant component of burnt sediment, reminiscent of the Feature 16 pit that accompanied the neighbouring F. 8 burial (**Fig. 7**) in the XX F Sondage (Webb and Edwards 2013). Similarly, Feature 20 may have been placed in order to mark the graves to its south (Features 29 and 32). Versions of this construction were built through all later phases of the settlement, over a period of some 500 years. By the end of the excavation period on 12 December 2016, Phase 4 was cleared to the basal travertine rock layer across the entire excavated area, except for the two incompletely cleared pits (F. 32 and F. 35).
(P.C.E.)

The Double Primary Grave (Feature 29, Phase 4)

Excavation of the Feature 29 double grave, (Locus 8.5, Squares E/F-2/3) was undertaken according to the protocol defined by the archaeothanatological approach. This method,

7. View west to Phase 4 pits.

8. The deep, stone-lined posthole (F. 34); view north.



9. Feature 20, Phase 4; before (top) and after excavation (below).

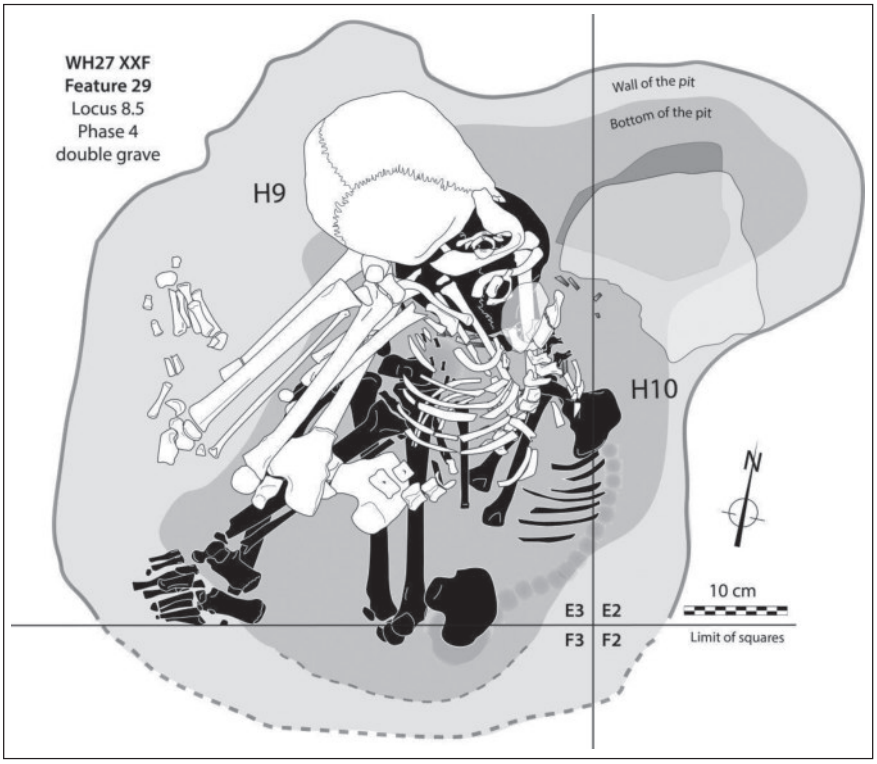
first named 'field anthropology' and recently renamed (e.g. Duday 2009), aims to precisely record the location and interrelation of items (human bones and other objects) present in a grave. Items are individually numbered and mapped, and anatomical aspects and the degree of connection or dislocation of bone joints are recorded. In comparison with their expected anatomical relations, the potential movements of the joints, from the moment of burial to the point of excavation, can yield crucial data for reconstructing handling of the corpse during deposition, the funerary process, and post-depositional events (whether deliberate or accidental). This kind of dynamic reading of the grave is directly inherited from a wider general attitude in archaeology that considers spatial evidence as an important clue to understanding the function and meaning of items and structures, through the reconstruction of micro-historical events (e.g. Leroi-Gourhan 1972).

Two children were deposited on top of each other in the small burial pit (F. 29) cut into the travertine from Locus 8.3. The bottom of the pit is narrow, and deepens towards the south-west; the bodies were partly resting against its irregularly carved walls. Both *Homo 9* and *Homo 10* were placed in a contracted position and oriented south-west to north-east, with skulls towards the north-east (**Fig. 10**).

Homo 10, a child of 8-11 years age-at-death[2], was first placed in the grave on its right side, with the lower and upper limbs flexed (**Fig. 11**). Its feet were crossed (the left ankle superimposed on the right one) and its hands were placed under the knees, on top of each other. The left fist was clenched while the right hand was open. The head and neck were initially in an upright position, resting on a slab. The position of the skull and the first cervical vertebra at the time of excavation, dislocated from the rest of the vertebral column, show that they collapsed against the bottom of the pit during the decay process. This collapse, together with other major joint dislocations (hips, knees, elbows) due to gravitational forces, points towards a delayed filling of the pit. The child must have been placed in a supple container, made of leather or vegetal fibres, which prevented the immediate infilling of sediment following decomposition of the soft tissues. This conclusion is corroborated by the fact that, at the periphery of the corpse, bones of the thorax and of the pelvis were maintained in an upright position (whereas collapse would normally be expected). The container wall, which must have been positioned at the pit margin, thus formed a barrier to bone element dispersal. Many poorly preserved Dentalium fragments were found in the area of the neck and upper thorax; a few were found in pairs, parallel to each other. These items were likely part of a short necklace of two rows of beads, scattered downslope to the south following the decay process. Eighteen pieces were removed, but remnants of others were observed as well, indicating the initial presence of a more elaborate piece of jewellery.

The deposition of the second child, *Homo 9*, was preceded by a further partial filling of the burial pit. Indeed, *Homo 9* did not rest directly on the container of *Homo 10*. Rather, about

2. Age estimation is based on dental calcification (Moorrees *et al.* 1963).



10. The double burial, Feature 29 (Locus 8.4), containing two children; (Homo 9 placed over Homo 10).

10 centimetres of sediment separated the two cadavers, except for the cephalic areas, which were in direct contact with each other. *Homo 9* is a younger child, *c.* 5-7 years age-at-death. Like *Homo 10*, it was also resting on its right side, but with the upper part of its chest lying in a ventral position, and its lower limbs more tightly flexed (**Fig. 12**). Its hands were placed together under its heart, and rested directly on the head of *Homo 10* (**Fig. 13**). Again, as with *Homo 10*, its head was initially placed against the western edge of the worked slab placed next to it (and directly on the slab dedicated to *Homo 10*). However, the skull of *Homo 9* rotated almost 180 to the north-west during the decay process, and appeared in postero-lateral right view during excavation. The first five cervical vertebrae followed the movement of the skull, pointing towards a collapse not long after the decay process started. As with *Homo 10*, taphonomic witnesses of a soft container

11. The primary child inhumation, Homo 10, in Feature 29.

12. The primary child inhumation, Homo 9, in Feature 29.

13. Detail of Homo 9, with its hands placed together under its head and resting on the head of Homo 10.

are clear:

1) delayed infilling is shown by the collapse or sliding of several bones, in addition to the rotation of the skull (left fibula, left calcaneus, left femur, left humerus and right foot).
2) peripheral constraints are evidenced by the unstable vertical position of both feet and the thoracic cage (right scapula vertical and vertebrae over the left ribs).

Several objects were found in the upper fill of the grave. These included a pear-shaped piece of limestone, two fragments of worked basalt, and two Dentalium fragments stained with red pigment. It was not possible to determine conclusively if these objects had been deposited as grave goods for *Homo 9*.

In conclusion, both children were placed in similar positions, one superimposed over the other. The oldest child, buried beneath the younger one, was wearing a Dentalium necklace. Both children were provided with an individual stone headrest and an individual funerary bag. The direct contact of the heads is a strong argument for simultaneous deposit, although a short period of delay while the pit lay open cannot be totally ruled out.

Superimposed burials are not frequent in a Natufian context, but interestingly some cases are documented in other sites and in various phases. One adult male and two young babies occur at Ain Mallaha during the Final Natufian (H. 154, 151, 153; Bocquentin 1998); two young adolescent males in Raqefet Cave during the Late Natufian (H10 and H13; Lengyel *et al.* 2013); two adult males in Hayonim Cave during the Early Natufian (H25 and H27; Belfer-Cohen 1988; Bar-Yosef 1993) and one adult male with a baby in al -Wad Cave during the Early Natufian (H4 and H9; Garrod and Bate 1937; Bocquentin 2003). Except for this last case, dug in the early 1930s and for which documentation is not detailed enough for an archaeothanatological discussion, all superimposed corpses were buried in individual shrouds or containers. Moreover, each time sex determination was possible, only males were involved. Finally, in the case of Hayonim Cave, strong family links were found between the two adult males buried together (Bocquentin 2003: 401). These examples show that superimposed corpses are not just a response to possible simultaneous death, but are specific features following strict rules or taboos, common to all Natufian communities. Other kinds of plural graves do exist with different rules (corpses side to side, mixed sex, no babies).

It will probably be difficult to say more about the biological identities of the two children from Feature 29 at Wādī Ḥammeh 27. Their skeletons were found in a poor state of preservation within a hard, black, organic matrix, mixed with chunks of travertine. As many *in situ* measurements as possible were recorded, and samples of sediment from the region of both pelves and within the crania were taken, in addition to well-contextualized charcoal pieces found in the fill. The hope of gaining more information rests mainly with the samples of molars and petrous bones extracted for isotopic (Shewan, below) and ancient DNA analyses (Valdiosera, below).
(F.B.)

Scattered Human Bones from Phases 2 And 3

During the 2016 season, a review of the faunal bags from the three project seasons (2014, 2015 and 2016) was made in order to look for human bones included in them during sorting. So far, forty human bones or clusters of fragmented human bones have been identified. A concentration was found in Square E6-1 (Locus 2.5 and 2.6, Phase 2), comprising twenty cranial fragments and five other human bone fragments (ribs, phalanges and vertebrae). All except two were burnt (mainly a black-grey colour, indicating a low temperature of burning). They belong to at least one adult and one immature individual. Another concentration of immature burnt cranial fragments was found in Square E2-1 (Locus 6.1, Phase 3). This preliminary inspection corroborates and extends the practice previously described from Phase 1 (Webb and Edwards 2002), where burnt pieces of human crania were scattered in the occupation deposits A comprehensive analysis of these remains will be done when finds sorting is completed.
(F.B and M.A.)

Geoarchaeological Sampling

A second season of geoarchaeological sampling was undertaken at Wādī Ḥammeh 27 during November 2016 for sediment samples, in order to establish the nature, origin and significance of the anthropogenic deposits (Courty *et al.* 1989; Macphail and Cruise 2001), and to evaluate field identifications of trampled floors (Edwards 2013a). The sampling program included the extraction of intact sediment blocks and associated bulk samples for micromorphological investigation (Courty *et al.* 1989; Goldberg and Macphail 2003). These samples will allow the investigation of archaeological questions pertaining to patterns of residence, abandonment and past human activities at the site.

Exposed surfaces were cleaned to remove weathered profiles and stratigraphy was drawn to scale. Sediment blocks measuring approximately 15cm x 10cm x 10cm were cut; blocks were larger than required to ensure intact samples for study (Goldberg and Macphail 2003). Before removal, sample locations were recorded on scaled stratigraphic diagrams. Samples were cut from profiles or pedestalled sediment blocks. Canned samples had been taken in 2015, but it was found that the vibration which ensued from driving cans into the baulk wall resulted in the partial break-up of sediment samples. To get around this problem in 2016, gypsum plaster bandages were applied to support block samples (**Fig. 14**), and to preserve the friable sediments, inclusions and artefacts therein (Goldberg and Macphail 2003). Photographs were taken during the process and before removal. Samples were labelled when the plaster was dry (including their orientation). Associated bulk samples were taken at 5cm intervals down the profile, and recorded on the scaled stratigraphic diagrams.

Both systematic and selective sampling were employed to provide full coverage of lateral and vertical variations in contexts and specific boundaries (Courty *et al.* 1989: 41; Goldberg and Macphail 2003: 573). Blocks sampled from Plot XXF are from sediments identified as occupation Phases 2, 3 and 4. Blocks were taken from the east baulk of the XXF Sondage in Square E1, from pedestalled sediment in Square D3, and from Feature 32 (Square D3), in order to investigate lateral variations in stratigraphy and pit fill. Selective sampling was applied at the East Cliff Exposure (ECE), to focus upon

14. Lauren Prossor taking plaster-jacketed, oriented sediment samples from the eastern baulk wall of Plot XX K.

transitions between sedimentary units. In order to sample Phases 0 and 1 sediments, a 2m x 2m area of backfill was removed from the eastern baulk of Plot XXK (excavated in the 1980s), to enable sampling by a series of systematic, overlapping blocks. A natural analogue for the Wādī Ḥammeh 27 sediments, which would provide a baseline for future analyses (Courty *et al.* 1989; Goldberg and Macphail 2006), was unable to be located for sampling on the plateau, because the site covered the entire landform (i.e. the 'Natufian clay', *cf.* Edwards 2013a).

Block samples will be impregnated with an araldite-based resin for thin section production. Micromorphological descriptive nomenclature by Stoops (2003), and Stoops and colleagues (2010), will be used to describe the thin sections. Thin sections with no cover slip will be produced, so that additional ancillary analyses such as *in situ* SEM-EDX or Fourier transform infrared spectroscopy (FTIR) can be undertaken directly on the thin sections, thereby increasing the accuracy and cross-correlation of microstratigraphic data gathered during analysis (Canti 1995).
(L. P.)

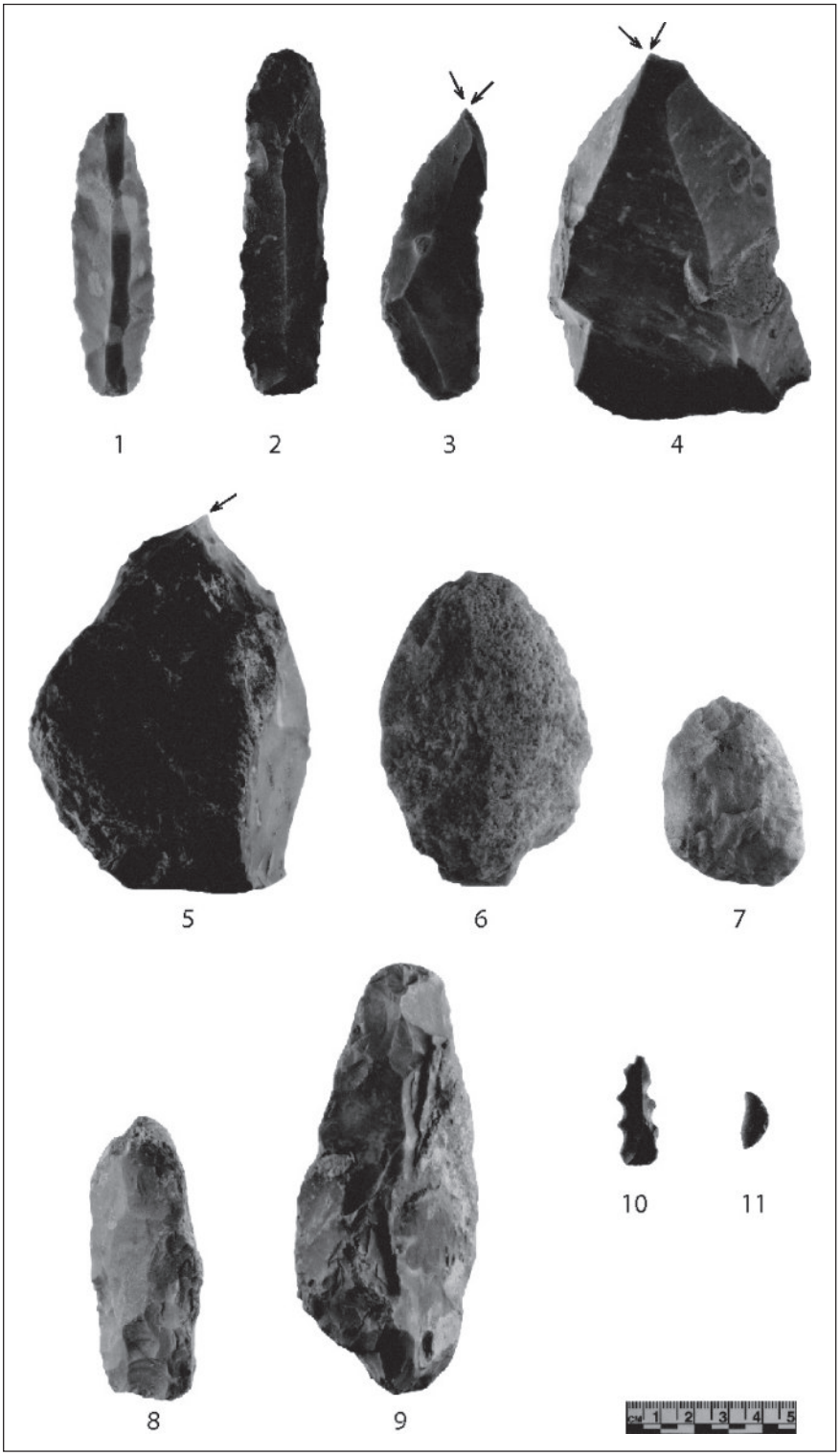
Flaked Stone (Chert) Artefacts

A total of 143,384 flaked stone chert (flint) artefacts were recovered from the lower Phase 3 deposits (*Loci* 8.1, 8.2, 9.1, 9.2 and 9.3), with an average volumetric density of 66,505 artefacts per cubic metre. Phase 4 proved to be similarly rich in lithic material, with 76,626 artefacts recovered from the relevant *loci.* A slight decrease in artefact density was noted, however, with the Phase 4 deposits containing an average of 53,361 artefacts per cubic metre. Artefacts classified as debris ('chips and chunks') numerically dominate every locus, demonstrating that knapping was consistently performed onsite from the earliest occupation of Wādī Ḥammeh 27.

Retouched chert artefacts from the 2016 excavations included characteristic types which have previously been described for other phases of the site, including Helwān-retouched lunates, sickle blades and bladelets, awls, and notched and denticulated bladelets. Significant this year were finds of large flint tools, particularly from the exterior areas north of Structure 3, including rare items such as large cores, massive burins, and trihedral picks (**Fig.15**). Also present were a small but significant number of exceptionally long, thick, retouched blades, which were unlikely to have served as composite sickle elements; their function was much more likely to have been hand-held serrated cutting implements (**Fig. 15:1-2**). Ultimately, however, these artefact types were few in number, and anomalous with respect to the series of smaller retouched bladelet products. Helwan-retouched lunates and bladelets dominate the geometric and non-geometric assemblages respectively. These items were often produced from the type of small core, often rotated, that was quintessentially Natufian from the earliest occupation of the settlement.

Of further note were two small quartzite bifaces (**Fig.15: 6-7**), one of which was recovered from the Lower Phase 3 deposits inside Structure 3, (Locus 8.1) and the other from the Feature 35 burial (Locus 8.9, Phase 4). These two artefacts are notable in that they are the only flaked stone artefacts manufactured from quartzite to feature in the Wādī Ḥammeh 27 assemblage. It is possible that they represent objects produced in the earlier Palaeolithic that were collected as curiosities. However, they do not resemble items found or excavated in Lower or Middle Palaeolithic sites from the region (Macumber and Edwards 1997; Edwards 2004). They may well have been be made *in situ*, given their fresh condition and lack of patina, and the fact that bifacial tools are a regular part of the Natufian assemblage.

While analysis of Phase 3 spatial distribution remains in its preliminary stages, several clear distinctions between lithic artefacts deposited within the interior and exterior loci are apparent. Most notable is that the average mass of artefacts deposited in Locus 9.1 was more than twice that of the internal Locus 8.1 artefacts. This is best represented by the comparative mass of cores and retouched artefacts deposited between the two loci. The interior Locus 8.1 cores comprise eight percent of the total mass of lithic material in this area, with the mean core weighing twenty-three grams. In contrast, Locus 9.1 cores incorporate fifteen percent of the exterior lithic material by weight, with the average core recovered from this area weighing



15. Flaked stone (chert) artefact tools from Plot XX F: 1-2) blade retouched on both edges; 3) dihedral burin/ endscraper; 4) dihedral burin; 5) burin on oblique truncation; 6-7) quartzite bifaces; 8-9) trihedral picks; 10) denticulated bladelet; 11) Helwan lunate. All objects are from Phase 3 except 5 and 6, which are from Phase 4.

forty-nine grams – more than twice that of the interior cores. The retouched artefacts recovered from the two loci demonstrate a similar – if slightly less pronounced - distribution, with a higher number of heavier tools recovered from the external area. This was most noticeably manifested in the fact that the only two trihedral picks to be recovered throughout the last three years of excavations were recovered (in close proximity to one another) from Locus 9.1. Both

loci contained a similar amount of minute lithic debris, suggesting that knapping was performed in both settings. The larger numbers of heavier artefacts deposited outside may nonetheless be indicative of a desire to keep the internal floor of Structure 3 somewhat clear.

The Feature 29 artefact assemblage yielded one of the lowest percentages of tools, with less than one percent of the flaked stone artefacts excavated from its deposits featuring retouch. In contrast, the adjacent Feature 32 fill exhibited the highest proportion of retouched tools seen in the lower deposits of Wadi Ḥammeh 27, suggesting that some of these may have been intentionally deposited alongside the bone tools uncovered from this pit.
(A.M.V)

Basaltic Artefacts

Twenty-nine basaltic artefacts were recovered from the excavations in 2016. The great majority (76%) of pieces were from Phase 4 layers, with five objects (17%) from Phase 3, and two (7%) found during sediment testing on the eastern side of the Plateau. Phase 3 produced a short pestle (RN 160100) of uncommon type and a miniature bowl (RN 160324, **Fig. 16:6**). Two pestle fragments and a handstone fragment complete the repertoire from this phase.

Less than a third of the objects from Phase 4 (28%) were complete. Two pestles were unusual in form; RN 160250 with its twisted, 'banana'-shaped profile (**Fig 16:4**) and the conical example, RN 160252 (see Fig 16:5). Large pestles, missing in Phases 2 and 3, make a return in Phase 4, for example RN 160291, which is 36.0 *cm* long and 10.4 *cm* in diameter (**Fig 16:1**). Another complete object (RN 160391) is a grooved plaque, or shaft straightener/ abrader (**Fig. 16:7**). The most interesting evidence from a technological point of view was the discovery of an apparently unworked lozenge of vesicular basalt raw material (RN 160248) and an apparently incomplete basaltic vessel (RN 160420; **Fig. 17**). These objects are the first signs that basaltic artefacts were made on-site at Wādī Ḥammeh 27, and were not always imported as finished pieces. Large vessels, probably mortars, were found in fragmentary form, with examples found in Feature 20 (RN 160247 and RN 160249).

During sediment sampling, a pair of gracile pestles fell from the East Cliff Exposure, located 18 metres south-east of the main excavation area. The two items were located side by side, similar to Artefact Cluster 2 from Plot XX E in Phase 1 (Edwards and Hardy-Smith 2013: 105). RN 160128 (**Fig. 16: 3**) has bi-convex terminals, whereas RN 160129 has one flat terminal (**Fig. 16: 2**). The additional significance of this find is that it augments the estimate of site area for the site from 2,380 m^2 (Edwards 2013b: 65) to possibly half a hectare. Previous evidence from Plots XX M had indicated a sharp fall-off in occupation intensity, immediately east of the main excavation area.

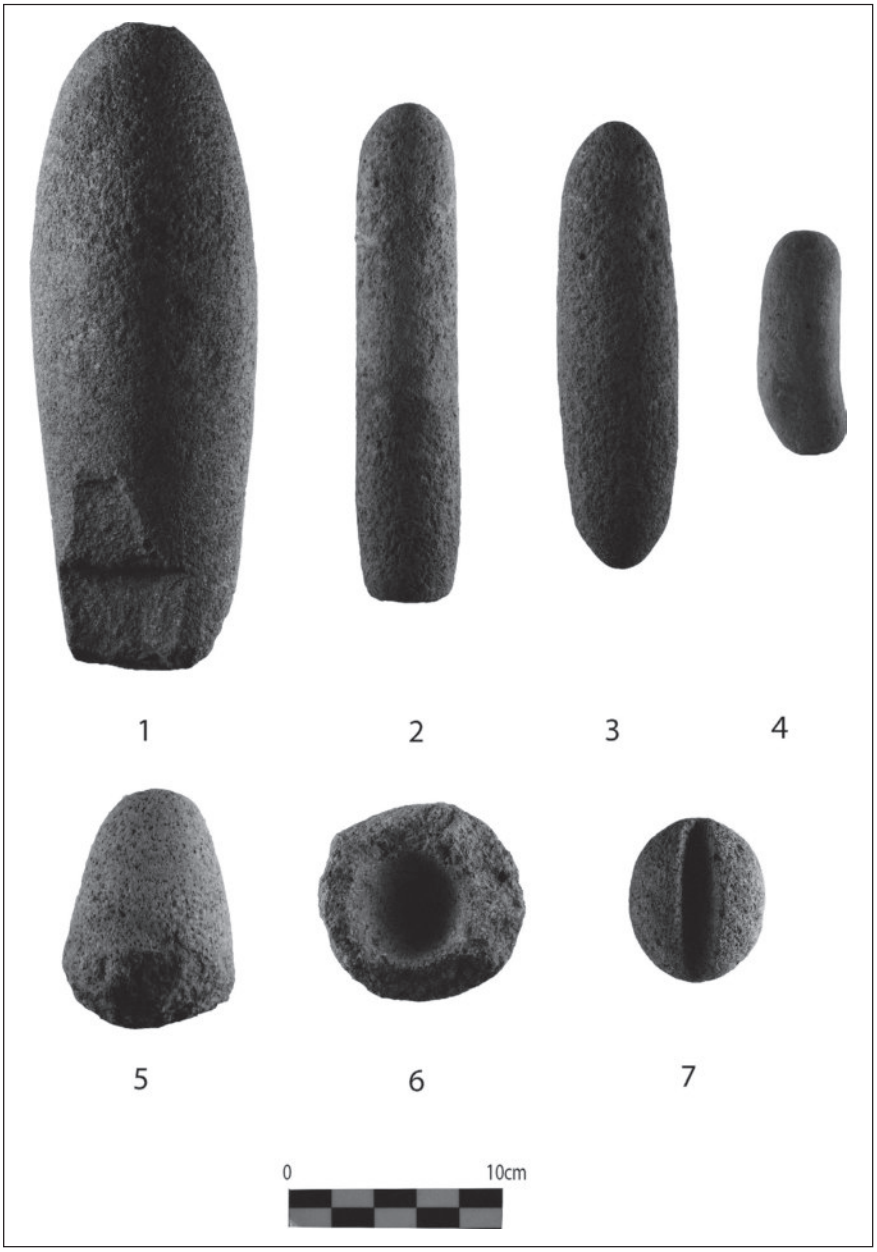
Limestone Artefacts

Of the twenty-two limestone artefacts, eight were recovered from Phase 3 deposits (36%) and thirteen (59%) from Phase 4 layers, with a plaque (5%) bearing an incised pattern found on the surface (RN 160431). The incised plaque (**Fig. 18**) features a series of parallel lines opposed to a series of vertical strokes, and in this respect it is reminiscent of a similar example from the nearby, small Natufian site of Wādī Khawwan 1 (Edwards *et al.* 1998). Complete objects from Phase 3 are comprised of a handstone, a small spheroid and a worked pebble. The fragmentary items include vessels, a handstone and a hammerstone.

Phase 4 produced more complete (8) limestone artefacts than broken ones (5), which is unusual, as fragmentary objects are usually numerically ascendant for most classes of artefacts. This is probably because complete limestone objects are quite robust, and this is certainly the case for a bulky quern (RN 160429), which is a rare item at Wādī Ḥammeh 27. Another limestone vessel (RN 160429), which was probably utilised as a mortar, had a breeched base (**Fig. 19**). Other artefacts included hammerstones, shaped plaques and pieces, and a pestle. The fragmentary artefacts are represented by a similar range of types, with the addition of a broken miniature plate, (RN 160275).

Bone Artefacts

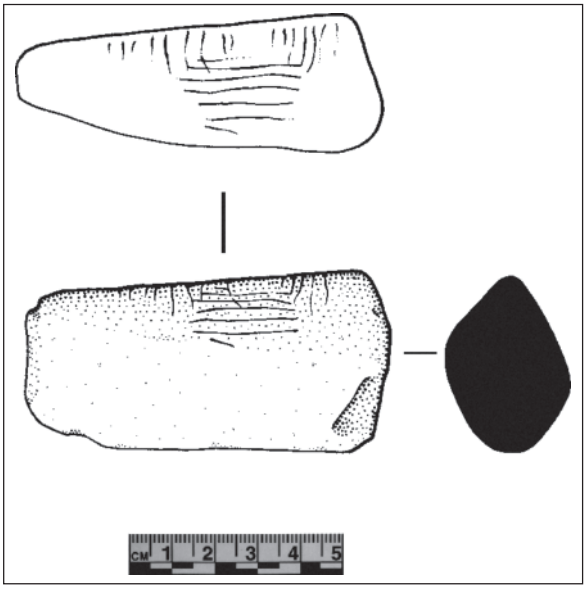
The 2016 excavations yielded some interesting new types of artefacts, as well as artefactual evidence that challenges previous interpreta-



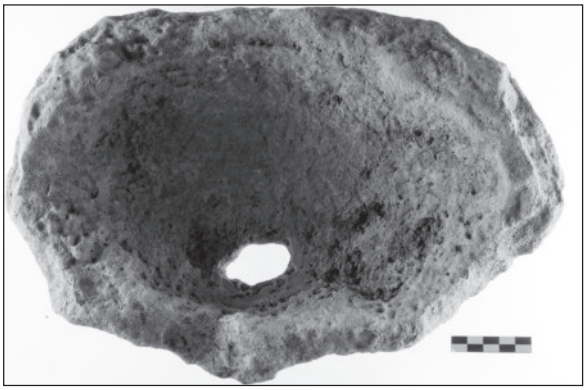
16. Basaltic artefacts: 1) massive pestle, RN 160291; 2) pestle with flat terminals, RN 160129; 3) pestle with convex terminals, RN 160128); 4) pestle with twisted profile, RN 160250; 5) conical pestle, RN 160252; 6) Grooved plaque (RN 160391; 7); miniature bowl, RN 160324. Various phases and excavation localities.

17. Unfinished basaltic artefact (RN 160420); Phase 3.

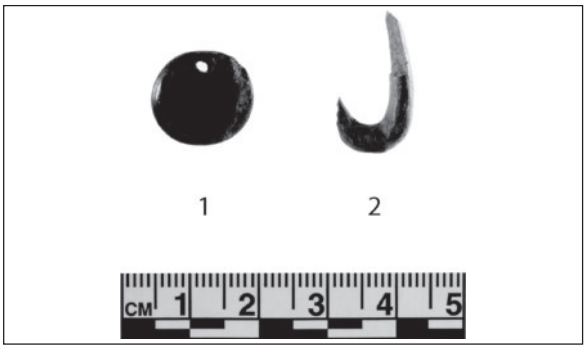
tions of the site. Of forty-three objects, nearly all were fragmentary. Phase 3 yielded twenty-six items, almost all of which were broken, while seventeen objects were recovered from Phase 4. The assemblage included numerous non-diagnostic fragments, a few points, and a gazelle podial bead. A notable find is a bone fishhook (RN 160278; **Fig 20:2**). The fish-hook is a reasonably common type in more westerly Natufian sites, but the example discovered in 2016 is the first one from Wādī Ḥammeh 27, from a bone artefact assemblage numbering over 550 specimens (Edwards and Le Dosse-



18. Limestone plaque with incised design of lines and strokes (RN 160431); surface find.



19. Breeched limestone vessel (RN 160429) from Phase 4.



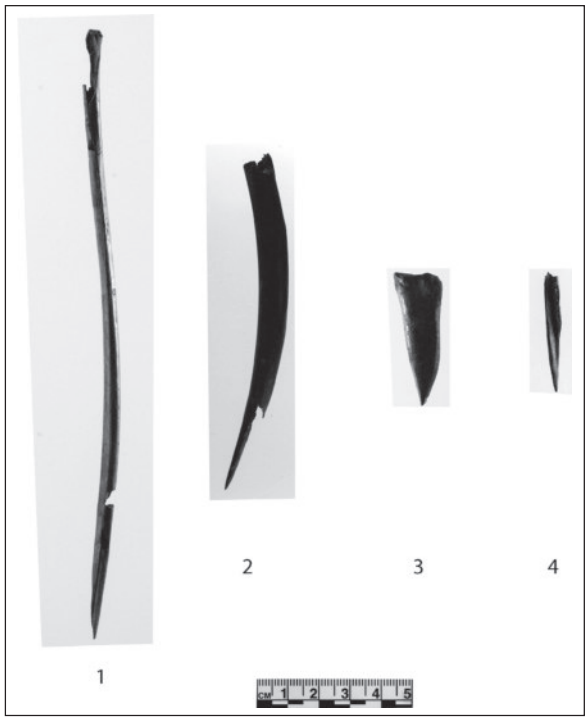
20. 1) Bone pendant, RN 160211; and 2) bone fish-hook, RN 160278; both from Phase 4.

ur 2013), and where fish remains do not occur (Edwards and Martin 2013).

The other noteworthy items from Phase 4 are a cluster of four unusual bone points, deliberately placed in the (incompletely excavated) burial pit, Feature 32. The most remarkable specimen is a very long, gracile point (RN 160365), measuring 19.5 centimetres in length, but only a few millimetres in width at any point (**Fig. 21:** 1). RN 160364 is a similar example, with a length of 15 *cm*. This piece had been fragmented into many pieces *in situ,* and could not be effectively mended. RN 160360 (**Fig. 21: 2**) is a long curved point, possibly made from a rib. All three of these objects are unique in the Wādī Ḥammeh 27 repertoire. Elsewhere, Phase 4 yielded a robust point (RN 160396) made from the proximal epiphyseal region of a mammal bone (**Fig. 21: 3**). The example from Phase 3 (RN 163063) is a finer, more conventional piece for the site (**Fig. 21: 4**). Another new artefact type from Phase 4 is a small, circular bone pendant (RN 160211; **Fig. 20:1**). Its closest parallel at Wādī Ḥammeh 27 is an ovoid specimen (RN 150007), excavated in 2015 from Upper Phase 3.

Pigmented Earth (Ochre)

Small flecks to large chunks of red and yellow ochre have been found in every phase and major context in Wādī Ḥammeh 27. These finds continued in 2016, together with examples of a distinctive, white pigmented earth. Forty



21. Bone points: 1) RN 160365; 2) RN 160360 from the Feature 32 burial pit; 3) RN 160396, Phase 4; 4) RN 163063, Phase 3.

percent of the ten recorded ochre pieces in Phase 3 were white, rising to 73% in Phase 4 (11 cases). Two large examples from Phase 4 were worked into squarish blocks.

Manuports and Miscellanea

Highly polished, siliceous stones have occasionally been found throughout the Wādī Ḥammeh 27 sediments (Edwards *et al.* 2013). The 2016 excavations produced relatively more than any other season, with four shiny pebbles from Phase 3 and two from Phase 4. The previously substantial numbers of marine Dentalium shell fragments were greatly augmented in 2016; not only from the current 2016 excavations, but also from finds found by wet-sieving bags from 2015. In all, 436 examples were registered. Three fossils were also discovered in Phase 3; a bivalve, a cephalopod specimen (cf. *Baculites sp.),* and a distinctive echinoid which is treated in more detail in the following section.
(P.C.E.)

Fossil Echinoid

The single, globular fossil echinoid or sea urchin (RN 160138), measuring 30mm in diameter (**Fig. 22**), found on an exterior Phase 3 (lower) surface, represents the first example of this type of fossil to be recovered from Wādī Ḥammeh 27. It is relatively worn, the wear seeming to be of natural origin. Like all echinoids, the animal's test (shell) is composed of five double columns of large plates (the interambulacra), alternating with five columns of small plates which are pierced by a pair of pores (the ambulacra). The abrasion suffered by the fossil has resulted in many of the surface features of the plates, especially the tubercles that in life bore spines, having been worn away, although a few residual tubercles occur on some ambulacral plates. As a consequence, determining the genus and species to which this fossil belongs is problematic. Alternatively, the weathering has made the specimen more striking in appearance, by highlighting the sutures between the plates. This may have been one of the reasons why it attracted the interest of an occupant of Wādī Ḥammeh 27.

22. Fossil echinoid (sea urchin) RN 160138, cf. genus Leioechinus; from Phase 3.

The echinoid is likely to be a stomechinid example, possibly belonging to the genus *Leioechinus*, which has been described from the Middle Jurassic of Saudi Arabia. This family has not previously been recorded in an archaeological context. It was widespread and existent from the Jurassic to the Cretaceous. Given that other fossils found at Wādī Ḥammeh 27 appear to have derived from local late Cretaceous sediments, it is possible that this echinoid also derived from these rocks.

Fossil echinoids have been reported from a number of Neolithic and Iron Age archaeological sites in Jordan (Reese *et al.* 2002; McNamara 2004). The earliest record to date is of worked fossil echinoids from 'Ain-Ghazal, dated between 9,500 years and 10,300 years BP. Wādī Ḥammeh 27, at 12,000-12,500 BP therefore represents the earliest known record of people collecting a fossil echinoid in Jordan and, indeed, in the Middle East.
(K.J. McN.)

Sampling for A Map of Bioavailable Strontium

The collection of soil and grass / plant samples continued during the 2016 field season, in order to extend the baseline reference map of modern bio-available strontium (Sr) isotope ratios. Sampling was conducted east of the Jordan Valley; firstly at Wādī al-Ḥammeh,

(including samples from Phases 2, 3 and 4 of Wadi Ḥammeh 27), at Tabaqat Fahl (Pella), and higher up–slope at Ashrafiyya and Barqash. Further south, sampling was conducted at Halawa, on the lower slopes above the Jordan Valley, at and near Ajlun Forest Reserve, at ʻAnjara south of Ajlun and Sakhra north-east of ʻAjlun, and at Dibbeen Forest Reserve south of Jarash. Further away to the north-east, samples were also taken from Turra (near Ramtha). The survey and sampling exercise resulted in twenty-five new samples from eleven locations.

Following compulsory Australian quarantine treatment, the samples were prepared for Thermal Ionisation Mass Spectrometry (TIMS) at the Research School of Earth Sciences, Australian National University, Canberra, according to the methodology previously outlined in Edwards and colleagues (2015).
(L.S.)

Archaeogenetic Studies

Ancient DNA or archaeogenetic studies are increasingly indicating their potential to shed light on our understanding of human prehistory, in particular the origins and legacy of agriculture (Günther 2015; Skoglund 2014). Therefore, a sampling campaign for ancient DNA analyses commenced as part of the 2016 field season. In order to conduct this type of research, it is necessary to obtain samples of human remains from stored collections and/or directly from archaeological sites (*in situ*). This is done following stringent protocols for ancient DNA analysis, by collecting the material under sterile conditions, in an attempt to reduce the risk of contamination from exogenous DNA.

The 2016 campaign involved collection of samples of human bones and teeth from the newly excavated Natufian human remains at Wādī Ḥammeh 27, and also a series of human remains stored at the Pella dighouse. The latter specimens derive from a variety of time periods and were accumulated over many seasons of excavation by the University of Sydney at Khirbat Fahl and associated surrounding sites. The Pella samples cover long time-spans, ranging from the Middle Bronze Age to the Umayyad caliphate, but consist in the main of Roman to Byzantine remains.

The human remains collected from previous Pella field seasons potentially correspond to twenty-five individuals. In addition, remains from three individuals were collected from Wādī Ḥammeh 27. Samples were collected from *Homo 9* and *Homo 10*, the two occupants of Feature 29 (Phase 4). Another human bone was sampled from a Phase 3 context excavated in 2015. Altogether, sixteen petrous bones, eleven teeth and up to eight other bone elements such as rib fragments and phalanges were collected.

The samples will be analysed at a specialised ancient DNA facility. Provided these samples yield preserved DNA, the Wādī al-Ḥammeh and Pella regions should be part of the key to understanding the origins and legacy of agriculture in the Southern Levant, and population dynamics of the area over time. Moroever, genetic analyses on human remains from the Natufian complex will enable us to understand the social and biological relationships among early sedentising peoples.
(C.V)

Conclusions

The 2016 La Trobe university season was concluded successfully, with the main research aim of locating human burials at the base of the site attained. More generally, the lower deposits of the site have revealed a great deal about the foundation and architectural evolution of Early Natufian settlements. Several new artefact types were also discovered. With these findings, fieldwork for the three-year La Trobe University project ‘Ice Age Villagers of the Levant’ was completed. The La Trobe University team is grateful to Dr Munther Jamhawi, departmental representatives Musa Malkawi and Muhammad Shalabi, the staff of the Department of Antiquities of Jordan, our local Jordanian staff, and the community of Tabaqat Fahl, for their strong support in the investigation of an important period of Jordanian heritage, which is also of global importance.
(P.C.E)

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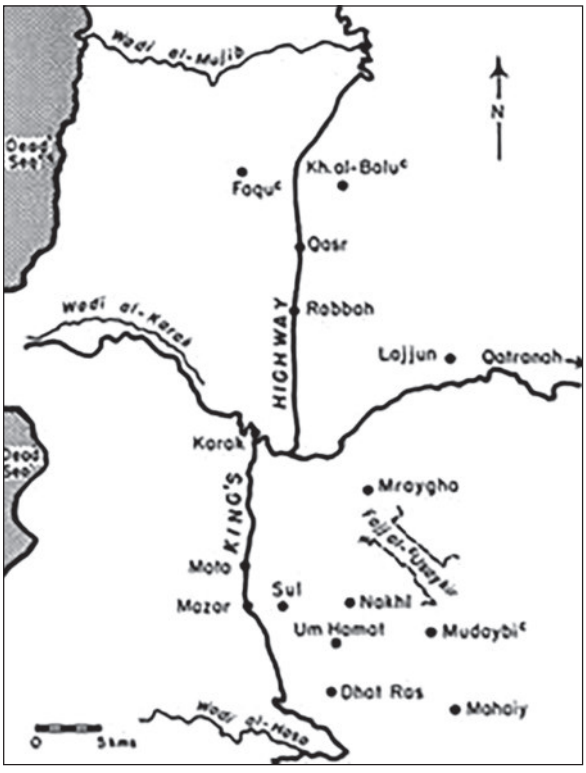
A GEOMORPHOLOGY OF THE KARAK PLATEAU OF JORDAN

Richard A. Stephenson

Introduction

The Karak Plateau, a small portion of the Jordanian land surface, has well defined natural boundaries, which are not easily altered by cultural forces (**Fig. 1**). The plateau, while somewhat of a continuum, represents an interesting phenomenon, which seems to follow the multiplicity of the region's biophysical attributes as well as its culture (**Fig. 2**). A study of the plateau's geomorphologic process tends to show how the landscape is altered as it relates to the interaction of energy and earth materials.

The Karak Plateau has been the subject of a comprehensive research effort by the Karak Resources Project (KRP) since its inception in 1995. The project's long term goal is to document the manner in which its inhabitants have utilized the environmental resources of the plateau (Mattingly 1997). It intends to attain its goal by: (1) surface reconnaissance; (2) multidisciplinary research in the physical and social sciences, and (3) excavation of significant sites which were occupied over a number of periods (Mattingly 1996). Each year, increased information and understanding is achieved by the KRP team (**Fig. 3**). In 1995, the KRP team examined 18 sites, which had originally been examined as part of the Pinkerton-Miller surveys between 1978 and 1982, and earlier described by Glueck in the 1930's (Miller 1991). In addition to regional studies, it was decided to consider one site for intensive archaeological research (**Fig. 4**); the site of Khirbat al-Muḍaybī', an Iron Age II fortress, was chosen. In situ and regional work was accomplished in 1997, 1999, 2001, 2009, 2011 and 2014; the hiatus of on-site research since then has been utilized for analyses of



1. Map of the Karak Plateau.

2. East Gate at Khirbat al-Muḍaybī'.

3. KRP 2009 Research Team at Mudaybi.

4. Fort of Muḍaybi' from the East.

findings (Wineland, J.D., 2009; Mattingly, 2014).

Multidisciplinary efforts in archaeological research have gathered momentum during the past several decades. As archaeological research becomes more sophisticated with its use of technological advancements, a team approach is now a requirement for surveying as well as for analyses and interpretation. There is little doubt that the study of archaeology is not without environmental considerations, such as geomorphology (Butzer 1974 and 1987 and Rapp and Gifford 1975). More recently, Hill (2001) added to the regional research endeavor with his study of environmental degradation in Wādī al-Ḥasā. This is also the case for the archaeological research currently being conducted by the KRP team on the Karak Plateau of Jordan.

Jordan, as observed today, can be spatially divided into several geophysical areas: (1) the Ghor, which includes three parts from north to south, the Jordan Valley, the Dead Sea and the Wādī 'Arabah; (2) the Northern Highlands east of the Ghor, which are upthrown blocks of upland plains and highlands, including the Karak Plataeau; (3) the Central Jordanian Limestone Area, including the El Jafr Depression; (4) the Southern Basement Complex and Paleozoic Sandstone Area; (5) the Azraq-Wadi Sirhan Depression; (6) the Basalt Plateau, and (7) the Northeast Jordanian Limestone Area (Abu-Ajamieh 1988). The Karak Plateau is commonly defined by the Wādī al-Mūjib to the north, the Wādī al-Ḥasā to the south, the Ghor to the west, and a transitional area, which becomes the Central Jordanian Limestone Area, to the east toward the desert. The plateau is a unique area, in that no other such landform exists in the Transjordan region.

The Location of the Karak Plateau

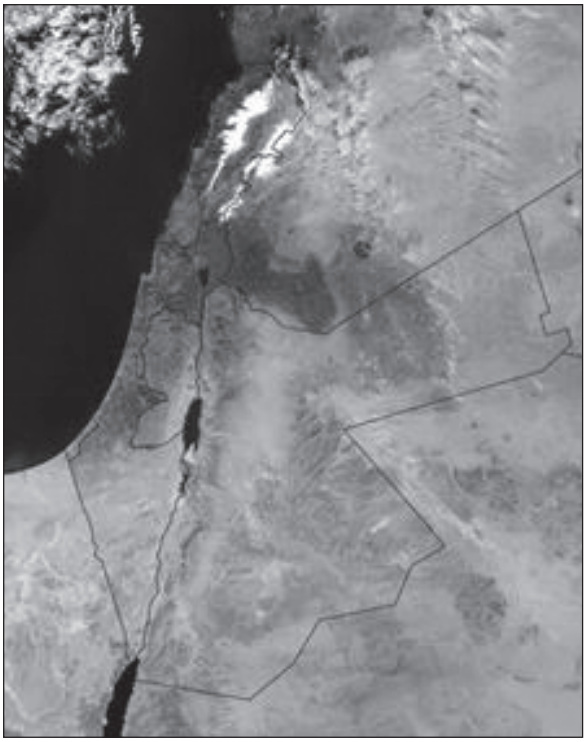
To understand the Karak Plateau, its place in time is of utmost importance. Geologically,

the plateau varies from very old to recent earth materials, as geologic processes never end. Spatially, the plateau is located with respect to adjacent landforms and other spatially distributed phenomena, which defines the uniqueness of the Karak region (**Fig. 5**). Of particular interest is the route east of the Dead Sea Rift known as the King's Highway, which runs through the ancient Kingdom of Moab, including the Karak Plateau, between ancient Babylonia and Egypt.

The Karak Plateau is an area of about 750 square kilometers, with the highest elevation of the upland surface approximately 1,200 meters above sea level in its southwestern quadrant, and its lowest elevation approximately 900 meters above sea level toward the east and the desert. Interestingly, the ancient town of Nakhl (*cf*. **Fig.1**) marks the apex of the drainage divide between the two major wadis mentioned above; this hilltop was well known to the first inhabitants of the plateau (Mattingly *et al.* 1998).

To the north, the Karak Plateau is separated from the Madaba Plain by the Wādī al-Mūjib (**Fig. 6**). To the south, the upland ends with the Wādī al-Ḥasā. To the west is the Dead Sea Rift, also known as the Ghor or Araba, and to the east is the vast Syrian Desert. Another wadi, the Wādī Karak, tends to drain northwesterly into the Ghor from the middle portion of the plateau. The site of the town of Karak is well positioned on a promontory at the confluence of this major wadi and a minor wadi near the top of the plateau surface, not very far from the northern end of the Fajj, which is a graben stretching toward the southeast (**Fig. 7**). The first inhabitants apparently knew of the importance of this very defensible position on the landscape, making Karak a major settlement on the plateau (**Fig. 8**).

The Karak Plateau was a major part of the ancient Kingdom of Moab, dating back to Biblical times. Of particular importance here is how the ancient inhabitants encountered the environment on the one hand, and how modern development is responding to the plateau on the other. Consequently, we are concerned with the surface features, and how they appear to be related to the habitation through time.



5. Satellite Image of Jordan, with the Karak Plateau east of the Southern Half of the Dead Sea (NASA).

6. Wādī al Mūjib, with the Karak Plateau to the South (on the left).

7. Fajj al-'Usaykir, to the east of Muḍaybi'.

8. Karak Castle.

The Karak Plateau can trace human occupation and settlement back to at least Iron Age I (1,200-925 B.C). In all probability, humankind in the earliest periods of occupation witnessed periodic crustal movements and volcanism. During the wet winter months, significant headward erosion from streams occurs, which begin from the base of the major wadis; this tends to incise the fractures or areas of structural weakness. In other words, humankind saw a relatively broad upland landscape, with narrow and sharp separations together with some sharply edged valleys, develop into what exists at the present time. The plateau is now a rolling upland surface interrupted by small wadis, and other surface features such as grabens. Most of the inhabitants appear to be concentrated in relatively small settlements, which are spread along major transportation routes. These routes generally mark the ease of human movement. At certain strategic locations on the plateau, fortresses and settlements have occurred at promontories and junctions of streams or transportation routes. A description of the plateau's surface should reveal how inhabitants have responded to their biophysical environment. Specifically, how did the landforms or the surface features of the Karak landscape develop? This is a major geomorphological question. Insofar as habitation is concerned, what was the response of those who have settled on the plateau? And what are the expectations for the future?

Previously, only a few scientific studies were undertaken in the Karak region, but this has changed in recent years. Burdon (1959) contributed a great deal to the understanding of the geology of Jordan, including the Karak Plateau. Later, Bender (1968) added his learning of the Jordanian geology as well. Both these studies are primarily concerned with stratigraphic references, as related to the general geology of the region. Baly (1985) contributed his environmental approach to the literature of Jordan, adding that the region requires more scientific investigations. In answer to his plea, the Jordanian Geology Directorate has been making progress by mapping the geology of the area (Powell 1988; Shawabkeh 1991; and Khalil 1992). Additionally, Salameh (1997) has added to our understanding of the geomorphology along the eastern side of the Dead Sea.

For general purposes, the studies of Koucky (1987), Frumkin and Elitzer (2001), and Niemi and Smith (1999) on the environment around the Karak area are worth noting. Lastly, Green (2002) summarized the plateau's environment in rather definitive terms. Nonetheless, with so little information available, it is difficult to interpret past environmentally significant events which have contributed to today's environment. It follows that it is even more difficult to estimate, with any degree of certainty, what may take place in the future. Speculation, even misinterpretation, is common. Generalities run wild without an adequate scientific base. More scientific research, with all the zeal that

can be mustered, is definitely required for this region. Furthermore, it is possible to improve the decision-making processes which will be necessary, both to plan for orderly development and simultaneously preserve the rich heritage of the Karak region.

A Theoretical Geomorphologic Construct

A literal translation from the Greek roots for defining geomorphology would mean "a discourse on earth forms". Today, the meaning is closer to "a study on how the earth's surface responds to energy processes". This response is one of a variety of resulting features called landforms. What are the surface forms of the Karak Plateau that make it so unique and so special? Landforms have been studied by many scholars since antiquity. Herodotus, for example, recognized the importance of the annual flood cycle of the River Nile, by depositing silts and clays on the delta. In addition, Aristotle recognized that streams removed material from the land and deposited it as alluvium. Strabo thought that a river delta varied in size according to the nature of the region drained by the river. Seneca held the idea that rainfall was insufficient to account for rivers, but that the power of streams made their valleys. Later, in Arabia, Ibn-Sina (Avicenna) held views that mountains were either produced by an uplifting of the ground or were the result of sculpturing by streams (Thornbury 1954). While the relationship between earth materials and energy is rather common knowledge today, it was obviously not so in ancient times. Even so, the mystery about all of this is still present today.

Geomorphology is a branch of the earth sciences dealing with the forms of the earth's surface. It is commonly divided into several areas of study, depending upon the nature of the energy, such as: (1) fluvial or streams; (2) eolian or wind; (3) glacial or moving ice; and (4) waves and currents along the coastline. Since the Karak Plateau is rather dry, one might think, but mistakenly so, that wind is the major sculptor of the land, when running water is actually the most prevalent source of energy, with the resultant alteration of the landscape.

From a genetic point of view, the study of geomorphology should reveal answers about the past, like "the present is the key to the past", as stated by Hutton several hundred years ago. The questions being, for example, what is a plateau? Or what is a caprock? Or what are concordant summits? Or what is a horizontal rock strata? Or what is a gently undulating upland surface? These and many more questions might legitimately be asked with respect to describing a landform such as the Karak Plateau in an historical context, but what about the generic context? About a hundred years ago, William Morris Davis, who many consider the "father" of geomorphology, described the geographical cycle, and this began the generic approach to the study of landforms (Davis 1899).

The geographical cycle, or geological cycle if one prefers, begins with the erosion of the land surface, followed by the transport of the eroded materials, and then their subsequent deposition. Following Professor Davis, from across the Atlantic Ocean in Germany, Walther Penck conveyed a similar construct (Thornbury 1954). However, while Davis advocated a decreasing slope as erosion, with transport occurring, Penck believed a slope retreated parallel to itself; both geomorphologists assumed all forces were equal. But in the late 1930's, the genetic approach used to describe landforms was replaced by a generic approach. Taking this to another level with respect to a fluvial landscape, Horton (1945) suggested the Laws of Stream Order be used to organize and understand the relationships between the earth's surface and energy. Subsequent research has been undertaken by numerous scholars using Horton's construct, including this author (Stephenson 1967), in the analysis of flood frequencies and magnitudes: And the generic research continues. With respect to the Karak Plateau, this endeavor tends to seek an understanding of the land surface as a functional relationship between energy and earth materials, where intermittent streams dominate the landscape.

In the process response model, the primary objective is to explain or account for slope, which is the most dominant feature on the land surface, with the function of landscape variables, all of which are related to energy. An undefined model for defining land surface or slope response is

S = f (cl, s, v, r, t) (1)

Where S (ground slope), cl (climate), s (soils), v (vegetation), r (rocks and sediments), t (time). How does ground slope respond to the elements of climate, namely precipitation, temperature, and wind characteristics, to mention only a few? Also difficult, but no less important, is the role of soils and vegetation as they relate to slope variation. Finally, defining the hydraulic characteristics of water flowing on the slope is extremely difficult to quantify in a process response model. Nevertheless, researchers attempt to explain the process by understanding these relationships in an organized fashion, or by using the dimensions proposed by Horton's stream laws.

Climate on the Karak Plateau

The Karak Plateau is characteristically dry. In contrast to humid regions, arid conditions favor infrequent occurrence of precipitation, but with rather intense periods at times, particularly during the winter months. The Mediterranean climate near the sea to the west has wet winters and dry summers, with a minimum precipitation of 762mm, according to the Koeppen classification of world climates. The occurrence of precipitation on the Karak Plateau is approximately 344mm, which includes an occasional snowfall, and is much less than what is required to be designated as a Mediterranean climate. The plateau's precipitation in winter is similar to the west, with an average January temperature range of 3.5º to 11.6º C., with minimal evaporation, and replenishment of groundwater (Bender 1974).

The "rational equation" commonly used in hydrology research suggests that

SRO = P + (E – I) (2)

Where SRO (surface runoff), P (precipitation, the water supply factor), E (evaportransporation), I (infiltration).

Both losses are modified by the occurrence of soils and vegetation. This relationship should always be kept in mind when dealing with water and its uses, particularly its energy to erode, transport and deposit earth materials.

There is very little, if any, precipitation in the summer, since cooling air is required for condensation to occur. (For example, winter rainfall is only 73.3 mm in the Ghor, which indicates that higher elevations are more favorably located for the occurrence of precipitation [Bender 1975]). With high evaporation because of summer temperatures and a steady breeze, it is exceedingly hot and dry, with an average daily temperature range of 20.7º to 40.1º C in July (Bender 1975). These summer conditions cause the water table to descend to its lowest level, and humankind is required to be very resourceful with respect to water use. At best, the Karak Plateau can be considered a semi-arid or steppe climate, with cool winters and hot summers, and perhaps a limited area to the west with a near-Mediterranean type climate, graduating to a desert climate to the east.

Soils and Vegetation on the Karak Plateau

The soils are moderately thick, but become thinner toward the east, the result of spatial variation in soil formation processes, with

S = f (cl, o, r, p, t) (3)

Where S (soil), cl (climate), o (organic matter), r (relief or topography), p (parent material), t (time).

It is known that soils vary with respect to slope, forming a soil catena. Such is the case with the semi-arid soils of the Karak Plateau, where precipitation is seasonal. Haploxeralfs are the dominant soils, with Zerorthents subordinate (Abu-Ajamieh *et al*. 1988). These soils grade into Chromozerests and some Haploxerfalfs toward the east, and then into Calciothids and Camborthids as aridity becomes a dominant factor in the desert. The upland soils are sufficiently moist to support a grassland type of vegetation in most areas. Foss (2003) however, presents a more practical view of soils on the Karak Plateau, and estimates that only thirty percent of the soils have good agricultural potential, which is not surprising.

Karak vegetation varies, with climate and soils the controlling factors. Much of the plateau was formerly covered by a natural vegetation of grass, which has since been replaced with vast cultivated fields of grain, particularly wheat. In the wadis, where water is available for most of the year, trees and scrub vegetation dominate the winding thalwegs of the wadis. Some trees, usually pine, can be found near the upper elevations of the plateau, where

water occasionally seeps out from the rock strata. Limited irrigation on the plateau allows a variety of crops and trees to be grown, such as watermelons and olives. Toward the east the steppe-like grasses, such as wheat, transcend into a desert type of vegetation.

Some scholars believe that past climates had more moisture than today (Burdon 1959). There appears to be several climatologic cycles involved, ranging up to a hundred years or more, when a higher rainfall occurred several thousand years ago (Cordova 2007). If this were the case, it would also mean that the fluvial process would have been different as well (Cordova 2000). The disappearance of the forest vegetation can be attributed to cutting most of the trees for a variety of uses, including logs for building roof supports and as fuel for smelting copper ore in the Araba. As a result, the climate became drier. At the present time, there is a trend for climate change as part of a warmer interglacial stage. This imparts a related drying trend, with the prediction that the existing deserts will have a larger areal extent in the future. Will this mean a warmer and drier climate on the Karak Plateau, resulting in even less water for vegetation, streams, groundwater recharge and humankind? And the many cycles continue as they have before, with the movement of settlements to more advantageous locations. In any case, with respect to the geomorphological process on the plateau, scant soils and vegetation will allow weathering and erosion to be maximized, but in a somewhat different manner than before, as we tend to improve the utilization of present and future technologies.

Rocks and Sediments on the Karak Plateau

At the base of the plateau are Pre-Cambrian plutonic materials. These rocks can only be found at the lowest elevations on the eastern side of the Ghor, which is known as the Southern Basement Complex and Paleozoic Sandstone Area (Abu-Ajamieh *et al*. 1988). The age of these rocks is estimated to be more than 570 million years, and structurally complex. In the Karak area, the only known outcrop of the basement is near Safi in the Ghor, well below the upland surface. Cambrian age sandstones and conglomerates sit unconformably above the late Proterozoic basement complex, which also has volcanic dikes.

The plateau area, for the most part, was inundated by the ancient Tethys Ocean during the Cretaceous Period (Powell 1988; Tarawneh 1988; and Khalil 1992). This means an unconformity exists from the Cambrian to the Cretaceous period. From the Cretaceous period and since, vast marine deposition has occurred. Sedimentation of the plateau was the result of organisms dying in the shallow ocean, which tended to vary its shoreline location as sea levels changed. Thus, limestones, chalks, marls, conglomerates and phosphorites were layered upon one another depending on the ocean depth, the velocity and direction of the currents and tides, and the location of the shoreline. All these items had a bearing on the type of organisms spatially distributed in the seas. Changes in transgression and recession levels of the seas dominated most of the area, with a number of lithological facies being formed, until a major uplift occurred in the Quaternary period. This sedimentary material was deposited for approximately 180 million years, almost without interruption. The stratigraphy can be observed easily throughout the plateau, particularly along the steep slopes of the major wadis. However, there have been volcanic intrusions from Jabal Shihan, as well as other volcanic eruptions that have occurred, forming partial basaltic covers of the land.

Orogenic activities after the Pre-Cambrian were practically non-existent until the Tertiary period, when uplift and faulting occurred. The major geologic fault in the area is, of course, the Ghor or Araba. This rift is part of a system extending from north of the Dead Sea through Lebanon and Syria to Turkey, and southwards toward the Gulf of Aqaba, the Red Sea and beyond to the East African Rift; a distance of more than 6,000 km. (Atallah 1991). The Ghor is related to the compression of two tectonic plates moving toward one another at an angle. In addition, compression resulted in the plates moving vertically upward on either side of the rift, and in between, blocks were moved outward as well as downward (Quennell 1983; Sneh 1996; and Wdowinski and Zilbermann 1996). The upthrown blocks on either side were raised to a maximum elevation of more than

1,100 meters, while the downthrown blocks were lowered to approximately 400 meters below the present sea level; a displacement of more than 1,500 meters. Due to the tremendous pressure created by this tectonic movement, transverse faults also occurred in the rift, as well as on either side of it.

Movement of the earth's crust creates sound waves known as earthquakes. This tectonic activity has been continuous since the rift was formed. The rift area has had numerous movements and resulting earthquakes, with a magnitude of six or more on the Richter scale. A recurrence interval of 20 years has been estimated (El-Isa 1991). This means, as in the past, more tectonic activity can be expected in the future (Husein *et al*. 1995).

Volcanism was active during the development of this gigantic structural zone of weakness, or geosuture, during the Pre-Cambrian period (Bender 1975). During the Oligocene, uplift began on the east side of the Araba. These orogenic activities continued through the Pliocene, with lithographic facies development. In the middle and upper Pleistocene, volcanism complicated the faulting and folding**.** During the Pleistocene and continuing today, there has been weathering, mass wasting, and erosion of the plateau surface, primarily by the drainage of the three major wadis already mentioned, which are in most cases, the surface expression of underlying tectonic structures (Powell 1988; Tarawneh 1991; and Khalil 1992). The nature of the Karak Plateau has responded, and will continue to respond, to the characteristics of climate, soils, vegetation, rocks, sediments and the geomorphic processes.

The Karak Land Surface Response

A classic plateau surface is a positive land form, in that there is considerably more upland surface than lowland or steeply sloping surfaces. The dominant sculptor of the land surface is running water. Further, there is commonly a resistant horizontal, or nearly so, strata of rock near the surface with less resistant rock below. Earth materials loosened from exposed bedrock by the weathering processes are ready to be removed downslope by mass wasting or the force of gravity, and then by flowing water. However, the plateau exists for many hundreds of millions of years before it becomes a negative land form, or one that is primarily a lowland surface with very little upland area.

The major element of the land surface is slope, or ground slope, which is measured as the relationship between the vertical and horizontal dimensions. Ground slope is commonly represented in percentage or degrees. A slope map is usually derived from a topographic map, illustrating slope areas of varying degrees. It can be observed that steep slopes occur on three sides of the plateau, in addition to the Wadi Karak near the middle, which drains in a westerly direction. Relatively steep slopes also appear along the Fajj. The majority of the remaining areas are of moderate or insignificant slope. Many of the moderate sloping areas are related to faults. The insignificant slope areas occur mainly to the east, as the plateau merges with the Syrian Desert. The topography of the plateau tends to show the changes in ground slope very well, rising from the north to the south and from west to east. The topography reveals how the land surface is responding to the independent variables of climate, soils, vegetation, rocks and sediments, and time. The ground slope is largely controlled by the cap rock, which dips from its highest point in the southwestward corner of the plateau, descending toward the north as well as toward the east, as a result of the uplifting of the formation of the Araba.

The flow of water, or surface runoff, on the plateau varies, according to the precipitation regime and slope characteristics. As indicated previously, precipitation occurs in the winter months, sometimes intensely, when evaporation is low and the water table is high. The consequence of such a regime is overland flow, such as sheet flow, then small rivulets or streams. Trails or pathways, as well as ruts made by vehicles and furrows, also contribute to flow direction and magnitude. This tends to erode the land surface from one place and deposit the material at another, lower level. Patterns of erosion and deposition are largely geologically controlled. Again, the Karak Plateau itself is defined north and south by two major wadis, with a third draining its interior. Within this defined area, there are additional geologic structures that tend to control the drainage pattern as well, although they may be difficult

to see or perceive. The pattern, nevertheless, results because the fluvial processes are the major sculptor of the land surface.

Plateaus are commonly defined as having a resistant caprock. The Karak has several, particularly near the major wadis. The Amman Limestone formation, consisting mostly of siliceous limestone, dominates the plateau as a caprock. Other formations below this include, but are not limited to, the Dana Conglomerate, the al-Hisa Phosphorite, and the Wadi as-Sir Limestone. These formations, due to their dip and the differential erosion of strata, tend to exhibit a step-like appearance. The basalt formations in the northern part of the plateau, toward the east from Wādī Balū‘, and southward to Khirbat al-Muḍaybī‘, also show a step-like surface.

The subsequent surface runoff on the plateau surface tends to follow the tilted and faulted bedrock formations, generally toward the northeast. The highest point on the plateau is about three or so kilometers south-southwest of al-Mazar near the rim of the Wādī al-Ḥasā, with an elevation of more than 1,297 meters. This location forms the southern end of a ridge which continues northward to Karak, and divides the drainage basins entering the Ghor and Dead Sea from the Wādī al Mūjib drainage area. This point is also located on the drainage divide between several tributary wadis of the Wādī al-Ḥasā and the Wādī Numayrī, which drain directly in to the Dead Sea toward the northwest and the Wādī al Mūjib. Directly and immediately to the east of the highest point, the Wādī ash-Sharma drains eastward to the southern portion of the Fajj al-‘Usaykir, and then in to the Wādī al-Ḥasā.

To the north and east of the highest area on the plateau, the majority of the faults on the plateau tend to lie in a similar direction; that is, northwest and southeast in alignment with the Fajj. In the northwest, Jabal Shihan dominates the plateau surface at 1,054 meters. Basaltic dolerite outcrops occur at approximately 800 meters in elevation, forming an additional rim for the plateau in some locations. The Wādī ash-Shuqayq drainage basin has its headwaters at Jabal Shihan, draining directly westward into the Dead Sea.

There should be little doubt that the interaction of climate, soils, vegetation, rocks and sediments have a functional relationship with how the Karak land surface responds. Of course, the time factor tends to suggest change. Recently, because of dam construction in the adjacent wadis, changes in the base level of streams will tend to alter the characteristics of the former erosion and deposition process. Thus, it is extremely important to substantiate baseline information under the most natural land surface conditions as possible.

A Comparison of Selected Fourth Order Drainage Basins in the Karak Plateau Region

In keeping with the generic Laws of Stream Order as suggested by Horton (1945), observations of six fourth order stream basins were made for the purpose of learning about the spatial variation of stream characteristics (**Table 1**). A fourth order stream is defined as having at least two third order streams, both of which have at least two second order streams, with each second order stream having at least two first order streams, which constitute the headwaters of the drainage area. The geometric progression of these stream parameters is obvious, and shows how streams vary spatially, as related to geologic and energy characteristics. The Wādī Numayrī and the Wādī ash-Shuqayq drain directly in the Dead Sea, the Wādī ash-Sharma and the Wādī Salaha drain into the Wādī al-Ḥasā, and the Wādī al-Ghuwaylah and Wādī al-Batra drain into the Wādī al-Mūjib. All waters eventually enter the Dead Sea. Except for the major wadis, all are intermittent streams in the region. Generally, drainage basin analysis is based on perennial streams, or those that flow all year long. However, the intermittent streams are definitely incised, making channels quite obvious, and can be observed and measured for comparative purposes. It should be kept in mind that a whole year’s worth of fluvial energy takes place only during the winter months.

The fourth order drainage basins vary in size from 25.25 km^2 to 106.19 km^2, with an average size of 55.79 km^2. The largest fourth order basins drain directly into the Dead Sea from the eastern slope of the plateau, while the basins draining into the Wādī al-Ḥasā are intermediate in size, and located in the southern area of the plateau. The smallest of the sample basins, the Wādī al-Batra, is located on the eastern flank of

the Fajj al-'Usaykir, draining into the Wādī ad-Dabba towards the Wādī al-Mūjib, while Wādī al-Ghuwaylah is located in the northeastern area of the plateau. The variation in drainage basin size for the fourth order streams appears to be related to geologic controls such as rock type and rock structure, but basin orientation and relative location are also important, as is distance to the stream's base level. The variation in stream numbers for the first and second order streams indicate an interesting grouping, with the highest occurrence draining into the Wādī al-Mūjib, and the lowest occurrence draining into the Dead Sea.

The Wādī an-Numayrī

This wadi is located on the western slope of the Karak Plateau, between the Wādī al-Karak and the Wādī al Ḥasā (refer to the Karak 1:50,000 topographic quadrangle). Wādī an-Numayrī's southern interfluve is in the Wādī al Ḥasā drainage area, but the stream drains into the Dead Sea. The highest elevation is 1,297 meters above sea level, while the lowest point, where distributaries from an alluvial fan are located, is 140 meters below sea level. The relative relief is therefore 1,437 meters, the highest of the basins examined. This wadi is also the largest of those examined, but has the lowest drainage density, at 0.89. This means that for every square kilometer of drainage area, there is only 0.89 kilometers of stream length. The orientation of the basin toward the west, steepness of slope and the nature of the earth materials, are contributing factors for this relatively low density of streams.

Settlement in the Wādī an-Numayrī drainage basin is related to the King's Highway on the plateau, with the small villages of el-Iraq at approximately 900 meters, and Khanzīra at approximately 1,000 meters, both being several hundred meters below the plateau upland. Located near the headwaters are the important towns of al-Mazar and Mu'tah, with drainage oriented toward the east. Several small hamlets are scattered within this drainage basin, above the crenulating rim of the plateau,which tend to have a functional relationship with the farming activities in the area. The steepness of the slope below the 900 meter elevation tends to inhibit settlement and economic activities.

The Wādī ash-Shuqayq

The headwaters of this wadi are at Jabal Shihan, located in the northwestern portion of the Karak Plateau, with the wadi draining into the Dead Sea (refer to the 1:50,000 Er-Rabba topographic quadrangle). Jabal Shihan, an extinct volcano with its peak at 1054 meters, has a ground slope of less than 40 degrees. The basin's drainage characteristics are very different on the slope of the volcano, compared to the steepness below the rim of the plateau. Wādī ash-Shuqeiq is the second largest of the drainage basins studied (**Table 1**). Its drainage density is the second highest of the six basins at 1.12, indicating a relatively high total stream length compared to the drainage area.

The headwaters of Wādī ash-Shuqayq reach the plateau rim; the small settlements of Faqū' 'Amra and Ṣirfā are located there at elevations of more than 900 meters. While there is an excellent view to the west of the Dead Sea, the settlements are oriented to farming and other activities on the plateau to the east.

The Wādī ash-Sharma

This drainage basin is located in the southeastern portion of the plateau (refer to the 1:50,000 Adir topographic quadrangle). Dhāt Rās near the headwaters of the basin has an elevation of 1,163 meters above sea level, and drains in an easterly direction toward the Fajj al-'Usaykir and then southerly to the Wādī 'Abyad. Of interest in this area are the ancient ruins of Nakhl. The southern slope of the ruins drains into the Wādī Asmar, which is the northern-most tributary of the Wādī ash-Sharmal however, Nakhl's northern slopes drain toward the Wādī al-Mūjib. Most interesting here are the headwaters of the Wādī Kikhil**,** which are a fine example of an ancient water catchment system (Mattingly *et al.* 1998). This is the only such catchment system found in the Karak Plateau, reminiscent of those located to the west of the Ghor.

Wādī ash-Sharma is of moderate size, with a drainage density of 1.78, the highest of the six basins examined, and has a dendritic drainage pattern as compared to the rectangular pattern of the Wādī al-Batrā, indicating that it is less structurally controlled by rock type and structure.

As well as Dhāt Rās and Nakhl, Hamat

is also located within this basin, all three at approximately the same elevation. The last vestiges of land suitable for growing grains are found immediately to the east of these settlements. It is here, beyond the Fajj, where the land transcends into a desert landscape, with elevations close to 900 meters above sea level. Located nearby, in a small drainage basin adjacent to the Fajj al-'Usaykir, is Khirbat al-Muḍaybī', an Iron Age II fortress of interest to the Karak Resources Project (Mattingly 1997).

The most prevalent geological structure here is a volcanic flow of basalt, which protrudes at an elevation of approximately 980 meters above sea level at the site of al-Muḍaybī'. Its walls consist almost entirely of local basalt, handcrafted with extreme difficulty into rectangular blocks. It is assumed that this basalt is from Jabal Shihan, located in the northwestern portion of the plateau. Also at al-Muḍeibi' is a very small outcrop, directly below the basalt, consisting of Amman Silicified Limestone, which was also used for building material. The three settlements on the west of the wadi are situated on the Bahiya Coquina, an al-Ḥasā Phosphorite formation of Upper Cretaceous age. Below this formation and over the basalt is a mix of fluviatile and lacustrine gravels and calcrete, all contributing to a soil which is used primarily for agriculture.

The Wādī Salaha

Located in the southeastern portion of the plateau, but very little of the drainage area is on the upland surface (refer to the 1:50,000 Aina topographic quadrangle). The plateau surface in this area tends to drain northerly, then easterly. The wadi is oriented in a southerly direction, draining its steep, rocky slopes directly into the Wādī al Ḥasā, although its basin axis is longer in an east-west direction. The entire basin has intermittent drainage, with elevations between 1,079 and 560 meters above sea level, giving it a relative relief of 519 meters. The drainage density of the wadi is 0.50, similar to Wadis el-Ghuwaylah and al-Batrā.

There are no permanent settlements in the basin area apart from a very small hamlet called Shuqeira, which is located on the plateau rim along the northwest basin interfluve. This area is also known as the Arab al-Mannain.

The Wādī al-Batrā

The Wādī al-Batrā is located in the Fajj al 'Usaykir (refer to the 1:50,000 Adir topographic quadrangle). The Fajj is a small and quite spectacular graben, with the streams structurally controlled, forming a rectangular stream drainage pattern. The geologic structure in the vicinity of the Fajj is obvious from its topography. The graben floor is covered with alluvial sediments underlain with Muwaqqar Chalk, which is a marl of Tertiary age. High on the flanks of the graben are the Amman Silicified Limestone formation topped with the Sultani Phosphorite, both of older Upper Cretaceous age. Below this rock, on the upper slopes of the valley side walls, are the more moderate sloping pediments of fluvial sands and gravels.

The drainage density of this basin is 0.54. Of the basins examined, this is one of the smallest, with the shortest total of stream lengths. The headwaters of the first order streams are high on the flanks on either side of the valley, followed by second order streams at lower elevations. This basin has one of the highest number of first order streams, as well as the most second order streams, largely due to the rock type and structure. The basin is elongated and oriented from southeast to northeast, while the stream pattern is similar on both sides of the valley sidewalls.

There are no settlements in the area, but the immense valley bottom is extensively farmed. This was a major connecting link from the Arabian Peninsula to the Dead Sea and the Araba in earlier times, and evidence of nomadic activities still prevails today. Several small ruined Roman watch towers or fortresses are on either side of the graben, including Khirbat al-Batra at the northern end. Khirbat al-Muḍaybī', a major fortress from Iron Age II farther to the southwest attests to the importance of this ancient highway.

The Wādī al-Ghuwaylah

Located in the northeastern portion of the Karak Plateau, it is oriented in a northerly direction (refer to the 1:50,000 Ariha topographic quadrangle). The Wādī al-Mūjib is located immediately to the east while the Wādī al-Balū' is located immediately to the west. The Wādī

al-Ghuwaylah drains directly into the Wādī al-Mūjib at an elevation of 440 meters above sea level. Only a small portion of the wadi at the confluence has a perennial flow. This drainage basin has a relative relief of 524 meters, with only the small upper reaches of the wadi on the plateau surface; the highest point is 964 meters above sea level. The drainage density of Wādī al-Ghuwaylah is 0.50, indicating there is only c. 0.50 kilometers of intermittent streams for every one square kilometer of drainage area. For the most part, earth materials tend to control drainage density and the dendritic drainage pattern, rather than rock type or structure.

Only the two small villages of Smākiyyah and Ḥumūd, at the edge of the plateau and approximately 850 meters above sea level are within the drainage area. At this elevation, the slope is quite steep as it descends into the wadi, while the plateau surface above is gently undulating. Agricultural activities tend to be above the 850 meter contour, with steep slopes below.

Summary

This analysis of selected drainage basins of the Karak Plateau is very brief, with only a few statistics; it is intended to be an invitation for further research in fluvial geomorphology. A more detailed analysis is required for an increased number of fourth order basins, with comparisons of both basic and more complex dimensional characteristics. The six drainage basins described here are merely a small sample of the wide variation of fluvial situations, which have existed on the plateau for thousands of years.

The land surface of the Karak Plateau has responded to varying energy forces, related to both earth materials and structure, and will continue to do so. The land surface is in a state of quasi-equilibrium, and will naturally adjust to varying climatic factors and geologic disturbances. With the change in base level of the major wadis brought about by recent dam construction in the Karak region, upstream dynamics will be altered, and humankind will have to adjust to these changes, as it has in the past.

Some Final Thoughts

This geomorphic study of the Karak Plateau has laid the foundation for additional research endeavors. All sciences play a role in understanding the environment more thoroughly, and how humankind responds to it. Ancient peoples had to make difficult choices, with no knowledge of the outcome. This is not so today. It is now possible to estimate the future of geomorphic phenomena with reasonable accuracy, using the generic approach. Such is the case even though the Dead Sea base level fluctuates, while streams are dammed, changing their base level.

The Karak Plateau has not changed significantly for thousands of years, apart from an increasing population growth in recent years, along with related infrastructure and technological advances. Urban settlements are becoming larger, more roads are paved, and there is more diversity in human activities; not to mention the archeological disturbances. Agriculture, the major economic activity on the

Table 1: Comparison of Selected 4th Order Drainage Basin Data.

	Wādī an-Numayrī	**Wādī al-Shuqayq**	**Wādī ash-Sharma**	**Wādī salaha**	**Wādī al-Batrā**	**Wādī al-Ghuwaylah**
Area (in sq. km.)	106.19	67.34	47.91	25.90	25.25	62.16
Number of 1st order streams	55	50	62	69	118	118
Number of 2nd order streams	12	12	19	13	33	27
Number of 3rd order streams	3	3	3	2	3	5
Number of 4th order streams	1	1	1	1	1	1
Total stream length (in km.)	94.5	75.5	85.5	52.0	46.5	62.2
Drainage Density	0.89	1.12	1.78	0.50	0.54	0.50

Karak Plateau, will continue into the foreseeable future. Nevertheless, an increasing percentage of the land will be used for non-agricultural purposes, due to the growing population and related settlement.

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A UNIQUE DOCUMENT OF ARCHITECTURE AND NEW BRONZE CASTING INSTALLATIONS ON THE SANCTUARY OF ZEUS AT GERASA (JARASH, JORDAN)

Jacques Seigne

Abstract

An exceptional architectural block was discovered at the northern entrance of the sanctuary of Zeus at Gerasa (Jarash). Identified as a pending keystone, it testifies to a unique and early technique. The decorated block, which was inscribed with an epigram, fits perfectly into the data concerning Diodoros of Gerasa, known as the architect of the vaulted corridors and propylon of the lower courtyard of the Zeus Olympian sanctuary in the first quarter of the Ist century AD. The donor, a certain Demetrius (named by inscription), might be the Gerasa citizen referred to in another inscription from the sanctuary, dated 9/10 AD, where he is mentioned as a former priest of Augustus.

Excavation under the collapsed stone vault blocks also uncovered new important remains of the 2nd century AD bronze workshop installation found and partially excavated in 1992 and 2012, which was covered by Byzantine and Roman period deposits. They attest that this artisanal bronze casting installation is the largest, and best preserved, which has so far been discovered from the Roman period.

Keywords - Gerasa, architecture, keystone, Greek epigraphy, bronze workshop, Roman period.

Reminder: The Vaults in the Sanctuary of Zeus

The sanctuary of Zeus at Jarash, ancient Gerasa, consists of two major parts, built into a hillside:

- A great peripteral octostyle temple on a high podium, built in 162/163 AD at the top of the hill overlooking the Oval Piazza,
- A large terrace (100 m x 50 m), constructed mid-slope. This terrace, known as the "Lower Courtyard", corresponds with the primitive nucleus of the sanctuary, established around the 'high place' and the cave where the remains of the first cult, dated to the middle of the 2nd millennium BC, were found. Over the following millennia, the sanctuary was progressively embellished[1]. At the beginning of the 1st century AD the Lower Courtyard was extended to the dimensions we know today. This courtyard was not surrounded by porticoes (as were most other regional Roman sanctuaries), but by a continuous stone barrel vaulted corridor on all four sides. A succession of small arched passageways allowed access from the open-air court to the shaded corridor. Three monumental entrances, in the middle of the south, north and east facades, gave access to the sacred area. For each of them, two exterior monumental doors (2.70 m wide), opened in the peribolos wall; inside were two corresponding, but double sized (5.05 m) doors overlooking the courtyard. Again, stone barrel vaults covered the passages to the exterior doors and inner bays. Cross vaults marked the penetration of these secondary structures, which, although of different widths and shapes, all had an intrados at the same level as the great barrel corridor vault. The complexity of these intersections made the stereotomy and cutting of the intersection blocks before construction extremely difficult[2]. The problem was solved in a very ingenious way, with no supporting scaffolding

1. For a general description of the sanctuary and its development phases, see Seigne *et al.* 1986: 31-42; Seigne 1993; Seigne 1997.

2. The technical problems raised by stone vault intersections are well known. The difficulties were such that the architects of antiquity avoided them. In this regard, see, for example, Adam 2011: 205-210.

(cintres) at the level of the intersections. Thus, the stones could be placed in simple chained stacks, leaving each one protruding inside the corridor at the level of the intersections. Arch-stone waiting beds were carved *in situ*, to support each block of the perpendicular vaulting. Once construction was completed, the cutting of the projecting tails for the arch-pieces allowed perfect edges, with a surprising final stereotomy of the intersection stones. In the absence of hanger support, the stability of the structures during the construction phase was obtained by wedging the corner blocks. The name of the architect of this remarkable achievement, dated 27/28 AD, is known by the inscription of the cruciform key stone from the southern entrance: Diodoros, son of Zebedos, of Gerasa[3].

Excavation of the Northern Entrance

Excavations carried out in the sanctuary of Zeus at Jarash (Jordan) between October 18 and November 27, 2014[4], were supported by an exceptional grant from the French Senate[5], The two objectives of the 2014 campaign were to:

- Collect as much information as possbible regarding the northern entrance of the sanctuary, the only one of the three which had not been excavated, although the few observable surface indices indicated that it was very similar to the southern entrance, which had been cleared in 1984[6];
- Check for any additional remains of the unique industrial workshop of large bronzes which had been discovered in 1993 and 2012[7].

The excavated area matches Squares AW 104 and AW 105, as well as the southern half of Squares AX 104 and AX 105. Before the work had commenced, only two blocks were visible *in situ* on the surface; both were at the west jamb of the outer door. At the rear, in the collapsed vaulted corridor, a wide depression over a meter deep was probably a former test trench opened by H. Kalayan in 1981. A lot of detritus from previous Jarash Festivals had accumulated there. Its removal allowed us to observe that the 1980 sounding had reached, at ± 9.20 m, the level of the collapsed vaults. In undisturbed areas, the search revealed that more than 1.20 m of sandy soil covered the collapsed fragments (level ground before work to ± 10.65 m). The origin of this grey-black sand deposit, which was subsequent to the ruin of the building, is not exactly known, but that it is the result of a long and continuous process (wind?) is clear. Fleeting remains of occupation (s?) were found during clearance; ceramic finds assign a date from the 11th -12th centuries of our era.

A compact layer of collapsed stone vault blocks, mixed with yellowish clay (waterproof coating of the roof?), 0.70-1.50 m thick, was uncovered throughout Squares AW 104 and 105. Removal of the large number of soft limestone vault blocks[8], most unfortunately in a very bad state of conservation, required many days of work, thankfully somewhat reduced with the assistance of the DoA crane.

A – The Keystone Block

During the clearance, found exactly in the center of the passage, and covered by fallen arch-stones, was an unusual, hard white limestone block. Placed vertically, 28 cm wide and 80 cm long, it was pierced by a horizontal hole, which was clearly intended for the passage of a lifting cable. Its sides have relatively symmetrical carved areas. Removal of the

3. Seigne 1985 (*SEG* 35, 1569); Seigne 2008.

4. The mission was composed of Anne-Marie Jouquand, archeologist at Inrap, Anne-Michèle Rasson-Seigne, archaeologist ceramologist, Giancarlo Filantropi, topographer, Frédéric Thomas, archaeologist, and Jacques Seigne, Director. Ali Al-Owaisi and Mohammad Atoom were the Department of Antiquities (DoA) Reprasentatives, with Ahmed Shami, the DoA Inspector of Antiquities for Jarash. We also thank Dr. Munther Dahash Jamhawi, Director General of the DoA, for the permanent support and courtesy he has kindly given to the publication of this article. The study will also be published in *Syria*, in French.

5. Our sincere thanks go to Mrs Christiane Kammermann, Senator, for the financial support she gave to the Jarash mission. Without her grant, the 2014 excavation campaign could not have taken place. The mission also received financial subsidies from the Commission des Fouilles of the French Ministry of Foreign Affairs.

6. Seigne 1985.

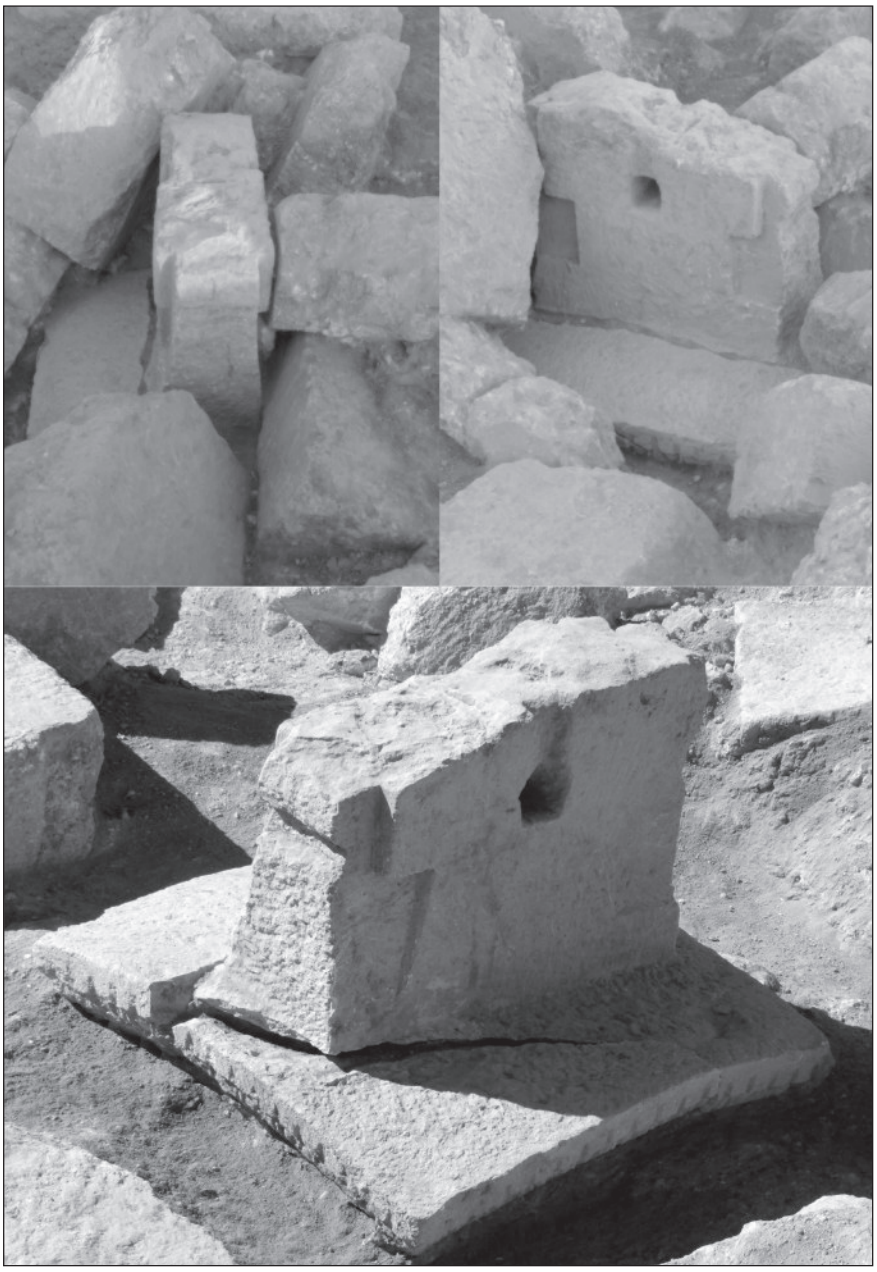
7. Khalil, Seigne and Weber 2013.

8. Hard limestone (*melekiyeh*) was only used for the frames of the three doors built through the peribolos wall (with red limestone used for the main east entrance, and white for the north and south gates). The rest of the construction was exclusively constructed from soft limestone (*narry*).

arch-stones which surrounded it allowed us to determine that it measured more than 60 cm in height, and widened abruptly at its base (under the collapsed vault stones which covered it), to form a slightly concave slab 96 cm wide and 30 cm thick.

Initially placed at the intersection of the four vaults which covered the passages from the northern entrance, this block was both engaged in the mass of the arch-stones and partially covered by them, as its fallen position shown unequivocally (**Fig. 1**). There is no doubt about its function; it is the keystone of the whole. Of an estimated 800 kg weight, it represents both décor and exceptional form (**Fig. 2**). Its general shape is that of a huge square nail with a head close to a meter on each side, associated with a rectangular tail, 60 cm long. Size and sculpture of such an element are, in themselves, a real "tour de force". It was certainly the work of a master stonecutter.

Removal of the block allowed us to see that its underside was decorated and inscribed. A row of "oves" (eggs), surmounted by a row of dentils, adorns the outskirts of the square, while a stylized small palm marks each corner.



1. The suspended keystone at the north entrance, in situ at the time of the discovery.

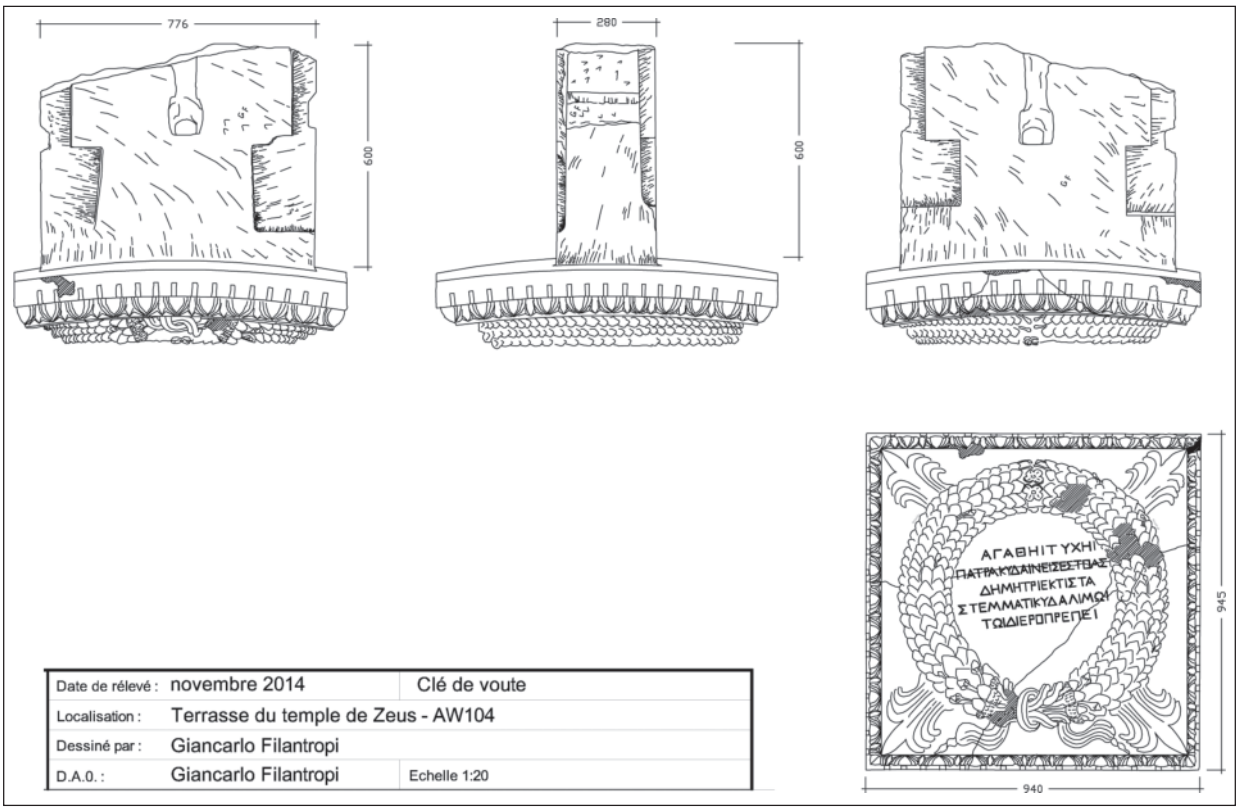
A thick crown in strong relief, composed of nested leaves, dotted with acorns[9] and four petal flowers, occupies the field, surrounding a five line Greek inscription. The latter, arranged according to the axis of the corridor, faced eastward; hence was not directly readable by a person entering the sanctuary by the north entrance. This particular disposition, apparently provided for people circulating in the northern corridor, could perhaps correspond to an error in design or realization, or that the axis of the housing for the tail of the block had shifted 90 during construction. However, such an error appears very strange in such a well-constructed building, and for an inscription of this importance. Maybe should we see it as the will to make it readable by any visitor coming from the East, from the main entrance to the sanctuary.

Greek Inscription

The block of limestone, which is complete but broken into four fragments, is decorated on the under face with a crown of oak leaves in high relief as described above. The inscription, an epigram of five lines, occupies the center of the crown (**Fig. 3**). It honors a certain Demetrius, who may be the citizen from Gerasa referred to in another inscription from the sanctuary, dated 9/10 A.D (Gatier 2002: 277-278). It fits perfectly into the information relating to Diodoros of Gerasa, known as the architect of the vaulted corridors and the propylon of the lower court of the Zeus Olympian area in the first quarter of the 1st century AD. The inscription will be published by Mr Pierre-Louis Gatier.

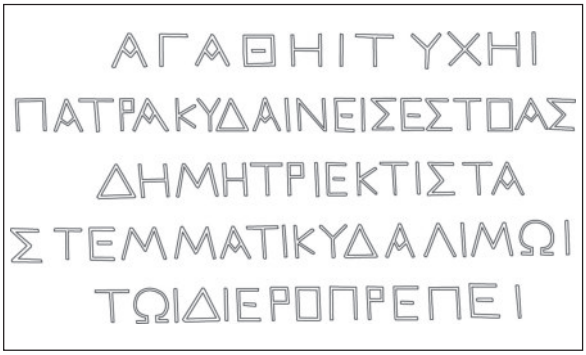
The Function of the Block

The major interest in the block is neither its decor nor the inscription it bears (although these are both exceptional), but its shape and, hence, the function it fulfills. The huge rectangular section lug (0.28 m x 0.60 m x 0.78 m) visible opposite the decorated surface is slightly pyramidal in shape, and was originally placed inside and at the top of the vaults, thus occupying the central intersecting point. It corresponds to the real key of the vaulted ensemble. The block



2. The suspended keystone at the northern entrance (Drawing and Computer Graphics: Giancarlo Filantropi 2014).

9. We know the symbolic link between Zeus and oak.



3. The inscription from the suspended keystone.

would not have been of significance if it had not been placed by the vaults intrados, by the bottom surface, and not by the extrados, because of the large, salient, decorated medallion adorns its lower bed. The presence of this medallion, which would have covered the arch-stones on the intrados level that surrounded it, as well as the inverted pyramid shaped lug, confirm that the block was lifted, not lowered, into place.

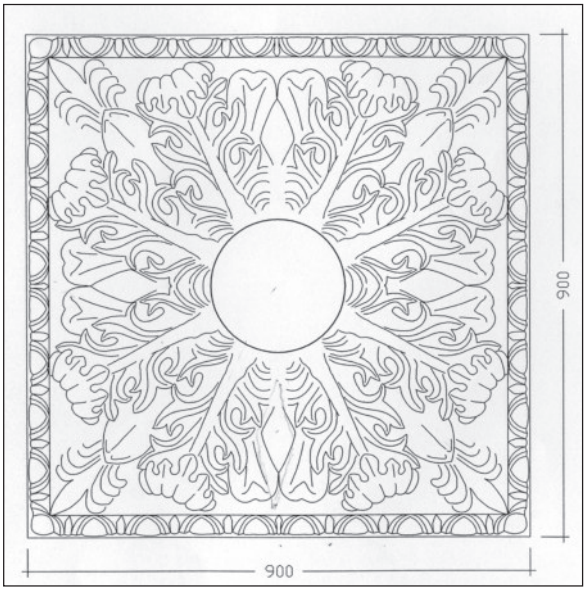
It would have been impossible to place the blocks using wooden scaffolding (cintre). The discovery of this new type of key vault stone confirms previous discussions regarding construction of the different stone vaults of the sanctuary, in particular in terms of the level of their intersections; their construction was partially carried out without hanger support (see above). The development of this unique technique, apparently known only at Jarash, no doubt helped Diodoros, the brilliant Gerasasian architect, to demonstrate that a keystone was not necessarily required, but that crossing vaults, or a cupola, could even accept a vacuum at their summit. Of polygonal or circular plan, such an opening could be scheduled, or left open[10] (or closed) by a keystone. Perhaps this is what prompted Diodoros to take full advantage of the opportunity to test the implementation of a revolutionary key vault by suspending a large, decorated medallion from the underside of the arch-stones.

If lifting an 800 kg block, as well as placing it into a recess in the vault was not a problem (using a cable through the hole prepared in the block tail for this purpose), attaching it to the vaulted structure was probably less easy. Unlike a normal key block, it was not self-locking, but had to be attached to the neighboring stones using pins, wedges or other devices. No metal (iron or copper alloy) was found during the search, which means these pins, wedges, and other fixing elements were therefore probably made from perishable materials (wood?), but also perhaps from lime mortar. It is indeed remarkable that the only witnesses of mortar joints uncovered during the excavation were found around this block during the clearing of the collapsed vaults. The different traces and holes noted on the vertical sides of the block tail probably played an essential role for anchoring it. We must imagine it was kept in place by hammering various materials (such as wood, mortar, small stones, etc.) into the small spaces, so as to hang this pendant key from the support vaults. Even though we do not know exactly what was used, it is clear that the anchoring material filled its role; the key only fell as a result of the widespread collapse of the vaults, probably during the earthquake of 749 AD, as the stratigraphic study reveals. It is certain that this carved block, apparently stuck on the underside of the vaults and defying gravity, did not fail to impress visitors, while recalling the tribute to the generous sponsor by his city.

To our knowledge, this carved and inscribed stone is the oldest physical attestation of a suspended keystone in architecture.

This discovery also allows interpretation of two fragments of reddish hard limestone block which were found more than twenty years ago near the eastern entrance to the sanctuary, and whose function heretofore remained unexplained. It is, on one hand, a block corner, decorated with a stylized small palm, and on the other hand, a fragment from a rectangular concave slab associated with a broad leaf acanthus in high-relief. This slab fragment, as the block found in the northern entrance, has the beginnings of a wide rectangular tail at the back of the decorated face. The two fragments found twenty years ago can now be attributed to the pending keystone adorning the main entrance of the sanctuary to the east (**Fig. 4**). Their more sumptuous décor, carved in a rare, hard, red limestone block, is different from that of the pending keystone of the northern access,

10. As the oculus he sought, at the top of the dome on columns built at the same time at the propylaeum of the sanctuary (see below).



4. Graphic restitution of the keystone's decorated face at the eastern entrance (Drawing and computer graphics: Giancarlo Filantropi 2014).

which is not surprising at the main entrance of the sanctuary. The circular recess in the center of the block probably held a bronze inscribed plate(?), which unfortunately has not been preserved.

Finally, these elements allow the uppermost part of the stone cupola, supported by columns, which stood on the propylaeum over the east access to the sanctuary to be accurately described and drawn; three rows of arch-stones, decorated with strong projecting large acanthus leaves, were placed in a vertical position. These segments formed a wreath of leaves pointing downwards, of increasing sizes from an uppermost oculus, taking the decorative principle of the suspended keystone from the main entrance to a monumental scale. There again, the adopted architectural solution (oculus and arch-stones in a vertical position), as well as the decoration, is unique and has no other parallel in ancient architecture, nor the dome on columns with which they were associated. All these structures confirm the exceptional inventiveness and the technical mastery of Diodoros, son of Zebedos, the architect of Gerasa.

Dating

The inscription is not directly dated. However, several convergent clues allow a probable chronology.

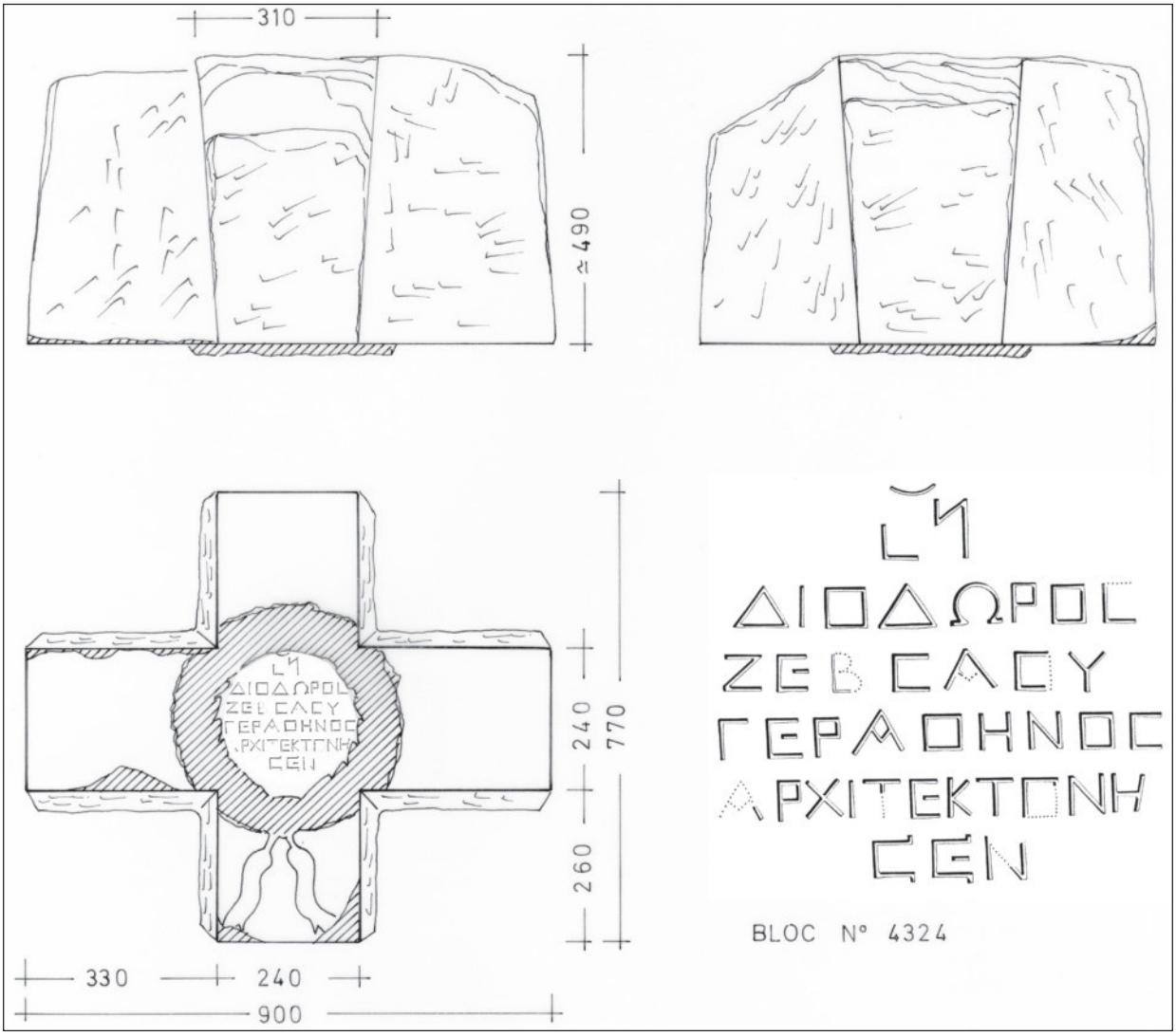
- Palaeography is typical of 1st century AD engravings[11].
- The white hard limestone used, until now, is known only on the most ancient of the monuments at the site. At the end of the 1st century AD, or at the latest from the beginning of the 2nd, it was replaced by pink hard limestone, from, in particular, the quarries of Dayr al-Liyat[12].
- The quality of the sculpture offers supplementary information. The work and carving of the "oves", as well as the crown and stylized small palms, without using a drill, is characteristic of the first half of the 1st century AD in Jarash, if not the end of the 1st century BC[13].
- The nature of the block, a keystone from the vaulted corridor surrounding the lower court of the sanctuary, provides the most accurate dating, as we know from earlier discoveries that all corridors structures were, in all likelihood, completed in 27/28 AD[14].

This discovery means that all three keystones which once adorned the vaulted entries to the sanctuary are now known; that for the North entrance, the object of this study, that of the main gate to the east, which is fragmentary and undated, and the one for the south entrance, with an inscription indicating the work had been done by Diodoros, son of Zebedos, of Gerasa, in 27/28 of our era (**Fig. 5**). However, although two of these key vaults are of the unique suspended type, the third one, which mentions Diodoros, is of a more classical shape, and installed by the vaults extrados. It could therefore be assumed that the latter one, which is more normal, and less revolutionary, despite its cruciform shape, would have been in place before the other two, and hence likely to be earlier.

But this is probably not the case; it is more likely that the two other keys were built first. Several arguments may be presented as evidence:

- We know, without doubt, that the main

11. See above.
12. Seigne 2000.
13. Architectural sculpture from the 1st century BC in hard limestone is, for the moment, very poorly represented on the site.
14. See Seigne 1985.



5. The keystone at the southern entrance (Drawing: Jacques Seigne 1985).

entrance to the sanctuary was in the east, where a monumental and exceptional propylon, with a stone dome resting on columns, was built in front of the oriental gate. Similarly, it is possible to assert that the northern entrance, on the street from the Oval Plaza to the South Theatre, was more important than the southern one, opening directly outside of the city. It is therefore very likely that the southern access was the least important of the three;

- In other monumental constructions of antiquity, most effort related, in general, to the main entrances, in the most visible facades, on the busiest gates[15]. It is therefore very likely that the east and north , as well as their vaults and suspended associated keystones, were constructed prior to the south entrance;
- Similarly, it is unlikely that an inscription mentioning an architect, even one as brilliant as Diodoros of Gerasa, could have been engraved before those celebrating a generous donor, who was a former priest of the imperial cult or of Olympian Zeus, as well as a member of one of the most powerful families of the city;
- Finally, the realization of the hanging keystones, in hard limestone, represents a technical "tour de force". Only exceptional stonecutters were able to carve such blocks without them breaking, and the cost of

15. Examples abound, including the west portico of the sanctuary of Bel at Palmyra, the facade of the sanctuary of Artemis in Jarash, etc.

completion had to be important. The return to a more traditional and cheaper solution (keystone in soft limestone, standard stone of the vaulted corridors, easier to carve and set up, classically, by the extrados face), seems more understandable for the realization of the south entrance keystone, as completion of the work on the sanctuary appears to have been marked by significant financial difficulties[16].

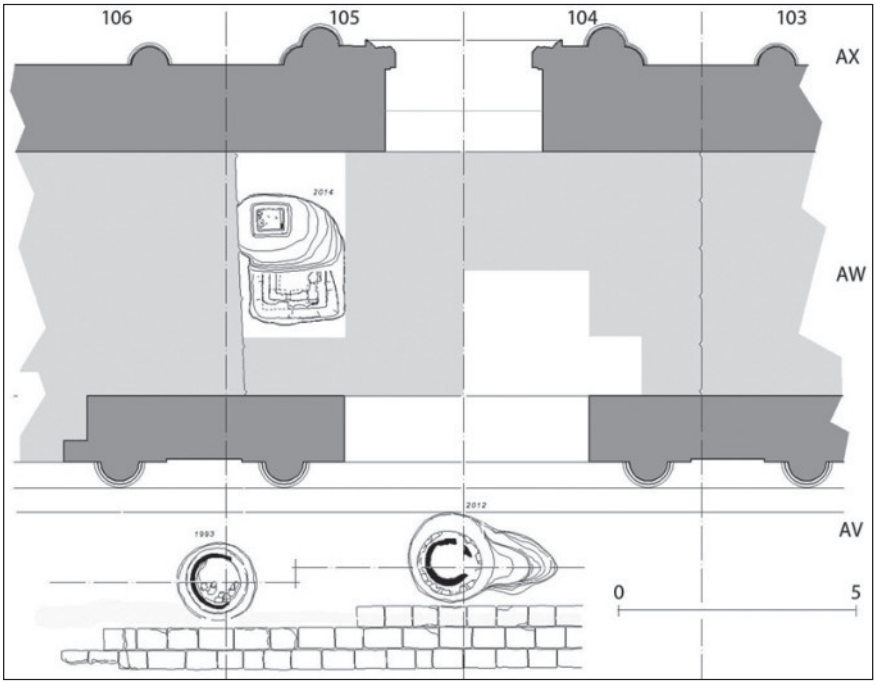
Thus, everything leads us to believe that the timeline for constructing the keystone vaults was as follows; east entrance, then north passage and finally south passage. If the inscription which honored Demetrios should be prior to that of Diodoros, (as stated above) then the inscription which mentions Diodoros should be later, at the end of the first quarter of the first century of our era.

The new block discovered in the sanctuary of Zeus at Gerasa is a testiment to a peculiar period of history of the city; the beginning of the Imperial era. By itself and the inscription contained therein, it documents the local architecture, politics and cultural traditions of this period. It illustrates the activity of two men, the notable evergete (benefactor), Demetrios, and, especially, the brilliant local architect Diodoros, son of Zebedos, author of surprising technical innovations. Each in their own way, they contributed to the realization of a large monument, the sanctuary of Zeus Olympios, which also housed, from the beginning of the 1st century AD, the cult of the emperors.

B – The Remains of a Large Bronze Workshop at the Sanctuary, an Unexpected Discovery

The scientific purpose of the French mission, which had been excavating and restoring the sanctuary of Zeus and its surroundings at Jarash since October 1982, was to study and attempt to understand the major organization and evolution phases of an oriental urban sanctuary from Hellenistic and Roman times.

In 1993, in the northernmost part of the Lower Terrace Courtyard, between the *naos* and the northern part of the peripheral stone vaulted gallery, the discovery of the remains of a bronze workshop was a great surprise: nothing foreshadowed the presence of such an artisanal installation within the sacred area, particularly in a level from the end of the 2nd century AD. In an unpaved part of the courtyard, a large (1.65 m) and deep (1.40 m) pit housed, still in situ, the basis of a large circular mold, probably that of a large basin. Thousands of fragments of molds, nozzles and chunks of burned clay, as well as a great deal of bronze slag, all evidence of a copper alloy workshop, were found in the



6. The bronze workshop: excavated molds in situ (Drawing and Computer Graphics: Giancarlo Filantropi, Jacques Seigne 2014).

16. See Seigne 1985.

filling of the pit.

The discovery seemed important, not only because of its nature, a workshop for «large bronze» objects, but also for its location, inside the sanctuary, and the considerable number of mold fragments discovered, some of them having probably served in the manufacture of drapery for large statues. However, it did not comply with the objectives of the mission, and none of the team members were familiar with ancient metallurgy. Furthermore, at that time, it was not possible to find a French specialist for Roman statuary who was interested in studying these remains. Gabriel Humbert, the ceramologist for the mission, completed the first cleaning, classification and restoration work on the discovered pieces, then all of the fragments were put in boxes and stored, waiting for specialist attention.

In the spring of 2012, thanks to Dr. Rafe Harahsheh, the newly appointed DoA Inspector of Antiquities for Jarash, all the fragments of marble statues which had been discovered during the previous forty years of excavation, from various locations on the site, were, for the first time, collected and stored in a single room at the archaeological camp. Dr. Thomas Weber, a Roman statuary specialist representing DAAD in Jordan, was available to study them[17] During one of his site visits, the conversation turned to non-marble sculptures, and focused on the ancient bronze workshop pit in the sanctuary of Zeus. As soon as he had examined the boxes of mold fragments, Dr. Weber immediately set to work. Thanks to him and his contacts, he immediately associated the project with the Johannes Gutenberg University and the Roman-Germanisches Zentralmuseum in Mainz, and a project study, which included restoration of the molds, was launched[18]. The partners for the project were the Universities of Mainz, Jordan and Yarmouk, the DoA, and the French archaeological mission. Support from these institutions, together with the embassies of the Federal Republic of Germany and France[19], allowed, in the summer/autumn 2012, the complete restoration of several molds[20], after recording[21] and photographing[22] of the fragments, together with ceramological and metallographic analyses[23], had been completed. During the autumn, after studying the results of the first restoration and analyses, research in the northern part of the sanctuary[24], postponed since 1993, could commence again; most of the finance was provided by a special grant from Germany. By chance, another casting pit, similar in all respects to that uncovered in 1992, was discovered only five meters to the east, in the same stratigraphic level (dated to the second half of the 2nd century AD). It housed, again still in situ, the remains of a large circular mold base (more than one meter in diameter), similar to the first one. Only the filling from the pit differed; instead of mold fragments, it contained many fragments from firing ovens (crucibles, walls, nozzles, etc,) which complemented the previous documentation and information on the foundry, together with furthering knowledge of ancient bronze manufacturing techniques. The presence of restoration specialists from Mainz[25], together

17. For many years, management of the Jarash Archaeological Park had been complicated by internal rivalry from local representatives of the DoA. One of the most important consequences was the absence of any overall organization for the collection of information, or even finds, especially statuary. Many discoveries (ceramic, coins, bronze, etc., as well as marble statues and inscribed and/or decorated architectural blocks) were not recorded. They were stored, when they were, in deplorable conditions and often left behind on the ground, outdoors, in various places. Any attempt to collect and update information was refused by some local officials. In 2013, after the departure of some of these officials, Dr Rafe Harahsheh organized a systematic collection of marble fragments in a suitable storeroom for the first time.

18. Jordanian-European Cultural Heritage Conservation Program at Jarash, funded by the Hashemite Kingdom of Jordan, the Republic of France and the Federal Republic of Germany.

19. The project was, for the most part, sponsored by the Federal Republic of Germany. However, it also received support from Mr Aumis, the Cultural Attaché for the French Embassy in Amman, and Mr Marc Griesheimer, the Assistant Director for the French Institute of the Near East (IFPO).

20. By Nina Heyer and Lotte Maue, conservators.

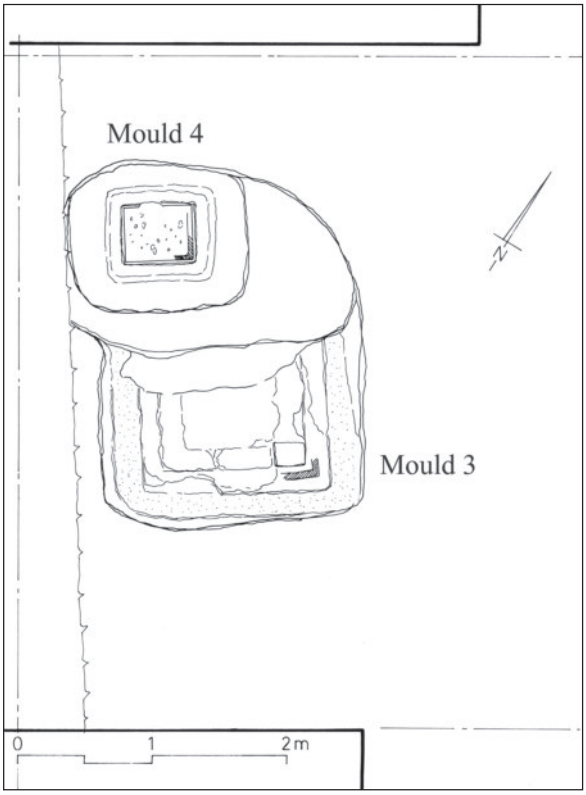
21. By Khairiyeh al-Kuhkun and Abd el-Nasr Hindawi from the University of Jordan.

22. By Mohammad Adi, photographer from the University of Jordan.

23. By Mustaffah Naddaf, from the University of Yarmouk and Lutfi Khalil from the University of Jordan.

24. By Anne-Michèle Rasson-Seigne and Christina Wolf.

25. All members of the archaeological team participated in the removal of the mold, with restoration under the direction of Christian Eckmann.



7. Bronze molds 3 and 4 in situ in the northern vaulted corridor (Drawing: Giancarlo Filantropi, Jacques Seigne 2014).

with administrative and technical support from the responsible Jordanian authorities[26], enabled the remains of the mold to be removed and transferred to the Jordan Museum for future restoration and exhibition, together with other pieces found during both excavations of the bronze workshop.

The discovery of this second casting pit, and the material it contained, confirmed the exceptional importance of the Jarash discovery, by increasing our knowledge of the ancient technology for manufacturing large bronzes[27]. It also verified that the search had so far only reached the outskirts of the bronze workshop. For technical reasons, such facilities are generally established under shelter, to protect the molds and ensure, as much as possible, constant light, in order to properly judge the temperature reached by the melting metal. Therefore, it appeared that the two pits established outside the gallery were most likely installed there due to lack of space elsewhere. They could then be interpreted as the remains of the last two major bronze casting areas used before the abandonment of the workshop. Moreover, the main area of activities should be sought nearby, within the northern vaulted corridor of the sanctuary.

In 2014, Madame Kamermann, a French Senator, provided a special grant which allowed us to explore the hypothesis. In October/November 2014, new research was undertaken at the northern entrance to the sanctuary. The excavation was considerably delayed by clearance, removal of blocks from collapsed vaults (see previous sections in this article)[28], and the study of important Umayyad and Byzantine remains in the underlying archaeological levels. Despite these constraints, and the fact that the 2nd century AD level could be reached in a small area only, the hypothesis was fully confirmed, as the entire space was occupied by the remains of two new casting pits. Shallower than those found in 1993 and 2012, they were used to manufacture rectangular and almost square large bronze objects, (0. 60m x 0.60 for the smaller, and 1.20 m x 1.10 for the larger). The filling of these pits contained a large number of firing oven fragments, nozzles, a few mold fragments, a great deal of bronze slag, some small lead ingots, and, for the first time, many molded plaster fragments (sculpture models?).

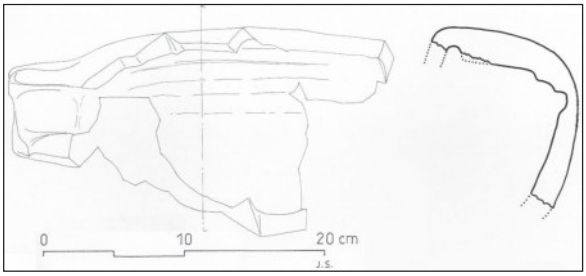
The Bronze Workshop

The 1993 and recent excavations proved that only a small part of the exceptional Jarash bronze melting installations have been excavated. It is also clear that the workshop for the production of large bronzes was probably first installed under the vaults of the Northern

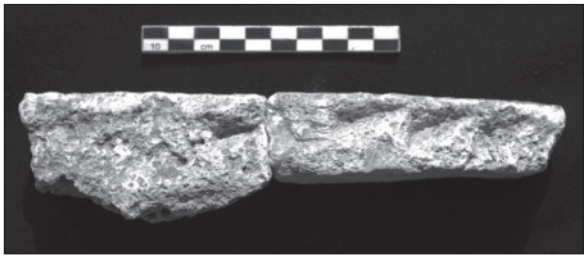
26. Our sincere thanks go to H.R.H. Princess Sumayya Bint Tallal and to his Excellency Mr Nayef al-Fayez, the Minister of Tourism and Antiquities, who agreed to and assisted as much as possible in the transfer.

27. The great earthquake of 653 was, most probably, the origin of the collapsed vaults in this sector. The excavation was delayed for a time, first because of the necessity to wait for the DoA crane to be available, but particularly by the unexpected discovery of a singular suspended keystone block, which was decorated and inscribed (P.-L. Gatier and J. Seigne 2015).

28. Preliminary results for the excavation and restoration of the bronze workshop were published early in 2013, thanks to funding from DAAD: (Lufti A. Khalil, Jacques Seigne and Thomas M. Weber, 2013).



8. Mold fragment (Drawing: Jacques Seigne 2014).



9. Fragment of molded plaster.

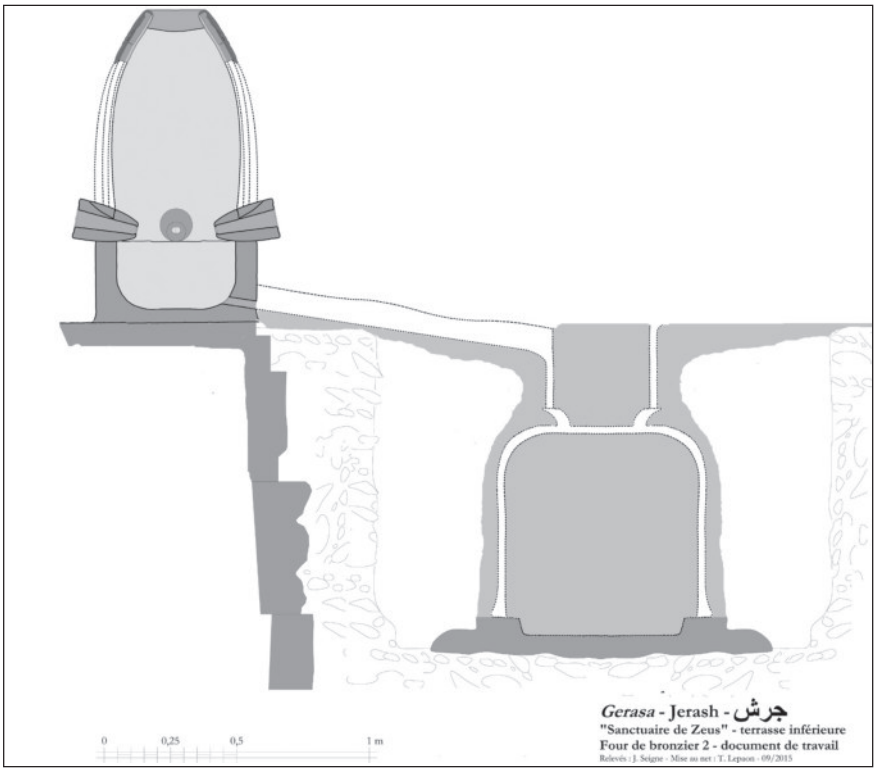
Corridor of the sanctuary. Apparently, so many pits had been dug and filled inside the corridor, the soil became so unstable it was no longer possible to dig new casting pits in that area, and the last(?) two (at least) had to be dug in the courtyard of the shrine.

The four excavated casting pits all have the same characteristics:

- They were dug in the early 1st century AD (inside corridor) and early 2nd century AD (courtyard) construction embankments of the sanctuary. Their shape and dimensions reflect the objects which were made, and only a narrow space (0.20 m to 0.30 m wide) between the mold and the sides of the pit allowed the founders to work on the construction of the outer mold;
- It is very likely that this narrow peripheral circulation was blocked (with sand?) after completion of the mold and before casting (strengthening resistance of the mold);
- No trace of calcination, or more generally of firing, was found on the walls of the pits;
- Similarly, the mold fragments remained in situ and appeared uncooked. Only the inside mold surfaces that have been in contact with molten metal show signs of "cooking".

In addition, the four pits remains excavated included:

- Objects that belonged to at least four kilns, in which between 200 and 400kg of metal were processed each time (estimated metal volume is calculated from the size of the melting chambers discovered);
- The remains verify that these kilns were built on the ground and not mobile;



10. Hypothetical reconstruction of the bronze melting installation. (Hyp.: Jacques Seigne, Computer graphics: Thomas Lepaon 2015).

- Therefore, the liquid bronze flowed by gravity between the kilns and the molds;

The different molds found in situ and in the fillings from each pit prove that this workshop was used to manufacture large basins and statues. The large number of "small" independent molds, for parts of larger statues (draperies), confirm previous studies of antique bronze statue techniques. These molds, some of which have been completely restored and are more than 0.50m in length, were cooked before melting (the "cire perdue", (lost wax) method).

What's more, such artisanal remains, in the sacred area inside a sanctuary, can be explained, in our opinion, only by the nature of the objects manufactured; that is, directly for the sanctuary.

All information which has been gathered as a result of the excavation and analyses for the bronze workshop confirm that it was, in all probability, functioning to provide equipment for, and decoration of, the large octostyle temple built in 162/163 AD.

Only a part of the casting installations have been excavated at this stage. We hope that, one day, someone will be able to complete the excavation and the study of this exceptional antique workshop.

J. Seigne, Tours (2015)

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RECYCLING THE VALLEY PRELIMINARY REPORT: TALL DĀMIYAH EXCAVATIONS 2014

Zeidan Kafafi and Lucas Petit

1. Excavation work in 2014.

Abstract

The fifth excavation season at Tall Dāmiyah took place from the 18th of October until the 20thof November, 2014. It was a joint project between the Dutch National Museum of Antiquities, represented by Lucas Petit, and Yarmouk University, represented by Zeidan Kafafi. Work was carried out in 6 squares on the south-eastern summit of the Tall. The main goal was to study the Late Iron Age levels, and to relate the findings to other Iron Age sites in the vicinity. Furthermore, attention was given to a cemetery on the summit, preliminarily dated to the Byzantine and Ottoman Period. The 2014 season uncovered further remains of a burned complex dated to the 7th century BC. Several objects, among them a clay bulla with cuneiform signs and Assyrian Palace Ware, which had been found in a previous season, point to a relationship with the Neo-Assyrian Empire; however, some Egyptian and Cypro-Phoenician objects or ceramics were also encountered. The interior walls of the most northern rectangular building were plastered, as was a platform against the most western wall. Several figurines were discovered in and outside this building, hence cultic activities can be assumed. Persian/Hellenistic silos, together with the Byzantine and Ottoman cemetery, were the latest occupation remains at Tall Dāmiyah.

Introduction

General Objectives and Importance of the Project

Recent archaeological and associated research has discovered intriguing short-term occupation activity in the Central Jordan Valley during most of the first millennium BC. Previously unknown in Near Eastern archaeology and even beyond, this systematic sedentary occupation forces scientists to widen their geographical scope, in order to understand

2. The Zor, close to Tall Dāmiyah.

how these people interacted with the surrounding area. Inhabitants of the Central Jordan Valley during Iron Age II and the Persian Period were unequivocally engaged in a continuing cycle of migration, returning to previously settled sites; in other words, searching for preferred areas but leading a sedentary way of life. Due to a complete lack of research in the foothills and on the plateau east of the Central Jordan Valley, archaeologists can only guess where these people migrated to in times of difficulties.

The project recycling a valley intends to systematically investigate the role Central Jordan played in the region during Iron Age II and the Persian Period. It continues at a point where other projects stopped:

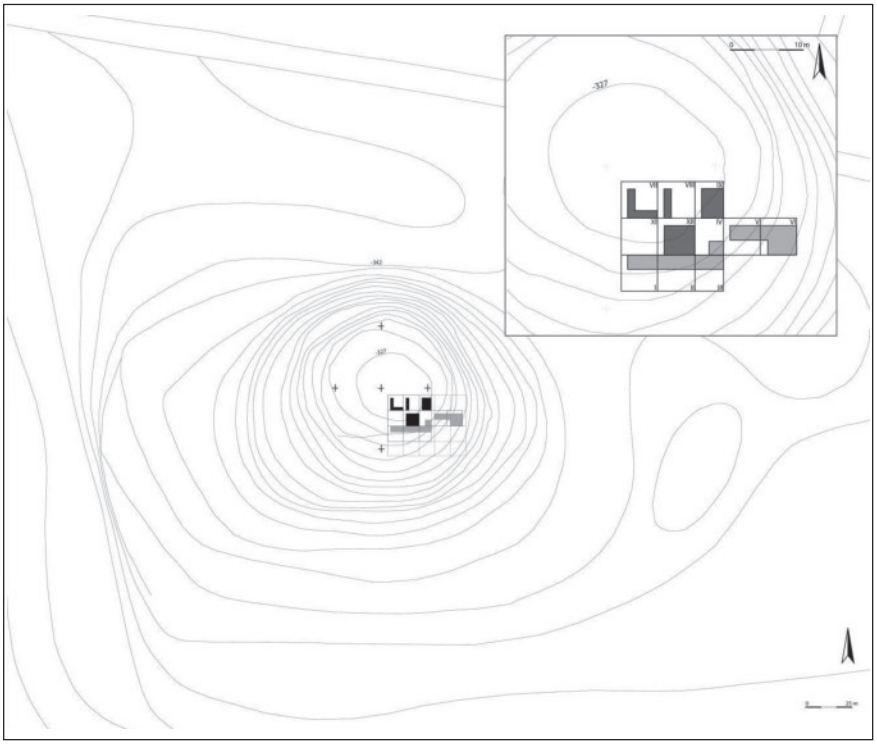
1) A detailed study of Tall Dāmiyah's role in the valley, as it seems to be one of the few sites which have been occupied almost continuously, without occupation breaks,
2) The investigation of settlements on the eastern plateau, to discover how their occupation system(s) relate to habitation in the Central Jordan Valley during the first millennium BC, and
3) Combining evidence from previous studies into one coherent picture. On one hand, this project will discover intriguing new information about first millennium BC sites, with evidence of destructive earthquakes, far distance trade and creative solutions to cope with severe climatological conditions; on the other, it will place ancient settlements which have already been investigated into a broader first millennium BC society. Recycling a Valley is a stimulating story about people with emotions, creativeness and a long-term vision of how they could survive in a fertile but unpredictable environment. The project also re-defines terms such as sedentary and migration in terms of archaeology and as a consequence will make people aware of pre- and historical solutions to recycling.

Tall Dāmiyah

The archaeological site of Tall Dāmiyah is situated in the Zor, directly south of the confluence of the Zarqa and the Jordan Rivers (Lat. 32.1040000915527; Lon. 35.5466003417969). The site is surrounded from three sides by Katar-hills (the Ras Zaqqum, the Sha'sha'a and the Damiyah Katar), and is 500 meters east of the Jordan River. Across the river, on the western side, are the Jiftik and the Marj en-Na'jeh, which belong to the Nablus district of Palestine. Tall Dāmiyah is considered to be the most southern settlement which has Iron Age occupation in the Jordan Valley, other than tells (or talls) which are situated in oases (e.g. Jericho, Tall Nimrin and Tall Hammam). The site covers an area of approximately 3 hectares at the base, and has relatively steep slopes all around, rising approximately 17 meters above today's ground level. It consists of two parts; an upper tell and a lower terrace which occupies the western and southern sides. The upper tall in particular occupies a strategic position, and today overlooks the Prince Muhammad (General Al-Linbi) Bridge across the Jordan River. In addition, it dominates the N-S road through the Jordan Valley and the E-W road which connects ancient Ammon with the Wādī Far'ah. This area is very fertile and currently irrigated for intensive farming.

3. Tall Dāmiyah (MEGA number: 2750, DAAHL Site number: 353200251).

Tall Dāmiyah is one of the few sites which was continuously occupied during the Iron Ages (Petit *et al.* 2006; Petit 2008; Petit 2009: 103-49). This fact is remarkable when viewed in relation to the discontinuity of other Iron Age sites in the area (*e.g.* Yassine 1988; Van der Kooij 2001; Petit 2009). Small soundings at this settlement mound in 2004 and 2005 (Excavation permits *59/2004* and *59/2005*) by Dr. Lucas Petit and Dr. Omar al-Ghul (Yarmouk University), and in 2012 and 2013 by Dr. Lucas Petit (Excavation permit 23/2012 and 56/2013) had intriguing results regarding late Iron Age occupation and the Neo-Assyrian presence along the river Jordan (Kaptijn *et al.* 2005; Petit *et al.* 2006; Petit 2009), and also about the Byzantine Period (Petit 2013). In 2012, it was decided to begin an in-depth study of the site of Tall Dāmiyah, in order to understand the role of the central Jordan Valley. Under the auspices of the National Museum of Antiquities in the Netherlands, an international team of archaeologists and specialists opened four squares along a former bulldozer cut (see site evalution). The excavations continued in 2013, with work resuming in the same squares. Preliminary results of the 2012 and 2013 seasons will be published soon in the Annual of the Department of Antiquities of Jordan (Petit 2013; Petit in prep).



4. Site Plan with Location of Squares.

Excavation work at the site of Tall Dāmiyah resumed again in 2014, this time as a joint Jordanian- Dutch project under the directorship of Zeidan Kafafi of Yarmouk University and Lucas Petit of the Dutch National Museum of Antiquities. With the cooperation of the Department of Antiquities of Jordan (DoA), represented by Ziad Ghunaimat, the team worked between the 18th of October and the 20th of November 2014. The aim of this season was to determine a more substantial view of the site's history, with excavations again continuing in the squares opened in 2004, 2005, 2012 and 2013. Tall Dāmiyah is one of the few sites in the southern Levant with Neo-Assyrian objects, including cuneiform writing. Furthermore, the spectacular discovery of a Byzantine cemetery on the summit of Tall Dāmiyah is a valuable asset, which has provided significant information, enabling researchers to better understand the late-Antiquity in the Jordan Valley. Furthermore, erosion processes on the southern summit as a result of a bulldozer's cut have made archaeological research extremely urgent.

The 2014 Team

The team members were Zeidan Kafafi (co-director), Lucas Petit (co-director), Zeyad Ghunaimat (DoA Representative), Yotti van Deun (archaeobotanist), Jeroen Rensen (area supervisor and physical anthropologist), Hendrik Uleners (area supervisor), Mariette Grimbergen (house manager), Mina Taheri, Gaelle Rochtus, Ali Al Amrat, and Salam Al Waked (square supervisors).

Previous Studies and Reports

Victor Guérin was the first to recognize the importance of Tall Dāmiyah (Guérin 1869:238-40), although others, such as Irby and Mangles in 1818, William Lynch in 1848 and Charles van de Velde in 1851 must have directly passed the site during their travels (Irby and Mangles 1823: 325-26; Lynch 1855: 249-50; Van de Velde 1854: 321). John William McGarvey, who visited the site in 1879, mentioned the ruins of a building on its summit near the eastern end (1881:350). He was also one of the first scholars to equate Tall Dāmiyah with Adam(ah), a city mentioned several times in the Old Testament (e.g. Joshua 3:16, I Kings 7:46, II Chr. 4:17) and on the victory stele of Shoshenq I in Karnak. From 1880 onwards, the site was visited and surveyed many times (e.g. Albright 1926: 47; Glueck 1951: 329-31; Yassine *et al.* 1988: 191). The survey teams found pottery from the following major periods: LB II, Iron I, Iron II, Persian, Early Roman, Byzantine and Islamic.

5. One of the Oldest Photographs of Tall Dāmiyah (©American Colony, ca. 1920-1933).

Archaeological excavations were undertaken by Petit in 2004 and 2005 (Kaptijn *et al.* 2005; Petit *et al.* 2006; Petit 2009). During these first two seasons, the main objective was to rescue and document the archaeological remains uncovered by the bulldozer cut (Squares I-III). Archaeological research has continued from 2012 onwards.

Methodology

Fieldwork

The excavation methodology follows the same practices as those executed by the joint Dayr 'Alla project. Small excavation units (max. 5x5m) divided by baulks will guarantee a good stratigraphic overview of the site. Documentation will include top plan- and section- drawings as well as digital photographs. Most drawings are scaled at 1:20, apart from the human remains, which were drawn at 1:10. In 2012 and 2013, a decision was made to rebury all the human remains uncovered at Tall Dāmiyah (from both the Byzantine and Ottoman Periods) immediately after a short study at the excavation house. All special finds were measured with x, y and z coordinates. Archaeobotanical, archaeozoological and soil samples were taken from 'clean' contexts.

A custom built database, designed specifically for the Tall Dāmiyah excavation, was used by all team members. Data (including photographs and drawings) of previous excavations are stored in the excavation house and are available for study.

Material Culture

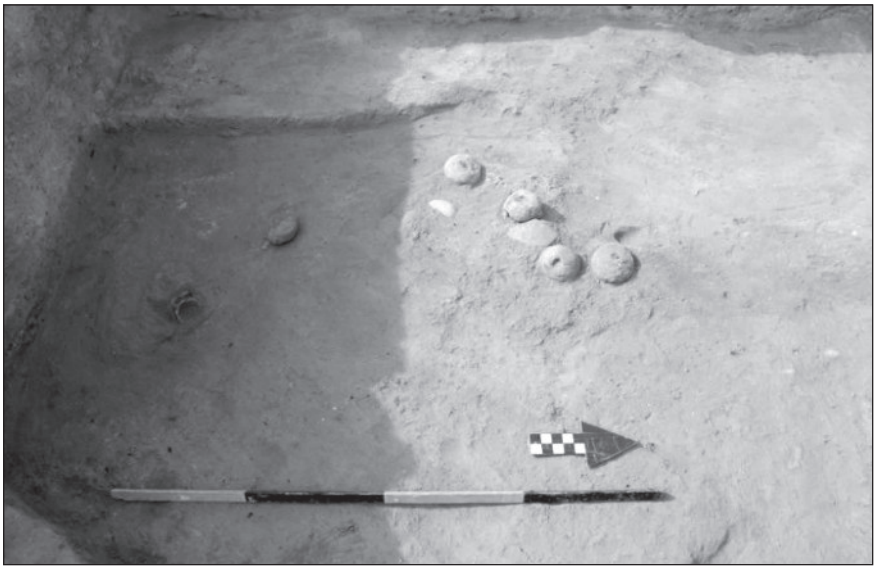
Portable finds were moved to the excavation house, washed (depending on the fabric of the object), drawn and photographed. They were numbered, packed and stored in boxes. Broken pottery was mended if possible.

Results (Stratigraphy and Finds)

Excavations

Excavation work was carried out in 6 squares, numbered I, III, IV, VII, VIII and XII **(Fig. 4)**. The preliminary results provided here are based on all excavation seasons (hence including data from the 2004, 2005, 2012 and 2013 seasons), although the 2014 season provided substantially more information, and solved several stratigraphic problems. The results are presented chronologically, commencing with the oldest occupation phase excavated so far. The excavators recognized several archaeological strata, which are all included in this report.

The oldest occupation remains were encountered in Squares I and III. They consist of thick deposits of occupation layers, with some complete pottery objects, and others which are restorable. The layers contain mud brick fragments, similar to some structures on the summit. The pottery, such as a complete bowl and small black juglet, can be dated to Iron Age IIC, somewhere around 700 BC. The presence of large clay loom weights suggest some textile production on the site **(Fig. 6)**. One special find was a bone seal which depicted a lion.



6. Juglet and Loom Weight in One of the Oldest Layers Excavated in 2014.

7. Courtyard Layers in Square IV.

The next occupation level, also from Squares I and III, encompasses the remains of several mud brick walls, oriented NW-SE which are extant in numerous occupation layers. The pottery, all fragmentary, can be dated exclusively to the 7th century BC. A possible oven associated with this level was found in Square III. Either contemporaneous or immediately on top of this phase was a thick deposit of courtyard layers; in 2014, most of the excavation in this area took place in Square IV **(Fig. 7)**. Successive greyish floors, some of which were plastered, were interrupted by a number of stones.

These stones range in size, from medium to small unhewn, and are all river stones, sourced from the basins of both the Zarqa and Jordan Rivers. Fireplaces and post holes were identified in these layers. Possible associated remains of a mud brick structure, destroyed by a heavy conflagration, were discovered in 2012 (Square VII) and 2014 (Square VIII). However, this level was only reached in two small spots, and the shape of this building cannot be determined. At least two ovens "tabuns" were in use during this phase in Square XII. The pottery is consistent and clearly Iron Age IIC, including a number of Assyrian Palace Ware and Ammonite sherds.

The next occupation phase, still dated to the 7th century BC, can be associated with an Assyrian presence. The discovery in 2004 of a clay bulla with Akkadian writing, and numerous Assyrian Palace Ware-sherds (in this and previous seasons) indicates increasing contact with the Neo-Assyrian Empire. But there was definitely contact with the Cypro-Phoenician coast and Egypt also.

At least two rectangular buildings separated by a small alley are located on the south-eastern summit of Tall Dāmiyah; unfortunately,

8. White Plastered Wall and the Roof Roller from the 7th Century BC.

very little of the southern building has been preserved due to the bulldozer cut. The other building is rectangular, with a doorway in the SE-corner. The interior of the walls were white lime-plastered **(Fig. 8)**, and a type of platform was situated against the western wall, which was also covered with plaster. It was difficult to get a complete plan of this building due to several later pits and burials. The pottery is clearly Iron Age IIC, some of which could be restored (in 2012 and 2013). A large stone roof roller was found on top of debris in the most northern building. The most important and intriguing finds were, however, several figurines and anthropomorphic jars.

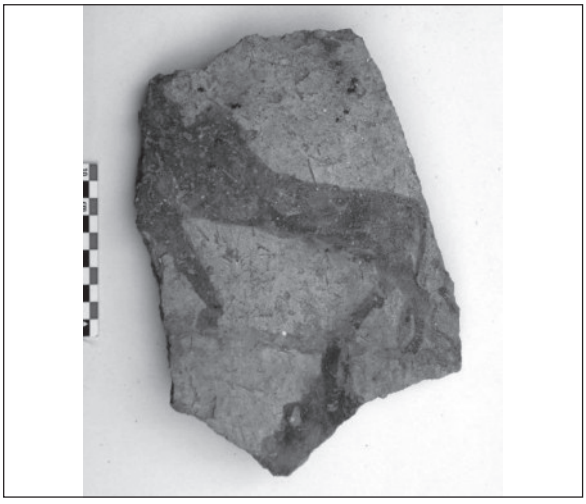
North of the platform, near the western wall, four animal figurines (*cf.* **Fig. 9**) and a possible anthropomorphic jar statue was found. Two similar statues were found in Square IV in 2005 and 2012 (*e.g.* Petit 2009). In that same area, which is situated southeast of the plastered building, several other animal and human

9. Animal Figurine Found in Square VII.

10. One of the Persian-Hellenistic Silos in Square XII.

figurines were discovered. The courtyard layers may be contemporaneous with these finds. If this is the case, it can be assumed that the white plastered building had a cultic function. Further analyses on the objects and the stratigraphic situation must be carried out before this can be determined conclusively. However, it could be determined that both structures had been destroyed by fire, and a thick, burnt mud brick debris covered the floors of the rooms.

Some scattered occupation remains (pits and hearths) were found in the destroyed remains, after which the site was abandoned. Some Neo-Babylonian finds, for example seals, indicate the presence of people during the late 7th and 6th century BC. The seals from Square IV reminded the excavators of the objects found at the Tall Mazar Cemetery, approximately 30 km to the north of the site (Yassine 1988). It is unclear if those finds could be associated with mud brick wall fragments at the summit, as their dating remained obscure.



11. Sherd Depicting a Cow with a Plough?

The only remains from the 5th to the 2nd century BC were numerous large pits (see Petit 2014 for a possible explanation). These rounded architectural features were of two types: silos which were simply dug into settlement mound layers, and pits lined with mud bricks **(Fig. 10)** They are almost all rounded in shape. The content of these installations consisted of dumped sediment debris, including mud brick chunks, on top of a decayed layer of organic material, possibly straw. This may indicate that the producers were either nomadic or semi-nomadic, and using the summit of the Tall as a storage facility, perhaps to store animal fodder during the summer. Beside the organic remains, some household equipment (*e.g.* grinding stones) and textile production tools (loom weights and spatulas) were also encountered. This year a large pottery sherd, which possibly depicted an animal dragging a plough, was found **(Fig. 11)**. Other sites in similar environments, such as Tall Dayr ‘Alla, Tall Mazār and Tall as-Sa’idiyeh have revealed similar silos, with dates varying from very late Iron Age II until the Hellenistic Period. The exact date of the pits found at Tall Dāmiyah ,as well as the period in which they were used, requires further study.

The presence of a large quantity of Late Roman and even more Byzantine pottery on the surface indicates a human presence during these times **(Fig. 12)**. The site was probably used as a cemetery during the 6th and 7th centuries AD. Numerous burials were encountered, particularly on the summit. The human remains were placed in elongated pits dug into the layers of the settlement mound. Depth differs tremendously; some were buried almost 1.5 meters deep, others only 30 cm. Many of the

12. Grave (with an Older Wall in the Background).

remains were of children, but adult bones were also found. Funeral objects such as beads and a glass vessel date at least a few of the graves to the Byzantine Period, although it remains difficult to date individual graves precisely. Many of the graves cut other graves; hence, the cemetery was probably in use for several centuries. Many of the individuals were lying east-west, with their heads pointing to the west and looking south, but they did not all follow this pattern (NE-SW, or W-E). Furthermore, the position of the body differed remarkably in individual cases; on their back, on the sides, with legs crossed, with one hand under the skull, etc.

It is quite possible that the site was again used as a burial ground during the Ottoman Period. At least two stone graves (Squares VII and VIII) yielded the remains of objects from this period, including an Ottoman pipe. One had already been excavated in 2012 (Square VII), which had revealed bronze objects, some beads and a mirror.

Archaeobotanical Research
(by Yotti van Deun)

Archaeobotanical research was carried out as part of the project 'Recycling a Valley', conducted in Jordan by the Dutch National Museum of Antiquities and Yarmouk University. This study was supported by the DoA, the Dutch National Museum of Antiquities in Leiden, Yarmouk University in Irbid, and the University of Groningen. To provide additional evidence for the study on migration patterns for the Iron Age inhabitants of Tall Dāmiyah, and to examine their natural resources and trade connections, several accurate flotation and soil samples from different contexts have been taken during all excavation seasons since 2012. The aims of this archaeobotanical research are to reconstruct the species which were present in Tall Dāmiyah, and additionally, to investigate which crops may have been either cultivated locally or imported across a range of periods, and compare results with other Jordanian talls.

The archaeobotanical samples are obtained by judgmental sampling from contexts such as ash layers, pits, graves, ovens and pottery. Random samples are also taken from surface levels, to establish the true predominant crop on the site. Various volumes are taken from both samples. The samples are floated using 2mm, 1mm and 0.5mm mesh sieves, and analysed using a stereo-microscope. The microscopic study consists of an initial scan in the excavation house at Dayr 'Allā, with the purpose of establishing an idea of the abundance of archaeobotanical remains, specifically the primary domesticated cereals and legumes, within each trench of the tall. Samples which contain botanical remains which cannot be determined by species on site, are taken to the archaeobotanical laboratory at the University of Groningen for further analysis, using the archaeobotanical reference collection.

In addition to shells and charcoal, which appear in almost all samples, cereals such as barley (*Hordeum vulgare*) and wheat (*Triticum aestivum/durum*) have been noticed in several samples. Other food crops such as lentils (*Lens*

13. Beads and Objects from One of the Graves.


14. Archaeobotanical Remains.

culinaris), grapes (*Vitis vinifera*), chickpeas (*Cicer arietinum*) and sesame (*sesamum*) have been present in some samples. One of the samples contained half an almond (*Prunus dulcis*). The nut was probably not eaten because of a sudden fire in the building. Wild species of *Malvaceae, Poaceae, Fabaceae* and *Caryophyllaceae* (namely *Gypsophila* or 'baby's breath') were noticed in most of the samples, which can be related to the open character of the Iron Age building.

The plant species encountered so far cannot be used as definitive evidence for storage units or general food patterns, nor can they be used as comparisons with archaeobotanical remains from other layers or other sites. A final report on the archaeobotanical remains of Tall Dāmiyah, containing a list of all species encountered, will be written as part of a literature study, after the microscopic study is finished.

^{14}C Dates (export permission granted: October 2013)

A carbon sample was taken to the Netherlands for ^{14}C analyses in 2013; it was studied by Dr. Rene Cappers from the University of Groningen. The sample contained *Triticum Aestivum/Dureum*, *Hardeum vulgare* ssp *vulgare* and grape. The sample was then dated by the ^{14}C laboratory in Groningen (by Dr. Hans van der Plicht) to the end of the 8th century BC (calibrated).

Discussion

The Tall Dāmiyah excavation results from 2014 have resulted in a more complete understanding of occupation during the late 8th and 7th centuries BC. Although heavily disturbed by Persian and Hellenistic pits, as well as by later burials and the bulldozer cut, the remains of two rectangular buildings, dated to the early 7th century BC, could be discerned. A clear relationship with the Neo-Assyrian Empire has been substantiated. However, Tall Dāmiyah's precise role in this period has not been determined yet, hence further research is required. Was this building a type of trading post, or an Assyrian fort, as was previously thought? Alternatively, was Tall Dāmiyah a religious center, with the white-plastered building functioning as a temple? That the site had some cultic role is highly likely, as evidenced by the discoveries in the layer directly underneath the mud brick buildings; figurines and statues are reasonable arguments for assuming religious activity. Nevertheless, cook pots and loom weights were found in essentially contemporary layers, implying that, around 700 BC, Tall Dāmiyah was not merely either a temple or a trading colony. People were living on the site, hunting, farming, producing textiles and possibly trading.

Site Evaluation

General Condition

The condition of Tall Dāmiyah is relatively good, particularly when compared to the condition of other settlement mounds in the Jordan Valley. This can be attributed for the most part to its position within a military zone, which prohibits people from entering without a permit. The main destruction to the site has been carried out by the military itself. In addition to some trenches which were dug during the 1967 War, a bulldozer cut a deep trench from the bottom of the tall to the top of the southern summit in 2003. This trench, which is almost three meters wide, has caused massive erosion, mainly in the period before the profiles were stabilised. A military watchtower which had been constructed on the summit was removed in 2008 or 2009, although some concrete blocks still remain.

Conservation Works and Maintenance

The section of the bulldozer cut, together with our excavation trenches were stabilised with plastic, stones and sediment at the end of the 2004 and 2005 excavation seasons; the result, seen seven years later in 2012, was relatively good. The profiles were in a relatively good condition, and it was decided to the repeat the same procedure in 2013. In 2014 the profiles were also covered with plastic. We have to wait for time to tell if this method will further reduce the loss of archaeological deposits.

Challenges

Ownership

The site is owned by three brothers of the Ramadneh family from the Abbad Tribe. Communication with the owners is excellent; they are very interested in the work and

15. The Bulldozer Cut in 2004.

regularly visit the excavation site. An undated written permit, signed by the owners, is in the possession of the DoA.

Looting and Destruction

No looting is evident at the site, although fields around it are ploughed; this means that any archaeological remains in this area, particularly in the slightly elevated area southwest of the site, may possibly be damaged by agricultural activities in the future. As noted above, a military bulldozer has already created a cut to the southern summit.

Recommendations and Conclusions

It has to be admitted that so far, final conclusions remain undetermined. Nevertheless, results of the archaeological excavations to date indicate that this site played a major role in the region, but was particularly important throughout the Iron Age. Several find objects proved it had relationships with other surrounding regions, not only with close neighbours, but also with others at a considerable distance. To determine this more accurately, further horizontal and vertical operations are required, to broaden our understanding of the site within the Bronze, Iron and Persian periods. Understanding the Iron Age occupation in the Jordan Valley is not sufficient it is necessary to comprehend how the site functioned through its lifespan, including unravelling the meaning of the scarce remains of Byzantine occupation of the valley.

In many ways, the site of Tall Dāmiyah is different from the other tells in the region. Its position on the Jordan River, close to one of the few fords, makes it a very likely place for ancient travellers to have visited and camped. Only further excavations can unravel the mysteries of the late Iron Age, the role of the Assyrians in this area, and probably much more.

Acknowledgments

The co-directors of the project would like to thank the Department of Antiquities of Jordan, represented by His Excellency the Director General Dr. Munther Jamhawi, for his continuous support and facilitation of all difficulties, thus enabling us to achieve the main goals of the project. Thanks are also due to the Dutch National Museum of Antiquities, for carrying the heavy burden of financial costs for the project. The directors would also like to thank Yarmouk University for signing the agreement with the Dutch Museum, which made this joint project possible. We were privileged to have an excellent team, and appreciated the work of all the local people who helped during the excavation and in the house. As always, it was a pleasure to stay in the Station for Archaeological Studies in Dayr ʻAllā, and we would like to express our gratitude to Yarmouk University for housing us. Furthermore, we would like to thank the Dutch company SOB Research, who granted permission for Hendrik Uleners to join our team.

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RECYCLING THE VALLEY: PRELIMINARY REPORT OF THE 2015 EXCAVATIONS AT TALL DĀMIYAH

Lucas Petit and Zeidan Kafafi

Introduction

The project *Recycling the Valley* was initiated by the Dutch National Museum of Antiquities in 2012, in order to understand the varied diachronic use of sites in the Central Jordan Valley and the Jordanian Plateau during the Iron Age (for a lengthy discussion of the project, Petit 2013). In 2014, the project became a joint venture with Yarmouk University. Whereas excavated sites like Tall Dayr ʻAllā, Tall al-Mazār and Tall as-Saʻidiyeh reveal discontinuing occupation histories (Yassine *et al.* 1988; Van der Kooij 2001; Petit 2009a, and references therein), Tall Dāmiyah was settled almost continuously during the Iron Age II period (Petit *et al.* 2006; Petit 2008; Petit 2009a: 103-49). This asked for an explanation and archaeological investigations at Tall Dāmiyah were carried out in 2012, 2013 and 2014.

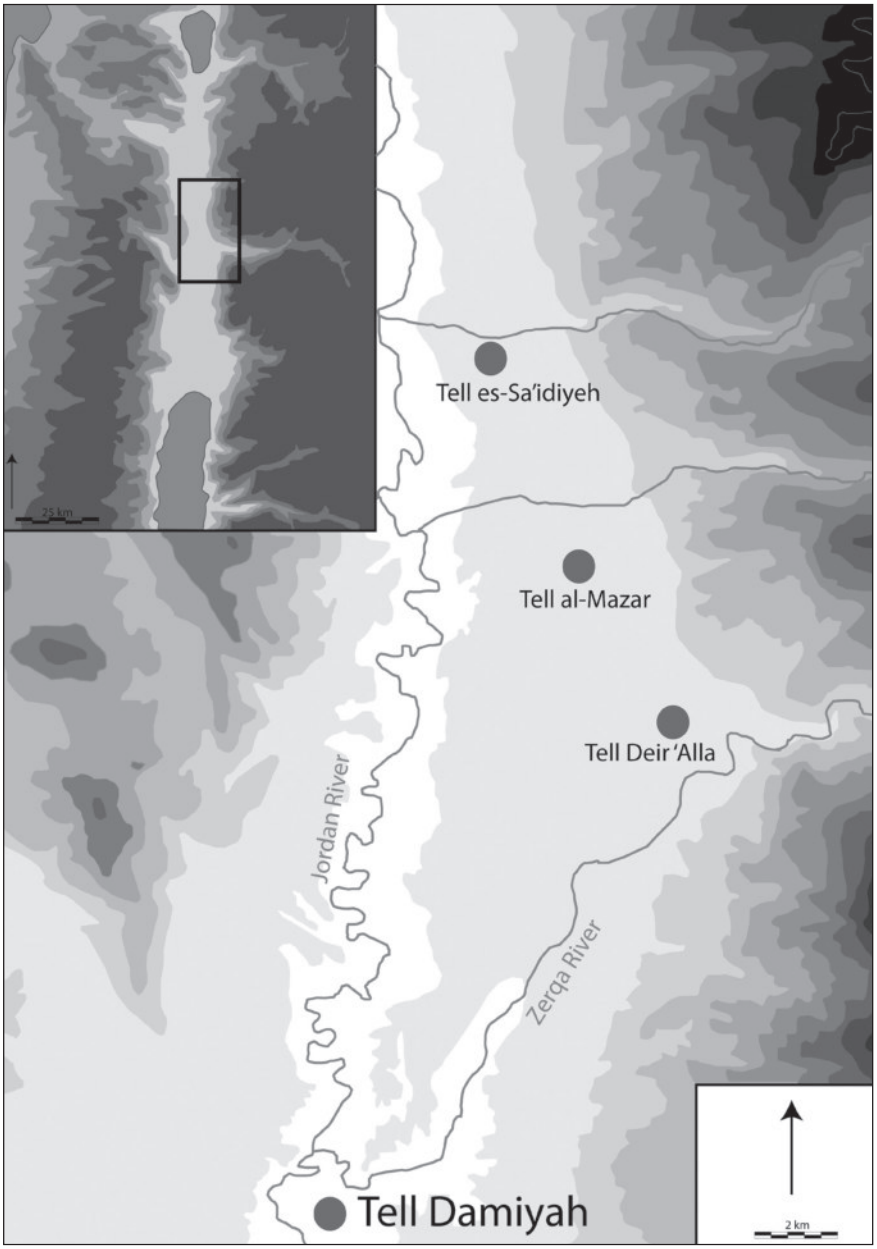
Tall Dāmiyah is a small settlement mound (the summit is less than one hectare) on the east bank of the Jordan River, a little south of the confluence of the Zarqa River (**Fig. 1**). It is considered the most southern of the Iron Age sites in this valley, with the exception of some settlement mounds in oases in the Dead Sea Plain (Tall as-Sultan, Tall Hammām). Tall Dāmiyah is strategically located in the Zor, close to one of the few forts of the Jordan River. The Zor is a lower located vale within the Jordan Valley, which was probably flooded seasonally in the past. The site's position near a fort and along an important historical E-W trade route might provide part of the explanation for its exceptional occupation history.

Excavation Work

Tall Dāmiyah was first trenched in 2004 and 2005 by Dr. Omar al-Ghul from Yarmouk University and Lucas Petit, at that time from Leiden University (Kaptijn *et al.* 2005; Petit *et al.* 2006; Petit 2009a). The excavation units were opened along a bulldozer cut that 'stimulated' massive erosion. Extensive Iron Age occupation was encountered, dating from the 10th until the 6th century BC. Finds indicating links with the Neo-Assyrian empire were intriguing (Petit 2009a: 117-20). Some Persian storage pits and two burials of unknown date were the only post-Iron Age remains.

In 2012, the Dutch National Museum of Antiquities started a new regional project in the Central Jordan Valley, called 'Recycling the Valley'; excavations at Tall Dāmiyah continued as part of this project (Petit 2013). In addition to valuable information about the 8th to the 3rd centuries BC, two cemeteries were discovered, dated by grave goods and surface pottery to the Byzantine and Ottoman Period (Petit 2013). In the following two seasons, 2013 and 2014, the team focussed primarily on the late Iron Age remains and the two cemeteries on the summit. In 2014, Yarmouk University, represented by Zeidan Kafafi, joined the project. The aim was to acquire a more substantial view of the site's latest history. Tall Dāmiyah is one of the few sites in the Southern Levant with Neo-Assyrian objects, including cuneiform writings. The finds suggest that Tall Dāmiyah was in use as an important centre, possibly with a cultic function (Kafafi and Petit 2018; Petit and Kafafi 2016). Furthermore, the spectacular discovery of a Byzantine and Ottoman cemetery on top of Tall Dāmiyah has increased our understanding of the late-Antiquity in the Jordan Valley.

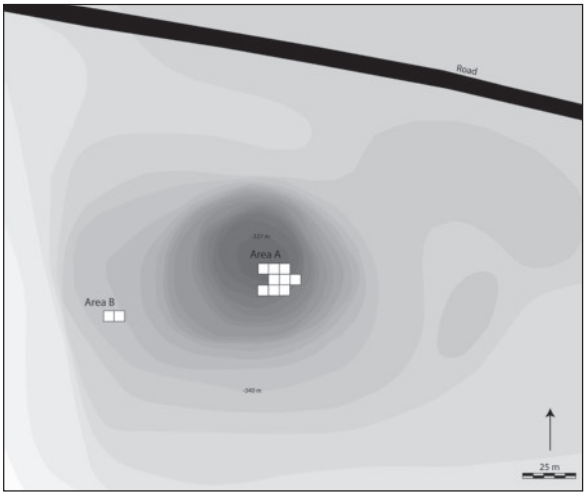
Excavation work at Tall Dāmiyah continued



1. Map of the Central Jordan Valley and the location of Tall Dāmiyah (Drawing by Lucas Petit).

in the autumn of 2015, between October 4 and November 5. The season was organised and sponsored by the Dutch National Museum of Antiquities, represented by Lucas Petit, and Yarmouk University, represented by Zeidan Kafafi. The excavation team included Muwaffaq Bataineh, Yousef al-Zu'bi, Jeroen Rensen, Mariëtte Grimbergen, Hendrik Uleners, Yannick Boswinkel, Sophie Tews and Diederik Halbertsma. The Department of Antiquities (DoA) Representative was Ziad Ghunaimat. The work was carried out in two areas: Area A on the summit (Squares IV, VIII, IX and XII) and Area B on the western lower terrace (Squares XIII and XIV) **(Fig. 2**).

The objective for excavation in Area A was to discover further information regarding the Late Iron Age (8th-6th centuries BC) and the Persian/ Hellenistic Period (5th-3rd centuries BC); the results will be compared with material culture from other contemporaneous sites located in the Jordan Valley. The decision to open Area B on the lower terrace was made at the end of the 2014 season, mainly to explore the nature and extension of the occupation at Tall Dāmiyah, as other similar sites in the Jordan Valley, such as



2. Contour Map of Tall Dāmiyah with Excavation Areas (Drawing by Muwaffaq Bataineh).

Tall al-Mazār and Tall as-Sa'idiyeh, have lower settlement areas and cemeteries at the foot of the site.

Preliminary Results in Area A (Summit)

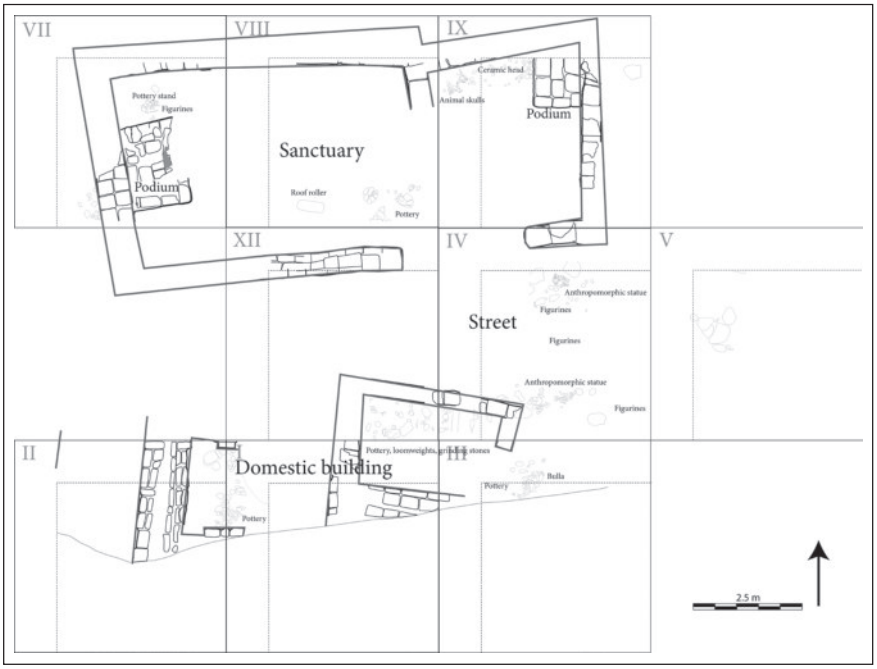
A few skeletons from the Ottoman and Byzantine Period were excavated during this season, most of them discovered during the removal of the baulks. Two Ottoman graves were encountered and studied in Square VII; both were covered by stone slabs (**Fig. 3**). The discovery of an Ottoman pipe in the fill above these slabs in 2014 dates those burials to the latest occupation phase at Tall Dāmiyah. Over the five seasons, more than 50 skeletons have been carefully excavated and studied; results will be published in the nearby future.

During the 5th, 4th and 3rd century BC, the summit of Tall Dāmiyah was used for storage. Numerous pits cut through earlier Iron Age layers, sometimes more than 2 meters deep. Reports from previous seasons have described their outlook and content in detail (Petit 2013; Petit 2014; Kafafi and Petit 2018). During the 2015 season, two interesting finds were discovered in pits from this period. One was a single large fragment of a jar with an Aramaic ink inscription (**Fig. 4**), and the other was comprised of fragments of two storage jars, one of which could be reconstructed. Neither object has been discovered previously, and both provide additional information about the function and date of the pits.

Excavations have verified that, during the late Iron Age, the summit was inhabited by at least two buildings (**Fig. 5**). Whereas the most southern building seems to be domestic in nature, finds near and in the northern excavated structure suggest a cultic function (Kafafi and Petit 2018). In 2015, the archaeologists concentrated on the better preserved northern building and the street in between. The baulks were excavated and remaining debris on top of the floor was removed. By the end of the

3. An Ottoman Burial in Square VIII (Photo Lucas Petit).

4. Pottery Sherd with Aramaic Inscription (Photograph by Yousef al-Zu'bi).



5. Top plan of the Iron Age II C occupation (Drawing by Lucas Petit).

2015-season, this level was reached in almost all squares.

The largest of the two buildings is rectangular in shape, oriented east-west, and has a doorway in the central part of the long southern wall. It was built on the top of a layer of artificial fill. At a few places, older wall remains were used as foundations, and one of these stumps acted as a division wall between the eastern and western part of the large room. In this rectangular building, all inner walls and installations were coated with white lime plaster. The inner dimensions are ca. 10.6 m in length and 4.2 m in width, and the building is considered large compared to contemporaneous structures at other sites in the vicinity. The roof was made of wooden beams, covered with smaller branches, reeds and packed clay. A heavy, stone roller was found on top of a layer of roof debris inside the building. Two mudbrick installations were found; one against the western wall and one in the north-eastern corner. The remains of the latter are difficult to interpret, due to its location close to the present surface. The western platform, probably the primary offering installation, was stepped, and plastered with lime (Petit and Kafafi 2016).

Several pottery stands and figurines, both of horses and females, were discovered inside and outside the building, and cultic activities can be assumed. The excellent condition of the figurines and the remains of two anthropomorphic statues are unique objects that have only a few parallels (Petit 2009b). Moreover, a clay bulla with cuneiform signs (found in 2004), Assyrian Palace Ware, a few Egyptian objects and Cypro-Phoenician and Ammonite pottery sherds, indicate relationships with the Jordanian Highland, Lebanon, Mesopotamia and Egypt. The head of an anthropomorphic statue (**Fig. 6**) was discovered near the northern wall, together with two animal skulls carefully placed on the walking surface.

Three other complete female figurines were uncovered in street-layers towards the southeast of the main building (**Fig. 7**). These objects were probably used during an earlier stage, implying that Tall Dāmiyah had a cultic function during large parts of the Iron Age. The co-directors suggest that Tall Dāmiyah was a significant and international religious centre during the late Iron Ages, along two major trade routes and close to one of the few fords crossing the Jordan River (Petit and Kafafi 2016).

Preliminary Results in Area B (Foot)

The identification of Adama in biblical and Egyptian sources as an important town (Petit and Kafafi 2016), does not fit the situation found at Tall Dāmiyah, a small settlement mound with space for only a few buildings. Either the identification is wrong, or the remains of the

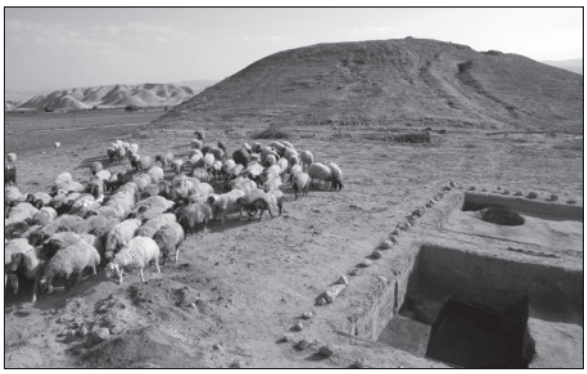
6. Ceramic Male Head (Photograph by Lucas Petit).

7. Street Layers south of the Sanctuary (Photograph by Yousef al-Zu'bi).

town must be located elsewhere; for example, at the foot of the 'acropolis'. Two squares were opened at the elevated south-western foot of Tall Dāmiyah (**Fig. 2**). Historical photographs suggest that it is part of a peninsula of white Qatar material that connect Tall Dāmiyah with the eastern Qatar hills.

Several graves and pits were discovered. The pits were circular and in almost all cases bell-shaped. They were filled with debris, some of which was mudbrick fragments. The pottery was a mixture of several occupation periods at Tall Dāmiyah; the presence of Byzantine pottery suggests that the pits were dug during or after this period. The graves must also have been post-Byzantine in date, based on similar reasoning. There were no funerary objects, and the skeletons were not buried according to the Islamic tradition.

All these features cut through a somewhat puzzling block of very regular white, black and yellowish layers (**Fig. 8**). Most of the material seems to be the result of some kind of industrial activity using intense heat. No structures have been detected yet, but the presence of burnt mudbrick suggest that some buildings were standing in the vicinity. Only fragmentary pottery with a mixed character was found. Coarse tempered pottery sherds might suggest an Islamic date, but in the lower ash layers, an increase in Late Bronze Age sherds was encountered, among them fragments of Cypriot milk bowls. The colourful accumulation of ash layers has, however, an identical parallel only a few kilometres to the north (Steiner 2008: Fig. 9). At Tall Abū Sarbuṭ similar layers were discovered between 1988 and 1992 dated to the



8. Trenches on the Lower Terrace, Looking Northeast (Photograph by Lucas Petit).

9. A Bell-Shaped Pit and Horizontal Ash Layers, Looking Southeast (Photograph by Lucas Petit).

Ayyubid/Mamluk period (De Haas *et al.* 1989; 1992; Steiner 2008). Although archaeobotanical research could not confirm the idea that sugar cane was processed, the excavators of Tall Abū Sarbuṭ believe the layers are the result of large-scale burning, which took place somewhere else on the site (Steiner 2008: 165). Although the situation at Tall Dāmiyah equals these findings, future investigations should bring more information about the date and function of the layers. A natural sand deposit was reached below the ash layers, containing no material culture.

Discussion

The excavation results of 2015 at Tall Dāmiyah have resulted in a better picture of the occupation during the late 8th and 7th century BC, as well as of the occupation remains at the foot of the settlement mound. Although heavily disturbed by Persian and Hellenistic pits, as well as later burials, the remains of two rectangular buildings on the summit, dated to the Late Iron Age, were further investigated. A clear relationship existed with the Neo-Assyrian Empire, as well as with Ammon and the western areas. However, the role Tall Dāmiyah played in this period is still unknown, and needs further research. Was this building some sort of trading post, or an Assyrian fort, as was previously thought (Petit 2009a)? Or was Tall Dāmiyah a religious centre with the white-plastered building functioning as a sanctuary? The material culture especially, such as the complete figurines, statues and animal skulls, are strong evidence to assume religious activities at the site. However, in contemporary layers, especially in and around the southern building, cooking pots and loom weights were found, implying that around 700 BC, Tall Dāmiyah was more than just a sanctuary. At least in the southern building, people were living, hunting, farming, producing textiles and possibly trading.

General Acknowledgements

We would like to thank the DoA, represented by His Excellency the Director General Dr. Munther Jamhawi, for his continuous support of the project. Without the help of the Director General and other staff-members of the department, this project would not have been so successful. Also many thanks to Rami Freihat and his crew at the Dayr ʻAllā office, and the DoA Representative, Ziad Ghunaimat. Further appreciations should go to the military in the Dāmiyah area and the inhabitants of the Dayr ʻAllā village. Thanks are due to the Dutch National Museum of Antiquities, and the Deanship of Research and Graduate Studies at Yarmouk University, who financed the project. The co-directors were privileged to have an excellent team, and appreciated the work of the local staff who worked on the excavation and in the house. As always, it was a pleasure to stay at the Station for Archaeological Studies in Dayr ʻAllā, and we express our thanks to Yarmouk University for housing us. We would also like to thank Gerrit van der Kooij for his comment on the Persian jar inscription.

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SETTLEMENT IN SOUTHERN JORDAN DURING THE IRON AGE: A GIS ANALYSIS

Shauna McGlone

Introduction

Settlement studies are an informative method for investigating socio-political systems (Feinman 2001: 13937). They provide an underutilised tool for understanding the dramatic changes, which transformed the socio-political landscape in southern Jordan during the Iron Age. Although there is evidence for continuous settlement in the region from the Pre-Pottery Neolithic A until the early Bronze Age, the archaeological evidence for occupation during the middle and late Bronze Age is sparse (MacDonald 1988; MacDonald 1992; MacDonald *et al.* 2004; Hauptmann 2007; Finlayson and Mithen 2007; Barker *et al.* 2007; Smith 2009; MacDonald *et al.* 2012; Parker and Smith 2014). Following the late Bronze Age settlement hiatus, the region witnessed an unprecedented era of resettlement. Neither the reasons for the abandonment of settlements in the middle Bronze Age, the impetus for the re-establishment of settlements during the Iron Age or their socio-political organisation is known.

Based on two Neo-Assyrian references to military campaigns, with references to southern Jordan, dated to the reigns of Adad-Nīrārī III, 805-752 BC (Luckenbill 1926: 262) and Assurbanipal, 668-626 BC (Luckenbill 1927: 314) it has been suggested that the Iron Age re-settlement of southern Jordan was a result of its assimilation into the Neo-Assyrian empire (Hart and Falkner 1985: 268; Bienkowski 1992a: 8; Knauf 1992: 50; Porter 2004: 388; LaBianca 2009: 3). It has been argued that the resulting political stability encouraged sedentarisation of the indigenous nomadic population, and the migration of agriculturalists from the north (La Bianca and Yonker 1998: 410) and west (Knauf 1992: 48). In 796 BC, the Neo-Assyrians embarked on a successful military campaign against Damascus. There is no evidence to support either a subsequent southern advance (Siddal 2013: 67) nor textual or material evidence for the presence of Neo-Assyrian officials in southern Jordan following this campaign.

That there were interactions between the Neo-Assyrian empire and Iron Age southern Jordan is indicated by architectural similarities in the design of buildings at Buṣayrāh and the open-court architecture of Neo-Assyrian residencies (Porter 2004: 385), as well as a textual reference to the payment of tribute to Nineveh by Edom (Luckenbill 1927: 119), a term used to describe Iron Age southern Jordan, which commenced following Adad-Nīrārī III's southern campaign. The comparable architectural styles at Buṣeyrāh and Neo-Assyrian sites are evidence of cultural interactions (Tyson 2015: 218), but not an indicator of either a Neo-Assyrian presence or the existence of Neo-Assyrian political control over the region (Stein 2002: 907). The single Neo-Assyrian reference to the payment of tribute to Nineveh from Iron Age southern Jordan has been the basis of the argument for the re-settlement of southern Jordan during the Iron Age in terms of the core-periphery model (Wallerstein 2011: 349). Although tribute can function as a form of economic exploitation, it can also be interpreted as evidence of a political alliance (Siddal 2013: 69-70). The absence of evidence to support a Neo-Assyrian presence in the region, combined with the interpretation of tribute as an indicator of an alliance, negate the argument that the Iron Age resettlement of southern Jordan was a result of its incorporation as a peripheral entity into the Neo-Assyrian empire.

The internal socio-political organisation of Iron Age southern Jordan has been informed by both the core-periphery model and Biblical references (Whiting 2002: 3). The region has been described as a kingdom with Buṣeyrāh its capitol, governing a defined geographical area defended by watchtowers and fortresses. Arguments for this early state model have been supported by evidence for a culturally unified region, as indicated by shared ceramic, linguistic and religious traditions (Tebes 2010: 146). This early state model was first proposed in the early twentieth century by Glueck (1935: 64). Although Glueck's thirteenth century BC date for the origin of this kingdom was revised following Bennett's excavations in the 1960s and 1970s to the eighth century BC (Bennett and Bienkowski 1995: 103; Bienkowski 2002: 305) the theoretical framework used in interpreting the archaeological evidence remained the same. More recent scholarship (Levy, Najjar and Ben-Yosef 2014: 981-986; Tebes 2014: 16) has questioned this traditional explanation. These authors have emphasised the importance of regional interactions in defining the socio-political organisation of the region. The current evidence for regionalism in southern Jordan during the Iron Age is limited to typological differences in kraters (Bienkowski and Adams 1999: 152) and inter-site differences in the proportions of vessel types (Whiting 2002: 222).

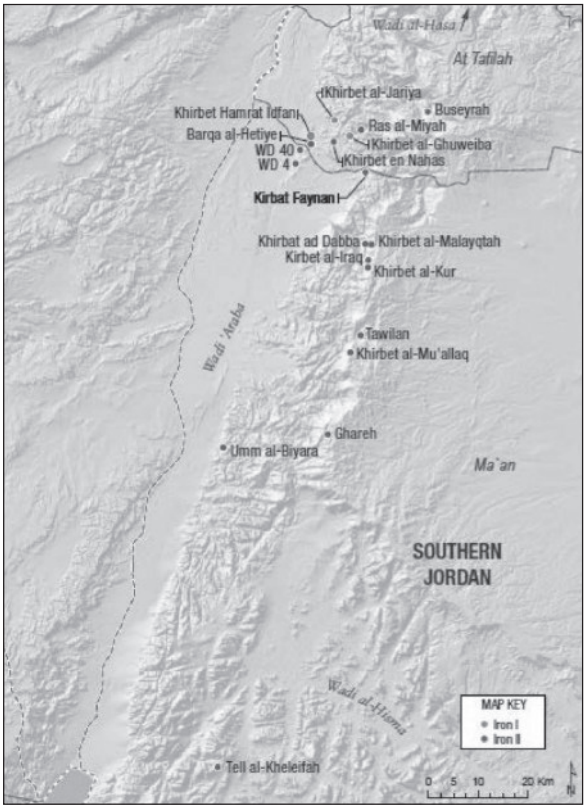
It has been argued that settlement studies are a more exact indicator of socio-economic frameworks than any other aspect of material culture (Wiley 1956: 1). However, their applicability in defining these processes using regional analyses is limited by the methodological difficulties associated with data collection over extensive areas. Although remote sensing using kite or drone mounted cameras is being increasingly used in archaeological surveying, data from most regional surveys is obtained from pedestrian surveys, which are rarely based on total coverage. Purposive surveys are the most frequently used method for data collection; only areas identified as yielding the highest probability of find sites are surveyed. Hence, they are biased by the possibility of under-estimation. Randomisation using computer based programmes has been used to overcome this bias. It has been argued that these traditional survey methods are "ill-suited" for investigating settlement patterns in southern Jordan, because of its mountainous terrain and the fact that find sites in this region are frequently small and unobtrusive (Knapp *et al.* 2015: 366). Despite the inherent methodological difficulties associated with pedestrian surveys, they remain the most informative method of obtaining evidence of settlement patterns in large scale regional studies.

Site identification using pedestrian surveys is based on the identification of diagnostic sherds. As a result, data from these surveys cannot be used to determine functionality. In addition, temporal relationships must be interpreted with caution, as the ceramic chronologies used in defining find sites often encompass hundreds of years.

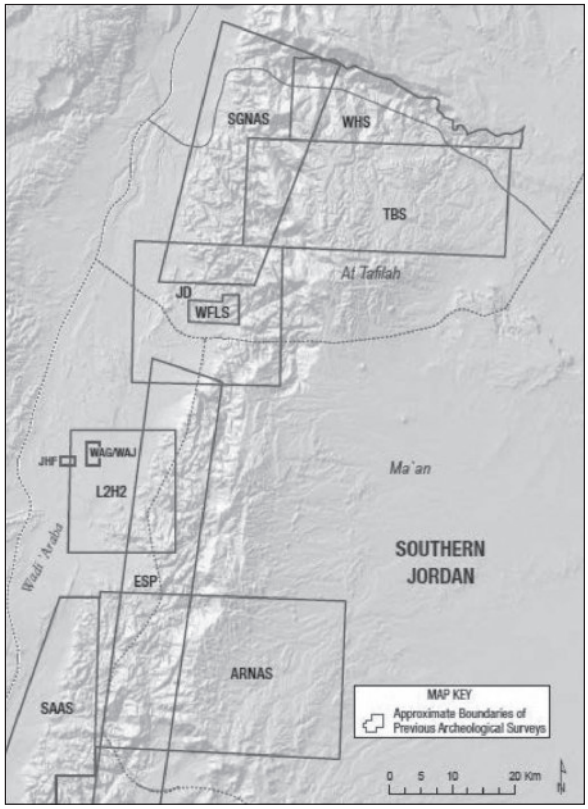
Regional settlement studies can provide information that enhances our understanding of the socio-political organisation of pre-historic societies. The recent accessibility of Geographical Information Systems (GIS) has provided researchers with a means of expanding the study of settlement patterns, using sophisticated technology which provides an integrated data management and analytical system. This information is invaluable in furthering the understanding of the socio-political organisation of an era such as the Iron Age in southern Jordan, where theoretical discussions are informed by finds from a limited number of excavated sites (**Fig. 1)**.

There are nineteen published excavation reports pertaining to the Iron Age in southern Jordan. Two of these (WD 40 and WD 4) are cemetery sites (Beherec *et al.* 2014) and three (Khirbat al-Ghuwaybah, Khirbat Ḥamrat Ifdān and Khirbat al-Jāriyah) have been defined as small scale independent production centres (Ben-Yosef and Levy 2014: 855). Of the remaining fourteen sites only one, (Khirbat an-Naḥās) has been dated to early Iron II (Levy *et al.* 2014: 110); the other thirteen sites have all been dated to late Iron II. Inferences regarding the socio-political organisation of Iron Age southern Jordan based on these reports is limited by the small size of this cohort.

This paper investigates the socio-political organisation of Iron Age southern Jordan by examining evidence for settlement patterns us-



1. Excavated Iron Age Sites in Southern Jordan. Tall al-Khalīfah (Glueck 1940); Gharēh (Hart 1989); Barqa al-Hētiye (Fritz 1994); Tawilan (Bennett and Bienkowski 1995); Khirbat al-Mu'allaq (Linder et al. 1996); Khirbat ad-Dabba (Whiting et al. 2008); Buṣayrah (Bienkowski 2002); Umm al-Biyāra (Bienkowski 2011); Khirbat Faynān (Levy et al. 2012); WD 40 and WD 4 (Beherec et al. 2014); Rās al-Miyāh (Ben-Yosef et al. 2014); Khirbat Ḥamrat Ifdān, Khirbat al-Guwaybah and Khirbat al-Jāriyah (Ben-Yosef and Levy 2014); Khirbat an-Naḥās (Levy et al. 2014); Khirbat al-Malāyqtah, Khirbat al-Iraq and Khirbat al-Kur (Smith et al. 2014).



2. Survey Boundaries Abbreviations: WHS=Wādī al- Hasa Survey (MacDonald 1988); ESP=Edom Survey Project (Hart 1989); SGNAS=Southern Ghors and Northeast Arabah Survey (MacDonald 1992); JHF=Jabal Hamrat Fidan Survey (Levy et al. 2001); WAG/WAJ= Wādī al-Guwayb and Wādī al-Jariyeh Surveys (Levy et al. 2003); TBS=Tafilā-Busayra Survey (MacDonald et al. 2004); WFLS=The Wādī Faynān Landscape Survey (Barker et al. 2007); JD=Deutsches Bergbau Museum Survey (Hauptmann 2007); L2H2=The Lowlands to Highlands Survey (Smith 2009); ARNAS=The Ayl to Rās an-Naqab Survey (MacDonald 2012); SAAS=The Southeast Araba Survey (Parker and Smith II 2014).

ing GIS analysis. The area under investigation is defined by the Wādī al-Hasā in the north, the Wādī 'Araba in the west, and the southern border by the Wādī al-Ḥismā. The eastern border lacks a clear demarcation.

Method

The data used in this analysis was obtained from a review of all systematic archaeological surveys conducted in the region between 1979 (1399 AH) until 2013 (1434 AH) (**Fig. 2**).

These used a range of survey methods, including one hundred percent coverage (Levy *et al.* 2001; Levy *et al.* 2003; Barker, Gilbertson and Mattingly 2007), purposive surveys (MacDonald 1988; Hart 1989; MacDonald 1992; Smith 2009; Parker and Smith II 2014) and surveys based on randomisation (MacDonald *et al.* 2004; MacDonald *et al.* 2012). Sites identified by non-systematic surveys were excluded. Over this thirty-four-year period, the ability to accurately record the geographical location of find sites has changed. In contrast with the earliest surveys, which used the K737 map series (United States, Army Map Service 1966) to identify site locations, more recent surveys recorded geographical locations using Global Positioning Devices (GPDs). The accuracy of the earliest surveys is estimated to be between 200 and 300 meters (Arikan 2010: 78), whereas the surveys which used GPDs are able to record geographical locations with an accuracy of less

than 3 meters.

Inconsistencies identified by the author between the published co-ordinates and site descriptions were clarified by discussions with the original surveyors where possible, and comparisons of topographical descriptions with imagery from both Google Earth® and topographical maps for the remainder. This was not possible for one site, which was excluded from the analysis. Sites were also recorded using different geographical co-ordinates; the Palestine grid, latitude and longitude, and UTM. All co-ordinates were converted into decimals, and the data entered into a GIS database. Some surveys overlapped, with the result that some sites were recorded more than once; when this was identified, only one set of co-ordinates was entered into the database.

Designation of find sites as Iron Age was based on the identification of diagnostic sherds. The chronology used in differentiating Iron I and Iron II was the simplified version of the Palestinian Iron Age, as proposed by Bienkowski (1992a: 7), which dates Iron 1 from 1200-1000 BC and Iron II from 1000-569 BC. Six hundred and thirty-three sites were identified; fifty-four Iron I sites, five hundred and sixteen Iron II sites and eighty-eight undefined Iron Age sites. Twenty Iron I sites had evidence of occupation during Iron II. Only sites categorised as either Iron I or Iron II were included in the final analysis.

Bienkowski (1992b: 258) questioned the validity of dividing find sites into Iron I and Iron II, arguing that all of these should be classified as Iron II. This argument is based on the ceramic finds from a single sounding at ash-Shurabāt (Bienkowski and Adams 1999: 157). This site was originally dated to Iron I (MacDonald 1988: 169-70) and subsequently re-dated to Iron II. Bienkowski's criticism is refuted by radiocarbon dates from Khirbat al-Ghuweibā. The original dating of this site to Iron I (MacDonald 1992: 73) has been substantiated by radiocarbon analysis (Levy *et al.* 2014: 848). In this study, the dates proposed by the surveyors is accepted.

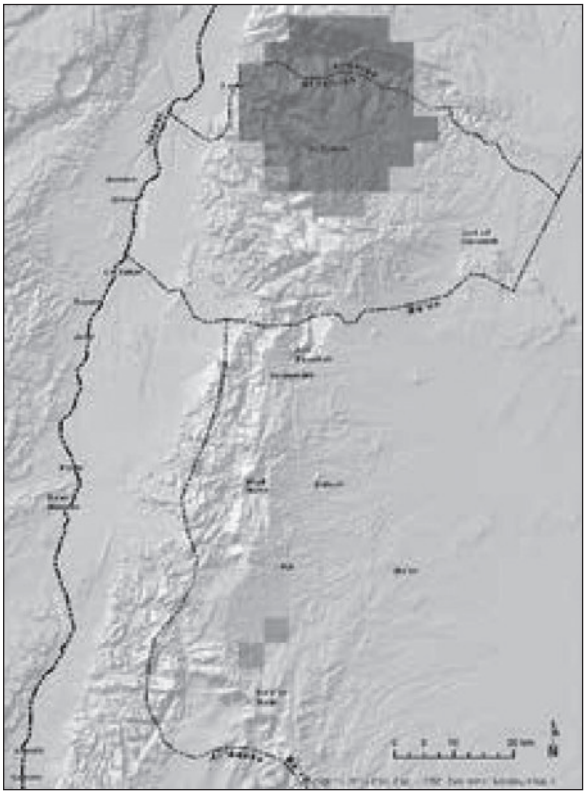
Evidence for clustering was analysed using the Getis-Ord Gi (Getis and Ord 1992). This analysis examines both the spatial relationships between points and the number of observations at each of these points. By ensuring that the spatial patterning of individual observations does not bias the results, the Getis-Ord Gi provides a robust method for identifying areas of interdependence, which may not be detected using a statistical method such as K means, which is based on the measurement of distances between individual sites (MacQueen 1967). A viewshed analysis was also conducted, to identify visible regions in the landscape from specific locations. These results can be used to infer the defensibility of a site, based on the assumption that sites with larger fields-of-view are defensive (Jones 2006: 525). The analysis used in this investigation was based on the assumption that the viewer had a height of 1.5 meters and was standing. The site data was combined with ASTER GDEM®, a product of METI and NASA. Both the cluster and viewshed analyses were performed using the ESRI Spatial Analysis tools in ArcGIS® 10.1.3.

Results

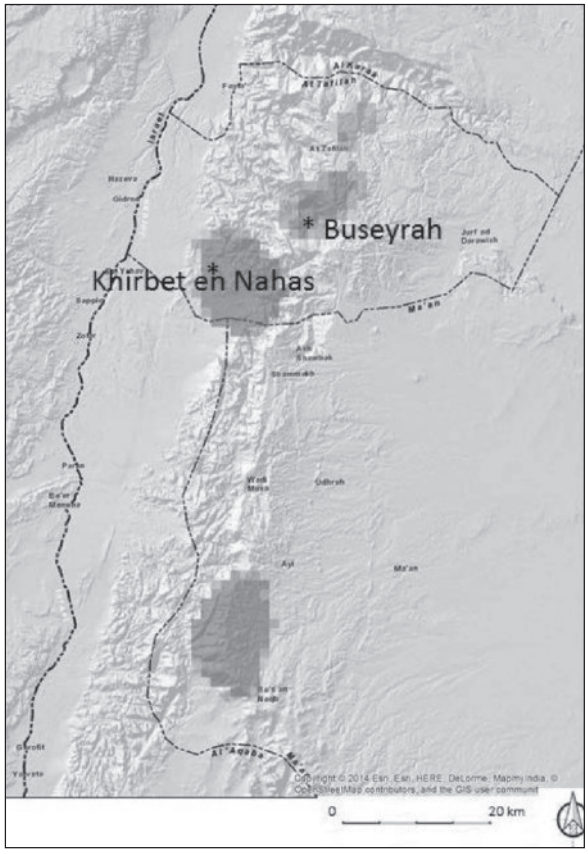
The cluster analysis of Iron I sites revealed two statistically significant clusters ($p< 0.05$). A northern cluster extending southward from Wādī al-Ḥasā, and a southern cluster extending northward from Ras an-Naqab (**Fig. 3**). Three statistically significant Iron II clusters ($p< 0.05$) were identified in the northern region (**Fig. 4**). Both Iron I and Iron II clusters in the northern and southern regions varied in size, from between 30 to 200 square kilometres. The size of these clusters limits the measurement bias associated with the recording of site locations based on the K737 map series.

The largest of the Iron II clusters, which is approximately 200 square kilometres, incorporates the mining sites at Faynān. A second Iron II cluster of approximately 140 square kilometres, which includes the site of Buṣeyrāh, was identified northeast of the Faynān cluster, with a third Iron II cluster of approximately 30 square kilometres located north of the cluster associated with Buṣeyrāh (**Fig. 4**). The location of the Iron II southern cluster, although larger than the cluster identified as Iron I, was in the same geographical area.

The viewshed analysis for Iron I clusters revealed restricted inter-site visibility in both the northern and southern regions, with visibility



3. Cluster analysis for Iron I sites; 1200-1000 BC (Z score ● p < 0.025 ● p < 0.05).



4. Cluster analysis for Iron II sites; 1000-569 BC (Z score ● p < 0.025 ● p < 0.05).

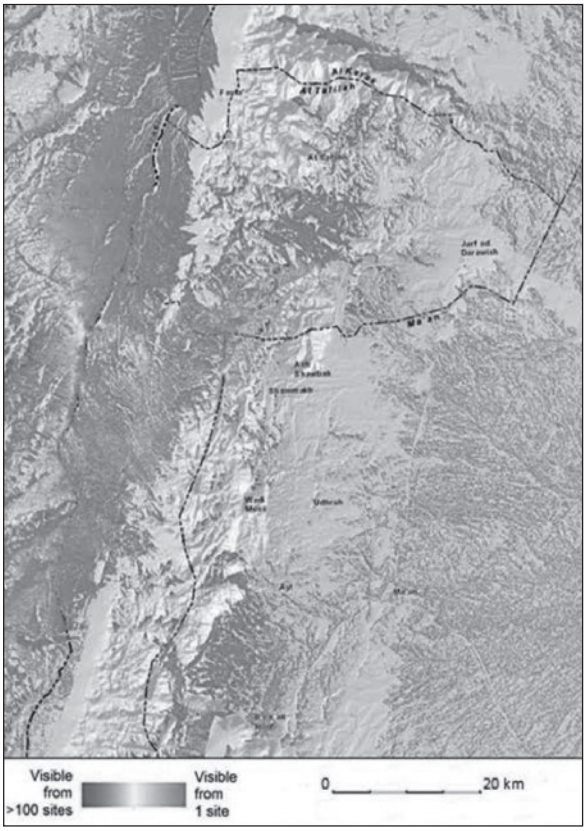
limited to only one other neighbouring site. A similar pattern was evident for the Iron II southern cluster (**Fig. 5**). This contrasted with Iron II clusters in the northern region, where an arc of sites with large fields-of-view, (that is, a visibility of more than one hundred other sites) was identified, extending from the southern border of the central northern cluster associated with Buṣeyrāh to the eastern/south-eastern border of the southernmost northern cluster associated with Faynān (**Fig. 5**).

Discussion

Iron I settlement in southern Jordan was localised to two areas; a northern region extending southward from Wādī al-Ḥasā, consistent with southward migration of settled communities from the north, and a southern region, which may also have resulted from the migration of settled communities moving northward from the oasis settlements in the Hijāz. The location of these sites on the Jordanian plateau, with their limited inter-site visibility, suggests that these were semi-autonomous agricultural communities.

The northern/southern divide evident in Iron I was also present in Iron II. Although the concentration of settlements in the southern region increased in Iron II, these were located in the same geographical area as those in Iron I, with no evidence of defensive sites, as indicated by limited inter-site visibility. It is possible that the socio-political organisation of the southern region in Iron II was similar to that in Iron I.

The settlement pattern in the north differs between Iron I and Iron II. The single Iron I cluster south of Wādī al-Ḥasā was replaced by three clusters, with the highest density of sites located in the south. The concentration of sites in the south of this northern area was associated with the copper mines at Faynān. This large scale, specialised industry operated by semi nomadic people (Levy, Najjar and Ben-Yosef 2014: 901) is estimated to have produced 36,000 tonnes of copper at the beginning of Iron II (Ben-Yosef 2010: 936). This industrial-sized operation must have been dependent on a complex infrastructure for supplies of food and fuel. It is



5. Viewshed analysis for Iron II sites; 1000-569 BC, located within a significant cluster (p< 0.025).

questionable whether the Iron Age agricultural fields in Wādī Faynān (Barker *et al.* 2007: 283) would have had the potential to meet requirements. Most of the food and fuel required for smelting was probably imported from the agricultural areas in the north.

This trade in commodities from the agricultural areas in the north to the copper mines at Faynān would have provided the stimulus for the development of a political economy (Earle 2002: 9). Buṣayrah is a mere eighteen kilometres from Khirbat an-Nuḥās, the most extensively excavated Iron II copper processing site in Faynān (Levy *et al.* 2014; 89-243). Buṣeyrāh was a wealthy stratified settlement, as evidenced by its monumental architecture (Bienkowski 2002: 69-70; 199). It has been suggested that its wealth was a result of its role in the overland trade route from the Arabian Peninsula (Bienkowski and Van der Steen 2001: 24). Although the coastal site of Tall al-Khēleifah probably functioned as a trading site (Bienkowski and Van der Steen 2001; 37), there is no evidence for the existence of an Iron Age overland trade route connecting the Arabian Peninsula with the Jordanian plateau. It is more likely that, during the Iron Age, the overland trade route from Tāymā transported goods to Mesopotamia via the north-eastern city state of Hindanu (Magee 2014: 267). It is the author's opinion that Buṣeyrāh's wealth was a result of its relationship with Khirbat an-Nuḥās, as evidenced by both its geographical proximity and the existence of an interconnected defensive system, located on the southern border of its settlement cluster with the eastern and south-eastern border of the cluster associated with Faynān. Although the temporal relationship between these sites is unknown, their spatial continuity is suggestive of a political association.

Settlement in and around Buṣayrah continued after the abandonment of settlement at Khirbat an-Nuḥās, which has been dated to the ninth century BC (Levy, Najjar and Ben-Yosef 2014: 986). The results of cluster analysis suggest that Buṣeyrāh's administrative and political influence during the latter part of Iron II was limited to an area of approximately 140 square kilometres. Its relationship with the smaller cluster to the north cannot be established with certainty. The absence of defensive sites linking this smaller site to the cluster associated with Buṣeyrāh suggests that this smaller northern cluster may have been an autonomous settlement. The complexity of ancient administrative systems can be inferred from the size of their jurisdictions (Blanton *et al.* 1993: 210). Although the monumental architecture at Buṣeyrāh suggests this site was a central administrative centre, the size of its settlement cluster suggests that its political economy functioned within the context of a localised traditional system.

This investigation into Iron Age settlement patterns in southern Jordan provides evidence for regionalism. Two distinct regional entities (north and south) were identified for Iron I, while three regional entities in the north and a single entity in the south were identified for Iron II. This analysis suggests that these northern and southern regions, although linked by cultural ties, were autonomous political entities in both Iron I and Iron II.

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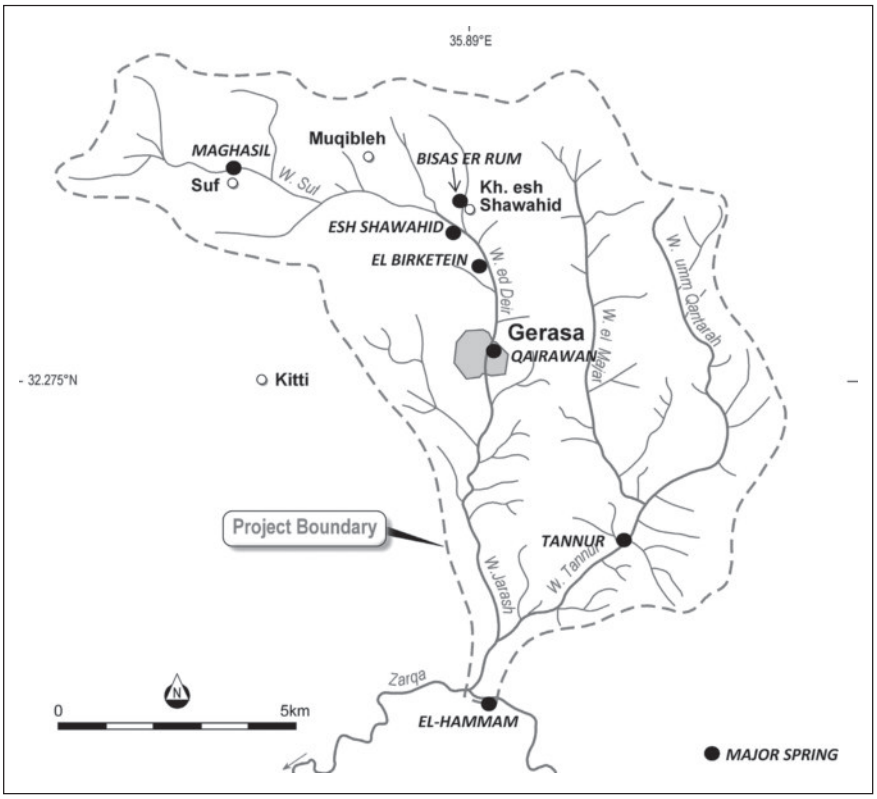
JARASH WATER PROJECT: REPORT ON THE 2014 FIELD SEASON

David D. Boyer

Introduction

The Jarash Water Project is studying the water management system of the Greco-Roman city of Gerasa (Jarash) and its hinterland by combining bibliographic and historical research, photographic interpretation, field survey and landscape analysis. The project was inspired by the water installations recorded outside the city during three seasons of field survey by the Jarash Hinterland Survey between 2005 and 2010, in which the author participated (Baker and Kennedy 2010, 2011; Kennedy and Baker 2009). The project area encompasses the watershed of the combined Wādī Sūf/Wādī ad-Dayr/Wādī Jarash drainage (hereafter the Jarash Valley), and the adjacent valley to the east containing the combined Wādi al-Majarr/ Wādī Umm Qanṭarah/Wādi Tannūr drainage (hereafter Tannūr Valley) (**Fig.1**).

Knowledge of Gerasa's ancient water management system has previously been constrained by the absence of a considered assessment of the water supply sources, the nature of the distribution network to and within the city, and the period in which the city's main water installations were in use; key problems that the Jarash Water Project seeks to resolve. Studies of some components of Gerasa's water



1. Study area boundary, watersheds and major springs (Don Boyer).

management system have been published, including the public baths (Lepaon 2008) and fountains (Seigne 2008), but there has been no detailed published study of the whole water management system to the city, such as that conducted at Gadara by Döring (2005) and Kerner (2004). Gerasa was also not included in Döring's regional study of the Roman water supply system of northern Jordan (Döring 2004). Seigne (2004) made some preliminary observations on water supply in the context of the city's hinterland, but provided no new evidence.

Until recently, the Jarash Valley carried a perennial stream, whose base flow was sustained by seasonal rainfall and surplus flows from springs. Flows from many former high-yielding springs have been lessened by a reduction in annual rainfall and the lowering of the water table as a result of extraction from water bores; however, a few springs, including Qayrawān within the ancient city and Tannūr to the south-east, still provide a reasonably reliable water supply for domestic use or irrigation. The main springs in the project area draw on water contained in limestone aquifers in the Upper Cretaceous Ajlun Group, particularly in the Na'ur Limestone member, with lesser flows in lower Wādī Jarash coming from aquifers in the underlying Lower Cretaceous Kurnub Sandstone (Hammouri and El-Naqa 2008: 86). Recent flow rate data from these springs show that they react rapidly to periods of high rainfall, nearly all of which falls in the winter months, with a significantly reduced flow during the summer months (Boyer 2017). It is hoped the study of layered carbonate sediment deposits in aqueducts carrying spring water, using the method described by Keenan-Jones *et al.* (2015) for Rome's Anio Novus aqueduct, will provide insight into spring yields and the quantity of water carried by aqueducts[1].

The archaeological evidence points to human use of major springs in the project area from the prehistoric period onwards. Early or Middle Bronze Age sites have been identified near the springs at Sūf, Birkatayn and Qayrawān in the Jarash Valley, with even earlier (Chalcolithic) use suggested at Tannūr (Glueck 1951: 87) and PPNB use at ar-Riyashi (Hanbury-Tenison 1987: 154) in the Tannūr Valley. Roman-Byzantine structures have been recorded at spring sites at Sūf, ash-Shawāhid, Birkatayn and Qayrawān, and use during the Classical period can be inferred from the existence of nearby settlements at the other major springs in the project area (Boyer 2017).

Qayrawān on the east bank of Wādī Jarash, was an important spring within the walled city, but its low elevation (566 m) limited its potential supply area to the lower east side of the city, and the provision of irrigation water to fields on both banks of Wādī Jarash south of the city. The west bank south of the city was supplied by an aqueduct that crossed Wādī Jarash west of the spring. Most of the city lay above the level of Qayrawān spring, including the western side where many of the water consuming public monuments were located. This means that spring-fed water supplies to the west and upper east side of the city would have needed to come from other sources. The prevailing view among archaeologists since the publications by Schumacher (1902: 167) and Kraeling (1938: 160-162) has been that the Birkatayn spring and reservoir complex north of the city was the principal water source for the city, although little evidence has been put forward to support it. Seigne, however, concluded that the open reservoir at Birkatayn was an unlikely source for the city's potable water supplies, due to its elevation relative to the monuments in the city and issues related to potential contamination. He suggested that the water supply came from another source or sources further upstream (2004: 176-177).

The 2013 field program included a pedestrian survey of selected areas in the valley and hills to the north, south and west of the city, to locate and trace the historic aqueducts to the city and its hinterland, and a preliminary survey of selected areas within the upper Tannūr Valley, to gain an understanding of water management in the rural context. A number of aqueducts were identified approaching the city from the north along both banks of Wādī ad-Dayr, and sections of an important aqueduct approaching the city from the hills to the north-west were traced for

1. Also known as 'calcareous sinter' in Europe (e.g. Sürmelihindi *et al.* 2014: 293) and as 'travertine'in North America (e.g. Keenan-Jones *et al.* 2014: 293).

over a kilometre. Additional aqueducts, which formed part of an irrigation system for the Bāb Ammān locality and the lower Jarash Valley, were also identified south of the city. This work resulted in the construction of a preliminary aqueduct plan for the near-city area (Boyer 2017). A preliminary pedestrian survey of the upper Tannūr Valley failed to identify evidence for major spring sources or ancient aqueduct systems; however, evidence of an aqueduct-fed irrigation system sourced from the Tannūr spring was found in the lower Tannūr Valley. The 2013 results verified that Birkatayn was not the sole water supply source for the water monuments on the west side of the city; in fact, although likely, a direct connection between Birkatayn and the city could not be confirmed. Many uncertainties remained, however, including knowledge of when the main aqueducts to the city were in use, their ultimate destinations, consumption requirements of the main water installations within the city, and the importance of irrigation requirements in the overall water management system. While many of the aqueducts identified in 2013 are probably of Roman-Byzantine date, none have been dated with any confidence, and advancement of this and related issues were considered a high priority for the 2014 field season.

An Outline of Settlement in the Hellenistic-Byzantine Period

The ancient site of Gerasa lies in a fertile, well-watered valley in the eastern ʻAjlūn highlands in north-west Jordan. There is evidence of prehistoric occupation on the site dating from the Bronze and Iron Ages (Braemer 1987: 525; 1989: 318), with evidence of earlier occupation south of the city in the Bāb Ammān locality dating to the Lower Paleolithic (Kirkbride 1958: 9-11) and Middle PPNB/ Pottery Neolithic (al-Nahar 2013). There is archaeological evidence from many sources for the establishment of a Hellenistic settlement on the site by the end of the 2nd century BC (e.g. Braemer 1989: 318; Kehrberg and Manley 2002: 197); one of a number of similar colonies in the region that formed the Decapolis. There are few locations within Gerasa where excavations reach pre-Roman levels, and many early levels were destroyed in later construction phases, so the size and location of this early settlement is uncertain. Some scholars question whether occupation of the site during the Hellenistic period was permanent (e.g. Pierobon 1984: 31; Raja 2012: 148) or whether occupation was continuous between the Hellenistic and early Roman periods (Lichtenberger 2014: 2067). However, the available evidence points to a settlement centred on the west bank of Wādī Jarash in the area between the Zeus Temple, Museum Hill (= Camp Hill) and the South Decumanus, probably close to an earlier Iron Age settlement, with a necropoleis established on the adjacent slopes of both banks of Wādī Jarash. While cisterns and possibly aqueducts would have been used in the Hellenistic settlement, no water installations of Hellenistic date have yet been definitively identified.

The settlement grew rapidly under Roman hegemony in the 1st and 2nd centuries AD. The naturally terraced landscape of the west bank of Wādī Jarash was remodelled, to accommodate an orthogonal street plan with a principal colonnaded street, the Cardo, and two colonnaded cross-streets, the Decumani. The settlement was divided into two parts by the deeply incised Wādī Jarash, and at least two bridges were built across the wadi to link them. Public bathing complexes (*thermae)* were erected on each side of the wadi and public fountains, including a monumental *nymphaeum*, were established along the Cardo. Very little is known of the Roman settlement on the east bank in the 1st and 2nd centuries AD, which now lies beneath the modern town. However three sites, the large East Baths (Lepaon 2008: 60-65), a high status residence evidenced from mosaic flooring (Kraeling 1938: 351-2), and possibly the monumentalisation of the Qayrawān Spring area (Seigne 2004: 175), all date to this period.

Building activity associated with major public works seems to have largely ceased by the end of the 2nd century AD, but two *balneae* were built in the 4th century (the small East Baths and the Central baths) and two more (the Placcus Baths and the Glass Court Baths) in the 5th century. The appointment of a bishop and the construction of the cathedral indicate the emergence of a significant Christian community in the city by the late 4th century AD, and at least another 21 churches were built in and

around the city prior to the Islamic conquest (Darabseh 2010: Table 6.1; Shiyyab 2013).

Objectives of the 2014 Season

The objectives in 2014 were to build on the results from the 2013 field program. There were three main goals: (1) pedestrian field surveys, (2) to collect samples of mortar/plaster and layered carbonate sediment deposits lining some of the water installations, for absolute dating and stable isotope analysis, and (3) a preliminary paleolandscape study.

Field Survey

The field survey was divided into several geographic sectors. A number of possible sites, which had been identified in the eastern part of the walled city from photographic analysis, needed to be ground-checked. North of the city, additional work was required to clarify aqueduct sites on the small plain south of Birkatayn, and the important Birkatayn reservoir site needed to be recorded in some detail; the last published survey of the site being that by Schumacher (1902: 165-171). South of the city, an important complex of rock-cut aqueducts on the west bank of Wādī Jarash in the Bāb Ammān locality (first recorded by the Jarash Hinterland Survey), required more detailed recording and analysis, and a detailed survey of a complex site 1 km south of Jarash was required. Immediately south of the city, the water mill complex near the city's south Watergate also required more detailed recording. More broad-ranging surveys were planned for the area north-west of the city, to locate more sections of the important north-west aqueduct to the city (particularly the location of its source), and east of the city, where further surveying was planned in the lower Tannūr Valley, to record any significant rural springs and water installations.

Sampling

Prior to the 2014 field season, none of the aqueducts which supplied the city had been accurately dated, and a key objective of the 2014 field program was to:

1) Collect representative samples of the mortar or plaster that line many of the water installations for the purpose, ultimately, of establishing a typology of such materials (similar to that already done on buildings within the city (Yaseen *et al.* 2013)) and for dating using C^{14}/ C^{14}AMS isotopic techniques (Al-Bashaireh 2013).
2) Collect representative samples of layered carbonate sediment deposits from aqueducts and other water installations for analysis. There has been considerable success in recent years in the collection of climate proxy data from stable isotope determination ($\delta^{18}O$ and $\delta^{13}C$) and Uranium/ Thorium dating of such material in Roman aqueducts (e.g. Sürmelihindi *et al.* 2013). Of particular interest in this regard is site JWP-128 on the north-west aqueduct, recorded in 2013, that contains a layered carbonate sediment deposit indicating perhaps >100 years of use. From the results of this work, the goal will be to date when the aqueduct was constructed and when it went out of use, its destination within the city, and the dating of any events, such as earthquakes, which may have impacted on it. The outcome of this research will benefit other researchers working on water installations within the city downstream of the aqueduct.

Techniques and Methodologies

The survey focused on locating and recording sites related to water management. Methodology was based on:

1) A pedestrian survey of selected areas previously identified from a study of published material, plans, satellite imagery and aerial photography, in order to identify water-related sites from all periods, because dating site elements is problematic, especially when, as in the case of this project, no excavation is carried out. In addition, it is evident that there was reuse of ancient aqueducts in the late Ottoman period, in particular the period post-Circassian settlement.
2) Location of all sites by hand held GPS (WGS84 datum).
3) Recording of all sites, including allocating a unique project site number for each, providing a brief written description, taking colour digital photographs and measurements for site elements, making sketches and entering the information in the MEGA-Jordan database.

Results

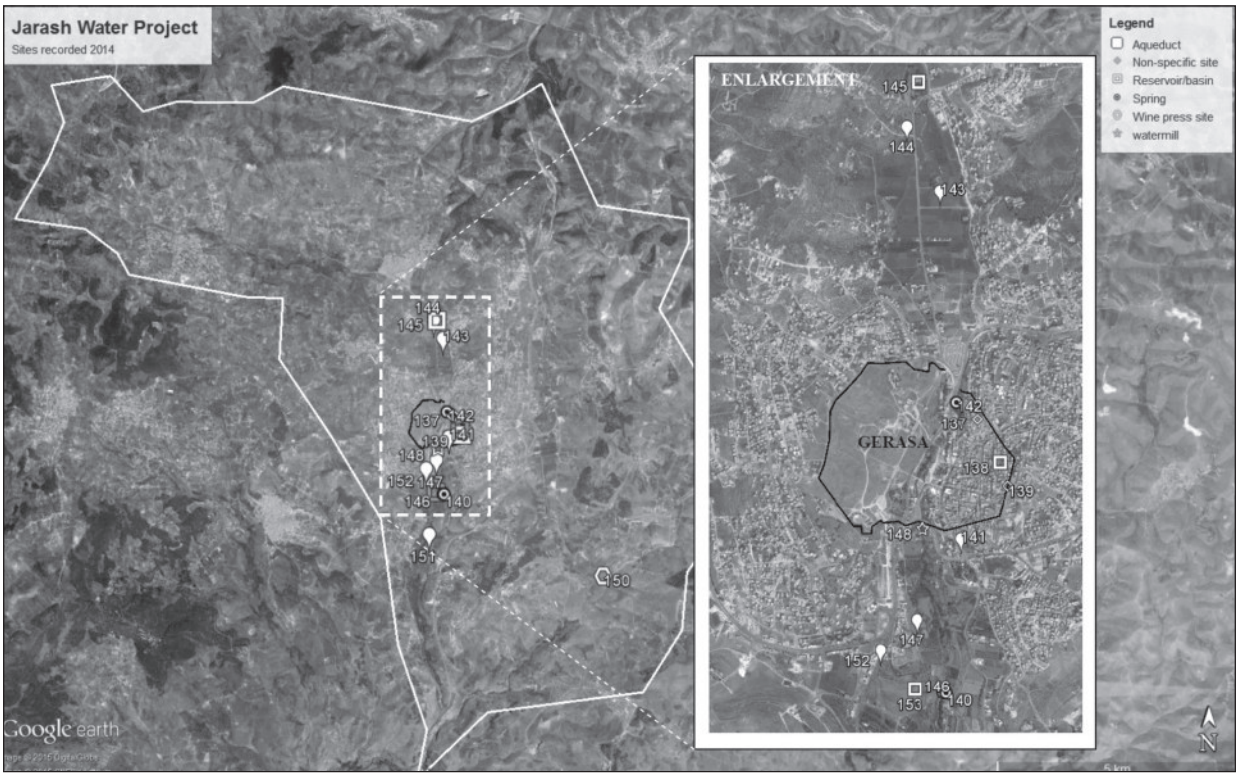
The 2014 field program was conducted for the most part on the areas immediately north, west and south of Jarash, and in the eastern part of the walled city. Visits were also made to the area near the junction of the Wādī Jarash with the R. Zarqā and the Tannūr Valley.

Site Types

Given the focus on water-related structures, only a limited number of site types were recorded. A total of 44 elements were recorded at 17 sites; the breakdown of site type is shown in (**Table 1)** and site locations are shown in (**Fig. 2).**

Table 1: Site Details.

Site No (JWP_)	Lat (N)	Long(E)	Aqueduct	Reservoir-basin-cistern	Wine press	Spring source	Fountain	Mill	Unspec.	Total
137	32.28193	35.89678		1						1
138	32.27964	35.89818		1		1				2
139	32.27839	35.89868							1	1
140	32.26746	35.89436				1	2			3
141	32.27483	35.89572	1							1
142	32.28287	35.89548	2			1				3
143	32.29321	35.89441	1							1
144	32.29659	35.89233	1							1
145	32.29973	35.89307		1		1				2
146	32.26730	35.89463	5			1	1			7
147	32.27053	35.89297	8							8
148	32.27616	35.89334						4		4
149	32.21453	35.89096						1		1
150	32.25209	35.92986		2	1					3
151	32.25667	35.89135	2	2						4
152	32.26892	35.89070	1							1
153	32.26766	35.89286		1						1
Subtotals			**21**	**8**	**1**	**5**	**3**	**5**	**1**	**44**



2. 2014 field season site locations (Don Boyer and Google Earth).

Plaster or mortar samples were obtained from nine sites, and layered carbonate sediment from seven sites. Despite careful search, no suitable sample material could be found at any of the exposed rock-cut aqueduct sites in the Bāb Ammān locality south of the city (sites JWP-146, 147, 152 and 153). The well-preserved section of north-west aqueduct recorded at site JWP-128 in 2013 (Boyer 2017) was found to be more complex when re-examined in 2014. After cleaning, the site was found to contain evidence of a longer period of use than previously suspected, and at least three applications of plaster were evident, the latter indicating repair on at least two occasions. In addition to plaster material collected from the north-west aqueduct, aqueduct plaster samples were collected from *specus* elements at site JWP-143, the masonry aqueduct (DW01) on the plain west of Wādī ad- Dayr. The plaster material at site JWP-143 appears macroscopically to be similar to the uppermost plaster at site JWP-128 on the north-west aqueduct, the mortar samples collected from the Birkatayn reservoir (site JWP-145) and the al-Ḥammām mineral spring site on the R. Zarqā (site JWP-108). This plaster material contains clearly visible charcoal fragments, which should provide an absolute date using the C^{14} dating method.

Geomorphological Setting

No specific landscape studies of the district have been published; however, there is evidence of substantial change to the landscape of the study area over its long settlement history, which spans perhaps >450,000 years BP from the Lower Paleolithic (chronology from Kennedy and Bewley 2004: 11-12). Given that the design and construction of ancient water management systems is in large part a function of the prevailing hydrogeological landscape, (that is, geology, landforms and climate), it is desirable to attempt a reconstruction of this paleolandscape in the period under study.

The most recent comprehensive analysis of the geology within the study area are the notes accompanying the geological map of the area by Abdelhamid (1995). This provides useful basic information on the Cretaceous stratigraphy, which also informs the work by more recent authors on the area's hydrogeology (e.g. Hammouri and el-Naqa 2008), but only limited commentary on the Quaternary stratigraphy and the local geomorphology. The bulk of the study area forms part of a dissected limestone plateau predominantly comprised of flat lying limestone and marl formations of the Upper Cretaceous Ajlun Group. The Jarash Valley has been incised into the Cretaceous stratigraphy, sequentially exposing the entire Ajlun Group sequence and the upper part of the underlying Lower Cretaceous Kunub Sandstone downstream from Sūf.

Field surveys during 2014 identified a previously unrecognised sequence of conglomeratic sediments of probable Pleistocene age within the Jarash Valley, together with a waterfall tufa deposit within the ancient city. A detailed investigation of these conglomeratic and tufaceous sediments is needed, but beyond the scope of the present study; however, some preliminary conclusions may be drawn, which have a bearing on the understanding of the palaeoenvironment and the water management system in the period being studied.

Jarash Conglomerate

A previously unrecognised fluviatile conglomerate formation, informally named 'Jarash Conglomerate' in this report, has been identified by the author during geological surveys of the Jarash Valley between Khirbat ash-Shawāhid to the north and Bāb Ammān to the south; the unit has not yet been studied outside of this area. The basal contact of the unit is exposed at site JWP-142, in a cave just north of Qayrawān Spring (hereafter Qayrawān Cave), where the Jarash Conglomerate lies disconformably on a weathered karstic surface of probable Na'ur Limestone. In the immediate Jarash area, the weathered, uppermost surface of the formation is a hard crust of hardpan calcrete known locally as *nāri*, generally up to 3 m thick, which forms a plateau-like surface incised by modern drainages, and with recent alluvium and colluvium occupying depressions in its surface[2]. The undulating geomorphology of the hardpan calcrete suggests that it may

2. Calcretisation is the precipitation of calcium carbonate in a regolith profile, through the introduction of calcium carbonate in solution and removal of CO2 through various agencies (Chen *et al.* 2002: 9). The process occurs near-surface in soft material (Itkin *et al.* 2012: 223). The process results in various morphological types, with well-indurated 'hardpan calcrete' (Chen *et al.* 2002: 12) being a common form in the study area. Itkin *et al.* (2012: 223) point out that nāri s.s. is a term that relates to calcrete associated with chert.

represent a fossil water table. Hardpan calcrete can be difficult to distinguish from Cretaceous limestone bedrock, which is probably why the unit was not distinguished in regional geological mapping (Abdelhamid 1995), but the conglomeratic fabric is readily identifiable where exposed in caves and tombs below the calcretised crust. Calcretes in the project area have not been dated, but a regional calcretisation event in the Levant has been dated to the late Pliocene-mid Pleistocene (Itkin *et al.* 2012: 223-4).

The Jarash Conglomerate is a variably indurated, unsorted, polymictic sediment, containing clasts of limestone and subordinate chert and flint. Clast sizes are highly variable, and range up to 1 m. Sedimentary structures, clast size and fabric all point to fluviatile deposition, probably as debris flows **(**Costa 1984: 268), in a high-energy environment (**Fig. 3**). The formation was deposited on an eroded and irregular paleosurface, so its thickness varies, and there are probably multiple depositional phases. The most extensive exposure identified to date is at Bāb Ammān, where a *ca.* 40 m thick section is exposed on the west bank of the wadi and on top of the low hill which lies east of Hadrian's Arch. In aerial photographs, the low hill can be seen to form the crest of an oval shaped plateau (hereafter the Bāb Ammān plateau) oriented north-south, with its southern end forming a spur between Wādī Jarash to the east, a small wadi to the west and Wādī Bāb Ammān to the south.

The age of the Jarash Conglomerate is uncertain. However, the preliminary view is that it is likely be contemporaneous with the Dauqara Conglomerate in the upper R. Zarqā area, 12 km south-east of Gerasa, which is dated to the Lower-Middle Acheulian period of the Lower Pleistocene, around 0.9-1.0 my BP (Parenti *et al.* 1997: 19), and/or the lower conglomerate member of the Ṭabaqat Faḥl Formation near Pella, dated to the Middle Acheulian (Macumber and Edwards 1997: 34). Macumber and Edwards believe the lower conglomerate member of the Ṭabaqat Faḥl Formation probably correlates with the Dauqara Formation. Acheulian lithics were found on the surface of the western and southern slopes of the Bāb Ammān plateau in the 1940s and 1950s (Kirkbride 1958: 9-10): they include one example of Middle Acheulian date, placing it in the Lower Paleolithic (>450,000 – 150,000 BP). These surface finds may have been eroded from the conglomerate, as is the case of the Middle Acheulian lithics recovered from the Dauqara Conglomerate in the upper Zarqā Valley (Parenti *et al.* 1997), or accumulated on the already calcretised surface at a later date.

Tufa

A *ca.*_12 m high deposit of freshwater waterfall tufa is exposed on the east bank of Wādī Jarash, between the South Bridge and the south Watergate, and forms an apron-shaped terrace approximately 200 m long which projects into the modern valley (**Fig. 4**)[3]. The

3. Bāb Ammān: Section of Jarash Conglomerate exposed in cave (scale 2 m) (Don Boyer).

4. 12 m high scarp of waterfall tufa on the east bank of Wadi Jarash, south of South Bridge (Don Boyer).

3. There is no universally accepted term for calcium carbonate deposits precipitated from cool or ambient temperature freshwater sources, and the term 'tufa', as described by Ford and Pedley (1996: 117-118) is used in this paper. The term 'travertine' is sometimes used for such material; however the author restricts this term to describe freshwater calcium carbonate precipitated from thermal/hydrothermal waters, as described by Ford and Pedley (1996: 117-118).

margins of the tufa deposit are obscured by the modern town; however, the visible dimensions point to accretion over a lengthy period. The only published comment on this formation is a brief note by Vita-Finzi (1964: 22). The original water source is unknown, but may have been a spring contemporaneous with Qayrawān Cave spring. The depositional date of the Jarash tufa has yet to be determined.

Paleolandscape

The working hypothesis is that in the early Paleolithic, the floor of the Jarash paleovalley, including the area later occupied by the ancient walled city, was filled with a sequence of fluviatile conglomerates following the onset of a pluvial or interglacial period. In a later, drier phase, after a period of erosion, the near-surface portion of the unit was strongly calcretised to form hardpan calcrete. Subsequently, pluvial conditions returned and the plateaued surface of the Jarash Conglomerate was modified by landslips and the incision of the modern Jarash Valley.

Within the walled city, the creation of the terraced area that extends from the Qayrawān Cave to the south city wall on the east bank, and the wadi-like depression in the city's north-west quarter on the west bank, probably date to this erosional period. Given the steep slopes and scarps that exist on the hillside above it, this gently sloping terrace with large adjacent springs would have been an obvious location on which to build a settlement on the east bank. It is here that the Circassian village was established in the late 19th century and, from the available evidence, it was where most east bank buildings in the Greco-Byzantine were built. However, Iron Age I sherd scatters on its surface (Braemer 1992: 198) indicate even earlier human activity on the terrace. A spring line was created at the contact between the Jarash Conglomerate and the underlying Na'ur Limestone in the area south of Qayrawān Cave at the foot of a low scarp on the eastern edge of this terrace. Colluvium and modern housing now obscure this contact, and Qayrawān Cave spring is the only visible remnant of this ancient spring line system that probably tapped an aquifer in the adjacent Na'ur Limestone. Spring flow onto the terrace south of Qayrawān Cave deposited tufa that eventually formed the prominent waterfall tufa apron terrace visible today in the city on the east bank south of the South Bridge.

The terrain inside the walled city in the Greco-Roman period would have had a distinct terraced appearance, with the terrace treads separating calcrete scarps up to 5 m high, which were utilised as tomb sites from the Hellenistic period onwards. Over the centuries, the accumulation of colluvium and slope wash has modified the landscape to the smoother profile that we see today.

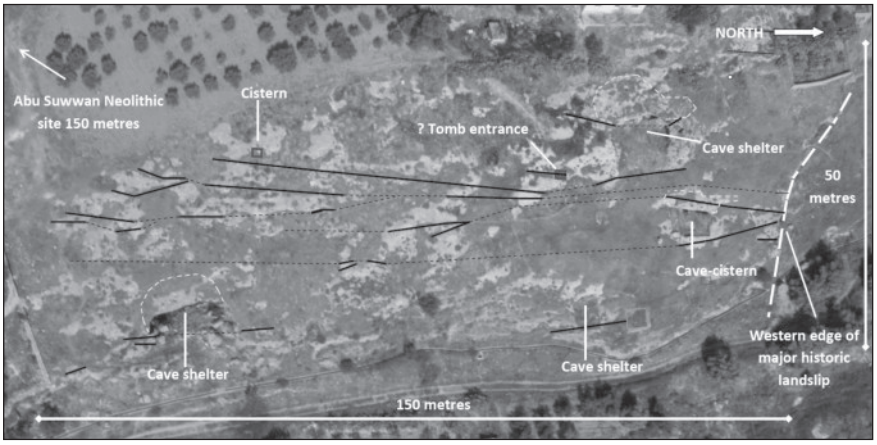
Aqueducts

Half of the site elements recorded during the survey were aqueduct components. The aqueducts fall into three groups.

(1) Masonry construction; with a 'U' shaped canal or *specus* cut into a dressed limestone block. There is some variation of the size of the *specus*; the major masonry aqueduct (DW01) of likely Roman-Byzantine date, which crosses the valley floor to the west of the bed of Wādī ad- Dayr was constructed of dressed limestone blocks up to 1000 mm long, 800 mm wide and 700 mm high. A *specus* 300-450 mm wide and 300 mm deep has been cut into these blocks (site JWP-143 (**Fig. 5**). A single block from the Qayrawān aqueduct in the eastern part of the city has the same dimensions (site JWP-141). There were also blocks with a smaller *specus* width (150-200 mm) associated with aqueduct DW01, which are interpreted to be from side canals supplying local agricultural users in the valley.

(2) Rock-cut construction; the canal is cut directly into bedrock. This is the most common form of construction. Although single canals

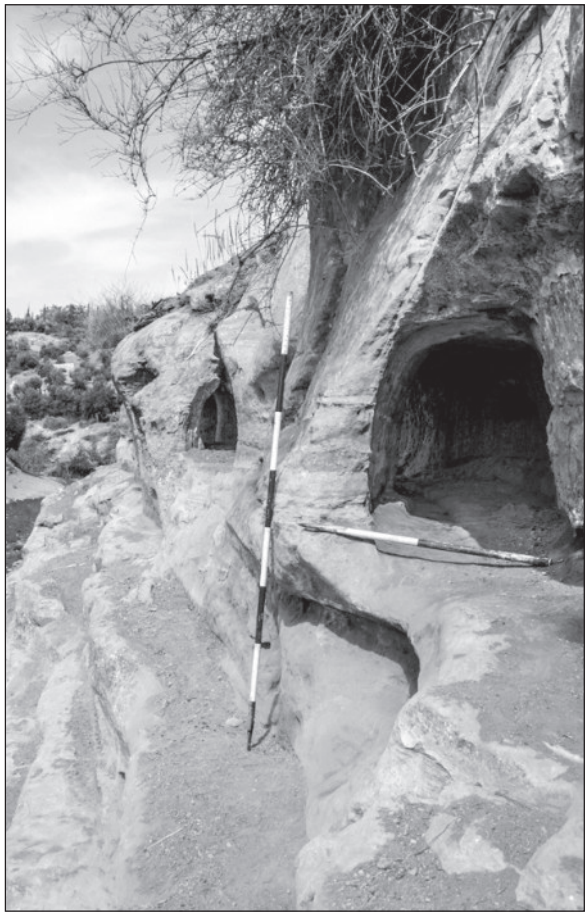
5. Site JWP-143: Blocks from masonry aqueduct DW01 (scale 2 m) (Don Boyer).



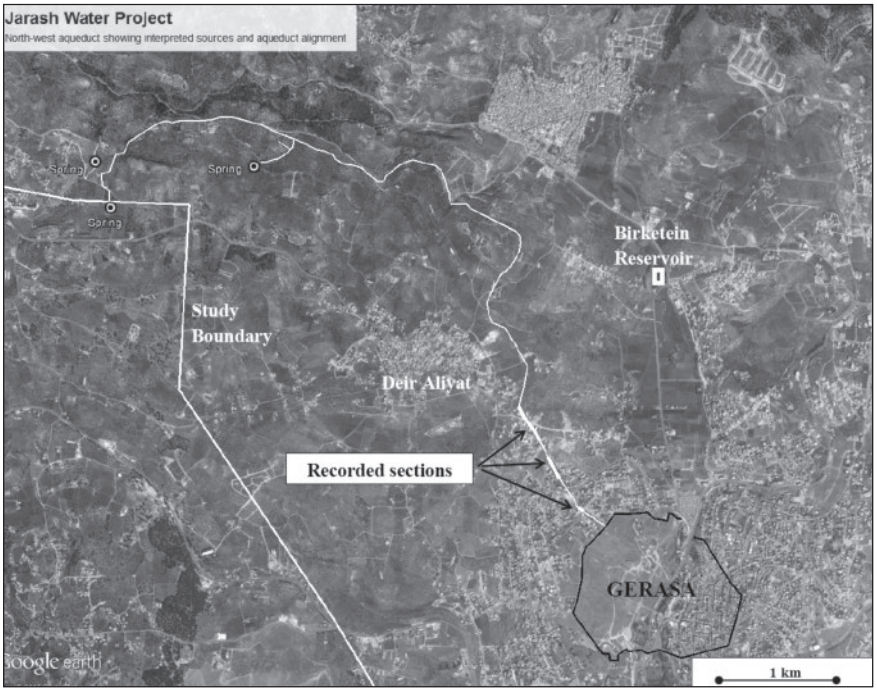
6. Site JWP-147, Bāb Ammān: Aerial photograph of a group of rock cut aqueducts on the eastern slope of Bāb Ammān plateau (Photo: APAAME).

exist (examples include sites JWP-144 and 151), there are also examples of canal clusters. At site JWP-147 on the eastern slope of Bāb Ammān plateau, up to eight rock-cut canals are cut into the exposed surface of hard, calcretised Jarash Conglomerate, on a 20 degree slope over a distance of 150 m. They are arrayed over a vertical interval of 7-10 m (**Fig. 6**). The northern (upstream) continuation of this aqueduct complex is abruptly terminated by a small 2-3 m high scarp, which represents the northern edge of a large historic, but undated, landslip some 200 m in length along the west bank of the wadi. This means that the aqueducts at site JWP-147 cannot be traced directly back to their source, which is believed to be a spring located at the northern end of the Bāb Ammān plateau, 350 m north of site JWP-147. At site JWP-146, at least three canals have been cut into outcropping Kurnub Sandstone directly beneath the main tunnel aqueduct (see below) on the east bank of Wādī Jarash. The relative age of the canals with respect to the upper tunnel aqueduct is unclear, but the lower tunnel aqueduct at the northern end of the sandstone outcrop appears to postdate the rock-cut canals.

(3) Tunnel construction; two examples were recorded in 2014, both cut into Kurnub Sandstone at site JWP-146 1 km south of Jarash. The longest is a 100 m long section cut into the edge of the sandstone cliff, and was first recorded by the Jarash Hinterland Survey (site JHS-666; Baker and Kennedy 2011: 459). The tunnel is typically 1.0 m high and 0.7 m wide, with a gutter cut into the floor, and is the highest of a series of at least three aqueducts cut into the west-facing rock face (see **Fig. 7**). The water source for the tunnel aqueduct is uncertain. The second tunnel element is at a slightly lower elevation, and is located at the northern end of the sandstone outcrop. It has a similar cross-sectional profile and appears to post-date the rock-cut canals cut into the outer face of the outcrop. The supply source for this aqueduct is also unknown, but lay to the north of the site.



7. Site JWP-146: 3 canals cut into the rock face below the tunnel aqueduct (vertical pole 2 m) (Don Boyer).

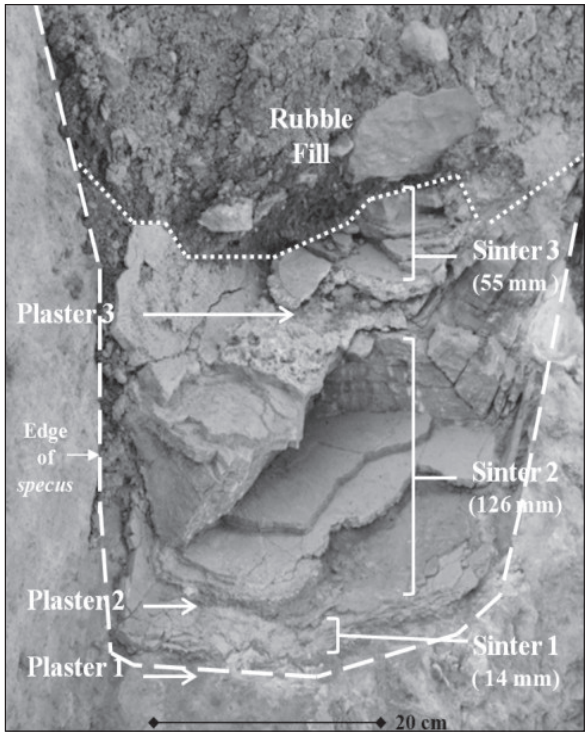


8. North-west aqueduct: trace of aqueduct from source to city (Don Boyer and Google Earth).

North-West Aqueduct

At the conclusion of the 2013 season, the source of the north-west aqueduct to the city was uncertain. Further analysis of early aerial photographs has been conducted, and two probable sources have been identified in the hills between Sūf and Dayr al-Layyāt, including a source that was visited in 2013. A total of seven sites on this aqueduct have been recorded, and the likely trace of the aqueduct is shown in the updated preliminary aqueduct plan of the area (**Fig. 8**).

Site JWP-128 on the north-west aqueduct, recorded in 2013 (Boyer 2017), was revisited and recorded in more detail. The aqueduct at this site is cut into limestone bedrock, and lies buried beneath 2 m of material that was deposited after it went out of use; this has preserved many original features that allow its history of use to be considered in some detail. The floor of the aqueduct has a gradient of 12%. The record of plaster deposition preserved in the *specus* shows three separate plaster applications (**Fig. 9**). Plasters 1 and 2 appear macroscopically similar, and are separated by a thin layer of laminated carbonate sediment, indicating a relatively short time interval between plaster applications. There is a thick section of carbonate sediment between Plaster 2 and Plaster 3, and the composition of these two plasters appears macroscopically different. The *specus* cross section is much reduced after Plaster 2, indicating a significantly reduced flow rate and sometime later, after a further period of water use, flow ceased entirely, and



9. North-West Aqueduct: Site JWP-128, showing canal construction detail and alternating layers of plaster and carbonate sinter (photo by Don Boyer).

the *specus* was filled with soil and rubble. It is anticipated that C^{14} dating of the plaster will yield absolute dates for the initial plaster application and the two subsequent plaster repairs, which will constrain the chronology of aqueduct flow history represented by the carbonate sediment layers. This aqueduct delivered water to a point close to the North West Gate of the city; however, this gate has not been excavated and the aqueduct's point of entry is not visible. Interpretation of early aerial photographs suggests that the aqueduct delivered water to one or more reservoirs located just inside the wall, before continuing eastwards down slope along the upper edge of a limestone scarp in the city's north-west quarter. The city's north-west quarter is now the subject of an ongoing archaeological study by the Danish–German Jarash Northwest Quarter team that is yielding valuable results, including the first absolute dates from water installations in this area. Mortar from a pressure water pipe excavated on the hilltop inside the city has been dated to 3rd/4th century AD (Lichtenberger *et al.* 2015: 125-Site E). There is no known direct connection between the water pipe and the large rock-cut cistern 150 m to the south near the Synagogue Church, which has a history of use ranging from the 2nd/3rd century AD to the 6th century AD (Lichtenberger *et al.* 2015: 125).

Reservoirs/Basins

Birkatayn

The study included a taped survey and the recording of key elements. The taped survey was necessary because the oft-quoted measurements of 43.5 m x 88.5 m published by Kraeling (1938: 162) lack clarity. The survey demonstrated that these are internal measurements that include the dividing wall between the two compartments, which needs to be taken into account when calculating the effective volume of the compartments. The outer wall of the reservoir is not perfectly rectangular in shape, which perhaps accounts for the variations in published figures; Hawamdeh *et al.* (2015: 3667) for example, report a width of 45.88 m and a length of 89.55 m.

The two-compartment reservoir as viewed today includes some masonry in its original position (generally the lower 2-3 courses), with the balance placed during the 'restoration' that was carried out by the Jordanian army in the 1960's. Although the reservoir floor is currently obscured by rubbish and rubble, it is clear that the south-west corner of the northern compartment was built on limestone bedrock, and evidence from a recent geophysical survey suggests that limestone bedrock may directly underlie the whole reservoir (Hawamdeh *et al.* 2015: 3671). No detailed instrument survey has yet been carried out, but analysis of recent photographs taken when the reservoir was partly full, show that there has been subsidence at the east end of the northern wall, and also of the southern end of the eastern wall, that may date to antiquity. A complete review of the structure is in progress, based in part on the analysis of photographic material published by Schumacher (1902) and largely unpublished material dating to the 1930's in the archives of the Yale Art gallery.

Analysis is incomplete but some preliminary conclusions may be drawn. There is historical evidence that the perimeter wall height may have been close to 4.5 m, which raises the theoretical maximum effective capacity to *ca.* 18,000 m^3 after allowing for the dividing wall, making it one of the largest reservoirs in the Decapolis of northern Jordan after the Jizah reservoir (68,180 m^3) and Umm al-Quṭṭayn 1 reservoir (19,765 m^3) (Kennedy 1995: Table 1). The reservoir is fed from one or more nearby springs *via* inlets at the base of the west and north walls in the northern compartment. The spring source is not visible, but is presumed to lie between the north wall of the reservoir and the Tomb of Germanus. Water was delivered from the source to the northern end of the northern compartment via a canal that is visible in a small underground walled cavity immediately adjoining the north wall. Evidence at the base of the north-eastern end of the northern compartment suggests that water was delivered from the spring supply canal to the basal masonry course in the north wall of this compartment *via* ceramic pipe(s), with an internal diameter of 0.14 m, set in mortar and then into the reservoir compartment *via* vertical slots between face blocks in the masonry wall. The mortar appears to have partially replaced masonry in the lowest course in the northern wall and this arrangement may

reflect the general system that supplied water to the northern reservoir compartment through this wall. The removal of the softer mortar as a result of water erosion would account for the cavities visible behind the basal face blocks in this wall at several locations, and provides a possible reason for the subsidence of the north wall already mentioned. While no evidence of water pipes or mortar was found behind the lower masonry course in the west wall of the northern compartment, the existence of large cavities up to 2 m deep behind the lowest masonry course, and the presence of vertical slots between face blocks similar to those in the north wall, suggest that the same water delivery system applied to the west wall.

Water could be drained from the northern compartment via outlets in the eastern wall and the dividing wall**.** Dating of a mortared repair to a water outlet in the north wall and of the mortar surrounding the ceramic pipe described above may clarify the date of construction, considered by Seigne to predate repair work on the nearby Gerasa-Adraa road that is dated to the Trajanic period (Seigne 2004: 177).

Large Cistern in Gerasa's North-East Quarter

Site JWP-137 was identified from analysis of 20th century photography as a possible water installation, based on its dimensions and location on the highest point in the eastern part of the city. It lies 20 m inside the north wall of the city, on top of a tongue-shaped spur at the southern end of Tall Jarash that extends into the walled city, and has views to the south over the eastern part of Jarash and the lower Jarash Valley. Modern housing and gardens now occupy the site, and the oldest observable walls are probably of Ottoman date. A large, rectangular walled structure approximately 31 m x 17 m and aligned east-west is clearly visible on many pre-1930 aerial photographs of Jarash, and a later ground photograph taken by Glueck shows it in more detail (**Fig.10**). The inside of the north wall has a number of variably spaced slots or niches, which may be the location of springers for arches of a vaulted roof; the structure would have been partially above ground. There are no visible signs of an entrance in any of the walls in the Glueck photograph, nor is there any sign of an apse, so the building was unlikely to have been a Christian church. The structure is strong, well-constructed and built of coursed masonry, with some blocks estimated to be 1 m in length. A possible analogue is the urban reservoir at Tiberias (of probable Byzantine date), which has surface dimensions of 32 m x 9.6 m and a depth of 6 m (Winogradov 2002), and a capacity of around 3000 m^3. Large cisterns are located on equivalent high points on the west side of Gerasa, the largest being the rectangular rock-cut reservoir or cistern of Roman-Byzantine date on the hill above the Artemis temple complex

10. Site JWP-137: Possible reservoir or cistern? Historic photograph showing a well-built masonry structure on hilltop (photo © ASOR Nelson Glueck Collection: c027Jerash019).

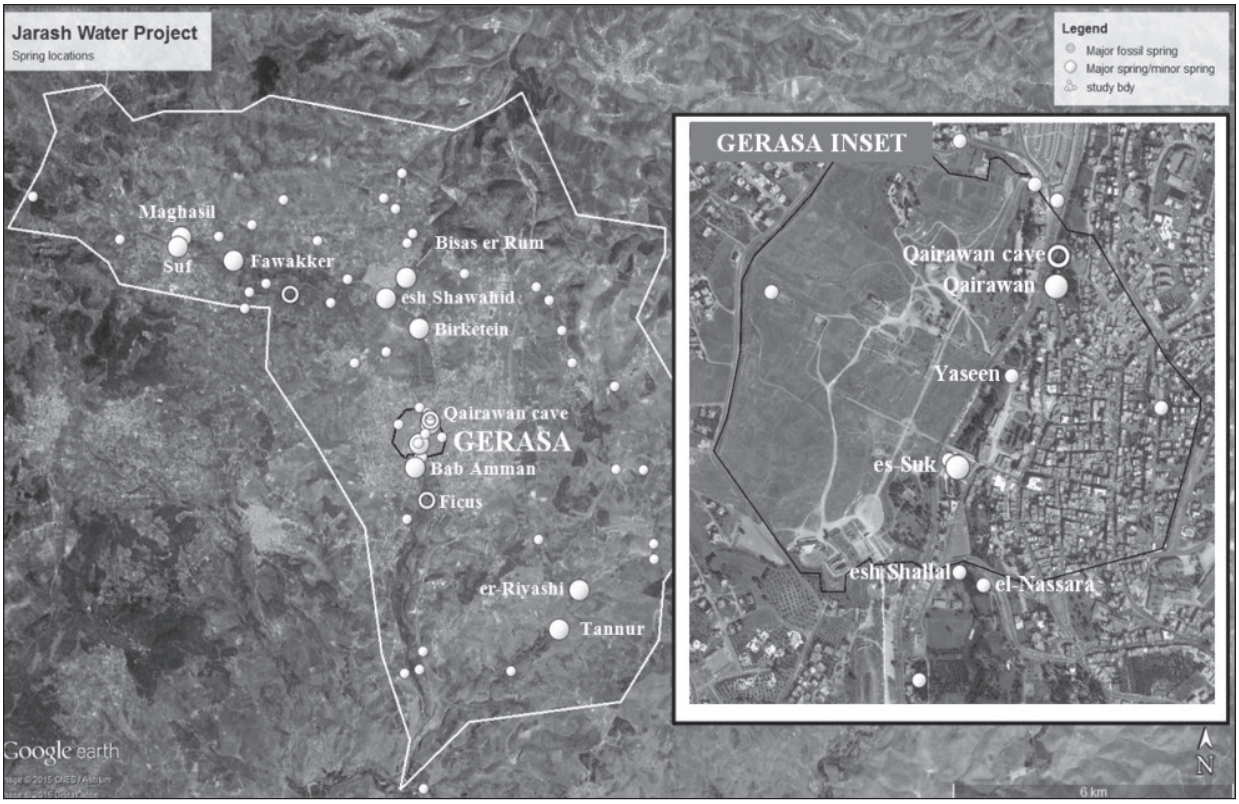
(Lichtenberger and Raja 2014: 643); which, taken together with the size and robust nature of the construction, leads to the conclusion that the structure in Glueck's photograph is a large reservoir or cistern with a capacity >1000 m^3.

The area of the interpreted cistern at site JWP-137 is now occupied by houses and gardens. Inspection revealed a number of interesting architectural fragments and components, said by the residents to have been found locally, including fluted columns, small arched structures (possibly from doorways or windows) and an altar rail colonnette. Additional column fragments were noted in a property 20 m to the south, and tesserae are reportedly common in the immediate area. These are all believed to have come from a second ruined building, no longer extant but clearly visible in the early aerial photographs, which may have been a church. Round hypocaust tiles 21-25 cm in diameter were also noted in the gardens and had reportedly also been used to infill holes in a section of the city wall that forms the boundary of one of the properties. The source of these is unknown, but the high status 2nd or 3rd century AD Roman building identified from an exquisite mosaic discovered under a Mudir's house in the early 20th century (Kriseleit 1984) and located <200 m to the southwest of site JWP-137 is one possibility.

Sources (Fig. 11)

Fossil Spring Sites

Major ancient fossil spring sources were identified at two locations. The northernmost site, JWP142, is associated with Qayrawān Cave 60 m north of the current Qayrawān Spring at an elevation close to 580 m, approximately 14 m above that of Qayrawān spring. Within the cave, prominent spring outlets lie at the contact between Jarash Conglomerate and underlying Na'ur Limestone. Other fossil spring outlets are evident at various points in the cliff face above and adjacent to the cave, at and above the level of the limestone contact. The size of the outlets suggests high discharge rates which, given the high elevation of the site and the perched nature of the water table, points to wet climatic conditions. The central outlet in the cave has the remnant of a 1 m high plaster facade constructed over it (**Fig. 12a**). The facade is poorly preserved and the original



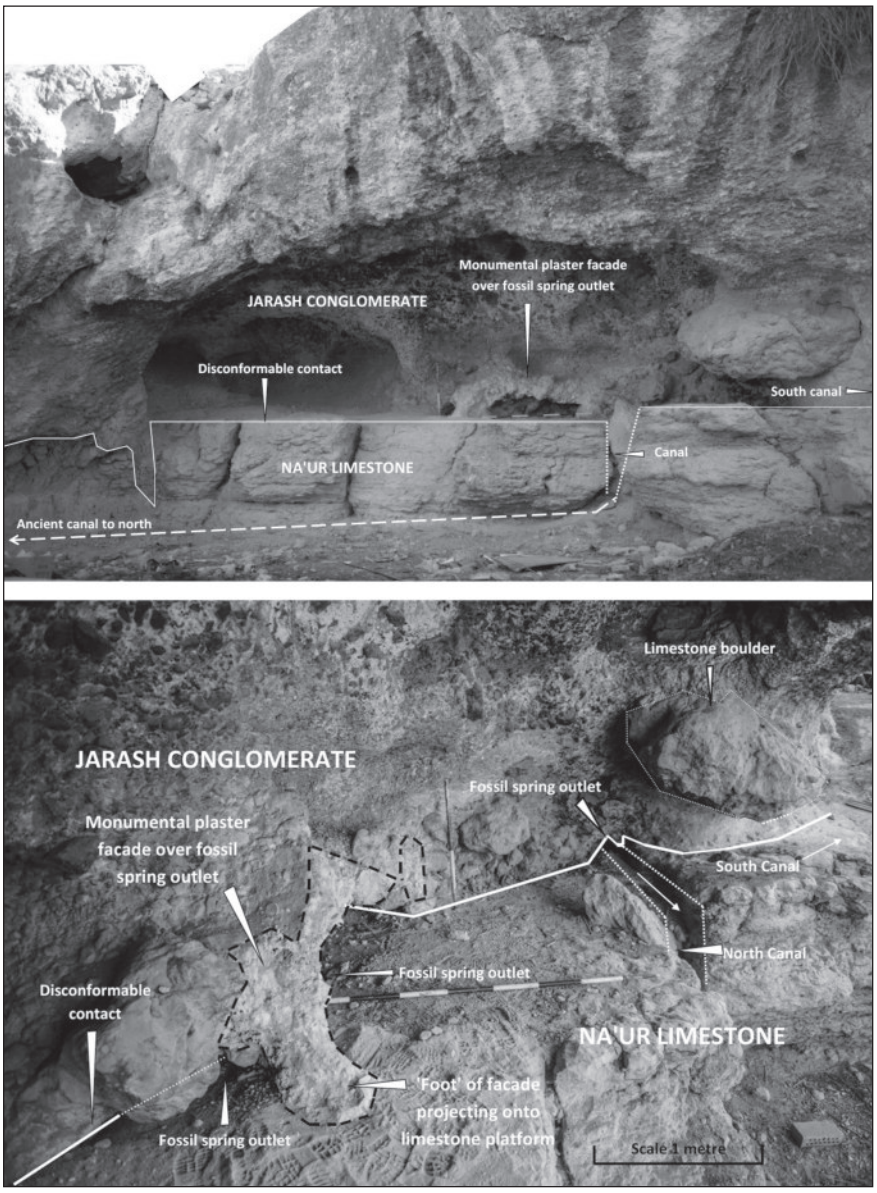
11. Spring locations within the project area (Don Boyer and Google Earth).

shape cannot be accurately discerned; however, the shape of the projection of the northern end of the facade onto a limestone platform facade is reminiscent of the paw and leg of a lion when viewed from the north (**Fig. 12b**). There is evidence of a plastered rock-cut canal leading from the southernmost outlet in the cave to the south, which was later cut by another rock-cut canal that carried water along the base of the conglomerate cliff to the north. To the south of the cave, it is likely that a spring line developed along the conglomerate/limestone contact.

The plastered facade around the main spring outlet in Qayrawān Cave represents a modest level of monumentalisation when compared with the more substantial monumentalisation of Qayrawān Spring 60 m to the south, dated tentatively to the 2nd century AD (Seigne 2004: 175). The Qayrawān Cave spring site is probably one of the two springs mentioned by John Fuller, an English traveller who visited Jarash in October 1819.

"Crossing the bed of the stream, which was now dry, we soon arrived at a pool of water overhung with fine shady plane-trees (sic) and surrounded by various plants and shrubs. It is supplied from two springs, at both of which are considerable remains of ancient buildings and some blocks of marble." (Fuller 1830: 336).

Fuller's description indicates that the spring



12. (a) Site JWP-142: View of Qayrawān Cave from the west, showing monumentalised fossil spring outlet and the disconformable contact between Jarash Conglomerate (?Pleistocene) and underlying Upper Cretaceous Na'ur Limestone, (b) View from inside Qayrawān Cave looking south, showing detail of plaster facade and canals (photos by Don Boyer).

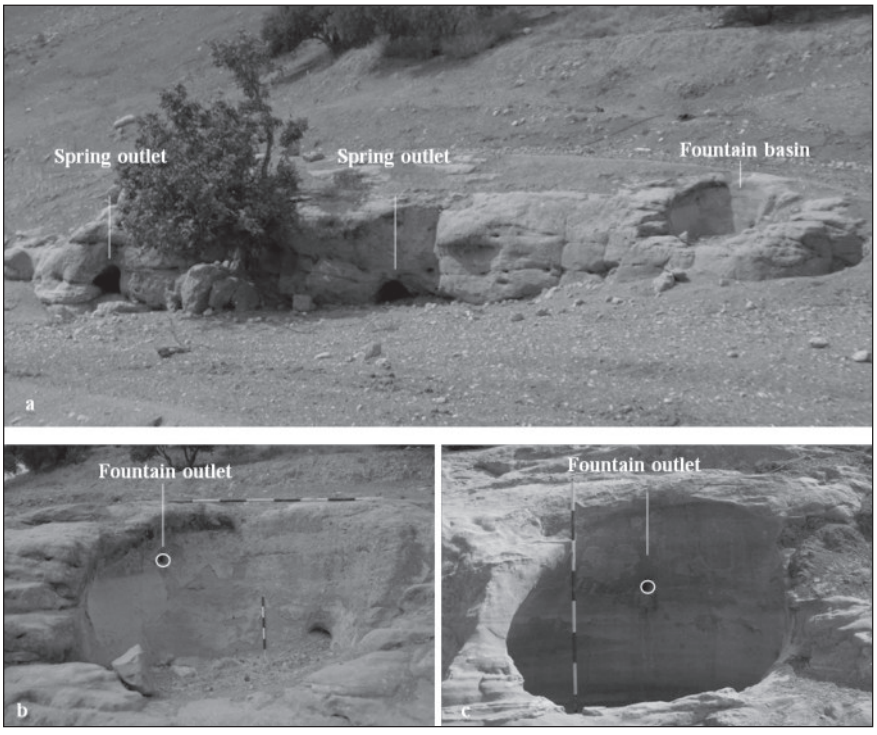
was still flowing in the dry season of 1819 and that there were buildings at the site. At this stage, the possibility that Qayrawān Cave spring and the nearby Qayrawān Spring formed part of a single complex or sanctuary cannot be discounted.

The second major fossil spring site is located 1 km south of the city in the Bāb Ammān locality, where there are substantial outcrops of Lower Cretaceous Kurnub Sandstone. The site spans the bed of Wādī Jarash at one of its narrowest points. It was recorded as two sites; JWP-140 on the west bank and JWP-146 on the east bank (informally named 'ficus springs'). A major fossil spring site is evident on the west bank, with multiple spring outlets close to the current ground level of a wadi terrace (**Fig. 13a**). The east-facing surface of the outcrop shows evidence of tufa deposition. A well-preserved hemispherical fountain basin with a diameter of 2 m has been carved into the face of the outcrop at its northern end (**Fig. 13b**), and a less well-preserved example is located at the southern end. Site JWP-146 on the opposite (eastern) bank of the wadi presents a similar picture, except that the sandstone outcrop is more imposing, being approximately 12 m high and with a prominent tunnel aqueduct cut into the upper edge of the cliff. One and possibly two hemispherical fountain basins have been cut into the sandstone outcrop midway up the slope. The best exposed basin has a width of 2 m and a height of 2 m, with a 0.35 m high lip forming the front of the basin and a small, circular water outlet located roughly midway up the rear wall. The installation is roughly hemispherical in plan and section; an almost identical installation is located 65 m to the south east at site JWP 146 on the east bank. (**Fig. 13c**).

The survey of sites JWP-140 and 146 identified two distinct groups of components; a network of aqueducts of different ages, including the only known examples of tunnel aqueducts in the immediate Jarash area, coming from an unknown source upstream, which carried water for probable irrigation use in the Jarash Valley downstream, and a group of spring sources and rock-cut fountains which may have formed part of a rural water sanctuary. The fountains appear to be unique in the Jarash area. No large settlements are known in the vicinity; however, the Abu Ṣuwwān MEGA-Neolithic site lies 250 m to the west.

Other Spring Sites

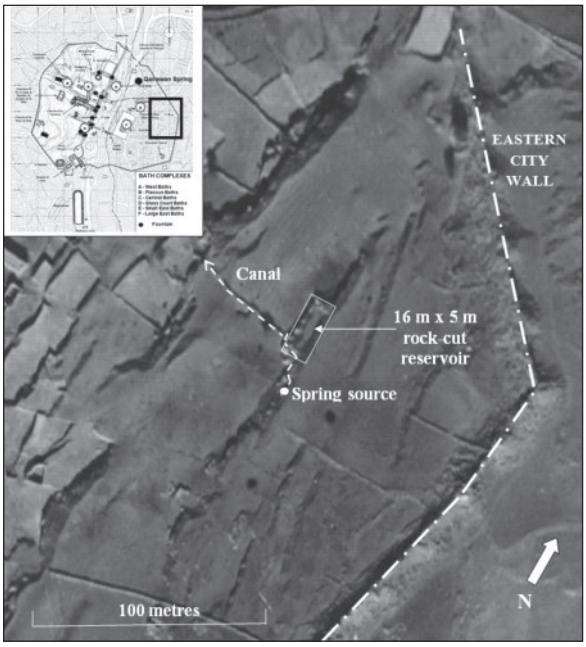
In antiquity, the lower east side of the city below 566 m elevation would have been supplied



13. (a) Site JWP-140, showing ancient spring sources and fountain on the west bank, (b) Site JWP-140, showing detail of fountain basin, (c) Site JWP-146, showing detail of fountain basin (photos by Don Boyer).

from Qayrawān Spring, and it is known that the small Byzantine Baths, and probably the large East Baths, were supplied from this source. This leaves the greater part of the eastern side of the city without an obvious spring supply. This problem may have been resolved by the identification of two new springs; firstly by the Qayrawān Cave spring (site JWP-142) at 580 m elevation described above, and secondly by a source high on the eastern slope of the city, located approximately 90 m west of the east wall of the city at an elevation of around 604 m (site JWP-138). Early photographs show that the spring flowed from a source on the upper slopes into a rock-cut basin with a capacity of *ca.* 150 m^3 (**Fig. 14**). The spring was still flowing as recently as the late 1920's and is likely to be a spring described by Burckhardt, who noted during his visit in 1812 "a stream of water descends from a spring in the mountain, and after flowing through this division of town, passes this building (East Baths), and empties itself in the river" (1822: 262).

Visits were made to spring sites in the Tannūr Valley, but recent agricultural activities either mask or have largely destroyed the spring-fed irrigation systems visited and described by Jean Sapin in the 1990's (1998: 112-113). Only the spring-fed irrigation system immediately downstream of Tannūr spring is in any way intact.



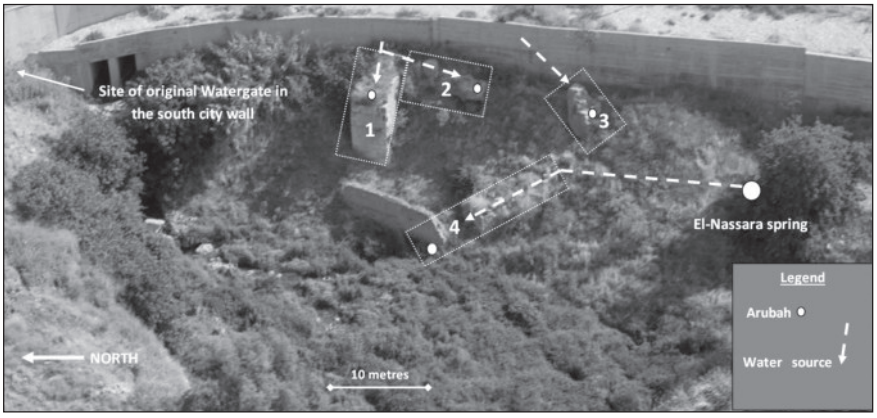
14. Site JWP-138: Spring and basin site, east side of city (Boyer 2016).

Water Mills

The combination of suitable terrain, perennial wadi flow and abundant springs explains why water milling was a feature in a number of the well-watered valleys in the Ajlun district (Liwa Ajlun) during the Ottoman period, including 'Ajlūn, Kufranji and Jarash, as reported in the 1597 Ottoman census (Hütteroth and Abdulfattah 1977: 162-164). The ruins of penstock (*arubah*) water mills in the Jarash Valley are testament to the importance of water milling in the late Ottoman period, and many more can be discerned in early plans and photographs, including a number on the banks of Wadi Jarash within the walls of the city. This type of mill, also known as "Greek" or "Norse", drives a horizontal mill wheel (McQuitty 1995: 746). There is mention of water milling being an activity in an otherwise virtually deserted Gerasa by the Arab geographer Yāqūt in the 13th century (Le Strange 1890: 462); yet, despite the wadi banks within the city providing optimal locations for water mill construction, the earliest attested example of a water mill in the Jarash Valley is the 6th century AD water-driven stone saw discovered in a room in the Artemis complex (Seigne 2002). From its location on the western hillside, this mill must have been supplied from a spring source.

While many of the mill ruins in the district are known to be of late Ottoman date from photographic or written records, none have yet been excavated, and it was decided to include mill sites in the current study, as it is possible that mills from the later Mediaeval and Ottoman periods were built on the foundations of earlier mills that date from the Roman-Byzantine period. Schumacher (1902: 119) mentions water mills from the 'Arabic period' in the valley north of Jarash, but provides no more detailed description other than they had wide water races.

Two mill sites were recorded in the 2013 field season (Boyer 2017) and a further two were recorded in 2014 (JWP-148, 149), by far the most significant being the water mill complex located immediately south of the city's south watergate at site JWP-148 (**Fig. 15**). Three separate mill penstocks have been identified in the complex at site JWP-148, west of the modern road; a fourth is inferred and a possible fifth



15. Site JWP-148: Aerial view of watergate mill complex, showing the 4 mills identified and their sources (photo by Don Boyer © APAAME_20130428_DDB-0373).

has been identified from historic photographs, but now lies beneath the modern road to the east, making this by far the largest known mill complex in the Jarash Valley. The sites of most of the mill buildings associated with them are no longer visible. The penstock of Mill 1 is of well-built masonry and is very similar in size and construction to the mill immediately east of the city's North Gate (JWP-136; Boyer 2017). It was probably one of the last of the mills to be operating in the late Ottoman period. A detailed 1:500 scale plan (SE B1) in the Yale Art Gallery archives shows that this mill, and possibly adjacent Mill 2, was supplied via a canal that brought water from the wadi stream near the south Watergate. The inferred penstock of Mill 2 is entirely buried beneath a thick deposit of tufa and is not visible. The source for Mill 3 is uncertain, but is likely to have been the as-Suk spring near the South Bridge. Mill 4 is unusual in that it was sourced from an-Nassara spring lying 20 m to the south of the mill complex. This spring is at a lower elevation than the sources for the other mills, and whereas the water races (water delivery canals) for the other mills were roughly horizontal, the water race for Mill 4 appears to have sloped, and delivered water to the top of a penstock that lies at the foot of the slope and close to the current wadi bed. Given that penstocks are typically 4-8 m high, this means that the base of the penstock for Mill 4 (and the mill house at its base) must lie at least several metres below the current level of the wadi bed. The low elevation of the penstock base, the sloping water race design and different source for Mill 4 all point to this being the earliest mill on the site. The water race and the masonry walls supporting it are covered by thick tufa deposits, indicating water flow over an extended period. It is hoped that C^{14} dating of mortar in the water race wall will clarify the date of construction.

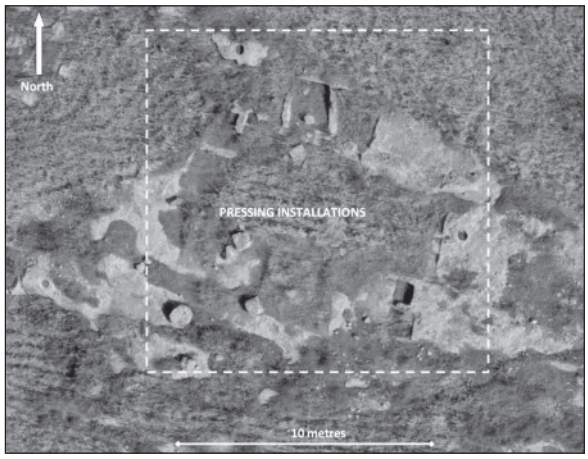
Wine Presses

A large wine press site (site JWP-150) was recorded on the site of Khirbat 'Ayn Riyashi in Wādī Umm Qanṭarah; the site had been previously identified in APAAME aerial photographs in 2013. The installation has been cut into the limestone surface on a south-west facing slope on a terrace north of the spring. The main installation covers approximately 100 m^2 and, although partially covered with slope wash, several pressing floors and plastered vats are visible (**Fig. 16**).

Sherds and Lithics

Site JWP-150: Kh. 'Ayn Riyashi

Flint lithics were found scattered in the slope wash that covers portions of the rural



16. Site JWP-150: Aerial view of Kh. 'Ayn Riyashi wine press installations (photo by Don Boyer © APAAME_20130428_DDB-0212).

installations, sourced from a site upslope to the north in an area where PPNB lithics had previously been recorded (Hanbury-Tenison 1987: 154). Selections of flints are shown in (**Fig. 17)**.

Sites JWP-152-153: Bāb Ammān

These lie adjacent to the Abū Ṣuwwān MEGA-Neolithic site, and extensive flint scatter was found at both locations.

Site JWP-147 Bāb Ammān

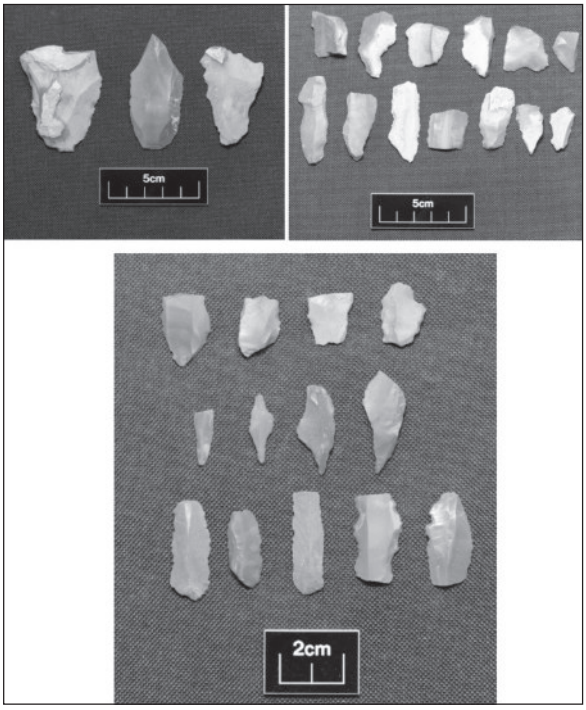
A concentration of sherds was found towards the top of the slope. The site is covered by a veneer of slope wash, and it is presumed that the sherds come from looted tombs on top of the Bāb Ammān plateau. The material has not yet been assessed.

Materials Sampling

Samples were collected from a total of 10 sites for further scientific analysis, including two sites recorded in 2013.

Preliminary Conclusions

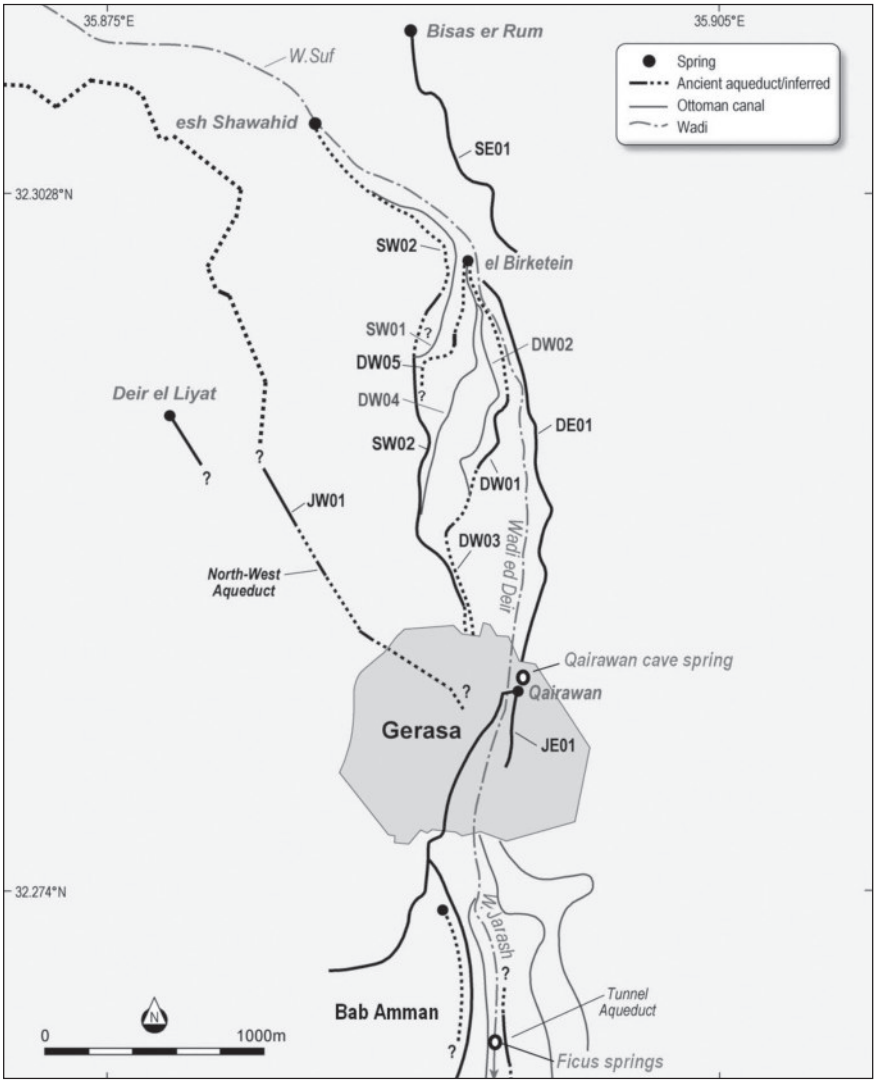
A total of 53 sites have now been recorded over two field seasons. The 2014 field season yielded important new information on the paleoenvironment of the city area, prior to the establishment of the urban centre in the historic period. A wadi-fill deposit of probable early Pleistocene age (the Jarash Conglomerate) has been recognised for the first time at a number of locations within the Jarash Valley. Subsequently, following a period of erosion, major springs were established during a pluvial period, and waterfall tufa was deposited on the terraced east bank of Wādī Jarash, in what later became the east side of Roman Gerasa. The fossil spring site in Qayrawān Cave above the modern-day Qayrawān Spring was part of this system, and evidence from ancient rock-cut canals and a plastered façade point to use of the Qayrawān Cave source in the historic period; possibly concurrently with the Qayrawān Spring. The terraced east bank provided an attractive natural platform on which later settlements were located from the Roman-Byzantine period to the present day.



17. Site JWP-150: Flint lithics, Kh. 'Ayn Riyashi (photos by D. Boyer).

Surveying in 2014 provided additional information regarding the extent of the ancient aqueduct network in the vicinity of Gerasa (**Fig. 18**). The sources for the major aqueducts recorded have now been identified; the only exceptions are the two tunnel aqueducts at Bāb Ammān . There is photographic and field evidence of an aqueduct network, which supplied irrigation water from perennial wādi flow and springs in the Jarash Valley between the village of Muqibleh and the confluence of Wādī Jarash with the R. Zarqā, as well as the Tannūr Valley below ar-Riyashi spring, although chronology for construction and use of this irrigation system remains to be established.

It is apparent that the north-west aqueduct provided an important water supply function to the west side of the city. Indeed, knowledge of the aqueduct's sources and potential alignment, the positioning of its entry into the city at the highest topographical point on the west side, and the ability to place water storage and distribution installations on the hilltop above the Artemis complex, are factors which may have formed part of the grand city plan for the west side of the city in the early Roman period. The chronology of construction, use and repair of this aqueduct is not currently known, but it is anticipated that C^{14} dating of the plaster will provide absolute dates and stable isotope analysis



18. Aqueduct plan: Gerasa Area (Don Boyer)

of carbonate sediment deposits preserved in its *specus* at various locations. Site JWP-128 in particular should yield paleoclimate proxy data spanning the period the aqueduct was in use. These results, when combined with results from important ongoing studies of the water installations in the city's north-west quarter by the Danish–German Jerash Northwest Quarter team, will provide a better understanding of the overall water management system in the city's north-west quarter. However, the part played by aqueducts approaching the west side of the city from the valley to the north remains unclear. It is hoped that it will be possible to obtain absolute dates of construction and/or use of two key elements in this northern network (the masonry aqueduct DW01 and Birkatayn reservoir) from C^{14} dating of plaster and mortar materials. The dating of materials from what may be the oldest water mill at the large water mill complex at the city's south watergate will hopefully shed some light on the timing of the introduction of water mill technology in the Jarash Valley.

The existence of higher elevation sources at Qayrawān Cave and high on the eastern hillside, together with a possible reservoir close to the highest point on the eastern side of the city, raises the possibility that this side of the city may also have enjoyed a similar (but separate) reticulated water supply to that which existed on the city's west side. A re-evaluation of the importance and use of the eastern part of the city is warranted in light of these discoveries.

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Abbreviations:

APAAME : Aerial Photographic Archive for Archaeology in the Middle East www.apaame.org
Kh. : Khirbat
M : metre
Mm : millimetre
My : million years
PPNB : Pre-pottery Neolithic B

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THE JARASH WATER PROJECT 2015 REPORT ON THE THIRD FIELD SEASON

David D. Boyer

Introduction

The ruins of the Decapolis city of Gerasa (modern Jarash) lie in the Jarash Valley 35 km north of Amman. There is archaeological evidence of occupation in the vicinity of Gerasa from the Bronze Age, Iron Age and Hellenistic period; however, the settlement blossomed into a vibrant provincial centre in the early Roman period and continued to be an important urban centre in the Byzantine and Early Islamic periods. The Jarash Water Project is investigating the water management system of the city and its hinterland in the Hellenistic to Byzantine period (2nd century BC-7th century AD). This report covers field work conducted in the third season, between 7th September and 20th September 2015. The work was conducted and directed by David (Don) Boyer, adjunct lecturer and PhD candidate in Classics and Ancient History at the University of Western Australia.

Previous field seasons had been conducted in 2013 and 2014. The 2013 field program included a pedestrian survey to identify hydraulic installations in the Jarash Valley[1] and a very preliminary survey of selected areas within the adjacent Majarr-Tannūr Valley[2], to gain an understanding of water management in the rural context (Boyer 2017). Several aqueducts were identified approaching the city from the north, and an important aqueduct to the city from the north-west was traced for over a kilometre. Additional aqueducts were identified south of the city in Wādī Jarash. This work resulted in the construction of a preliminary aqueduct plan for the near city area (Boyer 2014:3, Fig. 5).

The 2014 field season yielded new information on the palaeoenvironment of the city area, prior to the establishment of the urban centre in the historic period (Boyer 2018). A wādī-fill deposit of probable early Pleistocene age (the 'Jarash Conglomerate') was recognised for the first time at a number of locations within the Jarash Valley. Substantial relict spring systems were identified at several locations in the Jarash Valley. These systems would have been established during one or more pluvial periods; however, the timing of these climatic events remains to be determined.

Objectives

The 2015 program built on the results from the 2013/2014 field programs. There were two main components; firstly, pedestrian field surveys to record archaeological sites of interest in prospective areas identified from photographic analysis and other sources and, secondly, the collection of samples of mortar or plaster, and carbonate sediment deposits (calcareous sinter; Sürmelihindi *et al.* 2013: 962) for absolute dating and/or stable isotope analysis. Geoarchaeological evidence was also gathered to aid in the interpretation of the palaeolandscape.

The pedestrian surveys were split into a number of geographic sectors. In the city area; sites of interest were identified in the eastern part of the walled city and on the hill slopes west of the Jarash Archaeological Park. In the rural hinterland, areas of interest were identified in the hills west of the city, the Jarash Valley and the Majarr-Tannūr Valley.

1. From north to south, the valley comprises Wādī Sūf, Wādī ad Dayr and Wādī Jarash.

2. The valley comprises Wādī el-Majarr and Wādī at-Tannūr (also known as Wādī er-Raiyāsha).

The program for collecting samples of plaster/mortar material lining key canals and other water installations had been initiated in 2014 and was expanded in 2015, with the ultimate objective being to determine when the major aqueducts in the distribution network were constructed and in use. The specific objectives of the 2015 collection program were to:

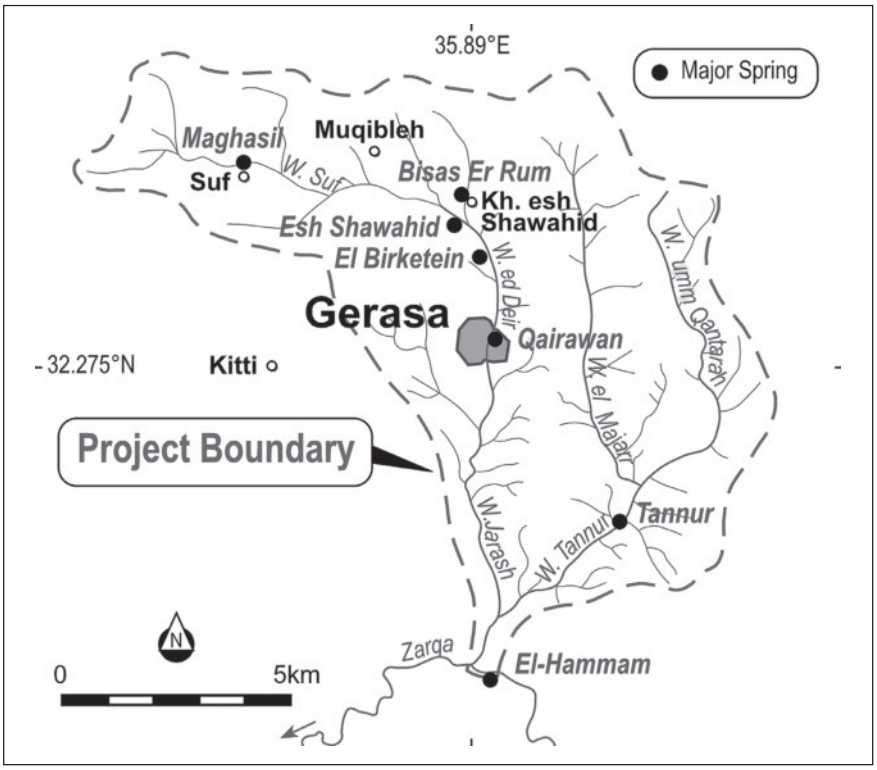
1. Collect plaster/mortar samples from selected hydraulic installations in order to date the material, as has recently been reported from the Jarash North-West Quarter project (Lichtenberger *et al.* 2015); and
2. Collect samples of tufa and/or calcareous sinter from aqueducts and other hydraulic installations. In recent years such material collected from Roman aqueducts has yielded valuable palaeoclimate proxy data from stable isotope determination ($\delta^{18}O$ and $\delta^{13}C$; for example Sürmelihindi *et al.* 2013) and it may also be possible to obtain absolute dates using the uranium-thorium method. If successful, this work would permit data from Gerasa aqueducts to be compared with similar data obtained from other aqueducts in the Near East. Of particular interest in this regard is a site on the North-West Aqueduct (site JWP128) located in 2013, that contains calcareous sinter deposits suggesting >50 years of use (Boyer 2018:9, Fig. 11) which is now the subject of a cooperative palaeoclimate study.

Field Survey

Techniques and Methodologies

The investigation includes the analysis and interpretation of aerial photographs and satellite imagery, detailed pedestrian surveys of selected areas and landscape analysis. It seeks answers to several fundamental questions, including water supply sources for the city and its hinterland, the nature of the water distribution network, and the period in which the main hydraulic installations were in use. The 100 km^2 project area encompasses the Jarash Valley and the neighbouring Majarr-Tannūr Valley to the east (**Fig. 1**).

The survey focused on locating and recording archaeological sites related to water management. Each site was allocated a unique number and its archaeological elements were recorded by means of a written description, measurements, colour digital photographs and sketches. Positioning in the field was by reference to hand held GPS.



1. Plan of study area, showing main drainages and main modern springs.

Results

Site Types

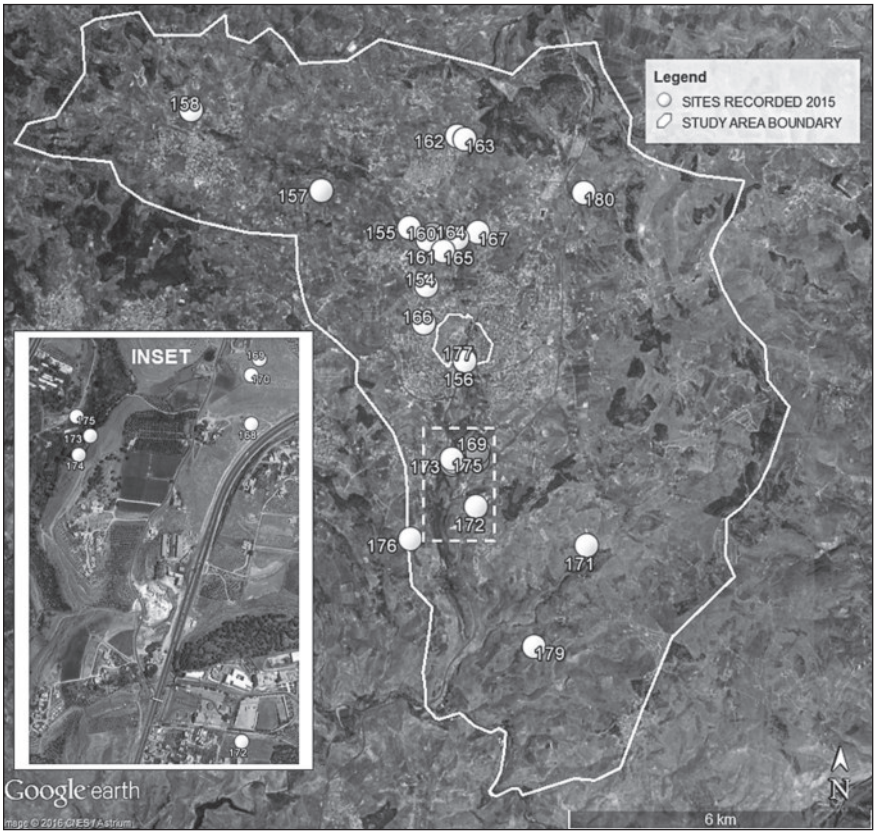
Given the focus on hydraulic structures, only a limited number of site types were recorded. A total of 40 new archaeological elements were recorded from 45 loci at 35 sites during the 2015 season. A breakdown of site type is shown in (**Table 1**) and site locations are shown in (**Fig. 2**).

Table 1: Details of archaeological sites recorded in 2015.

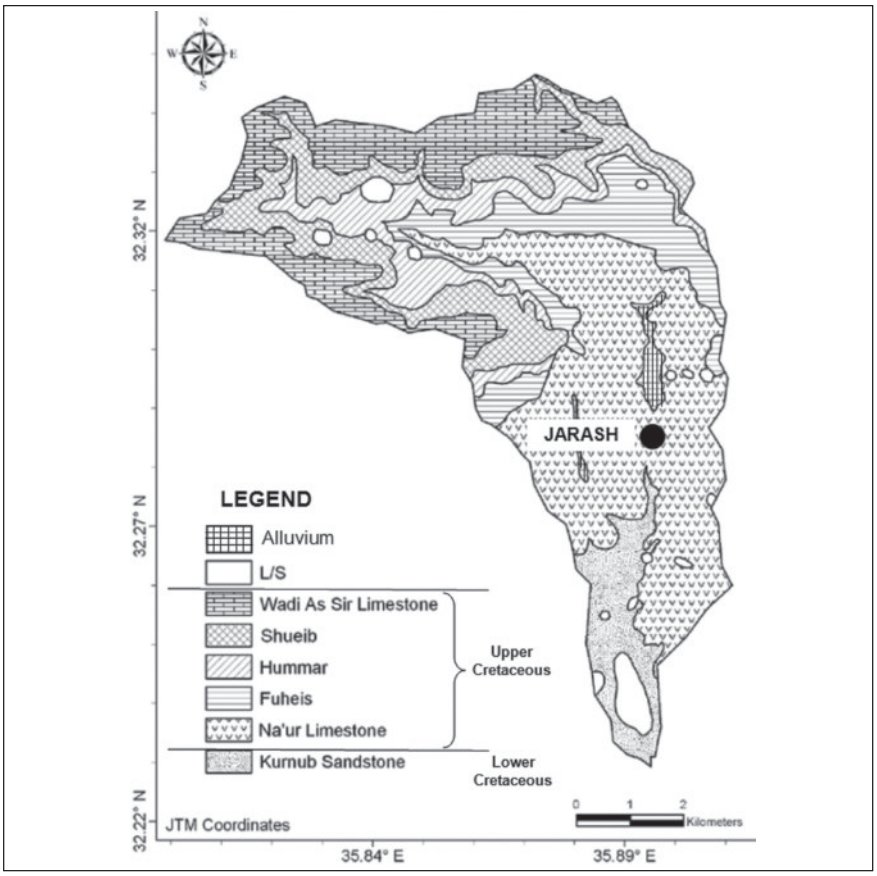
Site No. (JWP)	Locus	Lat (N)	Long (E)	Brief site description	Canal	Spring	Reserv.	Cistern	Basin	Winery	Other
154	1	32.29072	35.88349	Rock-cut winery						1	
155	1	32.30021	35.88143	Rock cut aqueduct	1						
156	1	32.27675	35.89344	Tunnel aqueduct	1						
157	1	32.30652	35.86292	Rock cut cisterns				2			
158	1	32.32033	35.83549	Spring (Ain Mansoura)		1					
159	1	32.29915	35.88640	Spring		1					
160	1	32.29805	35.88534	Rock cut canal	1						
161	1	32.29835	35.88533	Rock-cut winery						1	
161	2	32.29835	35.88533	Masonry building							1
162	1	32.31651	35.89114	Rock cut reservoir			1				
162	2	32.31651	35.89114	Rock cut canals	1						
163	1	32.31598	35.89273	Rock-cut winery						1	
164	1	32.29841	35.89148	Rock cut aqueduct	1						
165	1	32.29612	35.88859	Rock cut aqueduct	1						
166	1	32.28334	35.88477	?Masonry aqueduct	1						
167	1	32.29956	35.89578	Rock-cut canal	1						
168	1	32.25930	35.89635	Rock-cut reservoir			1				
169	1	32.26099	35.89657	Rock-cut reservoir			1				
170	1	32.26053	35.89633	Rock-cut winery						1	
170	2	32.26053	35.89633	Relict spring/reservoir		1	1				
171	1	32.24445	35.91943	Rock-cut canals	1						
172	1	32.25105	35.89620	Relict spring		1					
172	2	32.25066	35.89685	Rock-cut canal	1						
172	3	32.25605	35.89523	Rock-cut canal	1						
173	1	32.25893	35.89151	Spring/canal/basin	1	1			1		
174	1	32.25839	35.89069	Rock-cut canal	1						
175	1	32.25938	35.89101	Rock-cut canal	1						
176	1	32.24518	35.88262	Relict spring/canal	1	1					
176	2	32.24669	35.88237	Rock-cut canal	1						
177	1	32.27698	35.89332	Tunnel aqueduct	1						
178	1	32.27738	35.89343	Tunnel aqueduct	1						
178	2	32.27750	35.89339	Tunnel aqueduct	1						
178	3	32.27761	35.89334	Tunnel aqueduct	1						
179	1	32.22643	35.90873	Rock-cut canal	1						
180	1	32.30680	35.91779	Rock-cut winery						1	
Total	45			Subtotals	21	6	4	2	1	5	1

Geoarchaeological Study

The generally recognised bedrock geology within the Jarash Valley comprises a sequence of sediments of Cretaceous age (Abdelhamid 1995) (**Fig. 3**). Geological observations made during the 2014 and 2015 field surveys resulted in a revision of the geological history of the Jarash Valley, to accommodate the recognition of a sequence of fluviatile conglomeratic (wādī-fill) sediments of probable Quaternary age (Jarash Conglomerate) deposited on an eroded paleosurface of Cretaceous Na'ur Limestone and Kurnub Sandstone (Boyer 2018). To date, the Jarash Conglomerate has been recognised



2. *Location of archaeological sites recorded in 2015. Inset shows location of sites at the ash-Shallal locality (Image © CNES/Astrium).*



3. *Bedrock geology plan of Jarash valley (adapted from Hammouri and Naqa 2008: Fig.2).*

over an eight-km long section of the Jarash Valley, and has also been observed at several localities in the Majarr-Tannūr Valley.

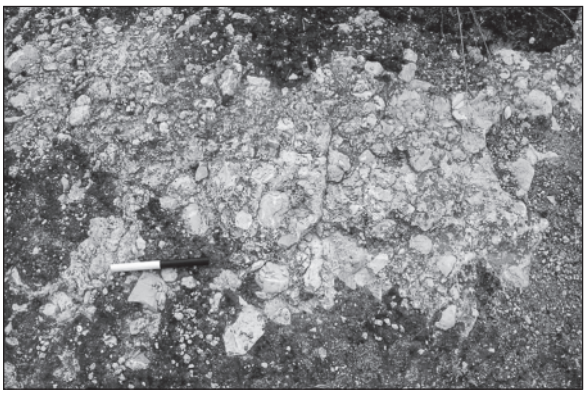
The surface of the Jarash Conglomerate has been indurated (calcretised) to a hard calcium carbonate crust virtually indistinguishable from Cretaceous limestone bedrock, with most of Gerasa interpreted to lie on this bedrock material rather than the Cretaceous Na'ur Limestone which is shown on the current geology plan (Abdelhamid 1995). Examples of outcropping Jarash Conglomerate have been observed across the west side of the city, from the north-west quarter to Bab Amman, and examples are shown in (**Figs. 4 , 5**).

Aqueducts

Canals were identified at more than half of the sites recorded during the 2015 season. They are typically of rock-cut construction, with a U-shaped *specus* cut directly into bedrock. The *specus* is 0.25-0.4 m wide and generally 0.4-0.5 m deep, although site JWP175 is unusual in that the *specus* is 1.2 m deep (**Fig. 6**).

Rarely has a rock-cut canal been cut into the floor of a tunnel excavated into bedrock. This subtype had previously been observed in the near-city area at 'ficus springs' (site JWP146, 1.0 km south of the city) only. However, in 2015 short sections of a tunnel aqueduct (designated JE01) were recorded over a distance of c. 100 m in the face of a cliff on the east bank of the wādī in central Jarash (sites JWP156, 177 and 178 described below)[3]. The c. 12 m-high cliff is a relict tufa cascade on the lower east bank of Wādī Jarash between the South Bridge and the southern city wall. It forms the western edge of a tufa terrace deposited on Jarash Conglomerate. Landslips and rock falls have removed sections of the cliff, and only short sections of the tunnel

4. Jarash Conglomerate exposed beneath southern colonnade, Gerasa South Decumanus (scale: 20 cm).



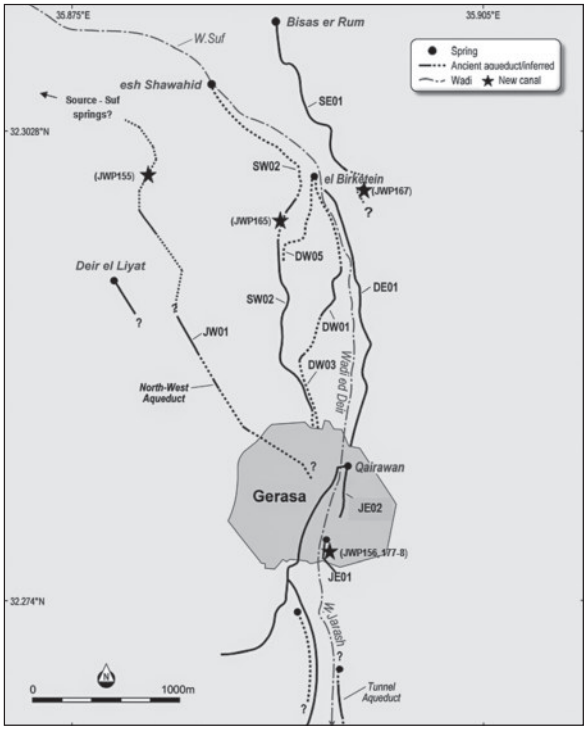
5. Jarash Conglomerate exposed near Hadrian's Arch, Bab Amman (scale: 20 cm).

6. 1.2 m deep canal cut into Kurnub Sandstone Formation at site JWP175 (pole: 1.0 m).

3. This is presumably the canal mentioned by Seigne (2004: 179) as 'partly excavated in the cliff behind the wholesale fruit and vegetable market'. Seigne speculated that its source may have been associated with the so-called deflector wall at the South Bridge.

canal system remain. The 1.0 m high and 0.65-0.95 m wide tunnel was excavated in tufa close to the base of the cliff (**Fig. 7**) and carried water from a spring basin located in a small cave at the northern end of the cascade for irrigation use downstream.

New canal elements were recorded north of the city on three aqueduct alignments identified in 2013-2014 (**Fig. 8**). A well-preserved 14 m long section of rock-cut canal was recorded at Site JWP155 on aqueduct JW01 (North-West Aqueduct; **Fig. 9**).This site lies 2.1 km west of the city's North-West Gate and 370 m upstream of site JWP115 (identified in 2013). The *specus* is lined with calcareous sinter; a feature which has been noted at all other recorded sites on this aqueduct. An additional site (JWP167) was recorded on the east bank aqueduct presently designated SE01, possibly supplied from the now dry 'Ayn Bsās ar-Rūm, but it appears that any downstream sections of this canal now lie beneath modern housing development.



8. Preliminary aqueduct network plan, showing new aqueduct sites recorded in 2015.

7. Tunnel entrance cut into tufa cascade, site JWP178 central Jarash (scale: 0.5 m).

9. Rock-cut 14 m long section of aqueduct JW01 (north-west aqueduct) at site JWP155.

On the west side of the Jarash Valley, a new section of aqueduct SW02 was recorded 0.5 km south-west of Birkatayn (site JWP165). A four hectare landslip obscures the aqueduct's alignment north-west of Birkatayn; however, on present information the source is likely to be 'Ayn ash-Shawahid. Its destination is also uncertain, although its high elevation (640 m at site JWP165) would theoretically have enabled it to supply the west side of the city.

Sections of rock-cut aqueducts were also recorded in the southern Jarash Valley at the ash-Shallal locality, two km south of Jarash (sites JWP173-5); part of an extensive network that irrigated both banks of the valley downstream. The wadi has incised deeply into relatively soft Lower Cretaceous Kurnub Sandstone at this location, and a 20-25 m high waterfall has been created in the bed of the wadi. Steep, unstable slopes and thick vegetation make access to this part of the valley difficult, and the ancient landscape has been modified by terracing, landslips and colluvial deposits. However, a composite site comprising relict hillside springs, small tufa cascades, rock-cut canals and relict natural fountains is preserved on the east bank (JWP173-4; **Fig. 10**). These sites lie at the northern end of a much larger site, which extends along the cliffs for a distance of perhaps 250 m to the south. The Roman-Byzantine settlement of Mesar Tôkh (Maysar Tawkh; Glueck 1951: 68-69, site 284)[4] lies on a prominent 3 hectare hilltop overlooking the entire site. A well-preserved section of a canal, cut deeply into Kurnub Sandstone bedrock, was recorded at site JWP175 on the opposite bank of the wadi.

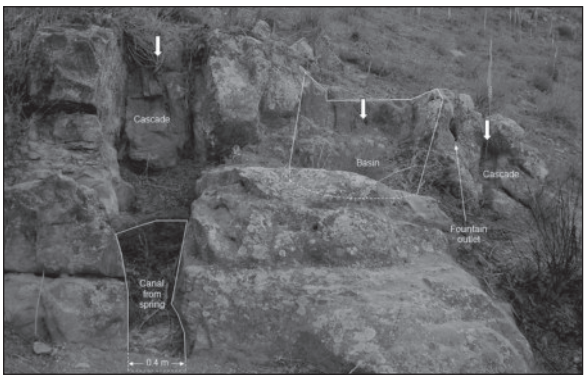
Elements of two canal systems were recorded in Wādī at-Tannūr. A well-preserved section of a rock-cut canal (with adjacent cistern) was recorded at site JWP179 (**Fig. 11**). This large canal formed part of the once-extensive ancient irrigation system supplied from 'Ayn at-Tannūr, located 2.5 km upstream to the north-east, which can be readily traced on aerial photographs. Site JWP179 lies on a section of the system known locally as Qanāt al-'Urqiya[5] which is still in use today, although reduced flows have impacted on its usefulness in recent years. The small canal recorded at site JWP171 was part of a micro-irrigation system in a tributary wadi north-west of 'Ayn at-Tannūr, close to the site of Khirbat al-Mashtā.

Water Storage Installations

These installations were found in two contexts.

Associated with Springs or Spring-Fed Aqueducts

Two reservoirs were recorded 1.7 km south of Jarash, adjacent to irrigation canals and stored water from these canals. They both appear to be rock-cut modifications of natural caves. The largest (JWP168), probably supplied from a spring ca. 200m to the east below the



10. Site JWP173 at ash-Shallal, illustrating the canal from the spring together with small cascades, a rock-cut basin and a natural fountain outlet.

11. Site JWP179, illustrating a section of ancient rock cut canal (from 'Ayn at-Tannūr) and adjacent cistern (scale: 1.0 m).

4. There is some uncertainty over the name of the settlement on this hilltop. The site fits Glueck's description for Mesar Tôkh, although the locality is named Abu Harasi on Mega-Jordan (site 12582). It was recorded as site 48 by Hanbury-Tenison (1987: 157).

5. 'Qanāt', in the local context, refers to a surface (generally rock-cut) canal.

ruins of Um er-Rutum (Ratam), has an irregular outline (38 m x an average of 12 m in plan) and an estimated capacity >1100 m^3. The reservoir at site JWP169, 180 m north of (and upstream of) site JWP168 is smaller, with an estimated capacity >200 m^3 (**Fig. 12**). It lies close to the end of an irrigation canal supplied from a spring inside the walled city[6]. The capacity of the part rock-cut reservoir/basin adjacent to the small relict spring at site JWP170, 40 m south of the reservoir at site JWP169, cannot be accurately estimated, but was probably c. 150 m^3. A reservoir was identified close to the relict spring/canal site JWP172. The reservoir, which was rectangular in plan (ca. 50 m x 25 m) and located in a small wadi, now lies beneath modern university buildings but is visible on mid-20th century aerial photographs. This reservoir was probably supplied from the relict spring 150 m to the south-east, and would probably have had a capacity of 1000-2000 m^3.

Associated With Rainfall Harvesting Systems

An irregularly shaped reservoir/basin 18 m x 5 m in plan is associated with the rainfall harvesting system recorded at site JWP162 north of Mukhayyam Sūf. The bottle-shaped rock-cut cisterns at site JWP157 are also likely to have been used to store runoff from adjacent rock outcrops.

Springs

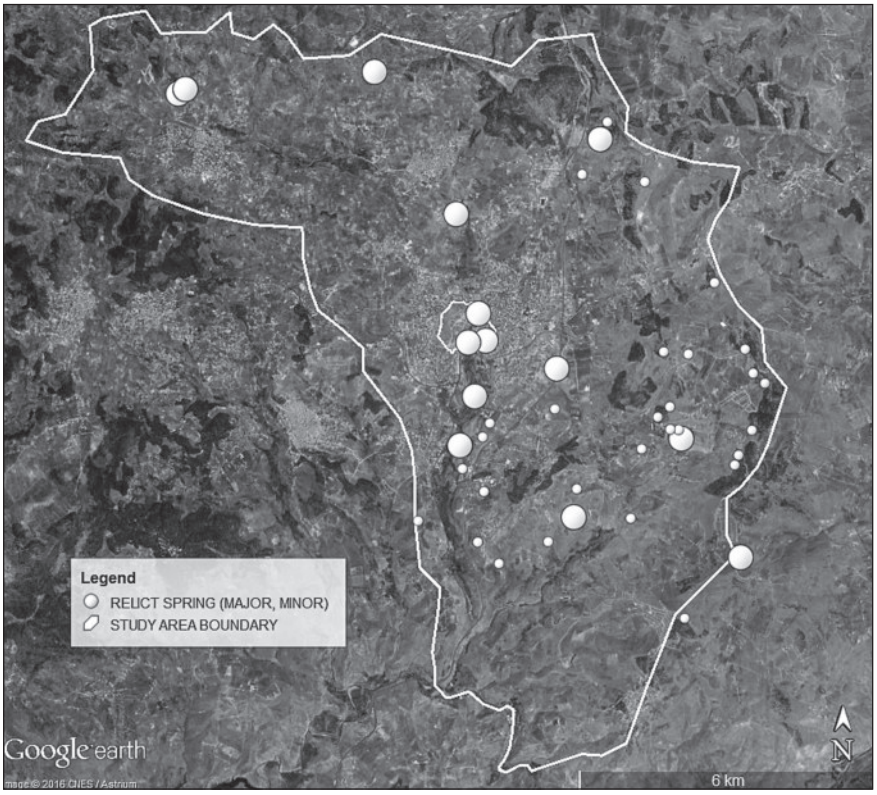
A total of seven new spring sites were recorded. Only one spring was still flowing, ‘Ayn Mansoura (JWP158), on the north bank of Wādī Sūf just east of Sūf township, although the small source at site JWP159 was probably operating until the mid-20th century. The remaining localities are relict spring sites, where it is likely that flow ceased in antiquity, or perhaps even earlier in some cases. Water from the spring at site JWP170 was directed into an adjacent reservoir (locus JWP170/2); however, at sites JWP172, 173 and 176 spring water was directed into a rock-cut canal for distribution elsewhere.

12. Rock-cut reservoir close to the end of the aqueduct sourced from the cave-spring at site JWP178 in central Jarash.

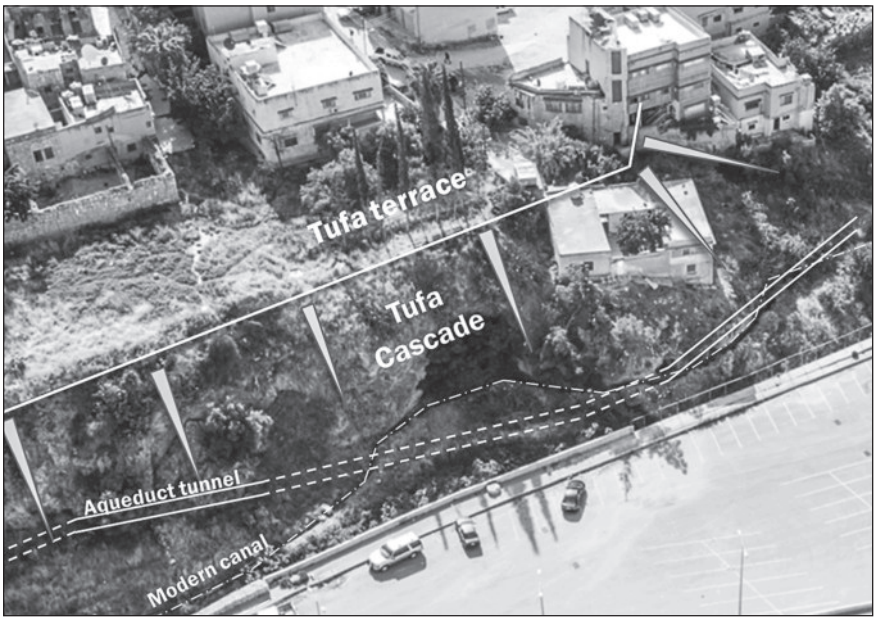
The main relict spring sites identified in the study area to date are shown in **Fig. 13**. The relict tufa cascade located in central Jarash on the east bank of Wādī Jarash between the South Bridge and the southern watergate to the ancient city is not the site of the original spring, but represents the outlet of a spring-fed system which originated somewhere beneath the modern town. The prominent 12 m cliff face of the tufa cascade visible today is the remnant of a cliff, which would have been 200 m or more in height in antiquity (**Fig. 14**). The cliff marks the western end of a tufa terrace which would have extended eastwards to the source. The natural surface of this terrace is no longer visible due to modern housing and an accumulation of building debris. Thick accumulations of tufa are visible on the steep slope that forms the face of the cascade, and the profile of the cascade is visible in natural and man-made openings in the tufa (**Fig. 15**).

Site JWP-173, adjacent to the ash-Shallal waterfall site two km south of Jarash, is one of several relict spring sites that are visible on a c. 250 m long section of the steep east bank of Wādī Jarash at this locality. It is likely that more relict spring sites lie hidden beneath slope-wash. The springs flowed from Kurnub Sandstone immediately below the contact with the overlying Jarash Conglomerate and probably also from the geological contact itself. At site JWP173 the relict spring flowed over a 3 m high sandstone cliff, and through at least one natural fountain outlet in the face of the scarp, which had been artificially sculpted to direct the water flow down the face in small canals and into a small basin. A large, separate rock-cut canal emerges from a tunnel at the foot of the cliff, directing spring water directly into

6. Originally the cave-spring at site JWP178, but replaced later by nearby ‘Ayn as-Sūq (Jordan Planning Team 1968: Fig. JER-11.



13. *Plan of relict spring sites identified in the study area (Image © CNES/Astrium).*



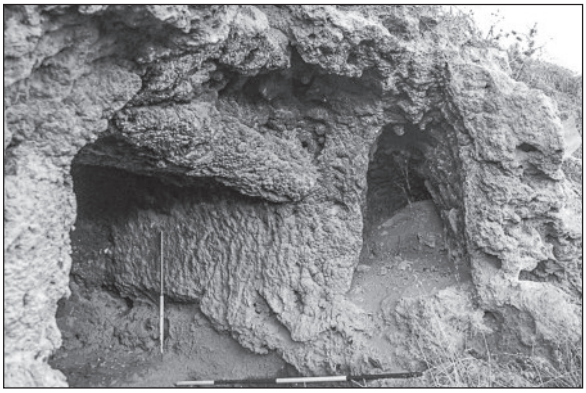
14. *Aerial view of relict tufa cascade and aqueduct tunnel in central Jarash (photo: APAAME: APAAME_20130428_DDB-0380, photographer: D. Boyer).*

another canal which carried it downstream on the east bank of the wadi.

These relict springs reflect a wetter climatic regime, which resulted in the water table rising to a much higher level than is the case today. An extreme example of a relict water table at a high elevation is the spring and associated canal located at site JWP176, within a few metres of a hilltop on the western boundary of the study area. A spring can only have existed at such a location during an extraordinarily wet climatic regime.

Wineries

Winery installations were recorded because the process involves the use of water and they



15. Section through base of relict tufa cascade and aqueduct tunnel at site JWP156, central Jarash (pole: 2.0 m).

17. Rock-cut winery at site JWP170, with rectangular 5 m² pressing floor (Zerbini type 2). (pole: 2.0 m).

frequently occur in close proximity to hydraulic installations[7]. Rock-cut rural wineries were recorded at five locations in 2015. Small, simple domestic-sized winery installations (Zerbini Type 1[8]), with treading floors of c. 1 m² were recorded at sites JWP163 and 164. The well-preserved installation at site JWP163 has an oval treading floor and vat cut into calcretised Jarash Conglomerate (**Fig. 16**). Larger (Zerbini Type 2) installations were recorded at sites JWP154 and 170, each with unique characteristics. The winery at site JWP170 (perched precariously on the outer edge of a rock outcrop) is the best preserved, although fractured by seismic activity. It has a rectangular 5 m² pressing floor which drains into a single, half-moon shaped, 1.35 m deep vat (**Fig. 17**). A lever beam slot is preserved in the east wall of the pressing floor. The winery at site JWP154 has a roughly square 14.4 m² pressing floor, draining into two rectangular, interconnected vats of unequal size and uncertain depth. A lever beam slot is preserved in the wall of the pressing floor. The more complex winery installation (possibly Zerbini Type 3 or 4) at site JWP180 has a roughly square pressing floor of 25.5 m², and two vats of unequal size; a 1.2 x 1.5 m intermediate vat which drains into a larger 2.4 x 1.7 m vat (**Fig. 18**). No lever beam slot is visible, but recesses cut into one wall may be associated with a lever arrangement.

16. Simple rock-cut winery at site JWP163, with 1.1 m² oval pressing floor (Zerbini type 1).

18. Complex rock-cut winery at site JWP180. Photo shows vats in foreground adjacent to square 25.5 m² pressing floor (Zerbini type 3 or 4) (pole: 2.0 m).

Sherds and Lithics

Sherds or lithics were collected at four sites during the 2015 survey, although none have been studied in detail as yet. A sherd pick-up was conducted on agricultural terraces adjacent to the relict spring at site JWP176, in an attempt to determine settlement history in the vicinity of the spring, and a preliminary analysis of the few

7. Only installations with evidence of a pressing floor connected to one or more receiving vats were recorded as wineries (Watson 2004: 487).

8. This report follows the winery typology of Zerbini (2015: 45).

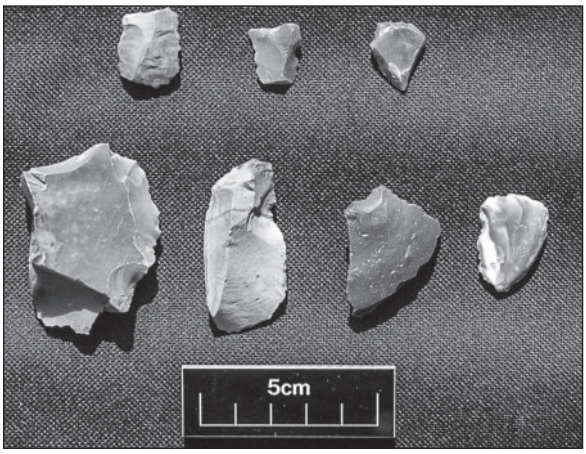
sherds collected from this site suggests possible use of the area from the Iron Age through to the Abbasid period (I. Kehrberg, Pers. comm., 01/03/2016).

Flints were found scattered in the slope-wash which covers the exposed calcrete bedrock immediately surrounding the winery at site JWP180. The site lies 300 m south-west of a small spring named 'Ayn al-'Akash ('Iksh) on the 1:10,000 plan and 500-750 m south-west of the ruined settlement of Khirbat al-Ḥūtah (Ḥūta) (Mega Jordan site 6685), where sherd/flint scatters spanning the Chalcolithic to Medieval periods were recorded by Hanbury-Tenison (1987: 155. Site 19 'Majara'). A selection of the lithics from site JWP180 is shown in **Fig. 19**.

Preliminary Conclusions

Aqueducts

New aqueduct elements were identified on aqueduct alignments north and west of the city and in Wādī at-Tannūr, which have been used to update the plan of the ancient aqueduct network in the vicinity of the city. There are still significant knowledge gaps in the higher-elevation aqueduct alignments (SW02 and SE01) approaching the city from the north as a result of modern housing development. While it is possible these aqueducts carried water to the ancient city, their alignments closer to the city are very uncertain, and no entry points to the city have been found. Sections of the North-West Aqueduct have now been confirmed over a distance of 2.1 km from the city's North West Gate, although its source remains uncertain. The 100-m long aqueduct tunnel visible in the cliff on the east bank of the wadi in central Jarash, together with its relict cave-spring source, is the start of a canal system which can be traced for 2.5 km south of the city, and is estimated to have irrigated an area of around 30 hectares on the lower east bank of Wādī Jarash. The cave-spring eventually dried up, and by the late Ottoman period the aqueduct's water supply appears to have been drawn from the es-Suq spring located a little further north.



19. Flint lithics recorded in surface slope wash at site JWP180.

Springs

The evidence available implies that water for the major ancient aqueducts in the study area was supplied by springs, with the greatest concentration of springs in the Jarash Valley. Likely sources have been identified for all of the main aqueducts, but uncertainties remain. There is evidence that individual canals in the ash-Shallal locality south of Jarash received water from more than one spring source, and this may have been the case more generally. The source or sources for the North-West Aqueduct lie at high elevation in the hills between the city and Suf; several potential sources have been identified, but further clarification is needed. Similarly, the sources for the east and west-bank aqueducts in the vicinity of Birkatayn have yet to be confirmed. The source for the large masonry aqueduct DW01 which crosses al-Ḥammār Plain[9] in Wādī ad-Dayr is almost certainly the Birkatayn reservoir, but confirmation of this is elusive, as no elements of this aqueduct remain in-situ. South of the city, a pedestrian survey identified a relict spring site in a small Kurnub Sandstone cliff on the east bank of south Wādī Jarash, which may have been the source for the tunnel aqueducts and other east-bank canals at 'ficus springs' (site JWP146).

Relict Springs

The tufa cascade and the related tufa terrace above it are evidence of a major relict spring system on the east bank of the wadi, and another was identified in Wādī Jarash at the ash-Shallāl locality 2.0 km south of Jarash. Several smaller relict springs were also located in rural contexts further away from the floor of the Jarash Valley. It is not yet known when any of these

9. The small plain between the city and Birkatayn was named '*el-hammar*' by Schumacher (1902: 163).

relict systems were active, but when added to the discovery of similar systems at Qayrawān (Qweirawān) cave and 'ficus springs' in 2014, it is evident that wetter climatic conditions and higher water tables existed in the Jarash Valley at some point in the past. Rock-cut canals are associated with some relict systems, which may imply that the period of relict spring activity at least partially overlapped the Greco-Byzantine period.

The location of the relict spring that supplied the tufa terrace and cascade in central Jarash lies hidden somewhere beneath the modern town. It is hoped that analysis of speleothem and tufa samples collected from the cascade locality will answer questions such as the period in which the spring system was active, the chemistry and temperature of the water supply, and aspects of the prevailing climate. The East Baths *thermae* is located close to the interpreted edge of the tufa terrace, and if the spring was flowing during second-third century AD[10], its water may have played a role in the location and function of these facilities. It is assumed that the aqueduct which supplied the Small East Baths 100 m north of the *thermae* continued southwards to the *thermae*, although it appears this has not been proven (Seigne 2004: 175). The discovery of site JWP141 in 2014 on the aqueduct from Qayrawān (JE02) indicates that the aqueduct must have passed very close to the *thermae*.

It is likely that more relict spring sites lie hidden beneath slope-wash on the hillside above sites JWP173 and 174 at the ash-Shallal locality. The springs emerge from Kurnub Sandstone that lies just below the contact with the overlying Jarash Conglomerate of Quaternary Age. The Kurnub Sandstone is considered an unlikely host for a substantial aquifer; tufa accumulations on rock surfaces at several locations along the slope indicate a lime-rich water source, which implies that the source aquifer was probably in the lime-rich Jarash Conglomerate rather than the lime-poor Kurnub Sandstone.

The existence of canals and/or basins at the major relict spring sites at Qayrawān cave, 'ficus springs' and ash-Shallal reflect an obvious practical use for these sites, but the presence of a monumental façade over an outlet at Qayrawān cave spring, and the creation of fountains at 'ficus springs' and ash-Shallāl springs, hint at the possibility that these sites may also have had cultic significance.

Palaeolandscape

Investigation has shown that Jarash Conglomerate occupies a substantial part of the Jarash Valley (and the neighbouring Wādī Majarr Valley), and underlies much of the ancient walled city. This formation is tentatively equated with the Pleistocene conglomerates of the Upper Zarqa (Dauqara Conglomerate) and Pella areas (Tabaqat Fahl Conglomerate), and suggests that wadi -fill conglomerates were deposited over a wider area of the highlands than was previously supposed.

Materials Sampling and Dating

Where present, samples of plaster and mortar were routinely collected from hydraulic installations for analysis and possible dating. Charcoal-bearing plaster or mortar suitable for conventional radiocarbon dating has been obtained from Birkatayn reservoir and 'Ayn al-Ḥammām on the Zarqā' River, but suitable aqueduct samples have only been obtained to date from the North-West Aqueduct (JW01) and masonry aqueduct DW01. ^{14}C AMS dating of lime-plasters is also planned, using the technique outlined in (Lichtenberger *et al.* 2015). A 2-sigma calibrated BC 40 to AD 80 ^{14}C date has been obtained from charcoal in the earliest plaster applied to the North-West Aqueduct at site JWP128 (Boyer in preparation). It is anticipated that the current ^{14}C dating program will yield absolute dates for other key aqueducts and other installations, thus improving our understanding of construction and usage history of the network.

Calcareous sinter has to date only been found in the 2.1 km section of the North-West Aqueduct closest to the city; perhaps (at least in part) reflecting the steep (8-15%) gradient of this section. The apparent absence of calcareous sinter in the other canals can be explained either by its non-deposition (they all have much lower gradients than the North-West Aqueduct) or its subsequent removal by natural or human agencies. The speleothems from the

10. Probably from mid-second to third century AD on present evidence (Lepaon 2012: 197).

cave at site JWP178 in central Jarash provide another opportunity to obtain palaeoclimate proxy data, and a cooperative study is planned for this material.

Acknowledgements

The support of the Director-General of the Department of Antiquities in granting a permit for the fieldwork and the export of samples for analysis is gratefully acknowledged. Thanks also go to the staff of the Amman and Jarash offices of the Department for their assistance and support during the season, with particular thanks to Department representatives Mr. Akram Atoum and Engineer Ali al-Owaisi for their cooperation and assistance during the survey. The valuable support of the director and staff of the CBRL in Amman is also gratefully acknowledged.

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MOSAIC OF JORDAN DOCUMENTATION PROJECT: PHASE1 NORTH WEST JORDAN (2011-2013)

Ana Silkatcheva

Introduction

The mosaics of Jordan were last synthesised by Michele Piccirillo in 1993, and many new discoveries have been made in the intervening twenty-odd years. Between 2011 and 2013, the author undertook the first stage of a renewed synthesis of the decorated mosaics of Jordan, to form the basis of an MA (Res.) dissertation at the University of Sydney (Silkatcheva 2014)[1]. Constraints on length necessitated that the scope of this first stage be limited to mosaics in one part of the country only; the north-west region of Jordan was selected as the focus for this first stage of research. While new finds have spanned the country, the greatest number of new discoveries have been concentrated here. Between 1993 and 2013[2], 52 more buildings with mosaic pavements were discovered in north-west Jordan alone, in addition to the 45 buildings with mosaics from this region that were already known when Piccirillo published *Mosaics of Jordan* in 1993 (**Fig.1**). While the majority of these new discoveries have been published either in this journal or elsewhere, a relatively large number remain unknown, their existence evidenced only by unpublished excavation reports and photographs in the archives of the Department of Antiquities. The present article constitutes a summary report on the data collection phase of the research project, with a particular focus on the previously unknown mosaics, in order to bring to light the material that has remained unpublished until now. A full catalogue of mosaics from north-west Jordan may be found in the author's dissertation (Silkatcheva 2014) and in a forthcoming extensive publication (Silkatcheva, in preparation). New additions, which have been added to the corpus since 2013, will be published in later reports in this journal.

Goals and Objectives

Beyond the synthesis of all discoveries, a broader study of the mosaics of Jordan involves an analysis of the ornamental programs of the mosaics, especially with regard to geometric motifs and patterns, previously been neglected in studies, which concentrated on figural representations. The over-arching goal of the project is to trace the works and movements of mosaicists and their workshops across the wider region, which incorporates the late Antique provinces of *Arabia* and the *Tres Palaestinae.* This involves a focus on the distribution of geometric motifs and patterns, assisted by epigraphically and archaeologically established dates. The results of the analytical phases of the project will be published elsewhere.

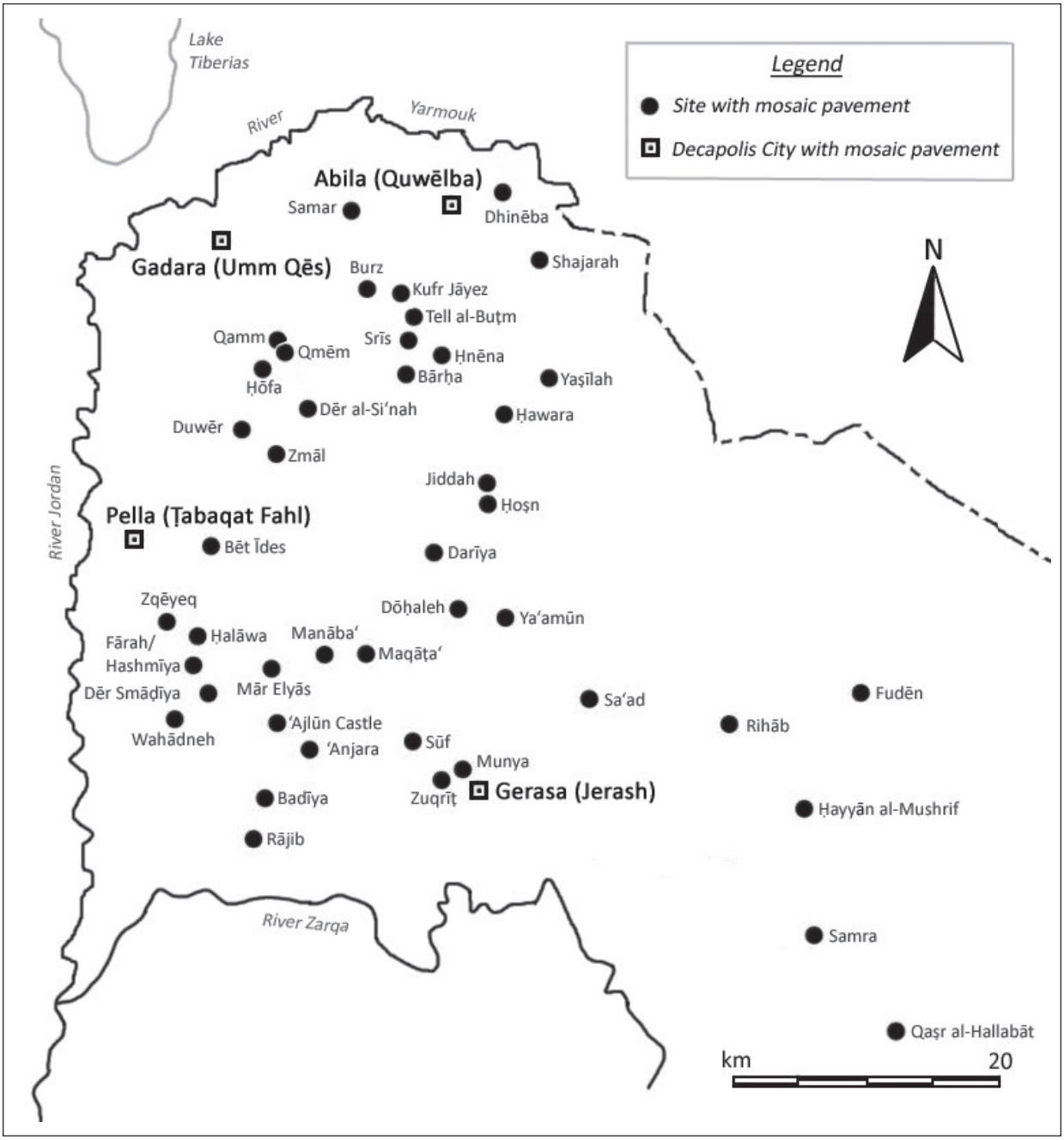
While the study of mosaics in north-west Jordan is now complete, the Mosaics of Jordan Documentation Project continues, with the goal of documenting, presenting and analysing all of Jordan's mosaics. Subsequent phases will focus on mosaics found in other parts of the country.

Delineating 'North-West Jordan'

As the first phase of the Mosaics of Jordan

1. The author is grateful to the Australian Federal Government for the Australian Endeavour Research Fellowship, which allowed her to spend extensive time in Jordan in order to undertake this research.

2. The author's research permit and funding period expired in 2012, while 2013 marked the beginning of a brief hiatus in publication of this journal, and therefore a cessation of ready access to information about new discoveries.



1. Map Showing Sites with Mosaics in North-West Jordan. (Plan: Ana Silkatcheva).

Documentation Project formed the basis of a dissertation, limits of size and scope demanded the delineation of a small region for a focused study. Its boundaries were not chosen arbitrarily; north-west Jordan has long been recognised as a micro-region with its own specific climate, culture and settlement patterns (Kennedy 2006). It is bounded by the Rivers Jordan, Yarmūk and Zarqa in the west, north and south respectively, and by the Eastern Desert.

Methodology

The starting point for a list of sites with mosaics was naturally Piccirillo's *Mosaics of Jordan*, which presented all the mosaics that had been discovered up to the publication date of 1993. Consultation of excavation reports published in the *Annual of the Department of Antiquities of Jordan* (*ADAJ*) since 1993, along with the annual supplement, *Munjazat* (which first appeared in the 2000s) provided more site names.

The list was further expanded by searching for 'mosaic' as a site element on the MEGA-Jordan system, concentrating on the four governorates of northern Jordan; Irbid, al-Mafraq, 'Ajlūn, and Jarash. At the time of research, this database (a substantial upgrade to the older JADIS system) had just been launched, which meant that many newer discoveries had not yet been referenced, and some older discoveries that had been imported from JADIS required clarification. Some sites suggested by the system were eliminated as possible sites for the corpus when it became clear they referred to mosaics which had either been destroyed long ago[3], were present only as traces (i.e. loose tesserae)[4] or were composed entirely of white tesserae[5], which were not of interest for this project. Two sites in the search results apparently had polychromatic mosaics, but no documentation could be located[6].

Finally, to complete the list, the names of a number of unpublished sites were gleaned from personal consultations in the field with Department of Antiquities (DoA) officials, former staff, and associates.

Other site names were encountered along the way, but either the mosaics there were long gone[7], or no information, published or unpublished, could be recovered[8]; these are therefore excluded from the corpus[9]. It must be recognised that this corpus of known and extant mosaics is as exhaustive as has been possible at the given time and with the given means, but a complete corpus with full documentation may not be possible to accomplish at all. At times, discoveries have not been recorded; documentation is presumed missing, or mosaics have been illegally lifted for the antiquities trade before archaeologists could be alerted to their existence. Local and foreign professionals in the country agree that a much greater number of mosaics have been exposed in Jordan than the documentation suggests[10].

Archival photographs and plans were the target of the data collection stage, supplemented by photographs taken by the author of mosaics *in situ* or on display in museums, and formed the complete catalogue which is published in Silkatcheva 2014.

Mosaics of North-West Jordan

All mosaics known up to 2013 are presented here in three sections: those known and published by Piccirillo in 1993; those discovered and published by various authors between 1993 and 2013; and those that have been discovered between 1993 and 2013, but have remained unpublished. In the interests of brevity for this journal, and in order to avoid unnecessary duplication of material, the mosaics which have already been published are merely listed with identifying details, and no photographs are provided. Interested readers may refer to the citations provided, or the detailed, extensively illustrated catalogue of the entire corpus (A. Silkatcheva 2014). In contrast, mosaics which are hitherto unknown and unpublished are treated in greater detail, with photographs included.

3. "Marhaba" and "Bishra" (pers. comm. Dayr Abu Said Antiquities Directorate staff, Dayr Abu Sa'īd, Jordan, May 2011).

4. "Umm al-Sarab", "Ṣabḥā", "Sama", "Umm al-Quttayn" and "Saba' Sīr" (King *et al.* 1987); "Khatla", "Sahari" and "Mudawwar" (pers. comm. Abdel-Qader al-Housan, Al-Mafraq Antiquities Office Director, Al-Mafraq, Jordan, August 2011).

5. "Zir'ah" (=Tell Zira'a, pers. comm. Dieter Vieweger, December 2010), "Abu al-Hummus" and "Khirbat Kadadeh" (pers. comm. Mohammad Abu Abieleh, Ajlūn Antiquities Office director, 'Ajlūn, July 2011); "Saal" (pers. comm. Dr. Wajiih Karasneh, DoA Consultant, Irbid, Jordan, May 2012, and Abd al-Raouf Tbeishat, Antiquities Inspector, Irbid Antiquities Directorate, Irbid, Jordan, May 2012).

6. "Rasūn Church" (pers. comm. Dayr Abu Sa'īd Antiquities Directorate staff, Dayr Abu Sa'īd, Jordan, May 2011, and Mohammad Abu Abieleh, Ajlūn Antiquities Office Director, July 2011, 'Ajlūn, Jordan) Umm al-Jimāl (pers. comm. Bert de Vries, Director of Excavations at Umm al-Jimāl, November 2011).

7. "Tubna" (Dayr Abu Sa'īd Antiquities Directorate staff, pers. comm, Dayr Abu Sa'īd, Jordan, May 2011).

8. "Buwayḍa" (pers. comm. Catreena Hamarneh, Assistant to the Director-General of Antiquities, Amman, Jordan, April 2011 and Al-Mafraq Antiquities Directorate staff, Al-Mafraq, Jordan, August 2011).

9. Piccirillo (1981: 104-117) published a comprehensive list of sites where mere traces of mosaics had been found. Michel (2001: 419-425) presented a similar and updated list in regards to the presence of churches, noting also traces of mosaics where these had been seen. There are traces of mosaics in the churches of Umm al-Jimal but these have not been published.

10. At Umm Qays in 2011 the author witnessed mosaics visible beneath a shallow cover of soil, but this area is yet to be excavated; the Borders of Arabia and Palaestina Project, headed by Dr Kate da Costa at the University of Sydney, discovered an unexcavated mosaic at Khirbat Duwayr (Kufr Abil).

Previously Published Mosaics
Mosaics Published by Piccirillo in 1993

Abila (also known as Quwayliba; MEGA-Jordan identifiers: 2762, "quweilbeh"), the **"Area D Church"** or "Umm al-'Amad" (Michel 2001: 111-120; Piccirillo 1993*:* 332; Mare 1991; Mare 1988).

Dayr Ṣmādiyyah (MEGA-Jordan identifiers: 10460, "dayr el-simadiyyeh esh-shimali") (Piccirillo 1993: 338; Piccirillo 1981: 17-18).

Fārah (also known as Hāshmiyyah; MEGA-Jordan identifiers: 9127, "Hāshmiyyah \fara") (Piccirillo 1993: 338; Piccirillo 1981: 18, plates 10-11).

Gadara (also known as Umm Qays; MEGA-Jordan identifiers: 2654, "Umm Qays"), the **Baths of Herakleides** (Michel 2001: 128-132; Weber 1990; Piccirillo 1993: 328f.; 1981: 29-31; Lux 1966).

Jarash (MEGA-Jordan identifiers: 58418, "jerash"), the **Villa of the Muses and the Poets**, the **Macellum portico**, the **Civic Complex** (578 A.D.), the **Glass Court**, the **chapels** in the southwest and northwest corners of the **Church of St Theodore** (c. 494 A.D.), the **Church of the Prophets**, **Apostles and Martyrs** (c. 464 A.D.), the **Church of Sts Cosmas and Damianos** (533 A.D.), the **Church of St John the Baptist** (531 A.D.), the **Church of St George** (529 A.D.), the **Synagogue**, the **Synagogue Church** (530 A.D.), the **Church of Sts Peter and Paul**, the **Procopius Church** (526 A.D.), the **Church of Bishop Isaiah**, the **Church of Elias, Maria and Soreg**, the **Propylaea Church** (565 A.D.), the **Mortuary Chapel**, and the **Chapel of Bishop Marianos** (570 A.D.). (Syntheses in Michel 2001: 224-274; Piccirillo 1993:.282-298).

Manābi' (also known as Umm al-Yanābī'; MEGA-Jordan identifiers**:** 11422, "Umm el-manabi") (Piccirillo 1993: 341; Piccirillo 1981: 21f.; Augustinovich and Bagatti 1952; Glueck 1951: 229-230).

Maqāṭi' (MEGA-Jordan identifiers: 5850, "maqati"; 482 A.D.) (Piccirillo 1993: 341; Piccirillo 1981: 21f.; Van Elderen 1972).

Munya (also known as 'Aṣfūr; MEGA-Jordan identifiers: 6636, "munya") (Michel 2001: 274f.; Piccirillo 1993: 299, 1983).

Pella (also known as Ṭabaqat Faḥl; MEGA-Jordan identifiers: 2705, "pella"), the **Central Ecclesiastical Complex** (Michel 2001: 120-128; Piccirillo 1993: 330f., 1981: 15f.; MacNicoll 1992; MacNicoll *et al*. 1982; Smith 1973).

Qaṣr al-Ḥallābāt (MEGA-Jordan identifiers: "hallabat", 7597) (Bisheh 1993; Piccirillo 1993: 350f.).

Qmaim (also known as Qamm; MEGA-Jordan identifiers:2867, "qumeim") (Michel 2001: 132; Piccirillo 1993: 340; Tarawneh 1990).

Riḥāb (MEGA-Jordan identifiers: 7506, "rihab"), the **Church of St Basil** (594 A.D.), the **Church of St Mary** (533 A.D., renovated in 582/3 A.D.), the **Church of St Menas** (635 A.D.); **Church of St Paul** (595 A.D.), the **Church of St Peter** (623 A.D.), and the **Church of St Sophia** (605 A.D.). (Michel 2001: 212-222; Piccirillo 1993: 310-313, 1981: 49-80, 1980a, 1980b; Housan 1992, n.d.; Lux 1967; Avi-Yonah 1948).

as-Samrā (MEGA-Jordan identifiers: 2659, "samra/mafraq"), the **Church of St John the Baptist** ("Church 95"; 639 A.D.), **Church of St George** ("Church 79"; 637 A.D.), **Church of St Peter** ("Church 78"), the **Egumen Church** ("Church 82"), the **Chapel of Anastasios** ("Church 81"); the **North-East Chapel** ("Church 20"); and the **Roman Fortress Chapel** ("Church 29"). **(**Michel 2001: 192-206; Humbert and Desreumaux 1998, 1981; Piccirillo 1993: 304-309; Desreumaux and Humbert 1982).

Shajarah (also known as Khirbat Mājid; MEGA-Jordan identifiers: 6745, "shejerah") (Piccirillo 1993: 341; Shraydeh and Karasneh 1987).

al-Wahādinah (MEGA-Jordan identifiers: 10419, "wahadne") (Piccirillo 1993: 339, 1981: 18-20).

Yaṣīlah (MEGA-Jordan identifiers: 2766, "yasileh"), the **Western Church** (Nassar and Muheisen 2010; Muheisen 2009, 1991, 1990; Michel 2001: 164f.; Piccirillo 1993: 341).

Mosaics Published Between 1993 and 2013

'Ajlūn Castle (also known as Qal'at ar-Rabaḍ; MEGA-Jordan identifiers: 2678, "ajloun castle") (Abu-Abieleh 2007; Piccirillo and Qudah 2003: 315f.).

Badiyyah (MEGA-Jordan identifiers: 2680, "bediye"), the **North-Eastern Church** (640 A.D.) and the **South-Eastern Church** (also known as the Rās ad-Dayr Church / Church of the Archangels Michael and Gabriel, c. 601 A.D.) (Muheisen 2006; Piccirillo 2005a).

Bayt 'Īdis (also known as Khallet 'Īsa; MEGA-Jordan identifiers: 3123, "beit eedis"; c. 529 A.D.) (Melhem 2002, 2001a).

Burz (also known as Sama ar-Rusān; MEGA-Jordan identifiers: 2812, "burz") (Puech 2003: 321f.; Michel 2001: 137f.; Khasawneh 1994).

Dariyā (MEGA-Jordan identifiers: 12621, "dariya"; 624 A.D.) (Piccirillo 2005b; Michel 2001: 135-137; Karasneh 1997).

Dayr as-Si'nah (MEGA-Jordan identifiers: 11503, "Dayr sa`aneh") (Puech 2003: 319-321; Fiyaad 1996).

Dhnaibah (MEGA-Jordan identifiers: 3205, "dhuneibeh church") (Nuqrish 2003).

Dūḥalah (also known as Dūḥalat an-Nu'aymah; MEGA-Jordan identifiers: 2816, "dohaleh el-na`ymeh") (Sari 1992, 1991).

Duwayr (also known as Jinīn al-Safa; MEGA-Jordan identifiers: 3145, "khirbet adware") (Melhem 2003, 1998a, 1998b).

al-Lufdayn (MEGA-Jordan identifiers: 58436, "al-fudaien") (Housan 2002; Michel 2001: 224; Piccirillo 1993: 315 (architecture only); Humbert 1986 (architecture only)).

Gadara (also known as Umm Qays; MEGA-Jordan identifiers: 2654, "Umm qays"), the **Five-Aisled Basilica** (Michel 2001: 128-132; Daire 2001; Weber 1998, n.d.).

Ḥūfā (also known as Ḥōfa al-Wasaṭiyyah; MEGA-Jordan identifiers: 2763, "haufa el-wastiyeh") (Michel 2001: 134f.; Abu Dalo 1994; Shraydeh and Abu Dalo 1992).

Ḥuwwāra (MEGA-Jordan identifiers: 2809, "hawara") (Karasneh and Zibdah 1998).

Ḥayyān al-Mushrif (MEGA-Jordan identifiers:7505, "hayyan al-mishref"), the **Middle Church**, the **Basilica**, the **North-Eastern Church**, and the **Monastery** (Michel 2001: 206-212; Muheisen 1997a, 1997b; Muheisen and Tarrier 1995; Piccirillo 1981: 99f.).

Ḥuṣun (MEGA-Jordan identifiers:3184, "al-sarj"; 535 A.D.) (Muheisen and Tarrier 1997).

Jarash (MEGA-Jordan identifiers: 58418, "Jerash"), the **Church of Bishop Genesios** (Hamarneh and Majali 2009).

Jiddah (also known as Ḥuṣn; MEGA-Jordan identifiers: 6728, "Husn/kh. El Jidda") (Michel 2001: 222; Melhem and Khasawneh 1994).

Pella (also known as Ṭabaqat Faḥl; MEGA-Jordan identifiers: 2705, "pella"), a **building of unknown function in Area XXXVIII** (da Costa 2012).

Qamm (MEGA-Jordan identifiers: 10636, "Qamm") (Puech 2003: 322-324; Michel 2001: 132f.; Ta'ani 1997).

Rājib (also known as Dayr Mismār; MEGA-Jordan identifiers: 58195, "dare mesmar"), the **Southern Chapel** and the **Northern Chapel** (Qudah 2005; Puech 2003: 317-319; Piccirillo and Qudah 2003; Rabadi 1997).

Riḥāb (MEGA-Jordan identifiers: 7506, "rihab"), the **Church of St George** (530 A.D.), the **Church of St John the Baptist** (620 A.D.), **Church of St Constantinos** (623 A.D.), the

Church of St Sergios (691 A.D.), the **Church of St Philemon** (662 A.D.), the "**Syriac Church",** the **Umayyad Monastery** (720 A.D.)**,** (Housan 2006, 2002, 2001, n.d.).

Ṣa'ad (MEGA-Jordan identifiers: 3248, "saad"; 572 A.D.) (Rose and Burke 2004; Michel 2001: 222-224; Sari 1995).

Samar (MEGA-Jordan identifiers: 5977, "samar") (Karasneh 2010).

Sūf (MEGA-Jordan identifiers: 5858, "suf") (Piccirillo and Hazim 2005; Hazim 2004a).

Ya'amūn (also known as Al-Nu'ēma; MEGA-Jordan identifiers: 2823, "ya`amun") (Nassar and Turshan 2012, 2011a, 2011b; Najjar 2011, 2001; Turshan 2010; Najjar *et al*. 2001; Khasawneh 1999).

Yaṣīlah (MEGA-Jordan identifiers: 2766, "yasileh"), the **Northern Church** (518/9 A.D.) (Muheisen and Nassar 2012).

Zmāl (MEGA-Jordan identifiers: 3189, "khirbat zmal") (Melhem 2001b, 1997).

Zughrīṭ (also known as Zaghrīṭ, the Church of St Sophia, 542 A.D.; MEGA-Jordan identifiers: 3577, "zeqrit") (Hazim 2004b).

Previously Unpublished Mosaics

Abila (also known as Quwayliba; MEGA-Jordan identifiers: 2762, "quweilbeh"), the "**Area E Church**".
Coordinates: UTME 7691, UTMN 36198.
Location: Irbid Governorate, 15km northwest of the city of Irbid.
Unpublished Reports: pers. comm. David Vila, John Brown University, and Robert Smith of Mid-Atlantic Christian University (Abila, Jordan, July 2012). Publication of results for the excavations is forthcoming.

Excavations at Abila continue under the directorship of David Vila of John Brown University. In addition to the churches already known from the site (including the Area E church with mosaics, see above), a cruciform, tri-apsidal basilica with three aisles is under excavation. Known as the "Area E Church", it features a large atrium to the west, which is connected to a small chapel in the south-west corner of the complex. The basilica is paved with mosaics, while the floor of the adjoining chapel was laid in opus sectile. Only geometric motifs appeared within the basilica.

'Anjara (also known as Abu Ḥāṭūn; MEGA-Jordan identifiers: 11433, "anjara").
Coordinates: UTME 7592, UTMN 35777.
Location: 'Ajlūn Governorate, 2km south-west of the town of 'Ajlūn.
Unpublished Reports: Balawneh 2008 (**Fig .2**).

In mid-2008**,** the 'Ajlūn Office of the Department of Antiquities was alerted to illicit digging activity in the vicinity, and the mosaic is the result of the subsequent investigation. The building had an ecclesiastical function, as evidenced by a partial mosaic inscription, which makes reference to *μαρτυρίου*, *πρεσβυτ(έρος)* and *ἁγία ἐ(κ)κλησία*. Only a single geometric panel, with a geometric border, is still extant. According to Moḥammad al-Balawneh, Inspector of the 'Ajlun Office at the time, there was evidence that the mosaic had been larger, but had been destroyed by construction work prior to its excavation. All surviving elements of the mosaic were removed for conservation. The six panels which formed the carpet of geometric motifs are on display at the 'Ajlūn Castle Museum, while the inscription panel is in the 'Ajlūn Antiquities Directorate office.

Bārḥa (MEGA-Jordan identifiers: not referenced).
Coordinates: UTME 7658, UTMN 36065.
Location: Irbid Governorate, 2km west of the city centre.

2. Excavation Photograph of the Mosaic at 'Anjara. (Mohammad Balawneh: 2008).

Unpublished reports: Tbeishat 2008 (**Figs. 3-5**).

The mosaic was discovered by accident when digging the foundation for a house. Once alerted by the local police, the Inspector from the Irbid office of the Department of Antiquities began a formal archaeological excavation in January, 2008. Although the whole building has not survived, an extant mosaic composed of linear panels, all of which have geometric designs framed by a border, suggests it once paved the aisles and intercolumniations of a small church. No inscriptions were found. The mosaic was removed in panels and conserved by the Bayt Rās Antiquities Office, and is currently stored at the Dar as-Saraya Museum in Irbid.

Ḥalāwa (also known as Al-Ṭanṭōr; MEGA-Jordan identifiers: 9128, "halawa")
Coordinates: UTME 7504, UTMN 35861
Location: ʻAjlūn Governorate, 9.5km north-west of the town of ʻAjlūn.

3. Excavation Photograph of the Mosaic at Bārḥa. (Ibrahim al-Zou'bi: 2008).

4. Excavation Photograph of the Mosaic at Bārḥa. (Ibrahim al-Zou'bi: 2008).

5. Excavation Photograph of the Mosaic at Bārḥa. (Ibrahim al-Zou'bi: 2008).

Unpublished reports: Abu-Abieleh 1998 (**Fig. 6**).

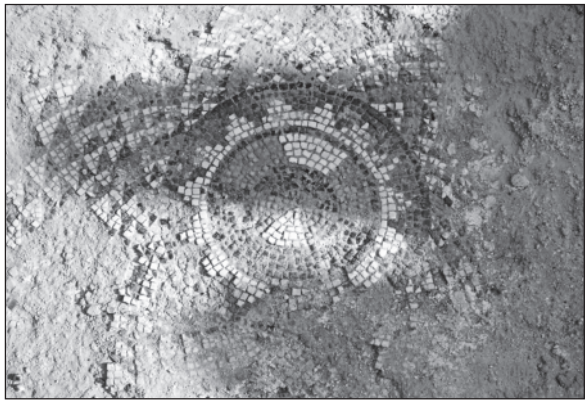
Having been alerted by the police to illegal excavation activity near the town of Ḥalāwa, the Minister of Tourism and Director-General of the Department of Antiquities organised the ʻAjlūn Antiquities Office to launch official excavations. These lasted for several months in 1997-8, and resulted in the discovery of a double church connected by their west/east walls. The ecclesiastical context is confirmed

6. Excavation Photograph of the Mosaic at Ḥalāwa. (Mohammad Abu-Abieleh: 1998).

by inscriptions, which mention the "*ἐκ(κ) λησία*"; they also mention that the village of the church was known as *Καλωα*. The mosaics were composed entirely of geometric panels. A dedicatory inscription was found at the eastern end of each church; dated 625 and 642 A.D. Another season of excavations was expected, in order to reveal more of the church, but apparently did not eventuate. Thus, the mosaics are likely to be preserved *in situ*.

Ḥunaynah (MEGA-Jordan identifiers:3153, "huneinah")
Coordinates: UTME 7685, UTMN 36080.
Location: Irbid Governorate, in the northern suburbs of Irbid.
Unpublished Reports: no excavation reports were located. Pers. comm. with 'Abd al-Raouf Tbeishat, Inspector for the Irbid Antiquities Directorate (May 2012, Irbid, Jordan). (**Figs. 7-8**).

A mosaic was uncovered in the town of Ḥnēna in 2006, following either civic works or illicit digging. A rescue excavation was launched by the Irbid Antiquities Office during December of that year. Rescue excavations focused only on the mosaic, in order to remove it for preservation. There was no exploration of the architectural elements of the building which housed the mosaic. The mosaics featured at least three different geometric motifs, although their relative position to each other is not clear from the excavation photographs.



7. Excavation Photograph of the Mosaic at Ḥunaynah. (Ibrahim al-Zou'bi: 2006).

8. Excavation Photograph of the Mosaic at Ḥunaynah. (Ibrahim al-Zou'bi: 2006).

Kufr Jāyiz (MEGA-Jordan identifiers: 2820, "kufr jayiz").
Coordinates: UTME 7652, UTMN 36126.
Location: Irbid Governorate, 3km west of Bayt Rās.
Unpublished Reports: no excavation report was located. Pers. comm. Mohammad al-Shalabi, Irbid Antiquities Office (June 2012, Irbid, Jordan). (**Fig. 9**).

Agricultural works prior to 2010 revealed the remnants of a mosaic; the Irbid Antiquities Directorate then excavated the site. A small church with a single apse and three aisles was discovered, of which only the nave and the north aisle were preserved at the time of excavation. All preserved parts of the church were paved with mosaics; a single motif continued across the nave and the north aisle.

Mār 'Ilyās (MEGA-Jordan identifiers: 2679, "mar ilyas").
Coordinates: UTME 7561, UTMN 35838.
Location: 'Ajlūn Governorate, 3.5km north-west of the town of 'Ajlūn.
Unpublished reports: Balawneh and Fayyaḍ 2002. Khouri (1999) published a non-academic article on the discovery. (**Figs. 10-12**).

9. Mosaic of Kufr Jāyiz on Display in the Dar al-Saraya Museum. (Ana Silkatcheva: 2011).

A two month excavation undertaken by the Ajlun Antiquities Office, under the direction of Inspector Mohammad Abu Abieleh, revealed one of the largest churches known in Jordan. The church has a triple apsed (exedrae) cruciform plan (east, north, south). It is part of a much larger complex on several levels, including an atrium and narthex, and a small chapel below. Only the church itself is paved with mosaics, not including the apses. Only approximately one third of the mosaics are preserved, comprised solely of geometric motifs. Despite the poor state of preservation, this church features the greatest number of motifs found in a single building in the whole

10. Mosaic in Situ at Mār 'Ilyās. (Ana Silkatcheva: 2012).

11. Mosaic in Situ at Mār 'Ilyās. (Ana Silkatcheva: 2012).

12. Mosaic in Situ at Mār 'Ilyās. (Ana Silkatcheva: 2012).

of north-west Jordan. A dated inscription was found in the south-west corner of the church; in Greek, it dates the mosaic to 623 A.D., and mentions the name Saint Elijah. The region in which the site is located, Listib, is associated with Tishbe, the birthplace of the prophet with the same name. The mosaics are preserved *in situ*, open for viewing by visitors and pilgrims.

Qirmil (MEGA-Jordan identifiers: not referenced).
Coordinates: unknown.
Location: Jarash Governorate.
Unpublished Reports: news of the discovery appeared informally in a non-academic article by Forster (2013).

The Jarash Office of the Department of Antiquities was alerted to the existence of a mosaic by looters in 2013. Excavation revealed a very well preserved mosaic floor, untouched by iconoclastic activity, which featured an unusual scene of men climbing trees to escape from attacking bears and lions. According to the news article, the mosaic inscription featured

the name of the patron and provided a date of 589-90 A.D.

Riḥāb (MEGA-Jordan identifiers: 7506, "rihab"), the **Church of St Procopios** and a **second basilica.**
Coordinates: UTME 2264, UTMN 35803.
Location: Al-Mafraq Governorate, located on the Jarash-Mafraq road, 26km to the east of Jarash.
Unpublished Reports: no reports located, but pers. comm. with 'Abd al-Qader al-Housan, Director of the Al-Mafraq Antiquities Directorate (May-June 2011: Al-Mafraq, Jordan).

Part of a double-church complex with the **Church of St John**, the **Church of St Procopius** had a single apse, a nave and two aisles **(Figs. 13-14)**. The north aisle featured geometric panels with an ivy leaf border, while the south aisle depicted at least one tall tree which spread across the length of the aisle. During the author's inspection, the nave was covered, and in the absence of publications, it is not possible to comment on the contents of the mosaic in the nave. The Greek inscription indicates that the mosaic was laid in 598 A.D.

Another building referred to by the excavator as the "**second basilica**" was also excavated **(Figs. 15 -16)**; a tri-apsidal church which was not paved with mosaics. In the absence of plans or photographs of the entire building, no comment can be made on the architectural form of this second church. Mosaics which are documented feature geometric motifs and a vine scroll.

Srīs (MEGA-Jordan identifiers: 5967, "sris").
Coordinates: UTME 7659, UTMN 36090.
Location: Irbid Governorate, on the northern outskirts of the city of Irbid.
Unpublished Reports: no excavation reports located. Pers. comm. with 'Abd al-Raouf Tbeishat, Inspector at the Irbid Antiquities Office (May 2012, Irbid, Jordan) (**Figs. 17-18**).

After earthworks for the foundation of a

13. Mosaic in Situ at the Church of St Procopios, Riḥāb. (Ana Silkatcheva: 2011).

14. Mosaic in Situ at the Church of St Procopios, Riḥāb. (Ana Silkatcheva: 2011).

15. Excavation Photograph of the Mosaic in the "Second Basilica" at Riḥāb. ('Abd al-Qader al-Housan: Undated).

16. Excavation Photograph of the Mosaic in the "Second Basilica" at Riḥāb. ('Abd al-Qader al-Housan: Undated).

17. Excavation Photograph of the Mosaic at Srīs. (Ibrahim al-Zou'bi: 2006).

private domestic building revealed parts of a mosaic floor in 2006, the Irbid Antiquities Office launched salvage excavations, which uncovered part of what may have been the aisle of a church. Although no walls were uncovered, the orientation of the mosaic panel and its border indicates it may once have paved the aisle of a church. Traces of another border motif adjacent to the extant border strengthens this possibility. All areas of the extant mosaic featured geometric motifs.

Tall al-Buṭum (also known as 'Aṭarūz; MEGA-Jordan identifiers: 11578, "butm").
Coordinates: UTME 7663, UTMN 36109.
Location: Irbid Governorate, 3km west of Bayt Rās.
Unpublished Reports: Tbeishat 2000 (**Figs. 19-22**).

Upon receiving news of the existence of archaeological remains on private land, the Irbid Office of the Department of Antiquities launched a survey and subsequently an excavation which lasted three months in 2000, resulting in the discovery of a single-

18. Excavation Photograph of the Mosaic at Srīs. (Ibrahim al-Zou'bi: 2006).

19. Excavation Photograph of the Mosaic at Tall al-Buṭm. ('Abd al-Raouf Tbeishat: 2000).

20. Excavation Photograph of the Mosaic at Tall al-Buṭm. ('Abd al-Raouf Tbeishat: 2000).

21. Excavation Photograph of the Mosaic at Tall al-Buṭm. (ʻAbd al-Raouf Tbeishat: 2000).

22. Excavation Photograph of the Mosaic at Tall al-Buṭm. (ʻAbd al-Raouf Tbeishat: 2000).

apsed church with three aisles, paved with mosaics. The mosaics were composed mostly of large panels bearing a variety of geometric patterns, some also including individual birds and vegetal motifs. In the apse, two figures, possibly peacocks, once flanked an amphora, which were badly damaged. Considering the excellent state of preservation of the geometric mosaics, it is possible that this damage was deliberate, performed by iconoclasts.

Zuqayq (MEGA-Jordan identifiers: 10474, "zqeq").
Coordinates: UTME 7484, UTMN 35870.
Location: Ajlun Governorate, 13km northwest of the town of ʻAjlūn.
Unpublished Reports: no excavation report located. Pers. comm. with Ziad Ghneimat, Director of Dayr Abu Saʻīd Antiquities Directorate (formerly the inspector of the Ajlun Antiquities Office) (October 2011, Irbid, Jordan), and Yousef Zouʻbi, Photographer, Department of Archaeology, University of Yarmouk (April 2012, Irbid, Jordan). (**Fig. 23**).

23. Excavation Photograph of the Mosaic at Zqēyeq (Zakaria al-Qudah: Undated).

Excavated by the Ajlun Antiquities Office under the directorship of Zakariah al-Qudah. A rectangular room was discovered, paved with mosaics. Brief inscriptions mention the names of three deacons, indicating that this was an ecclesiastical building, likely a small chapel. A large panel of a single geometric motif fills the room, framed by another geometric motif and featuring isolated geometric motifs around the edges. The inscriptions are located within the plain white border along the perimeter of the geometric panel.

Next Stages of Research

The mosaics of Jordan are many in number, and concentrated in a relatively small geographic context. Many have dates that are epigraphically attested, and almost all present a large and varied repertoire of geometric motifs and patterns. The co-occurrence of all these features means that the corpus of mosaics in Jordan is prime material for historical inquiry into the development and evolution of mosaic art in the region. Analytical phases of the broader project are already either under way or complete and will be published in depth elsewhere.

Meanwhile, the Mosaics of Jordan Documentation Project continues, and updates and reports on mosaics in other parts of Jordan will appear in subsequent issues of this journal.

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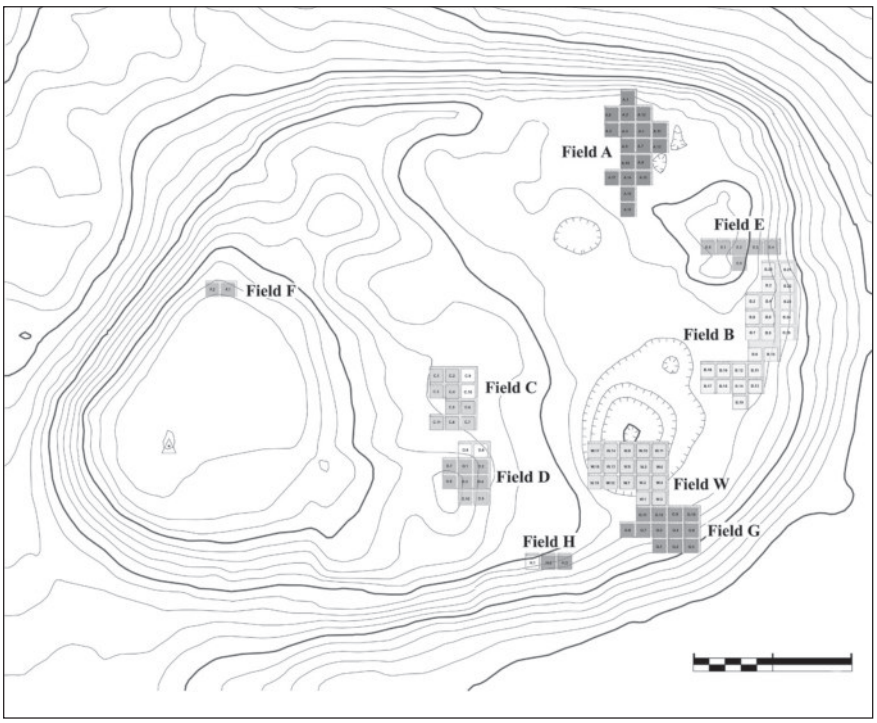
PRELIMINARY REPORT ON THE 2016 SEASON OF THE MADABA PLAINS PROJECT: TALL JALŪL EXCAVATIONS 2016

Paul Gregor, Robert Bates, Paul Ray, Constance Gane, and Randall Younker

Introduction

The 2016 season at Tall Jalūl, conducted by Andrews University, took place between May 1 and June 2, 2016. The excavations on the tell were directed by Paul Gregor, Constance Gane, and Paul Ray of the Institute of Archaeology, Andrews University. Seventeen faculty members, students and volunteers were joined by about 15 local Jordanian workers during the excavations this season[1]. Excavations at the site of Tall Jalūl (**Fig. 1**) began in 1992, with excavations in the Jalūl Islamic Village



1. Tall Jalūl Topographical Map Showing Excavated Fields To-Date.

1. We wish to thank Dr. Monther Jamhawi, Director General, and his staff, including Mr. Jehad Haroun at the Department of Antiquities of Jordan, for their support of the project this season. We would also like to thank Barbara Porter and Glenn Corbett of the American Center of Oriental research (ACOR) for their usual excellent assistance. Finally, we appreciate the help of Issa Siriana and Amal Khaled, of the Department of Antiquities of Jordan, who served as our department representatives. Staff for the 2016 season included senior director Randall W. Younker, and co-directors Paul Z. Gregor, Constance Gane, and Paul Ray. The Field Supervisors this season were Paul Gregor, Paul Ray, and Robert Bates. Constance Gane served as Object registrar, Trisha Broy was the pottery registrar, and Jacob Moody and Robert Bates were photographers.

Square supervisors for Field B included Trisha Broy, Hala Ajilat and Stefanie Elkins, with volunteers Bruno Barros, and Michael Orellana. Square Supervisors in Field W included Daniel Ulvoczky, Ricardo Scarfullery, Soowoong Moon, David Clark, and Jacob Moody. Volunteers included Liping Zhang, and Milosy Rodriguez. Post-excavation lab work was facilitated by undergraduate research assistants, including Jessica Bates, Elizabeth Bates and Alma Cortez.

beginning in 2008. For background information on Tall Jalūl, the Jalūl Islamic Village, and the history of the excavations at the site, see Gane *et al*. 2010; Gregor 2009; Gregor *et al.* 2011; Gregor, Younker and Ray 2012; Gregor and Gregor 2009, 2010; Herr *et al*. 1994, 1996, 1997; Younker *et al*. 1993, 1996, 1997, 2007; and 2009; Younker, Gane and Shqour 2007; Younker and Merling 2000; and Younker and Shqour 2008.

Results of the 2016 Season at Tall Jalūl

Field B

Field B was originally opened in 1992, at which time Squares B2-8 were initiated. Two superimposed flagstone pavements (Upper and Lower) were found at that time, both dated to Iron Age II. The lower of the two pavements (**Fig. 2**) was found primarily in Squares B4, B6, and B8, and was initially dated to the early 9th century B.C (Younker et al.: 1993: 216). The upper pavement (**Fig. 2**) was uncovered in Squares B2-B5, B7, B9, and possibly in B8 and B10, and was provisionally dated to the 9th/8th century B.C (Younker *et al*.: 1993: 216-17). In the 1999 season, additional squares further to the southwest revealed that the upper pavement had some additional re-pavings, primarily in Square B15, the latest dating to Late Iron Age II.

In the preparation for the final publication of Field B, it was discovered that there was inadequate ceramic evidence to support the initial dating of the upper and lower roads. The purpose of the 2016 season was to clarify the stratigraphy between the upper and lower roads in order to provide a firm date for the construction of these pavements.

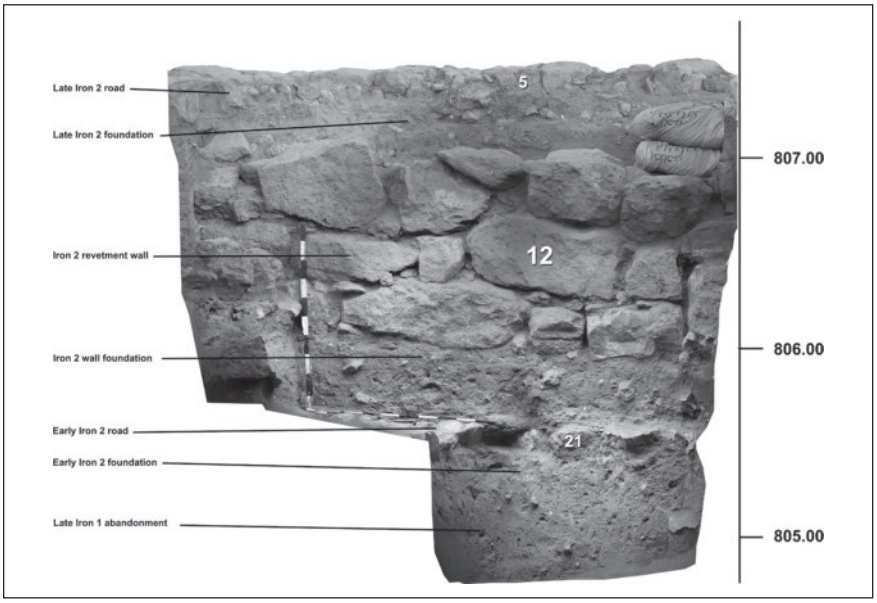
In 2016, two squares were re-opened in Field B (B2 and B6). A 3 x 3 m probe was opened in Square B2 along the north and east balks. The upper road was removed and the soil excavated until a lower road was found. Then a 1.5 x 1.5 m section of this lower road was removed, and a smaller probe was excavated to a depth of approximately 0.70 m. A 2 x 4 m probe was also opened in Square B6 along the north and east balks. The original lower road was removed, and the soil was excavated to a depth of 1.7 m, from the east balk to the revetment wall (Locus 13).

During the process of excavation, the probe

2. Upper and Lower Road (Gray) Overlay.

in Square B2 revealed that the revetment wall (B2:12), found earlier in Squares B4 (Locus 8), B6 (Locus 13), and B8 (Locus 13), continued below the upper pavement (B2:5). What was originally thought to be an even lower pavement (B2:21) was found below the revetment wall (**Fig. 3**). The probe in Square B6, underneath the original lower pavement (B6:15), yielded considerable amounts of ceramic data, but evidence for an additional pavement or pavements beyond the upper and lower pavement was not found.

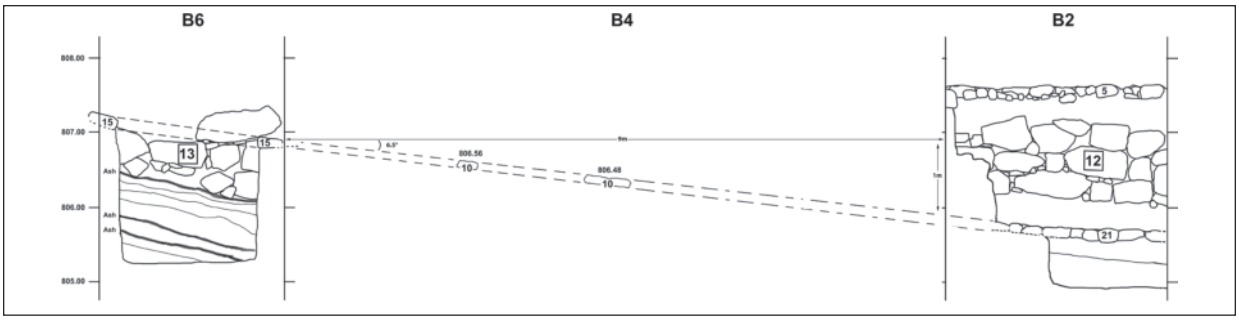
A 1.80 x 2.71 m section of the lower pavement (B2:21) in Square B2 was exposed, consisting of medium sized (0.40 x 0.50) flagstones, irregularly shaped and made of hard limestone. This stone surface continued into the north and east balks, the south sub-balk, and under the soil supporting the revetment wall (B2:12). It appears that there were only two phases of the road on the northern end of Field B, as was originally thought. The earliest flagstone pavement (B2:21=B4:10= B6:15) was built in the Early Iron Age II and laid into



3. Photo of the Western Face of Wall 12 In Square B2, Showing the Foundation Layers of the Upper and Lower Roads and the Revetment Wall.

Late Iron Age I abandonment deposits, in order to create a level surface for the road.

Following the excavation in 2016, it was determined that the lower road in Square B2 (B2:21) slopes upward from north to south at 6.5 degrees, on a 11% grade, over a length of 1:9 m measurement of slope, continuing into Squares B4 (Locus 10) and B6 (Locus 15), before mostly leveling off in Square B8 (Locus 10; **Fig. 4**)[2]. This degree of slope or incline is



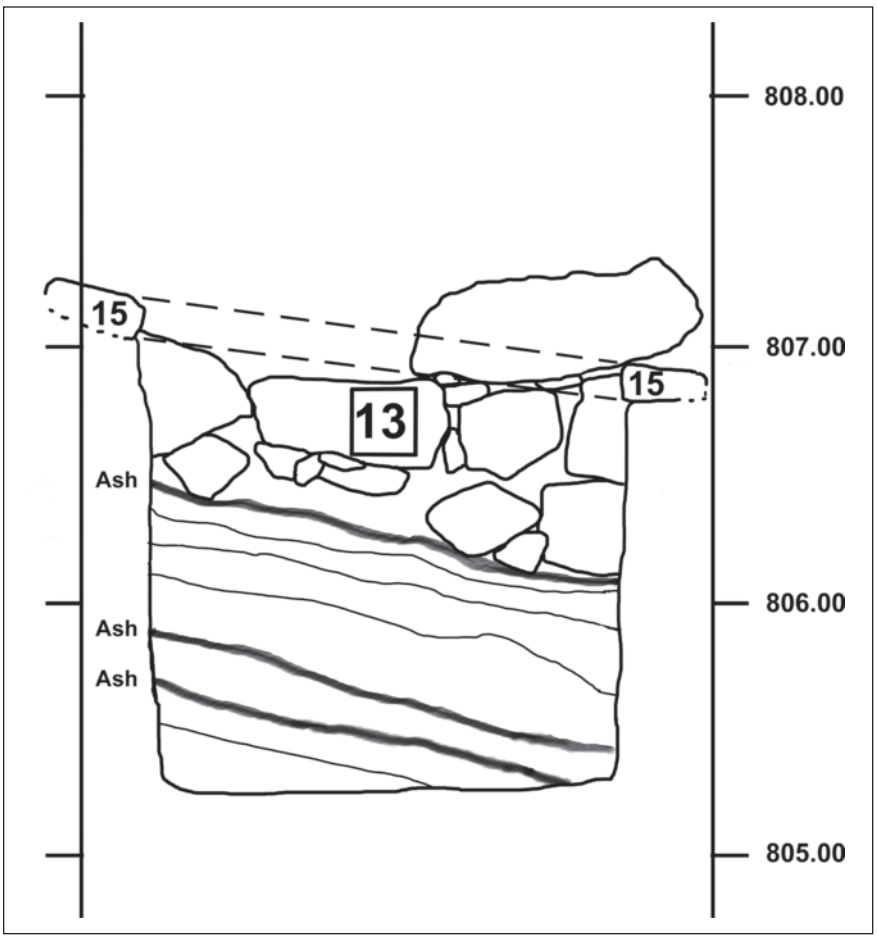
4. Facing West, Showing the Relationship Between the Lower Road in Each Square as it Slopes Upward from Square B2 to Square B6. the Rise is 1:9 M At 6.5 Degrees With an 11% Grade.

2. The lower pavement extends for a length of 9.00 m between the probes in Squares B2 and B6. Between them two elevations are marked on two known stones of the revetment wall (Locus 8) in Square B4. The dashed lines connect the stones against the revetment wall in Squares B4 and B6, and project the course of the lower road as if it were completely exposed in the remaining parts of these squares.

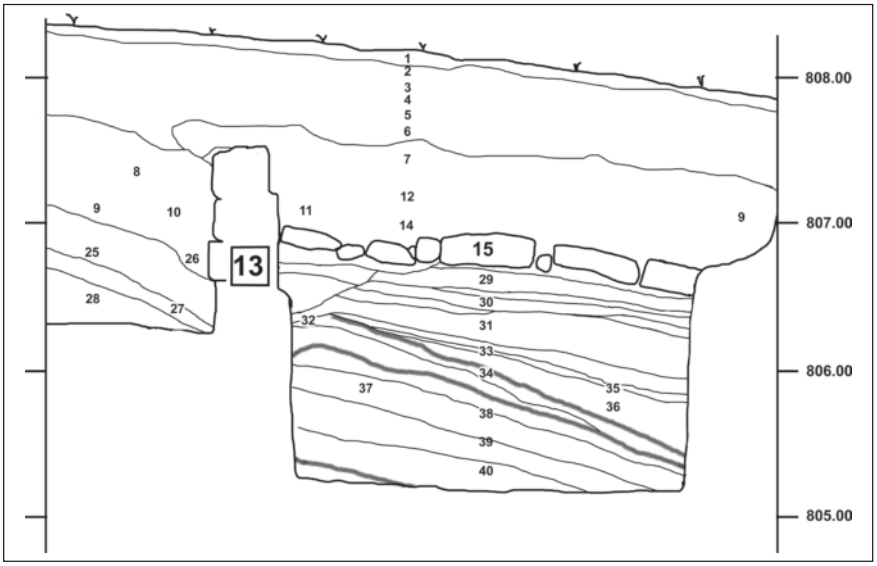
similar to other Iron Age sites, including the road leading to the gate at Bethsaida (also 6.5 degrees or 11% grade) which according to Rami Arav (Rami Arav: 2009:12): "gives the road a moderate gradient… and indicates careful pre-planning of the approach to the city". To put this into perspective, the slope of this road would not be difficult to walk up, but would be considered a "painful gradient, especially if maintained for any length of time" for those riding a bicycle.

Sometime later, the lower pavement in Square B2 was abandoned, and the ground was leveled with approximately 0.40 m of earth, possibly in Squares B4 and B6 as well, creating the foundation for a battered wall (B2:12=B6:13). It would seem that this wall was built as a revetment against the rampart on the east side of the tell, extending at least from the gate complex in Square B8 to the probe in Square B2, and may have continued further north into Square B20. A sloping ash layer immediately below the revetment wall in Square B6 (**Fig. 5**) may indicate that in this area the wall was built on destruction debris, with the remaining section, that continues into Square B8, accommodating the slope. The ash lens in Square B6 yielded a variety of Late Iron I bowls, cook pots and jars (See further discussion below).

Three courses of the revetment wall were exposed in Square B2, consisting of medium-large semi hewn boulders (approximately 0.40 x 0.90 m), dry laid with small cobbles as chink stones. The initial course of Locus B2:12 was founded at an elevation between 806.10-806.20 m, and is consistent with the elevation of the initial course found in the north balk of Square B6 (at 806.12 m) (cf. **Figs. 5** , **6**). However, while the lower pavement (B2:21) is located 0.40 m below the foundation of the revetment wall (B2:12) in Square B2, this same wall (B6:13=B2:12) was founded 0.85 m below the surface of the Lower Pavement (B6:15=B2:05) in Square B6, abutting it in places. This positioning would suggest that the lower



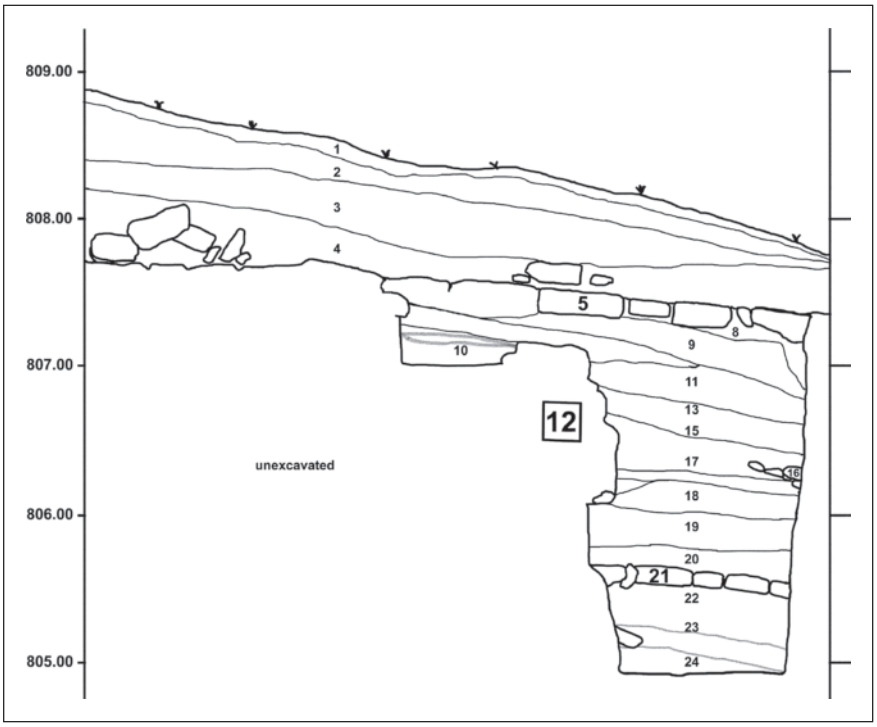
5. Facing West, Showing Square 6, Wall 13, Extending Below Locus 15 (Lower Road). Three Ash Lenses are also Shown Below Wall 13.



6. Facing North. Square B6 North Balk, Showing the Lower Road (Locus 15) and Three Ash Lenses. Note Pottery Below the Ash Lens Dated to the Late Iron I Period.

pavement, which was built before the revetment wall, as revealed in Square B2 (**Figs. 3 - 6**), was at least partially dismantled in Squares B6 and B4 when the revetment wall was built. Once the revetment wall was completed, the lower road in Squares B6 and B4 would have been repaired, sealing against the wall.

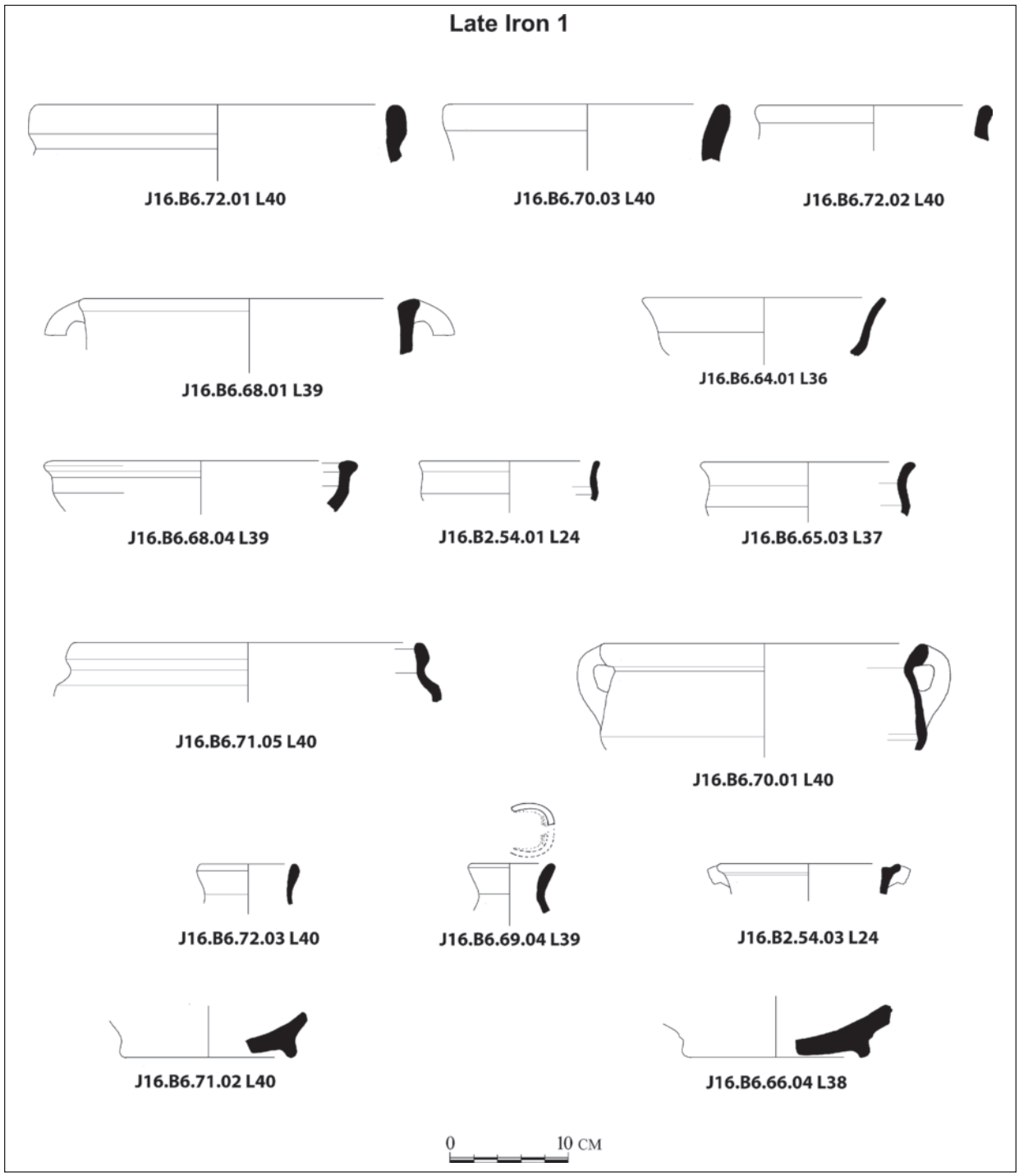
The lower pavement was in use for at least a century before it was abandoned in Iron Age II. Later, a fill of reddish colored (5YR 5/4, reddish brown) clay-like soil was brought in to level the slope of the road. At this time the builders removed the upper stone courses of the earlier revetment wall (B2:12=B6:13), and reusing them, along with stones from the lower pavement, laid them, likely with some new paving stones, above the wall, and in part, further to the west, creating the upper pavement (B2:05 = B6:15). Some Late Iron Age II (7th century B.C.) pottery was found in the uppermost earth layers below the new (upper) pavement, including many cook pots (cf. **Figs. 3 , 7**). The pottery immediately above the lower road was dated to Early Iron Age II, while the



7. Facing North. Square B2 North Balk, Showing the Upper Road (Locus 5), The Revetment Wall (Locus 12) and The Lower Road (Locus 21).

soil layers that sealed against the revetment wall likely date to the Mid-Late Iron Age II. This would suggest either a refinement to the earlier dating, or possibly a later repair, perhaps equivalent to the latest repaving further to the southwest, in Square B15, which was found in the 1999 season.

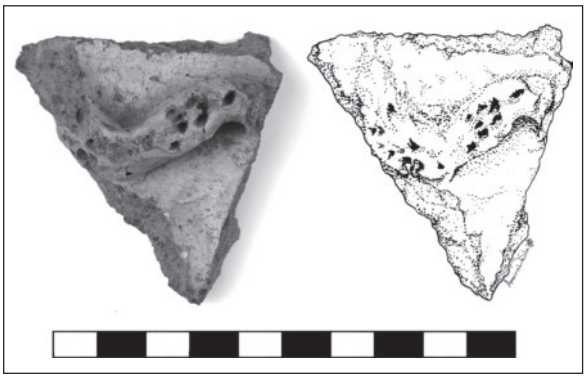
A Late Iron I phase was also found below the ash lens mentioned above, in Square B6 (Loci 37-40; **Fig. 6**) and below the foundation layer of the lower road in Square B2 (Locus 24; **Fig. 7**). The pottery consisted of a mixture of bowls, cook pots and jars, including two jar handles with potter's marks (**Figs. 8 , 9**), and an applique



8. Late Iron I Pottery Found Below the Ash Lenses in Square B6, and Below the Lower Road Foundation in Square B2.

(**Fig. 10**) on a small sherd. This applique piece may have been attached to a large jar or model shrine, and resembles the snake design found on similar vessels, including a model shrine fragment from Tall al-'Umayrī (B986678, Square 7K70, Locus 48, Pail 191). A crudely made Early-Middle Bronze Age sherd, which resembles a handmade cook pot with a rope design and semi-perforated holes (**Fig. 11**), was also discovered. Similar square-shaped cook pots have been found at Shechem (Cole 1984: 64, 145; Fig. 16, Pl. 23) and Megiddo (Amiran 1969: 101-2; pl. 30). Several Iron Age I painted sherds with light colored slips and parallel or crossed hatched lines were also found. Sherd J16.B6.69.03 from Locus 39, which has a very light colored pale yellow (2.5YR 8/2) slip, and a vertical line pattern that resembles certain types of Iron Age I biconical vessels, including jars, jugs and bowls (Herr 2012: 50; Fig. 2.10:22; Herr *et al*. 2012: 114; Fig. 4.28.8). Its line pattern alternates between straight vertical 3 cm. stripes, and large wavy or shallow wavy vertical stripes (**Fig. 12**). According to Herr (2012: 50), "this general pattern of straight and wavy lines, usually vertical, is normally placed on the shoulder of closed vessels at this time." This design pattern may also have begun in the Middle Bronze Age and continued to the Late Iron I period (Herr et al. 2000: 67; Fig. 4.13.10). In addition, sherds from jugs with parallel vertical lines and a basket weave pattern were also found in Late Age Iron I loci.

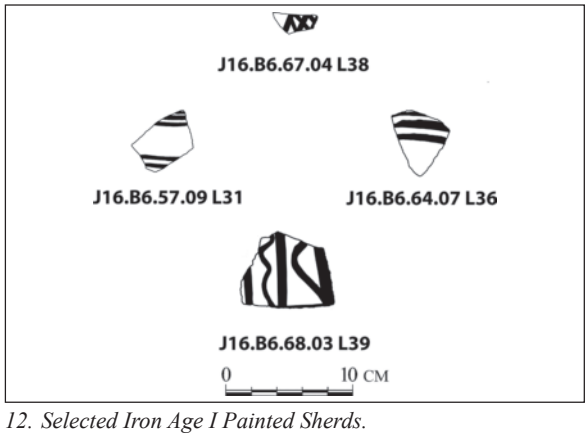
9. Late Iron I Jar Handles, With Potter's Marks that Appear to Have Been Made With the Blunt End of a Stick. Objects J16. B6.68.03 L39 (L) and J16.B6.66.06 L38 (R).



10. Pottery Sherd (J16.B6.63.11 L34) Found Near the Ash Lenses, Showing an Applied Ceramic Shape With Shallow Perforations, Possibly Representing a Snake.

11. Early to Middle Bronze Age Hand Made Cook Pot With Perforations.

Two graves were found in Square B2. The first grave, which was almost entirely in the north balk, was approximately 0.25 x 1.45 m, and oriented east/west. The flagstones of the upper road had been removed, creating a large oval shape, and the remains were deposited at a depth of 0.20 m below the surface of the upper pavement. The skeleton was left *in situ* and unexcavated because of its location within the balk. Two small stones were found upright on the east side of the grave, which likely dates to the early 20th century. The second grave (in Locus B2:14) was found approximately 0.20 m



12. Selected Iron Age I Painted Sherds.

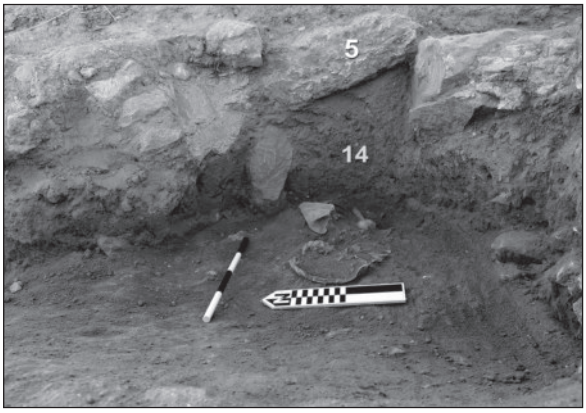
beneath the upper pavement, also oriented east/west. The majority of the remains were found in the east balk, and left *in situ*, except the skull, scapula, humerus and a few ribs, which were uncovered. The body appears to have been laid on its right side with the head facing south. Although a full forensic analysis was not possible, the skull measured 0.1746 m from the Menton (chin) to the top of the head, and 0.1805 m from the Glabella to the back of the head (**Fig. 13**). The sex could not be determined from the skeleton, but the skull measurements suggest that whether male or female, the deceased was probably a late adolescent between 15-19 years.

The position of the second grave in Square B2 below the upper pavement presented several questions as to when the body was buried. Was it a recent burial, like those excavated in earlier seasons in Loci 6 and 7, or an ancient burial dating to the Iron Age? In general, the grave resembled many found on the eastern slope of the tell that have been attributed to early 20th century slave burials, according to local custom. The body was interred in a relatively shallow grave only 20-40 cm below the surface with no burial goods. It was lying on its right side facing south, toward Mecca, according to local traditions, located near other similar burials within the same square (B2), and possibly from the same family. However, unlike the burials surrounding the remains which were buried on or above the upper pavement, this one was buried underneath the road. No other burials removed the flagstones and then replaced them after the body was interred. Indeed, those who dug the unexcavated grave in the north balk removed but did not replace the upper road stones following the burial.

13. Square B2, Facing North, Showing the Late Adolescent Remains of the Head and Upper Part of the Body.

One suggestion was that the burial in Locus 14 may have been from the Iron Age because the large flagstones above the body do not appear to have been removed or disturbed when the body was interred; rather, the road remained intact above the burial. It was also suggested that when this body was buried it was covered with a hard packed surface (Locus 11), a foundation layer for the road (Locus 9), and then covered with large flagstones as part of the upper road construction. In addition, all of the pottery found in the burial pit (Locus 14) and the surrounding earth layers date to the Late Iron Age II; none was more recent. However, stratigraphically the burial pit appears have cut into Loci 9 and 11, under the road, and the one flagstone resting above the burial is not entirely flush or even with the road. Although the stone is rectangular in shape with a relatively flat bottom, it appears to have been placed at a slight (approximately 23 degrees) angle with the uneven surface, facing up, and the south end of the stone raised slightly (approximately 4.5 cm) above the surface of the road. If the body was interred first, then this stone should have been laid flat or flush with the others as the pavement was being laid, since the foundation for the road would have been evened out to accommodate the new stone surface. Following the interment, it is possible that the stone was replaced upside down, with the uneven surface up and the flat side down. The unusual angle of the stone may be the result of dropping the stone onto the uneven surface created by the soil that was used to fill the hole (**Fig. 14**). The remains recovered in the excavation were reinterred at the end of the season in the cemetery at the top of the acropolis.

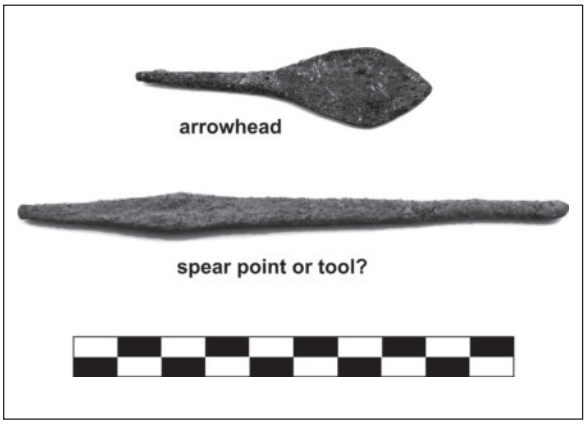
Two metal objects were found in the course of the excavation of Squares B2 and B6. A greenish-colored metal point (Object J0936), possibly a spear or tool, measuring 0.7 x 0.9 x 13 cm, and weighing 24.71 gm, was found in Square B6, Locus 30, next to Wall B6:13 (**Fig. 15**). The tip of the object is 3.7 cm long, with a blunted point that tapers 4.5 degrees to its maximum width. The tang is 9.3 cm long and tapers 1.4 degrees. The sides of the object are squared, and there is a groove on two sides,



14. Square B2, Facing East, Showing the Upper Road (Locus 5) and Its Relationship to the Late Adolescent Remains Below (Locus 14). Note the Angle of the Stone Above the Body.

extending 8.2 cm from the tip to the tang. A possible parallel is a small spear point which was found at Tall Jemmeh (Ben-Shlomo and Gardiner 2014: 882, Fig. 21.2k). However, although it is similar in shape, it lacks the squared body with the longitudinal groove; it has been suggested that it resembles a Middle Bronze Age butt-point spearhead.

In Square B2, a leaf-shaped arrowhead (Object J0938), made of bronze or copper, and overlaid with greenish-colored patina, was found in Locus 18, near the base of the revetment wall (B2:12). It measures 2.1 x 7.1 cm, and weighs 8.16 gm (**Fig. 15**). The tip of the blade is 1.48 cm and tapers 32.5 degrees to its the widest point. The body measures 2.0 cm and tapers 20 degrees from the widest point to the tang, which is 2.3 cm, then tapers 3.18 degrees to the blunt end. Several parallels have been found, including Objects J0392 from Square E3, in an adjacent field, J0682 from Square G1, and J0066 from Square B11. Examples of this type of blade made of iron have also been found in Mesopotamia. Nimrud Type 1 lozenge/ovoid shaped arrowheads are the most common arrowheads found in the Neo-Assyrian period, although their bronze forms appear much earlier. The examples from Nimrud were found at Fort Shalmaneser where they were being stored (Curtis and Ponting 2013: 39-40; Pl. X). The shape of these blades varies a little, ranging from leaf-shaped (such as Objects J0392 and J0066), to an almost diamond shape (such as Objects J0682 and J0938) from the current excavation. A Late Bronze Age example of this leaf or diamond shaped arrowhead was found at Tell Jemmeh, attesting to the longevity of the design (Ben-Shlomo and Gardiner 2014: 876-80).



15. Object No. J0938, Bronze Arrowhead Found in Square B2 With Leaf-Shaped Head (Top), and Object No. J0936, Metal Point Found in Square B6, With Blunted Tip, Possibly A Spear Point or Bronze Tool.

The 2016 excavation season has yielded new insights into the relationship of the revetment wall and the lower road, as well as the stratigraphy between the upper and lower roads (**Figs. 16** , **17**) in Squares B2 and B6. Further excavations will revisit Square B4, between the two squares reinvestigated this season.

Field W

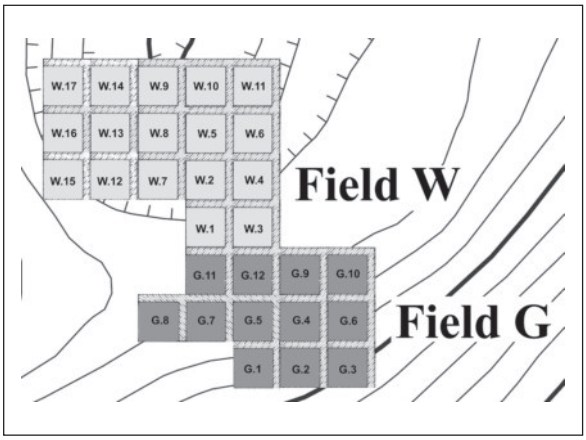
Field W was carefully laid out on the southeastern ridge of the large depression on the southeastern side of the tell (**Fig. 1**). Excavation began here during the 2010 season, at which time four squares were opened in order to locate the continuation of a water channel, found earlier

16. Square B2, Final Shot Facing North, Showing the Upper Road (Llocus 5), Revetment Wall (Locus 12), the Lower Road (Locus 21) and the Iron Age I Soil Layer (Locus 24).

17. Square B6, Final Shot Facing North, Showing the Lower Road (Locus 15), The Revetment Wall (Locus 13) and the Iron Age I Locus (Locus 40).

in Field G. It was anticipated that the channel would run straight to the depression where the remains of a water system were expected to be found. Excavation in Squares 1-4 brought the desired results, with the continuation of the channel being uncovered. However, it turned out that the channel does not connect to the water system, but rather passes by the depression on its eastern ridge, continuing further north. By the end of the season, almost 30.00 + m of the water channel were unearthed, with some missing sections removed by later stone robbing activities.

By the end of 2016, six seasons of excavation in Field W had been completed, with 17 squares excavated (**Fig. 18**). With the exception of Squares W15, 16 and 17, which were opened in the middle of the current season, work in all other squares has been completed. The reservoir consists of a fill (in some places up to 4.00 m thick), containing mostly post-7th century B.C. material culture.



18. Field W Squares Excavated to Date.

Occupational Phase 1 (10th Century B.C.)

Phase 1 is represented by the reservoir walls and plastered floor. The date of construction for the reservoir, which was probably during the 10th century B.C., was established during the 2011 season, and confirmed during the 2012 season. The floor of the reservoir, which was re-plastered several times, sits upon bedrock.

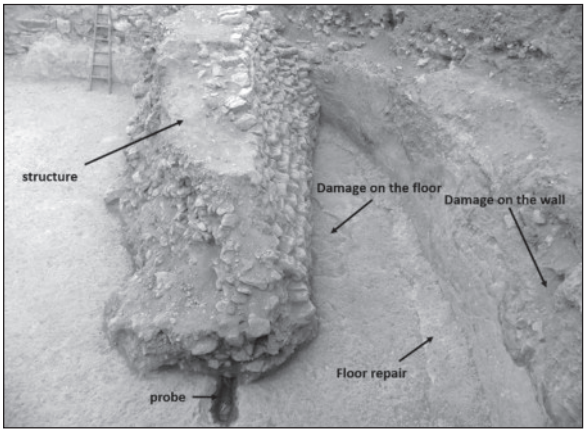
In 2016, another part of the southern reservoir wall was discovered, in Square W12, Locus 14. Here, the upper section of the wall appears to be missing, while the existing lower part, which is actually bedrock, was chiselled out, like the leveled floor throughout the reservoir. Both the wall (W12.14) and floor (W12.19) were plastered. The excavation in Squares W13 and W14 were completed this season, and the floor of the reservoir (Loci W13.16 and W14.10) was reached here. Surprisingly, relatively few objects have been found inside the reservoir. The ceramics found on the floor of the reservoir date to the 7th century B.C., indicating that the reservoir went out of use at that time.

Occupational Phase 2 (7th Century B.C.)

Phase 2 is represented by a structure built in the southern part of the reservoir, found in Squares W7 and W12. It consists of two parallel walls with a fill of earth and stones between. The function of this structure is not known, but it was most likely used to separate the southern section from the rest of the reservoir. The western part of the structure is not well preserved, while its eastern side is almost 3.0 m high. There are signs of attempts to repair the damaged southern section of the floor and wall, which may indicate that the inhabitants of the town tried to separate the unrepairable section from the rest of the reservoir. They also dug a probe in the reservoir floor, perhaps to see if it would sustain the weight of the structure (**Fig. 19**).

New Technology

This season we experimented with digital locus sheets in Field B. The locus sheets of the Madaba Plains Project Field Manual were converted to a completely digital format by Robert Bates, using FileMaker Pro software, and run on iPads in Squares B2 and B6. The data was uploaded from the iPad to a laptop



19. Reservoir, Looking East.

at the end of each day in the field. Daily progress shots and the pottery found in the squares each day were filmed with an iPad camera and incorporated into the database as a visual reference. Supervisor field notes were also entered on the device. In addition, photography was taken with a digital camera from a wonderpole (a telescoping device with a camera mount on top) integrated with an iPad as an optical piece; numerous images were combined together to create a final 3D image of each square, using PhotoScanPro software. These images have since been used to make top plans, section and architectural drawings back in the lab.

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INSIGHTS INTO THE CHALCOLITHIC / EARLY BRONZE AGE COLONIZATION OF THE ḤARRA (NE-JORDAN) – PART I: TŪLŪL AL-GHUṢAYN

Bernd Müller-Neuhof and Wael Abu Azizeh

Introduction

In the course of the Jawa hinterland project (*Arid habitats in the 5th to the early 3rd millennium B.C.: mobile subsistence, communication and key resource use in the Northern Badia [NE-Jordan]),* several surveys were carried out in the Jordanian basalt desert (*al-Ḥarra)* and the eastern adjacent limestone desert (*al-hamad)* from 2010 until 2014. These surveys revealed diverse indications for socio-economic activities in this region, especially dating to the period between the 5th and the 4th millennium calBC, which according to the Southern Levantine chronology is the Late Chalcolithic / Early Bronze Age I (LC/EBA I)[1]. A major result of these surveys was the discovery of the two hillfort sites Tūlūl al-Ghuṣayn and Khirbat Abu al-Ḥuṣayn in the basalt desert, which according to the few surface finds could provisionally be dated to the LC/EBA I (Müller-Neuhof 2013b, 2014b).

Contrary to the abundant nomadic pastoral campsites which were identified along wadis and mudpans in the basalt desert, and which hint at a seasonal occupation of the region during the winter rainy season, the two hillfort sites can be regarded as permanently occupied. This is indicated by the defence works, whose (defensive) strategic benefit could only be preserved by a permanent presence of at least part of the inhabitants or residents. The identification of these hillfort sites proves that, despite the arid conditions of today, this region was not only used on a seasonal basis but also occupied permanently. This discovery was the motive to continue the Jawa Hinterland Project with a new three-year project phase, focussing on *'The colonization of the Northern Badia (NE-Jordan) in the Late Chalcolithic and Early Bronze Age (4th to 3rd millennium BC): A contribution to archaeological settlement geography in the arid regions of Southwest Asia*', which is again funded by the *Deutsche Forschungsgemeinschaft* (DFG)[2].

Four major aims were defined during project planning, including:

- The identification of additional hillfort sites and other perennial settlements in the basalt desert
- The establishment of a chronology for the LC/EBA I settlements Tūlūl al-Ghuṣayn, Khirbat Abu al-Ḥuṣayn, and possibly other comparable sites in the Northern Badia (including Jawa), based on C^{14} data
- The characterisation of the socioeconomic conditions in the settlements, with consideration of subsistence economies such as agriculture and animal husbandry
- The identification of water management strategies (*e.g.* irrigation agriculture and water procurement) in the settlements and their immediate vicinity

Methodologically, this project focuses on surveys, small-scale excavations and soundings in a wider regional approach, in order to understand human occupation and settlement dynamics in this northeastern badia landscape during protohistory. The first fieldwork season was undertaken at Tūlūl al-Ghuṣayn in April 2015.

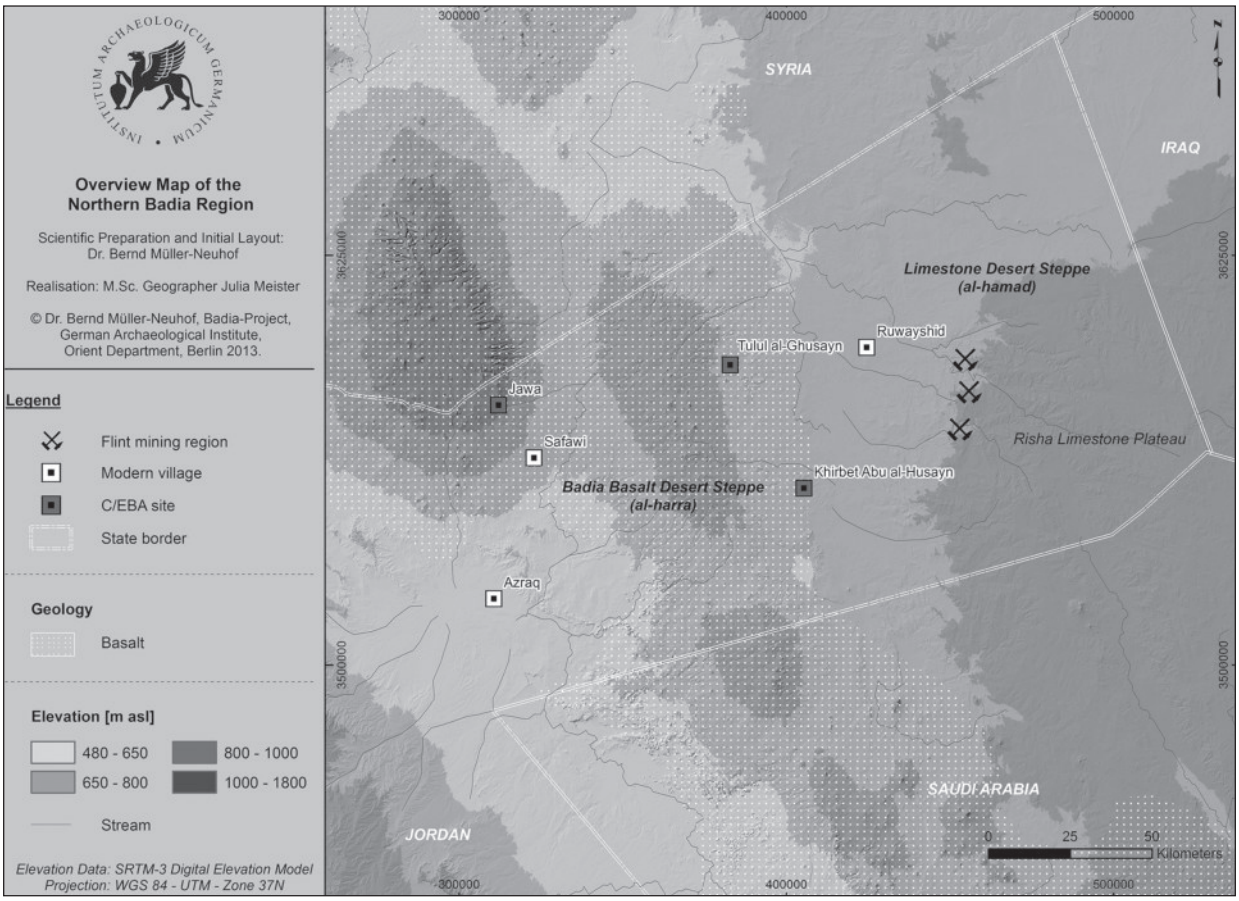
1. Concerning publications of preliminary results of these surveys refer to Müller-Neuhof 2012a, 2012b, 2012c, 2013a, 2013b. 2013c, 2013d, 2013e, 2013f, 2014a, 2014b, 2014c, 2015.

2. German Research Foundation (DFG MU-3075/3-1).

Setting

Tūlūl al-Ghuṣayn (32°27'22.69" N, 37°45' 6.38" E) (hereafter TaG) is located north of the 'Ammān – Baghdad road in the eastern half of the *ḥarra*; c. 72 km aerial distance east of Jawa and c. 25km west of the eastern edge of the *ḥarra* (**Fig. 1**).

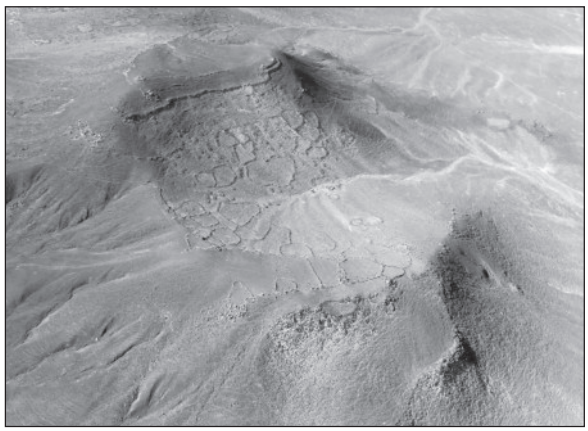
'Tūlūl', the first word of the name, refers to



1. Map of the northern Badia (©J. Meister and B. Müller-Neuhof, Deutsches Archäologisches Institut, Orientabteilung).

two elevations; in this case, two neighboring volcanoes. However, the archaeological site name Tūlūl al-Ghuṣayn refers only to the western volcano, on which the ancient settlement is located. This volcano is characterized by a crater (**Fig. 2**) which is blown out on its southwestern side, a rim on the preserved edges of the crater, which is relatively wide on the southeastern part, and an elongated terrace-like elevation beginning on the foot of the southeastern outer flank of the volcano, which expands in a southeasterly direction.

The site was discovered by David Kennedy and Robert Bewley in 2011 during one of the APAAME Project aerial reconnaissance flights, who kindly provided this project with the photos and coordinates. The first phase of the Jawa hinterland project in 2013 included a preliminary inspection of the site, examining visible structures on the surface, together with a quick preliminary documentation, over two

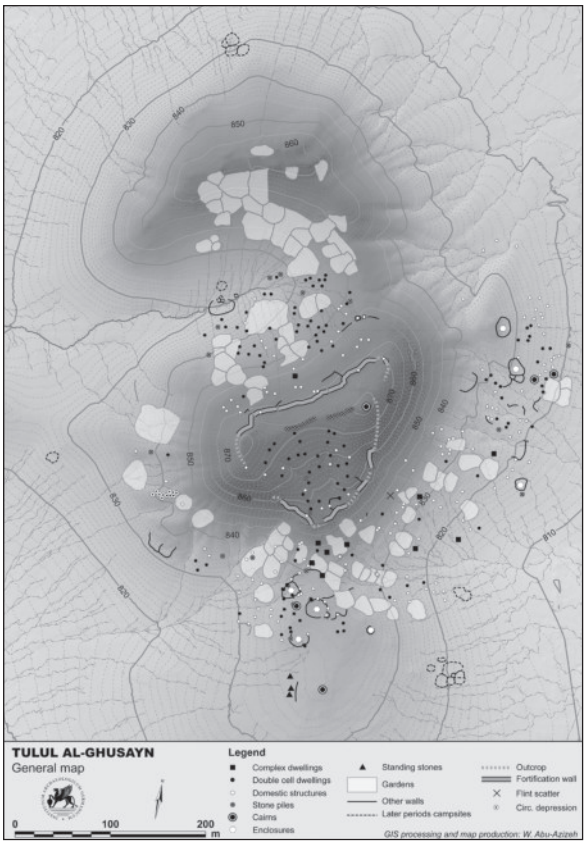


2. Aerial View of Tūlūl al-Ghuṣayn (©B. Müller-Neuhof, courtesy of APAAME).

half-days (Müller-Neuhof 2013b, 2014b).

In April 2015, two weeks were spent at TaG. One of the first tasks of this season was to identify the extension of the settlement area, the different residential / activity areas, and the characterization of the different structural remains visible on the surface. The surface survey revealed a total of 329 structures and activity areas (**Fig. 3**), comprised of four cairns, a post Ch/EB I campsite, one flint scatter site, 17 stone piles, 85 gardens enclosed by terrace walls, three groups of standing stones in rows, 126 double cell dwellings (also called 'Ghura huts' or 'double apsed' dwellings), and 10 complex dwellings. Apprximately 167 more structures were also found, mostly dwelling or storage structures, but there are also some linear structures such as terrace walls in habitation areas, and a cluster of c. 11 small circular structures, which might have been wells.

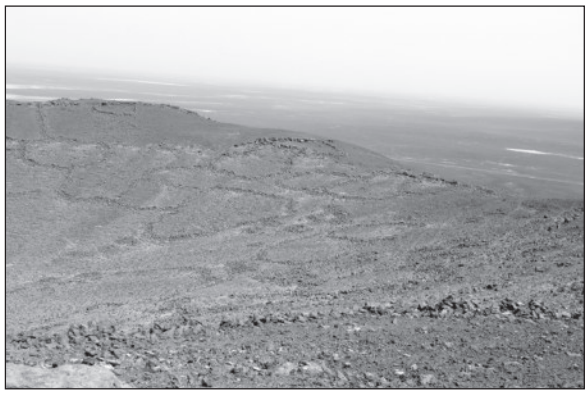
Four residential areas were identified; one inside the crater, another on top of the south ridge, one on the southern outer slope and the adjacent southern terrace, and one on the eastern outer slope of the volcano. Few buildings were observed on the south-western slope. The areas covered by terraced gardens are inside the crater and on the southern and the eastern outer slopes. Additionally, a few remains of terrace walls were identified on the southwestern slope as well. These remains may be further garden structures, but they were either destroyed by colluvial processes or were never finished.



3. General map of Tūlūl al-Ghuṣayn (©W. Abu-Azizeh, Deutsches Archäologisches Institut, Orientabteilung).

Terraced Gardens

During the survey of the terraced gardens in the crater and on the southern and eastern outer slopes of the volcano (**Fig. 4**), both the gardens and the terrace walls (which in parts were preserved up to a height of 1m; **Fig. 5**) were documented, and soil samples for future soil analyses were obtained. An interesting feature, which had already been observed in the terraced gardens at Jawa (Müller-Neuhof 2014c; Meister *et al.* 2016), are outlets or overflows which could be identified in the terraced gardens at TaG, and which clearly prove the management



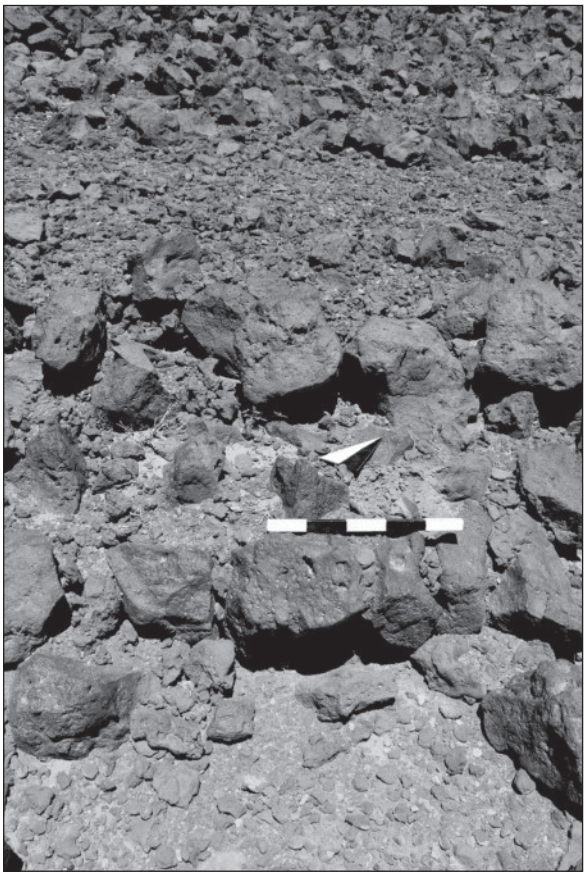
4. View into the eastern part of the crater at Tūlūl al-Ghuṣayn with garden terraces (©B. Müller-Neuhof, Deutsches Archäologisches Institut, Orientabteilung).

5. Garden terrace wall in situ (scale 0.5 m) (©B. Müller-Neuhof, Deutsches Archäologisches Institut, Orientabteilung).

of water irrigation (rainwater harvesting). These overflows are built in the terrace walls between the upper and lower gardens, and enabled the distribution of water from the upper garden to the lower garden according to the cascade principle. Such overflows are usually characterized by a gap in the wall, which is usually placed close to the edges of the lower terrace wall. Just below the gap, the soil surface of the lower garden is sealed with a stone pavement or one or two steps, which enables a wide and smooth dispersion of the water into the lower garden, and reduces the erosional impact on the soil surface when the water runs through the gap (**Fig. 6**).

Fortified Upper Residential Area

The residential area on the ridge consisted entirely of double-cell dwellings, which are characteristic for Tūlūl al-Ghuṣayn, and whose sizes and construction are discussed below.



6. Overflow steps between two garden terraces (scale 0.5 m) (©B. Müller-Neuhof, Deutsches Archäologisches Institut, Orientabteilung).

Besides the double-cell dwellings, a looted cairn on the topmost point of the eastern end of this area, from which a linear row of small stone piles protrudes towards the west, is another prominent feature of this part of the entire settlement. This feature follows the characteristic layout of tailed tombs(3), known from several areas of the arid landscape in Near Eastern deserts, and which are generally tentatively attributed to a wide 4th – 3rd millennia chronological timeframe (Abu-Azizeh *et al*. 2014; Abu-Azizeh 2011 and references herein). The entire residential area on the ridge is largely fortified by a wall, constructed of c. 0.75-1.00 m wide double faced masonry erected on a basalt outcrop, and in some areas preserved to a height of almost one meter (**Fig. 7**). In some areas large basalt outcrops were included in the fortification; here, further masonry was probably not necessary, but if it was, it no longer exists. Additionally, the very steep slopes on the eastern and western end of this area were not further strengthened by walls, since they offered a natural fortification. Five to six gates or posterns gave access to this area of the settlement (**Fig. 8**), which may have served as a refuge fort for the inhabitants of the other settlement areas of Tūlūl al-Ghuṣayn. At least two clear access routes, with a partly serpentine course, could be identified on the southern side of the fortified settlement area, which enabled a controlled and easily defensible access (**Fig. 9**).

Residential Areas South and East

Besides the terraced gardens, a large number of dwelling structures (double-cell dwellings

7. Section of the fortification wall on the southern edge of the fortified upper residential area (©B. Müller-Neuhof, Deutsches Archäologisches Institut, Orientabteilung).

3. Called "pendants" by Kennedy (e.g. 2011: 3189).

8. Gate no. 1 of the fortified upper residential area (scale 0.5 m) (©B. Müller-Neuhof, Deutsches Archäologisches Institut, Orientabteilung).

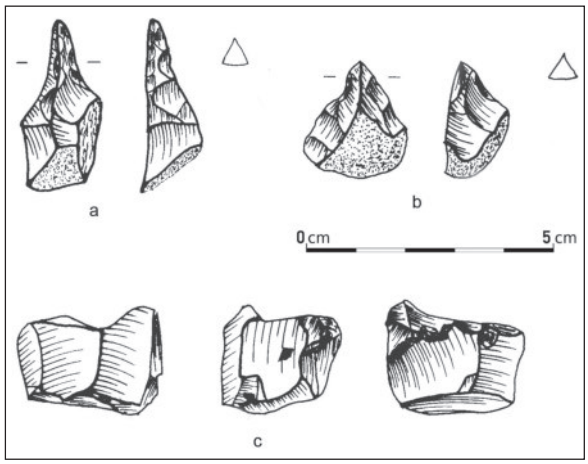
9. Access route to Gate no. 1 (scale 0.5 m) (©B. Müller-Neuhof, Deutsches Archäologisches Institut, Orientabteilung).

and larger structures) were built on the eastern and southeastern slopes of the volcano and the southern adjacent terrace (**Fig. 10**). An interesting observation is that some dwellings were erected on very steep slopes, and terraces presumably served to secure building areas and paths. An important discovery on a steep upper part of the eastern slope was a flint scatter,

10. Garden terraces on the southern slope of the crater, below the fortification wall of the upper residential area (©B. Müller-Neuhof, Deutsches Archäologisches Institut, Orientabteilung).

with carnelian cores, carnelian debitage, and drills which reflect a (open air?) carnelian bead workshop (**Fig. 11**). It was not attached to a dwelling and its extent could not be clearly identified, due to the cover of this area by stones which had slipped down the steep slope.

The residential area on the southern foot of the volcano extends several meters on the southerly adjacent elongated terraced elevation. Here, the residential area is mostly characterized by double-cell dwellings and some slightly larger, two-room buildings. In many cases, these buildings are incorporated into the walls of enclosures, forming clusters of residences, probably belonging to single families. Such a pattern could not be observed in the other residential areas, where buildings occasionally connect to garden terraces, but in most cases stand isolated.



11. Carnelian bead workshop implements: a and b: flint drills, c: carnelian core (©B. Müller-Neuhof, Deutsches Archäologisches Institut, Orientabteilung).

The Southwest Residential Area

The southwestern outer slope of the volcano is characterized by a few isolated dwellings, four large isolated garden terraces with incomplete terrace walls, and some isolated terrace walls below a basalt outcrop. Of particular interest, however, is a dense cluster of 11 circular structures (**Fig. 12**) located between two gardens on a slope. Each of these circular structures measures c. 2.0 - 2.5 m in diameter, and show central depressions that are surrounded by a single row of stones. A small sounding in one of these circular structures revealed that a pit had been dug into the colluvial sediments of the slopes that were encompassed by a set of stones, in order to prevent these holes from filling up with colluvial sediments, at least during the time of their utilization (**Fig. 13**). Although a single Roman sherd was discovered in their vicinity, the time of the construction and utilization of these structures probably dates to the Late Chalcolithic / EBA I period of occupation of Tūlūl al-Ghuṣayn. The function of these structures is still unclear, but possible interpretations are silos or wells.

12. Circular structures on the southwestern outer slope of the volcano with central depressions (©B. Müller-Neuhof, Deutsches Archäologisches Institut, Orientabteilung).

13. Section in one of the circular depressions, showing the colluvial deposit in an excavated pit (scale 0.5 m) (©B. Müller-Neuhof, Deutsches Archäologisches Institut, Orientabteilung).

Standing Stone Structures

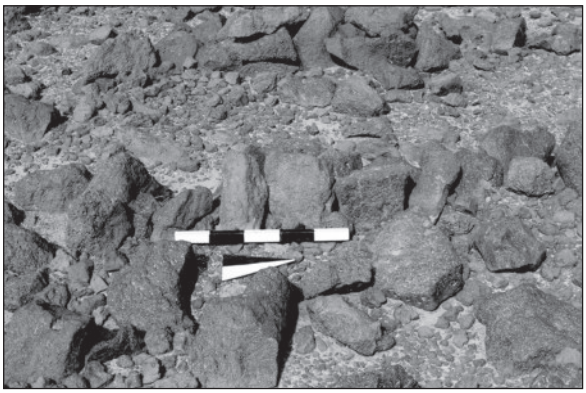
While the northern part of the elongated terraced elevation is covered with dwellings and enclosures, its southern part is characterized by a large flat empty area. Three standing stone structures (1-3) are located on the southwestern edge of this empty area. Their layout is characterized by the position of the highest upright standing stone slabs in the centre (**Figs. 14- 16**). While Standing Stone Structures 2 and 3 are characterized by single rows of stones, Standing Stone Structure 1 is characterized by at least three parallel and consecutively set rows of stones (**Fig. 17**).

All standing stone structures are clearly oriented towards the west (the sunset; **Figs. 14 - 16**), while the view to the east (the sunrise) is blocked by a nearby hill. Standing stone structures are known from southern Jordan (Abu-Azizeh *et al*. 2014: 178-179 and Fig.17, as well as references cited herein) and the Sinai (Avner 1984, 2002; also Müller-Neuhof 2014b), as well as the Arabian Peninsula (Zarins 1979 concerning the site of Rajajil for instance). Specific features of two standing stone structures (1 and 2) are stone platforms located in front of the central stones. Standing Stone Structure 1, which is the longest one, has a semi-circular platform on its western side behind the largest central stones, and a small rectangular stone platform on the eastern face in front of the central stones. Standing Stone Structure 2 is characterized by a semi-circular platform on the western side in front of the central stones. Since similar structures in the Sinai contained offerings such as cortical scrapers and grinding stones, which were placed below such platforms in connection with these standing stones (Avner 1984, 2002), test trenches were dug into the platforms of the two TaG standing stones structures; however, they did not reveal any offerings.

It is clear that the layout of these structures cannot be attributed to domestic or economic utilization (e.g. garden terraces or animal pens).

14. Standing Stones Structure 1 on the southwestern edge of the settlement (©B. Müller-Neuhof, Deutsches Archäologisches Institut, Orientabteilung).

15. Detail of the central stones of Standing Stones Structure 2 (©B. Müller-Neuhof, Deutsches Archäologisches Institut, Orientabteilung).



16. Detail of the central stones of Standing Stones Structure 3 (©B. Müller-Neuhof, Deutsches Archäologisches Institut, Orientabteilung).

17. Side view of Standings Stones Structure 1; note the consecutively set rows of stones. Detail of the central stones of Standing Stones Structure 2 (©B. Müller-Neuhof, Deutsches Archäologisches Institut, Orientabteilung).

The orientation of the structures towards the west allows a hypothetical interpretation of these installations as most probably relating to a cultic calendrical function, possibly connected with agricultural activities.

Dwellings

A number of dwellings are located within the settlement area on the southern foot of the volcano and the adjacent terrace. Some of them are the typical small double-cell structures which have been observed in all dwelling areas of Tūlūl al-Ghuṣayn, and which resemble the 'Ghura-huts' recently discovered on Maitland's Mesa (Rowan *et al*. 2015). These structures consist of a small main room and a small anteroom or 'forecourt'. Their length is mostly between 3.00 and 4.50 m and their width

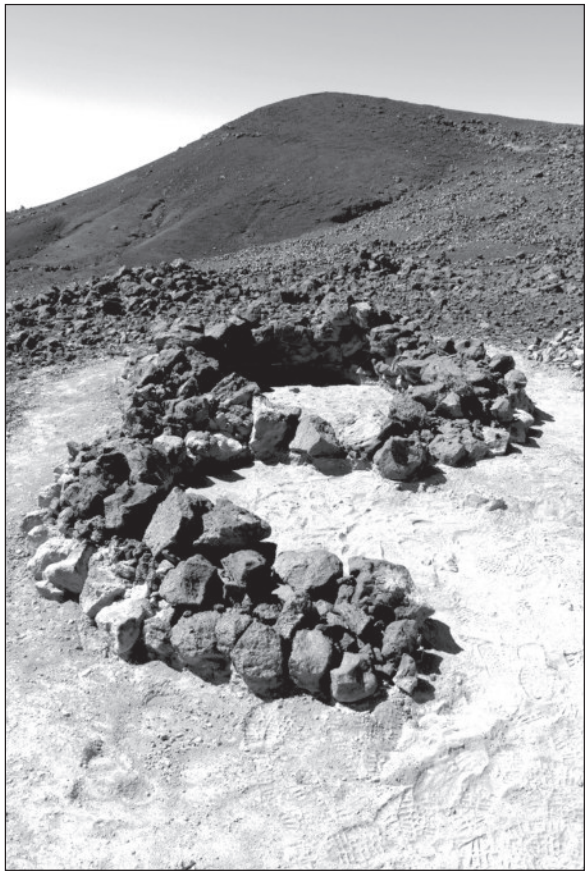
between 1.00 and 1.40 m. Typically, they have carefully constructed double-faced masonry walls of large basalt stones, filled with smaller stones between the two faces (**Fig. 18**). These walls are sometimes preserved to a height of 0.5 m or more. Interestingly, all structures in the settlement areas at Tūlūl al-Ghuṣayn have more or less the same orientation (SW-NE), with the entrance orientated towards the southeast. Additionally, some larger, more or less sub-rectangular single room dwellings were identified in this area, with lengths between 3.50 m and 4.50 m and width around 2.00 m.

During the 2015 season, two dwellings were entirely excavated; one double-cell structure (TAG 209; **Fig. 19**) and one of the larger dwellings (TAG 181; **Fig. 20**).

TAG 181 was mostly filled with aeolian sediments and stones from the walls; a complete jar was discovered *in situ* not very far beneath the surface, filled with sediments, two worked limestones and a sea shell (**Figs. 21, 22**). However, the jar was held together by the surrounding fill, and was already fragmented. Thanks to the ACOR Conservation Cooperative, the recovered sherds have been restored by Naif Zaban. An interesting observation is that, contrary to earlier statements (Müller-Neuhof 2015: 76), the jar does not show any affinities to EBA pottery in the southern Levant[4]. Its shape, but especially the very fine ware, leads us to assume that its origin might be further north, probably in the Euphrates region. (**Figs. 23 a: b**). Besides this jar, a number of lithic debitage and tools were found, notably including a cortical scraper (**Fig. 24 a**).

It is notable that no floor could be detected, which was also observed both in the second fully excavated structure (TAG 209), and in two other structures where soundings have

18. Detail of the double faced masonry for the walls of a double cell dwelling (©B. Müller-Neuhof, Deutsches Archäologisches Institut, Orientabteilung).



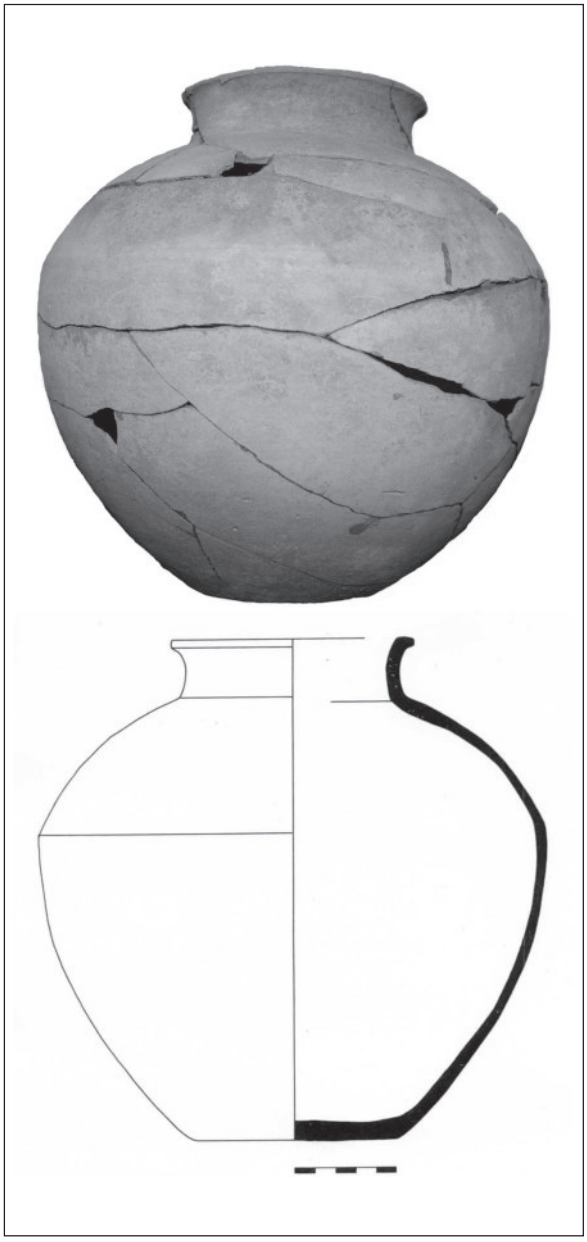
19. View of the excavated double cell dwelling structure TAG 209 (©B. Müller-Neuhof, Deutsches Archäologisches Institut, Orientabteilung).

4. We are grateful to Stephen Bourke and Susanne Richards for suggesting such a region of origin, after they saw the restored jar.

20. View of the excavated dwelling structure TAG 181 (©B. Müller-Neuhof, Deutsches Archäologisches Institut, Orientabteilung).

21. View of an almost complete jar in situ in TAG 181 (©B. Müller-Neuhof, Deutsches Archäologisches Institut, Orientabteilung).

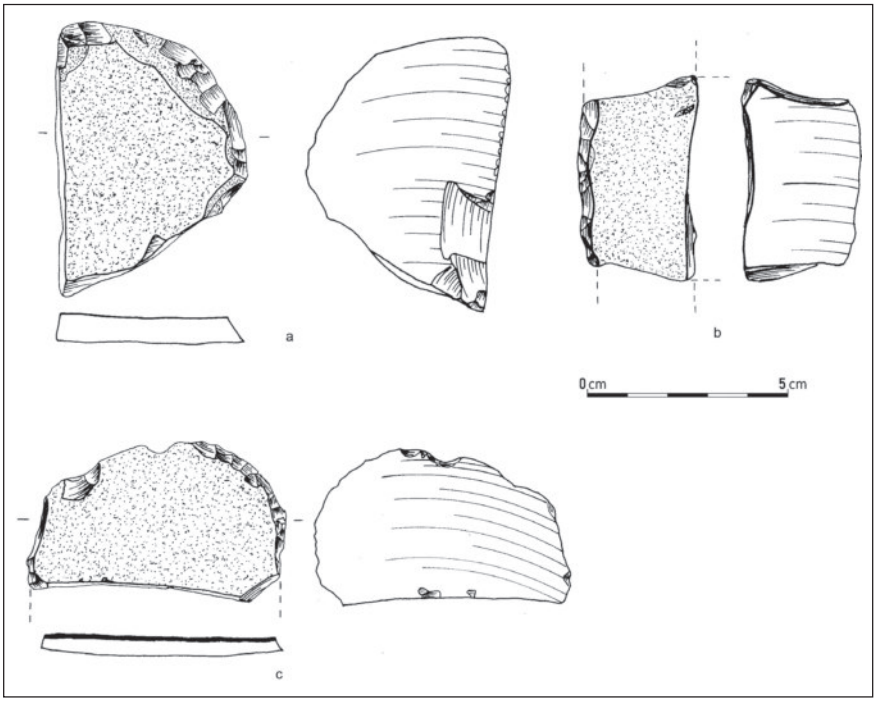
22. Contents of the jar in TAG 181; two worked limestones and a clamshell (©B. Müller-Neuhof, Deutsches Archäologisches Institut, Orientabteilung).



23a. Photo of the jar (©B. Müller-Neuhof, Deutsches Archäologisches Institut, Orientabteilung).

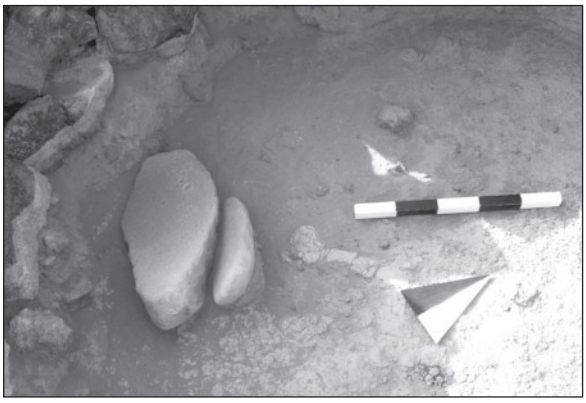
23b. Drawing of the jar (©Munjad Qassem, Deutsches Archäologisches Institut, Orientabteilung).

been carried out in order to check if floors could be identified. However an ashy area, which indicates a fire place in structure TAG 181, suggests the possible level of the floor, also indicated by the base level of the pottery found *in situ*, which was most probably lying on an occupation surface of which very few elements and artefacts were preserved. This hearth provided charcoal remains for C^{14} dating, discussed below.



24. Cortical scraper fragments from TaG: a TAG 181, b and c: surface finds (©B. Müller-Neuhof, Deutsches Archäologisches Institut, Orientabteilung).

As already mentioned, no clearly materialized floor was detected during the excavation of the double-cell structure TAG 209, which also was filled with aeolian sediments and collapsed stones originating from the upper parts of the building walls. At c. 20-30 cm depth, two large *in situ* grinding slabs came to light (**Fig. 25**). A fireplace was identified in the forecourt (anteroom), which contained ashy sand and charcoal that was used for C^{14} dating. Once again, although no proper floor (plaster or other kind of beaten earth preparation) was identified, the original occupation surface was evidenced by a couple of grinding stones found in the cell unit and the hearth in the forecourt.



25. View of two grinding slabs in situ at TAG 209 (©B. Müller-Neuhof, Deutsches Archäologisches Institut, Orientabteilung).

Dating and Discussion

The material remains recovered in TaG were not abundant. The assemblage of surface finds and the few finds from the excavations, where all the sediments were sieved, consist mostly of a few ceramic fragments, mostly body sherds of typical hard fired, reddish coarse ware with mineral and basalt temper. Some lithic artefacts, mostly debitage with typical C/EBA primary production characteristics (*e.g.* broad platforms, cortical platforms) were also found; among the lithic tools some drills and cortical scraper fragments are worth mentioning. Comparably abundant were grinding stones (mostly fragments, but some complete), most of which were hand stones, clearly indicating the processing of agricultural products on the site, and supporting the hypothesis that the terraced gardens were used for agricultural purposes. This was also supported by the discovery of two large grinding slabs in dwelling TAG 209. Grinding stones are indeed relatively poorly represented in the material culture of the arid margins occupation, and their unusual abundance at TaG (more than 20 scattered on the surface of the site and its dwelling units) stands in strong contrast with the pastoral nomadic occupation picture. All in all, the material remains indicate at least a LC/EBA date for the occupation in TaG.

The charcoal remains from the fireplaces in the excavated dwellings TAG 181 and 209 reduce the range of dating to the period between 3,700 and 3,400 calBC (Müller-Neuhof and Abu Azizeh 2016; **Fig. 26**). The occupation of TaG therefore has to be chronologically placed into EBA IA and/or the beginning of EBA IB. Such a dating fits nicely with early occupation layers at Jawa, as indicated by the recently published radiocarbon dates from this site (Müller-Neuhof, Betts and Wilcox 2015).

Of particular importance is the fortified character of TaG, which suggests a permanent occupation of the settlement, at least for some of the population. It appears that if Khirbat Abū al-Ḥuṣayn (KAH) dates to the same period (Müller-Neuhof 2013b), there is a pattern of fortified EBA settlements in the *Ḥarra*, which consists now of Jawa, TaG, KAH and the newly discovered site Khirbat Ja'bariya (KaJ), where the first field season was undertaken in 2016 (the second contribution in this *ADAJ* volume). However, it is still unclear how to determine the reasons and motivation for these fortifications.

Also important are the terraced gardens, which point to agricultural activities using rainwater harvesting irrigation, a strategy previously unanticipated this far to the east, and which show strong affinities to the contemporaneous gardens in Jawa. However, while the rainwater harvesting system in Jawa has a catchment area of c. 5 km^2, the catchment area of the rainwater harvesting system in TaG is much smaller, and encompasses only the top of the volcano and its rim. How agriculture could have been carried out under such conditions is therefore an important issue of continued research.

Finally, the standing stones are an important discovery in TaG, for they reflect affinities to similar structures in southeast Jordan, Saudi Arabia, the Sinai, and the Negev. These affinities may point to extensive long-distance connections between different groups occupying the steppe and deserts neighbouring the Fertile Crescent, which may also have formed a largely independent cultural entity. However, these are hypothetical surmises that need further research, which will hopefully be derived from future material analyses, excavations and surveys, within the framework of the second part of the Jawa Hinterland Project in the coming years.

Acknowledgements

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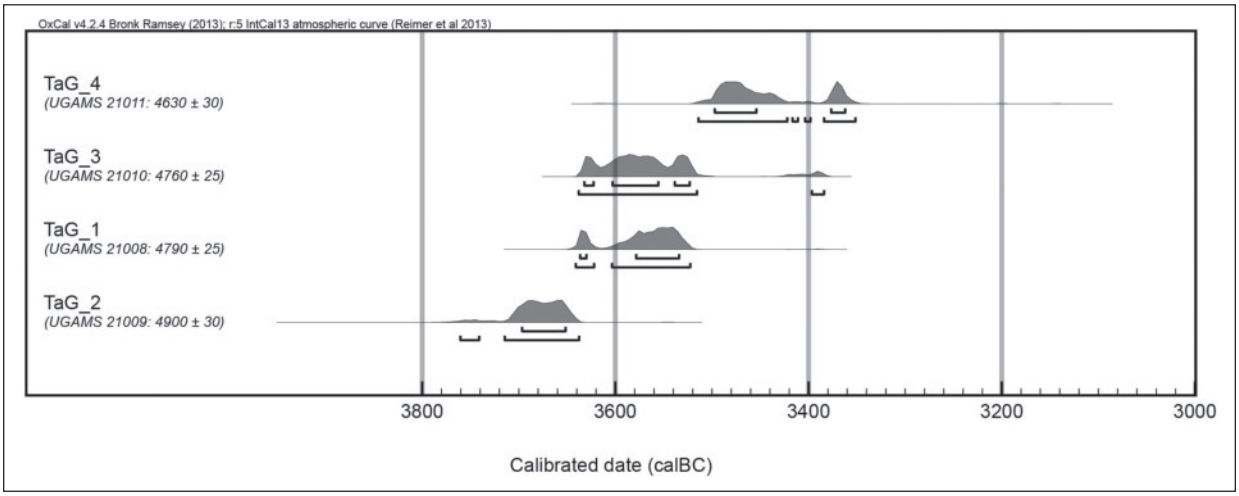

26. Chart with calibrated C^{14} dates from Tūlūl al-Ghuṣayn .

generous funding from the German Research Foundation (DFG MU 3075/1–2, MU 3075/3-1), this project would not have been possible. Finally, it has to be stressed that such a project could not have been undertaken without the cooperation and help of other colleagues. In this regard, we would especially like to thank Mr. Tobias Schmidt M.A., as well as our DoA representative Khaled al-Janaida, for their efforts and their ability to cope with the dust and three days of storm at the site and in the camp. We are additionally very grateful to Gary O. Rollefson, who took the burden of proof reading. Any remaining mistakes are ours.

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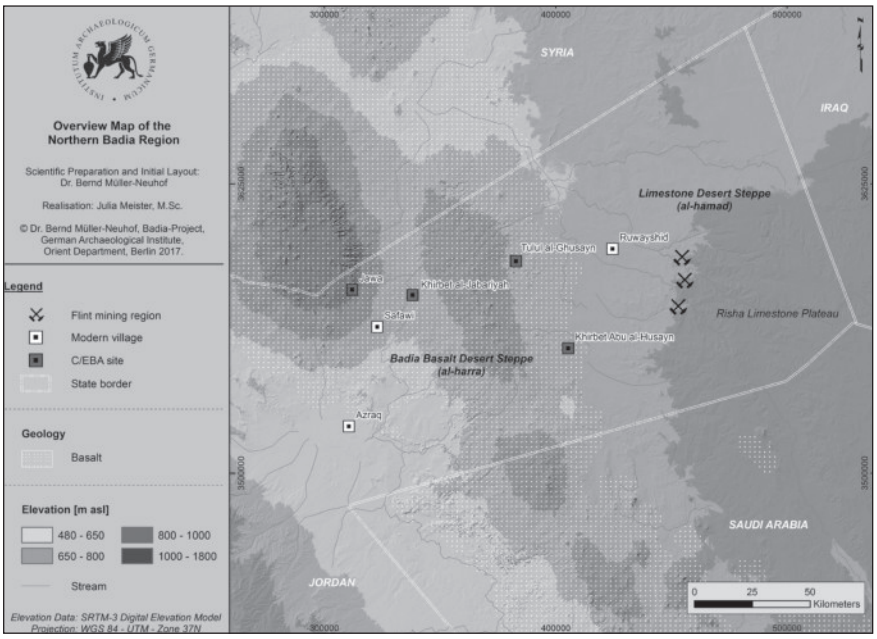
INSIGHTS INTO THE CHALCOLITHIC / EARLY BRONZE AGE COLONIZATION OF THE ḤARRA (NE-JORDAN) – PART II: KHIRBAT AL-JA'BARIYA

Bernd Müller-Neuhof and Wael Abu Azizeh

Introduction

The second field season of the project "*The colonization of the Northern Badia (NE Jordan) in the Late Chalcolithic and Early Bronze Age (4th to 3rd millennium BC): A contribution to archaeological settlement geography in the arid regions of Southwest Asia*" which represents the second phase of the Jawa Hinterland project[1], was undertaken in the *Ḥarra* from April 1st to April 14, 2016. It was originally planned to carry out soundings and excavations in Khirbat Abū al-Ḥuṣayn, a hillfort site in the eastern edge of the *Ḥarra* (see Müller-Neuhof 2013), but this was cancelled because all the access routes to this region were flooded, caused by intense rainfall in the eastern desert in that year's winter and spring. Therefore, the fieldwork was undertaken at Khirbat al-Ja'bariya instead, which had previously only been scheduled for a short reconnaissance survey and sounding visit.

The site of Khirbat al-Ja'bariya (hereafter KaJ: 32.317736° N / 37.280445° E), is located on one basaltic ridge opposite another basaltic ridge, whose field name is *Zumlat al-Ja'bariya*. The Wādī Marrab al-Ja'bariya, a tributary of the Wādī Rajil, passes by KaJ, which is located c. 25 km ESE of Jawa (aerial distance; **Fig. 1**) and c. 8km north of the Amman – Baghdad road. The name Khirbat al-Ja'bariya was assigned to the site by the authors shortly after its discovery on Google Earth satellite images in 2015; the local Bedouins, who were camped close to the site in



1. Map of the Northern Badia (©J. Meister and B. Müller-Neuhof, Deutsches Archäologisches Institut, Orientabteilung).

1. Regarding the background, development and aims of the second phase of the Jawa hinterland project, I refer to the first article on the "Insights into the Chalcolithic / Early Bronze Age Settlement Activities East of Jawa (North-East Jordan) part I: Tūlūl al-Ghuṣayn" in the current *ADAJ* volume.

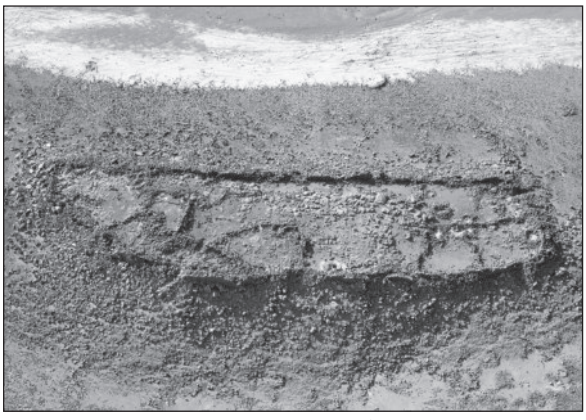
April 2016, were asked for a local name for the site, but no name was forthcoming. In October 2015, the APAAME project in cooperation with the Jawa Hinterland Project, flew over KaJ and took several aerial photos of this settlement (**Fig. 2**).

Since this was the first actual visit to the site, the aims for the season were to complete a general documentation and evaluation of the site and its vicinity, together with detailed architectural descriptions and mapping, small-scale soundings, and excavation. It was also planned to prepare a site plan, to document and characterize all visible architectural features, including the fortification, to collect small finds during surface surveys, to carry out excavation of structures to obtain stratified small finds and organic material for C^{14} dating, and soundings to collect sediment samples for geo-scientific analyses.

The settlement at KaJ can be divided into three zones (**Fig. 3**). Zone 1 is the settlement on top of the ridge, enclosed by a fortification wall, Zone 2 contains the dwellings and terraced gardens on the southern slope and foot of the ridge, and Zone 3 refers to the dwellings and terraced gardens on the northern slope and foot of the ridge.

Zone 1

This zone (**Fig. 4**) is an almost flat area on top of the ridge, which measures 2920 m^2, and is entirely enclosed by a fortification wall (**Fig**. **5**), whose double-faced construction is in large parts still preserved (**Fig. 6**). The width of the wall varies between c. 1.10 and 1.80 m (**Fig. 6**). Masonry is visible in almost all sections of the wall, and in some sections the inner and outer face masonry is preserved up to 2 m high (**Fig**. **7**).

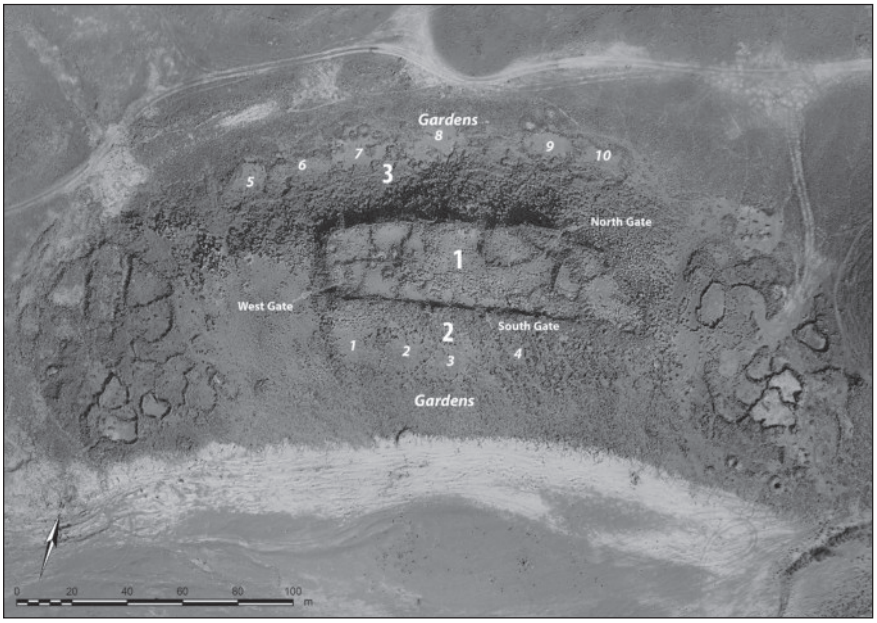


2. Aerial View of Khirbat al-Ja'bariya (©R. Bewley, Courtesy of APAAME).

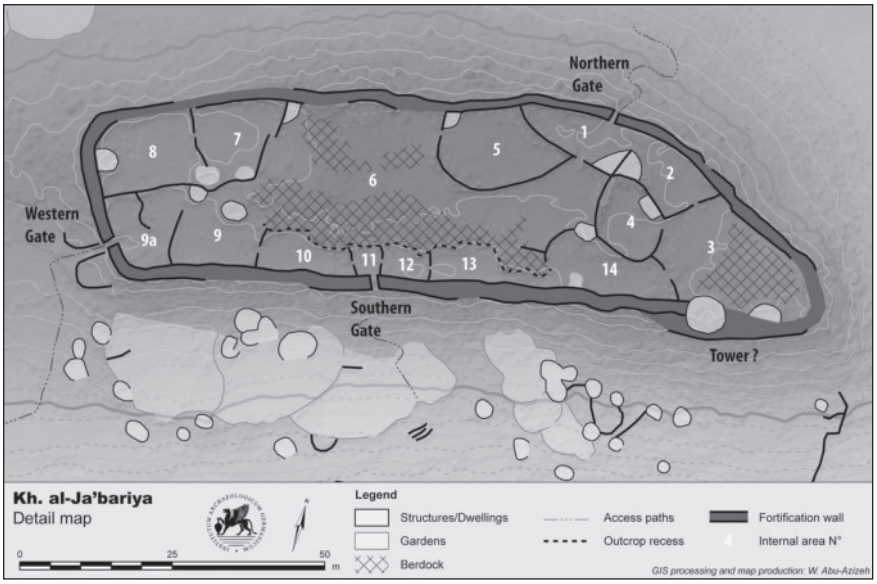
It is largely characterized by a basalt outcrop (Area 6) that emerges for the most part in the centre of the ridge, but also on parts of the eastern half of the enclosed area. The areas with no visible outcrops are divided by low walls into 13 areas (**Fig**. **4**), which are partly interlinked by doorways (**Fig**. **8**). Towards the south, several parallel short walls divide an elongated zone between the outcrop and the southern wall into a chain of possible rooms (**Fig**. **9**). Here a collapsed gate (south gate) was identified, which is one of the three gates that gave access to Zone 1 (**Figs**. **4 , 10**). Remains of an access path were identified outside of the south gate. The winding access path that leads towards the north gate is much clearer (**Fig**. **11**); it opens into a narrow forecourt (Area 1), from which another gate allows access into the central area (Area 6; **Figs. 4 , 12**). The eastern part of Zone 1, in the vicinity of the north gate, is characterized by several areas that are separated from each other by thick walls, with entrances to the central Area 6.

The west gate is characterized by two terrace-like projections on the outer side of the fortification wall, and two parallel running walls that confine the approach (**Figs**. **4 , 13**). This gate gives access to Area 9a, which belongs to a number of enclosed areas in the western part of Zone 1. Access to the west gate is facilitated by a wide, slightly winding path, that starts from the southern end of the settlement on the edge of the Wādī Marrab al-Ja'bariya and leads up to the west gate.

The course of the northern and southern fortification walls more or less follow the natural delineation of the ridge summit, which is mainly characterized by the basalt outcrop, and which causes a curve of the northern wall towards the east, where it meets the southern wall at the eastern end of the top outcrop (**Fig**. **3**). However, the western wall does not follow the contour of the top surface of the ridge. Instead, it runs straight in a N-S direction, cutting off the remaining (but narrowing) parts of the western summit, which are characterised by basalt outcrops (**Fig**. **3**). It can be assumed that, due to the narrowing of the basalt outcrop



3. *Location of the three Zones in KAJ and the Gardens (©W. Abu-Azizeh – B. Müller-Neuhof, Deutsches Archäologisches Institut, Orientabteilung, Based on an APAAME Aerial Photography).*



4. *Plan of the Top area (Zone 1) of KAJ (©W. Abu-Azizeh, Deutsches Archäologisches Institut, Orientabteilung).*

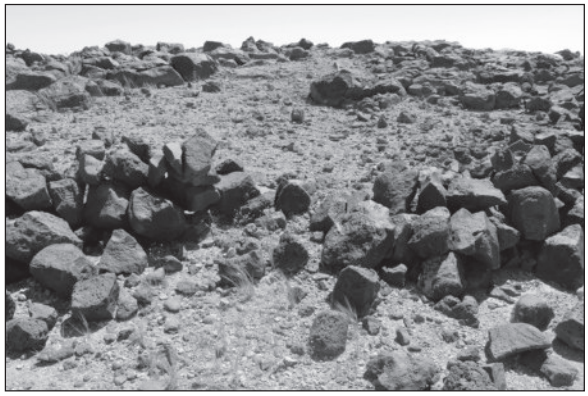
5. *View of the Inner Face of the Fortification Wall on the South Side (©B. Müller-Neuhof, Deutsches Archäologisches Institut, Orientabteilung).*

on the summit further west, an incorporation of this part of the summit into the fortified area was not feasible, because the fortification wall needed to be founded on the edges of the outcrop and would therefore leave only a small fortified space. Since the western part of the summit was outside of the fortification, it was necessary to reinforce the western fortification wall, which is thicker and was originally probably even higher than the other parts of the fortification wall.

On the inner side of this part of the wall a small, almost circular structure (KaJ 39, diameter c. 3.00 m) was built close to the inner

6. Detail of the Wall Thickness on the south side of the Fortification (Scale: 0.5 m) (©B. Müller-Neuhof, Deutsches Archäologisches Institut, Orientabteilung).

7. View of the Outer Face of the South Wall (©B. Müller-Neuhof, Deutsches Archäologisches Institut, Orientabteilung).



8. Interlinked Doorway between Areas 7 and 6, in the Fortified Zone on Top of the Ridge (©B. Müller-Neuhof, Deutsches Archäologisches Institut, Orientabteilung).

9. View of Chain of Possible Rooms (areas 9-13) on the southern Side of the Fortified Zone on Top of the Ridge (©B. Müller-Neuhof, Deutsches Archäologisches Institut, Orientabteilung).

10. View of the Blocked southern Gate (Scale 0.5 m) (©B. Müller-Neuhof, Deutsches Archäologisches Institut, Orientabteilung).

face of this western wall, not far from the west gate, which was partly excavated. The aim of this sounding was first to evaluate if this structure served as a dwelling, and secondly if it was somehow attached to the fortification wall. About half of the structure was excavated, reaching the underlying basalt outcrop (**Fig**. **14**). A thin ash lens and one Byzantine potsherd came from the upper part of the structure fill, but no small finds were recovered. The function of this structure is still unclear, but it most probably served as a dwelling. Another possibility is that this structure was part of the reinforcement of the western wall, and may have originally had a tower function. The Byzantine sherd and the radiocarbon analyses, which date the ash to

11. View of the northern Gate (©B. Müller-Neuhof, Deutsches Archäologisches Institut, Orientabteilung).

12. View of Area 1 in the Fortified Zone on Top of the Ridge, with the northern Gate in the Background (©B. Müller-Neuhof, Deutsches Archäologisches Institut, Orientabteilung).

13. View of the western Gate from Outside (©B. Müller-Neuhof, Deutsches Archäologisches Institut, Orientabteilung).

around 800 calBC, indicate a later and very short reutilization of this structure.

Proper dwelling structures could not be identified in Zone 1. In view of the large amount of stone debris, a larger, originally higher building with partly rectilinear walls was located in the eastern part between Areas 2 and 4, but its original function remains unclear. Several, probably later, cairns were built in the western part of Zone 1 in Areas 7 and 9.

14. Sounding in Structure 2, Close to the western Gate on the Inner Face of the Fortification Wall (©B. Müller-Neuhof, Deutsches Archäologisches Institut, Orientabteilung).

Earlier, probably Neolithic, activities on this site are indicated by a petroglyph depicting a cheetah hunting an oryx (**Fig**. **15**), discovered on the basalt outcrop in the area of the southern fortification wall in Area 3, while Safaitic (**Fig**. **16**) and Arabic inscriptions on single basalt blocks in Area 6 demonstrate the presence of visitors in KaJ during later periods.

Zone 2

Zone 2 encompasses the dwelling and garden area on the southern slope and the foot of the ridge of KaJ (**Figs. 3, 17**). Here four more-or-less adjoining garden terraces (garden nos. G01 – G04) were identified (**Fig**. **18**), all of which are located on the upper part of the slope

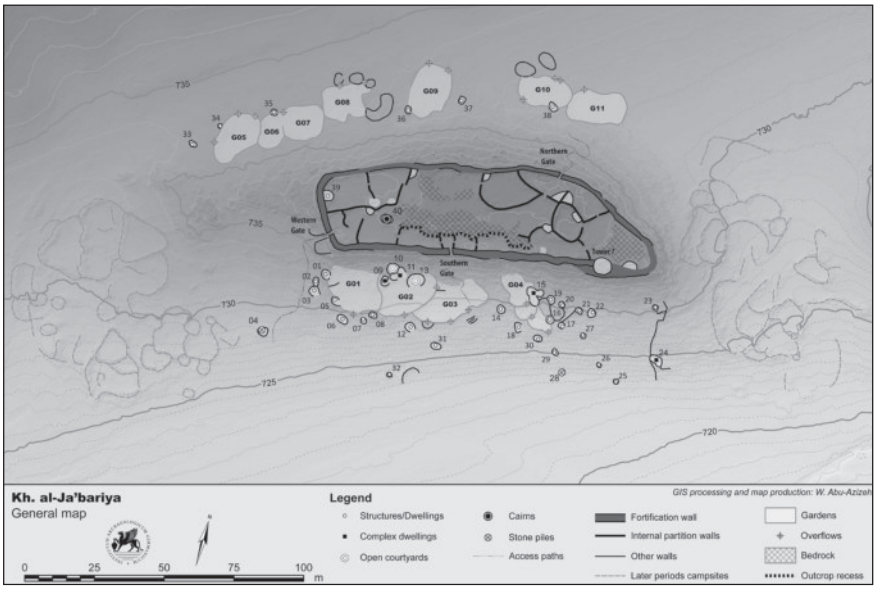
15. Neolithic Petroglyph, with a Cheetah Hunting an Oryx; Located in Zone 1 (©B. Müller-Neuhof, Deutsches Archäologisches Institut, Orientabteilung).

16. Safaitic Inscription Located in Zone 1 (©B. Müller-Neuhof, Deutsches Archäologisches Institut, Orientabteilung).

indicate the management of water flow

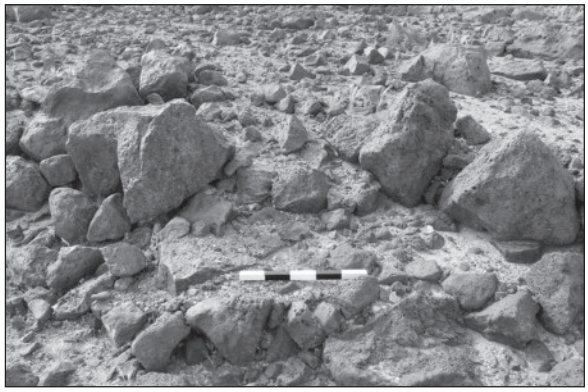
(**Fig**. **19**) from local precipitation in the immediate vicinity. Comparable to Tūlūl al-Ghuṣayn (see Müller-Neuhof and Abu Azizeh this volume), the catchment area for rainwater harvesting to irrigate the garden terraces is limited to the upper parts of the southern slope, and probably parts of the plateau on top of the ridge (Zone 1).

Zone 2 is clearly restricted, especially on its eastern side, where a wall runs generally in a N-S direction from the fortification down to the edge of the wadi (**Fig**. **20**). The southern limit of Zone 2 could not be properly identified. Dwellings are located on the bank of the Wādī



17. General Map of KAJ, with Indication of Structures Outside of Zone 1 (©W. Abu-Azizeh, Deutsches Archäologisches Institut, Orientabteilung).

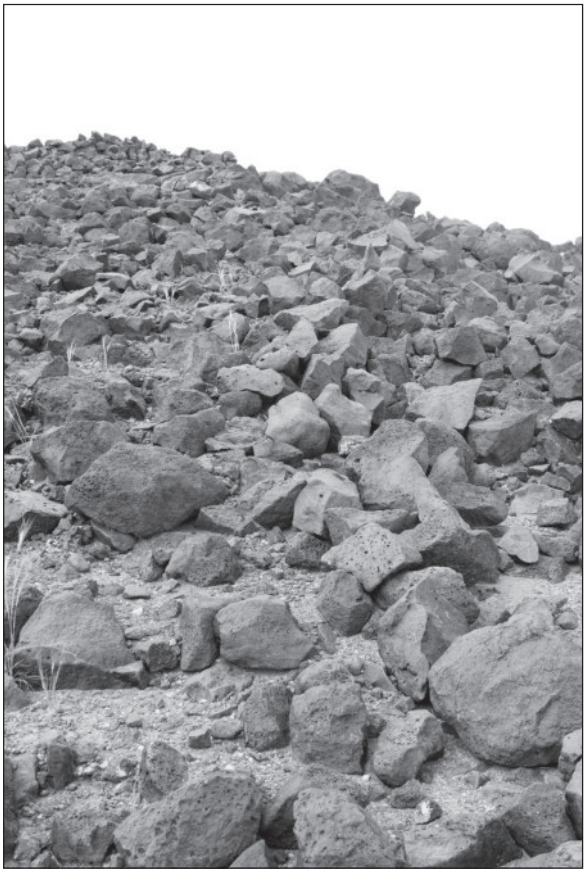
18. Location of Garden Terraces Nos. G01-G04 on the southern Slope of KAJ (©B. Müller-Neuhof, Deutsches Archäologisches Institut, Orientabteilung).



19. View of an Outlet in Garden G02 (©B. Müller-Neuhof, Deutsches Archäologisches Institut, Orientabteilung).

just in front of the basalt outcrop on which the fortification wall is erected. Outlets on the southern (downhill) side of the terrace walls

Marrab al-Ja'bariya. However, remains of stone walls are also located within the sediments of this wadi (**Fig**.**21**), which makes it possible that the original southern edges of the settlement



20. N-S Running Wall Limiting the Occupation Area on the southern Slope (Zone 2) in the east (©B. Müller-Neuhof, Deutsches Archäologisches Institut, Orientabteilung).

21. View of Zone 2, the southern Slope and the Fortification on Top of the Ridge, with Remains of Stone Walls in the Wadi Sediments in the Foreground (©B. Müller-Neuhof, Deutsches Archäologisches Institut, Orientabteilung).

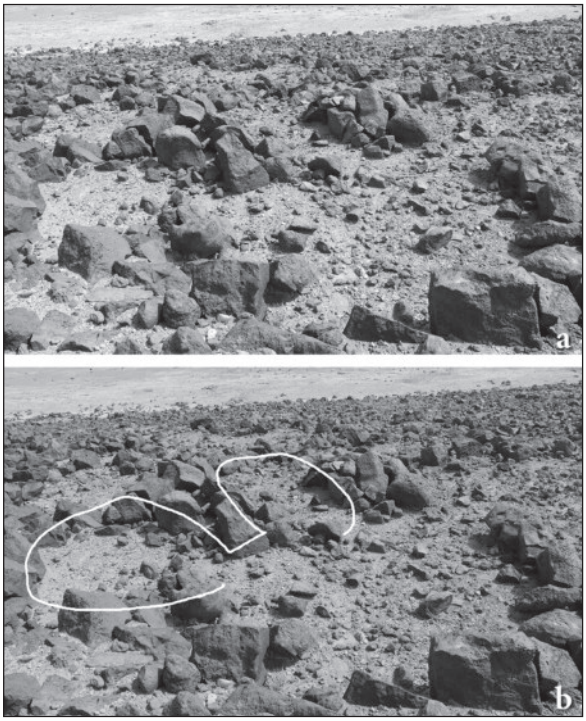
have been eroded by the wadi or buried beneath the wadi sediments.

The settlement structure of Zone 2 is characterized by dwellings that are located close to the gardens. In most cases, these dwellings are incorporated into the terrace walls, which suggests simultaneous construction of the gardens and these parts of the settlement. Another cluster of dwellings was recognized east of the gardens; these dwellings are connected to each other by a pathway, walls and several open spaces, which may have been used as courtyards or small gardens. This is the only area in Zone 2 where a recognizable settlement layout becomes visible. Farther to the east, the settlement area is limited by a north-south (downhill) running wall, whose possible gate is blocked by a larger dwelling (KAJ 24) on its eastern face. The remaining part of the occupation area of Zone 2, south of the gardens and the above-mentioned dwelling cluster, is characterized by an area with scattered dwellings, without any evidence for settlement planning.

In addition to the gardens, 32 structures (KAJ 1-32) have been identified in Zone 2. Two of them (KAJ 4 and 28) were stone piles of unclear function; one structure (KAJ 10) is a terrace wall and one structure (KAJ 13) was a small enclosed open area attached to garden no. 4. The remaining 28 structures seem to be remains of dwellings. Four of them (KAJ 9, 11, 15 and 24) were two-roomed buildings, with the rooms located diagonally to each other (**Fig**s. **22a, 22b**); the other 24 dwellings are one-room buildings, mostly with a sub-circular to oval outline, measuring between 3.00 to 5.00 m length and 1.80 to 4.00 m in width. The walls of these dwellings were made of basalt boulders and stones, and were either single- or double-faced. In contrast to the dwellings at Tūlūl al-Ghuṣayn (Müller-Neuhof – Abu-Azizeh this volume), the double-faced walls in KaJ lacked any filling between the two faces.

Two of the one-room dwellings (KaJ 1: **Figs. 23, 25** and KaJ 8: **Figs**. **24, 26**) were partly excavated. In both cases, grinding stones were located inside the structures on the surface (**Figs**. **23, 26**). These grinding stones, and other grinding implements found on the surface of Zone 2, are further evidence of agricultural activities in Zone 2 of KaJ, in addition to the gardens described above.

The excavations, together with sieving of the room fills in Zone 2, revealed only a few artefacts; mostly undiagnostic flint debitage and some animal bones, but no pottery. In both



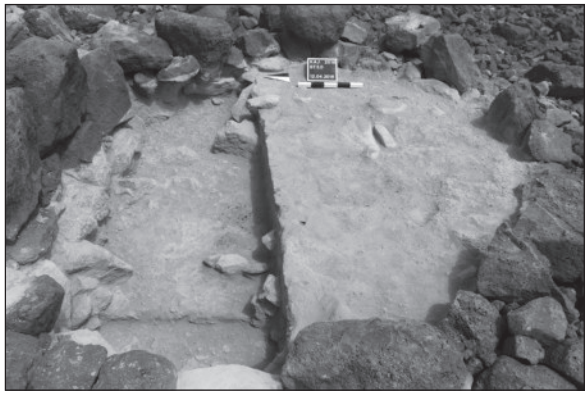
22 *a. View of the Two-Room Building KAJ 15 (©B. Müller-Neuhof, Deutsches Archäologisches Institut, Orientabteilung).*
b. View of the Two-Room Building KAJ 15, with Indication of the Rooms (©B. Müller-Neuhof, Deutsches Archäologisches Institut, Orientabteilung).

23. View of One-Room Dwelling KAJ 1 before Excavation, with Grinding Stones on the Surface (©B. Müller-Neuhof, Deutsches Archäologisches Institut, Orientabteilung).

excavations, reddish virgin soil was reached, on which remains of fireplaces were visible. The fireplace of KAJ 1 is characterised by stone packing (**Fig**. **19**), while the fireplace of KAJ 8 is characterized solely by an ash concentration (**Fig**. **20**). In both cases, abundant charcoal remains were collected for C^{14} dating (Müller-Neuhof and Abu-Azizeh 2016), which revealed an occupation date between 4,200 and 3,700

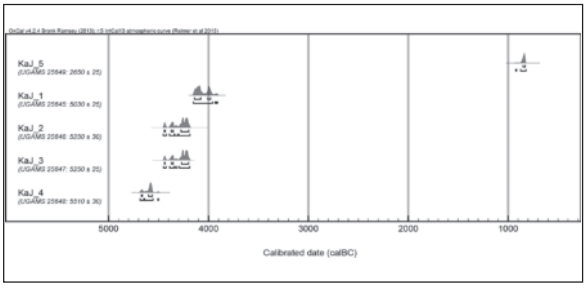
24. View of One-Room Dwelling KAJ 8 before Excavation (©B. Müller-Neuhof, Deutsches Archäologisches Institut, Orientabteilung).

25. Excexcavated southern Half of the Interior of Dwelling KAJ 1, with Stone Packing which Served as a Fire Place in the Center (©B. Müller-Neuhof, Deutsches Archäologisches Institut, Orientabteilung).



26. Excavated northern half of Dwelling KAJ 8, with Charcoal Remains of the Fireplace in the Trench, and Grinding Stones Lying on Top of the southern Part of the Dwelling (©B. Müller-Neuhof, Deutsches Archäologisches Institut, Orientabteilung).

calBC for KAJ 1, and 4,400 and 4,200 for KAJ 2. However, two samples (one from each of the two dwellings) provided parallel dates between 4,300 and 4,000 calBC; the researchers believe this range to be more reliable (**Fig. 27**).



27. C^{14} Charts of the Calibrated Dates from Khirbat al-Ja'bariya.

Zone 3

Zone 3 is located on the lower part and at the foot of the northern slope of Khirbat al-Ja'bariya. Gardens could again be identified here, although, contrary to the gardens on the southern slope, the northern slope gardens are located on the foot of the ridge. The seven Zone 3 gardens (garden nos. 7-11) are arranged in a row, and are enclosed by low terrace walls with outlets in the direction of the plain (**Fig**. **28**). Additionally six, mostly sub-circular, dwellings between 2.80 – 3.20 m long and 1.30 – 2.90 m wide (KAJ 33-38) have been identified in Zone 3, which are in most cases incorporated into the garden walls. Generally, the gardens in Zone 3 are more poorly preserved than the Zone 2 gardens. Moreover, it seems that later activities, such as ephemeral camps, have caused a great deal of destruction to the original layout of the gardens and their walls. It is therefore highly likely that gardens also originally existed on the western and eastern slopes of the ridge. However, later animal pens and Bedouin campsites in these areas have overlain these garden structure layouts, which are no longer reconstructable.

28. Garden Structures G05-G08 on the Foot of the northern Slope of KAJ (Zone 3) (©B. Müller-Neuhof, Deutsches Archäologisches Institut, Orientabteilung).

Discussion

Khirbat al-Ja'bariya is the fourth fortified hillside found in the *Ḥarra* after Jawa, Khirbet Abū al-Huṣayn and Tūlūl al-Ghuṣayn. Like Jawa and Tūlūl al-Ghuṣayn, there is evidence for rainwater harvesting agriculture on terraced gardens, an observation that is further supported by the discovery of several grinding stones. The very few surface finds, together with the nature of the structural remains, show several similarities with the above mentioned settlements, and allows for a tentative date to the 4th millennium (Early Bronze Age I). The radiocarbon dates from two dwellings on the southern slope, however, date to the second half of the fifth millennium calBC, which is a surprise. Although we cannot yet determine that the fortification also dates to the Late Chalcolithic, there is high probability that it is contemporaneous to the dwellings. This would mean we now have a longer occupation sequence for the Ḥarra, defined by fortified settlements ranging from the Late Chalcolithic to the EBA I.

These results direct attention towards late 5th to 4th millennium BC activities in a hitherto poorly understood region east of Jawa. Furthermore, the debate regarding the emergence of fortified settlements in the EBA, the origin of which have hitherto geographically been located in the southwestern Levant and chronologically placed during EBA II, will be heightened by the evidence for fortified settlements dating to the beginning of the EBA I in the Ḥarra The results from the analyses of small finds and sediment samples, together with the outcome of future fieldwork seasons, will hopefully provide more information on the formation, development, and most importantly, the background of the settlement processes in the Ḥarra, and the evolution of fortified settlements in such a region.

Acknowledgements

Our sincere thanks go to the Department of Antiquities of Jordan (DoA) and its director Dr. Munther Jamhawi, for the enduring support of these research activities in the NE-Badia, and especially for enabling the execution of this year's field season. We are also thankful to the Badia Research Program and its new director,

Mr. Nawras al-Jazi, for their support and the use of the facilities of the Badia Research Program Field Station in Safawi during this fieldwork season. We are grateful to the German Protestant Institute of Archaeology in Amman for hosting the project team after the fieldwork season, and to the CBRL in Amman for further support and the opportunity to affiliate this project with their institution. Furthermore, it has to be stressed that, without the generous funding from the *Deutsche Forschungsgemeinschaft* (German Research Foundation; MU 3075/1-3), this project would not exist. Finally, it should be underscored that such a project could not be undertaken without the cooperation and help of other colleagues. In this regard, we especially want to show our gratitude to our DoA representative, Mr. Mohammad Atoom B.A., for his excellent collaboration and support. Further thanks also go to our collaborator Dr. Arno Kose, for his commitment and efforts. We are additionally very grateful to Gary O. Rollefson, who took the burden of proof reading. Any remaining mistakes are ours.

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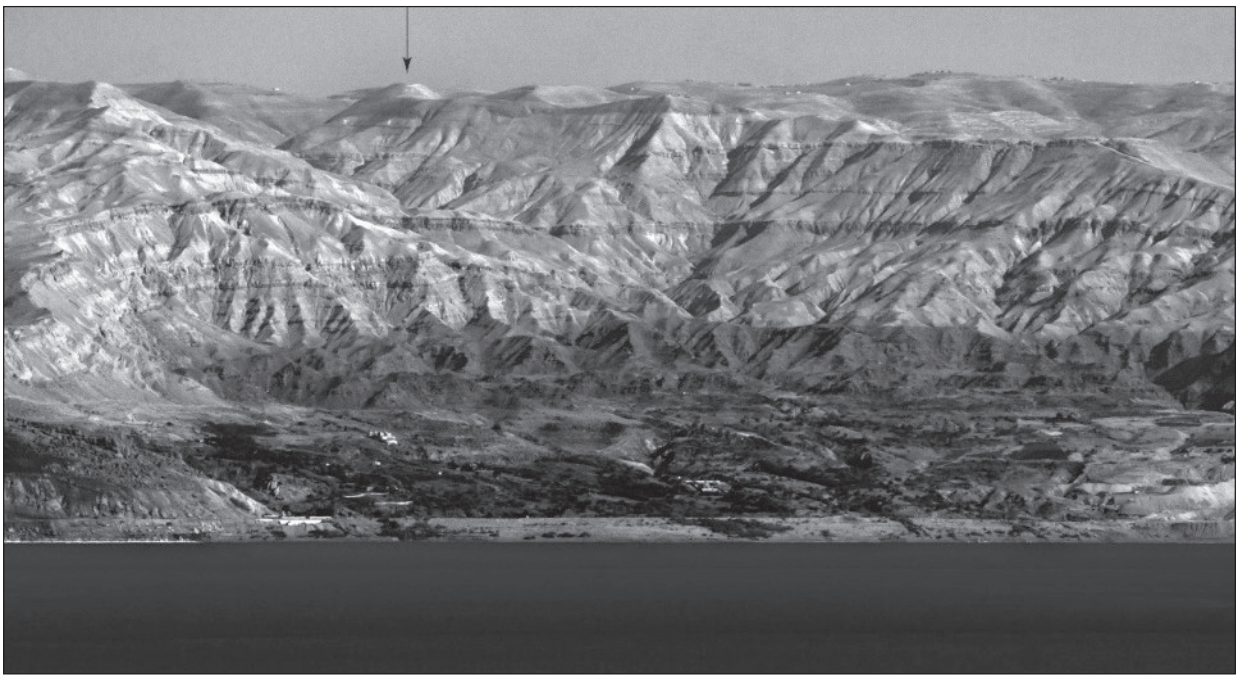
MACHAERUS PROJECT: PRELIMINARY REPORT ON THE 2016-2017 ARCHAEOLOGICAL EXCAVATION SEASONS THAT LED TO THE DISCOVERY OF THE LOST NORTHERN WING IN THE HERODIAN ROYAL PALACE

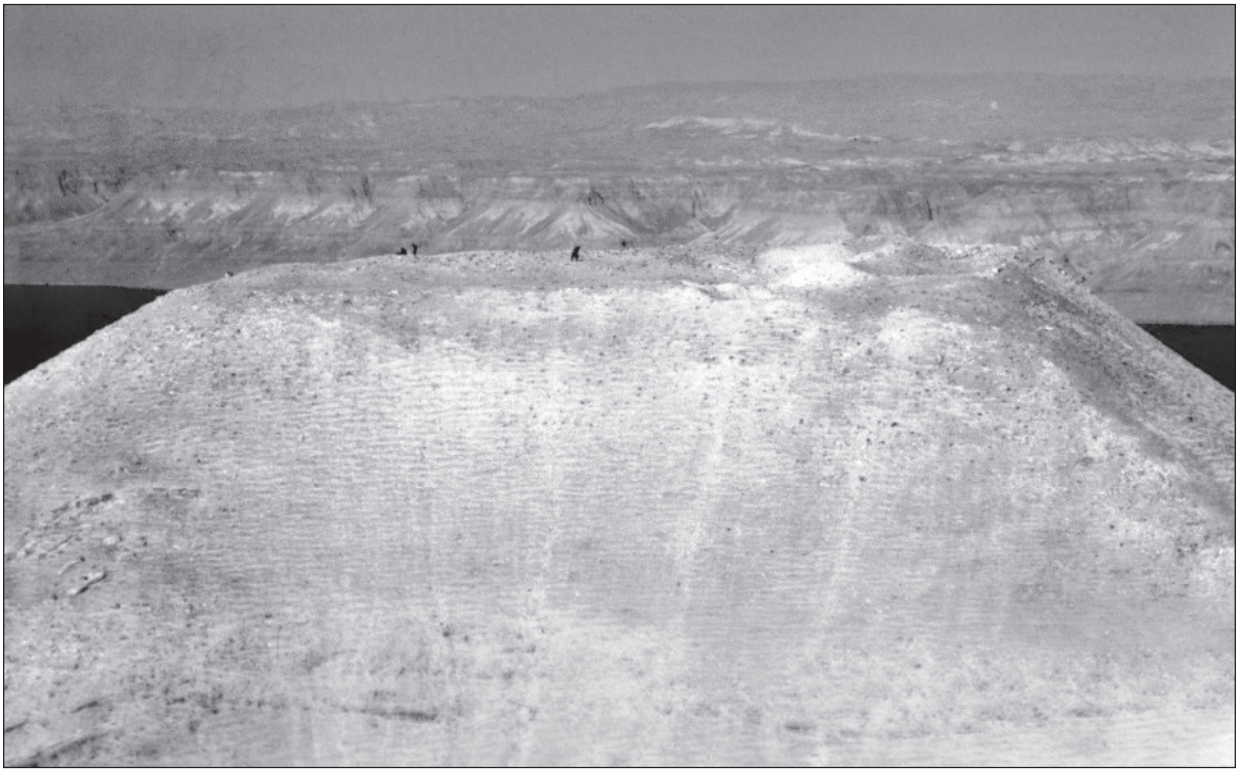
Győző Vörös

Introduction

The Memorial of Nabi Yaḥyā ibn Zakarīyā (Saint John the Baptist, Gr. Ἰωάννης ὁ βαπτιστής, Ar. يحيى بن زكريا), the historical place where the Christian and Muslim prophet was imprisoned and beheaded, is the Herodian royal city of Machaerus, overlooking the Dead Sea in Transjordan (Vörös 2013 and 2015). This information which complements the Gospels is not only based on the holy tradition of the Christian churches, but founded on the first century account of Josephus (*Antiquitates Judaicae* XVIII 5, 2), the official historian of the Flavian Dynasty in Rome. The written evidence of Josephus was also confirmed by the related reference in the *Ecclesiastical History* (I 11, 4-6) of Eusebius of Caesarea (c. 324 AD). The historical data from the *Antiquitates* on John's arrest and jail by Tetrarch Herod Antipas is attested by all the Gospels; their accounts are consistent with and complement that of Josephus. The fortified palace and city of Herod Antipas at the Dead Sea was the only royal palace the Tetrarch inherited from his father, King Herod the Great. The royal court of the once magnificent Perean citadel, with direct views from its towers to Jerusalem and Jericho, was a magnificent choice for the celebrations of the tragic birthday banquet, the circumstances of which were described in detail by the Gospels according to *Mark* (6, 14-29) and *Matthew* (14, 1-12), (**Figs. 1-2**).



1. The mountain top historical site of Machaerus crowns the horizon, as viewed from the Dead Sea shore of Palestine. The royal eagle's nest was erected 1100 meters above sea level, and was visible from Masada to Alexandreion.



2. The virgin archaeological site of Machaerus, just before the start of the June 1968 archaeological excavations. View from the northeast.

During the three months of our eighth and ninth archaeological seasons, in September-October 2016 (Vörös 2017a and 2017b), and in September 2017, among other important discoveries, we excavated and surveyed a previously unknown part of the royal citadel of Machaerus. The Hungarian Academy of Arts, in collaboration with the Studium Biblicum Franciscanum, has been conducting archaeological excavations and architectural surveys at this historic site since 2009 (under the directorship of the present author). The Hungarian members of the last two archaeological excavation seasons were: Messrs. Imre Balázs Arnóczki, Tamás Dobrosi, Tamás Dósa-Papp and István Őri-Kiss. The Italian fathers from the Jerusalem Studium Biblicum were: Fr. Amedeo Ricco OFM, Don Gianantonio Urbani and Don Stefano Vuaran. The Jordanian Department of Antiquities (DoA) was represented by Messrs. Abdullah al-Bwareed (September 2016), Ahmed Ajarmah (October 2016) and Basem Mahamid (September 2017), respectively. The original intention of the fieldwork was to uncover the uppermost street of the Herodian lower city in Machaerus, and collect additional architectural elements for our ongoing anastylosis project. However, the excavations uncovered a previously unknown area of the Herodian royal palace outside the surrounding wall of the Early Roman fortress.

The Discovery of the Lost Fourth Tower in the Northern-Wing of the Herodian Royal Palace through a Comparative Study of Aerial Archaeology

The late Father Michele Piccirillo (OFM) wrote the following observation in his 2004 internet-description on the Machaerus fortified royal castle: "The *upper city* was composed of the royal palace defended by four towers, of which only three have been identified." (Piccirillo 2004). He based his important scientific observation on the general layout of Judean Herodian fortresses, which usually had four towers. The three aerial photographs (**Figs. 3-5** below) illustrate what occurred during the previous half-a-century of excavations in the Machaerus citadel; the early archaeological excavations impacted on the later missions, as they dumped their excavation detritus on the area which overlay the fourth tower.

3. Aerial photograph taken at the end of 1978, after the first season of the First Franciscan Archaeological Mission. The excavation trenches of the 1968 American Baptist Mission are still untouched and visible, together with the long line of a military rifle pit fire trench from the 1967 War.

4. Kite aerial photograph taken in late 1993 (the camera-rig is clearly visible on the top-right, anchored at the modern dig-house), after the completion of the excavations of the 1992-1993 Second Franciscan Archaeological Mission, led by Michele Piccirillo (OFM). The excavation detritus, including the debris of the central Herodian cistern, is clearly visible on this photograph, deposited over the 2016-2017 excavation area.

The first aerial photograph was taken in 1978 (**Fig. 3**), after the completion of the first season for the Franciscan Archaeological Mission, under the direction of Father Virgilio Corbo. We can clearly see the 23 excavation trenches in the center of the citadel, opened as windows to the citadel's hidden past by the 1968 American-Baptist Mission, and a long military rifle-pit fire-trench from the period of the 1967 War. The 1978 excavation season of the Corbo-mission commenced by excavating around the Biblical citadel, to uncover the surrounding wall of the fortification. Their next objective was to reveal the important sacred interior. However, they were not aware at that time that the polygonal surrounding wall of the citadel is not from the Herodian period (ca. 30 BC – 36 AD), but from the period of the Early Roman garrison (ca. 44 – 71 AD). This explains why they did not discover the fourth Herodian fortification tower (or fortified bastion) Piccirillo spoke about in 2004.

After the death of Fr. Virgilio Corbo (in 1991), his former student Fr. Michele Piccirillo continued with the Machaerus excavations begun by his teacher; among other important undertakings on the field, he fully excavated the 9.5 meter deep Herodian cistern in the center of the peristyle Doric royal courtyard. However, he put his c. 1000 m^3 excavation

5. Helicopter photograph (APAAME_20171001_REB-0083) taken on 1 October 2017, immediately after the completion of our 2016-2017 archaeological excavation seasons. In the right-bottom corner of the early morning shot, the previously unknown wing of the Herodian royal palace is clearly observable (together with the refilled ritual pools and the cistern).

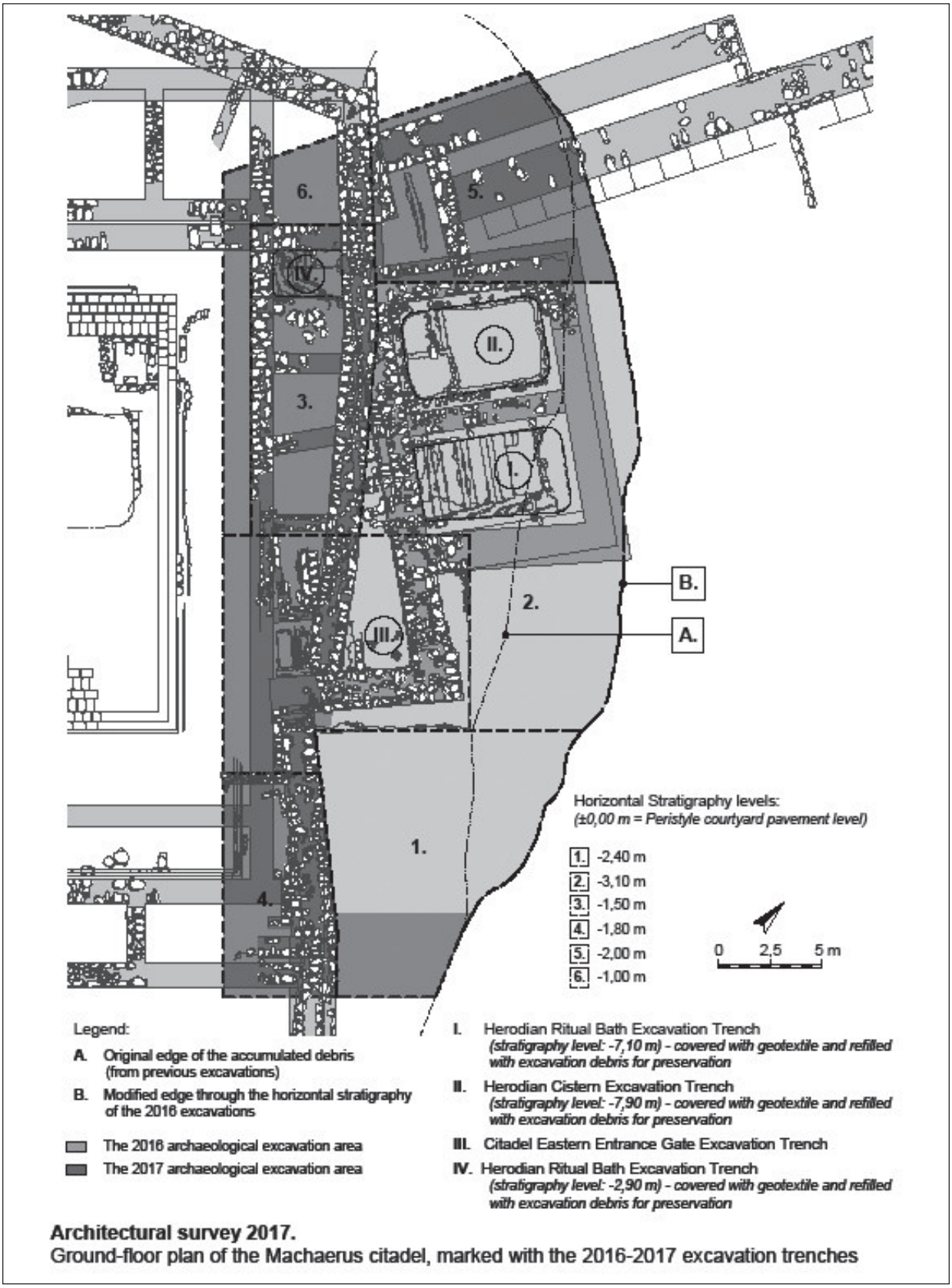
debris almost entirely above the area of the unexcavated, unknown, and since 71 AD completely forgotten, fourth fortification tower. The second aerial photograph from 1993 (**Fig. 4**) illustrates the surface-modifications on the Machaerus citadel since 1978.

The third aerial photograph **(Fig. 5)**, taken from the same angle as the previous two, was taken on 1 October 2017, immediately after the last day of the 2016-2017 archaeological excavations in this lost wing of the Herodian royal palace. It proves that this area consists of three halls and a huge fortification tower, with Hasmonean foundations, which had been converted into a monumental royal bath and cistern-reservoir during the Herodian period. The horizontal and vertical stratigraphies, together with chronological identification of the three subsequent building-periods, can be discerned on the season drawings (**Figs. 6-11**). We have also completed graphic and photographic documentation of the three newly discovered plastered constructions (the two ritual baths and the cistern), which were then covered with GEOTEXTILE covers and backfilled, to preserve them for future generations, and to ensure they will remain in good condition for presentation or restoration in the future.

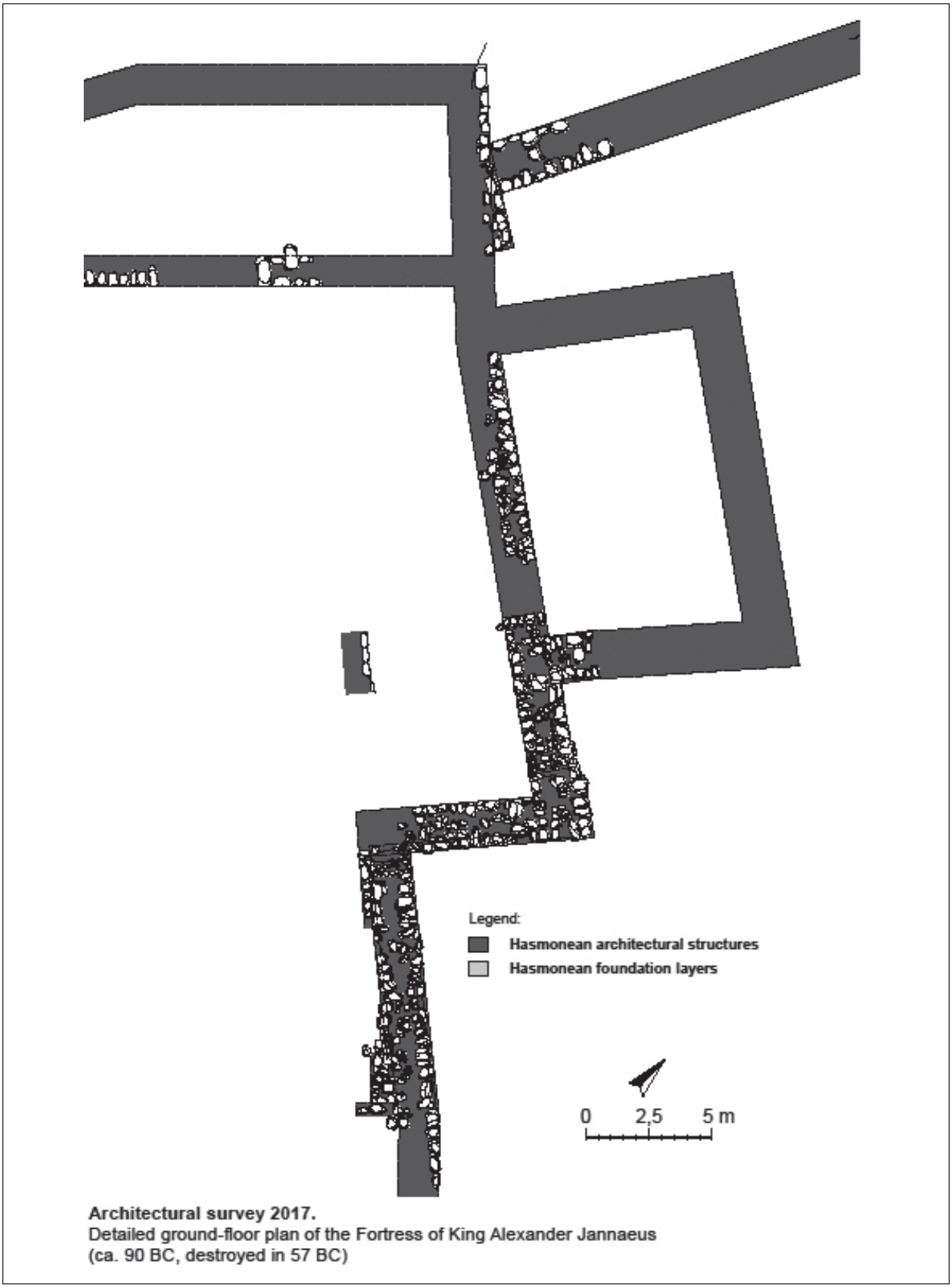
One of the important discoveries of our 2016-2017 excavation seasons was the unearthing of the Early Roman garrison's citadel-gate towards the lower city, which is visible on both the third aerial photograph and the architectural drawings. Even though the gate is poorly preserved, the meeting point of the Hasmonean and (later reused) Herodian wall with the polygonal Early Roman surrounding wall clearly indicates its original place. This is the exact location where the Zealots separated themselves from the goy-gentiles, as described by Josephus: *"As for the Jews that were caught in this place, they separated themselves from the strangers that were with them, and they forced those strangers, as an otherwise useless multitude, to stay in the lower part of the city, and undergo the principal dangers, while they themselves seized on the upper citadel, and held it, and this both on account of its strength, and to provide for their own safety. They also supposed they might obtain their pardon, in case they should [at last] surrender the citadel."* (*Bellum Judaicum* VII 6, 4)

The Discoveries of the Five Machaerus Immersion Baths Outside the Herodian Royal Bathhouse (from 1968, 1980, 1981, 2016 and 2017).

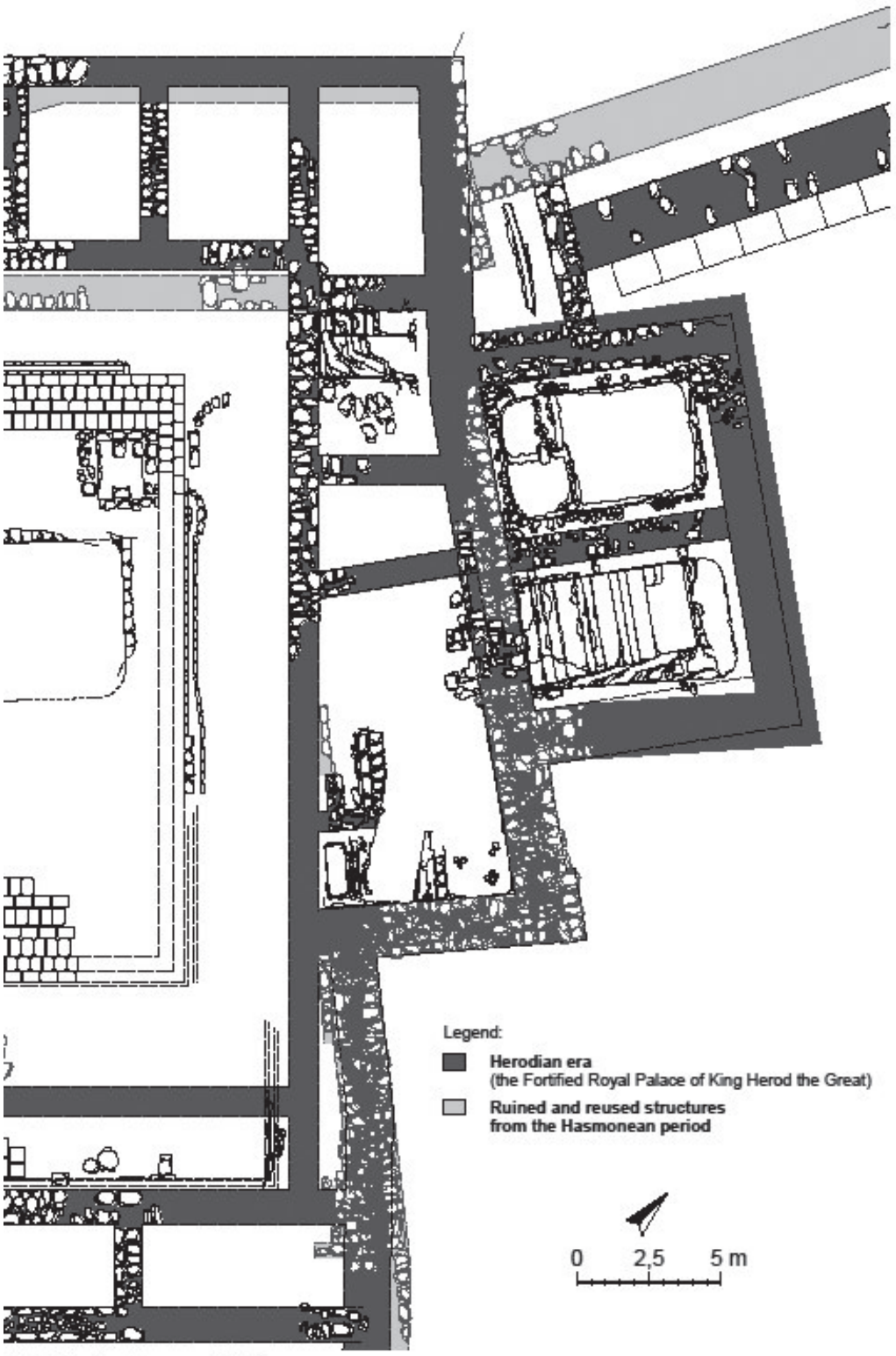
In June 1968, during the first excavation conducted at the ancient ruins of this Biblical citadel, the American Baptist Archaeological Mission (led by the Baptist Minister E. Jerry



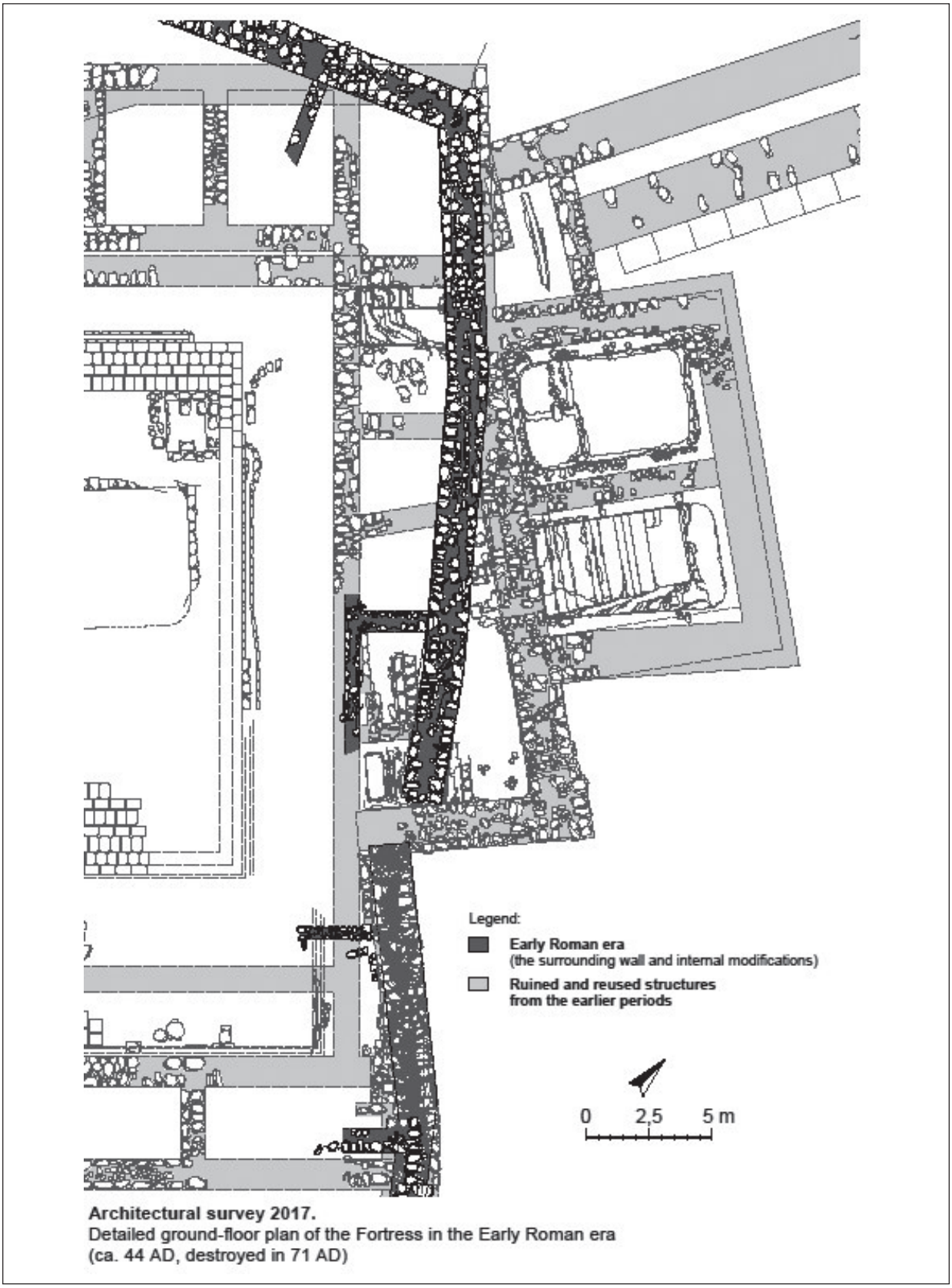
6. Ground floor plan of the Machaerus citadel, illustrating the 2016-2017 excavation trenches.



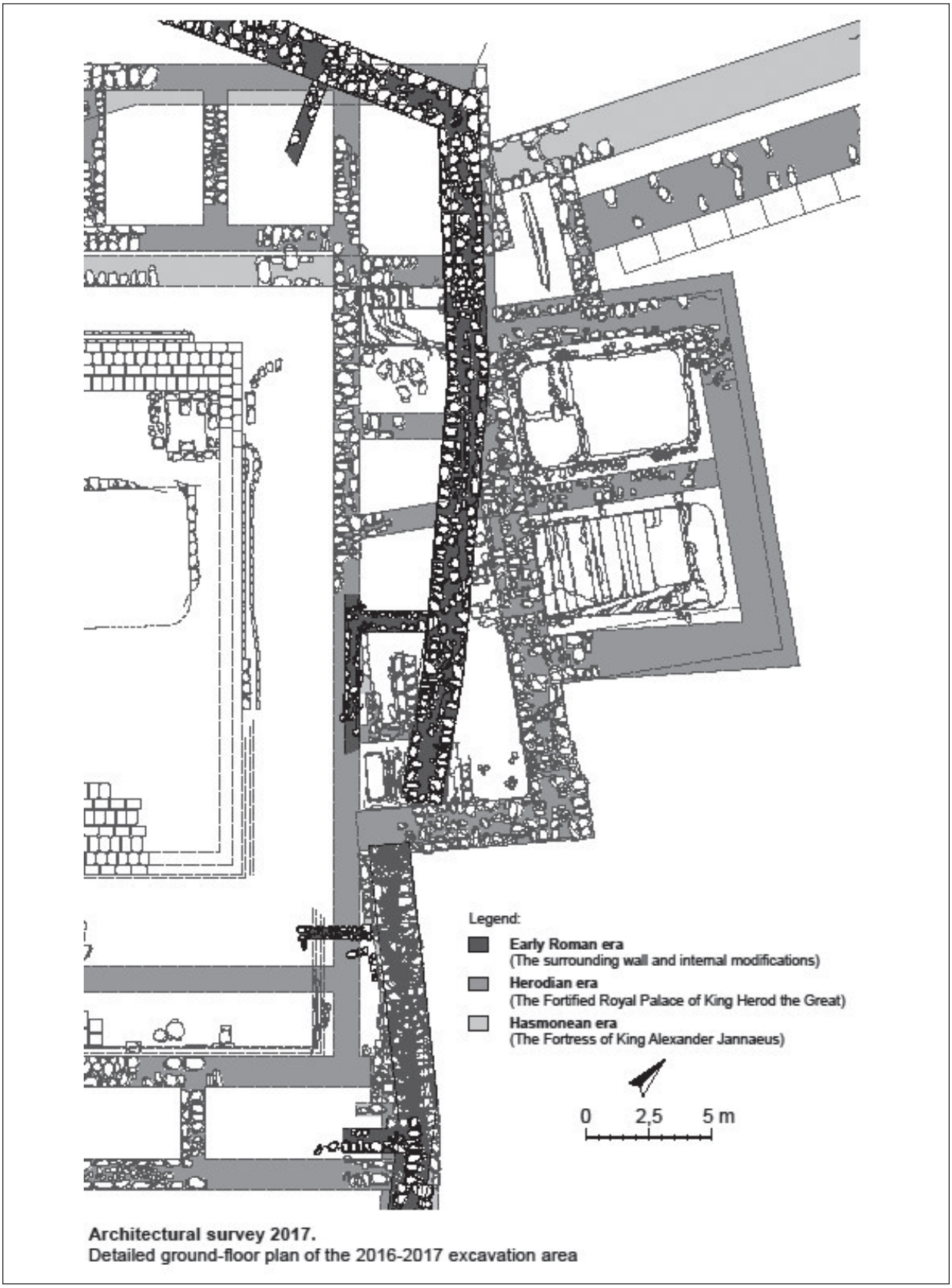
7. Detailed ground floor plan of the Fortress of King Alexander Jannaeus.



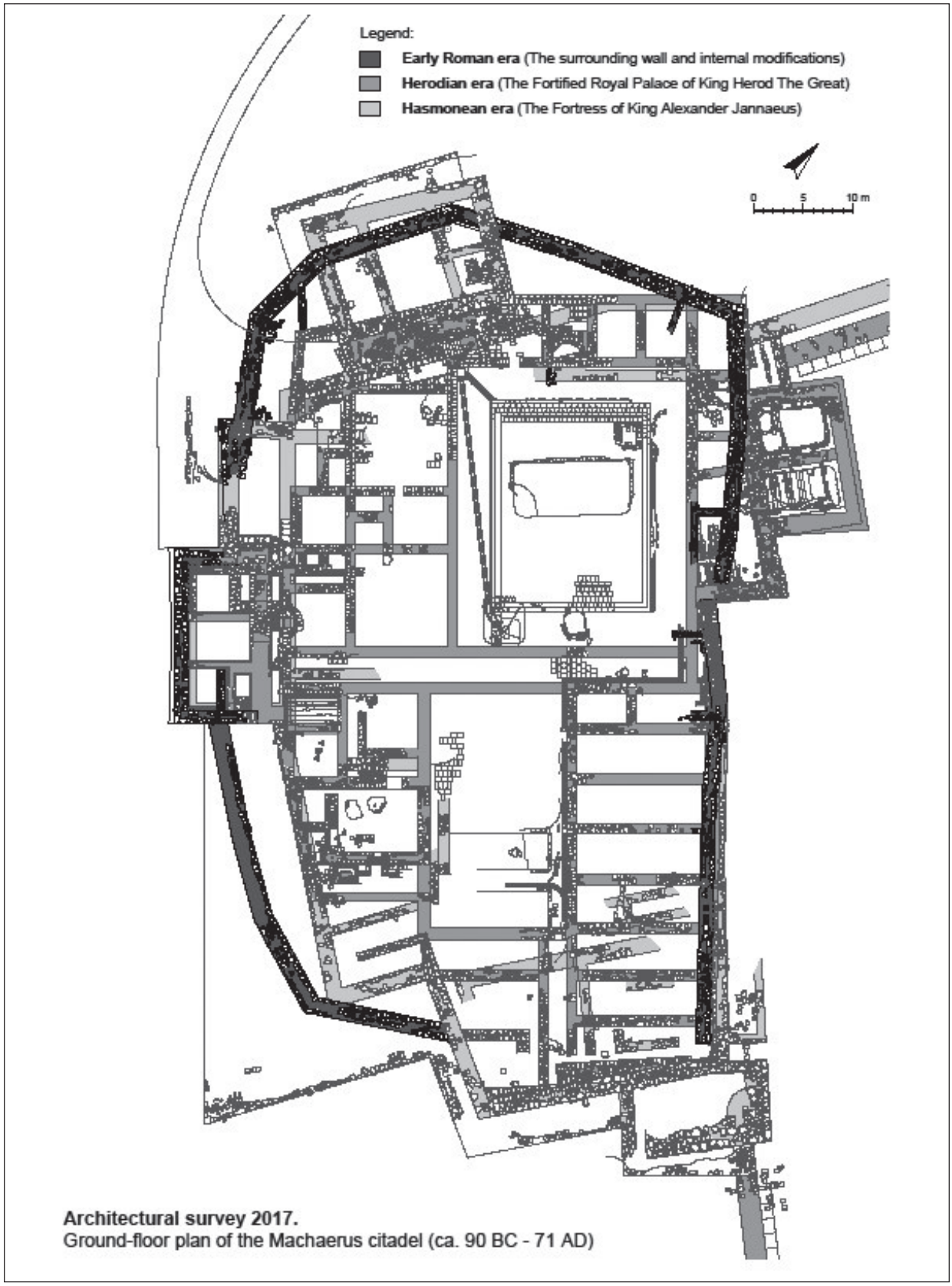
8. Detailed ground floor plan of the fortified Herodian Royal Palace.



9. Detailed ground floor plan of the fortress in the early Roman period.



10. Detailed ground floor plan of the 2016-2017 excavation area.



11. Ground floor plan of the Machaerus citadel.

Vardaman) discovered and identified the *apodyterium* and *caldarium* halls of the Early Roman bathhouse at Machaerus. This is the fourth largest built by King Herod; after the Lower Herodium, the Third Palace in Jericho and the Western Palace of Masada (Vörös 2015: 170-177; Netzer 2009: 256). The Americans also discovered a wonderfully preserved, small ritual immersion bath (a mikveh or hammam-tahara for tabila) for the royal family outside the walls of the splendidly decorated royal bathhouse; hence it provided a ritual rather than hygienic function. The wooden door and the segment-vaulted roof were both still intact; thus perfectly preserving the Herodian 3D architectural space. (**Fig. 12**)

In September 1979, the Italian-Franciscan Archaeological Mission, directed by Virgilio Corbo (OFM), completed the American excavation of the Herodian royal bathhouse at Machaerus, and discovered the only *in situ* Attic base of an Early Roman Ionic column from the Gospel period citadel, on the *stylobate-crepidoma* of the *apodyterium* hall. They also unearthed a beautiful mosaic floor in the *tepidarium*, and excavated the connected *frigidarium* bath as well, which clearly did not have a ritual function (Corbo 1979: 315-326). In 1981, the Franciscans discovered another mikveh outside the bathhouse; however, unlike that found by the American Baptist mission, it was outside the walls of the citadel, in a house in the lower city of Machaerus. (**Fig. 13**) Virgilio Corbo's excavation report states that this small, domestic, private mikveh *"cannot be excluded [as] a ritual bath"*(Corbo-Loffreda 1981: 284).

During March-April 2014, the Hungarian Archaeological Mission re-erected, with clean anastylosis, one of the 475cm high, complete Ionic columns of the *apodyterium* hall in the bathhouse at Machaerus, on the exact place where the Corbo excavation had discovered the *in situ* Attic base, and also completed a theoretical architectural reconstruction of the complete bathhouse (Vörös 2015: 26-79 and 426-457). In addition, it appears that all Machaerus excavations have the same destiny; during our 2016 and 2017 seasons, as did the Baptists and the Franciscans, we discovered and fully excavated a one-one Herodian mikva'oth (the plural of mikveh), outside the bathhouse in the previously undiscovered and unknown northern wing of the royal Herodian fortified citadel, the only palace of King Herod the Great outside the borders of present-day Palestine and Israel (**Figs. 14-19**).

Discussion

We reconstructed the Herodian rainwater harvesting system of the Machaerus citadel,

12. The segment-vaulted, small Herodian royal mikveh, discovered in 1968, as it appears today from the inside.

13. The 1981 excavation photograph of the newly exposed private mikveh in the domestic quarter of the lower Herodian city of Machaerus. Viewed from the north.

14. *The three steps at the bottom of the small northern Herodian royal mikveh in the citadel, discovered during the 2017 excavations, viewed towards the north. The surrounding wall of the Early Roman garrison is clearly visible on the right side of the photo. Before the destruction of the mikveh (probably in 36 AD) it may have had a well-made vaulted roof, as a large quantity of well-dressed Herodian ashlar stones had accumulated in its interior and in the immediate surroundings.*

15. *The monumental royal "Qumranic" mikveh, taken during the 2016 excavation. View from the south-east. Two large column drums are visible at the level of the fourth step, providing a clear indication of the final destruction of the citadel in 71 AD.*

incorporating the newly discovered, large royal mikveh bath (which has 12 perfectly preserved steps). This was the seventh in a

16. *The cistern and the king size royal mikveh can be seen in the foreground of the photo, with the two columns from the Herodian royal palace, which were re-erected in 2014, visible in the background. Taken during the 2016 excavation season. View from the north.*

17. *The completed, c. 1000 m² excavation area of the 2016-2017 archaeological seasons. View from the south.*

series of overflowing plastered rainwater basins, which flowed into each other (**Figs. 20-22**). Just before the ritual bath, there is a newly discovered six meter deep cistern; this does not have stairs, as this would have diminished the water capacity. Its general physical appearance (together with the mikveh next to it) is similar to the mikva'oth-tandems in Jericho, which have an "otzar" (reserve or storage pool). It also very much resembles the Qumran mikva'oth, particularly the loculi, (Roland de Vaux (OP) Nos. 48-49, 56 and 138), and the architectural design, with its triple-stairs and breathtaking wide steps in the pool staircases. (**Figs. 23-25**) The general architectural features and physical appearance of both the ritual and non-ritual staircases in the pools at the Herodian citadel of Machaerus are very similar; in the three royal mikva'oth (discovered in 1968, 2016 and 2017, respectively) and the *frigidarium* (excavated in

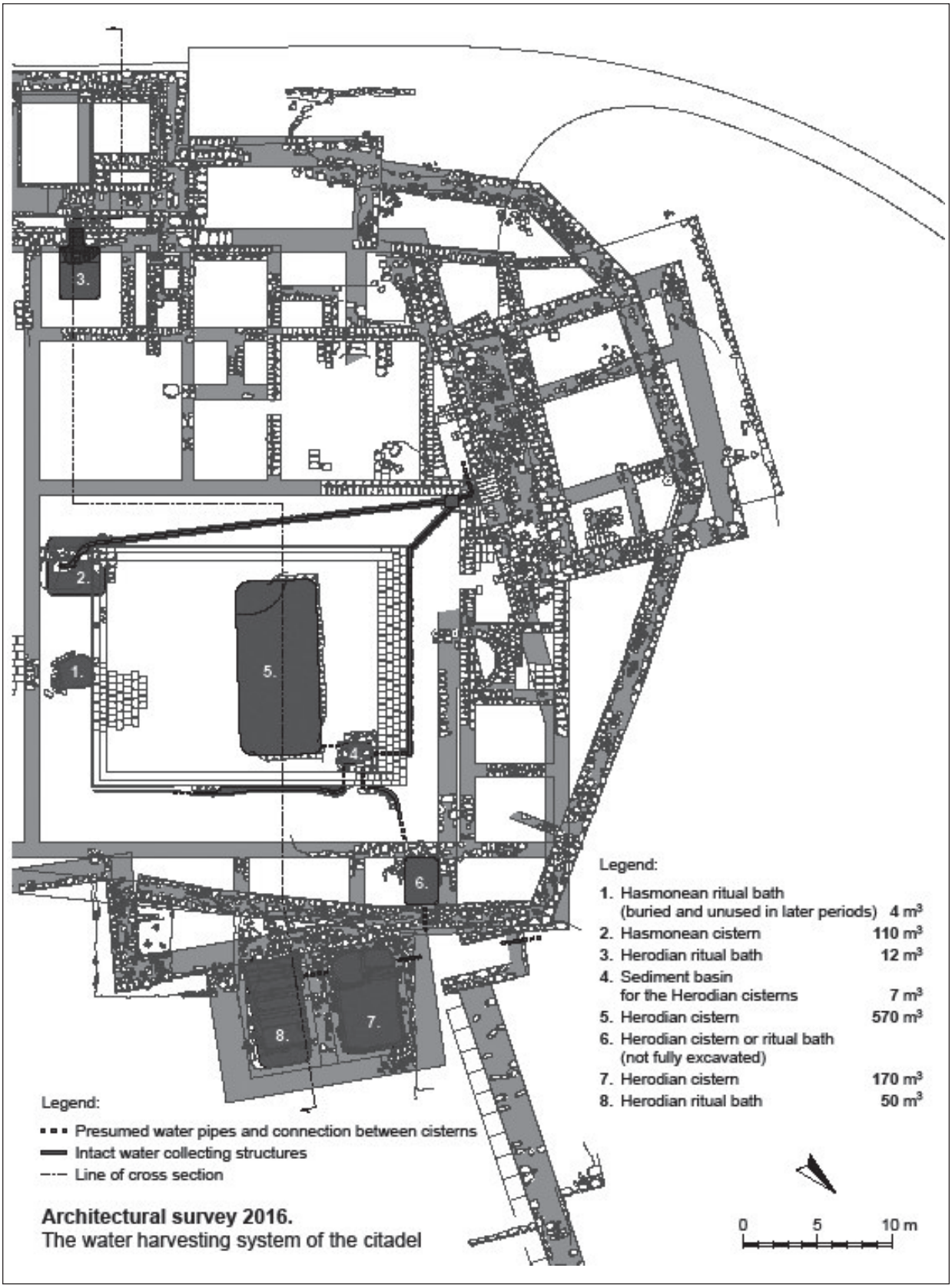
18. The newly discovered, completely excavated, Qumranic style, monumental Herodian royal mikveh at Machaerus, with the re-erected columns of the palace in the background.

19. The king size royal Herodian mikveh, with its intact staircase of 12 steps, and the six meter deep cistern, "otzar" next to it (above), in the early morning Dead Sea sunshine. View from the south.

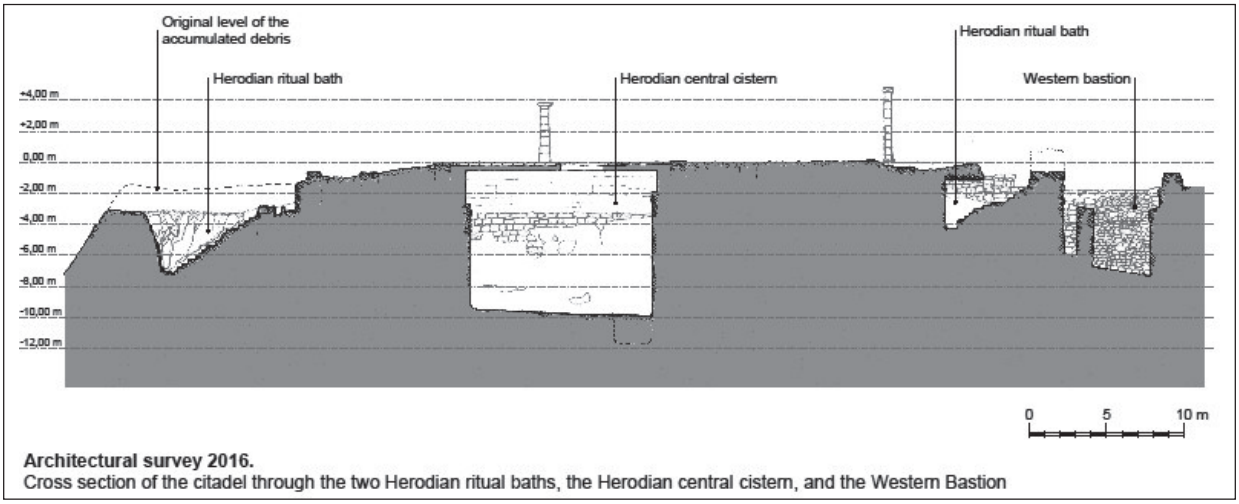
1979, **Fig. 26**). In addition to this, all four have the same type of plaster; thus, they have to have been constructed by King Herod the Great, c. 30 BC.

According to our archaeological discoveries, the newly discovered king-size mikveh, (the uppermost step of which is a good three meters lower than the level of the royal Herodian Doric *porticus* courtyard), originally had a vaulted stone roof, the architectural remains of which had accumulated in the bottom of the ritual bath. The roof of the other, much smaller Herodian royal mikveh at the citadel, discovered by the Americans 48 years earlier, is *in situ*; however, it has a segment-vaulted architectural space and form. Some years after the destruction of Machaerus by the Nabataean army of King Aretas IV Philopatris of Petra in 36 AD, a Roman fortress was built upon the ruins of the Herodian fortified palace. This took place after the 44 AD death of King Agrippa I, when Machaerus became a dominium of the Praefectus Judaeae. Its polygonal surrounding defense wall incorporated all of the earlier Herodian citadel, except for the northern wing, as only the basement level survived the Nabataean destruction; this became part of the uppermost area of the post-Herodian lower city (**Figs. 10-11**). During the post-Herodian period, the once magnificent king-size royal mikveh in the former palace, which had been used by the King and the Tetrarch Herods, was used as a kitchen; we discovered 12 fireplaces, thousands of cook-pot-fragments and animal bones in the ancient debris. The 71 AD demolition of the city by the Legion X Fretensis, commanded by Lucilius Bassus, was also evident in the upper stratum of the vertical stratigraphy of the excavation section profiles of the large royal mikveh; among the collapsed wall remains of the Roman fortress we uncovered four ballistic missiles. Moreover, in the identical horizontal stratigraphical layer, we uncovered two large-size column drums (**Fig. 15**).

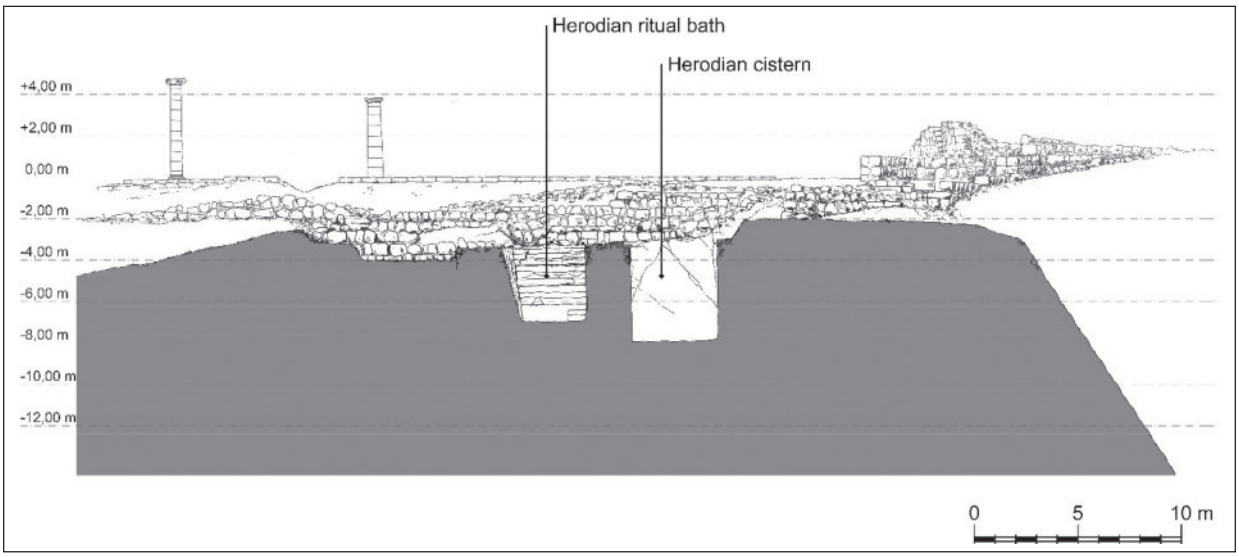
The ancient history of Machaerus had ended by 71 AD. However, its beginning did not start with the royal building activity of King Herod, c. 30 BC, as the Herodian royal builders had used the ruins of the Hasmonean citadel of High Priest King Alexander Jannaeus (erected around 90 BC), as foundations for their walls. During the 1980 excavations of the Herodian royal courtyard, under the south-eastern Doric porticus-corridor, the Franciscan Mission discovered a Hasmonean period mikveh. It



20. The water harvesting system for the citadel.



21. Cross section of the citadel, through the Herodian ritual baths, the Herodian cistern, and the Western Bastion.



22. Cross section of the Herodian ritual bath and the Herodian cistern.

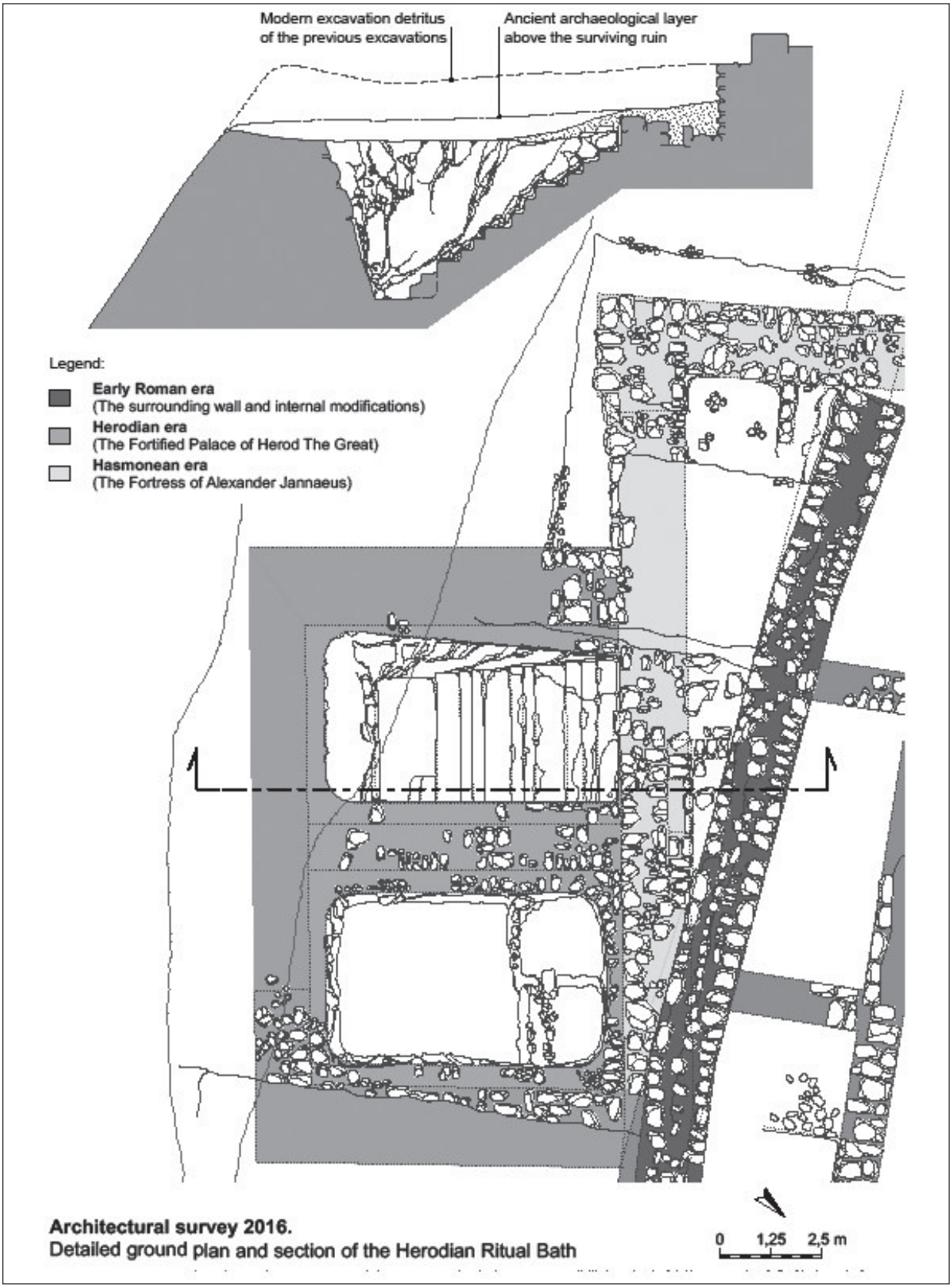
had been filled by the Herodian builders, and was hidden by the foundations of the new floor (Corbo 1980: 368; **Fig. 27**). In 2010, only seven meters from this small Hasmonean mikveh, the Hungarian Mission discovered and fully excavated a 15.5 meter deep Hasmonean cistern, which had a water capacity of 110 m^3; this reservoir had been incorporated into the rainwater harvesting system of the Herodian period citadel.

The Machaerus hilltop is an archaeological time capsule, covering one and a half centuries, between c. 90 BC and 71 AD, with only three periods; the late Hellenistic (Hasmonean), the Herodian and the Early Roman. Each period was ended by military destruction (which usually produces a great harvest for archaeologists). First, the Hasmonean royal fortress (erected c. 90 BC) was destroyed by the army of Aulus Gabinius in 57 BC. Secondly, the Herodian royal palace (erected c. 30 BC) was demolished by the armed forces of King Aretas IV Philopatris in 36 AD. Finally, the Roman garrison-fortress (erected by the Roman Praefectus Judaeae after the death of King Herod Agrippa I in 44 AD, which was occupied by the Zealots in 66 AD) was destroyed by the Legion X Fretensis, commanded by Lucilius Bassus, in 71 AD. This archaeological three layer sandwich is a unique opportunity to study and understand in context the built legacy and material heritage of New Testament period art, architecture and archaeology in the Trans Dead Sea Perea, which was not subsequently occupied.

23-24. Architectural similarities between the monumental Herodian royal mikveh of Machaerus, and one of the mikva'oth (Nos. 48 and 49) in Qumran (École Biblique Photothèque Number: 13630-QmPAM40424).

Retrospective Context of the Research History

Machaerus disappeared from the map after 71 AD, and during the Byzantine, Crusader and Ottoman periods, the Holy Land pilgrims did not know where this historical place could be found. In the history of visual arts, there are tens of thousands of imaginative representations of the once magnificent Herodian royal palace of Machaerus; the earliest known is the depiction in the *Codex Sinopensis* from the sixth century. (**Fig. 28**) They knew from Josephus, Eusebius and other authors that the Judean Machaerus at the Dead Sea was where Saint John the Baptist had been imprisoned and killed, but it was not on the map of the Promised Land! On 17 January 1807, Ulrich Jasper Seetzen visited the Transjordan-Perean area and found a small Muslim hamlet called Mukawer (Seetzen 1810). He guessed, based on linguistic etymology, that the truncated, pyramid shaped hilltop nearby, which had some visible surviving ruins, could be the lost Machaerus (which means sword in Greek) of antiquity (Seetzen 1854: Vol. II. 330-334). However, it was not until 1965 that August Strobel, a German compatriot of Seetzen, discovered by chance the 3.5 km circumvallation siege wall around the hill, in the late October afternoon sunlight. The destruction of Machaerus is very similar to the siege at Masada, which was also destroyed by the Legion X Fretensis, as Josephus states in his *magna opera* about the fate of both of the Dead Sea fortresses controlled by the Zealots. The huge Roman circumvallation wall was already an *opus delicti*; according to the historical sources, the only siege conducted by the Legion X Fretensis in Transjordan was at Machaerus. Strobel published his discovery three years later (Strobel 1968), and in that same year the American Baptist archaeological mission unearthed the first surviving walls, together with the mosaic and *opus sectile* floors of the once magnificent Herodian royal palace, pregnant with the history of this precious Gospel scene (Vörös 2013: 64-95; Vörös 2015: 110-241).



25. Detailed ground plan and section of the Herodian ritual bath.

26. *The young Father Michele Piccirillo (OFM) excavates the lower stratum in the plastered pool of the frigidarium. Taken during the 1979 excavations of the Herodian royal bathhouse of Machaerus.*

27. *The Hasmonean mikveh at the foot of the Herodian Doric column which was re-erected in 2014. View from the south-west.*

28. *The oldest known representation of the birthday banquet of Tetrarch Herod Antipas and the beheading of Saint John the Baptist in an unroofed prison at Machaerus. Codex Sinopensis, Folio 10 verso, in the National Library of France (Paris).*

It is now 49 years since the American Jerry Vardaman commenced fieldwork at Machaerus in 1968, which was the principal excavation season. In the second season in 1973, a German team, under the supervision of August Strobel, conducted a detailed survey of the Roman circumvallation siege monuments (Strobel 1974). Then followed two large scale archaeological excavations, conducted by two generations of Italian academics from the Studium Biblicum Franciscanum in Jerusalem, directed by professors Virgilio Corbo (OFM; 1978-1981) and Michele Piccirillo (OFM; 1992-1993). When the research team from the Hungarian Academy of Arts commenced its present excavations nine years ago, all of the previous generations of distinguished academics had passed away. The Hungarian team are likewise only a link in a predictably long chain of research generations, as the Herodian city of Machaerus is large enough to be excavated until the 23rd century. It is not a coincidence that Pliny the Elder wrote in 77 AD: *"Machaerus, next to Jerusalem, was once the most strongly fortified place in Judea"* (*Historia Naturalis* V 15, 16). This means that in antiquity, from the point of view of military defense, the fortified city of Machaerus was more important for the Hasmonean and Herodian kingdoms of Jerusalem than the fortifications of Masada, Herodium, Hyrcania or Alexandreion (Vörös 2013: 152-175).

Conclusion

Likewise, in terms of sacred archaeology in Christianity, Machaerus is much more important than the other Judean Herodian fortified royal palaces. As described above, the use of mikva'oth, as at Machaerus, was common during the Herodian period (c. 30 BC – 36 AD). There were three royal mikva'oth in the biblical citadel outside its glorious bathhouse, and there had to have been several similar ones in the lower city, such as the private domestic mikveh discovered in 1981 by the Franciscan Mission. In such a bathing and immersing surrounding, where ritual purification had to be a daily, common phenomenon, Saint John the Baptist was imprisoned. In light of the archaeological remains, we can now understand even better the first century words of Josephus: *"Now some of the Jews thought that the destruction of Herod's army* [and of Machaerus in 36 AD] *came from God, and that very justly, as a punishment of what he did against John, that was called the Baptist: for Herod slew him* [in ca. 30 AD]*, who was a good man, and commanded the Jews*

to exercise virtue, both as to righteousness towards one another, and piety towards God, and so to come to baptism; for that the washing [with water] *would be acceptable to him, if they made use of it, not in order to the putting away* [or the remission] *of some sins* [only]*, but for the purification of the body; supposing still that the soul was thoroughly purified beforehand by righteousness. Now when* [many] *others came in crowds about him, for they were very greatly moved* [or pleased] *by hearing his words, Herod, who feared lest the great influence John had over the people might put it into his power and inclination to raise a rebellion, (for they seemed ready to do anything he should advise,) thought it best, by putting him to death, to prevent any mischief he might cause, and not bring himself into difficulties, by sparing a man who might make him repent of it when it would be too late. Accordingly he was sent a prisoner, out of Herod's suspicious temper, to Machaerus, the castle I before mentioned, and was there put to death."* (*Antiquitates Judaicae* XVIII 5, 2)

HRH Prince El-Hassan bin Talal, Founder and Chairman of the Royal Scientific Society of Jordan, commemorated the historical place of Machaerus as follows: *"The evocative Citadel of Mukawir, or Machaerus to the ancient world, is a site that is redolent with the narrative and wonder of history and faith. It is one of those very special places that seem to exist beyond time and in its own space. It sits in a deeply imbued landscape that brings to life the resting chronicle of belief, devotion and struggle. This abandoned hilltop site with its faded but once magnificent fortified royal palace, occupies a strategic point overlooking the Dead Sea in the modern Hashemite Kingdom of Jordan. […] This story of death for faith and for love of an ideal makes Mukawir so much more than a fascinating archaeological site. It sits in the landscape of religious memory as a testament and place of pilgrimage, not only for Muslims, but for Christians too. In our country, our beloved Prophet Yehya is Saint John the Baptist by another name. He is the valiant predecessor of Jesus Christ and, indeed, he is rightly considered to be the Patron Saint of Jordan."* (Vörös 2015: 13); (**Fig. 29**).

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29. TRHs Prince El-Hassan bin Talal and Princess Sumaya bint el-Hassan receive a complimentary copy of the MACHAERUS II final excavation report from the author at the Hashemite Royal Palace. Prince El-Hassan wrote the Foreword for this academic monograph. (Photo: courtesy of the Royal Court)

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INVENTORY OF A LATE ISLAMIC SETTLEMENT: SMALL FINDS AND ANIMAL BONES FROM THE EXCAVATION AT BA'JA I

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with contributions by Benjamin Schröder and Michael Hochmuth

Introduction

In 1998 and 1999, the German Protestant Institute of Archaeology (GPIA) carried out a project with the support of the Department of Antiquities of Jordan (DoA), the Petra Regional Planning Council (PRPC) and the Kirchliche Hochschule Wuppertal, under the joint directorship of Hans-Dieter Bienert, Roland Lamprichs and Dieter Vieweger. Generous financial support was received from the Fritz Thyssen Foundation and the Evangelische Kirche in Deutschland (EKD) (Bienert *et al.* 2000: 119; Bastert *et al.* 2000: 39; Bienert *et al.* 2002: 161).

The project was designed to study the archaeology of the Ba'ja region, situated in the greater Petra area, and document its remains from the earliest time of human occupation until the Ottoman period.

The research history and survey results, including pottery collected during the survey and general stratigraphy, together with *loci* descriptions, have previously been published in a number of articles (Bienert *et al.* 2000: 119; Bastert *et al.* 2000: 39; Bienert *et al.* 2002: 161). Micaela Sinibaldi is studying the pottery collected during the excavation seasons (in prep.).

The objective of this article is to present the small finds and the animal bones excavated at Ba'ja I in 1999. Although these finds are not particularly remarkable, they do however give an overview of the inventory of a rural Mamluk/Ottoman household. Very few sites from this period have been excavated, and even more rarely published. Therefore, the finds from this site provide a significant addition to the literature.

Stratigraphy and Architectural Features

In 1998, a survey was conducted by Hans-Dieter Bienert and Roland Lamprichs at Ba'ja I; the pottery collected was identified as: Iron Age II (?) (0.72 %), Nabataean (10.04 %), Late Roman/Byzantine (12.90%) and Late Islamic/ Ottoman (76.34 %) (Bienert and Lamprichs 1999: 97–131, Tab. 3–4; Bienert *et al.* 2002: 173 Tab. 8).

Based on these results, a four-week excavation was conducted under the joint directorship of Hans-Dieter Bienert, Roland Lamprichs, and Dieter Vieweger in autumn 1999, in order to define the stratigraphy and architectural structures of this primarily Late Islamic site. An area of more than 120 m^2 was selected on the highest point of the terrain, southeast of a modern stone house, where traces of architectural structures were visible on the surface. An architectural edifice was uncovered in this central excavation area, consisting of an agglomeration of six rooms (AA 52, AA 53, AA 52/53, AB 52, AB 53 and AC 52) founded on bedrock. The bedrock was levelled with soil and stone fills, creating a nearly horizontal surface (Vieweger 2000: 135; Bienert *et al.* 2002: 174).

Two Late Islamic settlement phases – designated respectively as 'older' and 'younger' – can be distinguished; represented by two distinct floor levels and changes in the interior room layout. In some cases, the same walls and floors were used in both phases. No architectural remains were encountered below the older Late Islamic stratum, although a few pre-Islamic pottery sherds were uncovered, both in the filling and the construction level below the older level. Therefore, it can be concluded that there was no settlement at this excavation

area prior to the Late Islamic.

The rooms of the Central Area were constructed at the same time, but used different construction methods. The entrances of AA 53, AA 52/53 and AA 52 face west. AA 52/53 and AB 53 were originally connected by a door, which was blocked in the younger Late Islamic phase. Rooms AB 52 and AC 52 formed a single unit, probably entered by the unexcavated room AA 51.

In order to examine the extension to the architectural structure in the Central Area, a trench was opened to the north (Northern Trench AA 54–56; Vieweger 2000: 137–138); four occupational phases can be distinguished. Two levels dating to the Late Islamic period, contemporaneous with the phases in the Central Area, as well as an Ottoman stratum on top. In AA 56, a large gate was uncovered belonging to the older Late Islamic phase; it was blocked during the younger Late Islamic phase and used as a wall during the Ottoman phase. The area immediately to the south of the gate was carefully paved in the older Late Islamic phase; during the younger Late Islamic phase, the area was used as a rubbish dump which yielded countless sherds and animal bones (L 80).

According to the pottery, the Late Islamic strata can be dated to the Mamluk/Ottoman period (*pers. com.* M. Sinibaldi).

In contrast to the Central Area, a considerable quantity of Roman and Nabataean artefacts was uncovered below the older Late Islamic level in the Northern Trench. Beneath the Late Islamic Walls 99 and 100, a Nabataean/Roman stratum was exposed, which included an extremely hard layer (L 116) with a fire place (L 167) (Vieweger 2000: 138; Bienert *et al.* 2002: 175). However, no built structures could be discerned. The excavators believe it received only seasonal use during the Nabataean/Roman period.

As canals, cisterns, water reservoirs, terraces and wine presses were found close to the site of Ba'ja I, it had been assumed that a larger permanent Nabataean settlement must have existed in that area. However, the excavations at the Central Area and the Northern Trench do not provide evidence to support expectations in this regard. Therefore, another area on the hill southwest of the Central Area was chosen for excavation. Houses constructed at this place would best fulfil Nabataean requirements for safeguarding the area (Vieweger 2000: 138). While cleaning the surface of this small hill, the foundations of a rectangular building measuring *c*. 13m x 16m were uncovered. Roman and Nabataean sherds were collected on the eastern slope of the hill; it was decided to open a trench at this place (K 51, L 51 and L 52). As in the Central Area, two Late Islamic architectural phases could be identified. Below the Late Islamic walls (W 122 and W 119), architectural remains (W 162) of the Roman/Nabataean stratum were exposed. This site was identified as a seasonal campsite during the Nabataean/Roman period, but may possibly be a permanent outpost of nearby Petra (Vieweger 2000: 139).

Small Finds

The assemblage of small finds from the Central Area, the Northern Trench and the Western Hill excavations is comprised of 63 ground-stone tools, 42 flint objects, 84 metal objects, 279 fragments of iron slag, three ceramic objects and five glass sherds. These objects have been categorized according to their material and function below. Following the catalogue, the distribution of finds is examined, in order to understand the functions of the various rooms, and the layout of the settlement.

The catalogues for the objects are arranged according to the following system:
- Inventory number
- Square locus phase
- Measurements
- Description.

The following abbreviations have been used:
- dm. = diameter
- g. = gram
- h. = height
- l. = length
- max. = maximum
- w. = width
- wt. = weight
- rem. = remaining
- th. = thickness

Metal Objects

84 metal objects, 279 fragments of iron slag, and one piece of lead were uncovered

in the course of the excavation. The corpus is comprised of three tools, 65 fitting objects, one weapon and five personal ornaments. The tools consist of three knife blades (**Fig. 1a**). The fittings consist of 48 bands, one nail head, five hooks, two bolts, four rings, and four disc-shaped objects (**Fig. 1d**). The personal ornaments consist of two finger rings (**Fig. 1f**), two bracelets (**Fig. 1e**), and one belt buckle. The weapon is represented by one arrowhead (**Fig. 1b**). It was not possible to determine the function for ten of the objects.

78 of the objects are made of iron (**Fig. 1a. b. d.)**; the five personal ornaments were made from bronze (**Fig. 1e. f**). One indeterminate lead object (**Fig. 1c**) was found.

Finds distribution is classified according to the class of objects (**Fig. 2**). Personal ornaments were only found in rooms AB 52 and AB 53 of the Central Area. One knife blade was excavated in room AB 53 of the Central Area; the other two on the Western Hill (L 52). The arrowhead was uncovered in room AB 52. Fragments of 15 bands, 14 bands with rivets, four rings, four ring-shaped disks, one hook, and 18 undetermined pieces were found in a single *locus* in room AA 53; it can be assumed that they belong to a single object (for example, a box or a door) made of some now vanished material. No other metal objects were found in this room. A single nail head was found in room AA 52. Another concentration of fittings was found in room AB 52. No metal objects were found in rooms AA 52/53 or AC 52, nor in the Northern Trench (AA 54–56). The slag fragments, together with the lead object, were uncovered in the excavation on the western hill (K 51, L 51, L 52).

The object groups (tools, fittings, personal ornaments and weapons) were found in both older and younger Late Islamic strata. The iron slag was present in the Late Islamic strata as well as the pre-Islamic stratum of the Western Hill excavation.

The distribution of the metal finds corresponds with the activities which can be identified by the distribution of ground-stone tools (see below): Household tasks were done in rooms AA 53, AB 52 and AB 53. Iron processing was only carried out on the Western Hill.

Catalogue of Metal Objects

Central Area

7903
AA 53 L 51 both phases below floor level
Iron, fragments of 15 bands with rivets, 14 bands, 1 knob with rivet, 4 ring-shaped discs, 4 rings, 1 hook, 18 fragments of undetermined function and shape

7906
AB 52 L 72 younger phase on floor level
Rem. l. 5.8 cm, max. w. 1.5 cm
Iron, 1 hook

7905
AB 52 L 73 older phase
Rem. l. 2.3 cm, max. w. 2.2 cm
Iron, 1 nail head

7907-7908
AB 52 L 89+90 older phase
Rem. l. 7.9 cm, max. w. 0.6 cm, th. 0.15 cm
Bronze, 2 fragments of hook of a buckle

7910
AB 52 L 91 older phase
Max. l. 1.5 cm, th. 0.15 cm
Iron, 1 small fragment

7914-1
AB 52 L 91 older phase
l. 7.0 cm, w. 1.6 cm, th. 0.4 cm
Iron, 1 arrowhead

7914-2
AB 52 L 91 older phase
l. 2.5 cm, th. 1.0 cm
Iron, 1 hook

7911
AB 52 L 104 older phase
Dm. 2.1 cm, th. 0.4
Bronze, 1 closed finger ring with one flattened end, the other is broken off

7913
AB 52 L 105 older phase
l. 6.6 cm, w. 2.8 cm, th. 0.6 cm
Iron, 1 hook

7919-1
AB 52 L 112 older phase
Rem. l. 4.7 cm, w. 2.3 cm, th. 0.5 cm
Iron, 1 fragment of band

7919-2
AB 52 L 112 older phase
l. 3.6 cm, w. 1.0 cm, th. 0.9 cm
Iron, 1 hook

7919-3
AB 52 L 112 older phase
l. 4.2 cm, max. dm. 1.6 cm

Iron, 1 bolt

7915

AB 52 L 114 older phase

Rem. l. 5.8 cm, rem. w. 1.4 cm, th. 1.0 cm

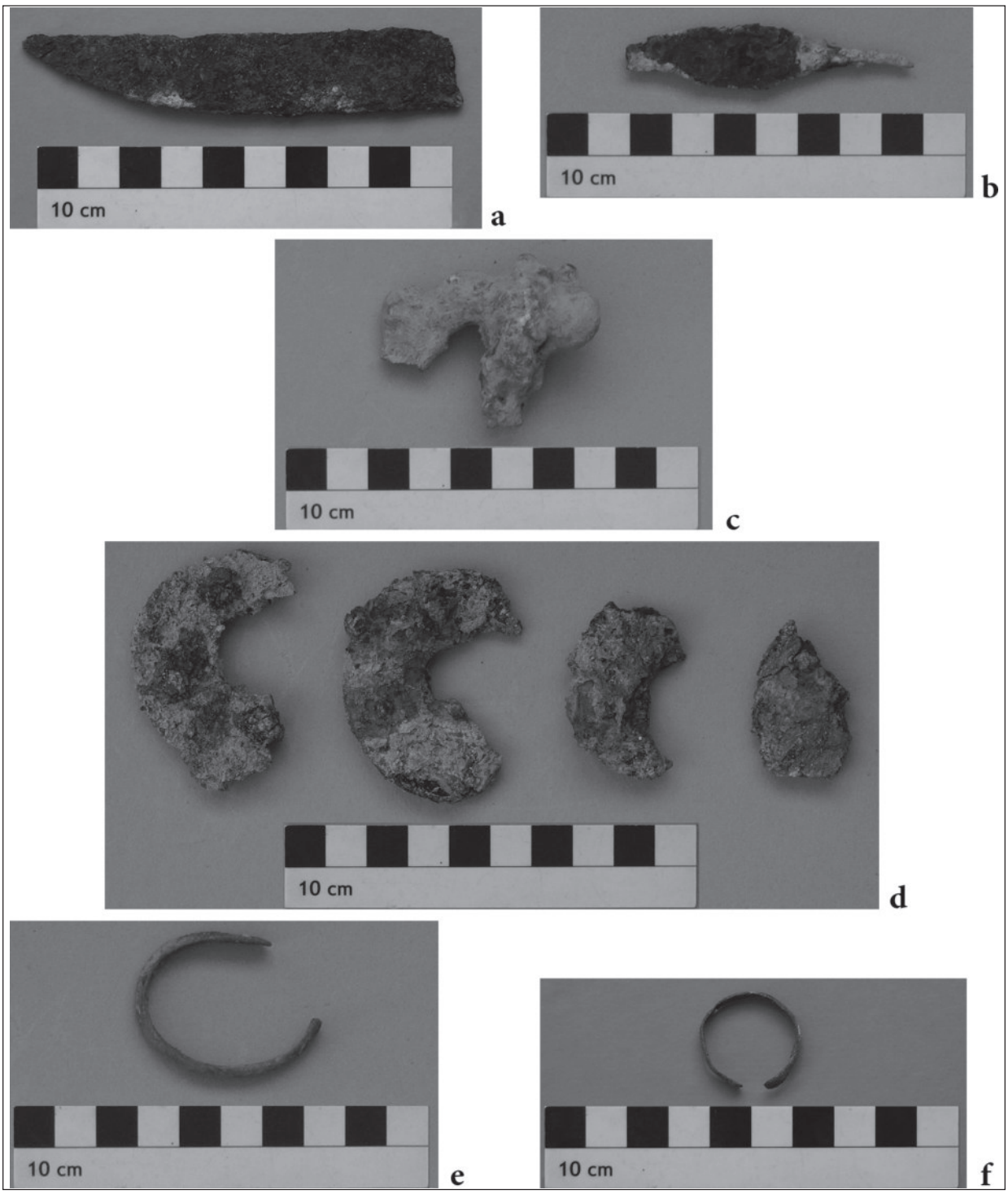
Iron, 8 fragments of a hook

7925

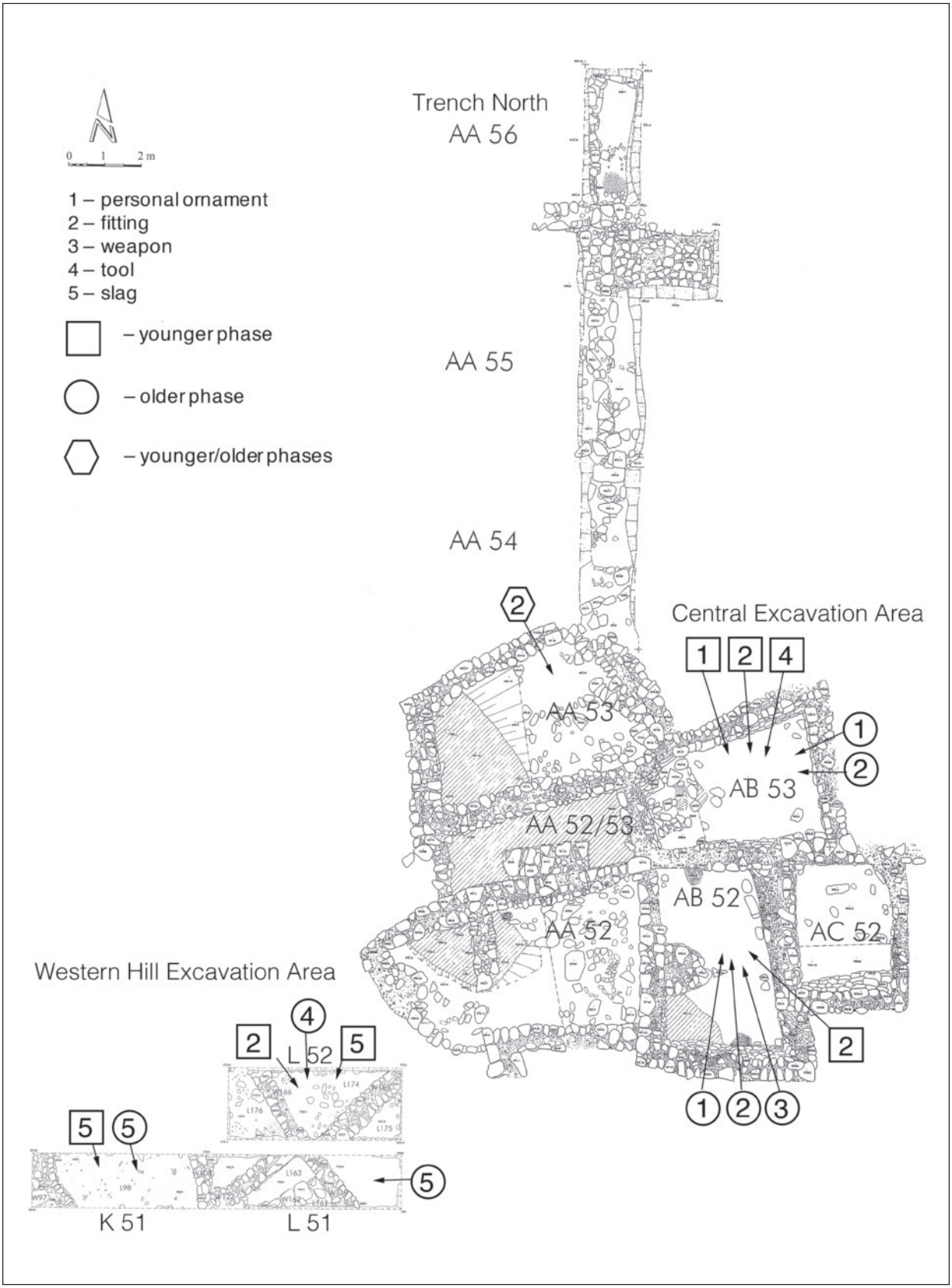
AB 53

Max. dm. 4.4 cm, th. 0.3 cm

Bronze, 1 small bracelet with one flattened end, the other end is broken off



1. a) Iron knife blade 7901; b) Iron arrow head 7914; c) Piece of lead 7924-2; d) Iron fittings 7903; e) Bronze bracelet 7925; f) Bronze finger ring 7900.



2. Distribution of metal finds.

7900
AB 53 L 14 younger phase
Max. dm. 2.4 cm, th. 0.1 cm
Bronze, 1 open finger ring
7901
AB 53 L 14 younger phase
Rem. l. 10.65 cm, max. w. 2.0 cm, th. 0.3 cm
Iron, 1 knife blade
7902
AB 53 L 50 younger phase
Iron, 8 small undetermined pieces
7909
AB 53 L 94 older phase on floor level
Max. dm. 4.3 cm, th. 0.3 cm
Bronze, 1 small open bracelet with one flattened end, the other is broken off

Western Hill Excavation
7912
K 51 L 98 younger phase
iron, 4 pieces of slag
7917
K 51 L 108 younger phase
Iron, 1 slag
7916
K 51 L 121 older phase
Iron, 50 slags
7918
K 51 L 123 older phase
iron, 22 slags
7922
L 51 L 126 older phase
Iron, 11 slags
7920
L 52 L 150 younger phase
iron, 46 slags
7921-1
L 52 L 147 younger phase
Iron, 30 slags
7921-2
L 52 L 147 younger phase
Rem. l. 11.4 cm, max. dm. 3.0 cm
Rron, 1 fragment of a bolt
7921-3
L 52 L 147 younger phase
iron, 3 fragments of one(?) knife
7923-1
L 52 L 154 older phase
Rem. l. 6. cm, max. w. 2.1 cm, th. 0.7 cm
Iron, 2 fragments of a knife blade
7923-2
L 52 L 154 older phase
Iron, 114 slags
7924-1
L 52 L 174 oldest phase, pre-Middle Ages?
iron, 1 slag
7924-2
L 52 L 174 oldest phase, pre-Middle Ages?
Lead, 1 undetermined fragment

Ground-Stone Objects

63 ground-stone objects were uncovered during the 1999 excavation season; the corpus is comprised exclusively of household items and architectural objects, almost half of which (30 objects) were used for grinding. Types include 14 upper grinding stones (**Fig. 3a**), 11 lower grinding stones (one uncertain; **Fig. 3c**), and five manually operated flour mills (**Fig. 4a. b**). Four undressed stones with holes were probably used as loom weights (**Fig. 5b**). The rest can be categorised as rubbing stones (**Fig. 3b**), a ring stone (**Fig. 5a**), mortar bowls (**Fig. 3d**), and hammer stones (**Fig. 4d**). The architectural objects are comprised of seven door sockets of various types (**Fig. 4c**).

There are three stone types: basalt, the least numerous with three objects (**Fig. 4b**), limestone and sandstone, of varying stone quality. No obvious regularity can be discerned for using a particular type of stone for the different types of objects, nor can typological differences in the various groups of ground-stone objects be recognized.

The objects were found in all excavated areas except AA 52/53 and AC 52 (**Fig. 6**). The objects identified as loom weights (**Fig. 5b**) are concentrated in younger Late Islamic phase contexts of AB 52; It can be proposed that a standing loom was situated in this room. Grinding tools were always found when stone objects were excavated. Therefore, it can be proposed that grinding and milling was performed in all these rooms, rather than concentrated in a single place.

The mills (**Fig. 4a. b**) were found in *loci* which cannot positively be associated with either the younger or older Late Islamic phases. Therefore, it is not possible to say whether they were used in both phases or belong only to one phase. Upper and lower grinding stones were found in both the older and younger phases.

Catalogue of Ground-Stone Objects

Central Area

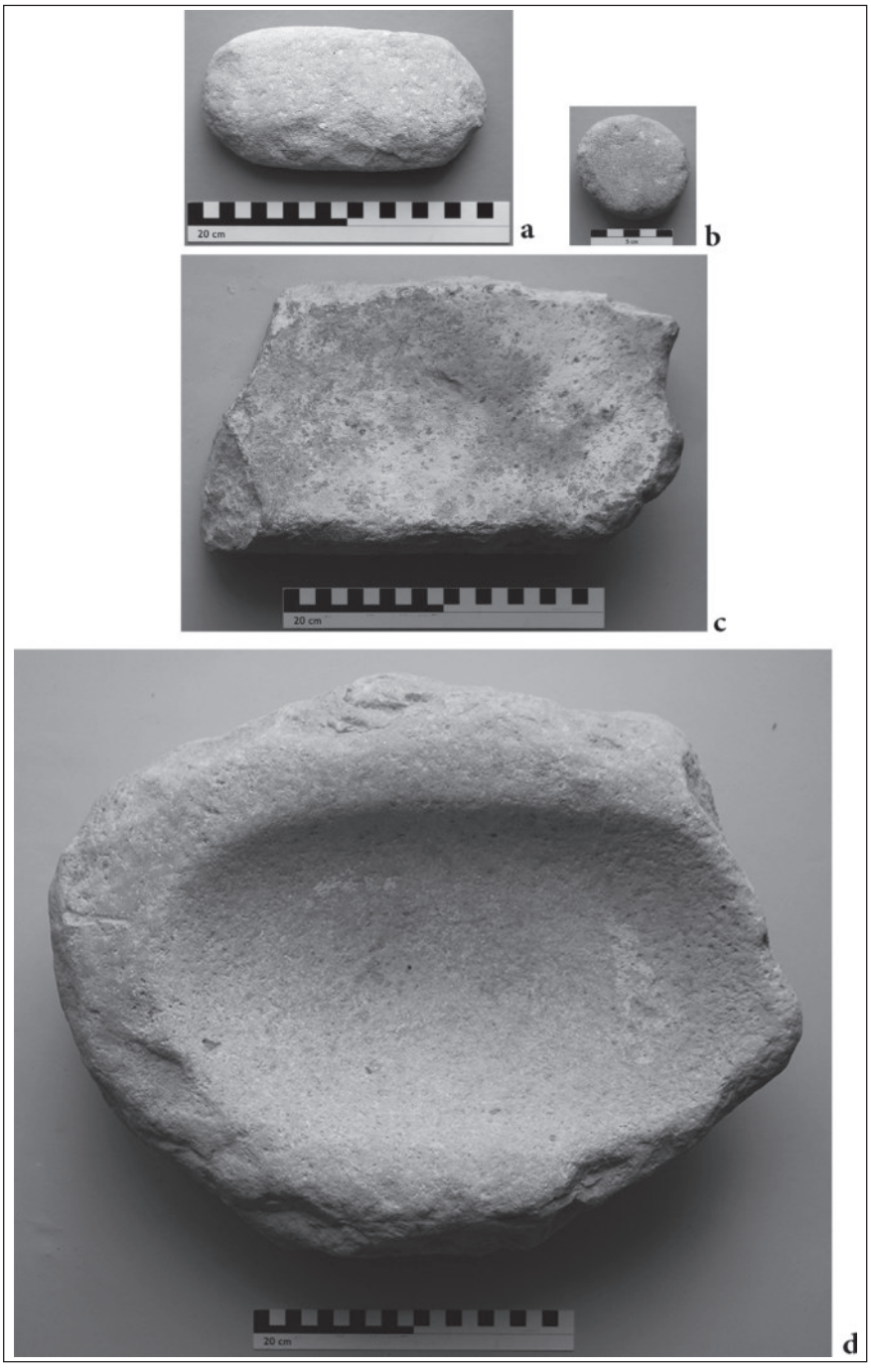
6001
AA 52 L 3 both phases
l. 12.4 cm, w. 8.5 cm, h. 8.2 cm
Limestone, door socket

6002
AA 52 W 7 both phases
rem. l. 7.5 cm, w. 6.3 cm, h. 2.9 cm
Sandstone, fragment of upper grinding stone

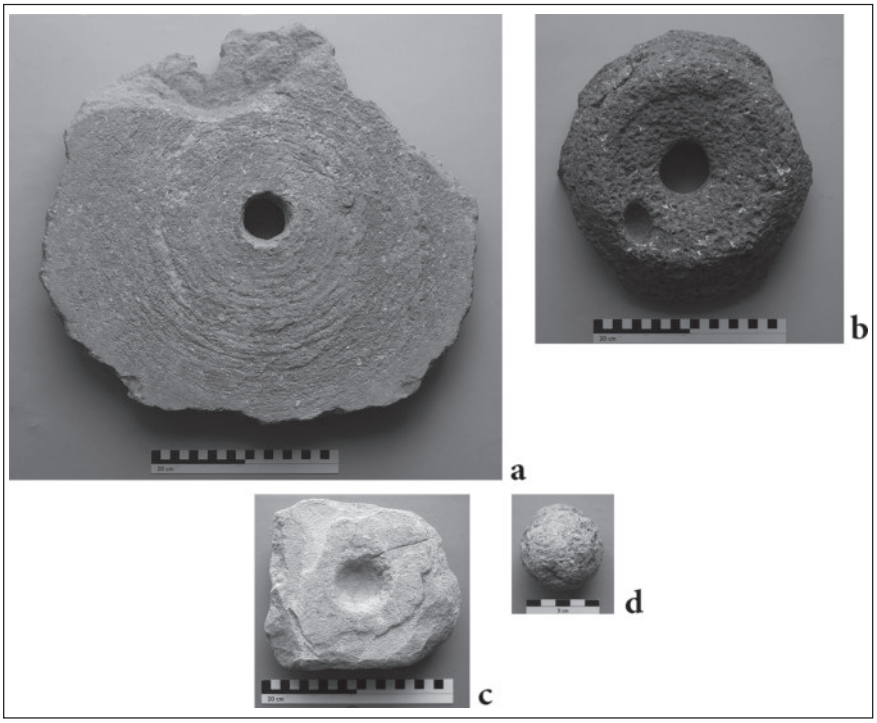
6012
AA 53 L 12 both phases
Rem. l. 8 cm, rem. w. 8.4 cm, rem. h. 4.1 cm
Basalt, fragment of 6010

6013
AA 53 L 12 both phases
Rem. l. 7.5 cm, w. 8.3 cm, h. 4.3 cm
Sandstone, upper grinding stone

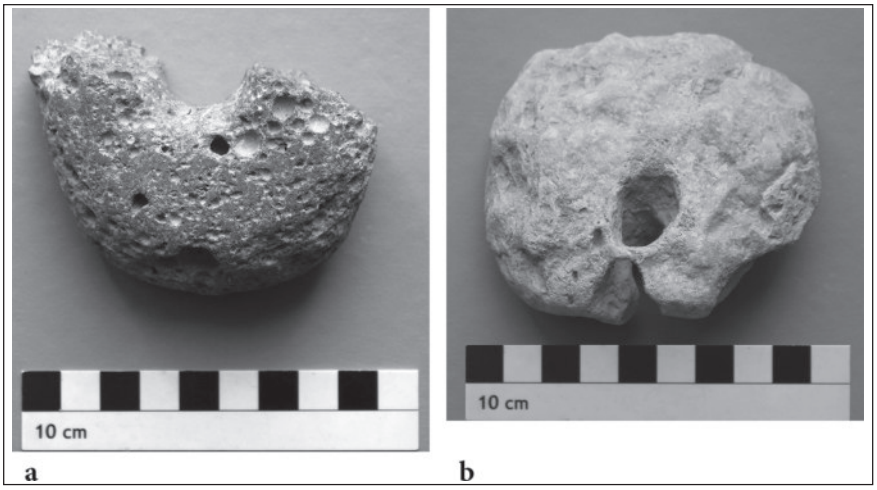
6500
AA 53 L 12 both phases



3. a) Upper grinding stone 6008-2; b) Rubbing stone 1820-4; c) Lower grinding stone 6016-4; d) Mortar bowl 6020-1.



4. a) Lower part of manually operated flour mill 6015-1; b) Upper part of manually operated flour mill 6010+6012; c) Door socket 1808; d) Hammer stone 1816.



5. a) Ring stone 1805; b) Loom weight 1809.

Rem. l. 22.2 cm, rem. w. 19.9 cm, rem. h. 5.8 cm

Sandstone, fragment of lower grinding stone?

1801-2

AA 53 L 17 both phases

Max. dm. 39.0 cm, h. 4.4 cm

Limestone, fragment of upper part of manually operated flour mill

1801-3

AA 53 L 17 both phases

Rem. dm. 22.8 cm, h. 4.9

Limestone, fragment of lower? part of manually operated flour mill

1802

AA 53 L 17 both phases

Rem. l. 12.5 cm, rem. w. 27.5 cm, rem. h. 9.5 cm

Sandstone, fragment of lower grinding stone

1803

AA 53

l. 31.6 cm, w. 20.7 cm, h. 17.2 cm

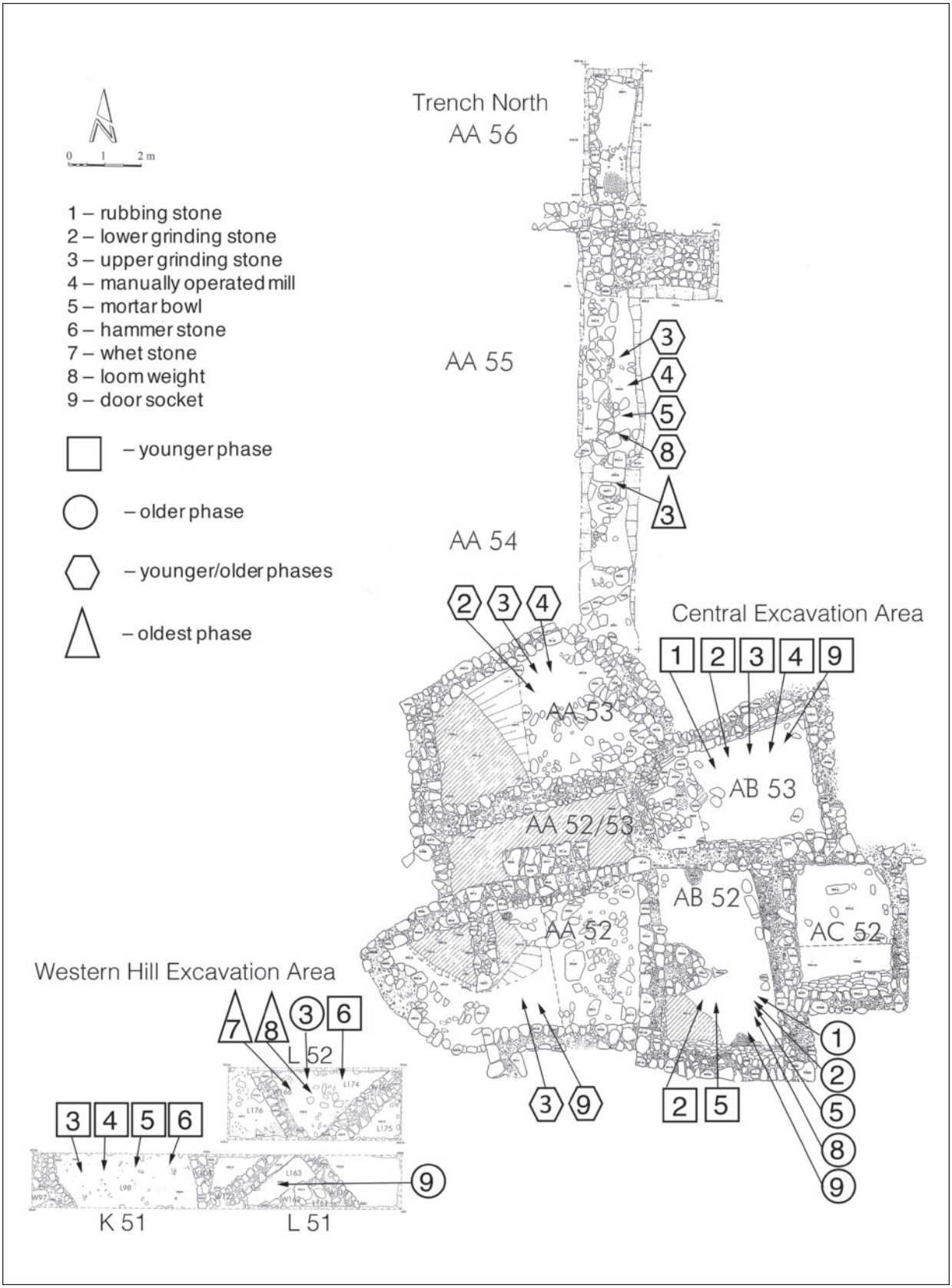
Limestone, cubic shaped stone with depression, mortar?

6000

AA 53 L 52

l. 17.6 cm, w. 10.4 cm, h. 5.4 cm, wt. 1460 g

Limestone, upper grinding stone



6. Distribution of ground-stone finds.

1806
AB 52 L 61 younger phase
Rem. l. 14.9 cm, rem. w. 14.6 cm, h. 6.6 cm
Sandstone, fragment of lower grinding stone
6007
AB 52 L 61 younger phase
Rem. l. 22.0 cm, rem. w. 19.0 cm, h. 7.7 cm
Limestone, fragment of lower grinding stone
6009
AB 52 L 61 younger phase
Rem. l. 29.0 cm, w. 27.2 cm, h. 14.0 cm
Sandstone, mortar
6014
AB 52 L 61 younger phase
Rem. l. 14.4 cm, rem. w. 19.3 cm, rem. h. 8.7 cm
Limestone, fragment of lower grinding stone or bowl
6016
AB 52 L 61 younger phase
Rem. l. 27.2 cm, rem. w. 17.0 cm, h. 9.3 cm
Basalt, fragment of lower grinding stone
1808
AB 52 L 89 older phase
l. 17.5 cm, w. 15.0 cm, h. 6.5 cm
Limestone, door socket
1809
AB 52 L 89 older phase
l. 8.3 cm, w. 7.2 cm, h. 3.4, wt. 286 g
Limestone, perforated undressed stone, loom weight?
1810-1
AB 52 L 89 older phase
l. 7.7 cm, w. 4.5 cm, h. 4.3 cm, wt. 158 g
Limestone, perforated undressed stone, loom weight?
1810-2
AB 52 L 89 older phase
l. 4.4 cm, w. 4.4 cm, h. 2.4 cm, wt. 54 g
Limestone, perforated undressed stone, loom weight?
1819
AB 52 L 89 older phase
l. 22.4 cm, rem. w. 15.8 cm, h. 7.5 cm
Limestone, door socket
6017
AB 52 L 89 older phase
Rem. l. 28.0 cm, rem. w. 21.7 cm, h. 8.1 cm
Limestone, fragment of mortar bowl
6019
AB 52 L 89 older phase
Rem. l. 22.5 cm, w. 22.5 cm, h. 5.0 cm
Sandstone, fragment of lower grinding stone
1811
AB 52 L 91 older phase
Rem. l. 12.3 cm, w. 11.3 cm, h. 6.3 cm
Sandstone, fragment of upper grinding stone re-used as loom weight?
1813
AB 52 L 114 older phase
l. 7.0 cm, w. 5.5 cm, h. 3.4 cm, wt. 125 g
Sandstone, rubbing stone
6022
AB 52 L 114 older phase
Rem. l. 225.0 cm, rem. w. 31.5 cm, h. 10.5 cm
Randstone, mortar bowl
1800
AB 53 L 4 younger phase
l. 13.6 cm, w. 12.8 cm, h. 6.4 cm
Limestone, door socket
1801-1
AB 53 L 4 younger phase
l. 31.7 cm, w. 25.8 cm, h. 5.1 cm
Sandstone, door socket
6004
AB 53 L 14 younger phase
Rem. l. 11.3 cm, w. 10.4 cm, h. 3.0 cm
Sandstone, upper grinding stone
6005
AB 53 L 14 younger phase
l. 18.0 cm, w. 14.7 cm, h. 6.7
Sandstone, trapezoidal, flat stone with uprising edges on two sides of unknown function
6008-1
AB 53 L 14 younger phase
l. 17.8 cm, w. 8.4 cm, h. 9.2 cm, wt. 1967 g
Sandstone, rubbing stone
6008-2
AB 53 L 14 younger phase
l. 17.1 cm, w. 8.6 cm, h. 4.1 cm, wt. 864 g
Sandstone, upper grinding stone
6010
AB 53 L 14 younger phase
Max. dm. 27.0 cm, h. 9.5 cm
Basalt, upper part of manually operated mill (+ fragment 6012)
6015-1
AB 53 L 14 younger phase
Max. dm. 45.0 cm, h. 7.8 cm
Limestone, lower part of manually operated

flour mill
6015-2
AB 53 L 14 younger phase
Rem. l. 26.1 cm, w. 18.6 cm, h. 7.0 cm
Sandstone, fragment of lower grinding stone

Northern Trench
1804
NTr L 30 floor level both phases
l. 5.7 cm, w. 4.5 cm, h. 2.9 cm
Sandstone, hook-shaped object of unknown function
6003
NTr L 34 both phases
Rem. l. 8.6 cm, w. 8.5 cm, h. 2.4 cm
Sandstone, fragment of upper grinding stone
6006
NTr L 42 both phases
Rem. l. 8.5 cm, w. 14.5 cm, h. 3.8 cm
Sandstone, fragment of upper grinding stone
1805
NTr L 56 both phases
Rem. l. 6.9 cm, rem. w. 8.2 cm, h. 4.0 cm
Basalt, fragment of upper grinding stone re-used as ring stone, loom weight?
1807
NTr L 59 both phases
l. 19.4 cm, w. 11.5 cm, h. 7.8 cm,
Basalt, upper grinding stone and mortar on two sides
6018
NTr L 59 both phases
Rem. dm. 21.8 cm, h. 4.7 cm
Limestone, fragment of upper part of manually operated flour mill
6011
NTr L 71 pre-older phase
Rem. l. 10.3 cm, rem. w. 14.5 cm, h. 7.3 cm
Sandstone, fragment of rubbing stone
1818
NTr AA 55 L 129 pre-Middle Ages?
Opening dm. 7.2 cm, rem. h. 7.9 cm
Sandstone, rim and wall fragment of mortar
6024-1
NTr AA 55 L 129 pre-Middle Ages?
Rem. l. 10.6 cm, w. 10.5 cm, h. 4.0 cm
Limestone, fragment of upper grinding stone
6024-2
NTr AA 55 L 129 pre-Middle Ages?
Rem. l. 11.6 cm, w. 8.0 cm, h. 5.7 cm
Limestone, fragment of upper grinding stone
1820-1
NTr AA 55 L 146
l. 6.8 cm, w. 6.0 cm, h. 3.6 cm, wt.190 g
Sandstone, rubbing stone
1820-2
NTr AA 55 L 146
Max. dm. 3.8 cm, h.1.9 cm
Chalk, lid

Western Hill Area
1812
K 51 L 97
l. 17.4 cm, w. 9.7 cm, h. 6.4
Limestone, hook-shaped object of unknown function
1814
K 51 L 98 younger phase
l. 5.5 cm, w. 4.8 cm, h. 4.0 cm, wt. 134 g
Limestone, ovoid undressed stone of unknown function
6021
K 51 L 98 younger phase
l. 19.6 cm, w. 7.7 cm, h. 4.3 cm, wt. 1092 g
Sandstone, upper grinding stone
1815
K 51 L 108 younger phase
l. 38.3 cm, w. 35.9 cm, h. 10.0 cm
Limestone, lower part of manually operated flour mill
6020-1
K 51 L 121 younger phase
l. 43.5 cm, w. 33.8 cm, h. 15.0 cm
Limestone, mortar bowl
6020-2
K 51 L 121 younger phase
l. 40.8 cm, rem. w. 22.2 cm, h. 12.5 cm
Sandstone, fragment of mortar bowl
1816
K 51 L 130 younger phase
Max. dm. 5.5 cm, wt. 207 g
Silex, nodule – hammer stone?
1817
L 51 L 120 older phase
l. 13.7 cm, w. 8.8 cm, h. 6.1 cm
Sandstone, mortar or door socket used from two sides
1826
L 51 L 120 older phase
l. 5.4 cm, w. 4.6 cm, h. 3.5 cm
Fossilised snail
6023

L 51 L 122
Rem. l. 18.5 cm, rem. w. 21.5 cm, rem. h. 6.4 cm
Sandstone, fragment of lower grinding stone?
1822
L 51 L 151
Rem. l. 8.4 cm, rem. w. 6.7 cm, wall th. 2.0 cm
chalk, wall fragment of bowl
1821
L 52 L 147 younger phase
Max. dm. 5.4 cm
Silex, nodule – hammer stone?
6025
L 52 L 153 older phase
Rem. l. 9.5 cm, w. 10.2 cm, h. 3.6 cm
Sandstone, fragment of upper grinding stone
1823
L 52 L 174 oldest phase, pre-Middle Ages?
Max. dm. 43.0 cm, max. h. 9.0 cm, inner dm. of centre hole 3.0 cm
Limestone, upper part of manually operated flour mill
1824-1
L 52 L 174 oldest phase, pre-Middle Ages?
l. 4.5 cm, w. 4.4 cm, h. 3.8 cm
Limestone, perforated undressed stone, loom weight?
1824-2
L 52 L 174 oldest phase, pre-Middle Ages?
Rem. l. 4.6 cm, w. 3.0 cm, h. 1.3 cm
Steatite, fragment of whetstone Surface
1825
AB 45 surface
l. 12.9 cm, rem. w. 10.5 cm, h. 10.8 cm
Sandstone, fragment of door socket or mortar

Flint Objects

The flint assemblage is comprised of 42 objects; most are flakes created during the production process, with some used as scrapers, blades, and cutting tools. More than half (24 objects) were found in the Northern Trench, while only three were found in the Western Hill area. Fourteen objects were uncovered in the same rooms as the ground-stone objects (AA 53, AB 52, and AB 53). All flint objects were found in contexts associated with the Late Islamic settlement (both the older and younger phases); none were found in contexts dated earlier than the Late Islamic period.

Thus, the flint assemblage of Ba'ja I verifies that this material was still in use in the Late Islamic period, although to a minimal extant.

Catalogue of Flint Objects (by Benjamin Schröder)

Central Area

2012-1
AA 53 L 17 both phases
l. 3.6 cm, w. 2.3 cm, th. 0.5 cm, wt. 4.7 g
Tabular flake core-trimming element
2008-1
AB 52 L 90 older phase
l. 3.9 cm, w. 1.5 cm, th. 0.7, wt. 3 g
Non-parallel sided blade, blade-core trimming element
2008-2
AB 52 L 90 older phase
l. 2.9 cm, w. 3.3 cm, th. 0.9, wt. 6.4 g
Flake core trimming element or ecofact
2008-3
AB 52 L 90 older phase
l. 3.3 cm, w. 2.1 cm, th. 0.7, wt. 3.9 g
Flake core trimming element or ecofact
2004-1
AB 53 L 14 younger phase
l. 6.4 cm, w. 2.4 cm, th. 0.8 cm, wt. 10.1 g
Blade core trimming element
2004-2
AB 53 L 14 younger phase
l. 5.6 cm, w. 2.4 cm, 1.0 cm, wt. 13.9 g
Cutting tool medial-terminal fragment of a parallel-sided blade, lateral-retouched
2004-3
AB 53 L14 younger phase
l. 4.4 cm, w. 2.7 cm, 1.3 cm, wt. 13.6 g
Fragment of a lateral-retouched blade
2004-4
AB 53 L 14 younger phase
l. 5.8 cm, w. 4.7 cm, th. 2.8 cm, wt. 32.8 g
Flake core trimming element or ecofact
2004-5
AB 53 L 14 younger phase
l. 5.3 cm, w. 3.6 cm, th. 0.7 cm, wt. 10.8 g
Scraper fragmented retouched flake
2004-6
AB 53 L14 younger phase
l. 4.9 cm, w. 2.9 cm, th. 1.2, wt. 14.8 g
Lateral-retouched flake
2004-7
AB 53 L 14 younger phase
l. 3.3 cm, w. 4.6 cm, th. 0.6 cm, wt. 10.8 g
Tabular retouched retouched flake
2007-1

AB 53 L 81 older phase
l. 6.9 cm, w. 4.2 cm, th. 1.3, wt. 35.3 g
Cutting tool distal fitted blade, lateral-retouched

2007-2
AB 53 L 81 older phase
l. 4.8 cm, w. 1.9 cm, th. 0.9, wt. 7.3 g
Non-parallel-sided blade core trimming element

2007-3
AB 53 L 81 older phase
l. 4.8 cm, w. 3.8 cm, th. 1.5, wt. 13.9 g
Flake core trimming element

Northern Trench

2000-1
NTr L 30 both phases floor level
l. 6.1 cm, w. 7.8 cm, th. 2.7 cm, wt. 125.7 g
Flint ad-hoc-tool/scraper crude retouched flake

2000-2
NTr L 30 both phases floor level
l. 4.7 cm, w. 1.7 cm, th. 0.7 cm, wt. 4.8 g
Cutting tool lateral-retouched blade, distal fragmented

2000-3
NTr L 30 both phases floor level
l. 4.5 cm, w. 1.8 cm, th. 1.2 cm, wt. 10.9 g
Medial fragment of a lateral-retouched blade

2000-4
NTr L 30 both phases floor level
l. 3.3 cm, w. 1.4 cm, th. 1.2 cm, wt. 5.8 g
Distal fragment of a blade

2000-5
NTr L 30 both phases floor level
l. 2.9 cm, w. 4.6 cm, th. 1.2 cm, wt. 13.5 g
Flake, core trimming element or ecofact

2000-6
NTr L 30 both phases floor level
l. 2.7 cm, w. 3.4 cm, th. 2.3 cm, wt. 11.7 g
Flake, core trimming element

2000-7
NTr L 30 both phases floor level
l. 3 cm, w. 3 cm, th. 0.9 cm, wt. 7.6 g
Flake, core trimming element or ecofact

2000-8
NTr L 30 both phases floor level
l. 3.3 cm, w. 2.9 cm, th. 0.8 cm, wt. 5.9 g
Ad-hoc-tool/cutting tool distal retouched/ notched with slight gloss

2000-9
NTr L 30 both phases floor level
l. 3.2 cm, w. 2.3 cm, th. 0.4 cm, wt. 2.4 g
Flake core trimming element or ecofact

2000-10
NTr L 30 both phases floor level
l. 2.7 cm, w. 1.7 cm, th. 0.8 cm, wt. 2.8 g
Limestone ecofact

2001-1
NTr L 34 equal to both layers in AA/AB 52/53
l. 6.8 cm, w. 3.2 cm, th. 0.8 cm, wt. 17.2 g
Cutting tool distal fragmented, lateral-retouched, parallel-sided blade

2002-1
NTr L 40 equal to both layers in AA/AB 52/53
l. 6 cm, w. 3.7 cm, th. 0.8 cm, wt. 12.5 g
Ttabular flake core trimming element

2011-1
NTr L 43 equal to both layers in AA/AB 52/53
l. 4 cm, w. 4.3 cm, th. 1.0 cm, wt. 15.2 g
Fragmented retouched flake

2011-1
NTr L 43 equal to both layers in AA/AB 52/53
l. 3.4 cm, w. 2.9 cm, th. 1.2 cm, wt. 11.5 g
Flake core trimming element or ecofact

2005-1
NTr L 57 equal to both layers in AA/AB 52/53
l. 5.6 cm, w. 2.5 cm, th. 1.0 cm, wt. 12 g
Ad-hoc-tool lateral use-retouched (?) blade

2005-2
NTr L 57 equal to both layers in AA/AB 52/53
l. 2.9 cm, w. 4.1 cm, th. 0.7, wt. 9 g
Flake core-trimming element

2006-1
NTr L 59 equal to both layers in AA/AB 52/53
l. 8.1 cm, w. 4.6 cm, th. 2.1, wt. 58.7 g
Ad-hoc tool distal use-retouched flake

2006-2
NTr L 59 equal to both layers in AA/AB 52/53
l. 2.9 cm, w. 4.1 cm, th. 0.9, wt. 10.7 g
Fragmented flake core trimming element

2006-3
NTr L 59 equal to both layers in AA/AB 52/53
l. 1.6 cm, w. 3.2 cm, th. 0.8, wt. 3.4 g
Parallel-sided blade, blade-core trimming element

2014-1
NTr AA 55 L 146
l. 4.5 cm, w. 3.7 cm, th. 1.2 cm, wt. 14.4 g
Flake core trimming element
2015-1
NTr AA 55 L 148
l. 4.6 cm, w. 2.2 cm, th. 1.2 cm, wt. 8.9 g
Blade, core trimming element
2015-2
NTr AA 55 L 148
l. 2.4 cm, w. 3.4 cm, th. 0.7 cm, wt. 1 g
Flake, core trimming element
2015-3
NTr AA55 L 148
l. 3.4 cm, w. 1.9 cm, th. 0.8 cm, wt. 5.6 g
Ecofact
2015-4
NTr AA55 L 148
l. 2.4 cm, w. 2.7 cm, th. 0.8 cm, wt. 4.1 g
Tabular flake core trimming element

Western Hill Area
2010-1
K 51 L 98 younger phase
l. 2.2 cm, w. 1.6 cm, th. 0.9, wt. 3.5 g
Retouched flake core-trimming element
2013-1
L 51 L 126 older phase
l. 4 cm, w. 6.3 cm, th. 1.2 cm, wt. 30.9 g
Fragmented flake core trimming element
2013-2
L 51 L 126 older phase
l. 5.9 cm, w. 2.7 cm, th. 0.9 cm, wt. 8.9 g
Ad-hoc-tool use-retouched blade
2003-1
Z 52 L 52 younger phase
l. 4.9 cm, w. 3.1 cm, th. 1.5 cm, wt. 17.3 g
Retouched flake core trimming element

Glass Objects

Five glass sherds from two distinct vessels were uncovered during the excavation; both were made of light blue glass. The four sherds (7500 and 7502) from the Northern Trench belong to one vessel, although they were found in different *loci* (L 106 and L 110). They form a concave base and probably belonged to a flask. The *loci* predate the Late Islamic period, and are most likely to be from the Nabataean/ Roman period (**Fig. 7**).

Sherd 7501 is a fragment from the beaded stem of a wine glass (Gorin-Rosen and Winter 2010: 169 Fig. 3) or a lamp. The context is in room AB 52 (L 91) in the Central Area, and dated to the older phase of the Islamic occupation (**Fig. 7**). However, this glass sherd appears to be intrusive (possibly a result of looting), as it dates from the 6th–7th century AD, and complements the Roman/Byzantine material found on the surface during the survey.

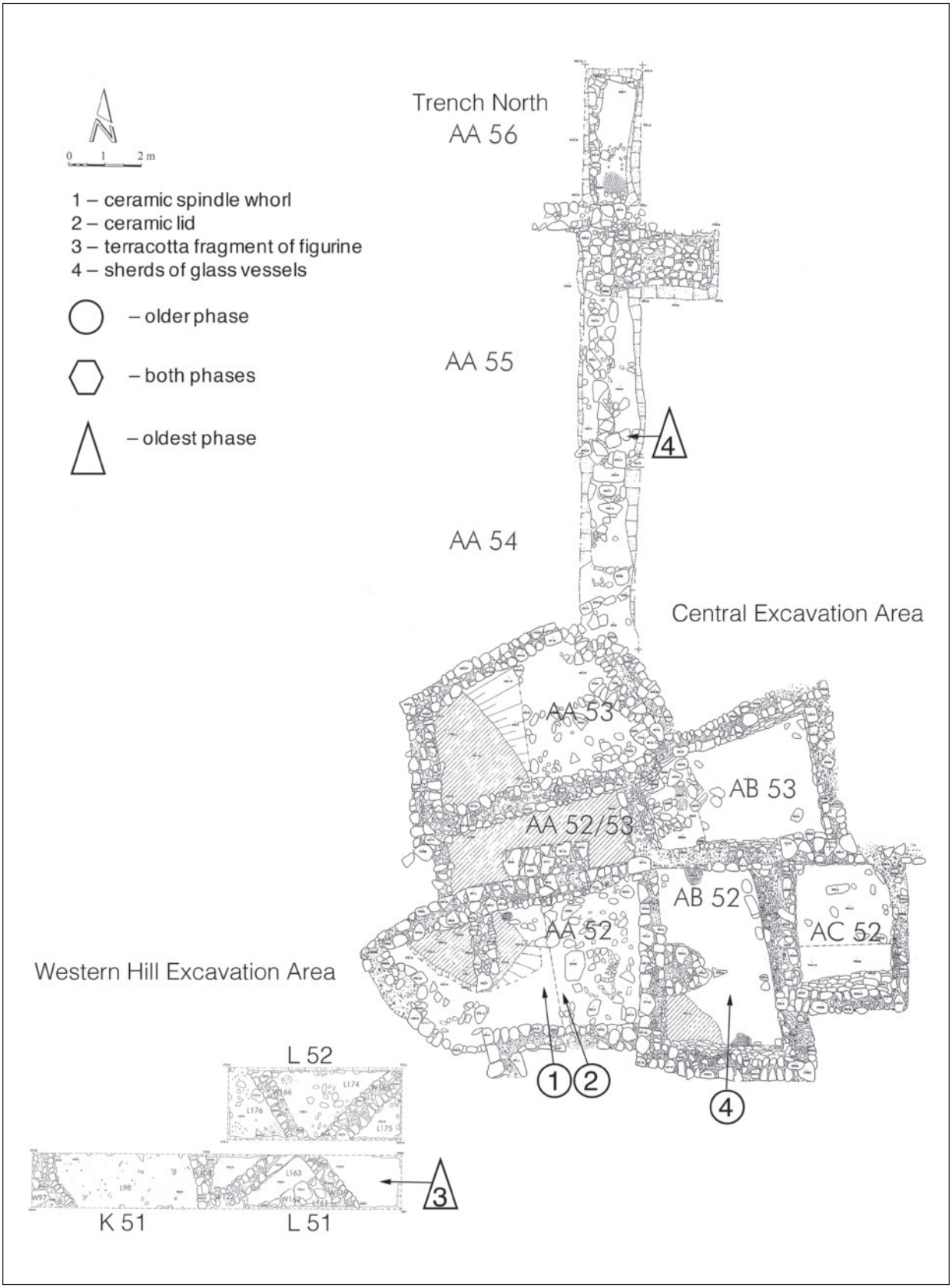
Catalogue of Glass Objects

7501
AB 52 L 91 older phase
Rem. h. 1.1 cm
Light blue fragment of beaded stem of wine glass or lamp.
7500
NTr L 106 pre-Middle Ages
Rem. h. 1.0 cm, bottom dm. 4.6 cm, th. 0.1-0.28 cm
Light blue bottom fragment of glass vessel (joint with 7502)
7502
NTr L 110 pre-Middle Ages
Rem. h. 1.0 cm, bottom dm. 4.6 cm, th. 0.1-0.28 cm
3 light blue bottom fragments of glass vessels (joint with 7500)

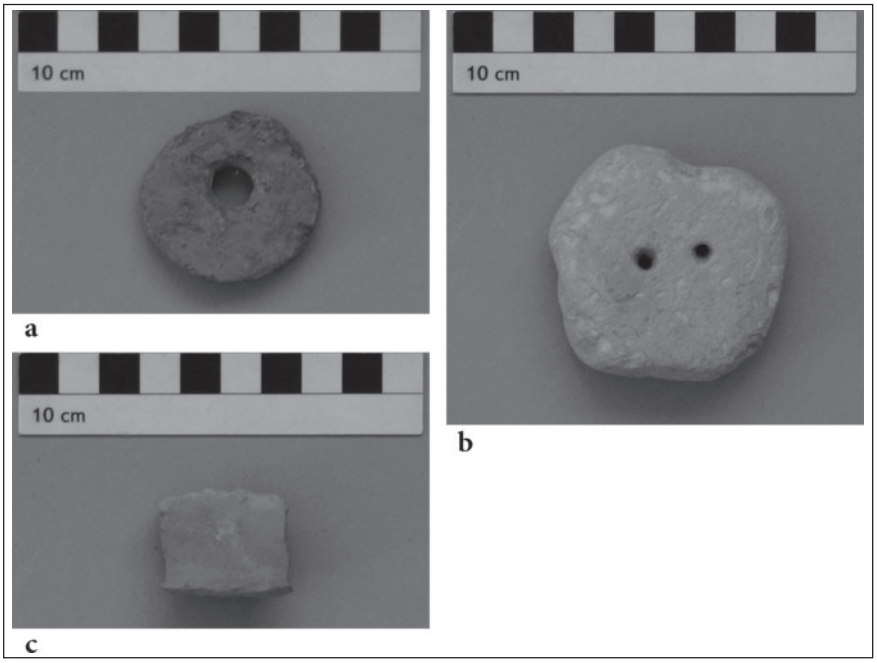
Ceramic Objects

Three ceramic objects were found which cannot be categorized as vessels. The first is an irregularly shaped spindle whorl made from a reworked pottery sherd (**Fig. 8a**). The second, an almost round object with two small holes (**Fig. 8b**), probably functioned as a lid and not as a button, as it is very thick. The third is probably the lower part of a mould-made terracotta figurine (**Fig. 8c**), although the original shape cannot be determined.

Both the spindle whorl and the lid were found in room AA 52 (both phases) from the Central Area of the excavation (**Fig. 7**). The terracotta figurine fragment was found in L 51, from the excavation on the Western Hill (**Fig. 7**). Although it does not have a specific context, it is more likely that it dates from a Nabataean/ Roman rather than an Islamic stratum, due to its shape and manufacture.



7. Distribution of glass and ceramic finds.



8. a) Ceramic spindle whorl 1600-1; b) Ceramic lid 1600-2; c) Lower part of molded terracotta figurine (no inventory number).

Catalogue of Ceramic Objects

1600-1
AA 52 L 20 both phases
Max. dm. 4.4 cm, th. 1.1 cm
Ceramic, spindle whorl

1600-2
AA 52 L 20 both phases
Max. dm. 5.9 cm, th. 2.2 cm
Ceramic, lid

No Inventory Number
L 51 L 151
l. 3.2 cm, w. 23 cm, rem. h. 2.7 cm
Ceramic, lower part of a mould made figurine

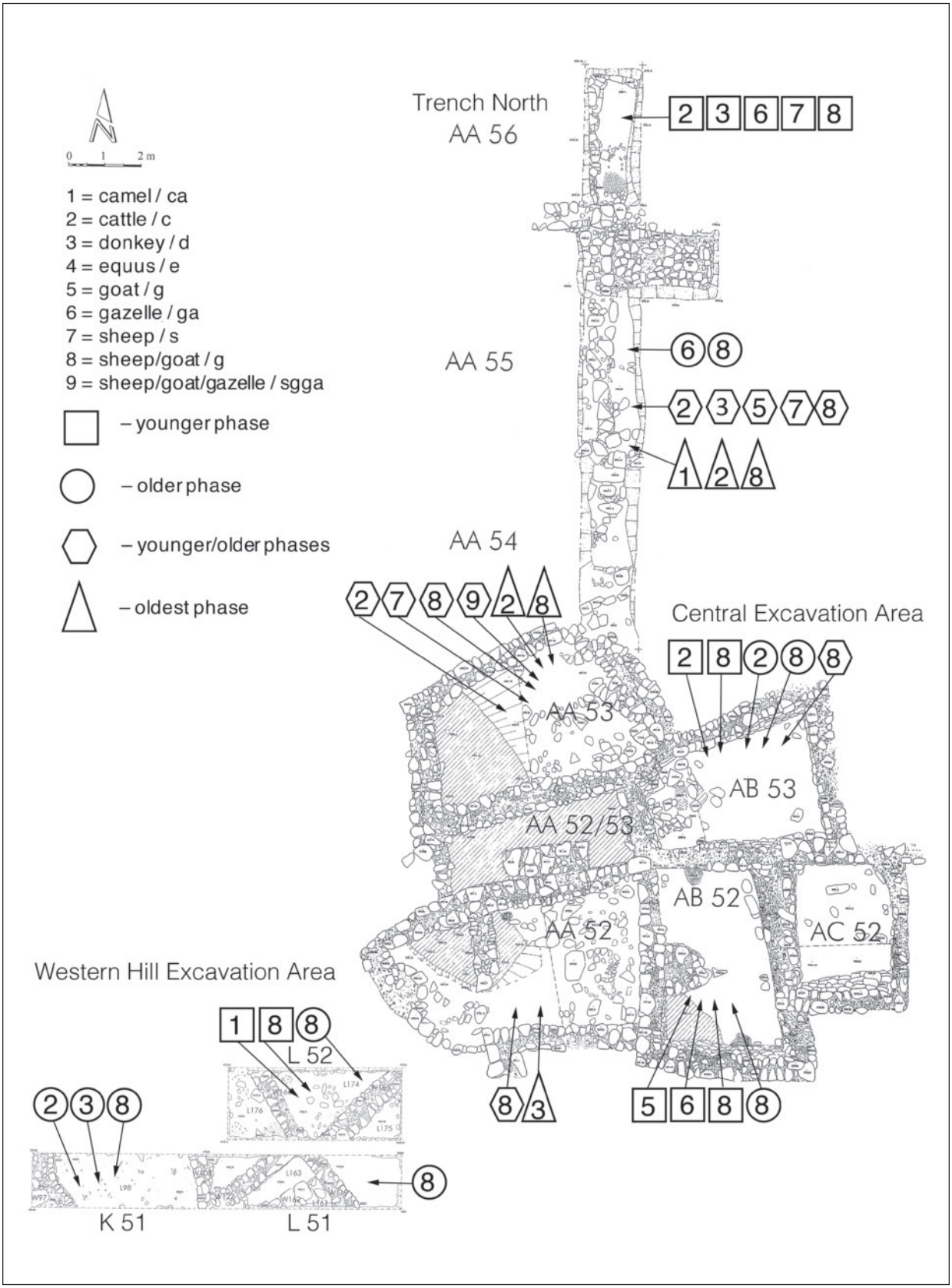
Animal Bones

414 animal bones which could be determined were found in the excavation. 410 are identified as domestic mammals such as sheep, goat, cattle, camel, donkey and horse. Three bones are identified as gazelle; one bone, which could not be positively identified, may be either sheep, goat or gazelle. Sheep/goat bones comprise 83.4 % and cattle bones 11.20 % of the total assemblage (**Table 1**). This substantiates that domestic mammals are dominant, beasts of burden are extremely rare and gazelles, which were probably hunted, were eaten sporadically.

Sheep and goat bones were present in all rooms except AA 52/53 and AC 52 (**Fig. 9**). Cattle bones were found only in room AB 52, the Northern Trench and in K 51 of the Western Hill excavation. Camel bones were located only in the Northern Trench and in L 52 on the Western Hill. Donkey bones were excavated from the Northern Trench, room AA 52 in the Central Area and in K 51 on the Western Hill. The single horse bone was uncovered in the Northern Trench. The gazelle bones were found in the Northern Trench and in room AB 52 of the Central Area. There is no distinctive distribution of the various species, however, it is noticeable that bones were completely absent in rooms AA 52/53 and AC 52, and that room AA 52 produced only two sheep/goat bones and one donkey bone from below the lowest floor level. This distribution corresponds with the allocation of small finds such as ground-stone, flint, metal, and ceramic objects.

Analysis of the distribution of animal bones with regard to time phases establishes that sheep, goat and cattle bones were found in all phases of the settlement and the strata below. Beasts of burden do not show any specific distribution in terms of time. The three gazelle bones were uncovered in the younger Late Islamic phase; it is not possible to definitively interpret this as an increase in hunting activity due to the insufficient number of bones.

The kind and distribution of animal bones ascertains that the inhabitants of the Late Islamic settlement lived from sheep and goat husbandry in addition to cultivating grain.



9. Distribution of animal bones.

Table 1

Species	Amount	%	Weight in g	%
cattle	46	11.2	2489	34.7
donkey	16	3.9	952	13.3
equus	1	0.2	19	0.3
camel	5	1.2	285	4.0
sheep/goat	342	83.4	3426	47.8
of this sheep	(5)	-	(61)	-
of this goat	(6)	-	(93)	-
sum domestic mammals	**410**	**100**	**7171**	**100**
sheep/goat/gazelle	1	-	2	-
gazelle (*Gazella spec.*)	3	-	29	-
sum	**414**		**7202**	

Catalogue of Animal Bones (by Michael Hochmuth)

Central Area

4021	sg	ti	sub/ad	1	2	AA 52 L 21
4021	sg	ri	sub/ad	1	1	AA 52 L 21
4003	d	mc	sub/ad	1	8	AA 52 L 22
4000	c	cra	juvenil	2	24	AA 53 L 12
4000	c	man	juvenil	1	13	AA 53 L 12
4000	c	ul	juvenil	1	3	AA 53 L 12
4000	sg	man	adult	1	62	AA 53 L 12
4000	sg	man	juvenil	1	18	AA 53 L 12
4000	sg	fe	sub/ad	1	13	AA 53 L 12
4000	sg	ti	sub/ad	3	49	AA 53 L 12
4000	sg	mc	sub/ad	1	24	AA 53 L 12
4004	c	man	juvenil	1	4	AA 53 L 12
4004	s	mc	sub/ad	1	20	AA 53 L 12
4004	sg	fe	sub/ad	1	2	AA 53 L 12
4004	sg	ti	sub/ad	2	19	AA 53 L 12
4004	sg	ri	sub/ad	1	3	AA 53 L 12
4027	c	p3s	sub/ad	1	3	AA 53 L 12
4027	c	ri	sub/ad	1	4	AA 53 L 12
4027	sg	man	sub/ad	1	13	AA 53 L 12
4027	sg	man	sub/ad	2	20	AA 53 L 12
4027	sg	ti	sub/ad	1	7	AA 53 L 12
4027	sg	mt	sub/ad	1	10	AA 53 L 12
4027	sg	vt	sub/ad	1	2	AA 53 L 12
4027	sg	ri	sub/ad	2	5	AA 53 L 12
4034	c	mt	sub/ad	1	36	AA 53 L 12
4034	c	ri	sub/ad	1	12	AA 53 L 12
4034	sg	m1s	sub/ad	1	6	AA 53 L 12
4034	sg	m1i	sub/ad	1	4	AA 53 L 12
4034	sg	man	adult	1	2	AA 53 L 12
4034	sg	hu	sub/ad	1	3	AA 53 L 12
4034	sg	ti	sub/ad	1	9	AA 53 L 12
4034	sg	mt	sub/ad	1	3	AA 53 L 12
4034	sg	ri	sub/ad	3	3	AA 53 L 12
4014	sg	man	sub/ad	1	5	AA 53 L 17
4014	sg	sc	sub/ad	1	6	AA 53 L 17
4014	sg	pe	sub/ad	1	8	AA 53 L 17
4014	sg	fe	sub/ad	3	11	AA 53 L 17
4014	sg	mc	sub/ad	1	3	AA 53 L 17
4014	sg	ri	sub/ad	2	6	AA 53 L 17
4005	sg	ra	sub/ad	1	7	AA 53 L 18
4016	sg	cra	sub/ad	1	7	AA 53 L 45
4019	c	cra	adult	1	620	AA 53 L 60
4028	sgga	ra	sub/ad	1	2	AA 53, W 27
4054	sg	hu	subadult	1	12	AB 52 L 114
4059	sg	max	adult	1	25	AB 52 L 128
4059	sg	sc	sub/ad	2	17	AB 52 L 128
4059	sg	hu	sub/ad	1	16	AB 52 L 128
4059	sg	ra	sub/ad	1	4	AB 52 L 128
4059	sg	pe	sub/ad	1	4	AB 52 L 128
4059	sg	fe	sub/ad	2	46	AB 52 L 128
4059	sg	ti	sub/ad	2	26	AB 52 L 128
4059	sg	vt	sub/ad	1	3	AB 52 L 128
4059	sg	ri	sub/ad	1	2	AB 52 L 128
4023	sg	man	juvenil	1	16	AB 52 L 61
4023	sg	ti	adult	1	26	AB 52 L 61
4023	sg	ti	juvenil	1	12	AB 52 L 61
4023	sg	vcv	sub/ad	2	6	AB 52 L 61
4023	sg	vt	sub/ad	1	1	AB 52 L 61
4023	sg	vl	juvenil	1	1	AB 52 L 61
4026	ga	cal	adult	1	14	AB 52 L 72
4026	ga	pe	sub/ad	1	7	AB 52 L 72
4026	sg	hu	subadult	1	5	AB 52 L 72
4026	sg	ri	sub/ad	6	10	AB 52 L 72
4038	sg	sc	juvenil	1	1	AB 52 L 72
4038	sg	hu	subadult	1	14	AB 52 L 72
4038	sg	vt	sub/ad	1	2	AB 52 L 72
4038	sg	vl	adult	1	5	AB 52 L 72
4038	sg	ri	sub/ad	1	4	AB 52 L 72
4038	g	ru	sub/ad	1	32	AB 52 L 72

4050	sg	man	juvenil	1	8	AB 52 L 89
4061	sg	hu	subadult	1	5	AB 52 L 89
4061	sg	ti	sub/ad	1	8	AB 52 L 89
4061	sg	ri	sub/ad	1	4	AB 52 L 89
4041	sg	hu	subadult	1	10	AB 52 L 91
4041	sg	ra	subadult	1	8	AB 52 L 91
4041	sg	ti	sub/ad	1	13	AB 52 L 91
4049	sg	vt	sub/ad	2	6	AB 52 L 91
4049	sg	ti	sub/ad	1	9	AB 52 L 91
4006	sg	hz	sub/ad	1	2	AB 53 L 14
4006	sg	pdi	subadult	1	1	AB 53 L 14
4012	sg	hu	sub/ad	1	7	AB 53 L 14
4012	sg	ra	sub/ad	1	2	AB 53 L 14
4012	sg	ti	sub/ad	1	2	AB 53 L 14
4022	sg	ri	sub/ad	3	3	AB 53 L 14
4024	c	mt	sub/ad	1	14	AB 53 L 14
4024	sg	man	juvenil	1	7	AB 53 L 14
4024	sg	hu	sub/ad	1	2	AB 53 L 14
4024	sg	fe	sub/ad	1	11	AB 53 L 14
4024	sg	ti	sub/ad	1	5	AB 53 L 14
4031	sg	hu	subadult	1	6	AB 53 L 14
4036	sg	hu	sub/ad	2	19	AB 53 L 31
4036	sg	ra	sub/ad	1	7	AB 53 L 31
4036	sg	ra	juvenil	1	2	AB 53 L 31
4036	sg	ti	sub/ad	5	34	AB 53 L 31
4036	sg	cal	sub/ad	1	1	AB 53 L 31
4045	sg	sc	sub/ad	1	23	AB 53 L 31
4045	sg	ti	sub/ad	1	6	AB 53 L 31
4045	sg	ii	sub/ad	3	2	AB 53 L 31
4009	sg	ri	sub/ad	1	2	AB 53 L 48
4018	sg	hu	sub/ad	1	6	AB 53 L 48
4018	sg	ti	sub/ad	1	14	AB 53 L 48
4018	sg	ta	sub/ad	1	3	AB 53 L 48
4033	ca	p1	adult	1	80	AB 53 L 86
4033	ca	p3	adult	1	25	AB 53 L 86
4044	sg	max	adult	1	20	AB 53 L 94
4044	sg	fe	sub/ad	1	7	AB 53 L 94

Northern Trench (NTr)

4046	e	sc	sub/ad	1	19	NTr L 106
4046	ca	mp	sub/ad	1	104	NTr L 106
4046	c	hu	subadult	1	43	NTr L 106
4046	sg	sc	sub/ad	1	6	NTr L 106
4055	sg	m1i	sub/ad	1	4	NTr L 110
4011	d	at	sub/ad	1	63	NTr L 30
4011	d	ii	adult	1	5	NTr L 30
4011	c	ra	sub/ad	1	82	NTr L 30
4011	c	mc	sub/ad	1	19	NTr L 30
4011	c	vt	sub/ad	3	59	NTr L 30
4011	c	ri	sub/ad	2	26	NTr L 30
4011	sg	max	adult	1	17	NTr L 30
4011	sg	man	sub/ad	1	12	NTr L 30
4011	sg	hu	sub/ad	1	11	NTr L 30
4011	sg	ra	sub/ad	4	51	NTr L 30
4011	sg	mc	sub/ad	1	6	NTr L 30
4011	sg	ti	sub/ad	4	25	NTr L 30
4011	sg	mt	sub/ad	1	11	NTr L 30
4015	d	man	adult	1	183	NTr L 34
4015	sg	hu	sub/ad	2	5	NTr L 34
4013	sg	sc	sub/ad	1	4	NTr L 40
5642	sg	ra	sub/ad	1	6	NTr L 42
4010	sg	man	sub/ad	1	18	NTr L 43
4010	sg	ti	sub/ad	1	2	NTr L 43
4053	sg	max	adult	1	14	NTr L 43
4053	sg	man	adult	1	32	NTr L 43
4017	sg	hz	sub/ad	1	8	NTr L 56
4017	sg	max	adult	1	26	NTr L 56
4017	sg	sc	sub/ad	1	28	NTr L 56
4017	sg	hu	sub/ad	2	43	NTr L 56
4017	sg	ra	sub/ad	2	45	NTr L 56
4017	sg	pe	sub/ad	1	9	NTr L 56
4017	sg	ti	sub/ad	2	21	NTr L 56
4017	sg	mt	sub/ad	2	11	NTr L 56
4017	sg	ri	sub/ad	1	6	NTr L 56
4029	c	man	sub/ad	1	25	NTr L 56
4029	c	pe	sub/ad	1	43	NTr L 56
4029	c	ul	sub/ad	1	7	NTr L 56
4029	s	sc	sub/ad	1	14	NTr L 56
4029	sg	man	sub/ad	2	46	NTr L 56
4029	sg	m3i	adult	1	12	NTr L 56
4029	sg	m1s	sub/ad	1	5	NTr L 56
4029	sg	hu	sub/ad	1	13	NTr L 56
4029	sg	fe	sub/ad	1	4	NTr L 56
4029	sg	ti	sub/ad	1	6	NTr L 56
4029	sg	mt	sub/ad	2	15	NTr L 56
4029	sg	ri	sub/ad	3	3	NTr L 56
4025	d	ra	adult	1	54	NTr L 59
4025	c	ri	sub/ad	2	37	NTr L 59
4025	c	vt	sub/ad	1	20	NTr L 59
4025	c	vcv	sub/ad	1	13	NTr L 59
4025	s	mc	sub/ad	2	15	NTr L 59
4025	sg	cra	sub/ad	1	14	NTr L 59
4025	sg	man	adult	2	34	NTr L 59
4025	sg	man	juvenil	1	3	NTr L 59
4025	sg	m3i	adult	2	21	NTr L 59
4025	sg	sc	sub/ad	2	26	NTr L 59
4025	sg	hu	sub/ad	3	22	NTr L 59
4025	sg	ra	sub/ad	3	47	NTr L 59
4025	sg	fe	sub/ad	1	5	NTr L 59
4025	sg	ti	sub/ad	3	13	NTr L 59
4025	sg	ri	sub/ad	2	8	NTr L 59
4032	d	pe	sub/ad	1	16	NTr L 59
4032	c	ra	sub/ad	1	26	NTr L 59

4032	c	p1a	sub/ad	1	19	NTr L 59
4032	c	sc	sub/ad	1	20	NTr L 59
4032	sg	cra	sub/ad	1	1	NTr L 59
4032	sg	max	adult	1	21	NTr L 59
4032	sg	m2s	adult	1	9	NTr L 59
4032	sg	man	adult	1	41	NTr L 59
4032	sg	man	adult	4	145	NTr L 59
4032	sg	m2i	adult	1	3	NTr L 59
4032	sg	ra	sub/ad	1	7	NTr L 59
4032	sg	ra	sub/ad	1	9	NTr L 59
4032	sg	fe	sub/ad	2	32	NTr L 59
4032	sg	ti	sub/ad	5	32	NTr L 59
4032	sg	mt	sub/ad	2	14	NTr L 59
4032	sg	vt	sub/ad	1	2	NTr L 59
4032	sg	ri	sub/ad	3	6	NTr L 59
4032	sg	hu	sub/ad	1	13	NTr L 59
4032	sg	ra	sub/ad	1	15	NTr L 59
4032	sg	ti	adult	1	20	NTr L 59
4032	g	hz	sub/ad	1	9	NTr L 59
4032	g	hz	sub/ad	1	14	NTr L 59
4037	c	sc	sub/ad	1	18	NTr L 59
4037	c	hu	sub/ad	1	26	NTr L 59
4037	sg	max	subadult	2	23	NTr L 59
4037	sg	m3s	adult	2	16	NTr L 59
4037	sg	ms	sub/ad	2	14	NTr L 59
4037	sg	man	adult	3	89	NTr L 59
4037	sg	man	subadult	2	41	NTr L 59
4037	sg	sc	sub/ad	1	9	NTr L 59
4037	sg	ra	sub/ad	2	30	NTr L 59
4037	sg	mc	sub/ad	2	11	NTr L 59
4037	sg	fe	sub/ad	2	23	NTr L 59
4037	sg	ti	sub/ad	1	17	NTr L 59
4037	sg	ri	sub/ad	2	8	NTr L 59
4037	g	hz	sub/ad	1	6	NTr L 59
5675H	sg	man	adult	1	36	NTr L 59
5675A	sg	fe	sub/ad	1	4	NTr L 59
5675Q	g	pe	sub/ad	1	12	NTr L 59
4035	d	p1	sub/ad	1	24	NTr L 80
4035	ga	mt	sub/ad	1	8	NTr L 80
4035	s	cra	sub/ad	1	12	NTr L 80
4035	sg	man	sub/ad	1	4	NTr L 80
4035	sg	sc	sub/ad	5	99	NTr L 80
4035	sg	ra	sub/ad	2	12	NTr L 80
4035	sg	ul	sub/ad	1	2	NTr L 80
4035	sg	fe	sub/ad	3	36	NTr L 80
4035	sg	ti	sub/ad	2	28	NTr L 80
4035	sg	mt	sub/ad	2	12	NTr L 80
4035	sg	ta	sub/ad	1	6	NTr L 80
4035	sg	vl	adult	3	18	NTr L 80
4035	sg	ri	sub/ad	3	9	NTr L 80
4040C	d	hu	sub/ad	1	116	NTr L 80
4040A	d	ru	sub/ad	1	186	NTr L 80
4040A	d	ti	sub/ad	1	71	NTr L 80
4040A	d	p3	sub/ad	1	10	NTr L 80
4040B	d	max	sub/ad	1	48	NTr L 80
4040B	d	sc	sub/ad	1	73	NTr L 80
4040C	c	fe	sub/ad	1	44	NTr L 80
4040C	c	ti	sub/ad	1	86	NTr L 80
4040A	c	man	adult	1	181	NTr L 80
4040A	c	hu	sub/ad	1	160	NTr L 80
4040B	c	man	sub/ad	1	49	NTr L 80
4040B	c	fe	sub/ad	1	144	NTr L 80
4040B	c	mt	sub/ad	1	99	NTr L 80
4040B	c	mt	juvenil	1	19	NTr L 80
4040A	sg	man	adult	2	92	NTr L 80
4040B	sg	max	subadult	2	30	NTr L 80
4040B	sg	sc	sub/ad	1	5	NTr L 80
5674S	sg	ri	sub/ad	1	2	NTr L 80
4039	c	hu	sub/ad	1	33	NTr L 96
4039	c	ti	sub/ad	1	24	NTr L 96
4039	c	mt	sub/ad	1	149	NTr L 96
4039	c	tsk	sub/ad	1	176	NTr L 96
4039	sg	fe	sub/ad	2	33	NTr L 96
4039	sg	man	adult	2	111	NTr L 96
4039	sg	man	subadult	1	28	NTr L 96
4039	sg	man	juvenil	2	26	NTr L 96
4047	sg	man	subadult	1	37	NTr L 96
4047	sg	man	adult	1	51	NTr L 96
4047	g	hu	sub/ad	1	20	NTr L 96
4020	sg	vl	sub/ad	1	3	Z 52 L 52

Western Hill

4056	d	ra	sub/ad	1	24	K 51 L 109
4056	d	pe	sub/ad	1	21	K 51 L 109
4056	ca	p1	subadult	1	46	K 51 L 109
4056	sg	cra	sub/ad	1	8	K 51 L 109
4056	sg	hz	sub/ad	1	3	K 51 L 109
4056	sg	max	adult	1	24	K 51 L 109
4056	sg	man	sub/ad	1	8	K 51 L 109
4056	sg	sc	sub/ad	1	7	K 51 L 109
4056	sg	hu	sub/ad	1	6	K 51 L 109
4056	sg	ra	sub/ad	7	49	K 51 L 109
4056	sg	mc	sub/ad	1	2	K 51 L 109
4056	sg	pe	sub/ad	1	2	K 51 L 109
4056	sg	ti	sub/ad	5	34	K 51 L 109
4056	sg	ti	juvenil	1	15	K 51 L 109
4056	sg	mt	sub/ad	1	6	K 51 L 109
4056	sg	ri	sub/ad	2	1	K 51 L 109
4057	c	mt	sub/ad	1	13	K 51 L 120
4057	sg	max	adult	1	14	K 51 L 120
4057	sg	man	adult	1	24	K 51 L 120
4057	sg	man	sub/ad	1	23	K 51 L 120
4057	sg	ra	sub/ad	1	15	K 51 L 120
4057	sg	mc	sub/ad	1	4	K 51 L 120

4060	d	sc	sub/ad	1	50	K 51 L 120
4060	c	vcd	adult	1	17	K 51 L 120
4060	sg	ps	sub/ad	1	1	K 51 L 120
4060	sg	man	juvenil	1	6	K 51 L 120
4060	sg	de	sub/ad	1	1	K 51 L 120
4060	sg	sc	sub/ad	2	5	K 51 L 120
4060	sg	ra	sub/ad	1	7	K 51 L 120
4060	sg	mc	sub/ad	1	4	K 51 L 120
4060	sg	ti	sub/ad	2	15	K 51 L 120
4060	sg	fe	sub/ad	1	2	K 51 L 120
4060	sg	mt	sub/ad	1	7	K 51 L 120
4064	sg	m3s	adult	1	7	L 51 L 126
4058	sg	man	sub/ad	1	8	L 52 L 133
4058	sg	hu	sub/ad	1	2	L 52 L 133
4058	sg	ti	sub/ad	1	7	L 52 L 133
4062	sg	hu	sub/ad	1	4	L 52 L 133
4062	sg	ri	sub/ad	2	5	L 52 L 133
4063	ca	sc	sub/ad	1	30	L 52 L 147
4063	sg	man	sub/ad	1	11	L 52 L 147
4063	sg	sc	sub/ad	2	6	L 52 L 147
4063	sg	hu	sub/ad	1	3	L 52 L 147
4066	sg	sc	sub/ad	1	3	L 52 L 154
4066	sg	pe	juvenil	1	2	L 52 L 154
4066	sg	ti	sub/ad	1	6	L 52 L 154
4066	sg	ri	sub/ad	3	6	L 52 L 154

Conclusion

Four strata were identified during the excavation of the three areas at Ba'ja I; the Central Area, the Northern Trench and the Western Hill. The older and younger phases of the Late Islamic period were found in all excavation areas. The Ottoman phase is evident only in the far northern part of the Northern Trench, established by the re-use of the Late Islamic walls. No small finds are associated with this phase.

In the Central Area, six rooms were uncovered. They belong to at least two, possibly three building units, which had been previously discerned by the building layout, but further proof is evidenced by the distribution of small finds (see below). In the Central Area, a soil filling was found below the older Late Islamic settlement layer; its purpose was to level the undulating bedrock for construction. This filling contained small finds from the Nabataean/Roman period, but no architectural remains.

In the Northern Trench, a floor with a fireplace was assigned to a Nabataean/Roman stratum, but the excavators believe the place was used seasonally rather than as a permanent settlement during this period.

Contrary to these observations, the Western Hill excavation provided evidence for a more substantial occupation from the Nabataean/Roman period; the lower part of a mould-made terracotta figurine clearly associated with this period was uncovered there. However, the excavated area was too small for a more detailed interpretation of the site.

The small finds and animal bones are distributed in all excavation areas; however, a clear functional difference can be discerned between the individual rooms of the Central Area, and also between the Central Area and the Western Hill Area.

Rooms AB 52, AA 53 and AB 53 of the Late Islamic settlement in the Central Area yielded ground-stone tools, flint objects, metal tools and personal ornaments, together with animal bones. Only a few finds were uncovered in room AA 52, and none at all in room AC 52. This establishes that the majority of activities were conducted in rooms AB 52, AA 53 and AB 53. This distribution confirms the visual observation of the architectural features before the excavation season, verifying that rooms AA 52, AB 52 and AC 52 are part of one building unit, AA 52/53 and AB 53 another, and AA 53 is probably part of a third. It appears that each unit has an activity centre for household tasks such as grinding, milling and food processing. Room AB 52 is also used in the younger Late Islamic phase for weaving. The other rooms were probably used for other tasks. This may also be true for the rooms in the Northern Trench, but the excavated area is too small for more detailed conclusions.

Tools for milling and grinding, as well as animal bones, were also found on the Western Hill in both Late Islamic phases. However, the most prominent small finds from this area are the iron slag fragments, hammer stones and the whetstone, which were only found there. It can be deduced that this place was used, even if only partially, for iron processing. This may also be true for the Nabataean/Roman period, as iron slag was also found in the oldest stratum of the site.

Only five sherds from two distinct glass objects were found; one in the Central Area

and four in the Northern Trench. These almost certainly belong to the earliest filling layers, despite being found in a later context (as seen in room AB 52).

The preponderance of sheep and goat bones, accompanied by only a few bones from beasts of burden and almost none from hunted animals, accentuates the interpretation of the site as a rural settlement in the Late Islamic period, which is further substantiated by the presence of numerous milling and grinding tools.

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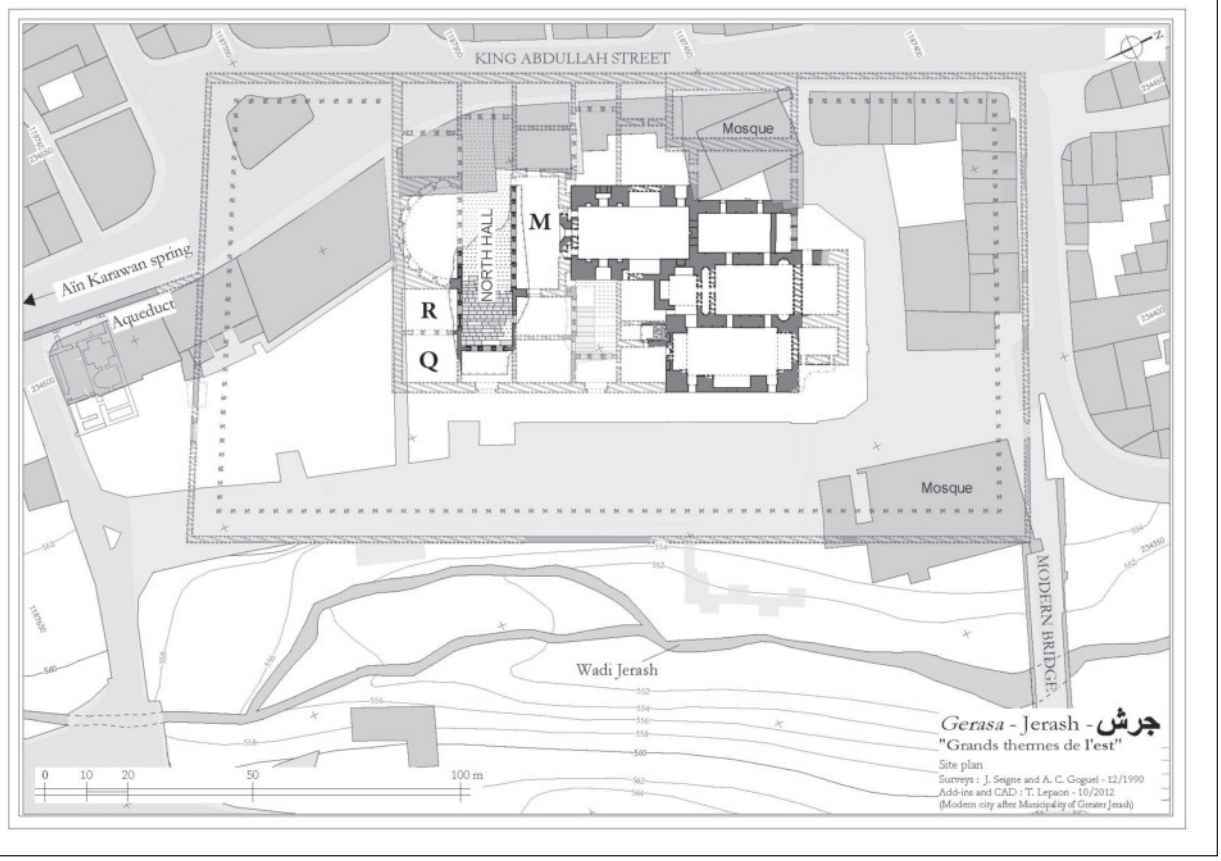
THE GREAT EASTERN BATHS AT GERASA / JARASH
REPORT ON THE EXCAVATION CAMPAIGN 2017

Thomas Lepaon and Thomas Maria Weber-Karyotakis

The 2017 excavation season marked the second campaign1[1] for the archaeological exploration of the Great Eastern Baths at Jarash (**Fig. 1**)[2]. It lasted from September 5th to October 20th 2017, and was a joint venture between the Department of Antiquities of Jordan (DoA), represented by Dr Ismael Melhelm (the director of the Jarash Antiquities Office) and Ms Eman S. al-Qor'an, the Mission Archeologique Francaise de Jerash (MAFJ), directed by Dr Thomas



1. Site map, indicating the excavation areas of the 2017 campaign in grey.

1. The project phase of 2017 was again generously funded by the *Gerda Henkel-Foundation* (Düsseldorf) and *le ministere des affaires etrangeres et du developpement international* (*MAEDI* – Paris). H.E. Mr Davide Bertolotti, Ambassador of the Republic of France to Jordan, honored the team with a visit to the site on October 16th, 2017.

2. The excavation permit issued by the *DoA* has the number 2017/47. We herewith extend our gratitude to H.E. The Director General of the *DoA,* Professor Dr. Monther Jamhawi, and to Mr. Aktham 'Abbadi, the Director of the *Department of Excavation and Survey* for their support of the project.

Lepaon, and the German Jordanian University (GJU), headed by Professor Thomas M. Weber-Karyotakis. The European-Jordanian team (**Fig. 2**) was comprised of four members from the French mission[3], four Jordanian archaeologists[4], twelve students from *GJU*[5], and fifteen experienced local workmen, most of whom were recruited from *al-mukhayyam* Suf, a local refugee camp. The excavation took place in an area in the center of modern Jarash[6], which is owned by the municipality. The Abdalla Abadi Company[7] from Amman provided the necessary expertise regarding the stability of the modern buildings adjacent to the excavation trenches. Professor Dr. Khaled Bashayreh (Yarmouk University, Irbid) and Professor Dr. Nizar Abu Jaber (GJU) sampled various marble objects for archaeometric analysis, with the consent of the project directors and an official permit issued by the Director General of the DoA Amman[8]. To all above institutions and personalities named, the directors of the joint archaeological project extend our thanks for their support and cooperation.

The work in 2017 resumed that of the first season in 2016[9] focusing on the transitional area (**Figs. 1. R and Q**) between the bathing complex and the so-called northern hall. Parallel to the exploration of this large area, limited clearance and a sounding was conducted in one of the rooms adjacent to the northwestern flank of the hall (Room Q) and in the south-western sector of the *exedra* (Room S). According to the excavation grid, these areas are mainly located in Squares 99-98 / 89-88.

The find materials consisted of large quantites of (mostly broken) limestone rubble, tiles, pottery, glass, colored marble slabs, some 400

2. The archaeological team of the 2017 campaign.

3. Mr. Gael Simon, archaeologist, French nationality, Ms. Katia Lagorsse, archaeologist, French nationality, Ms Anne-Marie Jouquand, archaeologist, French nationality, Ms. Daniela Baldoni, archaeologist, Italian nationality.

4. Ms Khairiyeh al-Khokhon, BA, conservator; Mr. Dheeb Hassan, BA, draftsman; Mr. Abd al-Kereem al-Awamlah, MA, and Mr. Ahmad Dhaher, BA. All Jordanian archaeologists hold a University degree in archaeology and had a long experience by field training. They all were attached to the team of *GJU*.

5. Mr Muhsen al-Bawab, Mr Mohammed A. Hayajneh, Ms Enas H. Qasem, Ms Hala H. Abu Hamda, Mr Ayman J. Abu Hamdiyah, Ms Diana D. Khezaqian, Ms Sawsan F. al-Bargouti, Ms Do'a H. Ta'an, Mr Zaid al-Kawaz; Mr Khaled Khresh. All students are enrolled in the MA-study track for architectural restauration and hold a *DAAD*-study scholarship. The participation was on the basis of a voluntary stage in architectural documentation, sponsored by the Deanship of the *School of Architecture and Built Environment* of the *GJU*, namely by Professor Dr. Ziad Haddad, Professor Dr. Maram Tawil, and Professor Dr. Feda Salah. The students were instructed by Professor Dr. Patric A. Kreuz (JU) and Ms Maha Salah, MA, Technical University Berlin. The GJU Vice-President, Professor Dr. Dorit Schumann, honored the team with her visit to the site on September 20th, 2017.

6. We owe thanks to H.E. The Mayor of *Jerash Municipality*, Dr. Ali al-Ghawghasi for granting permission, as well as to the Director of the *Department of Public Relation*, Mr. Hisham al-Banna, and to all concerned people of Jerash for their cordial hospitality, great support and vivid interest.

7. We express our sincere thanks to Mr Ammar Khammash for his advice and recommendations. Further measures of security were imposed by the installment of an iron reeling along the terrace on the eastern balk of Room M. The other trenches were secured by a fence with financial support from the Mission on behalf of the *DoA* Jerash.

8. Permit dated to October 31st, 2017 no. 4020/2/5/17.

9. Full preliminary report published in 2017: Lepaon, Th. - Turshan, N. - Weber-Karyotakis, Th. M., 2017: The Eastern Baths at Gerasa / Jerash: Preliminary Report on the 2016 Campaign. Edit. Digitale Publikation Gerda Henkel-Stiftung, DOI: 10.23778/ ghs. edit.2017.1; URL:https://edit.gerda-henkel-stiftung.de/gerasa/theeastern- baths-at-gerasa-jerash, see also here under bibliography "Report 2016".

white marble statuary fragments, and a few metal objects. All finds were moved at the end of the season into the DoA storerooms in Jarash, except for the precious marble statuary pieces, which were packed separately in wooden lockable boxes, and transferred to the storage rooms in the DoA's Jarash Directorate Office. On October 26th 2017, a complete list of these marbles was handed to the keeper of antiquities at the DoA.

1. The Excavation (By Thomas Lepaon).

1.1 Area M

Only partly excavated in 2016, area M (**Fig. 3**) Was the main focus of the excavations during the 2017 season, in order to obtain more precise data for restoring the overall plan of this transitional building between the bathing complex and the northern hall. The architectural structures which make up this room are arranged on either side of the south-north axis, (symmetrical to the thermal building), forming a large rectangular space with a total surface area of 285 m^2. As the soundings of the 2016 season have already shown, the floor of this transitional building in its primary use consisted of a carefully laid limestone pavement of large slabs, which are oriented with the cardinal directions.

The aim of the 2017 investigations was to clear the entire entity, in order to understand its entire occupation history, from today back to the Roman period when it was built.

1.1.1. Modern Occupation of Area M

The stratigraphic sequence exposed in 2016 for the modern occupation of the area has now been confirmed throughout the entire surface of Area M. Immediately below the topsoil level, several layers relating to the most recent occupation of the site have been reported. These layers contained modern rubbish such as plastic bag fragments, clothes, pieces of iron, and modern glass. In order to save time and money, the upper parts of these topsoil layers, together with the garbage deposits, were removed with the help of a small bulldozer, under the supervision of the excavation directors and the Inspector of Antiquities from the DoA, Jarash. The accumulation of modern material dates roughly from the time of the Circassian resettlement of Jarash until the last few decades, when the entire area had been used as a local bus station.

A sounding pit (F.550001), which was part of the rescue excavation undertaken by the DoA Jarash in 2004, is located immediately north of the central vaulted passage to the southern bathing hall (*frigidarium*). It was only partly cleared in 2016, but was fully excavated down to the Roman pavement during the 2017 season.

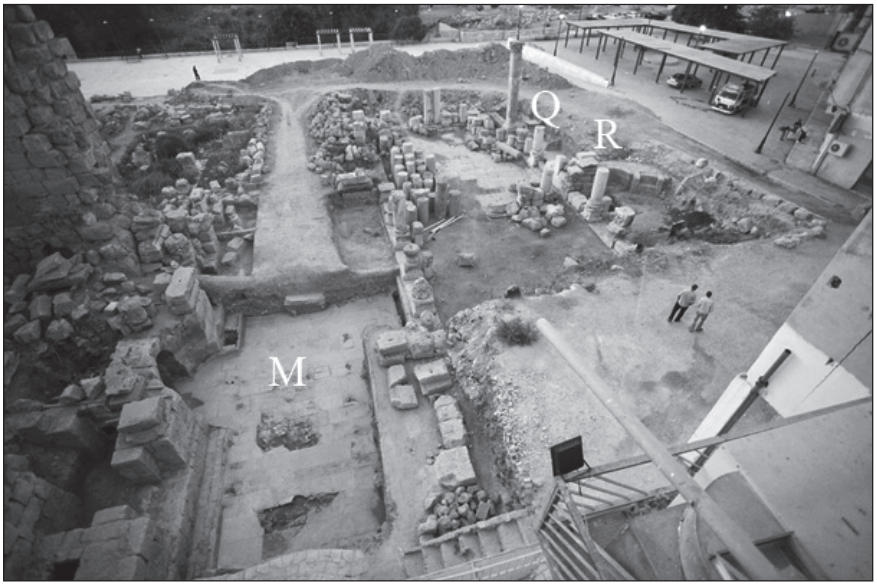
1.1.2. Abandonment of Human Occupation in Area M

Under the modern strata were a sequence of sterile silt layers. This material had accumulated to a considerable thickness, and displayed uniform characteristics such as a dark brown hue, with a homogeneous texture and substance. The stratum produced scarcely any or no archaeological artefacts at all, and thus relates to an epoch when the area was not used for human activities. The chronological limits of these strata obviously comprise those centuries when human settlement largely ceased at Jarash, from the 'Abbassid period through to the period of Ottoman rule.

1.1.3. Early Islamic Reoccupation of the Ruins in Area M

In 2016, the discovery of a wall constructed with Roman spoils in the northeastern part of Area M (MUR 55004) led to the discovery of a room-shaped dwelling (**Fig. 4**), which was obviously constructed after the demolition of the ancient monument. All the walls of this dwelling, which were cleared during the 2017 excavation, rested on a 30-50 cm thick soil deposit, which covered the Roman pavement. The remnants of this later structure were completely cleared within the limits of the excavation trenches.

Two walls, orthogonally oriented to the south and the east, formed the southwestern corner of a rectangular chamber measuring approximately 5 m in length and 2.50 m in width, occupying a space of approximately 12.5 m^2. This building continues to the north and east, under the unexcavated trench balks; this extension is still totally unknown. The perpendicularly arranged walls of this room consist of numerous Roman period entablature blocks (which are partly delicately decorated), and column drums, which



3. Overview of the whole excavation area of the 2017season.

have either smooth (**Fig. 5**) or spirally fluted shafts. These older architectural elements were reused as building material where they fell, after the collapse of the thermal building due to an earthquake. It should be noted that the interior of the building had been carefully cleared of fallen material, which is only found outside the walls, and scattered arbitrarily. This fact indicates the building postdates the catastrophe, and has nothing to do with any form of recycling of the marble statues, as all of the marble statuary fragments were found underneath collapsed architectural entablature blocks.

4. Early Islamic structure constructed from Roman spolia in the northwestern sector of Room M. Taken from the east.

The walls of the room were set on a foundation of carefully levelled brownish limestone blocks, which carried, lying horizontally or vertically, column drums and other Roman blocks. The southward face of this masonry, which was discovered in 2016, preserved along its interior base the remains of a layer of sediment and ceramic sherds, which formed the support for a whitish plaster coating. The masonry of the northern face is composed of a column drum, on which quadrangular blocks have been

5. Early Islamic structure constructed from Roman spolia in the northwestern sector of Room M. Detail of the southern wall spolia construction.

placed. This side of the masonry also displays plaster remains. Such careful plastering of the walls excludes an industrial function, such as a stable for cattle or as an improvised storage for goods.

However, the actual function of this room remains obscure. In light of the discoveries of 2017, the initial hypothesis of a secondary basin cannot be retained. There is no conclusive evidence which would allow a more precise specification of the use of this room. A preliminary study of the pottery indicates that the fragments which were used to support the plaster date to the Byzantine period, while sherds discovered on the floor level belong to the Umayyad and Abbasid periods. After careful documentation, and with the consent of the DoA inspector, this structure was removed by a crane, to allow exploration of the underlying structures. Due to the ancient numbering system on the joint faces of the column drums, it will be possible to attribute these pieces to the corresponding parts of the Roman colonnade in the future, facilitating an *anastylosis* of the northern hall. The removal of the elements mentioned above was inevitable for this reason also.

1.1.4. The Demolition of the Roman Building

A similar level of destruction was revealed throughout the excavation area, apart from the interior of the early Islamic construction described above. As already evidenced by the excavation of 2016, the entire area outside this building was full of tumbled architectural blocks (**Fig. 7**) such as spirally fluted column shafts, decorated architraves, cornices, and other elements.

The reason for their collapse must have been a natural catastrophe, perhaps an earthquake such as those from the years 551 AD or (more likely) 749 AD. Close investigation of the collapsed building material revealed an accidental deposit distribution of elements according to their size: smaller architectural elements, such as spirally fluted column shafts, or minor column bases destined for *naiskoi* (niche frames) were predominantly discovered in the upper part of the collapse. In contrast to this, more monumental elements, such as architraves and cornices, were found in the lower part of the rubble. During the extensive excavation of this area, we observed a peculiar scarcity, or even a complete absence of, expected architectural elements which were essential for the realization of both the northern façade cladding of the bathing complex and the southern façade, which formed a sector within the northern portico of the neighboring hall. Apart from one well preserved exception (**Fig. 6**), no further small Corinthian capitals which would have crowned the spirally fluted column shafts came to light. On the other hand, the excavation made it possible to identify some indurated surfaces (probably walking levels), which reflect an occasional visit to the sector, probably by people who were searching for building material. Se-

6. Small Corinthian composite limestone capital used for a smaller architectural order, with spirally fluted column drums. Found as a single object in the upper levels.

7. Room A, with the rubble of collapsed architectural elements, most probably as a result of the earthquake of AD 749.

lective stone-robbery in the period after the catastrophe could be a plausible explanation for an incomplete inventory of excavated building blocks.

These field observations led to the conclusion that a number of architectural blocks had been recovered for secondary reuse after the violent demolition of the monument, probably caused by the earthquake of 749 AD. As already noted in the previous excavation season, no evidence for the roofing of this compound was discovered. The catastrophe obviously did not cause human casualties, as no trace of human skeletons were uncovered. The isolated animal bones probably should be explained as the remains of food butchery and consumption.

1.1.5. The Abandonment of Area M before the Destruction

Immediately under the strata connected to the collapse of the architectural structure in Area M, a greyish layer of soil, mixed with ashes and lime, was uncovered over the entire area of excavation. The properties of this stratum testify to the abandonment of Area M prior to the natural catastrophe of 749 AD. Among the archaeological finds from this layer, a coin testifies the abandonment of this area occurred after 642 AD. For this reason, the earthquake of 749 AD was most likely the event which caused the collapse of the Roman period building.

1.1.6. A Recycling Yard of Marble Statuary

Under the abandonment level related to the monument prior to the natural catastrophe, the remains of an industrial recycling yard came to light. This installation facilitated the systematic destruction of marble statuary and other decorative elements from the former Great Eastern Baths. On the pavement of Area M, a large number of sculptural fragments, cladding slabs, and *Opus Sectile* of colored marble had been stored for the recycling process (**Figs. 8-10**). It is very probable that these objects were smashed into pieces at the spot, in order to facilitate their transport to the ovens. Among the marble fragments, eight large torsi of fine marble figures dating to the imperial Roman period came to light, which were destined for recycling in kilns or furnaces, no remains of which were uncovered in the excavated area. On exposure to high temperature, marble decomposes and is converted into lime, which was an important material in late antique and early Islamic construction. It may be assumed that the kilns, which were probably close by,

8. Deposition of large sculptural marble fragments underneath the rubble of the destruction layer. It is obvious that the fragments had been smashed and hoarded in Room M, in preparation for recycling; they would have been burnt to produce lime.

9. Deposit of large sculptural marble fragments underneath the rubble of the destruction layer. Overview of the whole of Room M. Taken from the east.

10. Deposit of large sculptural marble fragments underneath the rubble of the destruction layer. Detail of the statuary deposit in the eastern sector.

are buried under the modern houses bordering the excavation area to the east. See the remarks below by Thomas M. Weber-Karyotakis (in his chapter on the sculptural finds) concerning the methodological consequences for the study of the sculptural decoration of the baths and the northern hall.

In the southwestern sector of excavation Area M, the remains of a quadrangular structure built of limestone blocks came to light. The underlying Roman pavement had been removed for this construction, and the foundation was laid in the soil underneath. The quadrangular construction preserves an orange clay wall isolating the interior cavity. At the bottom of this construction, a ceramic jug from the Byzantine period was unearthed.

1.1.7. The Roman Phase of Area M

1.1.7.1. The Staircase

At the south-west corner of Room M, an internal staircase was built into the masonry (**Fig. 11**). Three steps, 0.30 m in height, were cleared during the excavation. No detailed architectural study had been carried out yet. A preliminary reconstruction of an open, U-shaped staircase, with two enclosing flights to access the roofs of the antique building, appears at present to be the most likely explanation, based on the archaeological traces.

11. Solid southwestern wall of Room M, with inserted staircase.

1.1.7.2 The Roman Phase Piscine

The final discovery of the excavation was the unearthing of the entire base of the monumental piscine (**Fig. 12**). It was sounded during the 2016 campaign, after a water supply channel coming from the bath's *frigidarium* had been cleared. The backdrop of the pool is composed of large quadrangular slabs of hard pink limestone. Along the southern flank, the entire wall of the room was lined by a parietal veneer fitted against brick masonry, which was partially uncovered in 2016.

1.2 Room Q

An area of approximately 15 m^2 was excavated at the site of room Q (Square 24), which borders the northern hall at its northwestern flank. Already partially excavated in 1986, the present work conducted in this room made it possible to highlight the masonry, and the occupation levels dating from different periods. As already suspected during the 1984 excavation

12. Roman outdoor pool (Room M, a piscine or natatio) in the thermal building. Taken from the east.

directed by Aida Naghawi, the Director of the DoA in Jarash, the pilaster separating rooms Q and R belongs to the original phase of the hall. This supporting element was entirely unearthed in 2017. In reference to comparable architectural features from the "northern hall", it seems possible to restore here a passageway between two columns, framed by two pilasters.

The 2017 excavation also documented the late reuse of this room before the abandonment phase of the hall, with a south-north oriented wall exposed. It is built of different sized, soft limestone blocks which had probably been reused, without any foundation and devoid of coating. It is stratigraphically associated with a thin occupation layer. This phase is characterized by the remains of a small hearth, which calcinated a part of the eastern wall of the masonry. Both the architectural and archaeological evidence affirm the late character of this ensemble. The forthcoming ceramic study by Daniela Bondoni will determine the chronological data of this phase.

This late occupation was based directly on a patch of mosaic floor excavated in the southern and eastern sectors of the area (**Figs. 13-14**). The mosaic is comprised of a 0.70 m border, made of irregularly arranged large white *tesserae*, which frames a more carefully executed polychrome panel (**Fig. 14)**. The latter is a geometric composition of thin black and red bands, combined with another geometric pattern of red and white diamonds. A gap in this floor at the southeast corner of the excavation area made it possible to study the composition of the bedding. Accordingly, it is evident that this mosaic constitutes the original floor for public circulation in this room, in a functional context with the thermal building. No later repairs to this decorative floor were observed.

13. Room Q, with a mosaic floor. Taken from the east.

14. Detail of the polychrome mosaic in Room Q. Taken from the northeast.

1.3 Area R

Adjacent to the east of room S, room R was excavated along its full length of 10 m and to a width of c. 4.50 m, thus covering a space of approximately 45 m^2 (Squares 34 and 44) (**Figs. 15-16**). Already partially excavated in 1986, work carried out in this room in 2017 uncovered the ancient pavement, made from large slabs of hard pink limestone. This floor showed evidence of repairs in some places, together with pieces of an older architrave. Several later installations resting on this Roman period floor testify to a secondary reuse of this area.

The southern face of these constructions had been visible since their excavation in 1986. The unearthing of their northern face in 2017 revealed the presence of coating. To the north of the latter, stonework constructed with *spolia* irregularly follows the orientation of the older Roman structures. To the east and south, rectilinear stonework forms the southeastern corner of a room, the west-east end of which is marked by the presence of a rounded angle. All these structures preserve the remains of the plaster which covered the interior face of this room, the function of which is still undetermined.

Finally, the vestiges of a wall oriented south-north were uncovered to the east of the sector. Of poor quality construction, this wall was coated along both western and eastern faces. The latter had two coats of plaster, attesting to a sustained occupation of the room. The remains which have been uncovered so far do not allow a specific function to be assigned to this space after the Roman phase. However, the continuous presence of a plaster coating indicates that this occupation was not limited to transient squatters in the ancient structures once they had lost their original function. Only by continuing the excavations towards the north will we be able to better understand the function of these rooms over their total occupation history.

15. Room R. Taken from the east.

16. Detail of the late construction, south of the west pillar in Room R.

2. The Marble Sculpture- New Finds of the 2017 Campaign (By Thomas M. Weber-Karyotakis)

2.1. Introduction

In addition to documenting the decorated architectural blocks, the GJU team focused on the study of the marble sculptures found at the site of the northern hall and adjacent areas. The most productive area was room M, which was interpreted by our French excavation partners as a paved outdoor piscine (*natatio*) between the bathing complex and the so-called northern hall. The aim of the present campaign was to discover further evidence about the nature and arrangement of the statuary decoration for these two important complexes. Therefore, we hoped that studying the excavated marble statues where they were found would allow us to further connect them with the inscribed statue bases of the neighboring northern hall. In the course of the 2017 campaign, 109 marble statuary fragments, with different dimensions and provenances, have been registered from the excavated areas, predominantly from room M. Only marble objects which preserved some portion of their worked surfaces were fully documented by registration, measuring, drawing, and photographing. The objects in this category ranged from large sculptured torsi to small flakes. However, a considerable number of amorphous lumps or chips, with no trace of surface treatment, were also kept for later restoration purposes.

Objects which retained faint traces of color were carefully cleaned by dry brushing (without water), in order to facilitate further research on original polychromy during the restoration process. Large sculptural fragments were also dry brushed for the same reason. In the photographs which illustrate this article, they appear much darker than they will be after professional cleaning, as the surfaces are still tainted by the reddish brown soil they were found in.

Almost all statuary fragments came to light in room M under the first destruction layer, which was marked by densely collapsed rubble of massive blocks, mostly from the lavishly decorated entablature which had collapsed during the disastrous earthquake of 749 AD. Even though this catastrophe may have caused further damage to the statues, their deposition in the stratum underneath was, however, a result of previous destructive human activities. People had intentionally accumulated and then smashed sculptures on the rubble above the limestone pavement of room M, obviously to send them for burning, in order to produce lime for domestic construction. This is definitively the reason why major parts of the torsi have not been found, particularly the heads or body extremities. The sugar-like, decayed porous surface of some of the fragments indicates they have been exposed to high temperatures. Even though there is no material evidence for a kiln or furnace, we must take into account that the sculptural fragments are the sad remains of a systematic industrial recycling process. Obviously, the sudden earthquake interrupted this activity and preserved some large parts of marble figures. As a consequence, the find position of a sculpture does not provide any clue for reconstructing its original arrangement within the northern hall. One cannot even exclude the possibility that some of the statues had never decorated either the baths or the northern hall, but had been brought from another area in the urban topography to the designated place for firing[10]. To our present knowledge, the hoard of marble statuary which has been uncovered was definitely destined for destruction by firing, certainly under the auspices of fundamentalist religious (Christian?) iconoclasts.

Despite the discouraging circumstances of their deposition, the statuary findings of the 2017 campaign have enriched our present knowledge of the statuary landscape of Gerasa in the Decapolis tremendously. Apart from the Alexandrian Muse by Antoneinus[11] and the Aphrodisian dancing Satyr holding Dionysus' babe[12], it is difficult to decide on the geographic location of the ateliers where the statues had been commissioned and bought; furthermore, the archaeometric determination of the quarry sources for the marbles does not help to resolve this problem. More decisive is the question of

10. This hypothesis is corroborated by the fact that the statuary material from the Eastern Great Baths produced until now two statues of Zeus if the identification of the bearded head fragment in Report 2016 ,cat.-no. 1 is correct.

11. See Report 2016, cat.-no. 5.

12. See Report 2016, cat.-no. 6.

implantation of Greco-Roman iconographic types, because this determines the extent the local Arab population participated in the interprovincial Roman imperial culture as a proof of political loyalty, in contrast to sustained indigenous religious traditions.

As well as the major fragment of the precisely dated colossal statue of Aphrodite, donated to the city by a certain Demetrius in AD 154, six further torsi have been preserved to an extent which allows an interpretation and solid future restoration.

2.2. Aphrodite of Demetrius

The upper body of Aphrodite came to light approximately 70 cm to the southwest of the find spot of the lower body (**Fig. 17**) with an inscribed plinth, which was found in 2016[13]. It was found lying on its back, and is preserved from the zone of the navel upward, until the base of the broken neck. The head and both arms are lost. If the colossal statue had collapsed by accident under the weight of falling architectural blocks, the broken head and both arms would certainly have been found scattered in the vicinity of the *thorax*. Moreover, the edges of the oblique break surfaces of both body fragments have been battered, flaking flat chips away, obviously caused by a tool rather than a single collision with a large stone block. Nevertheless, both parts fit perfectly together, and complete the figure from the bottom of the plinth to a height of 208 cm (**Figs. 18-20**). A curved fragment which retains strands of hair (**Fig. 21**) found close to the upper body torso[14] fits onto a flaked portion of the left shoulder (cf. **Figs. 18-20**). A number of further fragments may also be attributed to the statue, on the basis of similar proportions and the quality of the fine to medium, crystalline grain, white-grey marble.

17. The upper torso of Aphrodite as it was uncovered, lying on its back at a distance of c. 70 cm to the southwest from where the lower torso (with plinth) was found in 2016.

As already stated in the 2016 report, the Aphrodite of Demetrius is a variation of the late Hellenistic statuary type commonly called "Aphrodite of the Troade". In its present condition, the figure appears in an equilibrated contrapposto composition, with a slight turn around its anatomic vertical axis, causing an S-shaped line from the zone of the private parts to the key bones of the neck. The right arm (which is broken at the pit) was raised, while the left one was lowered, to grasp the lappet of the towel at the height of her left thigh. The trunk of the neck suggests a slight turn of her (possibly inclined?) head to the right side. The modelling style is compact and smooth, avoiding graphic elements for shading contours, with the necessary channels produced by pointed chisels, without application of the running drill. The absolute date of AD 154 given by the inscriptional dedication carved upon the plinth provides an absolute *terminus post quem non* for the stylistic evaluation of undated sculpture found in the eastern Mediterranean.

2.3. Zeus Type Florence

An important sculptural find is a nude standing statue of Zeus; it was uncovered in 17 fragments, each of which fit together at their breaks (**Figs. 23 a-f**). They appeared in the accumulation of debris under the fallen architectural blocks in the southwestern sector of the piscine, a few meters west of the southwestern corner of the early Islamic structure[15]. The fragments were deposited roughly in the layout of human anatomy. Apart from the missing lower right hand and entire left arm, the figure can be restored to its original height, measuring 174 cm from the base of the pedestal to the top of the

13. Report 2016 cat.-no. 4. The find coordinates of the upper torso are: Room M, square 88, locus 233, on the brown clay soil and stone gravel under the destruction layer, about 30 cm above the limestone pavement of the piscine.

14. Find information: Reg.-no. 2017/33: Found on October 1st, 2017, in room M, square 78, locus 233.

15. Find information: Reg.-no.2017/78A-Q: Found on October 10th, 2017, in room M, square 89, locus 244.

18-20. The current condition of the torso of the Aphrodite of Demetrius after the 2017 excavation campaign. height 208 cm. Currently packed and stored in front of the Jarash Archaeological Museum, in the control of the DoA.

head.

It depicts an upright standing, naked man of slim athletic stature, bearded, holding the right hand lowered and extended forward. Most probably, the god held his significant attribute, the bundle of flashes, in this hand. The entirely missing left arm was emphatically raised at the pit, and the hand may have grasped a vertical stick-like object, probably a scepter. There is no doubt the interpretation as Zeus is correct, as a squatting eagle with spread wings, the heraldic holy animal of the supreme Olympian god, serves as a statuary support along the outside contour of his right lower leg (**Figs. 23 d-e**). The head (**Fig. 23 b**), with its long curly coiffure, and the full beard with curly strands parted at the chin, emphasizes the majesty of the god.

In terms of art history classification, the sculpture can be attributed to an iconographic type richly represented during the Roman imperial period by a number of marble statues and bronze figurines, commonly named "Type Florence"[16] after a very famous bronze statuette which is exhibited at the *Museo Archeologico* in Florence (**Fig. 22**)[17]. The Florentine bronze figurine is the closest convincing icongraphic type comparison to the newly found Gerasa Zeus to the author's knowledge. Ernst Berger[18] recognized a colossal *chef d'oeuvre* of the Greek sculptor Myron, created around the middle of the 5th century BC, as the archetype of this bronze statuette at Florence. This masterpiece was originally exposed as a group on one base, with statues of Athena and Herakles in the Heraion of Samos. According to Strabo (*Geogr.* XIV, 637b)[19], Antonius brought the colossus of

16. C. Maderna, in: Forschungen zur Villa Albani 90-92.
17. Florence, Museo Archeologico Nazionale, inv. 2574. Bibl.: M. Sofia, in: Piccoli Grandi Bronzi 66 no. 4.
18. Berger 1969, 66-92.
19. Overbeck Leipzig 1868, 100 no. 536.

21. Fragment of a hair strand (2017/33) which fits onto a break on the left shoulder of the Aphrodite of Demetrius. Presently packed together with the torso, and stored in front of the Jarash Archaeological Museum, in the control of the DoA.

Zeus to Rome and displayed it in a small canopy temple ("*naiskos*") on the Capitoline hill.

The famous Zeus by Myron is thought to have inspired artists in the Roman capital to create a large number of replicas and variations[20]. The newly found Zeus from the Eastern Great Baths at Gerasa might be one of them, not necessarily manufactured in Rome itself, but in one of the ateliers of the Roman East. The date of this replica can be determined by stylistic features; the drilling of the contour line to produce a contrast between the curly strands of the coiffure and the flesh of the cheeks is still a modest application of graphic elements produced by the "running drill", which starts to dominate sculpture from the Severian period, and reduce the plastic volume. The bean-shaped drilling curve upon the eyeballs becomes a stylistic element in later Antonine portraiture, to indicate the light reflection on the iris.

Based on these two indicative features, the newly found Gerasa Zeus should be dated to the reign of Commodus; that is, the decade between

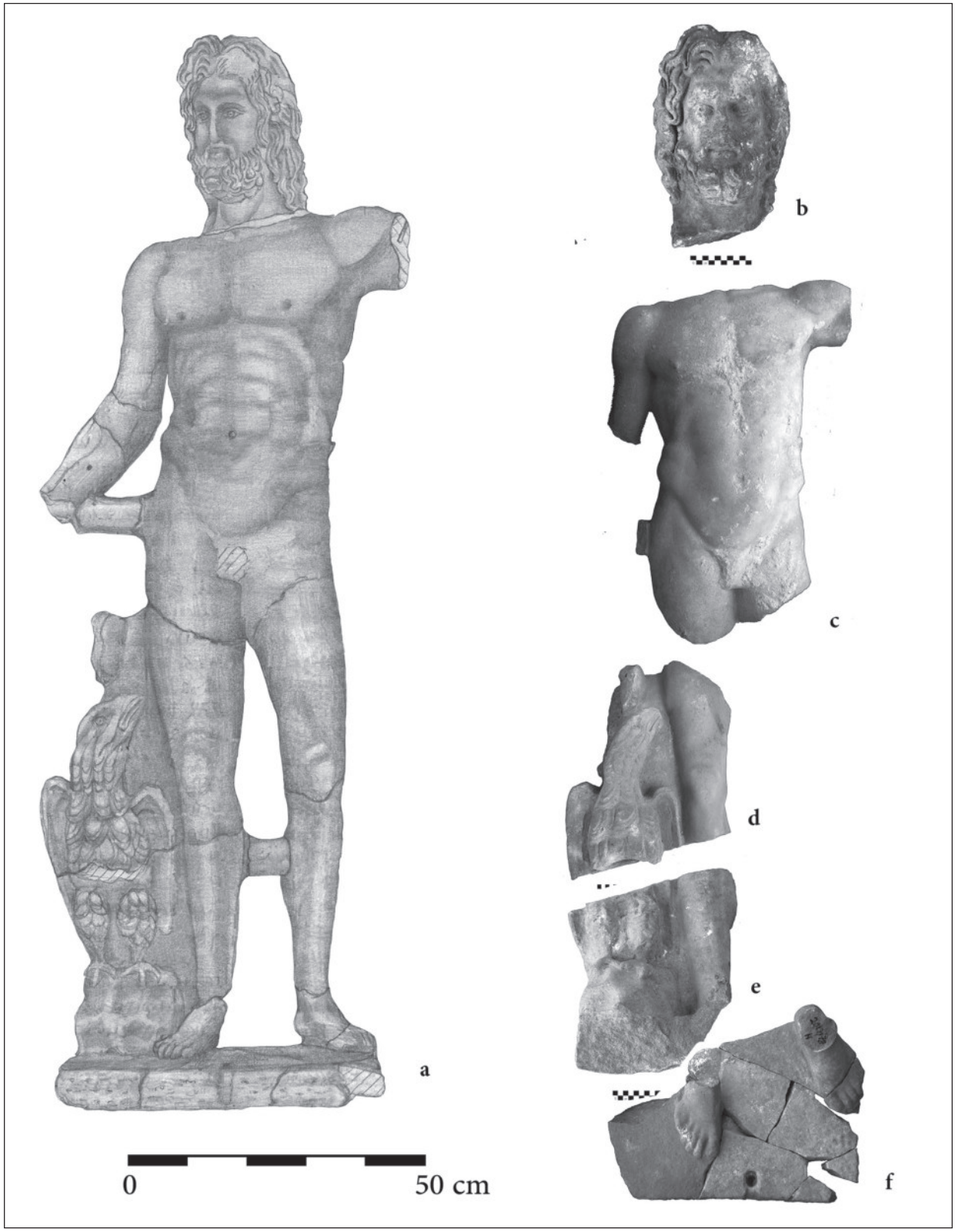
22. Bronze statuette of Zeus, evaluated as a fairly exact Roman copy in reduced size after the colossal statue of Zeus by Myron. Florence, Museo Archeologico Nazionale, inv. 2574.

180 and 190 AD. This means there is a chronological interval of about 30 years between the Aphrodite of Demetrius and the Gerasa Zeus. The sculptor of the latter adopted (more or less consciously) a blend of Hellenistic sculpture, by the slender proportions of the male anatomy and the "Pergamene" touch of the idealized bearded head.

The newly found statue of Zeus is important not so much because of its artistic quality (which is mediocre), but rather for the information it provides about the local cultural history of Gerasa and the *Provincia Arabia.* It is one of the best-preserved Roman sculptures known today from the territory of the modern Hashemite Kingdom of Jordan, and the only human sized representation of the main divinity of Gerasa. As is known from the inscriptions on the seats of the *bouleuterion/ odeion*[21] (formerly known as the "northern theatre") Zeus, together with

20. For a list of replicas and variations in two main groups see A. Leibundgut 1980, 10-12.

21. Seigne - Agusta-Boularot 2005a, 339-435; Seigne - Agusta-Boularot 2005b, 297-310.



23 a-f. Reconstruction drawing of the 17 fragments of the statue of Zeus (2017/78 A-Q) by Dheeb Hassan (a), total height: 174 cm. Photos of selected fragments: (b) the head, (c) torso, (d) upper part of statue support, with representations of the upper half of the eagle and right thigh of Zeus; (e) lower part of the legs of the eagle and the right calf of Zeus; (f) restitution of the pedestal, with both feet seen from above.

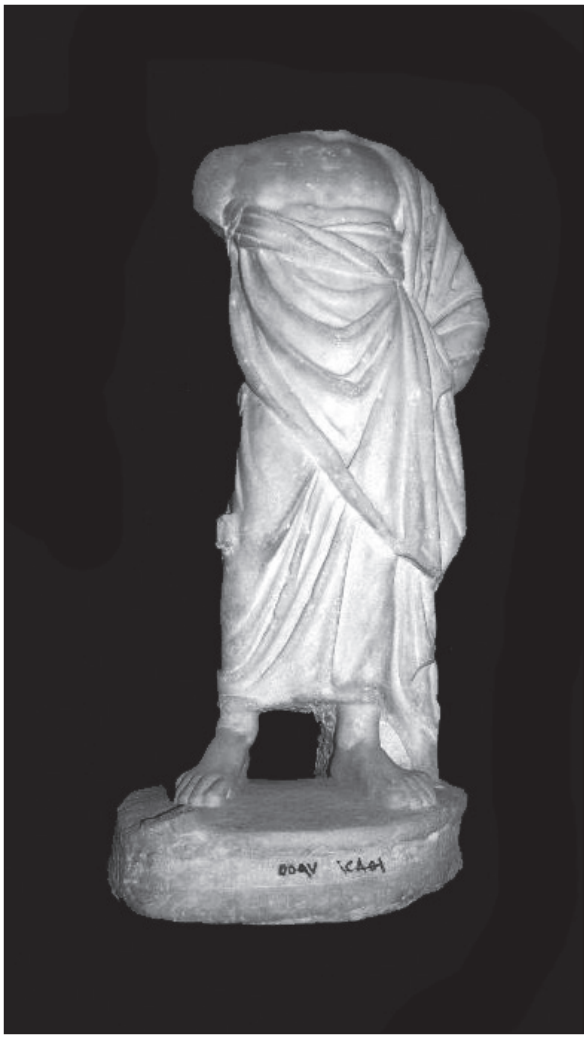
other Olympian gods, played a role in the city as the tutelary divinity of one of the leading urban tribes. We may assume with a high degree of probability that the statue uncovered in 2017 did not serve a purely decorative function in Gerasa; it was certainly a memorial of political self-identification for an influential Arab tribe from the local population.

All remaining fragments of this statue, together with some smaller flakes which may belong to it, were safely packed in a wooden chest and delivered into the custody of the DoA in Jarash on October 19th, 2017.

2.4. Asclepius, Similar To Types Este / Eleusis 30

A second male torso, which was broken into two big pieces, was found associated with several large fragments from other figures (**Figs.8-10**)[22]. The upper part was deposited upright, inclined forward in the northwestern sector of the basin. The lower fragment was uncovered after the torso of Apollo had been removed, as it was immediately underneath and parallel to it, lying face down on the ground. The stratigraphical context was the same as that for the sculptures described above; in a soil deposit underneath the destruction rubble, approximately 30 cm above the Roman pavement. The head, right arm, parts of the left hand, and both feet, together with the pedestal, are missing. Several smaller marble fragments from the same archeological context fit with the torso[23].

The male portrayed is of a youthful, slender and athletic stature (**Figs. 25-28**). His outfit is characterized by a long Greek cloak (*himation*) wrapped around the lower body, drawn from the back over the right shoulder, and falling in a long perpendicular fold of drapery along the left contour of the body down to the calf. This portion of the fabric covers the left arm, which is slightly angled at the elbow, with the covered hand stemmed into the left hip. The cloak is taken up at the height of the navel, and rolled to a thin hem which horizontally transverses the abdomen. A triangular piece of fabric falls forward, covering most of the thigh of the right leg, which is forward and bent at the knee; the lower part of the leg is bent side wards toward the back. The *himation* is worn without underwear; thus the uncovered portion of the chest is naked. Smaller fragments from the drapery were found in the same stratigraphic contexts, and a number of them fitted the breaks on the perpendicular cascade of folds along the figure's left side. In the pit of the lowered right upper arm, the trunk of an object remains, undoubtedly the upper end of the *caduceus*, a stick with a winding snake, the main attribute of the medical god Asclepius. The god was thus posed



24. Marble statue of Asclepius, Type Este/ Eleusis 30 from Syria (exact provenance unknown). height 63.5 cm. Damascus, National Museum, inv. 5597 / 12851.

22. Find information: Reg.-no. 2017/71A-B: Found on October 9th, 2017 in room M, square 98, locus 252.

23. These are mainly fragments of the drapery cascade running from the left side of the cloak: Identified firmly fitting pieces are the following: reg.-nos. 2017/34.54.62.63.110.113. All of them have been packed together with the two torsi and were delivered to the custody of the *DoA* Jerash, on October 19th, 2017.

25-28. Torso of Asclepius (reg.-no. 2017/71A-B). Type Este/ Eleusis 30. height 110 cm; Storage, Jarash DoA.

in a relaxed stance leaning on this stick, with his body slightly inclined to his left side. It seems very possible that this Asclepius from Gerasa was part of a group inside the baths, together with his divine daughter, Hygieia / Salus, who may have been on the left- side.

Several hundred marble statues of Asclepius have been found throughout all the regions and provinces of the Roman Empire, which has resulted in an elaborate sculptural typology in the literature, with a number of sub-types and variations. Due to the limited frame of this preliminary report, we are not able to provide a detailed discussion here. Nevertheless, the relaxed pose, leaning with the weight of the inclined body on top of the *caduceus*, with the bent right arm covered by fabric and stemmed into the hip, points to a similarity to the sculptural types Este or Eleusis 30[24]. Replicas and variations of these related types are variously attested in the coastal cities along the Phoenician and Palestine littoral, such as Sidon/ Saida, and Caesarea Maritima. Despite the repetition of the pose and the garment, the concept and style of the drapery displays great variety, such as that of a well-preserved torso from Damascus in Syria (**Fig. 24**)[25].

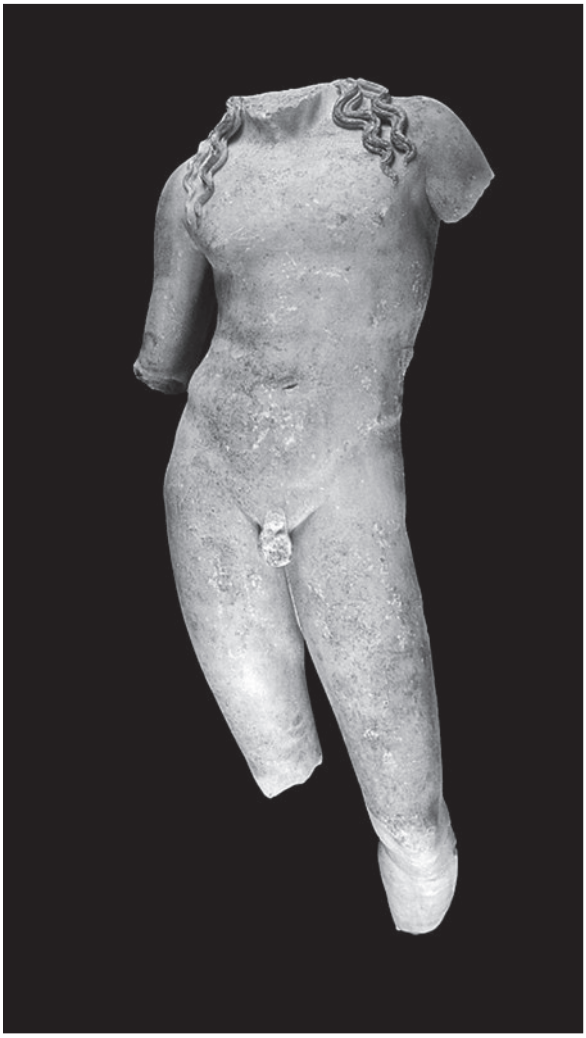
The date of production for the new Gerasa Asclepius is considerably earlier than that of the Zeus statue. The complete lack of drilled channels in the drapery points to the first half of the 2nd century AD, while the inorganic character of the cloak, which appears more like a thin metal foil rather than a textile, resembles the style of the provincial reliefs at the *Hadrianeum* at Rome (dated to AD 145)[26]. The style and finishing lacks the exquisite quality of the "Dancing Muse Miletus" by the Alexandrian sculptor Antoneinus, son of Antiochus, dated to AD 118 / 119[27] by its inscription. However after cleaning some of the drapery fragments which are broken from the Asclepius-torso (see FN 23) with water, it was discovered they have a smooth, porcelain-like surface, with the characteristic ivory-colored patina which gives a glimpse of the magnificent „*sfumato*"-surface of the Antoneinus-Muse. The Asclepius torso can possibly be attributed to the period between 140 and 150

24. See Meyer 1988, 119-159; Meyer 1994, 7-55.

25. Damascus, National Museum, inv. 5597 / 12851, provenience unknown, acquired on the local art market on June 6th, 1948. H 63.5 cm; W 27.5 cm; D 19.4 cm. White fine crystalline marble with bluish veins. Bibl.: unpublished.

26. Cippollone 1978-80, 41-47.

27. See Report 2016, cat.-no. 5. For the probable date of the belonging inscriptional base re-used in the Circessian suq at Jerash see now Gatier – Bader – Aliquot – Sartre – Yon 2017, 345.



29. Torso of Apollo from Berytus, Beirut. National Museum, inv. 2017.

30. Apollo Daphnephorus from Samaria-Sebaste. Amman, Jordan National Museum (Ras al-'Ain). no inv.-no.

AD; at the present stage of research, this date appears to be most likely. The sculptural workmanship, on the other hand, is flat and somewhat dull, lacking variation of detail and deeper shadowing for the under-cuttings.

2.5. Apollo (or Dionysus ?)

A third male torso, which is entirely nude (**Figs. 29-32)** was found deposited in the same cache of fragments as the Asclepius torso above and the Melpomene fragments below, lying on its back (**Fig. 10**)[28]. The head, both arms and both legs, together with the pedestal, are missing. The surface of the body is, in parts (especially in the area of the genitals), battered or worn. There is an oblong, vertical, whitish trace incrustation of lime running vertically downwards from the middle of the breast (*sternum*). The right part of the buttock (*glutaeus*) was found as a separate fragment[29] in a near-by stratigraphic context, which fits with the corresponding break of the torso (**Fig. 31-32**).

The torso is of a nude, gracile person of male gender with a relaxed stance. It is thought to be a 'boyish age', because no trace of public hair can be recognized, even though this part of the body has been intentionally damaged. The right truncated thigh is advancing, which indicates that the full weight of the body rested on the left leg. The equilibrated moving posture causes a flat curvature of the *linea alba* from the *abdomen* to the *thorax.* The right shoulder,

28. Find information: Reg.-no. 2017/62. Found on October 9th, 2017 in room M, square 98, locus 252.

29. Find information: Reg.-no. 2017/ 65 A: Found on October 5th, 2017 in room M square 98, locus 252.

31-34. Naked male torso of a god, Apollo? Dionysus? (reg.-no. 2017/62). height 76 cm. Storage, Jarash DoA.

together with the remnant of the upper arm is slightly raised, while the left shoulder appears to be lowered. The break at the left pit gives no evidence for the pose of the missing arm. It may possibly have been lowered also, with a slightly backward pose. The groin lines run steeply from the genitals to the hips, while the hip musculature is not emphatically articulated by modeling. Long wavy strands of hair remain, falling from both sides upon the shoulders.

Youthful naked male torsi of this type can be interpreted in a variety of ways. Most commonly, they represent a youthful Apollo or Dionysus in Roman sculpture, but alternatives such as Attis, Ganymedes and others are possible. No decisive attributes remain on the Gerasa torso which could lead to a conclusive decision. The motif of a lowered right arm trunk excludes identification with the common Lykeius-type for both Apollo and Dionysus, as this always depicts the right arm raised above the head. If the newly found Gerasa torso could be determined to be associated with the Melpomene which was found in the same stratigraphic context, it would favor a tentative interpretation as Apollo, but this can by no means be a convincing argument. The arbitrary deposition of the hoarded fragments in the whole complex of room M exhorts the researcher to remain prudent.

At this stage of the author's research, the best comparisons with the new Gerasa torso are a torso found at Berytus/ Beirut (**Fig. 33**)[30], and an almost completely preserved marble statue representing Apollo Daphnephorus from Samaria-Sebaste[31], which is currently part of the collection of the *Jordan National Museum* in Amman/ Ras al-'Ain (**Fig. 34**). Compared with the recently discovered Gerasa Torso, the Berytus Apollo has a similar stance, but is a mirror image, while the Samaria Apollo reflects the stance more precisely. Both of the comparative statues were originally displayed with a tripod on their right side, and for this reason their identification as Apollo stands beyond any doubt.

In its present condition, the Gerasa torso retains only the rendering of strands of hair upon the shoulders, which have all been done by a pointed chisel. For this reason, a preliminary dating to around the middle of the 2nd century AD, during the earlier phase of the Antonine reign, can be considered.

30. Beirut, National Museum, inv. 2014, found at Berytus, near the Nymphaeum at rue Emir Beshir, in the Lazariye suburb. H 140 cm; Bibl.: Jidejian 1973 fig. 98. 100; Doumet-Serhal - Maila-Afeiche - el-Dahdah - Rabate 1998, 105 figs. 44; 175; Friedland 2001, 468.

31. Crowfoot – Kenyon 1957, 74 no. 7 pl. X 1-4; Gersht 1996, 440 fig. 13; Fischer 1998, 159-160 no. 183; 198 figs. 183a-b; Friedland 2001, 468.

2.6. Melpomene and Two Unidentified Muses

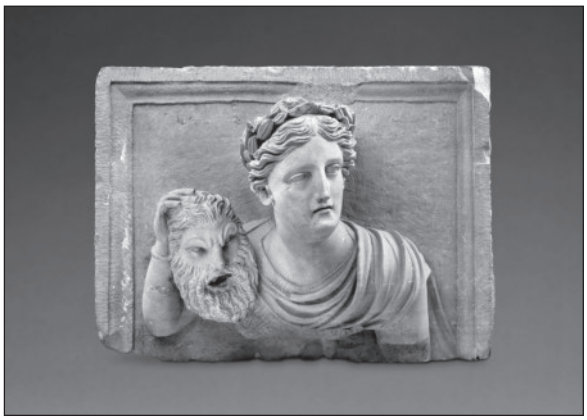
Three other torsi (reg.-nos. 2017/51. 56A-C. 57), all without heads, came from two different squares in the Roman pool. They represent seated female figures clad in classical Greek garments; thick cloaks (*himatia*) and long under-shirts (*chitones*). Two of them came to light in the vicinity of Asclepius and Apollo (**Fig. 10**)[32], while the third was found to the west of the Aphrodite torso[33]. One of them is preserved from the pedestal to the base of the neck; although the other two lack upper bodies, two large fragments of the right breast could successfully be matched to one of them, which has been identified as the Muse Melpomene[34]. All three marble torsi are definitively smaller than life size[35].

None of the three seated torsi would have had a portrait head depicting a person, as representations of noble ladies of the Gerasene society. Statues of this genre are well known in the Roman East[36] but in almost all cases they must be classified as funeral portraits. In contrast to such individual portrait statues, all three of the Gerasene female statue fragments are shown enthroned on a rocky ground rather than on a chair. However, representations of tutelary urban goddesses (in Greek Tyche, plural Tychai) are commonly represented on rocks, frequently with the legs crossed over each other. The most famous of these Tychai was that of Antiocheia, cast in bronze during the early Hellenistic period by the Greek artist Eutychides[37]. In addition, nymphs which were thought to live in grottos or trees are frequently shown sitting on rocks.

Another divine group of maidens squatting on rocks are the nine Olympian Muses. According to Greek religious imagination, these goddesses accompanied and patronized the human arts and sciences[38]. They were thought to reside in the mountain range of Parnassos in southern Boeotia, where a charming valley with a sanctuary of the Muses near the city Thespies, at the eastern slope of Mount Helicon, is visited until today[39].

One of the newly found Muses (**Fig. 35-38**) from Gerasa can be precisely identified by her attribute. She supports a long haired theatrical mask with her right thigh. Due to the expression of horror, with staring eyes and an opened, grimacing mouth, this mask depicts tragedy. This genre of theater was the domain of Melpomene, who is thus represented by the Gerasene torso[40]. Her missing feet were carved separately, and fitted to prepared cavities by *anatyroseis*. This special sculptural treatment is probably explained by the representation of the *kothurnoi*, rather thick-soled laced or half-open boots traditionally worn by Athenian tragic actors[41]. The comic counterpart to Melpomene is the Muse Thalia, who is represented in Petra by a limestone bust which decorates the monumental gate area of the *temenos* of the Qasr al-Bint temple (**Fig. 39**)[42].

As the two remaining female statues (**Figs. 40-47**) have very similar dimensions and poses to the torso of Melpomene, they could possibly



35. Bust of Thalia, the Muse of comedy. Limestone relief from Petra, found in the vestibule of the Temenos gate. Wadi Musa, Petra Visitor Center, J.P. 516; JMA 1434.

32. Find information: Reg.-no. 2017/51: Found on October 8th, 2017 in room M, square 98, locus 252; reg.-no. 2017/56 A-C: Found on September 26th, 2017 in room M, square 98, locus 252.

33. Find information: Reg.-no. 2017/57: Found on October 8th, 2017 in room M, square 77, locus 116.

34. Reg.-nos. 2017/41. 44.

35. Heights of reg.-no. 2017/51:73 cm; reg.-no. 2017/56 A-C: 62 cm; Reg.-no. 2017/57: 52 cm.

36. Weber 2015, 583.

37. Cf. *LIMC* I.1 (Munich 1981) 840-851 s.v. Antiocheia (J.-Chr. Balty).

38. Cf. Murray 2008, 199-219.

39. Roux 1954, 22–48.

40. See *LIMC* XXX.

41. Cf. the still most extensive description of the Athenian actor boot in Paulys Real-Encyclopädie der Classischen Altertumswissenschaft, Vol. 11 (Stuttgart 1922) 1520-1526 s.v. Kothurn (M. Bieber)

42. Wenning – Hübner 2004, 165 no. 12.8 with note 47 (with further discussion and literary references on the identification of this Muse.

36-39. Torso of enthroned Melpomene holding a tragic mask on her thigh (reg.-no. 2017/56A-C). Height 62 cm. Storage, Jarash DoA.

40-43. Torso of an enthroned Muse (Urania?) (reg.-no. 2017/51). height 72 cm. Storage, Jarash DoA.

also be representations of Muses. Moreover, the drapery of their cloaks is almost identical, and their poses differ only in the representations of their right hands and the crossing of their feet. In conclusion, they certainly originate from the same workshop and were commissioned as a pair. However, due to the lack of specific attributes, it is impossible to name them with certainty. The better preserved one (**Figs. 34-40**) has her right hand lying outstretched on her right thigh, with the battered palm directed upward in order to support the missing attribute, (**Fig. 41** in particular). The fingers are badly damaged, most probably lost when the missing object was broken off. It seems possible that she held a celestial globe in her hand; if this was the case, an identification as Urania, the Muse of Astronomy, would be a feasible proposition. The astral character of Urania is further indicated on colored mosaics by a dark blue *himation*, which sometimes depict embroidered golden stars. Whether this torso preserves traces of such painting will only be evident after professional cleaning of the marble surface. The

third female counterpart (**Figs. 44-47**) extends the hand of the lowered right arm on its corresponding thigh; however, it is entirely covered by a portion of the cloak.

Groups of the Olympian Muses have been discovered in various parts of the Roman Empire: A good starting point for further research would be, for instance, the nine seated Muses excavated during the reign of Pope Alexander VI. (1492-1503) in the southern theatre (*odeum*) of Emperor Hadrian's villa in the Albanian mountains at Tivoli, Lazio[43]. Compared to this, the sculptural assemblage from Jarash can be considered as the most complete arrangement of seated Muse statues which have been discovered in the Levant from the Classical period.

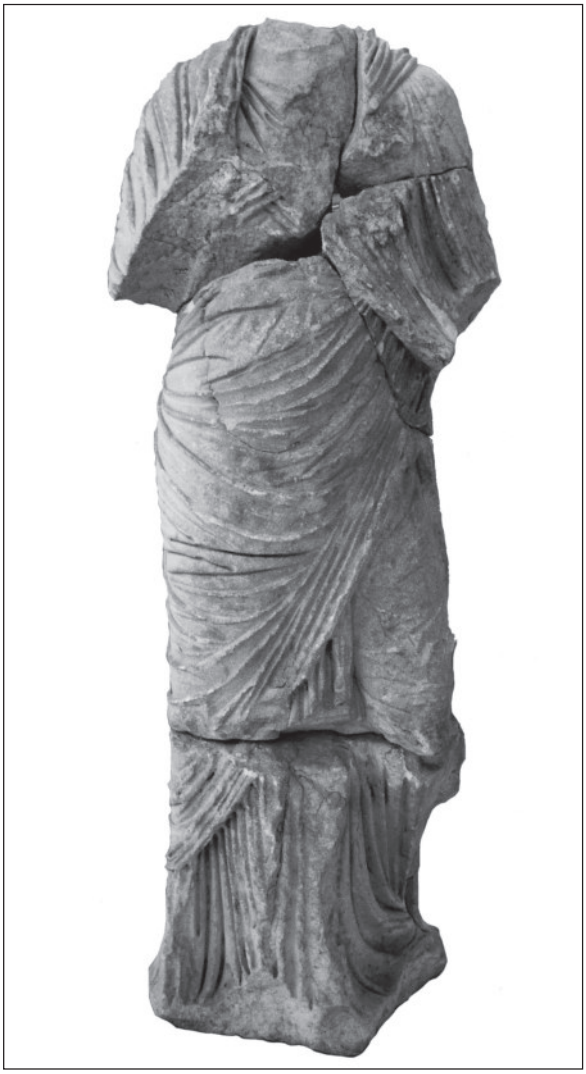
To understand where these newly discovered Muse statues may have come from within the ancient city of Gerasa, we need to consult monuments which were found in excavations prior to the 2017 campaign. It is, therefore, appropriate to include information about statuary finds from previous excavations as part of the context of these newly discovered pieces, which may supplement our knowledge. The first is an inscribed plinth fragment of a variant of the type known as the dancing Muse Miletos[44] which was found in the northern hall during the 1986 DoA excavation. This bears the signature of the Alexandrian sculptor Antoninus, and was commissioned for display at Gerasa by a certain Lysias, son of Ariston, most probably in the years 118/119 AD. The surface of the pedestal displays the same rocky ground as that of the three new statues. If the reading of the date of dedication is correct, it falls into the first years of the reign of Hadrian (AD 117-138), a full decade before the Emperor himself visited Gerasa and held his winter camp in the city (129/130 AD).

The second is a marble torso of a standing Muse, commonly assigned as "*the Muse with the book scroll type Miletus*" (**Fig. 48**), which has been restored from several fragments and is on display at the Citadel Museum in Amman[45]. C. S. Fischer reported finding the abdominal fragment of this statue, lying in the area of the so-called oval forum, in 1938[46]; Asem Bargouti and Zeidan Kafafi conducted excavations in this area on behalf of *The University of Jordan* in the 1980s. This perhaps provides evidence for the location of a sanctuary of the Muses (Greek *Museion*) near the southern theatre, within the topography of Gerasa, where the nine Muses would have originally been located.

The restored statue can be attributed to a series of predominantly Roman reproductions of a statuary type, the lost original of which goes back to the middle of the 3rd century BC; this typological archetype had been inspiring sculptors and coroplasts in western Asia Minor since the Hellenistic period. A fine marble torso from Astypalaia, now in the British Museum, is dated from the 3rd to the mid 2nd centuries BC, and

44-47. Torso of an enthroned Muse, unidentified (reg.-no. 2017/51). height 52 cm. Storage, Jarash DoA.

43. Still the most valuable treaty of this important group is by Raeder 1983, 48-52; more recently also Rausa 2002, 43-51.
44. See Report 2016 cat.-no. 5.
45. Weber 2002, 492 no. C 18 pl. 125A-D (unrestored); Weber 2007, 224 fig. 4a-b.
46. C. S. Fisher, in: Kraeling 1938, 158 pl. XXXI C.



48. Marble torso of the Muse type „with the book-scroll" from Gerasa. Amman, Jordan Archaeological Museum (the Citadel). no inv.-no.

small-sized reproductions in terracotta, such as the Myrina-types preserved at Paris, cannot be ruled out either[47]. A marble specimen of this type, produced by a Rhodian atelier, had already arrived as an import to the Levantine coast by the beginning of the 1st century BC, according to F. Kabus-Preißhofen[48]. It was found on Tall Hadra at Ascalon in 1924[49] and is stylistically

49. Marble head of Polyhymnia from Gerasa. Replica of the type of the co-called Thespiads from Tivoli. Amman, Jordan Archaeological Museum (the Citadel). inv. J 1837.

close to a contemporary late Hellenistic torso of unknown provenance in the Egyptian Museum at Cairo[50].

The third example of previously known Muses from Gerasa is a less than life-sized marble head of a young maiden (**fig. 49**)[51]; unfortunately, its exact provenance in Jarash is unknown. Identification of the personality represented by this head fragment can almost certainly be determined by the attribute of the flower wreath and the coiffure; both have close analogies to the statuary type of Polyhymnia of the so-called Thespiads, a famous late Hellenistic group of the nine Muses. Based on a text from Pliny[52], W. Amelung first associated a group of Muses accompanied by Apollo Musagetes, which was found in 1774 in the villa of Cassius at Tivoli and later added to the collection of the Vatican Museums[53], with a sculptural ensemble which had been transported by Mummius from Thespies in Beotia to Rome, where it was erected in the vicinity of the shrine of Felicitas.

47. Schneider 1999, 135-136 no. 15 pl. 42c.

48. Kabus-Preißhofen 1989, 147 note 585.

49. Today on display at Jerusalem, Israel Museum, inv. S. 928, H. 58 cm. Bibl.: Wenning 1983, 111-112 pl. 16,4; Fischer *1989,* 139 no. 104; 167 with fig.; Schneider *1999,* 135-136 no. 15 pl. 42c; Figueras 2012, 17 fig. 57. Erlich 2009, 13 is not aware of the Rhodian Hellenistic parallels and claims an Augustean origin of the Ascalon-Muse due to her working material, a marble from Carrara, cf. Fischer 1989, 138.

50. Edgar 1903, 16 no. 27 pl. 5.27; Pinkwart 1965, 193 no. 9; Wenning 1983, 111-112; Schneider 1999,135 no. 14 pl. 43.

51. Amman, Jordan Archaeological Museum (citadel), inv. J. 1837. H 28 cm; Bibl.: Weber 2002, 489 no. C 9 pl. 123a; Weber 2007, 222-223 fig. 2.

52. *Nat. Hist.* XXXIV, 69 and 36, 39.

53. Rome, Vatican, Museo Pio-Clementino, Sala delle Muse, inv. 287; W. Amelung, Die Basis des Praxiteles aus Mantineia (Munich 1895); Weber 2007, 223 note 7 figs. 3a-b.

The three marble Muses found in the transitional basin between the Great Eastern Baths and the so-called northern hall during the 2017 campaign considerably enrich our knowledge of these divinities in Gerasa during the Hadrianic and early Antonine periods. The reason why they were moved at this time from the context of the local *Museion* near the Oval Forum to be exhibited at the baths remains undetermined for two reasons. First, none of the hitherto known inscribed statue bases in the northern hall make any reference to the re-erection of a Muse statue. Secondly, the industrial character of the collecting area for recycling marble sculpture in the former Roman piscine does not exclude the possibility that the statues had been brought from another architectural context in Gerasa in order to be smashed and then burned for lime.

50-51. Colossal left marble hand (reg.-no. 2017/ 47. height 18 cm; width 15 cm. Found under the floor of the early Islamic installation in the northeastern area of Room M. Storage, Jarash DoA.

3.7. A Colossal Left Hand

After the removal of the two orthogonal walls, built from *spolia* from the Umayyad/ Abbasid installation (**Figs. 4-5**), the excavation continued to expose the strata beneath its earthen floor. Immediately underneath, the fragment of a large hand (**Figs. 50-51**) lying on its back came to light[54]. It was broken at the wrist, with the hand grasping a stick-like object of unclear nature, the ends of which were also lost. The tip of the thumb, including the nail, has broken off, while the backs of the bent fingers display a sugar-like decay of the original marble surfaces. This was caused by partial exposure of the upper part of the hand to high temperatures, testifying to the process of recycling marble by burning it to lime.

The hand itself is of remarkable interest, since it is considerably larger than that of a person. Its proportions and the structure of the marble corresponds with the Aphrodite of Demetrius (**Figs. 18-20**). However, it is not possible that it is a fragment from this torso, as it is a left hand, which is partly preserved on the Aphrodite statue.

We may thus conclude that the colossal Aphrodite was not unique in terms of its size in the sculptural landscape of ancient Gerasa. Regrettably, the nature of the colossus to which this hand belonged remains obscure.

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6. Hala H. Abu Hamda and Diana D. Khezaqian.
22. after Marco Sofia, in Piccoli Grandi Bronzi 2015: p. 66 Fig. 4.
29. Doumet-Serhal, C., Maila-Afeiche, A.-M., el-Dahdah, F. and Rabate, A. 1998: Stones and Creed. 1000 Artefacts from Lebanon's Antiquity Beirut. P. 105 Fig. 44.
35 and 49. Andreas F. Voegelin [†]). All other photos are by the authors.

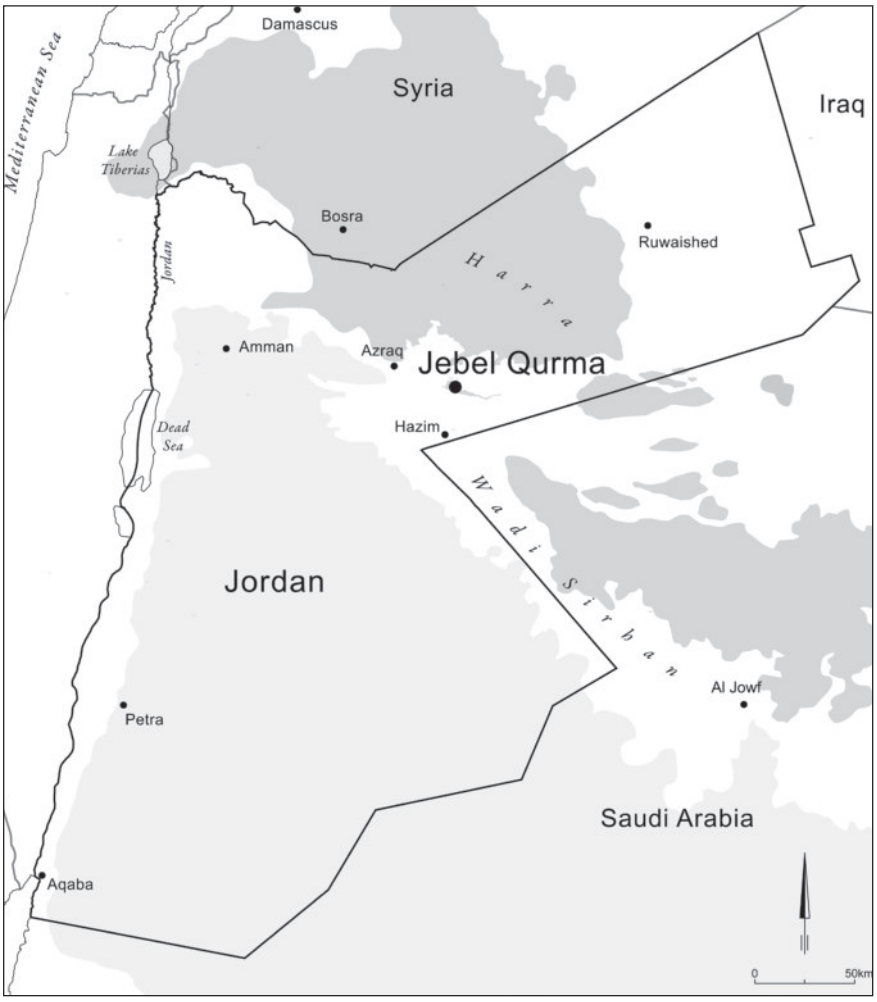
LONG-TERM SETTLEMENT TRENDS IN JORDAN'S NORTH-EASTERN BADIA:THE JABAL QURMA ARCHAEOLOGICAL LANDSCAPE PROJECT

Peter M. Akkermans and Harmen O. Huigens

New Research in the Jabal Qurma Region

The *Jabal Qurma Archaeological Landscape Project* started in 2012 as a new long-term research project, carrying out both survey and excavation in Jordan's north-eastern *badia*. It seeks to address local settlement and quotidian activities from a multi-disciplinary and multi-period perspective, and investigates how these relate to the diverse landscape and environment. The project takes place under the auspices of the Faculty of Archaeology of Leiden University (The Netherlands), in close collaboration with the Department of Antiquities of Jordan.

The study area lies to the east of the small oasis town of Azraq (Zarqa Province; **Fig. 1**), is comprised of rough and rocky terrain, and mea-

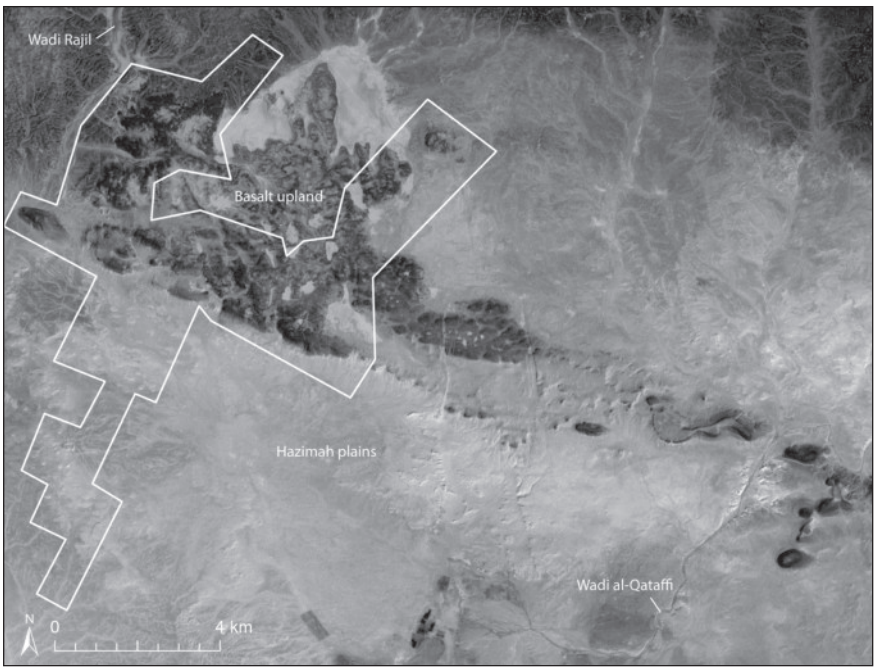


1. Map of Jordan, showing the location of the Jabal Qurma region.

sures about 16 by 21 kilometres, between Wādī Rajil in the west and Wādī al-Qataffī in the east (**Fig**. **2**). The highly arid desert environment, with an average annual precipitation of less than 50 mm, is characterized by basalt-strewn uplands or *Ḥarra* up to 80 metres in height in some places. It is jointly known as Jabal Qurma and (further to the east) Jabal Rijlat Suleiman. Extensive gravel plains extend to the north and south (Hazimah), alternating with mud flats of varying size, as well as low limestone ranges. The prominent table-mount of Jabal Qurma lies within the study area, close to Wādī Rajil, as does the adjacent Qurma Gap, a wide natural east-west corridor through the basalt barrier. Still further to the south-west is the flat, shallow depression of the Wādī Sirḥān , a major, millennia-old caravan track and communication route between the Levant and the Arabian Peninsula.

Because of its harsh, dry landscape with no permanent sources of water, the Jabal Qurma region is rather uninviting and remains difficult to inhabit, except for the occasional Bedouin group. However, this picture may have been very different in antiquity, especially in the context of the astonishingly large number of archaeological finds in the area. Many hundreds of ancient sites and installations of different sizes dot the basalt landscape and the surrounding gravel plains. To add to this picture, there are literally thousands of pieces of rock art and inscriptions in Safaitic and Arabic: the tangible testimonies of ancient peoples that roamed the *badia* in the past millennia. The north-eastern desert, it seems, was not always as forbidding and inhospitable as it is today.

However, the immense archaeological richness of the area was barely explored until two or three decades ago. Only recently has a renewed interest developed in the archaeology of the *badia*, although this has predominantly focused on the region's prehistoric remains (for a history of research see Betts, (ed.), 2013; and Müller-Neuhof 2014). The investigation of more recent, historical settlement evidence still receives (very) limited attention. The *Jabal Qurma Archaeological Landscape Project* aims to change this latter picture. With regard to its explicitly multi-disciplinary, multi-period perspective, the project addresses a series of key research issues for the *badia*, such as the reconstruction of long-term patterns of human activities across several environmental zones, exploring site and location preferences, and continuities and shifts in occupation through time. It also investigates the issues of both environmental and cultural marginality and its use in regional archaeology, together with the issue of settlement oscillations in the basalt wasteland through time; these are related to the alternating processes of sedentarisation and nomad-



2. Map of the Jabal Qurma region, indicating in white the area surveyed between 2012 and 2015 (Base image: Landsat 7 – courtesy of the United States Geological Survey).

isation, changes in environmental conditions, and/or shifts in economic and political organization. The exploitation of the desert landscape in relation to the implications of domestication processes in the Neolithic is also of interest, as well as continuities and changes to the burial practices of desert communities, the issue of long-distance trade and exchange and the role of caravan tracks, and the interaction between urbanized Roman and Nabatean polities versus the small-scale desert groups. Finally, the transition from the Roman-Byzantine era to the Islamic period and its impact (if any) on the local desert communities is considered, including the significance of rock art and inscriptions for pastoral nomadic communities in classical antiquity.

Investigation of the local archaeological record relies heavily upon the comprehensive use of high-resolution satellite imagery (both commercial IKONOS pictures and images available through Google Earth), and aerial photographs (available from the *Aerial Photographic Archive for Archaeology in the Middle East* (APAAME)). The remote-sensing data is complemented by investigations on the ground, using field survey and excavation in selected places. While previous archaeological surveys in the north-eastern *badia* were rather extensive in nature (see e.g. Betts,(ed.), 2013), an intensive surface reconnaissance was employed in the Jabal Qurma region to provide a detailed view of the local archaeological landscape. In this way, a substantial portion of the basalt uplands and the surrounding gravel plains in the Jabal Qurma area have been studied in detail during yearly field campaigns since 2012 (**Fig. 2**; *cf.* Akkermans *et al.* 2014; Huigens 2015). The research revealed proof of extensive settlement in many different periods, from prehistoric to modern times. Significantly, the sequence of regional occupation was not always continuous, but showed distinct punctuations; periods of abundant habitation alternated with long episodes of abandonment. The remainder of this article seeks to provide a brief overview for the local settlement sequence and its interruptions. It must, however, remain an interim evaluation, as most of the materials and their chronologies are still under study.

Neolithic and Chalcolithic Settlement in the Jabal Qurma Region

The evidence for prehistoric habitation in the Jabal Qurma region has been discussed at length elsewhere (Akkermans *et al.* 2014; Huigens 2015), yet it is useful to summarise the main trends here. The basalt uplands and the more distant gravel plains present a highly intact prehistoric landscape, in which hundreds of highly varied Neolithic and Chalcolithic settlement remains are preserved with remarkable clarity, ranging from the 9th to the late 4th millennium BC. The surface finds from our surveys demonstrated several major prehistoric habitation phases, often with limited overlap in site layout and material culture. Although chronological embedding for distinct assemblages remains problematic, significant changes from one phase to another suggest hiatuses in the regional settlement record.

Neolithic occupation in the Jabal Qurma region began with the construction of a series of so-called 'desert kites'. These are large, funnel-shaped installations consisting of two or more stone guiding walls, which converge on a star-shaped enclosure placed on the crest of a ridge or hill. The number of people required for the construction and efficient operation of these extensive installations for the hunt of large game must have been considerable, yet there is still conspicuously little evidence for campsites to accommodate these supposedly large groups.

More substantial sites for local habitation began to appear in the Late Neolithic period, around the middle of the 7th millennium BC, with the occurrence of the burin-related grouped enclosures and their often dense lithic distributions. The sites occur regularly in advantageous places on the edges of the basalt wasteland, within close proximity to water channels. The burin sites sometimes seem to have been placed inside the desert kites, suggestive of continued exploitation for hunting purposes many centuries or even millennia after their original construction.

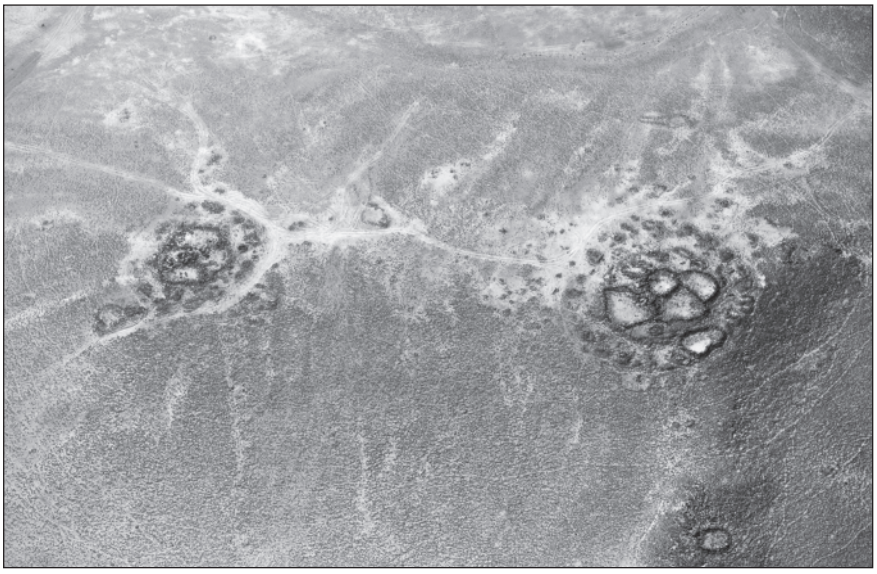
Neolithic settlement in parts of the Jabal Qurma area increased significantly in the 6th millennium BC, with sizeable habitations, completely different in extent and layout from those of the previous periods, appearing. These extended up to ten hectares in size

and consisted of hundreds of small, circular or 8-sided, freestanding dwellings. These settlements perhaps had a population size in the order of several hundreds, and rank among the largest prehistoric sites known to date in Jordan and the wider Levant. They are not exclusive to the Jabal Qurma region, but have clear parallels elsewhere in Jordan's *Ḥarra*, such as on the table-mounts in Wādī al-Qataffi and the Wisad Pools on the southeastern edge of the basalt expanse. Excavations at these sites have exposed a number of round or oval dwellings, which provided lithic assemblages of Late Neolithic types, as well as some ceramics of Yarmukian origin (Wasse *et al.* 2012; Rollefson *et al.* 2013; Rowan *et al.* 2015).

Another major phase of prehistoric settlement in the Jabal Qurma region is represented by several dozen circular stone structures up to 70 metres wide, with extensive enclosures in the centre, and surrounded by an outer ring of small, round, horseshoe-shaped or 8-sided 'huts' (**Fig. 3**). These sites, often referred to as 'wheels' or 'jellyfish' because of their shape (Betts 1982; Kennedy 2011), often occur in groups of two to seven installations on the high grounds at the edge of the basalt range, and tend to face onto the mud flats and large open plains. The high locations offered extensive views over the surrounding countryside, and could be highly advantageous with regard to safety, herd control, or hunting. The exact use of the wheel structures is still unknown, although it has been suggested that the central areas of the enclosures functioned as animal pens, whereas the outer circles of round structures provided protection and shelter for family units (Betts 1982: 31). More recently, it has been proposed that the wheels were funerary monuments because of the cairns they often contain in their interiors (Kennedy 2011: 3189). However, based on the many pieces of Safaitic rock art on and around the cairns, there is reason to believe that the cairns date to (much) later periods, and bear no direct relation to the original wheels.

Since none of the wheels have been excavated, their precise date within the local habitation sequence remains unclear. The lithic assemblages found on their surfaces resemble local Late Neolithic technologies and typologies. The occurrence of handmade pottery in small, but consistent quantities at the wheels may equally argue for a date in the Late Neolithic period, although a (much) later date in the Chalcolithic period is equally tenable. Recent OSL dates taken from wheels in the nearby Wisad area allow for a similar range from the Late Neolithic to Chalcolithic and Early Bronze Age (Athanassas *et al.* 2015).

Surveys conducted in the Hazimah gravel plains and along its low limestone ridges revealed a series of late prehistoric enclosures, in relatively close proximity to each other. The roughly circular or oval enclosures are between 17 and 44 metres across, with the larger ones divided into smaller interior compartments. Relatively rich artefact assemblages were found in and around the enclosures, mostly consisting



3. Two Wheels at sites QUR-143 (Left) and QUR-144 (Right). These installations are between 60 and 70 m across (aerial photograph: David Kennedy, courtesy of APAAME).

of chipped stone, but also some ground-stone tools, and pottery with impressed decoration and ledge handles, which are reminiscent of Chalcolithic ceramics elsewhere in the southern Levant.

The Hazimah enclosures with their low and roughly piled, irregular walls may have been little more than clearances for temporary shelters. The numerous tools discovered in them, however, point towards their frequent reuse, perhaps on a seasonal basis by pastoralists. The concentration of these enclosures in parts of the Hazimah plain suggests that relatively large groups of people regularly resided together.

An Early Bronze Age I Cemetery and the 'Long Gap'

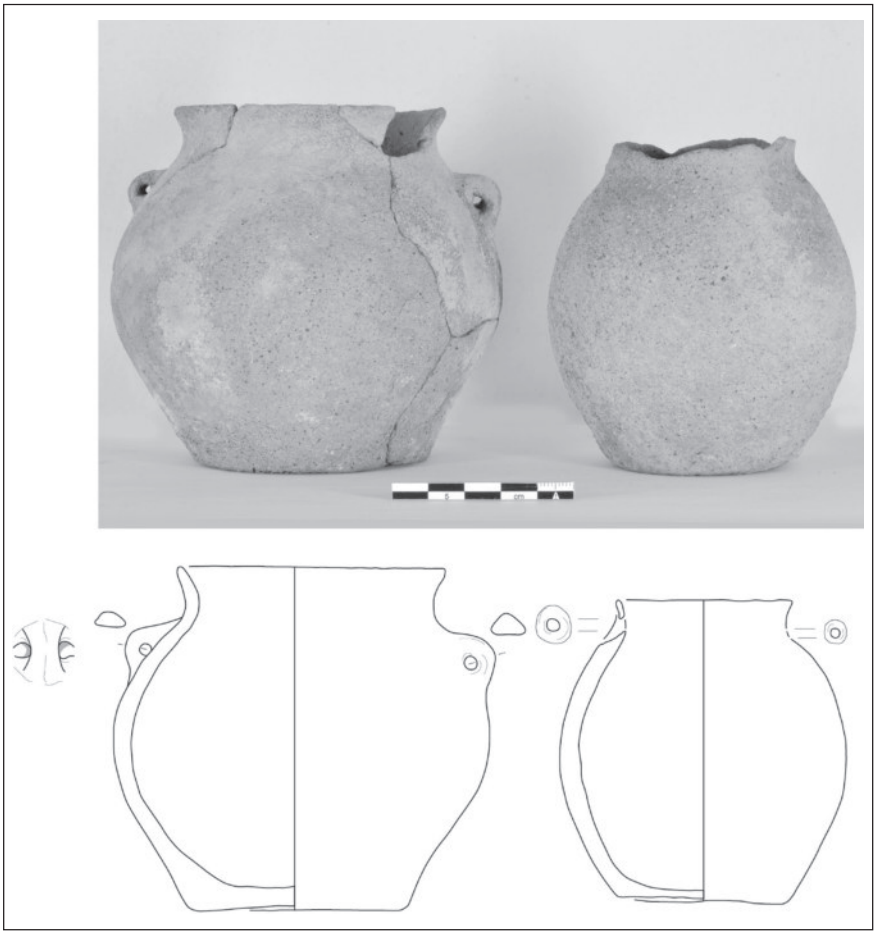
A unique find was the extensive burial field in and around the site of QUR-186, comprised of some 50 small, low cairns, up to 2.2 m across and up to 1.2 m high (**Fig. 4**). Excavations have been carried out at 25 cairns, four of which each yielded a single pottery vessel (**Fig. 5**). The ceramics closely resemble those found in the cemeteries near Madaba and the Dead Sea, such as at Bāb adh-Dhra and Fīfā (see for example Schaub and Rast 1989; Chesson and Schaub 2007), suggestive of a date from Early Bronze Age I for this cairn field.

The burial cairns were all constructed in the same way. First, the small, low, corbelled burial chamber was made; second, the burial chamber was surrounded by a ring of large, sometimes stacked stones. Finally, the space between the chamber and the outer ring was filled in with stones, adding both stability and visibility to the cairn. In some cases, the burial chamber was corbelled in its entirety, while in other cases it was covered by one or more large, flattened slabs. The burial chamber was always roughly round in layout, about 0.7-1 m in diameter and 0.4-0.7 m high; hence, the chamber cannot have been used for extended position burial, but must have facilitated contracted burial, with the deceased resting on their side. Unfortunately, preservation of the skeletal remains in the tombs was very poor and restricted to a few small fragments or no bone at all.

4. Cairn at the Early Bronze Age I cemetery, QUR-186 (Scale: 50 cm).

The cairn field is situated high on the slope of a basalt-covered hillock, with a magnificent, wide view over Wādī Rajil below. The cairns were set into much earlier enclosures of a Late Neolithic type, with large concentrations of concave truncation burins in places. The latter suggest a date in the late 7th millennium BC (*cf.* Betts, (ed.), 2013). The cairns stood in the centre of the enclosures, or were partially built on their walls, suggesting that the Neolithic enclosures were re-used solely for burial and not for habitation in the Bronze Age; the habitation site(s) associated with the cairns remain unknown.

At present, the Early Bronze Age I graves represent the final phase of prehistoric occupation in the Jabal Qurma region, roughly dated to *ca.* 3000 BC. The abandonment of the cemetery – and, by association, the places for the living who buried their dead here – seems to have ushered in what we have termed the 'Long Gap'. During this period, we see wholesale evacuation of the Jabal Qurma region for some 3000 years, from the early 3rd millennium BC until the Safaitic habitations around the beginning of the Common Era. Significantly, apart from the graveyard mentioned above, our surveys have been unable to identify sites dating to the Bronze Age or the Iron Age in the Jabal Qurma region until now. These results are despite an intensive, full-cover reconnaissance strategy, which aimed to document both highly visible sites with relatively dense artefact scatters and small, ephemeral locales with a handful of finds and low visibility. The apparent absence of find spots from the 3rd to the 1st millennium BC is remarkable and as yet unexplained, although few and disparate sites from these periods can be found elsewhere in the *Ḥarra*. Notable examples come from the Late



5. Pottery vessels found in Early Bronze Age I cemetery (Drawings: Akemi Kaneda).

Chalcolithic / Early Bronze Age I rock shelter at al Hibr (Betts 1992; Betts and Martin 2013), and the Iron Age settlements and graveyard in the vicinity of Qaf and Ithra at the onset of the Wādī Sirḥān (Adams *et al.* 1977: 36).

Renewal of Settlement from the Late Hellenistic to the Umayyad Periods

Preliminary analysis of the material finds collected during our annual surveys indicates a major renewal of settlement in the Jabal Qurma region from the late Hellenistic to the Ummayad periods, *ca.* 2nd century BC to the 8th century AD. With regards to the Long Gap, it seems evident that occupation in this period was by newcomers to the Jabal Qurma area; where they came from and why they colonized the region is still elusive.

The domestic habitations of the 1st millennium AD took the form of both stone-walled enclosures and irregular clearances about 20-50 metres across and free of basalt rocks, which probably served for short-lived camping activities. The sites may have had shelters of perishable materials such as hides or cloth, although we were unable to identify separate tent remains or the like, perhaps due to the common re-use and re-working of the campsites in later periods (see below). The camps are mostly situated in secluded areas at the foot of the basaltic uplands or in deep valleys.

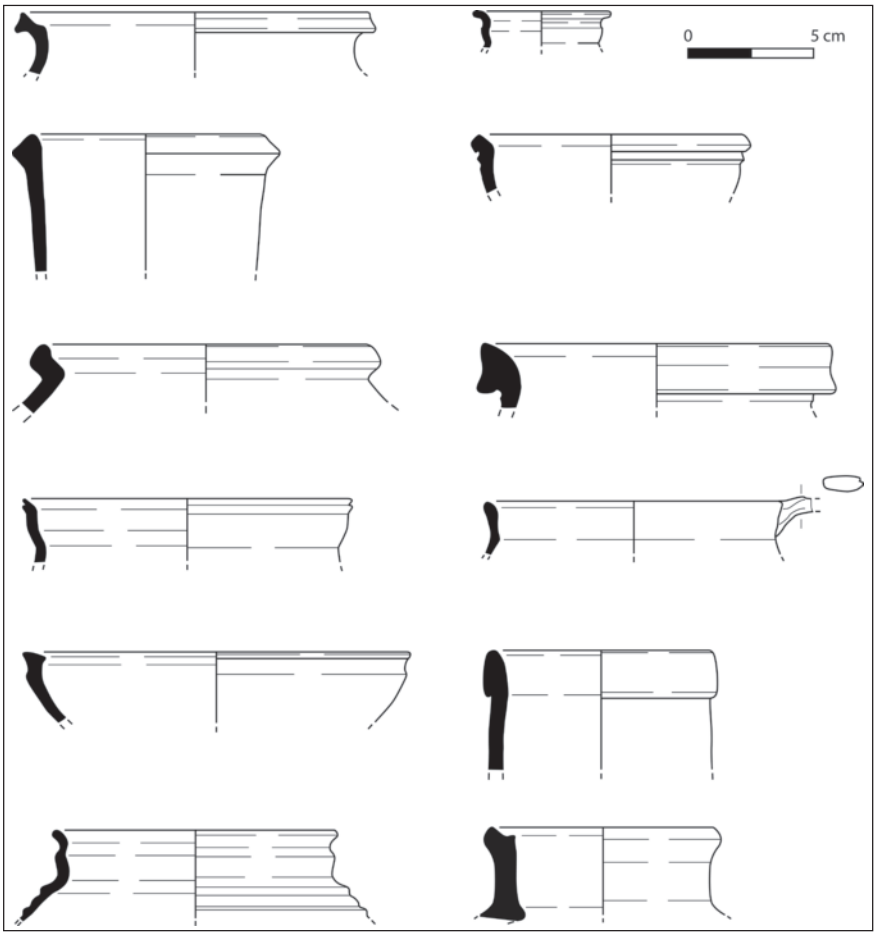
Ceramics were regularly found in the campsites, although in small quantities, ranging from a handful of pieces to a few dozen sherds at the most. Although it is evident that the use of pottery was limited at each site, it appears that nearly every site, large and small, had access to it; pottery, it seems, was a rather ordinary product amongst desert communities. Although the ceramics have yet to be studied in detail, preliminary analyses indicate there are close connections to the stratified assemblages from the south-western Levant. There are a few sherds

belonging to the Late Hellenistic and Early Roman periods, with the majority from the Late Roman, Byzantine, and Umayyad periods (**Fig. 6**). The ceramics from the Jabal Qurma region were predominantly wheel-made, red or grey-black coloured, mineral tempered, and often had a corrugated surface. They were mainly comprised of cook pots and storage jars, while typical luxury products such as Nabataean Fine Ware and terra sigillata were wholly absent. In addition to the undoubtedly imported wheel-made pottery, there were some handmade, dark-brown, coarsely finished, and heavily basalt-tempered ceramics (local products?).

The valley floors, the edges of the mud flats and the lower slopes of the basalt hills were the foci of daily living and domestic activity, while the surrounding high plateaus and the summits of the basalt-covered table-mounts were preferred areas for disposal of the dead. These high locales are littered with various sized burials cairns, and represent a veritable landscape of the dead.

Although it is often difficult to date the cairns based on surface material alone, we tentatively attribute a range of tombs to the early 1st millennium AD. These include, firstly, the monumental 'tower tombs', which can be up to 2-3 m in height and up to 6 m in diameter, and which consist of a round burial chamber and a corbelled roof, carefully made of large, flattened basalt slabs. These cairns usually occur in relative isolation on high locations with visual prominence, such as on hill tops and the edges of basalt plateaus (**Fig. 7**). They are often associated with (very) high quantities of Safaitic inscriptions and petroglyphs, conventionally dated between the 1st century BC and the 4th century AD (*cf*. Al-Jallad 2015 for a recent evaluation of the Safaitic texts).

A second type of burial which we provisionally date to the early half of the 1st millennium AD are the low, circular 'ring cairns', each with a round or oval opening ('ring') at the top which encircles an interior platform. The ring cairns may range from small



6. Selection of Late Hellenistic to Early Islamic pottery sherds from the Jabal Qurma region (drawings: Akemi Kaneda).

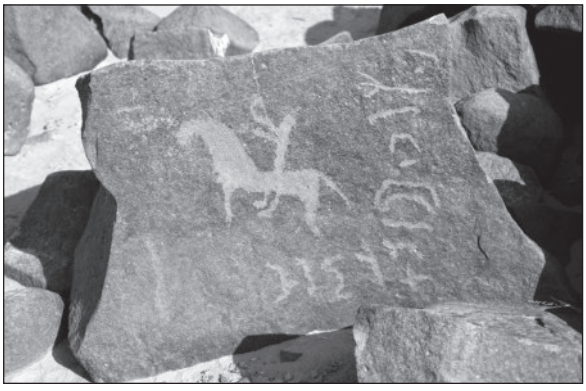
7. Tower tomb remains on a hilltop overlooking Wādī Rajil (Scale: 50 cm).

features 1.50-2 m in diameter and 0.8-1 m high to installations 4-5 m across and up to 1.50 m in height. These cairns occur throughout the basalt range; however, in contrast to the tower tombs, they also occur in places with low visibility. They are regularly (but not always) provided with Safaitic inscriptions or rock engravings.

A third type of burial, found only at the site of HAZ-27 in the Hazimah plains until now, consists of a linear string of at least ten low graves, each with a lining of limestone blocks and filled in with flint gravel. Several graves appear to have been recently looted, and the debris contained many bronze and iron ornaments, as well as coarse pottery dating to the 3rd or early 4th century AD (Huigens 2015: 189-190).

Rock Art

Our investigation of the Jabal Qurma region has yielded abundant epigraphic and iconographic data, in the form of thousands of petroglyphs, inscriptions in (mostly) Safaitic, and combinations thereof (**Fig. 8**). These are



8. Safaitic inscription with associated depiction of a horseman.

conventionally dated from the 1st century BC to the 4th century AD; however, this date is unsatisfactory, as the practice of writing may have started earlier and ended later (*cf*. Al-Jallad 2015: 18). The many inscriptions give proof for astoundingly widespread (and unexplained) literacy in the desert in the early 1st millennium AD. They inform us about a number of cultural practices, such as tribal affiliations, lineages, social relationships, pastoralist activities, and daily life. The rock art, which often occurs in association with the inscriptions, is predominantly figurative in nature, and one can clearly recognize the depicted subjects: wild and domestic animals, warriors, horsemen, camel caravans, dances, hunting scenes. The iconography contains information about important features from daily life that is rarely apparent in the archaeological record.

In short, this unique visual culture of text and image constitutes an essential and unrivalled source of information to assess local pastoralism. It offers a rare insight into the pastoralist communities who made use of the many campsites in the Jabal Qurma area, and who built the funeral monuments (cairns) for their dead, while continuously migrating from one region to another with herds of camels and sheep (*cf*. Macdonald 1993; Al-Jallad 2015). Many questions, however, remain open, such as the relevance of inscribing their landscape in such fashion and abundance? Who produced the many carvings and for whom? In terms of distribution, what was the relationship between the carvings and the many habitation sites, burials, pathways, *etc*.?

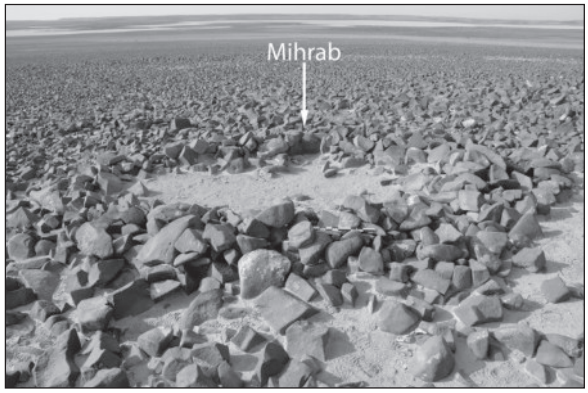
Mamluk Campsites and 'Desert Mosques'

Evidence for settlement in the Jabal Qurma region after the Umayyad period is patchy and highly discontinuous. Based on the survey data, we must conclude that the Jabal Qurma region was practically deserted from the late 8th to the 13th century AD. Subsequently, local habitation was renewed for a relatively short period in the late 13th and 14th century AD, during the Mamluk period. Small quantities of Mamluk glazed and painted pottery, as well as some pieces of glass, were found at sites on the edge of the mud flats and wadis, and along camel tracks crossing the basalt. In addition, there are several dozen

Arabic inscriptions on basalt stone in or around the sites, most of which appear to belong to the 14th century, as many of the inscriptions carry Hijri dates. Indicative of widespread literacy in the desert in the late medieval period, the texts usually consist of prayers or simply bear the names of individuals and their tribal affiliation.

All of the Mamluk-period habitation sites in the Jabal Qurma region have been re-used since the early 20th century by Bedouin groups for tent construction and camping. With regard to their specific location in the *ḥarra* and their close relationship to places selected much later by Bedouins for temporary stays, we suggest that the Jabal Qurma sites with medieval ceramics were short-term campsites as well, with tents as the main units for living. The remnants of what appears to be a small Mamluk-period tent have been exposed at the site of QUR-210, inside a much earlier, Neolithic enclosure, which perhaps served as a windshield. The tent installation was comprised of a series of elongated, irregularly shaped heaps of basalt blocks, which demarcated a roughly rectangular, sandy area about 7 m long and 5 m wide. The rectangular area for the tent's construction had several shallow, round fireplaces, sunk to a depth of about 5-15 *cm*. Two radiocarbon dates were obtained for charcoal from two separate hearths, yielding a date of 1190-1280 AD and 1270-1390 AD respectively (*lab.* inventory *nos.* GrA-61122 and GrA-61121, 95% probability). The site was probably used intermittently for habitation during the Mamluk period.

In addition to the tent remains, a number of Mamluk open-air 'desert mosques' have also been uncovered, usually placed at a prominent location a few hundred metres away from the settlement area (see e.g. Avni 1994 on the early mosques in the Negev). These either occur in the form of rudimentary installations, with a small cleared area bounded on its southern side by a single low wall, with a *mihrab* niche in its centre, or in the form of more elaborate structures measuring about 6 by 6 metres, with walls up to one metre high. They are also provided with a *qibla* wall (such as at the site of QUR-999; **Fig. 9**). The 'desert mosques' usually have brief Mamluk-period inscriptions in the form of prayers. In a few cases, the builders of the mosques identified themselves, such as



9. Mamluk-period 'desert mosque' at the site of QUR-999 (Scale: 50 cm).

at the site of QUR-162, where one text reads: "The House of Allah constructed by Jowab bin Rabea bin Salama in the year 792" (Hijri date, i.e. 1389/1390 AD).

The Ottoman Period and Beyond

The local revival of settlement in the Mamluk period seems to have been rather short-lived, lasting only from *ca.* 1250 to 1400 AD. The Jabal Qurma area subsequently seems to have become largely (though not entirely) devoid of settlement once more, with only a handful of sites attributed to the Ottoman period between the 15th and the 19th century. Proof of Ottoman habitation is limited to fragments of glazed pottery, Chinese porcelain, clay pipes and coins at clearances for infrequent and dispersed camping sites in the basalt. Local Ottoman-period occupation, it seems, was incidental and *ad hoc*, rather than organized and continuous. Remarkably, Arabic inscriptions on stone are entirely absent in the region during this time, in sharp contrast to dozens of texts from the preceding Mamluk period.

Only from the late 19th and, particularly, 20th century, onwards does the intensity of occupation in the Jabal Qurma region increase substantially. In this period, Bedouin communities, whose abandoned campsites can be found everywhere in the harra and beyond, regularly frequented the area. With their extensive clearances and installations of various kinds, the sites are almost always located on the edges of mud flats, on low ground along the wadis, and in the open Hazimah plains in front of the basalt range. Small occupations also occur on the high plateaus deep inside the basalt

region. Importantly, the sites often occur at the same locations as earlier, Medieval or Classical-period, campsites. They usually comprise one to six tents, although larger sites occur as well, each of which is often clearly outlined by stones. We cannot be certain whether tent use was contemporaneous, but it is most likely that the actual area in use at each campsite at any given moment was probably smaller than first appears.

Many Bedouin campsites yield considerable quantities of refuse, such as plastic, cloth, shoes, metal tools, glass, and industrially made coffee cups, often associated with clearly defined tent outlines (**Fig. 10**). They also often provide clues for more precise dating, in the form of coins, datable bullet cartridges, inscribed tin cans, etc. Significantly, Bedouin groups in the Jabal Qurma area have produced large numbers of so-called tribal marks on stone (*wusūm*) as well as Arabic inscriptions, many of which carry dates; interestingly, some periods are much better represented than others. Texts from the 1970s to the early 2000s are manifold, whereas there are currently no inscriptions dating from the 1960s, and only a few from the 1950s and 1940s. Bedouin inscriptions from earlier decades are extremely rare, with only a handful from the late 1920s located on the prominent table-mount of Jabal Qurma itself.

The substantial boom in dated inscriptions from the 1970s onwards quickly came to an end at the turn of the last century. In fact, the Jabal Qurma region seems to have entered another period of large-scale abandonment since the beginning of the 21st century, due to socio-political circumstances, (for example, increased sedentarization of the local Bedouin groups, and the interruption of long-range migration due to the closure of borders), as well as environmental change. It is probably not without significance that the modern desertion of the Jabal Qurma area coincides with the recent 15-year drought in the Levant (1998-2012), which is the driest in the past 500, if not 900, years (Cook *et al.* 2016).

10. Recently abandoned Bedouin tent place on the edge of the basalt landscape (Scale: 50 cm).

Discussion

The preliminary results presented above provide evidence for a (very) long and diverse sequence of settlement in the Jabal Qurma region, from prehistoric times until the present day. Until now, archaeological research in the north-eastern *badia* at large has focused upon the many prehistoric installations, with little or no attention given to later, historic occupations in the region (see for example the recent overviews in Betts, (ed.), 2013; Müller-Neuhof 2014). However, the *Jabal Qurma Archaeological Landscape Project* explicitly takes the latter into full consideration. We employed a highly intensive survey strategy in the field in order to gain insights into the full diversity of archaeological remains and periods in our study area. In this way, we were able to identify sites that have been dramatically understudied in the north-eastern *badia*, such as the many Late Antique campsites comprised of little more than thin scatters of pottery sherds in cleared areas. Remarkably, many of the Late Antique find spots occurred in the same areas as the remains of modern Bedouin campsites. While the study of recent (20th century) settlement in the *badia* is relevant in itself, it also enables the identification of ancient remains that would otherwise remain unnoticed.

Our research in the Jabal Qurma region has profited enormously from an extensive use of satellite images and aerial photographs; it goes without saying that remote sensing has become an essential tool in the study of the archaeology of the *badia* and beyond (see e.g. Kempe and Al-Malabeh 2010; Kennedy 2011). Nevertheless, it is likewise important to realize that intensive pedestrian survey (and excavation) remain the key to a detailed understanding of the nature and chronology of the local archaeological record and its past societies.

With regard to site numbers and sizes, the density of population in the area must have been very substantial in some periods. Significantly, the occupational sequence is not continuous, but characterized by alternating episodes of distinct habitation and regional abandonment. There is, for example, presently no convincing evidence for settlement in the Jabal Qurma region in either the Bronze Age or the Iron Age, pointing at a desertion lasting for perhaps as much as 3000 years – the so-called 'Long Gap'. The cyclical rearrangement of settlement configurations are not restricted to prehistoric periods, but occur in later ages as well. Following a phase of local habitation from roughly the 2nd century BC to the 8th century AD (in the form of campsites, tombs and a massive production of rock art), there was another period of local abandonment for several hundred years from the late 8th century (Umayyad period) to the late 13th to 14th century (Mamluk period). The Mamluk revival (a series of camp sites and Arabic inscriptions in stone) was however short-lived, with widespread evacuation of the Jabal Qurma taking place once again from the 15th to the late 19th or even early 20th century, with proof only for infrequent and spread out camping.

The cyclical rearrangements of settlement in the Jabal Qurma region are still unexplained. Evidently, climate and environment, and changes therein, were perhaps crucial; while they may have substantially facilitated settlement in the Jabal Qurma area in some periods, they may have rendered the region wholly inhospitable in other periods. Although there is ample evidence for strong climatic and environmental oscillations in the wider Levant for the long period under consideration (*cf.* Cordova 2007), the way in which the north-eastern *badia* in particular was affected by such oscillations is still unknown, due to a lack of local environmental proxies (*cf.* Davies 2005; Rambeau 2010). Sparse evidence from botanical remains and palaeosoils from the Wisad Pools, situated to the east of the Jabal Qurma region, suggests that local conditions may have been more verdant during the Late Neolithic (Rowan *et al.* 2015). However, this conclusion needs to be further substantiated, with attention given to a much broader time frame.

Perhaps another determinant for long-term settlement trends, as observed in the Jabal Qurma region, were regional economic and socio-political trends, including local production and exchange systems. Pastoral nomadic groups do not usually operate in isolation, but are tied economically to sedentary communities in villages and towns (see e.g. Dyson-Hudson and Dyson-Hudson 1980). The Azraq oasis may have been of relevance in this respect, as its occupational history is broadly in tune with settlement trends in the adjacent Jabal Qurma region. Both areas yield proof of abundant settlement in the Neolithic and Chalcolithic periods, both areas seem to have been completely abandoned during the Bronze Age and Iron Age, and both areas were re-inhabited in classical antiquity (for Azraq see e.g. Kennedy 1982; Lash 2009; Garrard and Byrd 2013 and references therein). While the Jebel Qurma region was frequented by pastoral nomads, the renewal of occupation in the Azraq basin in the 3rd century AD was presumably sedentary in nature, as shown by the Roman military installations at the site, as well as the substantial architecture from later periods (*cf.* Bisheh 1989; Watson and Burnett 2001). We may hypothesize that sedentary occupation of the Azraq oasis at least partially facilitated development of the pastoralist economies in the Jabal Qurma region. This interpretation perceives Azraq to be a focal node of interaction and exchange (see e.g. Sartre 2005: 239 for a similar perspective on the relationship between the Hawran and the Black Desert in general from the 2nd century AD onwards).

Acknowledgements

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THE FRANCO-GERMAN FIGURINES PROJECT (FGFP)

Regine Hunziker-Rodewald, Astrid Nunn and Thomas Graichen

Introduction

(Regine Hunziker-Rodewald)[1]

A comprehensive study of Transjordanian iconography and its classification, from a comparative and contextual as well as from a typological and chronological point of view, has never been conducted. The few first steps in this direction resulted in the publication of a monograph (Dornemann 1983: 30 pages on small objects and sculpture) and some exhibition catalogues (e.g. Amiet 1986; Bienkowski 1991).

With regard to iconography, Iron Age II (c. 9th-6th centuries BC) is a crucial period. The whole of the Southern Levant was under neo-Assyrian hegemony from the second half of the 8th century BC. Foreign supremacy transformed artistic production in the small kingdoms which were integrated into the Assyrian Empire; local ideas shifted to an 'international' perspective with an adapted thematic scope (Beaulieu 2005; Keel 2008). This substantial change became apparent, *inter alia*, in the influences on glyptic imagery (Ornan 1993; Hunziker-Rodewald 2015a). Until the 6th century BC, a specific cultural and ideological amalgam is well attested from this area, which was later superimposed by the Achaemenid and Hellenistic art styles, each featuring a new scope of reference.

The Female Terracotta Figurines from the Southern Levant

In recent books on the history and culture of the kingdoms in Iron Age Transjordan (Bartlett 1989; Gass 2009; Tyson 2014), iconography has simply been treated as a companion of archaeology; its particular evidence has not been properly researched. In-depth studies on topics such as the *'atef* crown, the statuary of particular sites, the iconic repertoire of seals or small objects excavated at certain sites (Horn 1973; Abou Assaf 1980; Huebner 1993; Dabrowski 2009) are *per se* thematically limited and restricted to a specific geographical area.

Towards the end of the 20th century, two doctoral theses (both unpublished) were dedicated to the anthropomorphic and zoomorphic representations in the plastic art from Palestine and Transjordan (Holland 1975; Amr 1980). These clay objects, which are frequently found in excavations, often appear in archaeological reports as a few lines, sometimes accompanied by a photo; however, these publications are usually known only to specialists.

Among the terracotta figurines from the southern Levant, those depicting females gained in importance after the discovery of inscriptions from the 8th century BC mentioning the biblical God, together with "his Ashera" (Naveh 1979). While trying to determine the identity of Ashera, scholars brought a long known group of iconic objects back into focus: the Judean Pillar Figurines (Pritchard 1943; Kletter 1996). The debate triggered by the Ashera inscriptions mainly centered on the known Levantine goddesses (*Athirat, Anat, Astarte*) and the "fertility cults" condemned in the Bible (Hadley 2000; Dever 2005). As the contemporaneous female figurines from Transjordan were poorly known, attention focussed on the figurines from the western side of the River Jordan (Paz 2007; Sugimoto 2008).

1. I am grateful to Maria-Louise Sidoroff, Hobe Sound FL, for reading the manuscript for the first part of this article. Her valuable comments and suggestions are highly appreciated.

The Female Terracotta Figurines from Transjordan

The female terracotta figurines from Transjordan have many details in common with the western corpus, while at the same time displaying various characteristics of their own (Hunziker-Rodewald 2012). In addition, the eastern figurine corpus is not homogenous; a large variety and significant regional characteristics can be observed.

The assumption that clay figurines, male as well as female, were linked to cultic activities in both the private and the public sector, is supported by the discovery of shrine models (fenestrated or box-shaped) with open fronts, with figurines attached to the façade or at the entrance (Daviau 2008). In addition, the accumulation of objects, primarily female figurines but also ceramic sherds, in an isolated wayside shrine located on a hilltop and enclosed by a temenos wall (Daviau 2012), attests to the connection between figurines and some kind of ritual. The evidence should be compared with other sources from the Levant in order to refine our knowledge of ritual practices performed in Transjordan during Iron Age II. Oral or literary sources are either lost or hidden behind biblical polemics (Hunziker-Rodewald 2016a), and epigraphic sources are still rare. However, the theophoric names for example contain valuable information on ideological and religious practices and conceptions (Albertz 2012; Hunziker-Rodewald 2015a, 2015b).

Artefacts featuring expressions of ritual or cult in Iron Age II Transjordan were exposed to outside influences, and may also attest reactions to these influences (Feldman 2014). The details of the corresponding shared repertoire of imagery and style, and the manner of its adoption, reaction and counter-reaction, still await scientific exploration.

Another major challenge is the definition of the Transjordanian pantheon during the Iron Age. To date, the very few potential references to a goddess in Ammon and Moab remain highly ambiguous (Albertz 2012). Nevertheless, based on old Canaanite traditions, a link between the female figurines and the El cult is conceivable (Hunziker-Rodewald 2015a). Of major importance, and definitely needed, is a systematic comparative analysis of the ensemble of objects associated with female figurines (libation vessels, animal figurines, clay rattles, amulets, lamps etc.).

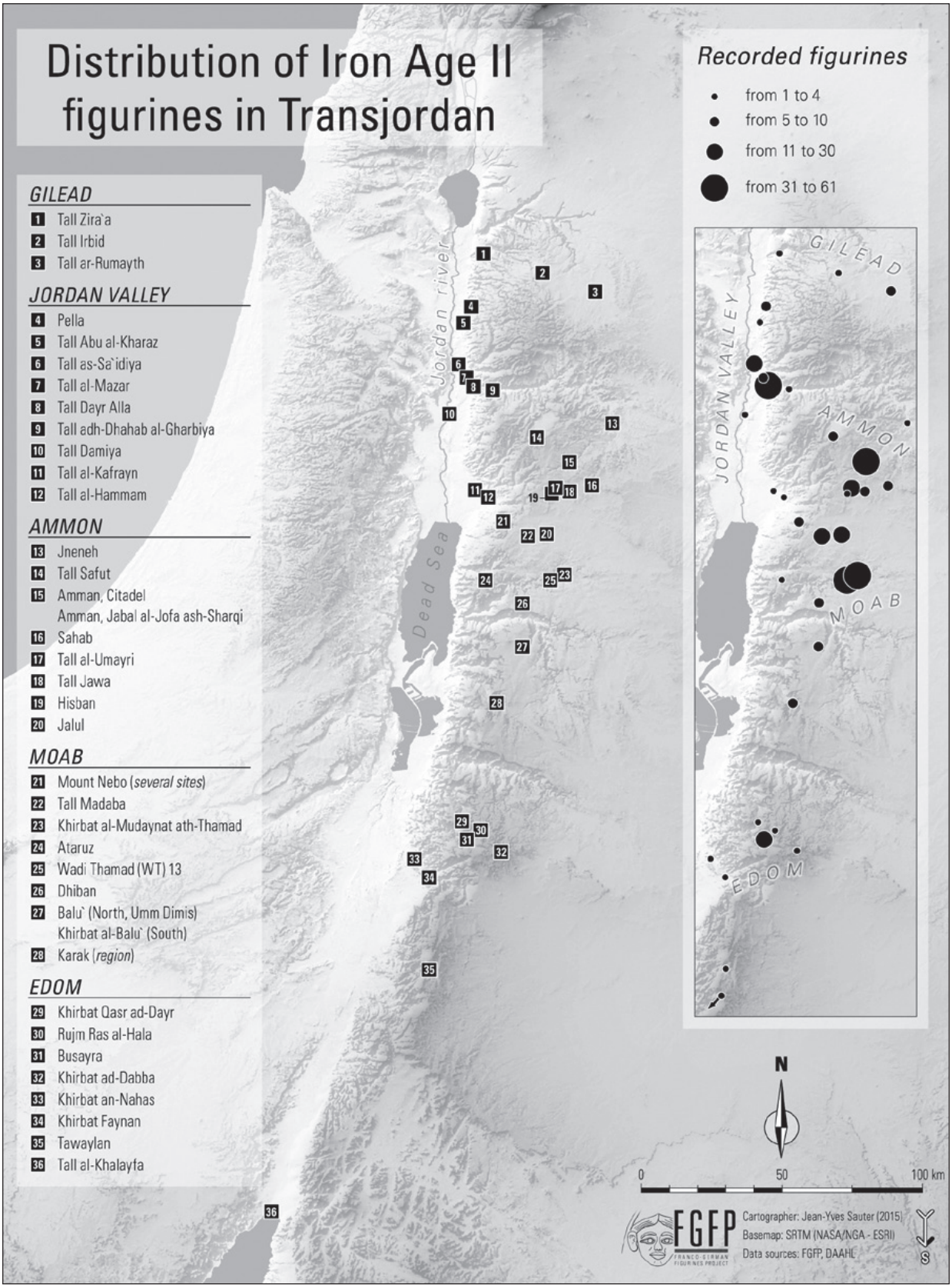
The Franco-German Figurines Project: Campaigns 2012-2014

The Franco-German Figurines Project (FGFP) is financially supported by the Universities of Strasbourg (France) and Wuerzburg (Germany). Its primary goal is to document the Iron Age female terracotta figurines found in Transjordan, and create a refined typology of these objects. Between spring 2012 and summer 2014, the project team (Regine Hunziker-Rodewald, Astrid Nunn and Thomas Graichen) carried out several preparative and five research sessions in France, Germany, Jordan, the United States and Canada. The team works exclusively on material held in museums, storage facilities and university collections. To date, 423 female terracotta figurines (96% of them fragments) have been registered, and 229 figurines have been documented using a computational photography method (RTI; see below).

For each figurine, the Hunziker-Rodewald/Nunn/Graichen team records the characteristics (object type, state of preservation, origin, archaeological context, current location, excavation and museum numbers, dimensions, clay quality and color, fabrication technique, painting, detailed description) in searchable files, complimented by plates, photos and geographical and archaeological maps. See Part II of this article, written by Astrid Nunn, for a preliminary evaluation of the data which has been gathered so far, and Part III, written by Thomas Graichen, for the computational photography methodology, called Reflectance Transformation Imaging, which was adopted for the project.

The Franco-German Figurines Project: Activities in 2015

This was a year of preliminary evaluation and publication, technical planning, and identification of further financial resources, which will ensure the continuation of the project. First results were presented at international conferences in the United States, Israel, France, England and Estonia. From



Distribution of Iron Age II female terracotta figurines found in Transjordan.

April 8 to May 14, 2015, an Experimental Archaeology Workshop, jointly financed by the Franco-German University Saarbruecken and the University of Strasbourg, was undertaken at the University of Strasbourg, France. Its educational and scientific goals were to achieve practical and theoretical insights into raw material processing, kiln construction, tool manufacture, master figurines and mold production, as well as molding and firing procedures. The model for the reconstructed kiln was excavated in Mari (Beyer/Laroche-Traunecker 2006), and the originals for the reproduced figurines were discovered in Syria and on both sides of the River Jordan. The workshop was an FGFP project, directed by two local potters and the ceramic technologist Maria-Louise Sidoroff, who is associated with the Mudayna-Thamad Regional Survey Project in Jordan. The sessions were recorded for a documentary film, which was registered as a candidate for the 2016 French Festival of Research Movies in Vandœuvre-lès-Nancy (https://vimeo.com/150722204).

In June 2015, an International Colloquium on nude female figurines from The Ancient Near East, Egypt, Nubia, Mediterranean and Central Asia (Neolithic – 3rd century AD) was also organized at the University of Strasbourg, France. The presentations focused primarily on "Figurines in Context: Archaeological and socio-cultural aspects" and "Interpreting Nude Female Figurines". The accompanying exhibition offered an additional opportunity to examine photos of Mesopotamian figurines provided by the Louvre Museum in Paris, a 3-D animation of an Old Egyptian figurine held by the Institute of Egyptology at Strasbourg University, three RTI presentations of female terracotta figurines held in museums in Jordan (http://www.stephane-ostertag.fr/rti/), the film created during the Strasbourg Experimental Archaeology Workshop, and some of the replicas produced during the workshop. The conference volume is in preparation.

In July 2015, FGFP was selected as one of three pilot projects by the team in charge of realizing the Open Archives Initiative (Archives Ouvertes de la Connaissance [AOC]) at the University of Strasbourg, France. This project will enhance the value of the collected data with an interactive database in French, English and Arabic, including RTI files. FGFP will also develop programs for RTI static images as a replacement for freehand line drawings, virtual reconstructions of original figurines from existing fragments, and virtual reconstitutions of original colours from traces of paint or pigments still detectable on the surface. Excavators for all of the figurines, as well as the Department of Antiquities in Jordan (DoA), will be asked for official permission before the FGFP data is posted on the web.

Key Issues Still to Explore

Further research includes FGFP sessions in Europe and Jordan, in order to complete the RTI files, create the interactive database, and explore the corpus of female terracotta figurines which have been recorded and photographed since 2012 in several archaeological, socio-cultural and religious respects. The results of these research activities will be integrated into the database primarily as PDF files, which will be cross-referenced with the photos and other material; our Jordanian colleagues will translate the French and English documents into Arabicto complete the database. A lavishly illustrated monograph, with high quality RTI static images, is envisaged for the second phase.

The following is an incomplete, but progressively evolving list of research procedures which will be performed in the near future:

- Comparative research on the geographical distribution, regional particularities, commercial exchange and import (e.g. from Cyprus, Palestine/Israel/Juda, Phoenicia, Aram, Mesopotamia) of female terracotta figurines, in collaboration with directors of recent excavations in Jordan; creation of geographical maps in collaboration with the AOC team.
- Identification and evaluation of ensembles of objects and pottery excavated in the same loci and squares; creation of archaeological maps in collaboration with the directors of recent excavations in Jordan and the AOC team.
- Specification and adjustment of the dating and relative chronology for regional and trans-regional types of figurines, in collaboration with directors of recent excavations in Jordan

and adjacent regions (e.g. the Araba, Jordan Valley, northern Gilead) to the west of the River Jordan.
- Identification of clay texture and analysis of specific paint pigments, compared with painted pottery from the same find spot or site; hypothetical reconstitution of the original appearance of female figurines, in collaboration with experts in ancient ceramics and the AOC team; comparison of all contemporaneous female figurines from the southern Levant.
- Comparative studies of iconographic details: hairdo, headdress, facial features, gesture, musical instruments, jewelry, hand position, dress, baby; comparison with Syro-Palestinian and Egypto-Phoenician representations of females (e.g. on ivories and seals) from the Late Bronze and Iron Ages.
- Comparative ethno-archaeological, socio-cultural and anthropological studies for the ritual usage of figurines in societies in the Ancient Near East and Mediterranean region from the Late Bronze Age to the Hellenistic period; research on the relationships between woman-figurine, goddess-figurine, god-figurine and social agency.
- Evaluation of links connecting figurine molds on both sides of the River Jordan (Hunziker-Rodewald 2016b), in collaboration with directors of recent excavations in Jordan and the adjacent regions west of the River Jordan; identification of mold generations by enhanced measuring techniques.
- Creation of a refined typology, building on previous research, e.g. by Holland 1975, Amr 1980, Kletter 1996.
- Iconological analysis and critical examination of proposed identifications for Levantine female figurines, building on existing research, e.g. by Kletter 1996, Daviau 2014, Darby 2014.

Significance

To date, the corpus of female terracotta figurines from Transjordan has never been compiled. Preserved in museums and collections in Jordan, Europe, Canada, Australia and the United States, the 423 female figurines currently known to the FGFP team are distributed over widely dispersed geographic locations. The publication which includes some of these figurines is of a rather mediocre quality, and some of the earlier articles and reports are not easily accessible. A Franco-German-Canadian collaboration was established in 2014, with Michèle Daviau, who excavated almost 25% of all known Transjordanian female figurines, as an associate member of the FGFP team; this collaboration combines specialized knowledge with practical know how. Furthermore, our ongoing collaboration with the directorate and staff of the DoA, as well as with the directors and curators of local museums and international excavation teams, means our work cannot be overestimated. We have met with a friendly reception and strong support everywhere. For example, in August 2013, we were accompanied by Omar Nofal, a member of staff and DoA representative for three weeks. We hope our work will ensure these figurines will soon be available for ongoing research, not only in Jordan, but also abroad. It goes without saying that the corpus of female figurines from the Iron Age should be extended to include those from the Late Bronze Age, and also by male figurines; but let's take one step after the other!

Part II: Geographical Distribution and Archaeological Context

(Astrid Nunn)

Geographical distribution and archaeological context will be discussed in this section, which also includes our latest information.

Historical and Geographical Division of the Territory

The material has been arranged according to historical provinces. Gilead was situated in the most northern part of Jordan. The "Jordan Valley" was densely settled and extends to the north of Ammon, which roughly begins at the Wādī az-Zarqa. The border between Ammon and Moab was approximately from the northern shore of the Dead Sea, running southeast to the Wādī al-Hasa. The most southern province is Edom, which extends to the Red Sea.

Number of Figurines and Distribution (Table 1)

This paper is based on the 415 figurines which are currently known to us and whose

Table 1: Distribution of Iron I-II Figurines According to Region and Site.

Region	Gilead	Jordan Valley	Ammon	Moab	Edom
Number of figurines per region	9	99	140	135	32
Number of sites excavated	3	9	8	7	6
Sites recorded				• Mount Nebo (*several sites*) • Karak (*region*)	• Khirbat Qasr ad-Dayr • Rujm Ras al-Hala
Site names with number of figurines recorded, from north to south	• Tall Zira'a: 2 • Tall Irbid:2 • Tall ar-Rumayth: 5	• Pella: 6 + 13? • Tall Abu al-Kharaz: 1 • Tall as-Sa'idiya: 15 • Tall al-Mazar: 9 • Tall Dayr Alla: 42 • Tall adh-Dhahab al-Gharbiya: 2 • Tall Damiya: 7 • Tall al-Kafrayn: 1 • Tall al-Hammam: 3	• Jneneh: 1 • Tall Safut: 6 • Amman, Citadel and Jabal al-Jofa ash-Sharqi: 61 • Sahab: 5 • Tall al-Umayri: 26 • Tall Jawa: 9 • Hisban: 1 • Jalul: 31	• Mount Nebo (*several sites*): 6 • Tall Madaba: 15 • Khirbat al-Mudaynat ath-Thamad: 42 • Ataruz: 1 • Wādī Thamad (WT) 13: 50 • Dhiban: 9 • Balu' (north, Umm Dimis) and Khirbat al-Balu' (south): 6 • Karak (*region*): 6	• Khirbat Qasr ad-Dayr: 1 • Rujm Ras al-Hala: 1 • Busayra: 21 • Khirbat ad-Dabba: 2 • Khirbat an-Nahas: 1 • Khirbat Faynan: 1 • Tawaylan: 2 • Tall al-Khalayfa: 3

provenance is secured. This number will certainly be amended; some figures may be late Bronze Age (as in Pella), while assignment to a specific gender may not be possible for others. Nevertheless, the current distribution reflects general tendencies, which probably correspond to a historical reality. The number of figurines varies considerably, both between regions and between different sites. The regional distribution ranges from nine figurines in Gilead to 140 in Ammon. Amongst all the sites, Amman with 61 figurines is currently the place of origin of the highest number of figurines. At the other end of the scale, a few places are represented by only one figurine.

Thus, the regions with the largest quantity of figurines are Ammon and Moab, where 275 out of 415 were discovered. There are as many as 374 figurines if we add the Jordan Valley. This area, extending over 70 km from north to south, can be regarded as the core area for this type of female figurine, although we are not yet able to determine possible places of production or distribution patterns.

Contexts for Archaeological Finds

Further light can be shed on the identity of these women by the information we gain from the archaeological context, including the stratigraphy (this still needs further study) as well as structural features, which may lead to an interpretation of the original architectural environment of the figurines. This latter aspect is discussed here.

The context is "undetermined" for 166 figurines. "Undetermined" comprises several possibilities; either information is missing, the piece has no precise origin (Karak region), or was retrieved from the surface (Tall Dayr Alla, Amman, Khirbat al-Balua'). Moreover, the figurines may indeed have been excavated, but either the figurines were not found in situ (Amman), or the original function of the excavated context is unclear.

Find locations have been divided into five categories for the remaining 249 figurines; these also include the pieces we have not been able to categorise with certainty. Domestic (100 objects); domestic and/or administrative (48 objects); domestic and industrial (24 objects); cultic (62 objects) and funerary (15 objects). Domestic settings are clearly best represented; the combined total for wholly residential, residential/administrative and residential/ manufacturing is approximately 172 pieces (100 + 48 + 24).

Examples now follow for each category. Three significant sites have been chosen for the *domestic* context. In Busayra, 19 of the 21 figurines were found in Area B. Excavations there revealed a sequence of perimeter walls and a number of rectangular structures, with a possible courtyard associated with plaster floors, benches or shelves, storage and cooking; all suggesting a domestic occupation (Bienkowski 2002: 111-147). In Iron Age II Tall Dayr Alla, mostly flimsy structures, courtyards and walls of a single layer mud-brick were found, as well as small, enclosed rooms, which were covered annually with layers of reed. These were erected, destroyed, levelled and rebuilt; therefore, discerning the sequence of construction and destruction is intricate and difficult to follow. Storage rooms, pits and finds hint at mainly agricultural and domestic activity (van der Kooij 2001). Dhiban and Tall al-Mazar both suggest an *administrative* structure with a *domestic aspect*. To date, ten figurines are known from Dhiban, six of which originate from two adjacent rooms (LII and LIIIA) in the "Moabite Palace" in Area L (Routledge 2004: 161-173). The nine figurines from Tall al-Mazar were all found in Field I, where the construction phases of a large building can be followed through all strata. This building may have been an administration centre or a "Palace Fort" according to the excavator, but may also have had a private function (Yassine/van der Steen 2012). Two figurines were uncovered in the rectangular fortress on top of the Lower Tall of Tall as-Saʿidiya (Pritchard 1985).

On Tall Jawa, all buildings have a *domestic and industrial* character, with no buildings or architectural features of explicit religious character found. In Building B204 (Field B), vessels and a modest number of food preparation tools hint at a domestic context. Ovens, large amounts of pottery, spindle whorls, loom weights and grinding tools are characteristic of domestic food preparation and storage, as well as household-level textile production in Buildings B800, B900 and B910 (Field C). B300 (Field E) had cooking areas and food processing tools such as cook pots, craters, bowls, lamps, storage jars and pithoi, strainers, basalt tools, mill stones, querns, pestles, pounders and mortars (Daviau 2002, 2003).

In Khirbat al-Mudaynat ath-Thamad, excavation campaigns revealed a casemate wall with a six-chambered gate and small shrine, where figurines were discovered; however, they were even more numerous in several buildings which were rather industrial in nature. As in Tall Jawa, pounders, grinders and querns, stoppers, polishing stones and slingstones clarified that the function of B200, B 205, B210 and B 400 was the production, manufacture and processing of textiles. Pottery sherds, grinding tools, mortars, millstones and limestone basins all clearly hint at industrial activities such as food processing in buildings B300 and B303 (Daviau *et al.* 2006: 261, 264. Daviau, *et al.* 2008: 348-349).

The *cultic* context of the figurines is noteworthy, in as much as the vast majority of them (49 out of 62) were discovered in the only sanctuary at Wādī Thamad (WT) 13. The architectural remains of this isolated shrine consist of one rectangular structure, surrounded by walls of limestone. As well as clay and limestone figurines, 20 large, hollow male and female statues, together with architectural models, jewellery and more than 25,000 ceramic sherds demonstrate the unusual wealth of the shrine (Daviau 2012). The second most important sanctuary in relation to figurines is located in Khirbat al-Mudaynat ath-Thamad, about three km to the east of Wādī Thamad (WT) 13. Seven figurines were discovered in the main room and an adjacent room (Daviau/Steiner 2000). A *funerary* context is rare. While most of the Amman figurines seem to have been originally used on the citadel, eight were found in two tombs located on Jabal al-Jofa ash-Sharqi, 300 m east of the Roman theatre (Dornemann 1983: 47). Mount Nebo's peak rises around 800 m above sea level, some seven km west of Madaba. Of the several other peaks surrounding Mount Nebo, the two most historically important are Jabal Siyagha on its western spur and, three km to the south east, (Khirbat) al-Mukhayyat. Two tombs dating to the Iron Age were excavated there, one of them with two figurines (Benedettucci 1998).

There may be different archaeological find contexts within one site. Buildings are domestic and industrial as well as religious in Khirbat al-Mudaynat ath-Thamad. In addition to the "Moabite Palace" in Dhiban, one figurine was found in a grave (Tushingham 1972: 115).

Preliminary Conclusion

The figures presented here lead us to two conclusions, which will probably remain unchallenged by further research. Firstly, the area which includes the Jordan Valley, Ammon and Moab must be regarded as the core area for Iron Age II female figurines; the density of sites not only reflects modern archaeological activity, but also the density of ancient settlement. The second conclusion concerns the context. Many figurines come from an everyday living and working context, be it a palace or a house, while evidence for a cultic context is currently limited to a few sites; amongst these, Wādī Thamad (WT) 13 is by far the most important. According to our present knowledge, only six sites indicate a funerary/tomb context.

Part III: The Technical Aspects of Image Acquisition for the FGFP

(Thomas Graichen)

Inherent project limitations and adverse conditions were the main factors defining requirements for documentation methodology. Firstly, we were aware that acquisition time would be limited by departmental working hours; hence, relatively large numbers of objects would have to be captured in a short time frame. Our work would be carried out in various departments, museums and storage facilities; therefore, the dimensions of available workspace would vary. It also meant that ambient light conditions would be unpredictable and for the most part uncontrollable; and as our destinations would probably include rural sites, reliable and constant mains power supply could not be guaranteed either. Considering these factors, the setup had to be simple and able to be deployed quickly, allow for time-efficient acquisition of images, and able to function with or without electricity on site.

After careful consideration, the decision was made to use Reflectance Transformation Imaging (RTI), which produces dense surface data for captured objects, far surpassing traditional photographs for versatility of output format, and requiring a relatively simple setup. With only a few additions to conventional photographic equipment and slight adjustments to shooting technique, a captured object's surface orientation and reflective properties can be computed per pixel and displayed in conjunction with its color value. This is achieved by examining each pixel's behavior under different known lighting angles, assuming a perfectly diffuse surface and constant lighting temperature, intensity and distance[2].

In practice, an object view is captured from a fixed perpendicular position under varying lighting directions, with two or more reflective spheres in the frame (**Fig. 1**). These pictures are then processed by the RTI-Builder (**Fig. 2**). The resulting file can be visualized with an RTI-Viewer (**Fig. 3**); color, topography information and reflective properties can be processed by visualization filters to accentuate certain surface characteristics (**Fig. 4**). This opens up many possibilities for subsequent virtual analysis of the artifacts.

This method has been used with great success in numerous other heritage projects. In one of its earlier forms, it played a crucial role in the discernment of previously undetected inscribed letters on the Antikithera-Mechanism[3], and has since been adopted by a number of heritage projects[4]. The latest publicly available version of this technology was released by Cultural Heritage Imaging, a San Francisco based non-profit organization[5]. Developed in collaboration with Tom Malzbender from HPLabs in Palo Alto, California, the Hemispherical Harmonics Algorithm increased portability of the acquisition setup, while simultaneously improving data accuracy[6].

In addition to meeting the requirements imposed by the adverse circumstances mentioned above in relation to data acquisition for our project, files generated using RTI offer significant advantages to photographs and hand drawings. A regular photograph is limited

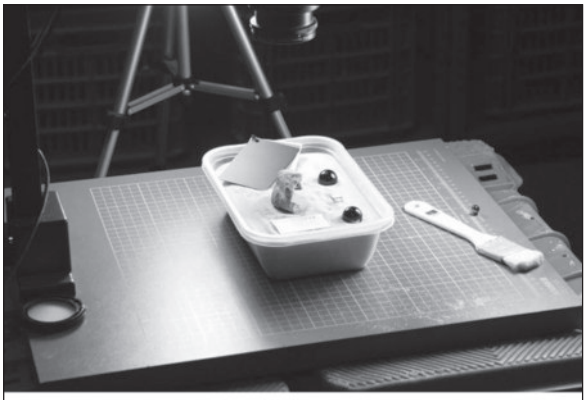
2. See <http://culturalheritageimaging.org/Technologies/RTI/> (accessed Jan 6th 2016) for further details on the theory and practice of RTI-photography.

3. See <http://www.antikythera-mechanism.gr/data/ptm/full-resolution-ptm> (accessed Jan 6th 2016) for the full resolution PTMs of the mechanism.

4. Among the most noted collaborators are the Metropolitan Museum of Art in New York, the Smithsonian Institution, the Staatliche Museen zu Berlin, as well as the British Museum in London. For a full list, please refer to

5. <http://culturalheritageimaging.org/About_Us/Collaborators/> (accessed Jan 6th 2016).

6. <http://culturalheritageimaging.org/> (accessed Jan 6th 2016).



1a. The project's RTI setup; the external flash unit and wireless remotes are not shown. (Photograph: Regine Hunziker-Rodewald).

1b. RTI capture setup, from the camera's point of view. The figurine is nested in chemically neutral sand in the center, framed by two or more black reflective spheres (corners), cards for white-balance correction (right, top), and a note with the object's identification number.

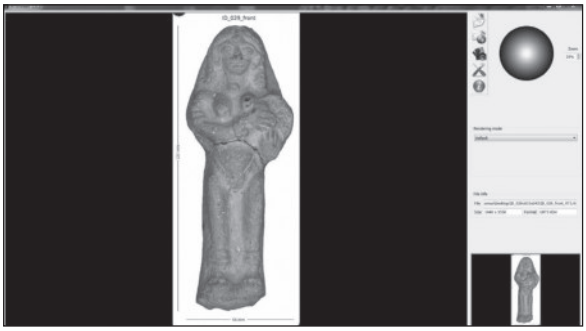
to a representation of an object under a fixed light cadence. An RTI-file, on the other hand, allows for a seamless dynamic variation of lighting angles. Although between 24 and 60 pictures per object view are needed for reliable computation of the RTI-file[7], the shooting itself doesn't factor heavily on the total acquisition time. Since positioning of the object and camera setting remain the same for RTI-capture and classical photography, the total difference in time between the two processes is negligible. When confronted with objects of varying sizes, textures and reflectance properties, RTI can even be more time efficient than traditional photography, since the latter requires, depending on each object's characteristics, adjustments to lighting position, temperature and hardness; all features which can be retroactively emulated within the RTI-Viewer. Since a widely accepted standard practice has yet to be established for object photography in archeological disciplines, photographs of the same archaeological artifact can differ considerably, depending on hardware, shooting technique and circumstances. Drawings can be very detailed and rich in information, especially as a complement to photographs, emphasizing surface characteristics not visible in the latter. Nevertheless, their use as a scientific tool is questionable at best. They are inherently interpretative, and can differ substantially between artists. RTI efficiently captures surface characteristics, which can be processed using an array of visualization filters, thus facilitating the discernment of color and topography features. This largely eliminates the need for interpretative feature accentuation via drawings. It even offers benefits compared to naked eye examination of the actual object, where many features can go unnoticed, even under magnification and varying light cadence. From a digital heritage point of view, the RTI-Builder and the produced file format comply with the standards for digital files and methods defined by nestor[8].

The pictures for RTI processing can be acquired either by a light dome (**Fig. 5**) or a hand held light source. A dome setup offers

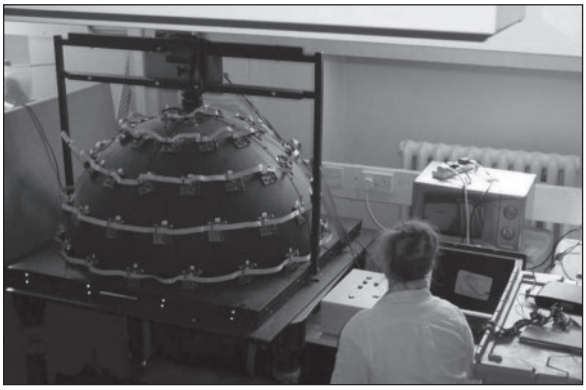
7. <http://culturalheritageimaging.org/What_We_Do/Publications/vast2006/VAST2006_final.pdf> (accessed Jan 6th 2016).

8. <http://culturalheritageimaging.org/What_We_Offer/Downloads/RTI_Hlt_Capture_Guide_v2_0.pdf> p. 30. (accessed Jan 6th 2016).

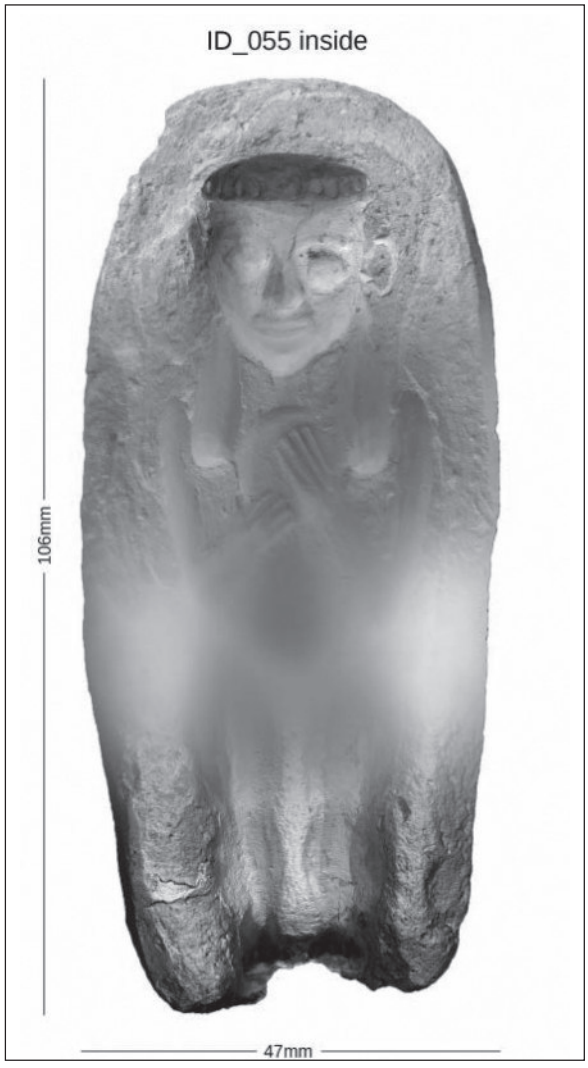
2. *A screenshot of one of the post processing steps inside the RTI Builder.*



3. *The finished file loaded, as displayed by the RTI Viewer. The lighting angle can be manipulated using the virtual trackball (top, right), and a collection of visualization filters can be accessed via a drop-down menu (middle, right).*



5. *An RTI-dome with 64 flash units (*http://ewic.bcs.org/upload/pdf/ewic_ev11_s8paper4.pdf. *accessed Jan 6th 2016).*



4. *An overview of the surface characteristics discernible through RTI-data. From top to bottom: color, surface orientation, topography (extrapolated from surface orientation) and reflectance.*

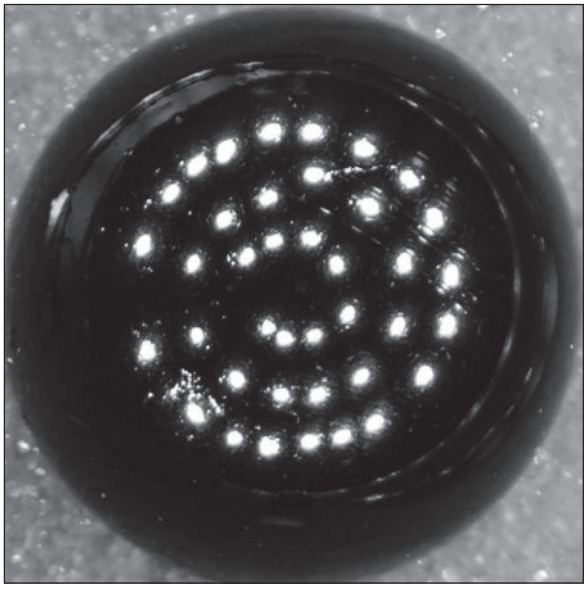
some benefits in terms of faster and less tedious acquisition, and therefore potentially more images per view, which in turn can increase data precision[9]. However, those benefits come at a cost. Since commercial solutions are not

9. <http://vcg.isti.cnr.it/Publications/2006/DCCS06/Dellepiane_et_al_High_quality_PTM.pdf> (accessed Jan 6th 2016).

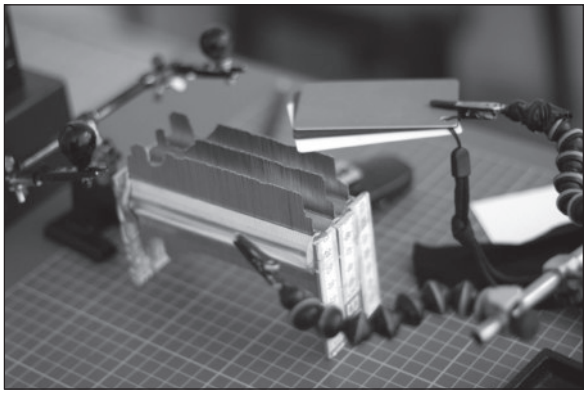
available, the development and construction of such a device can be costly and time-consuming. Spare parts are almost unobtainable in Middle Eastern countries, especially on short notice, and ensuring a sufficient base of spare parts can be a very expensive matter. Furthermore, the intricate wiring of the light sources and micro-controller can require occasional on-site maintenance by a technical expert, the dome′s fixed diameter narrows the size range of objects that can be captured, and its relatively large size can restrict its portability. This can be compensated by a modular setup, but assembling and disassembling on site can be time consuming, and lead to a lower structural integrity of the whole setup. Lastly, entering Near Eastern countries with electronic appliances of ambiguous origin and function can sometimes be difficult.

A free handed acquisition approach, on the other hand, offered many advantages for our project. The components on the whole are very little more expensive than regular photographic equipment, consisting of a DSLR camera, a hand held external flash unit, two wireless transmitter/receiver pairs, a copy stand and different sized reflective spheres. The equipment is inconspicuous enough to raise no flags at customs, and it is easy to ensure sufficient spare parts. It is structurally robust and can be adapted to a broad range of object sizes. As mentioned above, a manual approach means tedious and physically strenuous data acquisition[10]. In our case, this was compensated by a reduced number of shots per object view[11].

A copy stand was chosen over a conventional tripod, because the single vertical mounting arm and resulting top-to bottom-view allows better light distribution around the object (**Fig. 6**). Furthermore, the camera can be focussed accurately by sliding the camera mounting plate down the mounting arm. As well as the camera fixture, stable positioning of the object is crucial, as the smallest movement can result in blurred RTI-files. After some trials with plasticine, a small box filled with chemically neutral sand was used to nest the objects and the reflective spheres. In cases where our own chemically neutral sand could not be imported due to national restrictions, a self-made contraption of three pottery gauges fitted in a row proved to be equally efficient (**Fig. 7**).



6. Light distribution using a copy stand. The stand's arm prevents lighting from its direction, leaving a slight gap (horizontal, left).



7. A contraption made of aligned pottery gauges, used as a fixture for the figurines.

Concerning the camera itself, shooting with a DSLR is preferable, as it allows precise manual control for virtually all camera settings. Although we encountered many small figurine fragments, using a macro lens would have resulted in a much higher image distortion, as well as a very narrow depth of field. A standard kit zoom lens (18-55mm) was used initially, but we quickly observed significant image misalignment between pictures during post-processing, probably caused by vibration from the shutter

10. About 160 pictures were captured per figurine for this project.

11. However, given stationary use and nonrecurring import of the equipment (i.e. an excavation project), a dome's benefits outweigh its disadvantages.

slightly shifting the lens's zoom tube. For this reason, the kit lens was replaced by a 50mm fixed focal length lens, thus eliminating image misalignment, as well as minimizing distortion. Since the focus ring still tends to shift between shots in a vertical setup, tethered shooting using the camera manufacturer's photo studio software is advised. This way, the lens's internal servo motor can be used to fix the focus for the duration of a shoot, without the use of external mechanical aids. A hand-held wireless flash unit serves as the light source, enabling shorter exposure times. This means that ambient lighting can be largely disregarded. Additionally, higher f-stop values can be set, thus increasing the depth of field. In addition to the figurine itself, several objects have to be placed in the frame. These include at least two reflective spheres for the RTI-computation[12], grey cards for white balance correction, as well as a label containing the object's ID-number. As mentioned above, 40 pictures with different lighting angles are taken for the obverse, reverse, and side views of the object; top and bottom views are captured as photographs only. In roughly ten to fifteen minutes, a figurine can be prepared, positioned and captured accordingly. During post processing, the alignment between the images for each series is checked and, if necessary, corrected. Prior to processing in the RTI-Builder, a composite mask is applied to each image series, removing the background and adding the text formatted ID-number and dimensions of the object (**Fig. 8**). Post-processing of each figurine takes roughly two and a half hours, with most time spent on manual background masking. However, adding this step allows for easy extraction of publication ready RTI-screenshots.

The process described here leaves much room for improvement. In retrospect, automatic acquisition would have been favorable, given slightly different circumstances. Some of the repetitive steps in our custom post-processing could surely be further automated using high level programming languages, depending on the availability of time and financial resources. Since the RTI-method does not return real 3D-data (i. e. surface points with x, y and z values in space), combining it with photogrammetry could close the gap between 2.5D and 3D-data. Both methods could easily be implemented as standard procedure in museums and excavations, regardless of individual technical sophistication or budgetary constraints. However, if projects do not have an open data policy[13] for their files, they are of little or no value to researchers. For this reason, FGFP aims to make its RTI-files available online in the near future.

8. A composite mask is applied to all photographs before further processing, discarding the background and adding the figurine's identification number and measurements.

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12. See FN 6.

13. Please refer to <http://www.openoasis.org/index.php?option=com_content and view=article and id=130 and Itemid=390> (accessed Jan 6th 2016) for an introduction into the subject.

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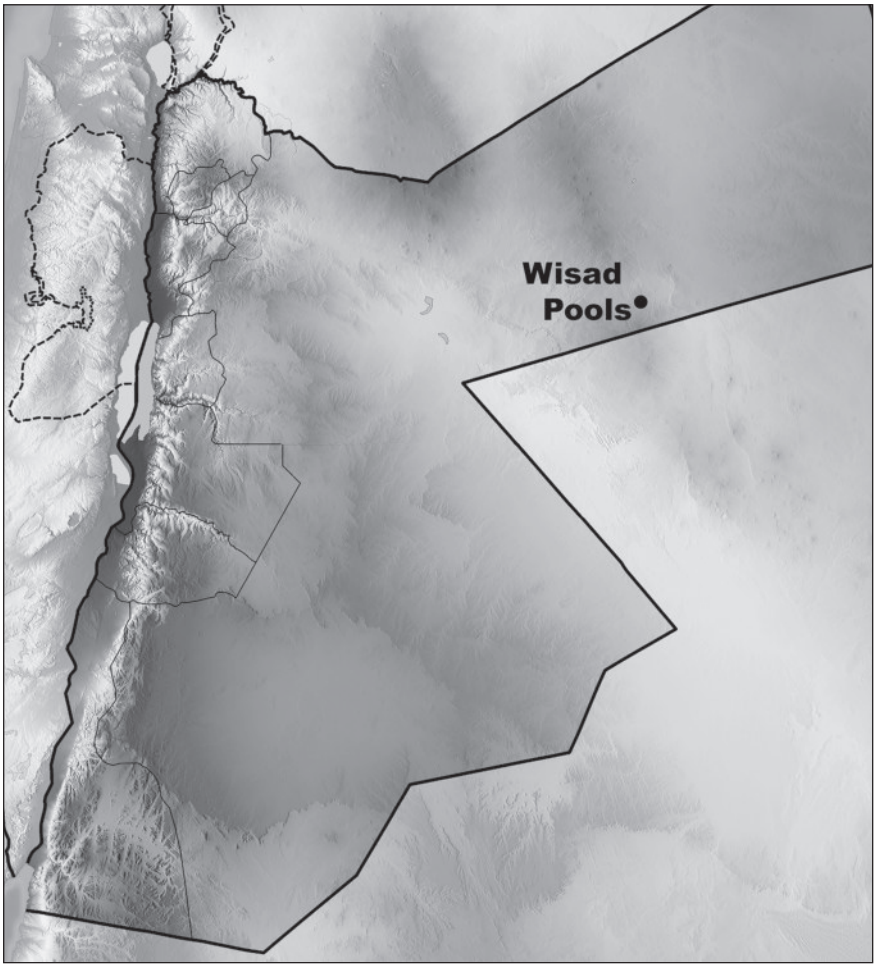
EXCAVATIONS OF STRUCTURE W-80, A COMPLEX LATE NEOLITHIC BUILDING AT WISAD POOLS, BLACK DESERT

G. Rollefson, Y. Rowan, A. Wasse, M. Kersel, A.C. Hill, B. Lorentzen, J. Ramsay and M. Jones

Introduction

Wisad Pools is an immense site, whose core area extends over more than 1.5 km^2 at the eastern edge of the Black Desert in Jordan's panhandle (**Fig. 1**). Within the core area there are 400-500 structures (excluding animal pens), built of local basalt slabs and boulders; among the buildings are tower tombs, large tumuli, structures of unknown function, low burial mounds, and residential houses (Rollefson, Rowan and Perry 2012; Rollefson, Rowan, Perry and Abu-Azizeh 2012). The attraction to the site was a series of natural and artificial pools in the short (c. 1 km) Wadi Wisad that led from one plateau to another one just 8 m lower in elevation. Measurements of Pool #1 (the highest in the series) revealed that it alone held more than 2000 m^2, and the lowest pool (c. a half kilometer long and 40 m wide)

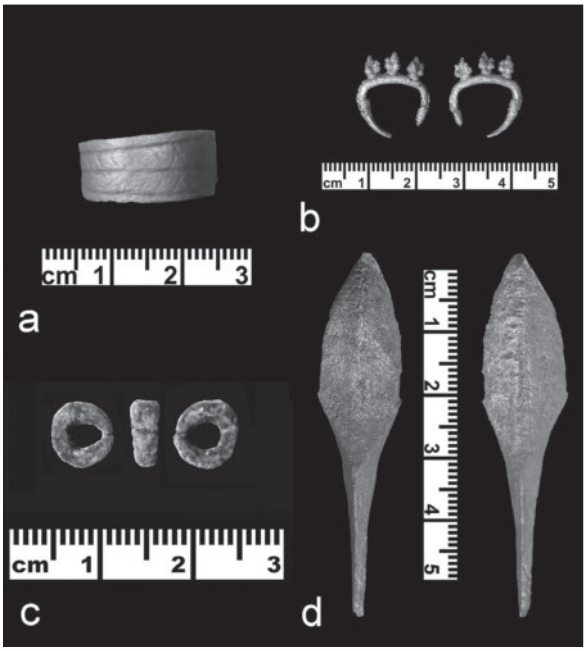


1. Location of Wisad Pools in Jordan's Black Desert.

would have held much more water during and after winter rains (Rollefson, Wasse and Rowan 2014). Excavation of two houses in 2011 revealed that some of the structures were Late Neolithic in age, with one (W-66) yielding a radiocarbon date of 6606 to 6455 calBC (±2σ, Beta-346621) (Rollefson, Rowan and Wasse 2014: 291).

In 2013, our attention turned to what appeared to be a tomb built on top of a low rubble platform: building W-80 (**Fig. 2**). Due to the logistics of working in this hyperarid desert, the crew was small, and the exposure of W-80 was undertaken over two seasons of four weeks each (2013 and 2014).

2. The partially exposed tomb on the upper part of W-80. (Photo: Y. Rowan).



3. a: Copper finger ring; b: silver ear ring; c: copper bead; d: bronze arrowhead. (Photo: G. Rollefson).

The Tomb

Clearance of the tomb showed that it consisted of a low (70 cm high), poorly constructed wall of basalt slabs. The tomb was never roofed, and the body inside had simply been covered by filling in the c. 4.5 m diameter structure with basalt boulders. Preservation of the body was very poor, in part due to burrowing animals. Grave goods included a bronze spear point, a copper finger ring, a silver ear ring, 12 biconical carnelian beads, two carnelian disc beads, a carnelian tubular bead, a copper bead[1], two frit/glass beads, and two Dabba marble "melon beads" (**Table 8, Fig. 3**). Comparisons of this cache with published material indicate that the tomb was probably later Late Bronze or early Iron I in age (Paz 2014; Yahalom-Mack 2014).

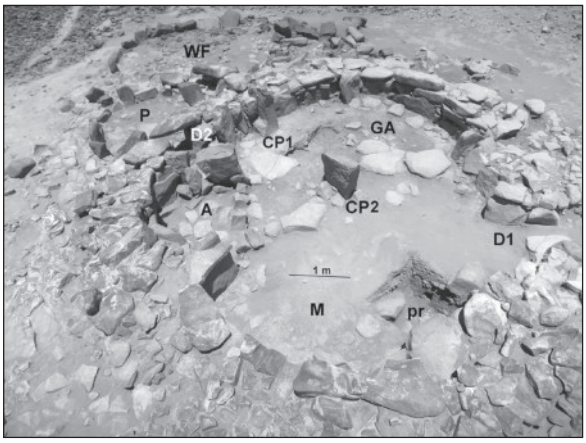
The Underlying Architecture

The "low rubble platform" on which the tomb was situated turned out to be a collapsed corbeled house, similar in some respects to W-66 excavated in 2011 (Rollefson, Rowan and Perry 2012). As has been the case in several excavated buildings, the nearly vertical basalt slabs inside the wall indicate that the corbeled roofing collapsed, possibly as a consequence of an earthquake (**Fig. 4**). Despite the collapsed roofing, the wall of the abandoned house continued to be used as a windbreak to shelter people engaged in a variety of activities, including butchering, stone tool production, grinding of vegetal matter, and bead production.

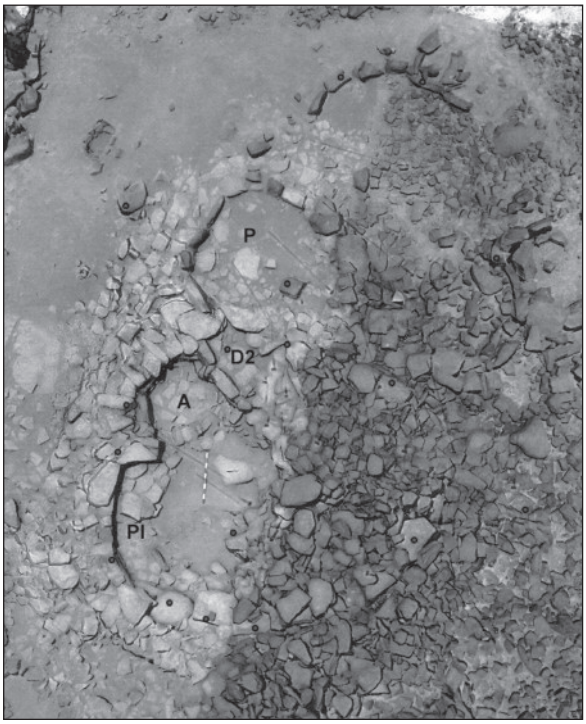
4. Excavation inside the walls revealed collapse slabs from the roof. (Photo: G. Rollefson).

1. This copper bead was found several centimeters below the tomb, and like several of the biconical carnelian beads, it appears to have moved downwards through the sandy silt, perhaps due to bioturbation.

The building underlying the tomb was relatively large c. 6.5m (NW-SE) by 5.5m (SW-NE), and it clearly had a long and complex history during and after its first construction phase (**Fig. 5**). In its final configuration, W-80 consisted of a large central room with two pillars that remained standing (CP1 in **Fig. 5** and CP2; a third may have stood at one time against the wall opposite CP1). D1 was probably the main entrance from the northeast, although a low doorway (D2) opened onto a small external work area (P, for "porch") to the southwest, which has a "fence" of basalt slabs set on edge inside a double-leaf stone external pathway (**Fig 8a**). A small alcove (A) was paved several times, and an area set aside in the northwestern part of the building for food processing activities (GA, the "grinding area"). The main room (M) was the location of a variety of work and, at a relatively late phase of occupation, had a narrow curved paved area or platform along the southern wall (**Fig. 6**). Just below "P" in Fig. 6 is a large grinding stone with a central cuphole (**Fig. 7**).

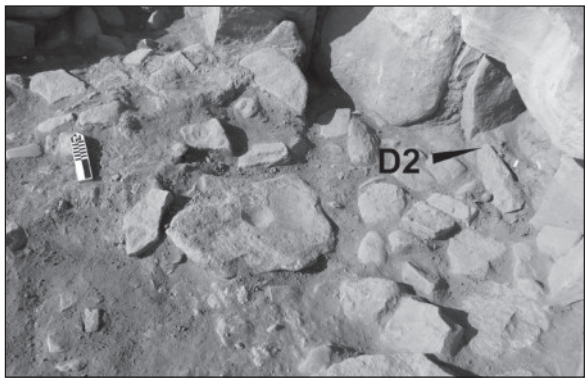


5. The final configuration of W-80. WF = western forecourt; P = "porch"; D2 is a low doorway; A = alcove; CP1 and CP2 are central pillars; GA is a grinding area, D1 is the main entrance; M is the main room; and pr is the subfloor probe. North is at the top of the image. (Photo: Y. Rowan).

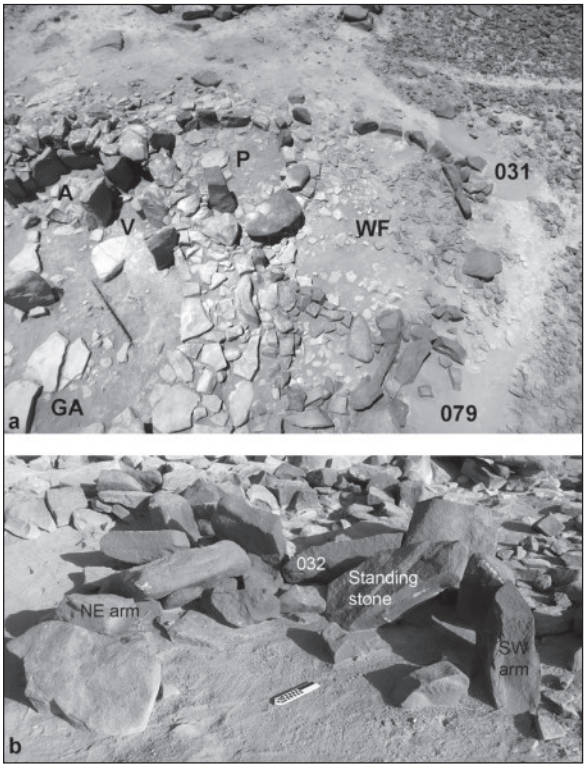


6. An aerial image from the 2013 season, showing the bench/platform along the southern wall (to the lower left) and one of the three pavement phases of the Alcove (A). D2 is the low doorway leading to the external work area (P). (Photo: A.C. Hill).

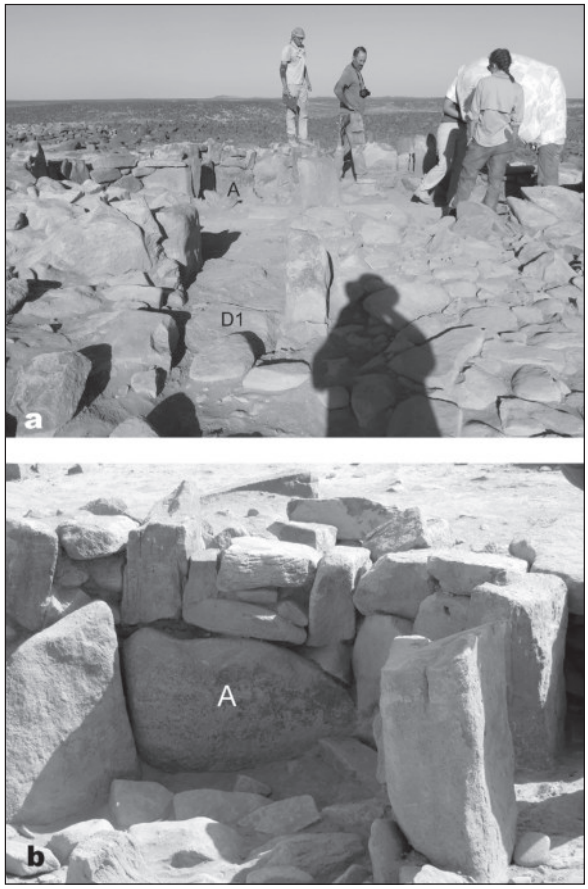
Outside of the main structure to the west is a forecourt (WF in **Figs. 5, 8a**), fenced with basalt slabs set on edge. Why this area was set apart is not clear, since there was no concentration of artifacts or animal bone, although there was a small, shallow fireplace near the center. In the middle of the fence was a small U-shaped feature made by two "arms" of basalt slabs oriented to the west; the northern arm was 55 cm long and the southern one 96 cm long. The feature was 75 cm wide, and in the center of the eastern margin there was a small standing stone, 32 cm high and 25 cm wide (Locus 031 in **Fig. 8a**). Farther north along the wall of the western forecourt, there was a larger U-shaped feature (Locus 079 in **Fig. 8a,b**) that used the wall as its back. The two arms of the feature were 125 cm long, and they were separated by 162 cm at the back wall. In the rear of the feature was a standing stone, 80 cm high, that had toppled towards the SW (**Fig. 8b**).



7. Large grinding stone with a cuphole in the center in the external work area P in Fig. 5. Low doorway D2 leads into the main structure. North arrow is 25 cm long. (Photo: G. Rollefson).



8. a: The location of the Western Forecourt (WF) in relationship to the "porch" (P) and the interior of W-80. Between the "porch" (P) and the alcove (A) is a short vestibule (V). North is towards the bottom of the image. (Photo: Y. Rowan). b: view towards the SE of Feature 079, showing its relationship to the WF wall (Locus 032). (Photo: G. Rollefson).



9. a: The photographer's shadow on June 26, 2014, parallels the axis from the NE doorway (D1) towards a niche in the Alcove. b: Detail of the alcove niche, which appears to have once been a window that was later blocked up. (Photos: G. Rollefson).

There is some indication of attention paid to the summer solstice. The shadow in a photo taken on June 26, five days after the 2014 solstice, aligns almost perfectly along an axis that passes through the middle of the NE doorway (D1) to intersect the middle of a niche in the alcove (**Fig. 9a, b**). The current rainy season generally ends in April, although occasionally rain can occur in late May, as was discovered during the 2011 season at Wisad (Rollefson, Rowan and Perry 2012). Modern "pasturage" in the area today is not abundant, and dries up soon after the end of the rainy season, so a solstice marker seems unnecessary, unless past climate provided for a more verdant and longer-lasting vegetation cover. Notably, architectural orientation around a summer solstice marker was also noted at Late Neolithic structures in the Negev Desert (Rosen and Rosen 2003; Rosen *et al.* 2007).

The grinding area (GA in **Fig. 5**) was dominated by large grinding slabs, four of which had central cupholes that ranged in diameter from 7-11 cm and depths up to 10 cm. The largest grinding slab was calculated to weigh 140 kg, while the smallest weighed 50 kg. Notably, most of the hearths were in close proximity to the grinding slabs (**Fig. 10**). A cache of three large pestles and a handstone were found in a niche under a corbeling slab at the eastern wall, just to the south of door D1 (**Fig. 11**); the storage of several pestles recalls the cache of 11 pestles found in structure W-66 in 2011 (Rollefson, Rowan, Perry and Abu-Azizeh. 2012).

At the western edge of the grinding area, and perhaps associated with milling activity, is a rectangular "bin", set off with low basalt slabs set on edge near the central pillar against the western wall (CP1) (**Fig. 12**). On the eastern side of central pillar 2 (CP2) is a small cache (Locus 072) of gazelle/caprine astragali (**Fig. 13b**), and another cache of astragali (Locus 064)

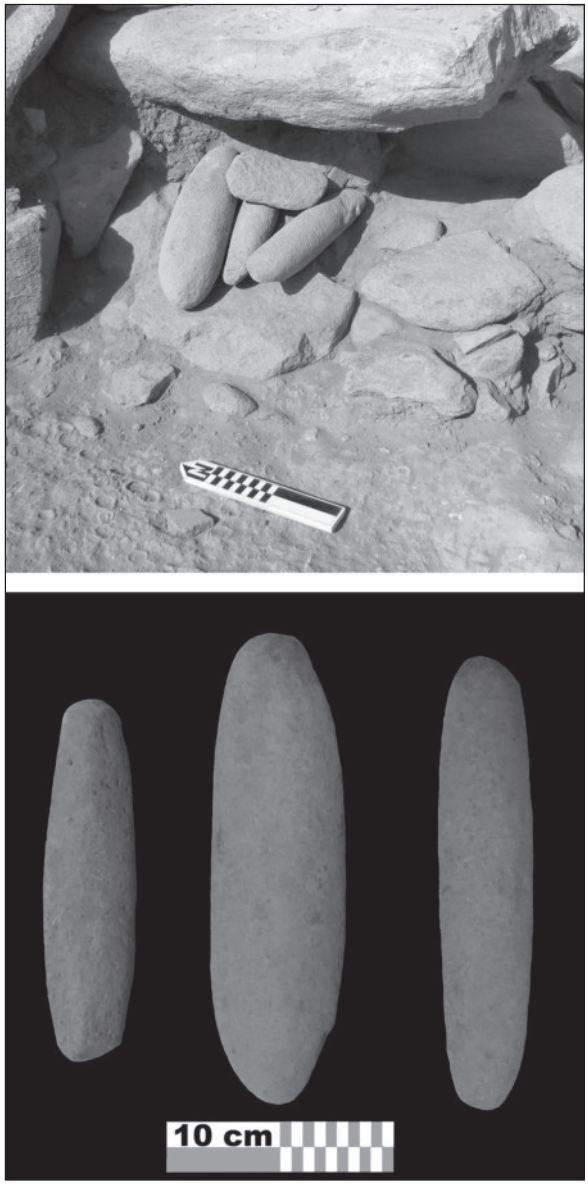
10. Six grinding slabs, four of which have central cuphole mortars, near central pillar C2. Loci 055, 058, and 061 are deep hearths. (Photo: Y. Rowan).

is near the northern edge of the main doorway D1 (**Fig. 13a**).

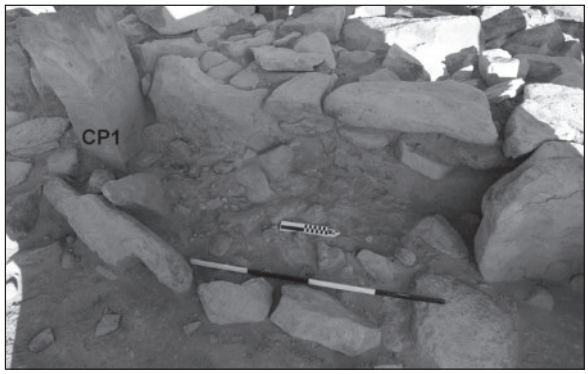
A 1 x 1m probe was sunk beneath the floor of W-80 near the center of the eastern wall ("pr" in **Fig. 5**). The excavation revealed a layer of gritty, porous red sediment up to 37 cm thick, that had clearly been protected from wind and water erosion by the construction of W-80 (**Fig. 14a**). A similar situation was found under the original floor of W-66 in 2011 (**Fig. 14b**). The importance of this layer is that winter rains would not have washed off the land surface as they do today. Instead, much of the precipitation would have been absorbed into the soil, where it would have remained as a reservoir for a much more luxuriant vegetation cover than occurs today; the vegetation cover would also have lasted for a longer period of time.

Charcoal Analysis

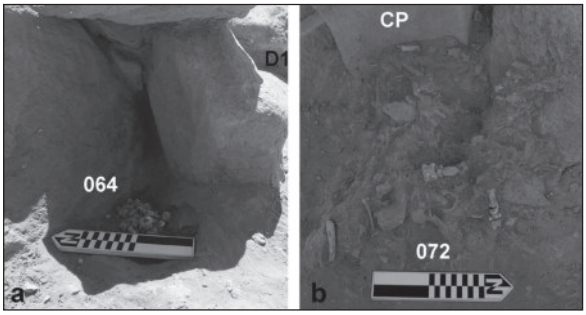
The hearths in the grinding area (GA) were rich in charcoal. Probably at least partly related to the soil found under W-80, the presence of *Tamarisk* sp. and *Quercus ithaburensis* type (**Fig. 15a, b**) should not be surprising, since they are constituents of forest-steppe vegetation (Willcox 1999). Even so, their presence is



11. The cache of three pestles and a handstone from Locus 007, against the east wall of W-80. The largest pestle weighs 8.2 kg, the smallest 2.7 kg. (Photos: G. Rollefson).



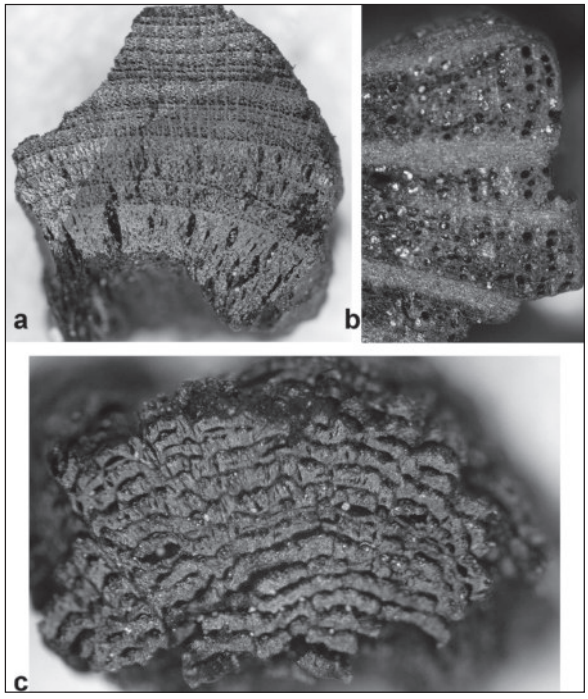
12. A low-walled rectangular bin at the western wall of W-80, adjacent to central pillar CP1. (Photo: Y. Rowan).



13. a: a small cluster of gazelle/caprine astragali, just inside and to the north of the main entrance D1. b: A second cluster of gazelle/caprine astragali, adjacent to the eastern face of central pillar CP2. The north arrow is 25 cm long. (Photos: Y. Rowan).

14. a: The darker sediment at the base of the probe is an absorbent reddish soil. b: Matt Jones takes an OSL sample from a similar reddish soil from beneath the floor of W-066, excavated in 2011. (Photos: G. Rollefson).

somewhat startling, considering the hyperarid status that characterizes the area today; it is probable that the region enjoyed a higher level of precipitation during the Late Neolithic, at least (Rollefson 2017). Although it is commonly held that Tabor oak (*Q. ithaburensis*) needs c. 350 mm annual rainfall, local topography and hydrological conditions under lower rainfall amounts may have resulted in isolated oak



15. Charcoal samples from W-80. a: Tamarix sp. 12x; b: Quercus ithaburensis type, 12x; c: Anabasis sp. 25x. (Microphotos by B. Lorentzen).

stands in wadis and along playas. *Anabasis* brush (**Fig. 15c**) is currently the most abundant fuel in the region today, and it was also plentiful in the past.

The presence of oak raises important possibilities for the inhabitants of Wisad. *Q. ithaburensis* is one of the most productive acorn producers for the genus, and this resource may have made the diet of the herder-hunters of Wisad much more nutritious. The cuphole grinding stones in the grinding area (GA) fit in well with the possibility that they were used for crushing the meat of acorns before leeching out the tannins, a combination of equipment and processing known among Native American populations of southern California, and postulated for Late Epipaleolithic populations in the Mediterranean zone (e.g. McCorriston 1994; Olszewski 1993).

Archaeobotanical Analysis of Flotation Samples

Three soil samples were collected from different loci of a hearth feature in square W80 and processed by water flotation to recover macro-botanical remains. A total of 326 specimens were identified that represent 13

plant taxa and 24 were indeterminate (**Table 1**).

Table 1: Identified archaeobotanical remains from hearth features at Wisad Pools

Sample # (lab)	1	2	3
Square	W80	W80	W80
Locus	55	61	75
Sample # (field)	56	65	76
Species			
Aizoon sp.	22		
Arnebia sp.	206	51	9
Astragulus sp.	1		
Carex sp.			1
Asteraceae		17	
Cypruss sp./Juniper sp.	2*		
Erodium sp.	1		
Lithospernum sp.	5		
Malva sp.	3		
Medicago sp.	1		
Onobrychis sp.	6		1
Phalaris sp.			1
Spergularia sp.	1		
Indet.	17	7	0
Total	**263**	**75**	**12**

* Possible contamination from flotation site.

All species were wild or weedy in nature and no domesticated seeds were identified. Arnebia nutlets were the most common specimens recovered. Arnebia (most commonly the root) is known to have many medicinal properties such as treating skin disorders and burns (Zargari 1990; Ghasemi Pirbalouti *et al.* 2009) and as an antibacterial and an anti-inflammatory (Kim *et al*. 2001; Ghorbani 2005). They have also been noted to contain red dye in their roots. The fact there is a significant number of Arnebia identified in the samples compared to other species could potentially be the result of the intentional collection of the plant for medicinal purposes. There were too few of the other species recovered to discuss potential uses or reasons for their inclusion in the assemblage as they may have been simply accidentally collected and burned.

This brief study of the archaeobotanical assemblage recovered from Wisad provides evidence of a local desert environment, as many of the species identified are generally found in desert settings. However, there are indications of seasonal precipitation as species in genera like Aizoon, Carex and Spergularia were identified and can be found in damp soils, dry stream beds, oases and muddy soils. All species identified flower between January and June and point to an occupation of the site in the spring (Zohary 1966: 74-75 and 123-125; Feinbrun-Dothan 1986: 369-375). Although only three samples were collected, it is clear that the plant remains provide support for both the environment of the region in antiquity as well as the season of site occupation.

Radiocarbon Dating

Charcoal from several hearths provided the means of acquiring C14 dates from several loci in the stratigraphic sequence at W-80. (The results are presented in **Table 2**.) All of the samples were small stems or twiglets of local brush and trees, so "old wood" problems are not in effect.

The sequence of dates is stratigraphically sound, with the earliest occupation perhaps beginning at the end of the PPNC, but later uses of the building certainly continued almost to the middle of the 6th millennium. At the moment there are gaps in the dates that suggest periodically prolonged absence, but there are radiocarbon samples from the intervening occupation layers that have not yet been assayed.

Table 2: Radiocarbon dates from W-80.

Sample	Locus	calBC (2σ)	13C/12C ratio	Comments
Beta 395440	073	5765 to 5670	-24.7 0/00	Late in sequence
Beta 366675	011	5710 to 5610/5590 to 5570	-24.9 0/00	Middle of sequence
Beta 395441	078	5890 to 5740	-23.1 0/00	Middle of sequence
Beta 366677	033	6000 to 5840	-23.7 0/00	Halfway up fill of alcove
Beta 366676	022	6590 to 6580/6570 to 6440	-23.2 0/00	Near floor

The earliest date at W-80 is very close to the founding of W-66, and we might suggest that many of the corbeled structures were originally constructed at around 6,500 calBC[2].

2. Two C-14 dates from early layers in Late Neolithic structure SS-1 at the foot of Mesa 7 in the Wadi al-Qattafi are also near the PPNC/Late Neolithic "boundary": 6455 to 6390 calBC and 6490 to 6430 calBC (unpublished data).

Faunal Remains

Animal bones were richly preserved throughout the interior of W-80. Faunal analysis is still underway, but samples from three loci from the 2013 season indicate a dominance of gazelle, followed by hare at c. 25% and caprines making up c. 10% of the mammals. Fox is present, as are small and large felids, including possible cheetahs, and there is a sizeable quantity of bird and microfaunal bones as well.

Chipped Stone Tools

Stone tool manufacture and use is richly represented in **Tables 3-8**. The strong character of the hunting aspect of the subsistence economy is clearly shown by the importance of projectile points in **Table 3**, where points make up almost a third of the classifiable formed tools. Scrapers account for almost 11% of the inventory, with knives of various sorts making up an additional 7%. The production of holes in beads, bone, and perhaps wood was strong, with perforators, borers and drills representing 14% of the shaped tools. Notches and denticulates were also well represented, at almost a fifth of the tool kit. At the fringe of chipped stone tools are two pecking stones – one made on a flake core and the other on a quartzite pebble – used to shape grinding stones (**Fig. 16**).

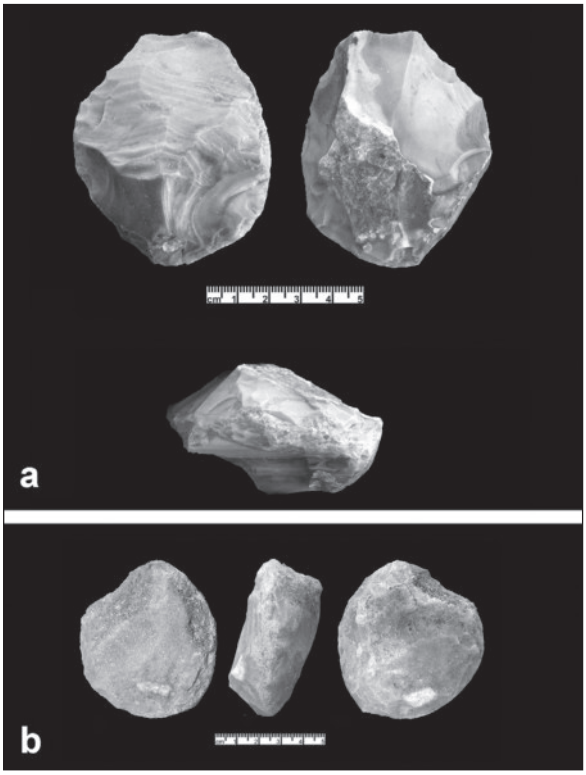
The production of stone tools was heavily dependent on blade manufacture (**Table 4**), although flakes were also important blanks for a wide variety of tools. Other forms of blanks are weakly represented; notably, the Levallois blanks indicate a parsimonious use of flint, since double patina on all six Middle Paleolithic pieces shows they were retouched into new tools used by the Late Neolithic inhabitants.

Hunters clearly preferred transverse arrowheads (**Table 5**), with other types registering only 15% presence (**Fig.17**). Although the number of cores (see below) and the enormous quantity of unretouched blades, flakes, and other debitage indicate that arrowheads were probably manufactured inside W-80, the large quantities of animal bones might also indicate that many of the arrowheads fell out of the animal carcasses as they were butchered. Support for this interpretation is indicated by damage to the bits, tangs, and corners of the projectile points (**Fig 16a**).

Table 3: Tool types from structure W-80, Wisad Pools, 2013-2014.

Tool type	n	%	%'
Projectile point	638	27.2	32.0
Sickle	2	.1	.1
Burin	58	2.5	2.9
Truncation	89	3.8	4.5
Endscraper	34	1.4	1.7
Sidescraper	136	5.8	6.8
Tabular/fan scraper	37	1.6	1.9
Core scraper	2	.1	.1
Circular scraper on thermal spall	2	.1	.1
Unifacial knife	105	4.5	5.3
Bifacial knife	17	.7	.9
Tuwailan knife	1	.0	.1
Seam knife	18	.8	.9
Backed element	15	.6	.8
Tanged blade	6	.3	.3
Notch	153	6.5	7.7
End-notched blade	34	1.4	1.7
End-notched flake	2	.1	.1
Denticulate	200	8.5	10.0
Perforator	29	1.2	1.5
Borer	142	6.1	7.1
Drill	102	4.3	5.1
Biface	10	.4	.5
Pick	2	.1	.1
Chisel	3	.1	.2
Chopper	2	.1	.1
Wedge	96	4.1	4.8
Other	49	2.1	2.5
Lunate, abrupt	1	.0	.1
Bladelet, exterior retouch	9	.4	.5
Bladelet, interior retouch	1	.0	.1
Bladelet backed & retouched	1	.0	.1
Subtotal	1996		100.0
Retouched flake	85	3.6	
Retouched blade	51	2.2	
Utilized piece	59	2.5	
Unclassifiable	155	6.6	
Total	2346	100.0	

In addition, there were 10 bone awls and one bone needle. More bone tools will be identified as faunal analysis continues.



16. a: Flake core converted to pecking stone (note battering at the bottom). b: Quartzite pebble used as a pecking stone. (Photos: G. Rollefson).

Table 4: Debitage blanks for W-80 tools, 2013-2014 seasons at Wisad Pools.

Debitage type	n	%	%'
Ordinary blade	922	39.3	50.4
Naviform blade	4	0.2	0.2
Unknown blade type	1	0.0	0.1
Bladelet	79	3.4	4.3
Flake	735	31.3	40.2
CTE	18	0.8	1.0
Burin spall	27	1.2	1.5
Microflake	2	0.1	0.1
Debris	1	0.0	0.1
Core, nodular	12	0.5	0.7
Core, tabular	17	0.7	0.9
Chunk/thermal spall	4	0.2	0.2
Levallois blade	3	0.1	0.2
Levallois point	2	0.1	0.1
Levallois flake	1	0.0	0.1
Subtotal	1828		
Unclassifiable	518	22.1	
Total	2346	100.0	100.0

Tools on microflakes were an unidentifiable tool fragment and a retouched flake fragment. The debris example was a small seam knife fragment.

Table 5: Projectile point types from W-80, 2013-2014 seasons at Wisad Pools.

Point type	n	%	%'
Transverse, stemmed	210	32.9	34.2
Transverse, not tanged	151	23.7	24.6
Transverse, trapezoid	156	24.5	25.4
Trapeze, unknown	19	3.0	3.1
Haparsa	34	5.3	5.5
Nizzanim	13	2.0	2.1
Herzliya	19	3.0	3.1
Byblos	4	0.6	0.7
Other	8	1.3	1.3
Subtotal	614		100.0
Tang only	12	1.9	
Preform	3	0.5	
Unclassifiable	9	1.4	
Total	638	100.0	

Table 6: Burin types from W-80, 2013 and 2014 seasons at Wisad Pools.

Type	n	%	%'
Simple	6	16.7	18.2
On break	7	19.4	21.2
Angle	1	2.8	3.0
Simple transverse	1	2.8	3.0
Transverse from lateral retouch	1	2.8	3.0
Straight dihedral	1	2.8	3.0
Canted dihedral	3	8.3	9.1
Oblique truncation	4	11.1	12.1
Concave truncation	4	11.1	12.1
Convex truncation	2	5.6	6.1
Double concave truncation	1	2.8	3.0
Atypical/other	2	5.6	6.1
Indeterminate	3	8.3	
Total	36	100.0	100.0

Table 7: Drill types from W-80, 2013 and 2014 seasons at Wisad Pools.

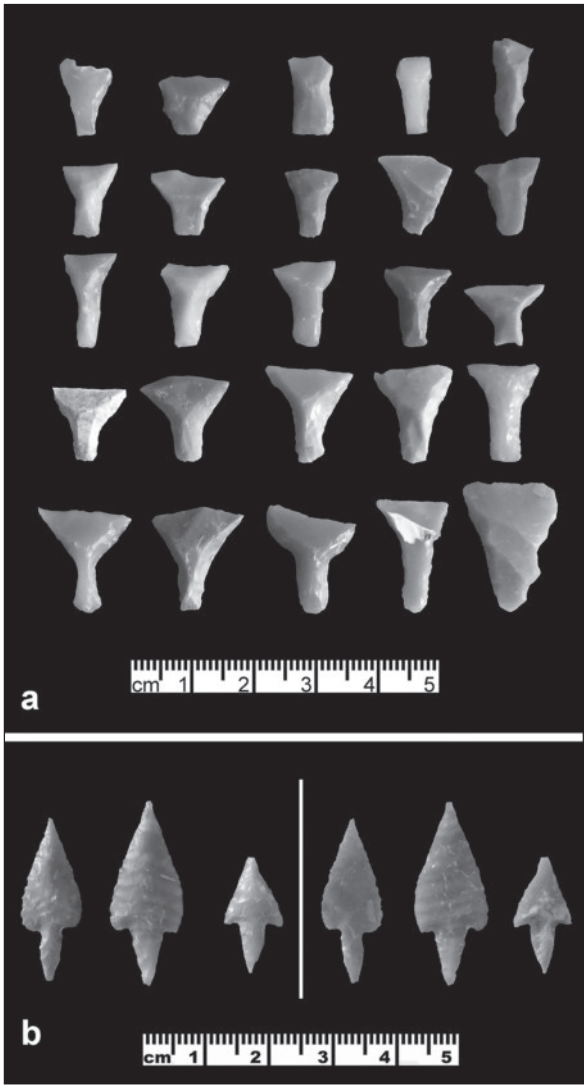
Type	n	%	%'
Bladelet, symmetrical	14	25.9	28.0
Bladelet, asymmetrical	8	14.8	16.0
Burin spall, symmetrical	7	13.0	14.0
Burin spall, asymmetrical	5	9.3	10.0
Mèche de forêt	15	27.8	30.0
Double drill, burin spall	1	1.9	2.0
Bit only	1	1.9	
Indeterminate	3	5.6	
Total	54	100.0	100.0

Table 8: Core types from W-80, 2013 and 2014 seasons at Wisad Pools.

Type	n	%	%'
Single face radial flake core	19	1.8	2.3
Biface radial flake core	23	2.2	2.8
Single platform, single face flake core	125	11.8	15.3
Single platform, multiface flake core	68	6.4	8.3
Single face, multiplatform flake core	44	4.1	5.4
Multiface, multiplatform flake core	131	12.3	16.1
Core on a flake	75	7.1	9.2
Other flake core	1	0.1	0.1
Microflake core	132	12.4	16.2
Bladelet core	21	2.0	2.6
Blade + bladelet core	1	0.1	0.1
Opposed platform non-naviform blade core	2	0.2	0.2
Single platform, single face blade core	74	7.0	9.1
Other blade core	15	1.4	1.8
Pyramidal core	3	0.3	0.4
Semi-pyramidal core	15	1.4	1.8
90° change-of-orientation core	59	5.6	7.2
Other	8	0.8	1.0
Subtotal	816		100.0
Manuport	6	0.6	
Tested piece	32	3.0	
Unclassifiable	208	19.6	
Total	1062	100.0	

Although burins were very important during the Late Neolithic, especially at burin sites, W-80 produced only a minor amount, with individual burin classes(Rollefson 1959: Table 1) represented by many simple types (42.4%), far fewer transverse varieties (6.0%), moderate numbers of dihedral types (12.1%), and relatively strong truncation burins (33.3%). However, the total of 36 burins pales beside the huge numbers at burin sites, and even at other kinds of Late Neolithic settlements such as at Mesa 7 structure SS-1 (644 burins from a total of 1331 shaped tools, 48.4%; unpublished analysis) or at Kharaneh A-15, where in a sample of a calculated population of more than 80,000 artifacts, 87% of the tools were burins (Muheisen and Rollefson 1985:142-144).

Only 74 drilled beads and pendants of any kind were recovered from inside W-80



17. a: Transverse arrowheads; note damage to bits and bit corners. b: Three Haparsa points. (Photos: G. Rollefson).

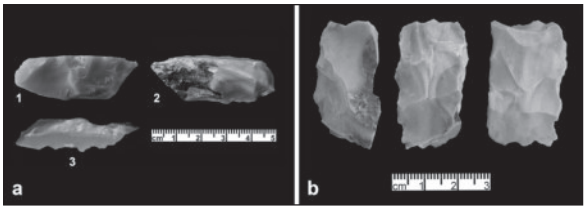
(**Table 8**), but 102 bead drills came from the same sediments (**Table 3**). It is likely that either many of the beads that were made were taken away, perhaps for trade, or that bead drills were used for more than bead manufacture. In a study of eastern badia burins, the absence of use-wear on many of the truncation types led Finlayson and Betts (1990) to suggest that it may have been the burin spalls that were the objective of much of the burin production during the Late Neolithic, possibly as blanks for drill bits, an interpretation supported by frequent correlations of unretouched burin spalls and drill beads as was noted in Yarmoukian layers at 'Ayn Ghazal (unpublished research). Another possibility was the use of burin spalls as teeth,

mounted in wooden or bone handles for use as carding boards to harvest wool from Late Neolithic sheep (Quintero *et al*. 2002:209). The status of blanks used for making drills at W-80 is equivocal in terms of what burin spalls were used for. **Table 7** shows that 44% of drills were made on bladelets, not burin spalls (which were still strong at 24%).

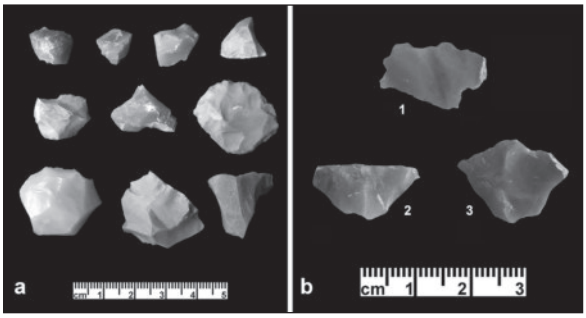
Cores were remarkably frequent in the W-80 sediments, underscoring the intensity of tool production inside the building. Flake cores of various kinds were most numerous, with single platform single face cores (**Fig 18a**) and multiple platform multiface cores most popular (**Table 8**). Blade cores were also numerous, though less so than the importance of blade blanks for tool production (**Table 4**). Microflake cores are intriguing, since many of them have active faces that would have produced flakes only around a centimeter in maximum dimension (**Fig. 19a, b**).

Special Finds

Among the material recovered from below the tomb, stone "bracelet" fragments were the most numerous items, except for beads and pendants (**Table 9**). Dabba marble outcrops can be found in the vicinity of Wisad Pools, so beads of this stone do not represent any long-distance networking. Shells, on the other hand,



18. a: Single face single platform core. 1=active face, 2= inactive face, 3= platform. b: Three-face prismatic flake core. (Photos: G. Rollefson).



19. a: Microflake cores. b: Semi-pyramidal microflake core; 1=platform, 2 and 3 are active faces. (Photos: G. Rollefson).

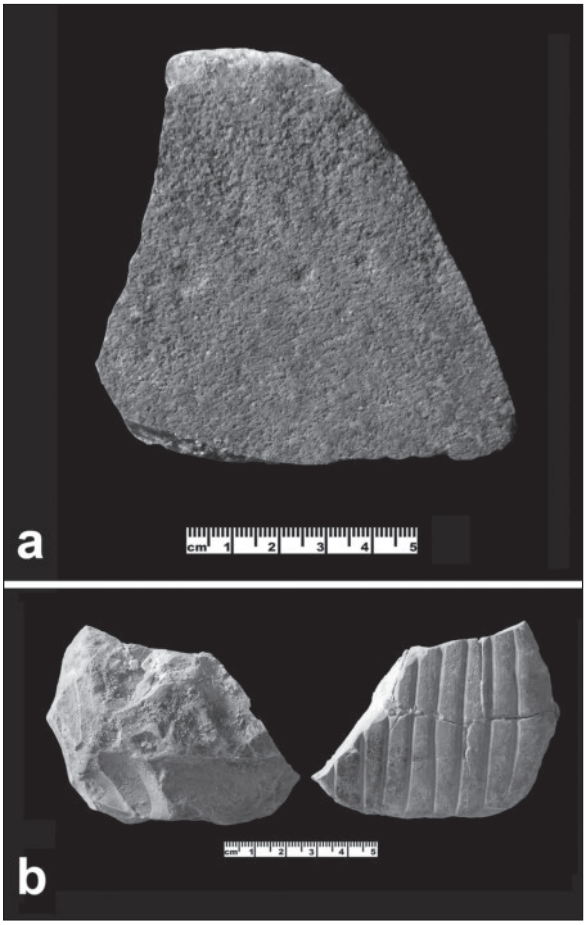
Table 9: Special finds from W-80, 2013-2014 seasons at Wisad Pools.

Material	n	Material	n
*Bronze arrowhead	2	Shell beads	12
*Copper finger ring	1	Shells	3
*Silver ear ring	1	Mother-of-pearl pendant	1
*Carnelian biconical beads	12	Stone micro-vessel	1
*Carnelian disc beads	2	Stone vessel fragment	1
*Carnelian tubular bead	1	Quartzite tray fragment	1
*Frit/glass beads	2	Sandstone tray fragment	4
*Cowrie shell beads	2	Other stone tray fragment	1
*Dabba melon "melon" bead	2	Gypsum palette	1
*Copper bead	1	Sandstone disc	1
Carnelian chunks	4	Potsherds[3]	13
Mace head fragments	8	Acheulian bifacial cleaver	1
Stone bracelet fragments	22	Basalt shaft straighteners	3
Stone finger rings	4	Grooved stone	1
Bone beads	5	Red ocher fragments	5
Quartz beads	2	Green crystal fragment	1
Dabba marble disc beads	18	Quartz crystal	1
Dabba marble pendants	8	Incised crystal	1
Redstone beads	11	Incised stone fragment	1
Blackstone beads	2	Polished/ worked stone	8
Other stone beads	15	Gizzard stones[4]	47
Stone bead blanks	11	Iron/steel pin	1

probably represent extensive contacts with both the Mediterranean and Red Seas. In addition to several tray or platter fragments made of (local?) sandstone, a reddish quartzite tray fragment was decorated by small depressions ("dimples") on one surface (**Fig. 20a**), as well as a burned and broken limestone (?) palette, with eight longitudinal channels engraved on one surface (**Fig. 20b**). Thirteen potsherds (many of them minute fragments) included four typical Yarmoukian examples (**Fig. 21**); two other Yarmoukian potsherds came from structure W-66 in 2011(Rollefson, Rowan, Perry and

3. At least four of the potsherds are Yarmoukian.

4. Of these, 27 are from one locus.

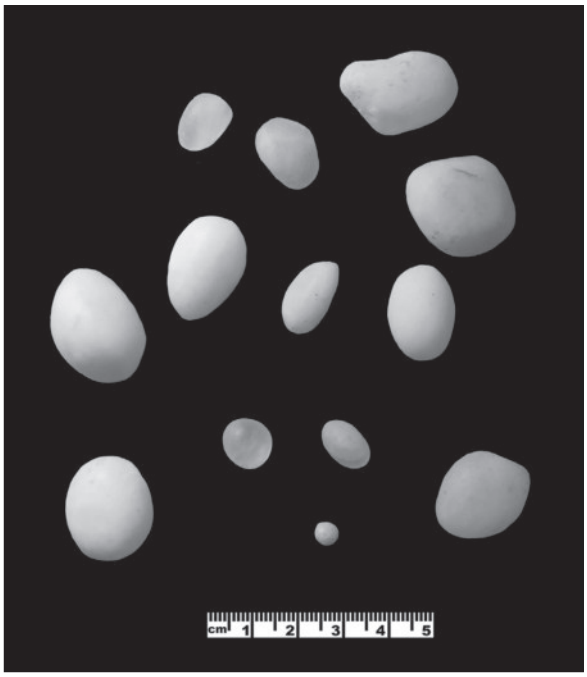


20. a: Red quartzite tray fragment; note the dimples on the surface. b: grooved limestone palette. (Photo: G. Rollefson).

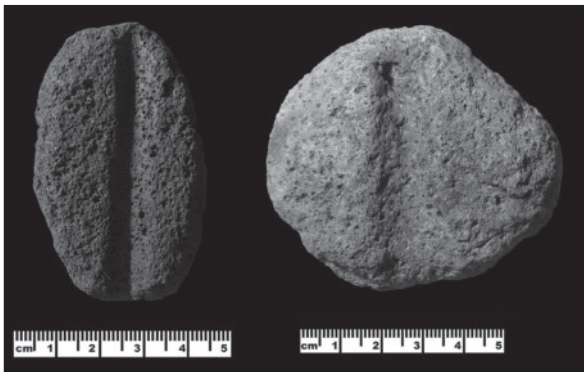
21. One of four Yarmoukian potsherds. (Photo: G. Rollefson).

Abu-Azizeh 2012: 40; Rollefson *et al*. 2013: **Fig. 19c**). A total of 47 gizzard stones, all of a creamy colored quartzite, were recovered from the sequence inside W-80, although 27 were from a restricted area within a single layer (**Fig. 22**). Some researchers have suggested they were used as sling stones, and while that may be true for some of them, the tiny size of many of them raises doubt to their use as projectiles.

Finally, three basalt shaft straighteners (**Fig. 23**) might be taken to reflect a much moister period of occupation of W-80. Arrow shafts have not been found in Levantine Neolithic sites, but it is widely held that many hunters used reeds (*Phragmites* sp.) that grew abundantly near marshy conditions for their arrows. Shaft



22. Selection of quartzite gizzard stones showing the variability in sizes. (Photo: G. Rollefson).



23. Two of the three basalt shaft straighteners recovered from W-80. (Photos: G. Rollefson).

straighteners would have been used to remove the nodes for a smooth surface. It is not clear if shaft straighteners were used for other purposes, or if there were resources other than *Phragmites* in the Black Desert. The presence of oak charcoal argues for a wetter environment at Wisad Pools, and the shaft straighteners lend support to that observation.

Concluding Remarks

Three residential structures have been excavated at Wisad Pools since 2011, and all three have proven to be Late Neolithic in age. There are hundreds of structures in the core area of Wisad, and it now appears that perhaps a majority (at least) of the structures could be 7th and 6th millennia buildings. The concentration of permanent (albeit likely seasonally inhabited) residences challenges earlier views that the badia was an inhospitable territory, that demanded frequent shifts from one camp to another during the Late Prehistoric period. Instead, more and more evidence of a landscape with lusher vegetation and effective water harvesting during the rainy season made it possible for relatively large herder-hunter groups to remain throughout the rainy season, and even for some time into the post-rainy season.

The bleakness of the current landscape is probably a relatively late phenomenon; the hyperarid desert may have developed only in the past three to four millennia (Rollefson n.d.; Rollefson, Rowan and Wasse 2014) and until that time, people may have enjoyed a comfortable life style. Research will continue at Wisad in the future, with particular attention paid to different types and styles of construction, in part searching for the time when structures were founded on bedrock or silt, not the red absorbent soil that had been deflated due to intense aridity and strong winds.

Acknowledgements

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PRELIMINARY REPORT ON THE SUMMER 2012 SEASON OF THE WĀDĪ ḤAFĪR PETROGLYPH SURVEY

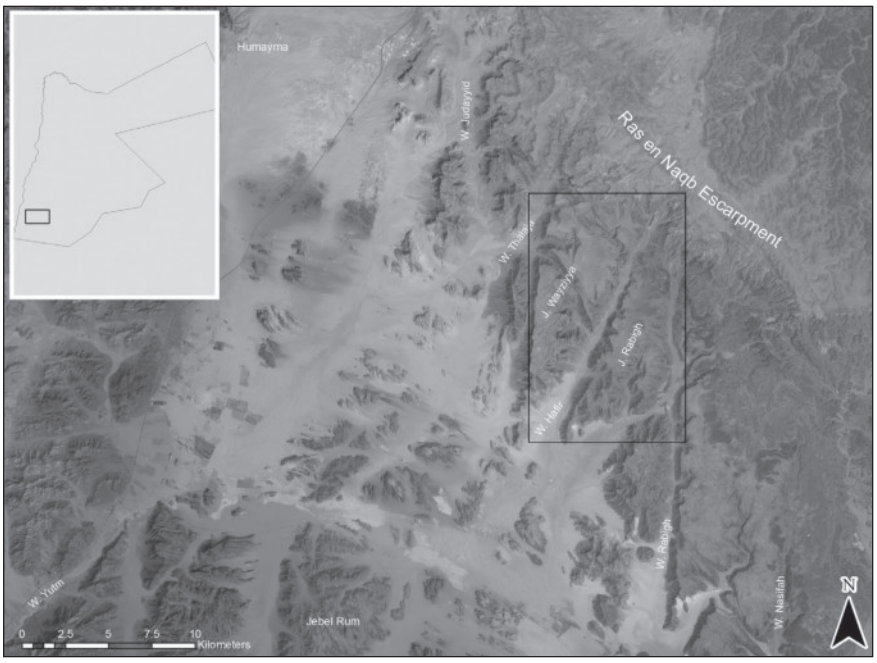
Glenn Corbett, George Bevan, Miglena Raykovska, Michael Fergusson

Introduction

In the summer of 2012, the Wādī Ḥafīr Petroglyph Survey (WHPS) returned to the field for ten days (7–16 July), to photograph specific inscription and rock art sites within the Wādī Ḥafīr of the Ḥisma/ Wādī Ramm desert of southern Jordan (**Fig. 1**). The narrow, boulder-strewn Wādī Ḥafīr canyon, previously surveyed by the WHPS over a six-week period during 2005–06 (Corbett 2011), is home to thousands of inscriptions and drawings carved during various periods of Jordan's history, from the Neolithic to the late Ottoman period. Perhaps the most well-known are the so-called "Thamudic E" (or, more recently, Hismaic) carvings, which date to around 2,000 years ago, and preserve the names, short prayers, simple musings, and signed drawings of the innumerable shepherds, farmers, and traders who lived in or passed through this region.

The 2012 field season aimed to use the latest in digital photography methods and equipment to accomplish three primary objectives:

1) To provide better photographic documentation of select sites, Inscriptions, and drawings that were poorly or insufficiently photographed during the original 2005–06 campaign;
2) To evaluate the effectiveness and usability of various three-dimensional photographic methods for recording worn, abraded, and/ or faintly-carved inscriptions and drawings; and
3) To evaluate the effectiveness and usability of ultra-high-resolution panoramic Gigapan photography for documenting and analyzing select petroglyph sites and landscapes.



1. The Northern Ḥismā of southern Jordan (with Wādī Ḥafīr highlighted).

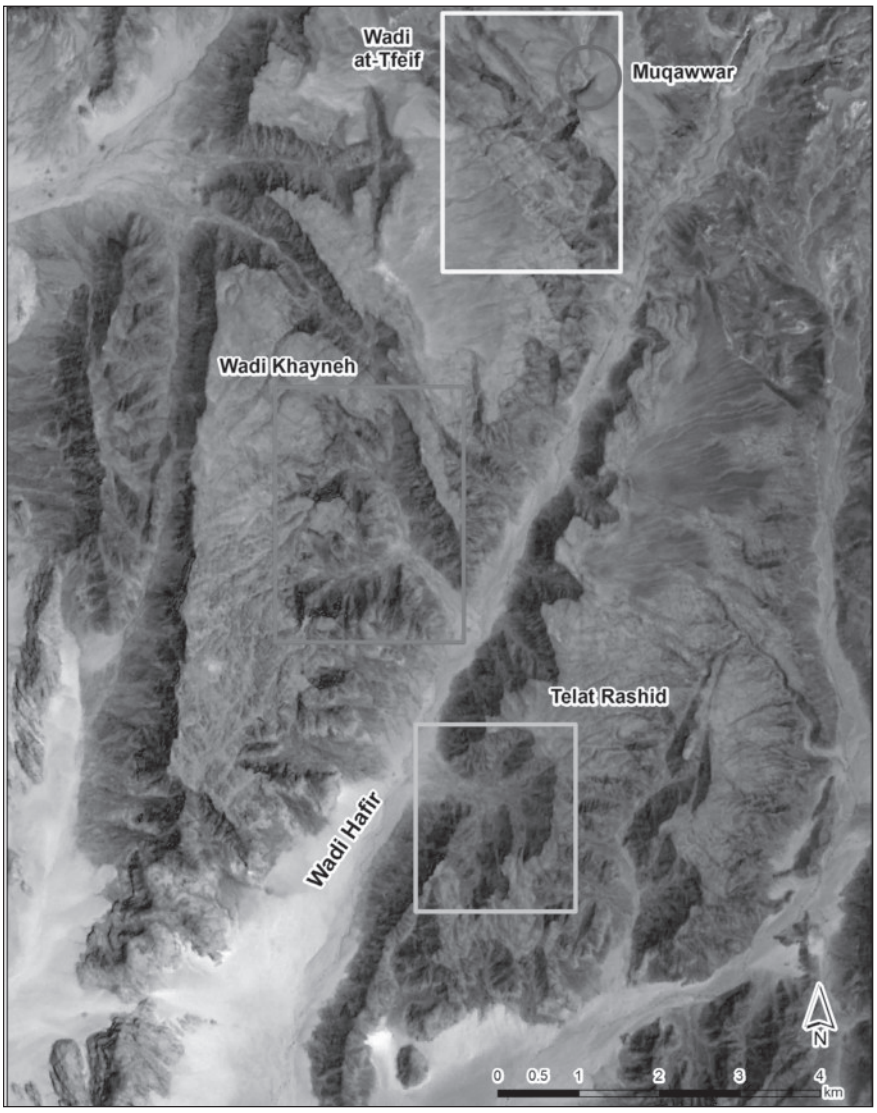
In addition, the project had the secondary objective of visiting and photographing a handful of exceptional Thamudic carving sites that had been recorded in the Ḥafīr during the earlier survey work of William Jobling (‘Aqaba-Ma‘an Archaeological and Epigraphic Survey, 1980–1990; Jobling 1983, 1985a, 1988, 1989), but had not been identified during the first season of the WHPS.

The 2012 survey focused almost all of its efforts on re-photographing individual stones and rock faces already identified by the WHPS in the three major tributaries of the Ḥafīr (Telat Rāshid, Wādī Khāyneh, Wādī at-Ṭfeif) and the seasonal cascade pools of Muqawwar located in the heights above at-Ṭfeif (**Fig. 2**), although a selection of other petroglyph-rich areas were also visited.

Improved Photo Documentation of WHPS Sites

The project’s first goal for 2012 was to re-photograph select Hismaic inscription and drawing sites that were poorly photographed during the first session of the WHPS in 2005–06. In these limited but often significant cases, the existing digital photographs did not capture the complete inscriptions and/or drawings in a single frame, were shot in full sun or heavy shadow, or were photographed at insufficient resolution. The poor quality of the photographs made full reading, analysis, and interpretation of the carvings unnecessarily difficult or impossible, not to mention the fact that they were often not of publication quality.

As such, the 2012 survey re-photographed approximately 100 inscription and drawing

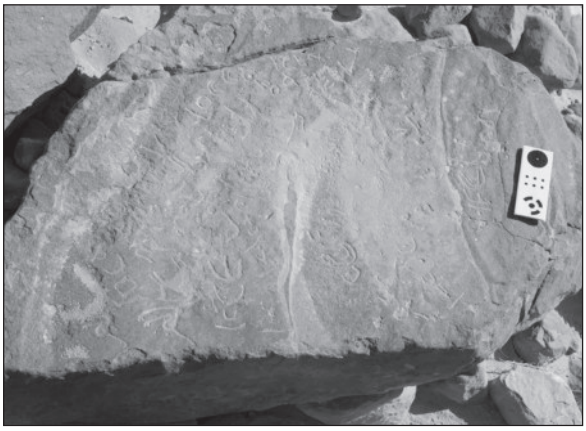


2. The Wādī Ḥafīr, with its main tributaries highlighted.

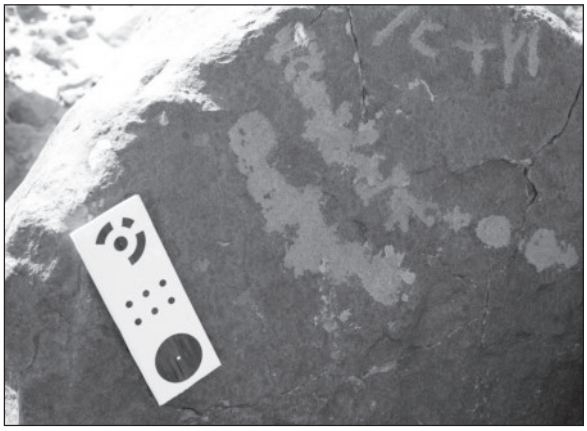
sites originally surveyed in 2005–06. In most cases, the new photographs were taken from different angles or perspectives, or with the scale or white board placed in a different location, allowing for a clearer view of the entirety of an inscribed surface. For most sites, the new photograph simply provides better visual context for the location of a carving relative to the stone surface, while in other cases, re-photographing the stone has helped clarify textual readings or even identify new inscriptions.

Advanced Digital Photography

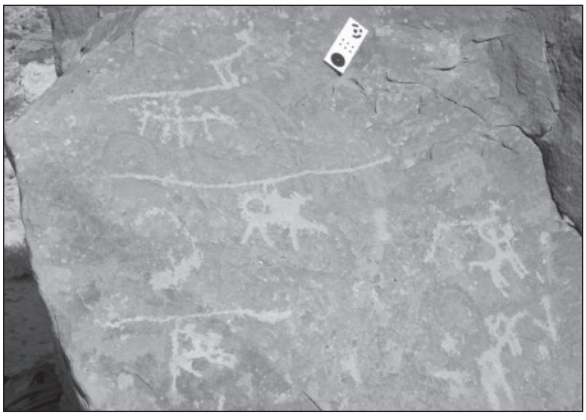
The project's second major objective was to re-photograph specific petroglyph sites, first recorded by the WHPS in 2005–06 and to evaluate the field practicality, and ultimate effectiveness, of various computational photographic methods. These methods, which are increasingly used in rock art and petroglyph studies to reveal carving elements that are difficult to discern in standard digital photographs, or are even invisible to the naked eye, help improve the contrast in images of inscriptions and drawings that have suffered various weathering processes and/or severe damage. These weathering processes, the mechanisms and typology of which have been extensively discussed in the rock art literature (Bednarik 2012; Dorn *et al.* 2008; Siegesmund *et al.* 2002), reduce readability by either effacing the carving entirely (**Fig. 3**), or should the carving be of sufficient age, producing a dark patina that makes the inscribed surface virtually indistinguishable from the undisturbed, natural stone (**Fig. 4**). In addition to natural weathering processes, ancient erasures (e.g. deliberate human attempts to disturb or "erase" texts) have made some inscriptions unreadable (**Fig. 5**). In other cases, the density and complexity of multiple carvings from various periods inscribed on the same panel can often lead to a layering effect, that itself reduces readability (**Fig. 6**).



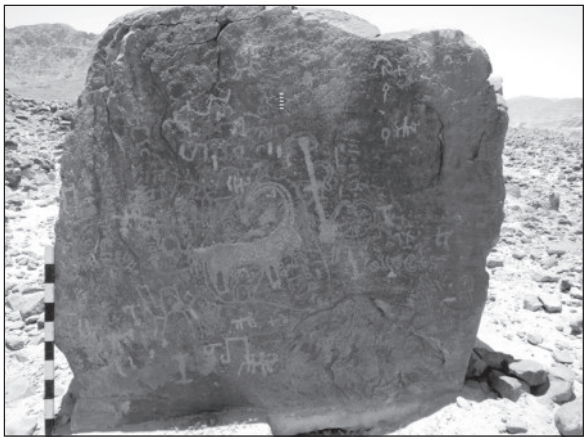
3. An inscribed boulder that suffers from heavy weathering, obscuring the details of inscriptions and drawings.



5. An example of an ancient erasure, where the original text was obliterated by a later carver.



4. An example of a stone where old, heavily patinated glyphs disappear into the background, whereas newer glyphs are clearly visible.



6. A large boulder face featuring multiple layers of inscriptions, drawings, and markings carved during various periods.

Many earlier studies (Mudge *et al.* 2012, 2006; Plets 2012; Matthews and Noble 2008; Landon and Seales 2006; Chandler *et al.* 2007; Sanz *et al.* 2010) have shown that two photographic techniques (Digital Photogrammetry and Reflectance Transformation Imaging [RTI]), can dramatically improve the reading, analysis, and interpretation of ancient inscriptions and rock drawings. In Jordan, a recent study also showed the efficacy of Photogrammetry to improve the interpretation of petroglyphs carved on basalt (Yorke and Austin 2014). In addition to RTI and Digital Photogrammetry, the 2012 survey also deployed a robotic Gigapan camera-mount to obtain high-resolution panoramic imagery (>200 megapixels) of both large rock-panels and the broader landscape context of inscribed boulder fields.

In order to test the relative effectiveness and usability of each method, specific carving sites from Wādī Ḥafīr were re-photographed, using one or more of the above mentioned techniques. Although such methods are most immediately useful for extracting better readings from the wadi's worn or faintly-carved Hismaic, Nabataean, and Kufic inscriptions, they were also applied to select examples of blackened, heavily-patinated prehistoric rock art panels, where three-dimensional models may help identify "hidden," worn, or obscured dimensions to the drawings.

Reflectance Transformation Imaging

RTI is a photographic technique that allows one to extract dense surface-normal information from a rock face, by taking between 16 and 60 photographs with a strobe light placed in different random but evenly distributed positions around an "invisible" hemisphere surrounding the rock face (Malzbender *et al*. 2001; Mudge *et al*. 2006). This technique is often effective for the extremely detailed recording of the incisions in the rock, as surface normal information can be provided for each pixel, which can often measure under 1 mm depending on the camera, lens, and distance to the object. The RTI files are relatively small, and can easily be viewed in the freely available RTIV iewer software. Several filters are also available to enhance faint features (Earl *et al*. 2010a, 2010b; Gabov and Bevan 2011; Bevan *et al.* 2013).

For the WHPS, however, only a few RTI captures were attempted in the field, because of problems in effectively deploying the equipment (**Fig. 7**). Large, high-powered strobe lights (Alien Bees B1600, 640 watts maximum output) were required to provide sufficient illumination to overcome the sunlight and, as a consequence, very dark neutral density filters were required to reduce the exposure time (the remote flash triggers could only synchronize under 1/400 of a second). The neutral-density filters can make camera set-up difficult, as they are almost opaque to the naked eye. Several portable batteries were also required to power the flash system. As such, the technique was found to be time consuming in the field, while another restriction was the requirement that the flash be positioned at a distance of at least 2.5 times the diagonal dimension of the rock panel. If a rock panel exceeded a diameter of 1 m or if it was too high up (above 1 m) or too low to the ground, it could not be illuminated in enough positions to produce high-quality data.

Photogrammetry

Photogrammetry, in contrast to RTI, seeks to keep the lighting scene of the rock face constant, but uses overlapping pairs of images (60–100% overlap) to generate a highly accurate 3D model of the surface. Recent studies have demonstrated that models generated by dense stereo matching can easily achieve sub-millimeter accuracy (Koutsoudis *et al.* 2014; Remondino *et al.* 2014) and are, as a consequence, more than adequate to record most glyphs encountered in Wādī Ḥafīr in 3D.

7. Setting up to photograph an inscription at the Muqawwar cascades using Reflectance Transformation Imaging (RTI).

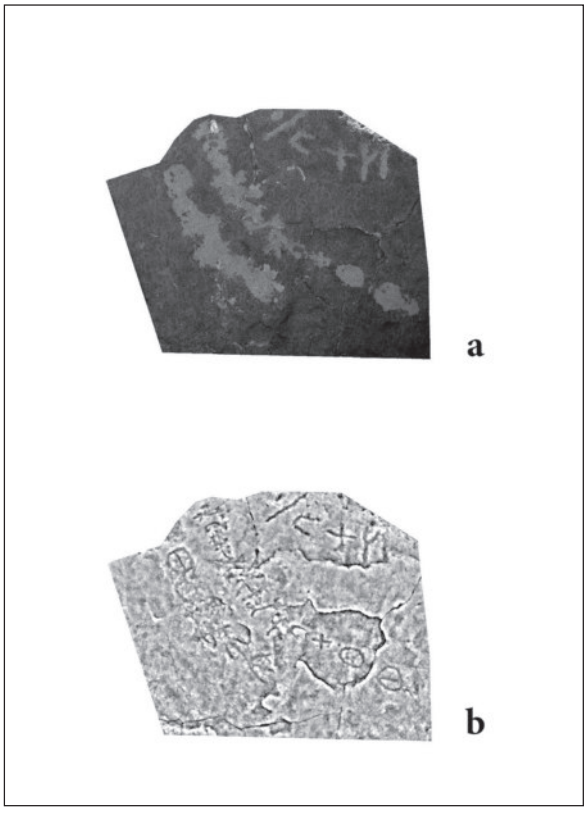
Three types of photogrammetry capture were used in the field. For areas where extremely high detail was required, strips of photos with 66% overlap were taken at close range (30–50 cm; **Fig. 8**). In cases where the entire area of interest could fit in a single camera frame, several photos were taken from several converging angles. Finally, where very detailed models were required of large rock faces, panoramic photogrammetry was employed. For the latter, the camera was fitted with a long focal-length lens (200–300 mm), and set up on a robotic Gigapan in several positions, such that the panoramas "converged" on the rock panel.

Once the photographs were processed in one of two commercial photogrammetry packages (Agisoft Photoscan or ADAMTech CalibCam), the resulting 3D models were enhanced in one of two open-source point-cloud and mesh manipulation software packages: MeshLab or CloudCompare. While good results were obtained by removing the color from the models, and either dynamically relighting the surface to bring out small details, or by applying artificial lighting models such as "radiance scaling" or "ambient occlusion," the most consistent results were achieved by "depth mapping," a technique where the stone surface is compared to a smoothed, average surface of the stone, and the difference between the actual and smooth surface is assigned a gray-scale value.

Three successful cases of depth mapping deserve discussion. WHPS 377 (**Fig. 5**) provides an excellent case, where a text that was deliberately scratched out in antiquity can be at least partially recovered. With normal digital photographs, obtaining accurate readings from such "erased" texts can be difficult, if not impossible, as the "erasures" typically obliterate the distinguishing features of individual letters, causing the text to appear as a jumbled mess with no discernible order (**Fig. 9a**). With depth mapping, however, it becomes somewhat easier to get beneath these relatively shallow scratches, to discern something of the characters of the original inscription (**Fig. 9b**). In WHPS 377, the distinguishing features of many (though certainly not all) of the individual characters are now discernible, allowing us to clearly identify this as a prayer text (Opening with the verb *ns²rt* ["may she release an ill from"]) to the goddess Allat (*'lt*), that was carved (*ḫṭṭ*) by someone whose name is still somewhat unclear (though perhaps *w'l*). In any event, depth mapping allows us to propose a plausible reading for a text that was previously completely unreadable.

A second example, WHPS 864, shows how depth mapping can help discern carvings and inscriptions that are heavily patinated and, as such, largely indistinguishable (Either in standard digital photos or with the naked eye) from the surrounding stone surface. The standard

8. Capturing strips of photos on a large rock panel using a macro-lens.



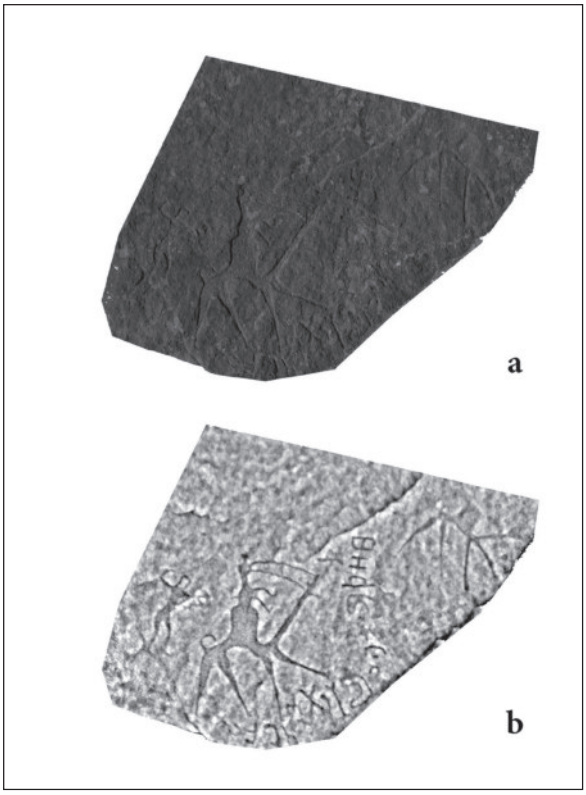
9. Before (a) and after (b) enhancement of WHPS 377 using depth mapping.

color image (**Fig. 10a**) allows us to see only the vague outlines of a camel and rider drawing, and perhaps the presence of an inscription, with few details of either discernible. Using depth mapping (**Fig. 10b**), however, many more aspects of this rather elegant drawing are now clearly visible (a she-camel with rider, legs outstretched, holds the camel's reigns, while a figure armed with a bow attacks both from behind) and the Hismaic inscription that signed the drawing is almost completely readable (w zdmnt bn rm'l *ḫṭṭ h-bkrt = "and zdmnt son of rm'l carved this she-camel"*).

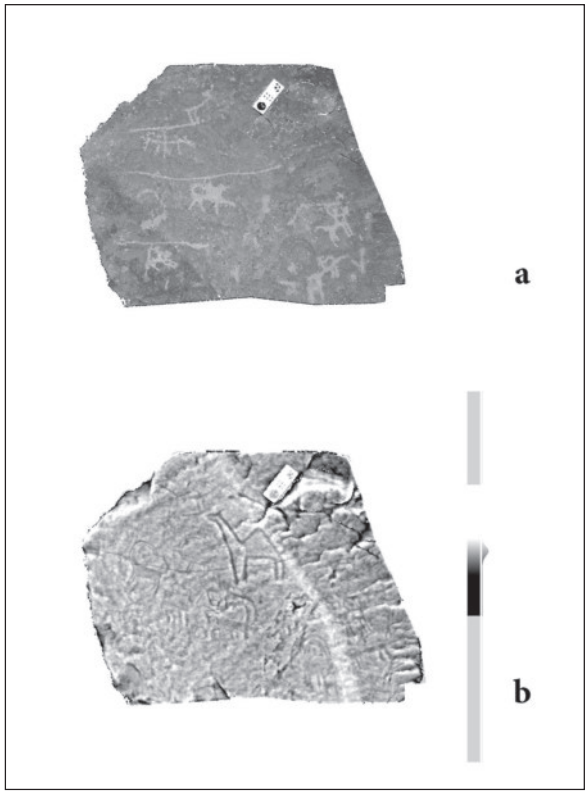
Finally, WHPS 368 presents an example of a stone where not only are earlier carvings heavily patinated, but they are also covered and hidden by drawings from a later period. In the standard color image (**Fig. 11a**), all one can clearly make out are several stylized horse and rider figures (armed with long lances) carved across the stone surface. Using depth mapping (**Fig. 11b**), however, an entire layer of earlier, more deeply carved drawings is revealed, including the bold outlines of a camel drawing and several ibex depictions. Depth mapping, therefore, allows us to capture and document an earlier stratum of drawings that would otherwise be likely to go unnoticed. This additional 3D information on the layering of the carvings can be a useful tool, alongside other established methods in rock art dating (Keyser 2001).

High-Resolution Panoramas

Panoramic photography positions the camera on a rotating mount, and is offset from the rotation center by a distance unique to the particular camera and lens combination. This offset, the so-called "no parallax point," ensures that there is no change in perspective as photos at different angles on the mount are taken (Littlefield 2006). To expedite this process, and to ensure that adequate overlap between photos was achieved, a robotic Gigapan head was used, that automatically captures images of an area once the upper left and bottom right corners of the panorama have been set (**Fig. 12**). This technique allows researchers to use conventional Digital SLR cameras and lenses to take extremely high-resolution photos of rock panels much more quickly and accurately than by using image mosaics (e.g., Mark and Billo 2011a, 2011b). The stitching of the individual



10. WHPS 864 before (a) and after (b) depth mapping.

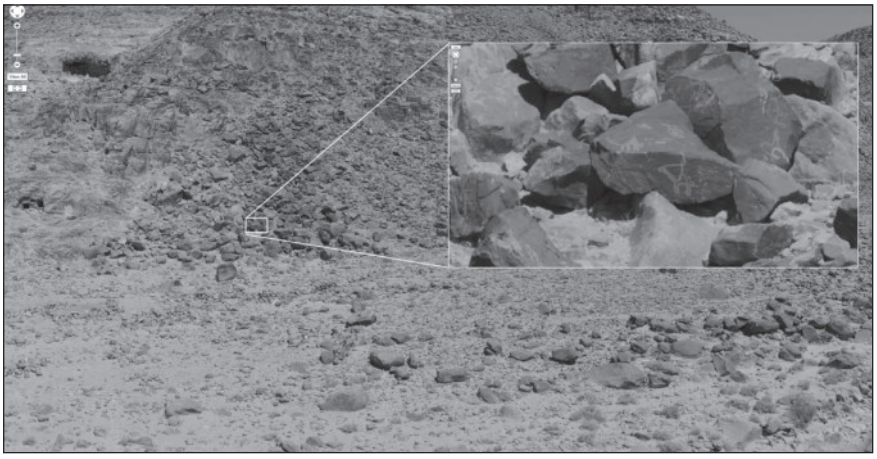


11. WHPS 368 before (a) and after (b) depth mapping.

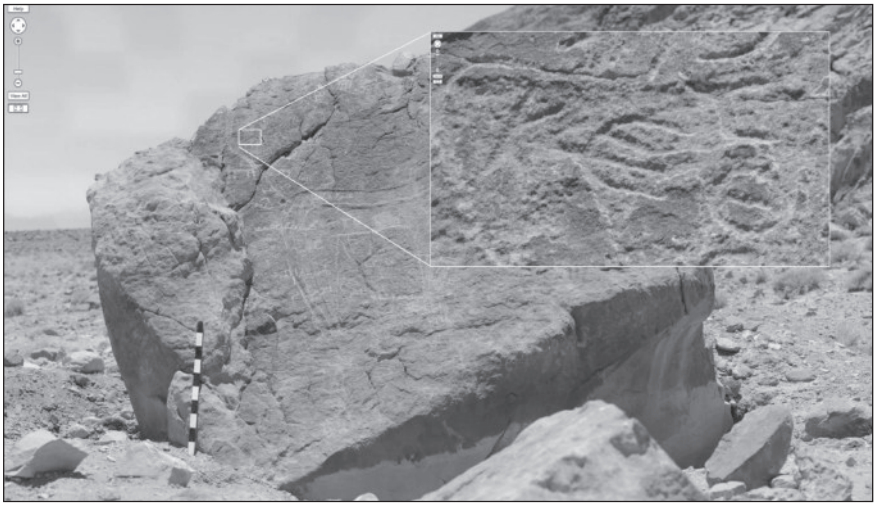
12. Setting up the tripod-mounted Gigapan robotic head at the "Bull Stone" (WHPS 836).

photos into panoramas was accomplished with either Gigapan Stitch or with Kolor's Autopano Giga.

In Wādī Ḥafīr, panoramic photography served three main purposes. First, by producing panoramic views of entire boulder fields at sufficiently high resolution within a single image, the technique allows individual carvings to be discerned and studied within the broader landscape context in which they are found (**Fig. 13**). This is a particularly useful technique for both documenting and visualizing the particular areas where Hismaic inscriptions and drawings tend to cluster, such as along elevated wadi banks, and at the confluences of significant wadi tributaries (Corbett 2012: 212). Second, for large densely carved boulders and rock faces, such as the so-called "Bull Stone" (WHPS 836), panoramic photography with long focal-length lenses allows the entire surface of the inscribed panel to be recorded in great detail within a single high-resolution image (**Fig. 14**), allowing for far more efficient documentation, analysis, and presentation / publication. Likewise, in many cases it would be difficult or impossible to take overlapping image mosaics of the same panels at close range. Finally, by using the ADAMTech CalibCam software, we can take the constituent images from panoramas shot at several positions around a rock panel, and build extremely detailed 3D models of the surface, thereby providing a dynamic way of viewing, analyzing, and presenting epigraphic and rock art sites. This application of panoram-



13. Gigapan image of a boulder field in Wādī at-Tfeif, with magnified view of WHPS 691 highlighted.



14. High-resolution panorama image of the "Bull Stone" (WHPS 836), with magnified view of inscribed Hismaic characters.

ic, gigapixel photogrammetry has already found useful applications in geotechnical engineering of unstable rock slopes (Lato *et al.* 2012).

Re-Locating Sites from the AMAES

During the 2012 season, nearly a dozen exceptional Thamudic carving sites first identified by Jobling during the AMAES were re-located and re-photographed, and their coordinates recorded with GPS. These sites, which were not located during the first season of the WHPS, were found by using the AMAES film rolls, together with the locations of Jobling sites previously identified by the WHPS, to isolate the most probable areas for discovery. In this way, several exceptional Thamudic E/ Hismaic carvings first recorded by Jobling were re-identified by the WHPS, including an elaborate ibex hunt scene (WHPS 580; Jobling 1985a: 214) carved by *ḥgg* son of *bglt* (**Fig. 15**), a battle with a lion (WHPS 564; Jobling 1988: 429–431), that was drawn by *zdmnt* (**Fig. 16**), and a large boulder (WHPS 178; Jobling 1985b: 398–399) covered with many intriguing Hismaic inscriptions and drawings (**Fig. 17**).

15. Re-located Jobling site, WHPS 580: An ibex hunt scene carved by ḥgg son of bglt.

16. Re-located Jobling site, WHPS 564: A lion battle scene drawn by zdmnt.

17. Re-located Jobling site, WHPS 178: A boulder covered with Hismaic inscriptions and drawings.

Conclusions

In addition to re-photographing many inscriptions and rock drawings recorded during both the first season of the WHPS and Jobling's original AMAES, the WHPS 2012 season was able to draw several important conclusions regarding the use of computational photographic techniques for epigraphic and rock art survey in Jordan. First, while RTI has impressive capabilities in a studio or museum setting, it is difficult to deploy in very remote and bright, sun-lit locations like Wādī Ḥafīr. What is more, the often poor positioning (e.g., too large, high, low) of the carved stone faces often made proper light distribution for good RTI capture impossible. Photogrammetry, by contrast, allowed for very quick capture in the field (usually not more than 10 minutes per stone) and, after photographic processing and analysis, yielded results that matched or exceeded those typically achieved with RTI. Frequently, software manipulation of the resulting 3D models using rendering tools such as radiance scaling, ambient occlusion or, more often, depth mapping, revealed features in the carvings that were virtually invisible both in digital photographs and even during thorough inspection in the field. The high-resolution panorama equipment was also very successfully employed and produced extremely dense 3D models, as well as very detailed photos that could easily be shared online.

Our experience in 2012 has also led to several recommendations for future epigraphic and rock art surveys employing such photographic methods. First, the volume of data collected from three DSLR cameras in the field was immense (over 15,000 photos). Organizing the images and processing the resulting 3D data, from even a relatively short survey like our 10-day season, has been very time consuming. While handheld GPS was used to locate the position of each stone, in the future we will routinely employ geotaggers on all cameras, to record the position of the photos as well as their direction, using a built-in triple-axis compass. This metadata will allow us to plot the location of all the photos within a Geographic Information System (GIS), thereby allowing image sets to be quickly retrieved and analyzed, while also providing a much better overall picture of what areas of the wadi have (and have not) been documented. Finally, the latest generation of DSLR cameras offers three times the number of megapixels (36 *vs.* 12) as the cameras used in 2012. As such, we could now produce models virtually the same as were achieved in 2012, but with only a third of the photographs taken.

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TALL ḤISBĀN 2016 EXCAVATION SEASON: HOUSEHOLD ARCHAEOLOGY IN THE MEDIEVAL VILLAGE

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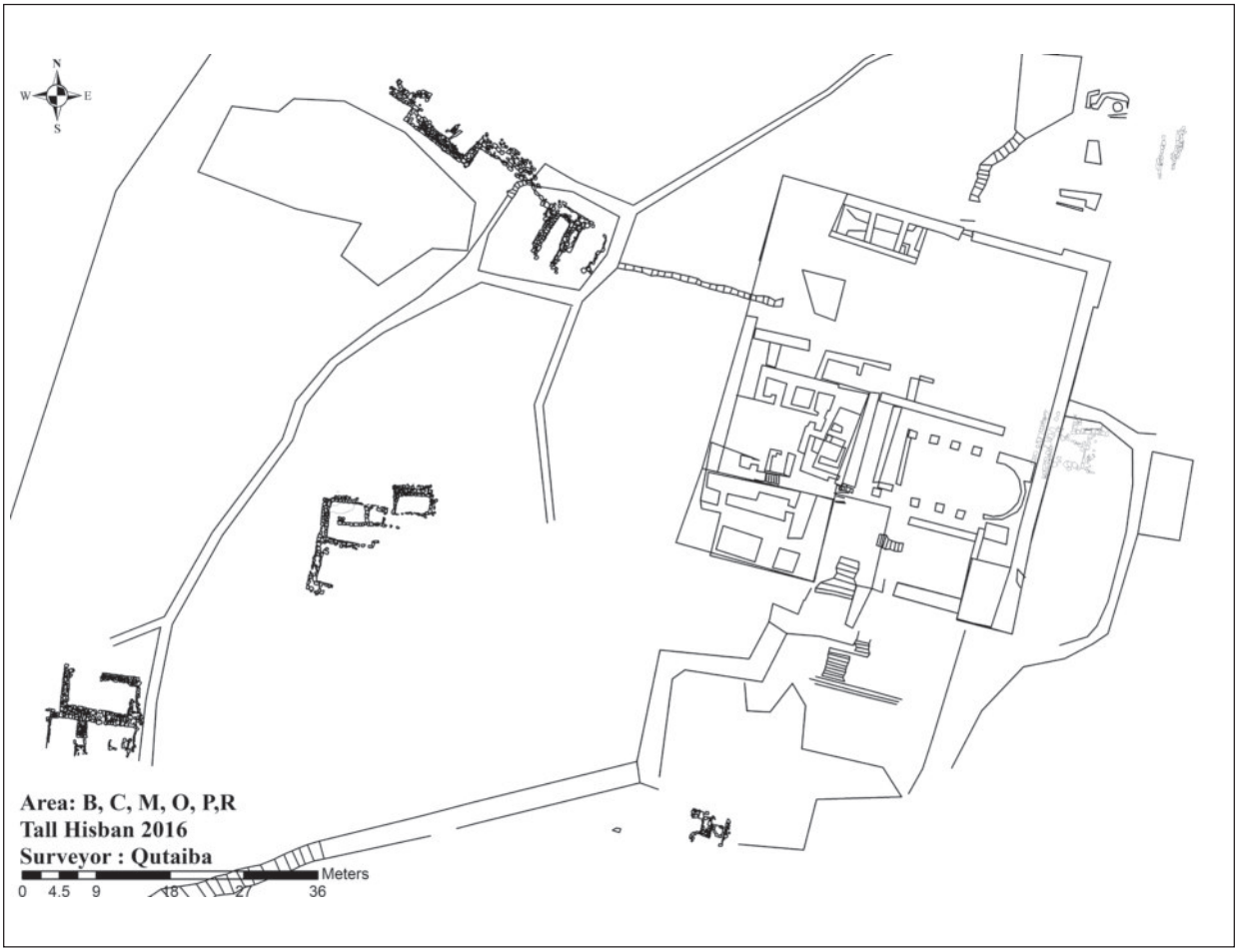
The Medieval Village: Tall Ḥisbān and the Late Byzantine and Islamic Periods

The Ḥisbān Cultural Heritage Project returned to the field from 15 May – 1 June, 2016 for a three-week field season. Excavations this year, which are part of a larger program of heritage preservation and site presentation, focused on the western, northern and southern slopes of the Tall, to better document the history of occupation of the village associated with the public buildings on the summit of the Tall in the medieval (Byzantine and Islamic) periods. The international team consisted of 35 students and staff, (the majority from the United States and Germany), and 16 workmen from Ḥisbān. The excavation was run as a field school for both undergraduate and graduate students from Andrews University, Missouri State University, and Bethel College, as well as a field school in Mamluk archaeology for an international group of graduate students and post-doctoral scholars from the University of Bonn[1].

Excavations at the site have, since 2013, centered on the architectural remains of the part of the medieval village that occupied the slopes and base of the Tall (within the fenced area of the Department of Antiquities site), on the summit of which was perched the Mamluk-era citadel, Byzantine basilica, and earlier monumental Roman buildings (**Fig. 1**). The structures in the civilian settlement, identified as farmhouses, belong to a common architectural koine for the region and adhere to a common plan: single-room, barrel-vaulted buildings of local stone with a single door, roughly 5 x 7 meters in dimension, with plastered walls and floors. The regional architectural tradition of low-sprung, barrel-vaulted buildings has a frustrating longevity, spanning the entire medieval and modern periods (McQuitty 1986, 2007; McQuitty and Lenzen 1989; Porter 2010; Walker 2017). Therefore, the goals of this season were to confirm the original construction date of these structures, document their physical and functional development over time, and investigate the structure of the medieval settlement as a whole, with its neighborhoods and pathways, as well as assess the spatial patterning of their abandonment (as in Walker 2014). The clustering of these farmhouses (in a row, rather than in a circle around a courtyard) represents a special spatial pattern, which likely reflects the ways in which extended families shared resources and pooled labor and use of the slopes for drainage. This season was, then, a first step towards studying family structure and community development in the Byzantine and Islamic eras. For this effort, use this season was made of photogrammetry and 3-D modeling of architecture (**Fig. 2**)[2], extensive material culture analysis (with laboratory analysis to support results), and a closely coordinated

1. Andrews University was represented by the Department of Anthropology and the Institute of Archaeology. The University of Bonn was represented by graduate students and staff of the Research Unit of Islamic Archaeology, as well as post-doctoral fellows of the Annemarie Schimmel Kolleg (an institute of advanced research of Mamluk Studies, funded by the German Research Foundation). The Ḥisbān Cultural Heritage Project is under the senior direction of Prof. Øystein S. LaBianca. The excavations are directed by Prof. Bethany J. Walker..

2. Nicolò Pini, a doctoral student at the University of Cologne, provided the expertise for this work. As photography with remote, miniature aircraft was again not possible this season, such photography, aided by "boom shots" and panorama photography, provided a great deal of information on architectural development and technology, and the relationship of neighborhoods to the local topography.



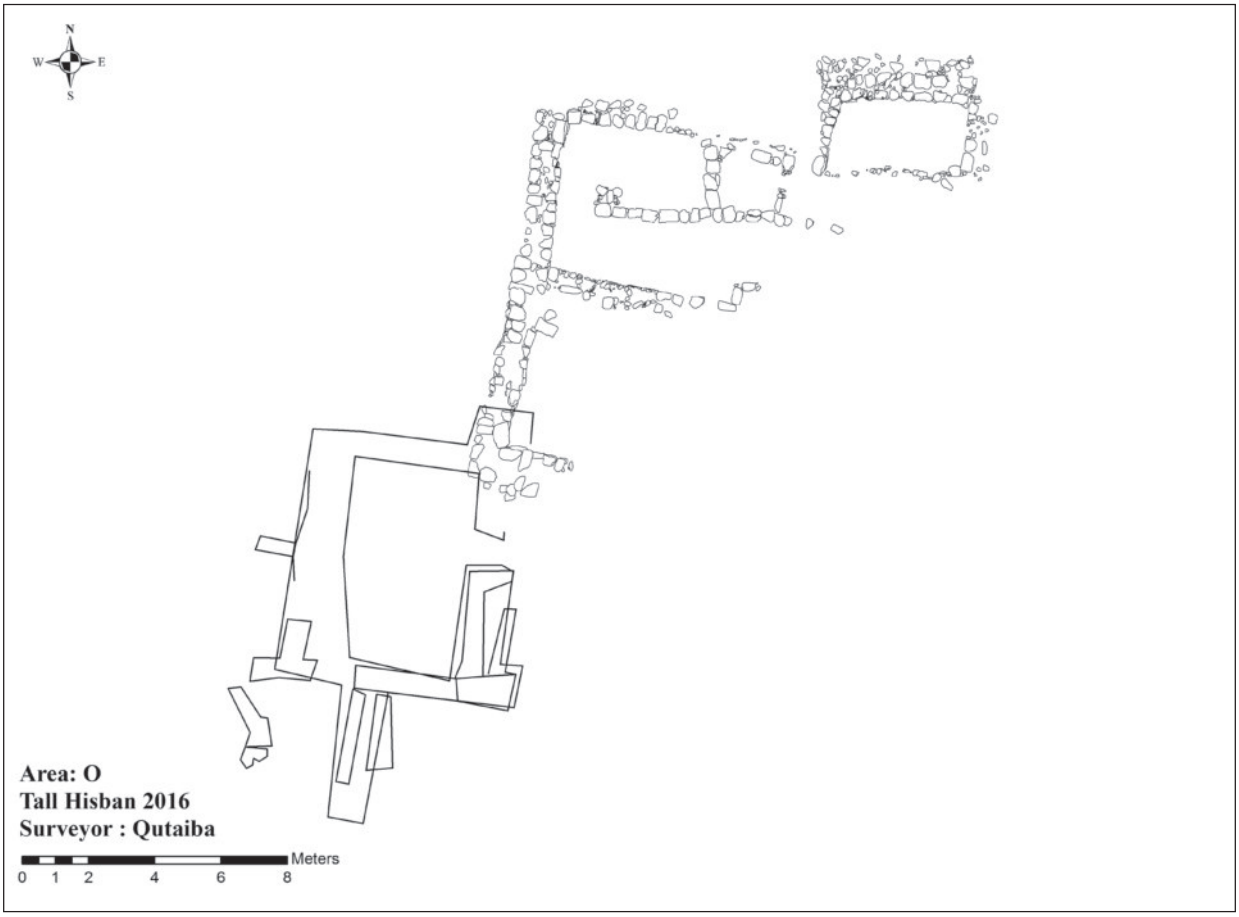
1. Plan of the archaeological site of Tall Ḥisbān and current fields of excavation (courtesy Qutaiba Dasouqi).

2. Panorama photo of Field C cluster of farmhouses in their topographical context on west slopes of the tell (courtesy Nicolò Pini, University of Cologne).

environmental project, developed over the last two seasons of excavations, in support of the study of diet and land use.

*Field O: Stratigraphic Report (based on report by Tarina Greer***; Fig. 3***)*

Field O is located on the undulating base



3. Plan of Field O farmhouse cluster (courtesy Qutaiba Dasouqi).

of the tell slope to the southwest, and has been excavated for a total of four seasons. In 2007, excavation began with the opening of four squares (105, 107, 109, and 110), which revealed two one-room structures (identified as farmhouses), built against one another. The season was largely devoted to clearance of vault collapse, though a beaten earth surface (Locus O5.4), representing the last phase of occupation in the southernmost house) was reached by the end of the season. In 2013, these same squares were excavated further, renumbered 5, 7, 9 and 10 (with the re-alignment of the site grid to true north), reaching the latest of the plaster floors (L. O10.14) (as the last phase of occupation in this building) and bringing part of the northernmost house into phase. During the 2014 excavation of Field O, three squares were re-opened, two in interior spaces (Squares O9 and O10) to reach foundation levels and better understand the complex's history of occupation and physical and spatial development, and one in the external courtyard (Square O.11). A cross wall running east-west (L. O9.26) was also uncovered, which divided the living space of the Mamluk farmhouse. Shallow channels (L. O10.41) were cut into the plastered floor (L. O10.14) of the space south of the wall, the function of which at the time was unknown. Several middens and hearths in the same floor were sampled for macro- and micro-botanical analysis (see discussion below). Excavations in the courtyard documented two cisterns and several beaten earth surfaces, identified with domestic activities conducted outside. The courtyard produced some of the highest concentrations of small finds (pottery, plain glass and glass bangles, metal fragments), suggesting that the courtyard was used for domestic disposal at a time contemporary with (and possibly after) occupation of the farmhouses.

In 2016, fieldwork in Field O continued in the same farmhouse complex, with the aim

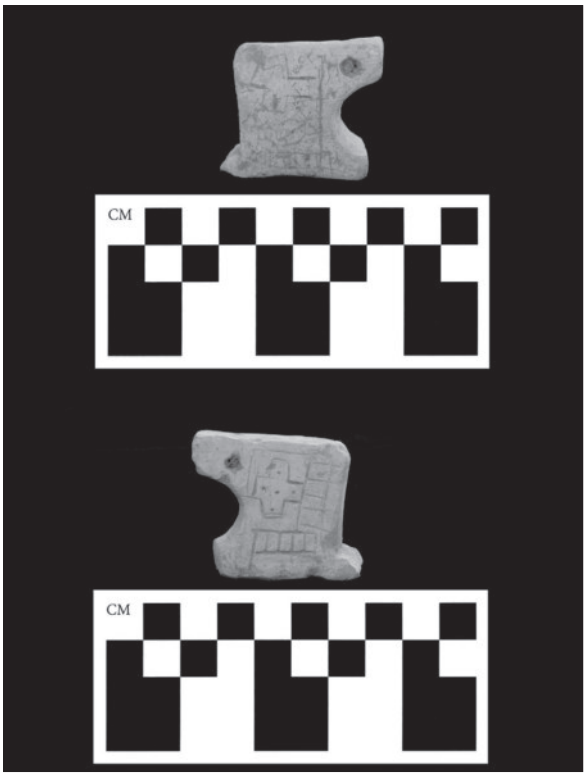
of securing dates for the original construction and documenting family structure and daily activities; through house arrangement, spatial division of activities, and use of courtyard space. Excavations were centered on the northernmost house of the complex in Square 14 (previously square 10 in the 2014 season), which uncovered the complete floor plan of the farmhouse in its latest phase of occupation. Excavations continued in the southeast corner of the square, which led to the uncovering of a second cross wall (L. O14.12), oriented north-south and abutting the east-west Wall O9.26 (of the old grid). This blocked off a small section of the house in its northwest corner. Here, the plastered floor in its last phase of use was covered with a flagstone pavement (L. O14.9) of large, roughly cut octagonal stones of purple-colored flint (locally procured) and soft limestone, seemingly recreating the kind of polychrome, marble flagstone floors of octagonal design popular in the public buildings in Cairo in the 14th century (**Fig. 4**). The contents of this "room" were quite unusual for the site: a heavy concentration of fine, enameled and lustered glass beakers and bowls (likely Syrian imports of the late 14th century, discussed below), along with a range of glazed vessels. As the contents of this room and the flagstone floor were sealed by vault collapse, this storage space represents a final phase in the use of this building before abandonment. In light of this evidence, it appears there were three phases of occupation (and building development) in the Mamluk period, as has been documented in other fields of excavation (and most clearly in Field M on the north slope of the Tall). During the last phase, sometime in the late 14th c. or shortly thereafter, the southeast corner of the room was cordoned off by a low wall and the floor paved, transforming the space into a storage area for fine tableware. At the same time, the living space of this house was divided into two by cross-wall O9.26, with the southern half of the house used for cooking and channels cut into the floor, possibly for carrying water to a cistern, though this is still unclear at this point. Together this may represent the same phase of short-term storage (and possibly brief abandonment), temporary reoccupation (possibly squatter occupation), and final abandonment as documented in Field B, dated to the end 14th century by the "jar burial" in B8.

4. Detail of flagstone floor in O14 storeroom.

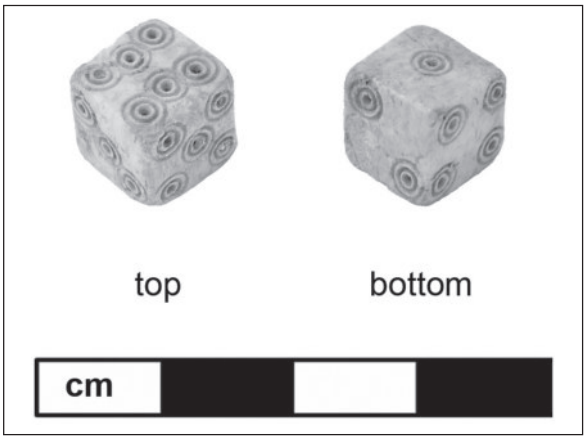
In Square 10, along the western wall of the same house (Wall O10.5 – old grid), a probe was excavated at the end of the season in an attempt to reach wall foundations, and to explore earlier and prior use of the Mamluk-era complex. The foundation trench was identified, and the founding deposit (L. O10.55) dated to the Abbasid period by the pottery. Wall O10.5 abuts and its courses interlock with the three other walls of this farmhouse, dating the original construction of the structure as a whole to the Early Islamic period. The clean reading of pottery from this locus, then, confirmed a pattern of occupation common for many site throughout Transjordan and Palestine: Mamluk reuse of Early Islamic ruins and revitalization of structures from the Umayyad and Abbasid periods in rural sites.

Square 13 (5 x 2.5 meters) was placed outside the west wall of the northernmost house, in order to explore the exterior spaces of the farmhouse complex opposite the courtyard. This square produced the heaviest concentration of pottery sherds (and many partially mendable forms), small finds, and palaeobotanical remains, suggesting its use as the primary midden of the complex. The ceramic assemblage was dominated by cooking vessels, tabun fragments, and storage jars (see ceramic discussion below). The midden was rich in fragments of metal tools related to agriculture, animal husbandry and household goods (for example, a hook, a horse-shoe, nails, and a kohl applicator), as well as lithics (worked and debitage). The midden also produced a rich deposit of charcoal, ash (in Locus 8.11. and

17), small bones, and teeth, which are now under study by the project phytolith specialist, palaeobotanist, and zooarchaeologist. Among the small finds in the deep fill of Loci 2-14 were an inscribed lamp, glass bangles, beads, coins, a glass-lamp fragment, and a ceramic chess piece (**Fig. 5a**). The chess piece was not the first gambling or game-related artifact found at the site, as a single die was recovered from Field B in 2011 (**Fig. 5b**). The chess piece appears to be a rook, although the form is irregular (Murray 1913: 767). On both surfaces



5a. Chess piece (rook) from Field O farmhouse in 2016.

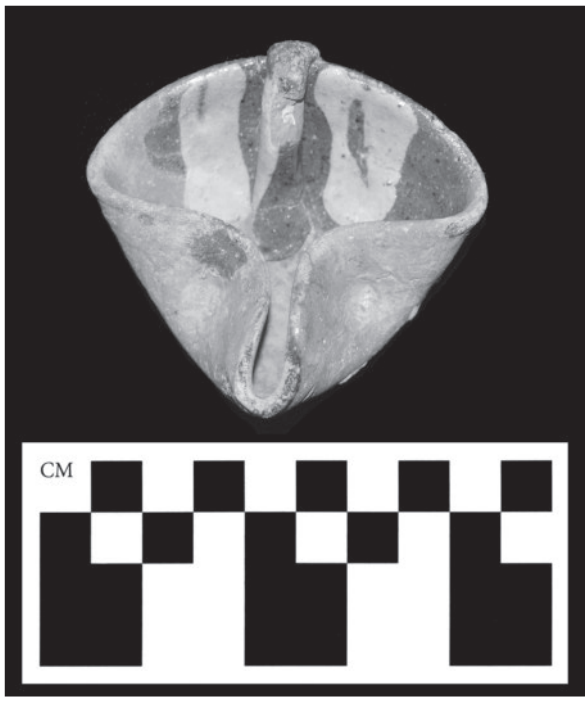


5b. Single die from Field B room in 2011.

are incised what appear to be gaming boards, but their function and meaning are not entirely clear at this point. Gaming pieces such as these are also known from Middle Islamic contexts at Khirbat Nuqayb al-Asaymir in the Wādī Feinan, where they have been attributed to the way miners spent their free time, that is, by gambling (Jones, n.d.).

To explore the space between the northernmost and southernmost houses in the farmhouse complex, an extension probe (Square 15, 5 x 2.5 meters) was opened south of Square 13, and the walls brushed clean of debris. During wall cleaning, a complete Mamluk-era slipper lamp was recovered from the wall, having fallen between the courses (**Fig. 6**). The east balk of Square 14 (the southern half of the northernmost house, excavated in 2014), was also partially excavated to understand the relationship of wall architecture between Squares 14 and 12. In the process, a wall (eastern half of O9.26) was uncovered that is shared between Squares 12 and 14, thus between the northernmost and southernmost houses. Wall O9.26, in its entirety, follows the same pattern of construction as all Mamluk-era constructions at the site: two faces with a rubble-filled core.

In order to further explore the changing



6. Pinched lamp (Slip-Painted Ware, Mamluk period) from Field O farmhouse.

patterns of use and disposal in exterior spaces, and to investigate the pathways that may have connected different neighborhoods of the medieval village, Square 12 (5 x 5 meters) was opened this season to the east of Square 14; in the courtyard outside and to the east of the northernmost house. Unexpectedly, excavations here revealed three new walls, one that extends from Square 10 and runs east (Wall O12.5), and two others (Walls O12.6 and O12.8), abutting one another and forming an additional room to the east of the northernmost house. Finds included include two coins (see below), glass bracelet fragments, and a concentration of lithic debitage; worked stone, and a core, as well as an entire camel scapula and a rather typical domestic assemblage of cooking and tableware of the Middle Islamic period. A series of beaten earth surfaces and thin plastered floors were uncovered at the end of the season. The function of what appears to have been an auxiliary room attached to the house in the courtyard has yet to be determined; however, in its latest phase (late Mamluk/Middle Islamic II) it appears to have been used for household garbage disposal.

After this season, the structure of the farmhouse complex in Field O is becoming clearer. Two one-room farmhouses are partially built against one another, with a narrow vaulted storage space in between them on the western side. They face a common open-air courtyard, sharing both the two cisterns there and the work space devoted to food preparation. The two houses have no direct access to one another. At some later time another structure, of yet unknown function, was built on the northern end of the courtyard. Domestic garbage was thrown into both the courtyard and the space outside the houses on their west side. All middens and surfaces have been sampled for faunal and archaeobotanical analysis, and this analysis is ongoing.

Field P: Stratigraphic Report (based on field report by Reem al-Shqour)

Excavations in Field P, located on the flatlands to the southwest of the base of the tell, recommenced this year, to further explore the large (9.6 x 6.2 m), one-room, single-floor, vaulted building with walled courtyard first uncovered in 2004 and 2007, and originally

7. Field P farmhouse at end of season, view northeast.

excavated as Field O (**Fig. 7**). This structure was dated to the Middle Islamic (Mamluk) period, with extensive renovations, rebuildings, and additions in the Late Islamic (Late Ottoman, 19th-century, "Tanzimat") era. Excavations continued this season in Squares 102 and 103 (the latter ending early in the season), with cleaning of Square 104 (located on the west side of the courtyard).

Square 102

This 5 x 5 m square is located on the northeastern side of the field. Part of it previously excavated in the 2004 and 2007 seasons, to the level of the lower fourth course of the north wall of the square. After cleaning the weeds and the collapse, we immediately reached a plaster surface (Loc.105 =Loc.112). The thick surface contains a significant amount of pottery, dated to the Late Byzantine/early Islamic periods, as well as tesserae, flints, bones, glass, a possible bronze cotter pin, and a glass bead. The north wall (P102.103) of the building was built on top of the plaster surface, suggesting that an earlier structure was demolished to build the standing structure that exists today.

Removal of this layer revealed another thick deposit (Loc. 124), comprised of compact soil with chalk and many irregular stones. The finds from this locus were ceramic, a few flint fragments, tesserae, one complete basalt pestle and an incomplete sandstone pestle. Below this (Loc. 125) was a soft fill of soil, with tesserae, glass, and pottery dating to the Late Byzantine and Early Islamic periods. We then opened a probe trench (Loc. 130) in front of the interior face of the south wall (Loc. 100) of the building, to locate the foundation trench. The

pottery was a mix of Late Byzantine and Early Islamic periods.

A preliminary assessment of the life cycle of this farmhouse, based on the archaeological stratigraphy and architectural phasing, is that a Late Byzantine structure stood on this site, which was replaced by another structure in the Early Islamic period (plaster floor Loc. 105, 112, and 115; bottom course of south Wall 100; Loc. 125). Most of the occupation dates to the Mamluk era (top courses of Wall 100, Wall 103). The building was abandoned for a lengthy period, and was then rehabilitated, reoccupied, and expanded in the Late Ottoman period, as dated by Palestinian gray chibouk fragments of the 19th century (upper three courses of Wall 100).

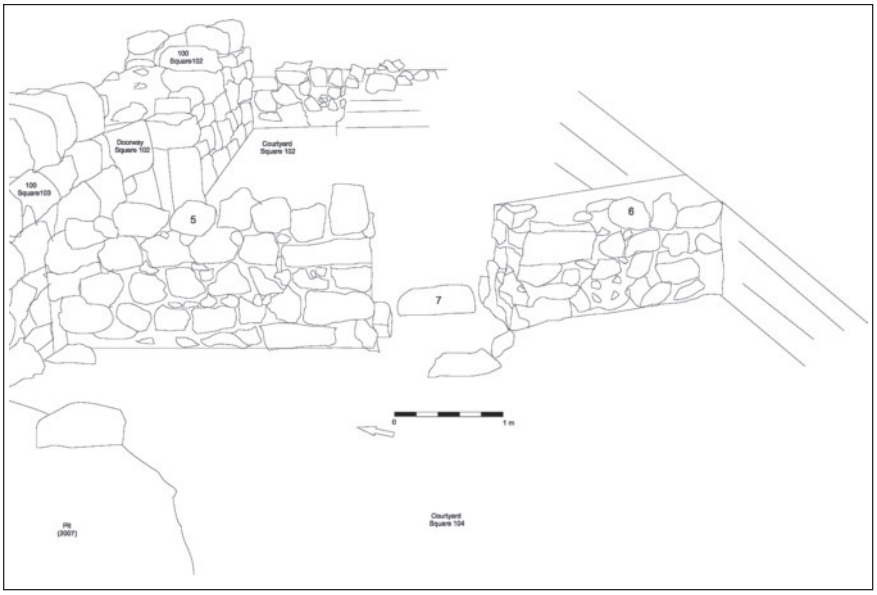
Squares 104 and 105 (Farm House Courtyard; Fig. 8)

These two 5 x 5 m squares are located to the south of Squares 102 and 103 (the farmhouse) and constitute the exterior, walled courtyard of the complex. This season they were only cleared of architectural collapse and interseasonal debris, and subjected to a study of architectural phasing; relating those phases to the stratified contexts revealed through excavation in the farmhouse interior. In Square 104 a wall (Loc. 5 north half, Loc. 6 southern half) divides the courtyard into two parts (possibly to create separate spaces for sheep/goats and chickens, as today). It contains a doorway and threshold (Loc.7). The east face of L. 5 continues under the south wall of the Mamluk-era farmhouse (Loc.100), while its west face was built against the same wall. Another small wall (Wall 8) was added at the same time to the south wall of the farmhouse (Loc. 103), connecting it to the western wall of the courtyard (Loc. 9). These walls were added at some point in the early Ottoman period.

Thus, the courtyard went through several phases of construction and development over the course of the Mamluk (Middle Islamic) and Ottoman (Late Islamic) periods. In its earliest phase, Wall 103 (the south wall of the farmhouse on the west side) was constructed; this building phase is represented today by the bottom three courses of the wall. At some point in the Early Ottoman era (*c*. 16th century AD) Wall 5/6 was built, with a doorway and threshold, dividing the courtyard into two halves. A small wall (Loc. 8) was also constructed, to connect the south wall of the farmhouse (Loc. 103) to the west wall of the courtyard (Loc. 9). In the late 19th century, three courses were added to Wall 100, as well as the well-cut facing of the doorway in the farmhouse's south wall and its threshold. It is likely that the west and east walls of the farmhouse were also rebuilt then.

Field M: Stratigraphic Report (based on field report by Aren LaBianca)

In 2016, the primary goal for excavation in Field M was to reach pre-Mamluk levels, and better understand the nature of the usage for the



8. Wall phasing in Field P farmhouse, view from courtyard to northeast (courtesy Adriana Gaspar, Institute of Archaeology, University of Bucharest).

parallel barrel-vaulted chambers which lined the slope during the 13th and 14th centuries AD. In order to do this, M8 was again reopened, and the midden exposed in 2014 (M8.9 and M8.13) was removed completely to expose earlier levels. As the season progressed, a new square, M10, was opened directly north and downslope of M8. This was done to allow for a probe that could verify if the "terrace" wall between M4 and M5 continued to run east into the north balk of M8 and the south part of M10. Finally, M4 was reopened, to allow for a balk trim of the north and east balks of the square, as well as the M4 balk stub. This was done in order to expose the south face of the "terrace" wall between M4 and M5, the west face of wall M8.3 which runs between M4 and M8, and the junction between the two walls, to determine the width of the vaulted rooms (after removal of collapse).

Square M8 (5m x 5m) is located downslope and northeast of the NE tower. Due to architecture and rubble in the balk, excavation was limited to a probe in the middle of the square. Excavation started by removing the remaining sections of plaster floor M8.8/15, which had been left between and on the north and south sides of the two parallel probes excavated in plaster floor M8.8/15 in 2014.

While removing the plastered floor, a pit (M8.17) of oval shape, with a length of 0.75 m N-S and a width of 0.42 m E-W was uncovered. The pit was filled with earth locus M8.16, and the soft, loose fill was completely sampled for archaeobotanical analysis. Based on the pottery found in the fill of M8.16, the pit appears to be contemporary with M.8.15. After removing plaster floor M8.8/15, M8.19 was excavated using a triangle-shaped probe in the southeast portion of the square, with a length of 3.27 m N-S and a width of 1.21 m E-W. M8.19 was a loose, soft earth locus, with large pockets of terra rossa and ash. At its thickest, the locus was 0.30 m deep, and was found to lie directly on bedrock. This layer clearly dates to the Mamluk period, although there is a dominance of late Byzantine and early Islamic pottery. This seems to indicate that the area around M8 was occupied in an earlier phase. Nine coins from the total of nineteen found at Tall Hisban in 2016 were found in M8, during both clean up and excavation.

The bedrock under M8.19 slopes slightly to the north. Wall M8.3 was built on bedrock in the south, but to the north M8.19 fills a space between the wall and the bedrock (**Fig. 9**). It seems most likely that the wall was built on bedrock all the way across the square, but that the upper courses of the wall shifted to the east during an earthquake, leaving the lower courses slightly recessed to the west. This has confirmed that the Mamluk-era vaulted chambers on the north slope were constructed directly on bedrock, likely removing earlier structures, as was the case with the possible terrace walls uncovered on the east slope in 2013.

The function of the vaulted building in this square is becoming clearer, with sampling of ashy pits and surfaces for archaeobotanical and faunal analysis (Walker *et al.* 2017b; Hansen *et al.* 2017). The many thin layers of plaster and ash, cut by middens and tabuns, have revealed repeated domestic activity (areas of cooking and replastering of floors). Noteworthy in this respect is the condition of the handmade pottery (Handmade Geometrically Painted Ware), which is distinguished from sherds of the same ware from contemporary deposits in other fields of excavation by its lightweight, extreme porosity, "cloudy" white film on surface, and pale green hue. Several conditions could account for this; absorption of salts by the vessel's fabric (salinity), long-term submersion in water, and repeated heating (Skibo and Schiffer 1987; Tschegg 2009; Tschegg *et al.* 2009)[3]. Salinity was eliminated as a factor in

9. Detail of Field M architectural stratigraphy – Mamluk wall on bedrock, M8 (on left) and wall shared by two vaulted rooms in M8 and M4.

3. A collaboratively written article on this phenomenon is forthcoming.

the erosion of the pottery in the M8 building through a conductivity test[4] It does appear that submersion in water played some role in the physical deterioration of the handmade jars in this building (see also faunal report below for evidence of standing water on the north slope). The north slope of the tall appears to have been hit hardest by earthquake damage, and the collapse of the heavy barrel vaults of the buildings here may have blocked the water channels which carried water away from the slope into the cisterns at the base of the hill. It is, however, a phenomenon that warrants further investigation.

During the last week of excavation, M4 (to the west of M8 and sharing a wall with its vaulted building) was reopened, to allow for cleaning and removal of parts of the north and east balks of the square, as well as the balk stub, to expose the west face of the east wall of the chamber found in M4, as well as the south face of the "terrace" wall found between M4 and M5. Balk removal revealed the NE corner of the barrel-vaulted room in M4, and that wall M8.3 was also the west wall for the chamber in M.4, and used to support barrel-vaulting. This, along with clearance of vault and wall collapse, clarified that the width of the vaulted chamber was approximately five meters, similar to the Middle Islamic vaulted farmhouses in Fields O and C. The vaulted chambers across the northern slope appear to have the same dimensions (5 x 7 m) as the farmhouses elsewhere at the site. They thus appear to be a series of vaulted structures, built one against another in a line across the slope, and all facing downslope to shared cisterns; in other words. the same clustering of structures noted in the other fields of excavation for the Mamluk period.

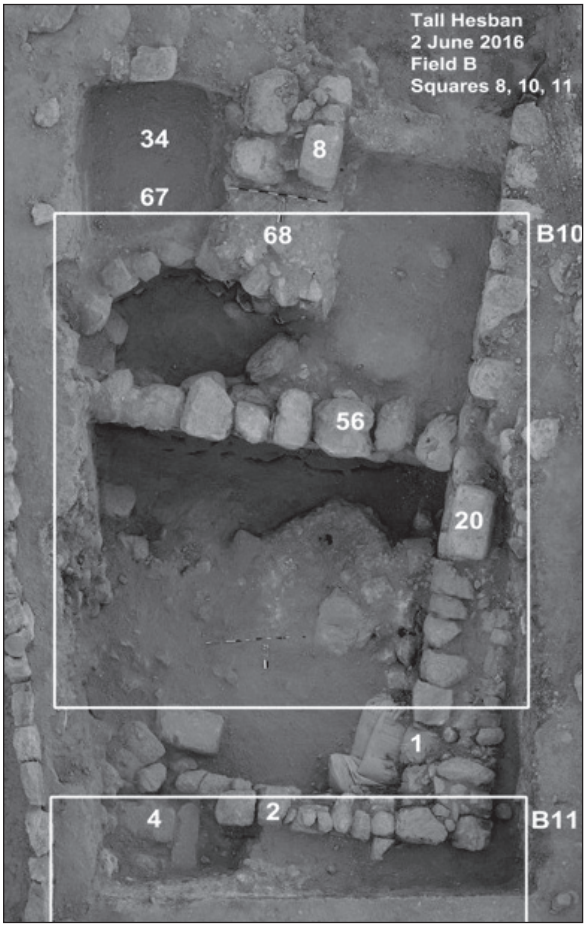
The excavation of Square M10 (5m x 5m), immediately north and downslope of Square M8, was essentially an extension of M8, and meant to investigate the space outside the doorway of this vaulted building. During excavation, an opening shaft into a chamber was found beneath fill rocks. The chamber was a rectangular barrel-vaulted room 5.03 m in length and 2.94 m in width. The orientation of the room was 338° NW, meaning that the chamber runs under squares M8 and M9. The three-pointed arch construction of the vaulting seems to indicate that the chamber may have been built in the Early Islamic period; however, based on stratigraphy and pottery findings elsewhere in the field, construction during the Byzantine period seems also plausible. A cave and cistern were linked to the barrel-vaulted chamber through a hole in the east wall of the chamber. A collection of surface pottery in the cave and cistern indicate that they were last in use during the Mamluk period. Due to the presence of a number of 20th century adult and infant burials in the barrel-vaulted chamber, after briefly mapping and photographing the space, the opening shaft was blocked off and covered with stones, and excavation of M.10 ceased.

Field B: Stratigraphic Report (by Robert Bates; **Fig. 10***)*

The Tall Ḥisban excavation returned to Field B in the 2016 season to explore the Byzantine and Mamluk architecture, and determine the nature and function of the Mamluk building. Some unanswered stratigraphic questions still remained from previous seasons; namely, the relationship between the Mid-Late Islamic pit (B8.44) on the south side of Square B8/10 and the Late Byzantine wall (B8.8) on the north side of the square. In addition, a Mamluk wall (B10.56) had been found in 2014, which may form the north side of a Mamluk building.

The field was initially opened in the 1970's, and then more recently during the 2011 and 2013-14 seasons. Several interesting discoveries have been made during these previous seasons in Squares B8/10. Two Late Byzantine walls and two Late Byzantine pits were found on the north side of the square, as well as a Mamuk wall and pit, which cut into the Late Byzantine structure on the south side of the square. A four-horned altar with a triangular shaped tenon joint

4. A conductivity meter is used to measure the salinity of liquids. A fragment of the sherd is soaked in de-ionized water for 24 hours, and afterwards the salinity is measured. The level of salinity was quite low. We gratefully acknowledge Yazan Abu Alhassan (Department of Engineering Geology and Hydrogeology, RWTH Aachen University, Germany), who generously conducted this test. We are also thankful to Hussein al-Sababha (PhD student, Islamic Archaeology Research Unit, University of Bonn) for making the arrangements for us.



10. Overview of Squares B8-11: final top plan juxtaposed on end-of-season photo.

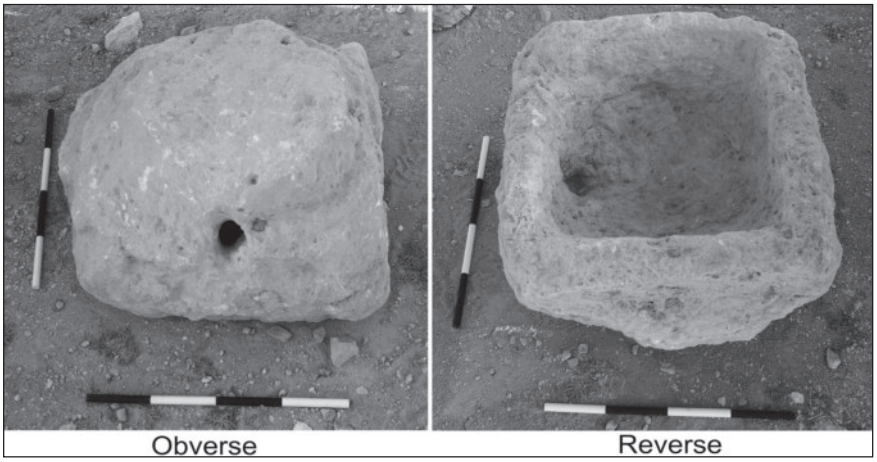
was found reused in the Late Byzantine wall (Walker *et al.* 2015; **Fig. 10**) while a globular-shaped jar and two late 14th century underglaze-painted jars, preserved in complete form, were found in the Mid-Late Islamic pit ("Pit #3") (**Fig. 13 below**). All three jars were sampled for residue analysis, and the results of that analysis are briefly discussed below.

Two squares were opened in Field B; Squares B8/10 and B11. A 2 x 5 m probe was opened on the south side of Square B8/10, to follow Wall 20 (B8.20) and expose the east wall of the possible Mamluk building. A 2 x 5 m probe was also opened in Square B11 to expose the east wall (B11.1=B8.20) and south walls (B11.02) of the Mamluk building as well. In addition, a 0.7 x 1.0 m section of Wall 8 (B8.08) was removed and the plaster foundation (B10.67) was excavated to clearly date the wall. The excavation and stratigraphic sequence for the Mamluk building (B10.56, B11.1=B8.20, B11.2) was complicated by recent restoration and preservation efforts on the site, and modern fill from previous seasons. Much of the soil that was removed contained large boulders, mixed soil and modern trash. Only two Field phases could be clearly determined through excavation; Field Phase 5b (Late Byzantine) and Field Phase 2b (Middle Islamic II/Late Mamluk).

A Late Byzantine period building phase was found in Square B8/10 during the 2013-14 seasons (Field Phase 5a). Wall 8 (B8.8) was made of double faced, medium-sized boulders and reused ashlar. It also contained a small four-horned altar and a fragment of a small pillar base. The wall was cut into by the Mid-Late Islamic pit (Loc. 42 – "Pit #3"). It was initially thought that during the construction of the pit the south side of Wall 8 was rebuilt, since it appeared that the stones lining the pit continued under the wall (see discussion in Walker *et al.* 2015). However, when Wall 8 was excavated this season, only Late Byzantine sherds were found in the wall and in the plaster foundation (B10.68) that supported it. It appears, now, that one stone of Wall 8 had shifted out of place (perhaps the result of an earthquake), and that it was incorporated during the Middle Islamic II/ Mamluk period in the lining of the pit that held the two glazed jars.

On the northwest side of Square B8/10 between Wall 8 (B8.8), a 1.1 m semi-circular pit, which cut into the *terra rossa* plaster floor (Locus 47), continued into the west balk and under Loci 6-7. The pit (B8.34 – "Pit #1") was excavated approximately 0.15-20 m in 2014 and approximately 0.08-0.12 m in 2016. The pottery in the pit consisted of Late Byzantine bowls, jars and cook pot sherds. A "*terra rossa*" colored, 10-12 cm plaster floor (B8:47=B10:67), which was cut by a later phase of Wall 8 (Loc. 8) and the two pits on the east side of Square B8/10, was removed and phytolith and floatation samples were also taken.

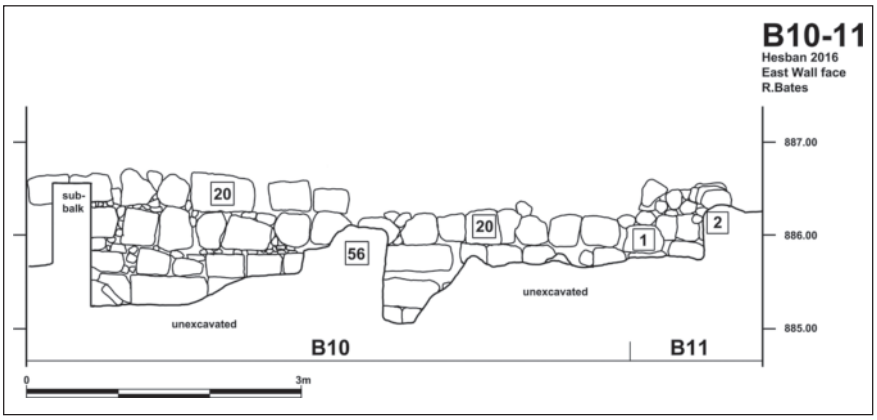
On the south side of Wall 56 (B10.56) in Square B10, a stone pillar base was found in the rubble during the cleanup (**Fig. 11**). The pillar base is made of hard limestone and is approximately 0.45 x 0.45 m in size. The base was reused, probably during the Byzantine period, as a baptismal font or for a similar



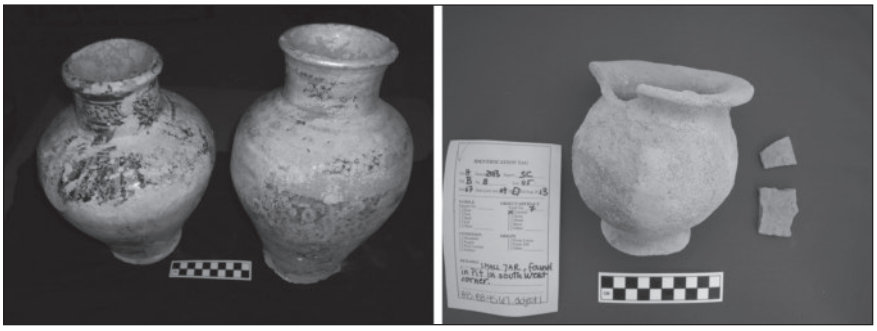
11. Pillar base reused in Wall B8.8.

purpose. The underside of the base was carved into a square shape, approximately 12-14 *cm* deep, with a hole all the way through on one side, which drained the water that was poured over the initiate. A similar reused pillar was found at the Mt. Nebo church, with a square hollowed-out pillar base and a similar hole on one side. This object may have been associated with the Byzantine church on the acropolis, and perhaps related to the four-horned altar found in the Late Byzantine wall (B8.8) on the north side of the square.

Three walls of a possible Mamluk building were found in Squares B8/10 and B11 (B10.56 north, B8.8=B11.1 east, B11.1 south; **Fig. 12**). In 2014, two wall phases were found in the north wall (B10.56) that transects Square B8/10 and abuts Wall 20 (B8.20). The south side of the wall appears to be faced, while the north side was left uneven and irregular. Two to three courses of 0.30-50 m x 0.20-25 m boulders and semi-hewn rough ashlar stones were exposed. The pottery that was sealed against this wall was a mix of Late Byzantine and Middle Islamic sherds. The east wall (B8.8) was founded on a soil layer above the Byzantine wall phase, and slightly overlapping its stones. This construction forms a north east corner of the possible Mamluk



12. Wall phasing of Wall 20, Field B.



13. Three jars in "Pit #3" in B8.

building and continues south along the east balk into Square B11 (B11.1). The south wall of the Mamluk building abuts Wall 1 (B11.1=B8.20) and is also made of medium sized, 0.20-0.45 m x 0.20-25 m boulders and some reused ashlar. Two courses are preserved, and the wall is doubled faced with a rubble fill. Wall 2 (B11.2) abuts Wall 1 (B11.1), and forms the south wall of the Mamluk building. It is made of a single row of dry stacked 0.15 x 0.20 x 0.25-0.40, medium sized boulders, and semi hewn or reused small ashlar. At least 1.5 m of the wall with four courses has been preserved; the east side leans 25 degrees toward the north. The top of another wall (B11.4) was discovered in the north east corner of Square B11 behind Wall 2, but further excavation is needed to understand its purpose.

Preliminary Conclusions

Following the results of the botanical reports (see below) there are a few preliminary conclusions that can be made to suggest the purpose and function of the rooms found in Squares B8, 10, and 11. Stratigraphically, the earliest structure in these squares is Wall 20 (B8.20=B10.20); it likely dates to the Byzantine period. Based upon the ashlar exposed on the west side of the east balk of Squares B8/10, it consisted of at least ten courses and stood approximately 2.5 m tall. How far the Byzantine section of Wall 20 extended beyond the later addition of Wall 56 (B10.56) remains uncertain until further excavation is completed. However, this early structure most likely collapsed or was abandoned until a Late Byzantine structure was built on top of its remains.

The upper part of Wall 20 was repaired in the Late Byzantine period and a new wall (B8.8) was added, dividing the space into two rooms. A later doorway was created when Wall 7 (B8.7) was also added on the west side of Wall 8. Several plaster surfaces were found. A terra rossa floor (B8.47=B10.67) on the west-side of Square B8/10 was cut into by a Late Byzantine pit (Pit #1, B8.34). This pit was subsequently plastered over several times, before the room was eventually abandoned. Between Walls 8 and 20 another plaster floor (B8.31) was cut into by a second pit (Pit #2, B8.27), that sealed against the west face of Wall 20. Unlike Pit #1, Pit #2 was not completely plastered, but may have remained active until the entire space was abandoned.

These Late Byzantine structures were abandoned sometime before 1350 BC (see ceramic report below), when the foundations for a Late Islamic/Mamluk north/south wall (B10.56) cut into the older building. Using the existing Wall 20 as its east wall, the Mamluk construction removed the south side of Wall 8, and dug into the preexisting Byzantine collapse or abandonment. As reported earlier, two phases of Wall 56 were discovered abutting Wall 20. A later construction phase extended Wall 20 (=B11.1) southward into Square B11 and added an additional north/south wall (B11.2) to enclose the space.

On the northwest side of Wall 56, an area was cleared out of the Late Byzantine abandonment to form a pit (Pit #3). Although not used as a cooking area (as was initially suggested), according to the environmental reports the earliest layers of this pit were likely devoted to kitchen waste or similar deposits. When the second and final phase of Wall 56 was built, the pit was likely reused as a temporary storage area that contained at least three whole vessels including two imported, handle-less, stonepaste jars and a small, handmade, globular jar, that was probably added slightly later but in the same period. The larger jars contained olive oil and the smaller a dairy product (see residue analysis in ceramics section below). It is unclear as to why the three jars were abandoned and additional refuse filled in over them, but the pit continued to be used as a midden. Four stones were later added to Pit #3, cutting into the abandoned Late Byzantine plaster floors in line with two stones from the base of Wall 8. The stone lining may have been built in conjunction with the small jar providing both a protected storage space and a later waste disposal area. The refuse pit continued in use until the Mamluk building was abandoned.

Additional excavation is needed to explore the extent of the Mamluk room formed by Walls 56 and 20 on the north and east sides, and Walls 1 and 2 (B11.1, 2) on the south side. Opening a square on the west side could possibly locate the entrance to the room and its west wall. Further excavation on the north side of Wall 56

in the area of Pit #2 might clarify the earlier Byzantine strata as well.

Reservoir Clearance (based on a report by Jeff Hudon)

Clearance of balk collapse and debris accumulation continued in the Iron Age reservoir this season, to expose the reservoir for visitors. Based upon safety concerns, work soon concentrated in a large rectangular probe, in order to expose a more modest, yet significant section of the plastered floor. Subsequently, clearance work began on the adjacent section of the reservoir to the north that abuts the Iron Age II header and stretcher ashlar eastern wall previously exposed during the 1970's, but later covered, assumedly with excavated fill from the reservoir.

However, because of the towering height and relative instability of the old western balk of Field B, we limited exposure of the reservoir floor to a large rectangular 2 m x 2.1 m x 2 m x 1.3 m probe. The plastered floor was reached and cleaned five meters below the lowest point in the eastern bedrock wall. To our surprise, the southern (1.3 m) balk revealed continuing stratigraphy from the western balk (Squares B10 and B11, see report above) and had not been previously excavated. Therefore, the probe apparently dissected the edge of the unexcavated portion of the reservoir from that part cleared during the 1970's. Balk trimming also revealed several layers of ash in the stratigraphy, providing an ideal opportunity to date the process of in-filling of the reservoir and relate it to larger site development. Consequently, samples were taken from the lower four of these for Carbon 14 dating, using the reservoir floor (879.107 meters) as a benchmark for measuring respective elevations[5].Work then transferred to the north eastern edge of the reservoir, where a trench was opened across the previously excavated part of the reservoir that abuts against the Iron Age II header and stretcher wall. The wall itself has badly deteriorated, due to its soft Senonian chalk composition and partial exposure over the last forty years.

Plans for future excavation of the reservoir fill abutting the header and stretcher wall will serve to expose more of this monumental wall. There are also plans for a raised "parapet" wall, comprised of stones from the reservoir, to be constructed around the edge of the site.

Material Culture

Ceramics (preliminary remarks by Bethany Walker)

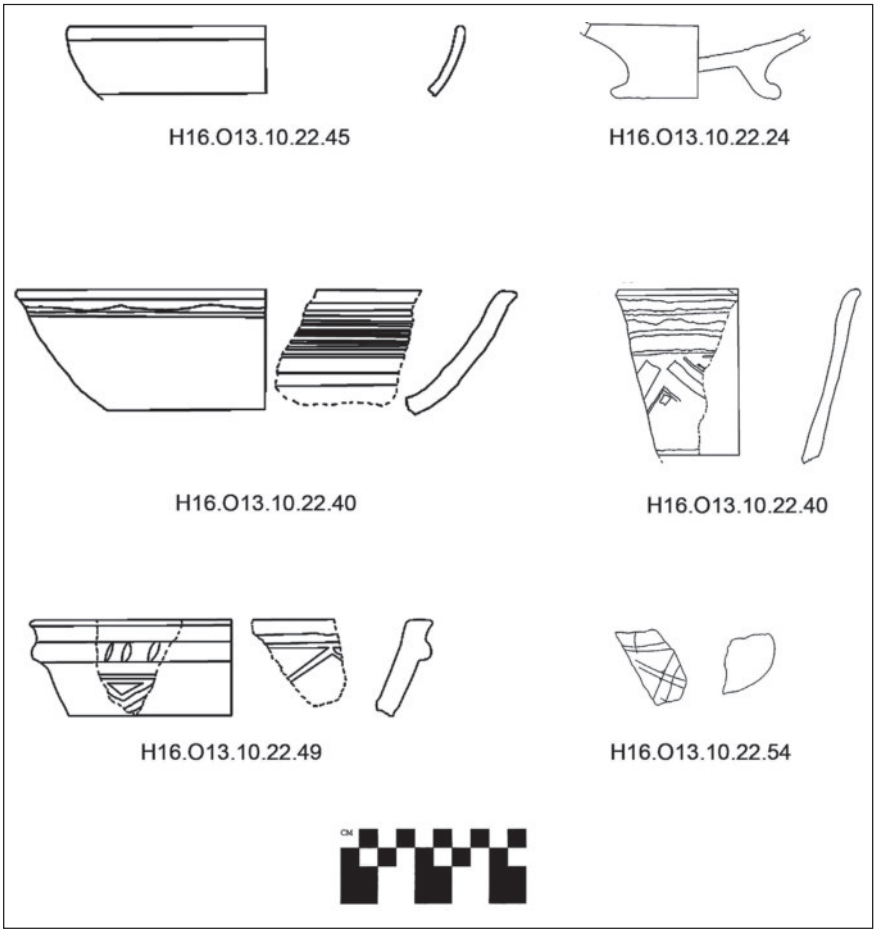
One of the most important ceramic discoveries is from the 2013 and 2014 excavation seasons, with the recovery of three complete vessels from stone-lined Pit #3 (Walker *et al.* 2015); (**Fig. 13**). The excellent stratigraphic association of a handmade jar (which would otherwise have been dated generically to the Middle Islamic or Late Islamic periods), together with two complete underglazed-painted stonepaste jars that are very well known Syrian imports of the late 14th century (Atil 1981: 171-174), secured an independent dating for the first time, based on stratigraphy rather than style, for the handmade ware. The pit also appears to be the key to understanding the function of the structure in B8/10 during the Mamluk (Middle Islamic II) period. As the purpose of the "jar burial" (if this was indeed what it was), was not obvious, care was taken to sample soils in such a way as to reveal the purpose of deposition. The contents of the two underglazed-painted jars were sampled by the zooarchaeologist, phytolith specialist, and macrobotanist, who all concurred that the contents were typical fill, the jars having remained open (without lids) for some period of time, and "buried" with soil. All three jars were sampled, as well, for residue analysis. The results of that analysis document that the small, handmade jar held goat milk, with evidence of fermentation and heating, and that the larger glazed jars held olive oil[6]. Handle-less jars of this form, usually attributed to Damascene production, were generally exported either as apothecary jars (and also found in Europe),

5. The C14 analysis underway at the Institut für Geologie und Mineralogie, Universität Köln. We are grateful to the efforts of Svetlana John for processing our many samples. The results are due in June 2017, which is not in time to be included in this article.

6. The residue analysis was done by Prof. Dr. Silvia Polla, A. Springer, and S. Weihe, Institut für Klassische Archäologie, Freie Universität Berlin. A full discussion of the residue analysis and its relevance for understanding building function will appear in Walker et al 2017a.

or used for the storage of grain or olive oil in household pantries (Atil 1981: 172). Although such jars were mass-produced, they were, nonetheless, rather pricey commodities, and their recovery from a rural site such as Ḥisbān raises many questions about the local economy and the nature of the settlement itself in the 14th century. The goat milk could be related to the production of cheese (as the jar exhibited signs of burning/cooking, and there was residue evidence for heating and fermentation) or *samneh*, which is a kind of very fatty butter made of milk and herbs, and which requires long hours of cooking[7].

While a comprehensive ceramic report is underway for publication elsewhere, a few comments should be made here about the nature of the Middle Islamic corpus recovered this season. The fortuitous identification of domestic middens throughout the site, together with their full excavation, makes it possible to describe in some detail the character of cooking ware, tableware, and storage ware used by a rural household in central Jordan in the Middle Islamic period (**Fig. 14**). The pottery recovered from the middens was dominated by cook pots, large handmade jars (both with and without painted design), and tabun fragments, suggesting a diet heavy in stews and bread. The decorative designs for the HMGP (Handmade Geometrically-Painted) vessels are remarkably diverse, while preliminary study suggests some degree of standardization of jar dimensions, for both small and large vessels. Dating handmade coarse wares with any confidence has been a nagging problem in the archaeology of Bilād al-Shām in the medieval Islamic periods. While traditionally based on surface decoration and a rough typology of forms (which reveal considerable regional diversity) stratigraphically



14. Representative pottery of midden outside farmhouse in Field O, Loc. O10.22.24 (profile drawings and plate courtesy of Robert Peitsch, University of Bonn).

7. Personal communication of 19 May 2017, with Maria Elena Ronza (based on interviews with residents of Wadi Musa). An alternative interpretation is that the goat milk represents a coating or sealant, as milk or milk fats have also been used in this way in the past (personal communication, Annette Hansen).

secure contexts are not that common. The series of plastered floors and beaten earth surfaces of the farmhouses at Tall Ḥisbān, as well as pits sealed by wall and vault collapse, many associated with charcoal, are very promising contexts for the stratigraphic separation of coarse wares, and dating by means independent of the pottery (through stylistic analysis) itself. This work is well underway, and the results will appear in the forthcoming ceramic report.

Numismatics (by Warren Schultz)

Twelve copper coins were found during the 2014 season. Five of these are at least partially identifiable in terms of issuing authority, four are poorly preserved but by fabric and trace inscriptions are likely to be from the Middle Islamic period; and three are illegible. Of the identifiable coins, one is a Byzantine *folles* of Justinian (r. 527-565), probably from the mint of Antioch, although the mint mark is effaced. One is Umayyad, with mint and date unknown. The final three date from the mid eighth/fourteenth century and are clearly Mamluk, with two from the reigns of al-Nasir Muhammad (693-694/1293-1294, 698-708/1299-1309, 709-741/1310-1341) and one from the second reign of al-Nasir Hasan (755-762/1354-1361). The Mamluk copper coins are types number 220, 257 variant, and 374 respectively, according to the system established by Paul Balog in his *Coinage of the Mamluk Sultans of Egypt and Syria* (New York: 1964).

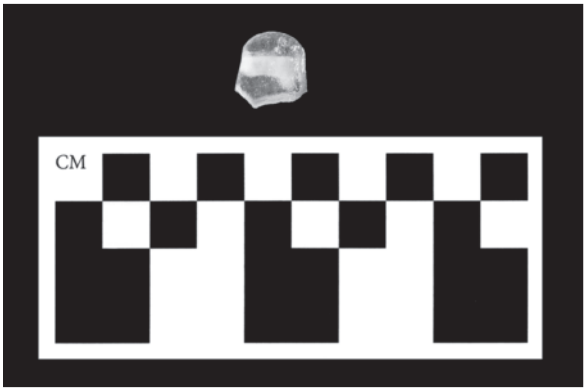
An additional 22 copper coins were excavated during the 2016 season. Seven of these are at least partially identifiable in terms of issuing authority, two are from the Middle Islamic period, while eleven are poorly preserved but have traces of Arabic and are thus Islamic coins, although their condition is so poor it is not possible to determine whether they are Early or Middle Islamic in origin. Two are broken and illegible, while one is a machine-struck, base metal token, and obviously a modern contamination. Of the partially identifiable coins, one is likely to be Roman, although its poor condition makes a more detailed identification difficult. Two are Umayyad, lacking mints or dates; one appears to be a mule, featuring two different reverse-type dies. The remaining four coins are Mamluk *fulūs*. The first of these possibly dates from the reign of al-Mansur Qalawun (678-689/1279-1290), and the remaining three from the reigns of his son, al-Nasir Muhammad. These last three appear to be of the same design (Balog *CMSES* 222-226) from Damascus, but their respective dates are either off-flan or illegible. The dates of the Mamluk coins found in these two seasons are in line with the Mamluk-era coins found in the Phase I excavations of Tall Ḥisban.

2014:

Item Number	**D(mm)**	**W(g)**	**Comments**
H–14–O–11–4/L –10N	30	13.74	Byzantine *folles*, pierced, Justinian, probably Antioch (mint mark is effaced).
H–14–O–9–14/E–41	15	4.27	Umayyad, but poorly preserved. No mint, no date. Reverse central inscription: *Muhammad / rasul / [Allah].* Obverse: *La ilah / illa Allah / wahdahu*. There are trace circular inscriptions surrounding the central field on both sides.
H–14–8–5/6–40	20	2.93	Mamluk. Al-Nasir Muḥammad, Balog *CMSES* type 220, Cairo, undated.
H–14–M–1–Cleanup/B–51	20	2.44	Mamluk.Al-Nasir Muhammad, Balog *CMSES* type 257 variant, no mint, no date.
H–14–O–11–5/E–11	21	2.85	Mamluk, al-Nasir Hasan, Balog *CMSES* type 374, Damascus, date missing but has to be 762 H.
H–14–B–2/4–B/T–33	16	1.10	Unidentified. Trace Arabic inscription. By fabric probably middle Islamic.
H–14–M–1–Clean up/B–59 1	3	0.57	Unidentified. Trace Arabic inscription. By fabric probably middle Islamic.
H–14–M–1–13–64	15	1.74	Unidentified. Trace Arabic inscription. By fabric probably middle Islamic.

H–14–M–1–clean up/B–51	16	2.34	Unidentified. Trace Arabic inscription. By fabric probably middle Islamic.
H–14–B–2-4–Balk/–46	12	1.73	Illegible, with flue or jewelry loop?
H–14–M–1–C–72	10	0.99	Illegible.
H–14–B–2/4–B/T–31	13	0.62	Illegible.
2016:			
Item#	**D (mm)**	**W(g)**	**Comments**
B2/4, pail 62	22	10.42	Possibly Roman. Corroded, but outline of a male bust facing left is visible on obverse. Traces of a design are visible on the reverse.
P102-109	19	2.39	Umayyad, unknown mint. See Illisch 1993: number 572, Plate 18.
007	14	1.76	Umayyad, unknown mint. This coin is a mule struck with two reverse dies. One side has reverse legend I and the other has reverse legend II as described in Illisch 1993: 8.
013	17	0.88	Early Mamluk, possibly Qalawun by combination of trace design, script, and light-weight fabric.
002	21	1.80	Mamluk, epigraphic, al-Nasir Muhammad, [Damascus], date missing, Balog *CMSES* type 222-226.
009	20	2.86	Mamluk, epigraphic, al-Nāṣir Muḥammad, [Damascus], date missing, Balog *CMSES* type 222-226.
014	20	2.97	Mamluk, epigraphic, likely al-Nāṣir Muḥammad, [Damascus], date missing, Balog CMSES type 222-226.
005	1.85	17x14	Middle Islamic. Reverse has two-line inscription in a thick script: *al-Malik* / …., with remains of a thick, linear, and scalloped border closely surrounding the inscription.
H07.0524	16x13	1.55	Middle Islamic, *al-sulṭān* clearly visible in *naskhī* script.
004	22	3.71	Unidentified. Trace Arabic, corroded, illegible.
001	18x15	0.76	Unidentified. Trace Arabic, corroded, illegible.
010	13	1.33	Unidentified. Trace Arabic , corroded, illegible.
012	19x20	2.71	Unidentified. Trace Arabic, illegible.
011	12x10	0.64	Unidentified. Trace Arabic, illegible.
013B	14	0.70	Unidentified. Trace Arabic, corroded, illegible.
015	18	1.19	Unidentified. Trace Arabic, corroded, illegible.
016	18	1.29	Unidentified. Trace Arabic, corroded, illegible.
017	23	3.43	Unidentified. Trace Arabic, corroded, illegible
H-16-O-10-12	16	1.75	Unidentified. Trace Arabic, illegible. Corroded with some copper sickness.
006	13	1.13	Unidentified. Possible trace Arabic, corroded, illegible.
027	x	x	Unidentified. Broken, corroded, illegible.
008	x	x	Unidentified. Broken, corroded, illegible.
003	21	3.38	Unidentified. Modern, machine-struck token, base metal, illegible, with 5 mm hole pierced near the edge.

Finally, there is one additional numismatic-related object of interest. The artifact is a fragment of small a glass disk first identified by Julian Henderson (**Fig. 15**). The object was found in a late 14th-century locus, placing it in a firm Mamluk context. It was weathered with a thin, iridescent pellicle which, when removed, revealed it was made of translucent green glass.



15. Glass weight from Field O farmhouse.

It has a slight rim on the exterior edge, likely produced when the molten glass was pressed with a stamp in its center, but the impression is not deep, nor is any inscription or design legible in what remains of the central impression. The reverse side is flat and unadorned, as is typical for these objects. As for stratigraphic context, the object was recovered in 2014 from a soil deposit (Locus O9.22.54) on a beaten earth floor, right under vault collapse, inside the Field O farmhouse described in this report. This represents, then, either the last period of occupation of the house (so a domestic context) or the immediate years of abandonment (as refuse), and before the roof collapsed. Therefore, it dates to the late Mamluk period (the late 14th *c*.). This object is likely a coin weight. While glass weights of a similar size have been found previously in Ḥisbān, they were from earlier Islamic contexts (Kritzeck 1976). As such, this object, along with one recently excavated in Aqaba, represent the first glass coin weights found in a clear Mamluk context from excavations in Jordan.

It must be stated, however, that these objects, commonly called jetons in earlier scholarship, do not have any specific legends or marks which identify them as weights. Rather, they have been assigned the function of coin weights by modern scholars due to a series of observations; chief among them that these jetons were produced to clearly identifiable weight units (such as the dirham or the *mithqāl*, or fractions and multiples of these units), while the coins from the same period were clearly not produced to any consistent weight standard. Mamluk silver dirhams from the first 150 years of the sultanate (1250-1400), for example, were minted at such irregular weights (individual coins can vary from less than a gram to more than seven and all points in between) that they must have required the presence of weights and balances to determine their value in any but the smallest of transactions (Schultz 2003a). The same holds for Mamluk gold dinars of the same period (Schultz 2000). Given that the vast majority of Mamluk coins found at Ḥisbān during the three phases of its excavation date from this same period (including the 1971 hoard of 66 dirhams of irregular weight) it is thus not surprising that we have found this fragment of a probable coin weight at the site.

When it comes to metrological evidence of the Middle Islamic period in the eastern Mediterranean, the general pattern is one of bronze weights being found in Bilād al-Shām, and glass weights in Egypt (Schultz 2003b)[8]. This observation seems to hold, whether we are talking about archaeologically-derived weights or those which entered institutional collections from the market. There is, however, one site where both glass and bronze weights have been excavated, and that is Aqaba. The glass weights found by Whitcomb at Aqaba were from Fatimid-era contexts (Whitcomb 1995: 36-37). Recently, however, al-Shqour identified a glass jeton from a 14th-century context during her excavations of the Aqaba castle environs (al-Shqour 2015: 409. Fig. 318). This object joins the one discussed above as the first two archaeologically-found glass coin weights from the Mamluk era in Jordan. The recovery of an object associated so intimately with the market structure of the time provides further archaeological evidence for the *suq* of the *madīnah* of Ḥisbān, attested to historically for the 14th century (Walker 2011: 71).

Glass (by Julian Henderson, with notes by Bethany Walker)

While fragments of glass vessels and bangles have been recovered from both the Citadel and the medieval village in previous seasons, this season's excavations produced an unexpected volume, not only of glass but very fine lustered and enameled glass, including those of imported beakers, from the Mamluk period. The quantity, quality, and find contexts (such as the special storage space of the farmhouse in

8. For more on the Middle Islamic bronze weights, not discussed here, see Holland 1986 and Goodwin 2012.

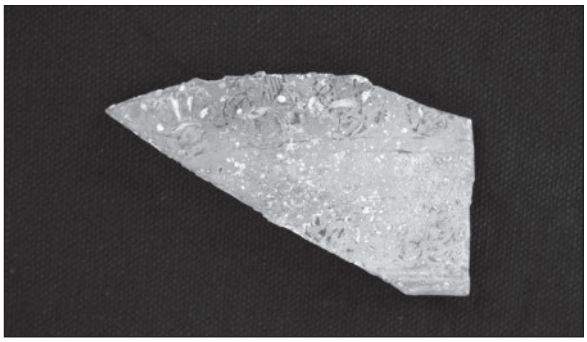
Field O, described above) justified a systematic study of this corpus, as part of the larger study of household material culture in the medieval village.

The glass was examined in March 2017 as part of a preliminary study. The bulk of the glass excavated in 2016 can be dated between the Byzantine (6th century) and Mamluk (namely 14th century) periods. Amongst the material examined are several fragments of tank furnaces, providing the first evidence at Tall Ḥisbān of glass production on the site. They are all quite small, and the glass attached to the remains of a brick is all of a pale green color and only slightly weathered. The color is more typical of Byzantine or late Roman glass; if it is all natron glass, this would suggest a date before the 9th century (Henderson 2013). If glass was worked on the site in the Byzantine period, perhaps these small fragments were discarded.

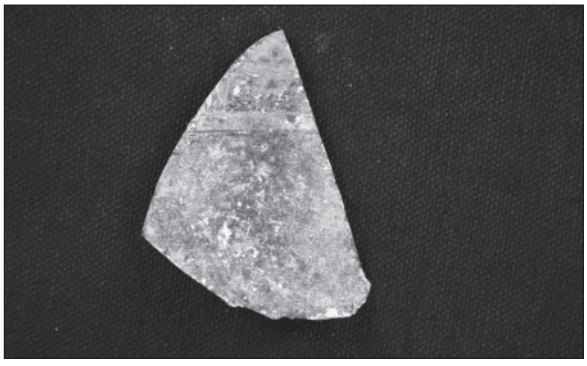
For an agricultural settlement, a surprising proportion of the glass examined is decorated; some would have a higher economic and social value than undecorated glass. It includes various fragments of marvered glass, trail decorated glass (often in contrasting colors) and unexpectedly high quality enameled and lustered glass in the form of beakers, bowls, and possibly lamps (**Fig. 16**). One fragment of enameled glass is decorated with a row of human figures (**Fig. 17**). Another, notably, bears a heraldic design with fleur-de-lys blazon and Arabic inscription, normally associated with Mamluk military sites (**Fig. 18**). Enameled, lustered beakers and bowls were the product of specialist urban workshops of the 13th and 14th centuries (Atil 1981: 126-131). Their recovery from archaeological sites in Jordan is very rare (if documented at all; see Dussart 1998), but comparable beakers have been recovered from Mamluk contexts in Israel (Amitai-Preiss 2004:181, and Pl.11.2, No.19; Jackson-Tal and Tal 2013). Chemical analysis of the medieval glass fragments is planned (by Henderson) for the coming year at the University of Nottingham labs to determine provenance, although it is likely that the enameled and lustered vessels were imports from Damascus.

In addition to these, there are single examples of cut glass; the remains of a glass token (see numismatic report above); and a number of undecorated pale green or colorless bowl, bottle, and lamp fragments. Much of the glass, including decorated glass, has a thick layer of

16. Misc. decorated glass fragments from 2014 and 2016 seasons.



17. Lustered and enameled glass bowl or lamp fragment from O14 storeroom, with registers of figural designs.



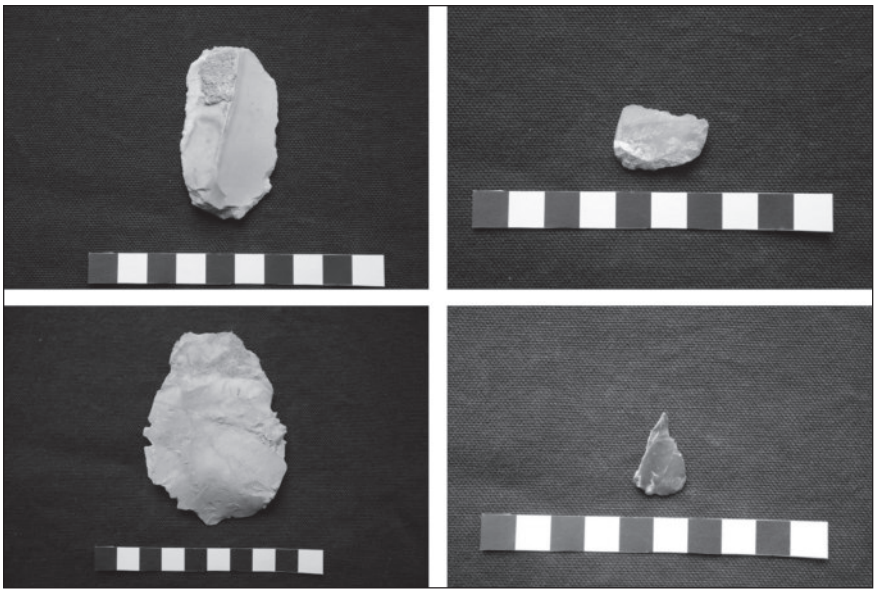
18. Lustered and enameled glass bowl or lamp fragment from O14 storeroom: with militarized design of fleur-de-lys blazon and Arabic inscription.

brown weathering, which is typical of plant ash glass, a type of glass which was introduced around the 9th century. This material, then, is likely to be Middle or Late Islamic in date. Such plant ash glass continued to be made until at least the 16th century in the Middle East.

Lithics (preliminary remarks by Bethany Walker; **Fig. 19***)*

Equally surprising this season was the recovery of concentrations of worked flints (retouched flakes, scrapers, borers, and points) and debitage from the Middle Islamic-era middens and courtyards of the farmhouses of Field O, suggesting flint-knapping in the Mamluk period[9]. While there are no published parallels for this technology for the medieval Islamic periods in Jordan, there is in Africa, the Gulf, and Iraq for the same period and until today[10]. The forthcoming final report on the British salvage excavations of Qara Dere and Eski Mosul in Iraq documents a simple chipped stone industry that was active in today's Iraq in the Early Islamic period, as well as the reuse of ancient flint tools to kindle fires (as "briquettes")[11].

While the study of the lithics has only begun, certain patterns are suggested. Wear patterns suggest that the tools were made in a haphazard fashion and perhaps used only once, for a domestic purpose. The cut marks on the animal bones recovered from the same contexts (analyzed by Dr. Chiara Corbino, see report below) were produced, unsurprisingly, by metal tools, though it is possible that flint scrapers, for example, were used to cut soft tissue, leaving no trace on the bones themselves[12]. In order to investigate whether worked stone tools were



19. Chipped stone fragments of flint (worked flakes, scraper, borer).

9. The readily available flint beds in this region of the Madaba Plains likely provided the raw material for these tools.

10. Explicit published references to flint-knapping at medieval Islamic sites are rare, though this might be more a reflection of neglect, rather than lack of material. Knapped obsidian and chert/flint have been recovered during excavations at the site of Harlaa (eastern Ethiopia) from 11th-14th C. AD contexts (personal communication of 24 May 2017, Prof. Timothy Insoll, University of Exeter, UK). For published references to chipped stone tools in Islamic contexts in Bahrain, see Insoll 2005: 333 and for Mesopotamia (modern Iraq), see Miller and Simpson (forthcoming). There is, as well, written documentation for flint-knapping among some groups in the central Sahara. Flint tools are used on occasion there even today (personal communication of 23 May 2017, Prof. Detlef Gronenborn, Römisch-Germanisches Zentralmuseum, Leibniz Research Institute for Archaeology; University of Mainz, Germany), as well as in Iraq (flint-mapping documented by Warsaw University in the 1980s; Miller and Simpson, forthcoming).

11. We are very grateful to Dr. St John Simpson (Department of the Middle East, British Museum) for so generously providing access to the lithics chapter from the monograph's manuscript. Many Early Islamic historians and travelers also attest to this industry: al-Jahiz (d. 868/9, lived in Bosra), who described use of worked flints for briquettes), the Persian traveler Nasir-i Khusrawi, who writes of the flint markets of Basra in the 11th century (citing references in Miller and Simpson, forthcoming).

12. Chipped stone was also believed to provide a ritually pure cutting edge for knives and scrapers, appropriate for circumcisions, as well as khilāl butchery (references in Miller and Simpson, forthcoming).

used to process plants for cooking, we plan phytolith and starch analysis this coming year.

Specialists' Reports – Environmental

In 2013 a coordinated sampling strategy was developed for zooarchaeological and archaeobotanical analysis, along with ongoing analysis of medieval Arabic texts, in order to systematically and carefully investigate changes in diet, land use, and environmental conditions at the site (both Citadel and village) over its history of occupation. The samples taken in 2016 come mostly from middens, surfaces, and hearths in the current fields of excavations (B, M, O, and P), as well as the remarkably well preserved Byzantine-Mamluk farmhouse in Field C, excavated at the base of the western slope in 2004 and 2007 (**Fig. 20**). The preliminary results of this analysis appear below.

Zooarchaeological Report (by Chiara Corbino)

Introduction

In 2016-2017, faunal analyses on the material from Tall Ḥisbān focused on the animal remains from the village surrounding the citadel. These were recovered from different fields: C, M, O and B. The analyses also focused on selected periods, i.e. Byzantine, Early Islamic and Mamluk; such a diachronic approach aims to assess changes in human-animal interactions through time.

Materials and Methods

The archaeological investigations carried out in the village demonstrate long-term occupation of the site. Some areas (fields) were inhabited during more than one of the selected periods. In order to avoid problems related to contamination and redeposition of bones (Albarella 2016), a selection protocol for identifying the most suitable contexts was applied. Only faunal remains collected from

20. Doorway of Byzantine-Mamluk farmhouse in Field C.

loci which have been confidentially attributed to one of the chosen chronological periods (according to their physical location and/or for the unambiguous dating provided by the archaeological finds) have been included in this study. The accurate selection of well dated contexts aims to obtain reliable results for each period.

The animal remains analyzed here come from the loci listed in Table 1. Fields B and M showed some features that have been dated to the Byzantine period. A house was set in Square B8, while some walls were identified in M4. A few sealed Early Islamic contexts come from Field C. A midden related to the Early Islamic period was identified in Square C102. Faunal remains dated to the Mamluk period were recovered from contexts located in Fields C, M and O. These areas show remains of Mamluk structures probably associated with domestic activities. The animal bones from Field C were collected from Square 102. Probably, C102 was a kitchen during the Mamluk period. All the analyzed remains come from contexts related to the use of the kitchen itself. The animal remains collected from Field M come from Squares 1 and 8. Those from M1 belong to a midden located just outside the acropolis

Table 1: List of the Ioci Selected for Zooarchaeological Analyses by Period and Square.

	List of selected loci by field/square						
	B8	**M4**	**C102**	**M1**	**M8**	**O9**	**O10**
Byzantine	34-35 and 38	23 and 27					
Early Islamic			19-21				
Mamluk			12-13 and15	10-13	5-8	9-10	13

walls (next to the north-east corner tower). The pottery collected, together with the animal remains, indicates that this dump originated during the Middle Islamic period. M8 was a narrow vaulted chamber dated to the Mamluk period. Square 9 from Field O is probably the courtyard of a Mamluk house, while O10 is a barrel-vaulted Mamluk farmhouse.

The identification of faunal remains relied on atlases and comparisons with complete modern specimens of the LaBianca bone reference collection preserved in Madaba (Jordan), and with the skeletons of the mammal collection of the Koenig Museum in Bonn (Germany)[13]. The relative taxonomic and skeletal element frequencies were based on the NISP (Number of Identified Specimens). Long bone epiphyseal fusion (Reitz and Wing 1999) and tooth eruption and wear (Grant 1982) were used to assess the age at death of some species. Tooth ontogenetic ages were obtained adapting Grant's (1982) wear-scoring technique to Payne's (1973), following Greenfied and Arnod's (2008) schemes for sheep/goat.

Table 2: NISP Frequencies for the Byzantine Period.

Byzantine period	B8		M4
Taxa	NISP	%NISP	NISP
Pig/wild boar	4	24%	
Sheep/Goat	9	53%	
Chicken	1	6%	
Pigeon	1	6%	
Rodent	2	12%	
TOTAL	17		0

Results:

In total, 1962 bone and tooth fragments have been analyzed from the village. Only 22% of these, corresponding to 429 fragments, were identified to species level.

Table 3: NISP Frequencies for the Early Islamic Period.

Early Islamic period	C102	
Taxa	NISP	NISP%
Dromedary	1	2%
Cattle	5	8%
Sheep/Goat	41	69%
Chicken	9	15%
Parrotfish	3	5%
TOTAL	59	

Tables 2, 3 and 4 show the NISP frequencies of the taxa for the considered periods. The majority of the identified remains are dated to the Mamluk period. The Byzantine (**Table 2**) and Early Islamic periods (**Table 3**) are represented by very small samples, which cannot provide statistically significant results. However, they do seem to suggest some possible trends in the exploitation of taxa through time.

Domestic species are the most abundant in all periods. Sheep/goats dominate both the Byzantine and the Early Islamic periods, although their presence increases through time. Remains of swine decrease while dromedary and cattle appear in the Early Islamic sample. However, their absence in the Byzantine period is likely to be related to the small sample size. Chickens were consumed at the site during both the Byzantine and the Early Islamic periods; although they probably began to play a major role only since the latter period.

NISP frequencies illustrate that the inhabitants of the village also relied principally on sheep/goat in the Mamluk period. Remains from this taxon have been collected from all fields. In general, it represents about 67% of the samples of each square. When it was possible to distinguish between the two species, goat occurred more frequently than sheep. This is probably due to the fact that goat is more adaptable than sheep to semi-arid environments. However, the sheep/goat proportion in the Ḥisbān assemblage appears in line with the general trend of the Mamluk period. Indeed, other Mamluk faunal assemblages located in Jordan show goat frequencies higher than those of sheep in terms of NISP (Brown 2016). Ontogenetic data about sheep/goat were provided only by the M1 sample. Adult individuals (one of 3 years and one 4-6 year old) dominate the sample, although a 2-5 month old animal indicates the consumption of meat from juvenile animals.

Low frequencies of pig/wild boar have been recorded from C102, M1 and O9. It is likely that a small Christian community was still living in the village during the Mamluk period. Indeed, Madaba, a well-known city in Jordan for the presence of a large Christian community,

13. We are grateful to Jan Descher (curator of the mammals section) and Eva Bärmann for granting access to the mammal collection of the Koenig Museum in Bonn.

Table 4: NISP Frequencies for the Mamluk Period.

Mamluk period	C102		M1		M8		O9		O10	
Taxa	NISP	%NISP	NISP	%NISP	NISP	%NISP	NISP	%NISP	NISP	%NISP
Horse					2	5%				
Donkey					2	5%				
Pig/wild boar	4	4%	2	1%			1	17%		
Cattle	1	1%	8	3.5%	4	11%				
Sheep/Goat	60	67%	140	65%	26	68%	4	67%	2	100%
Sheep			2	1%						
Goat	1	1%	3	1%						
Gazelle	1	1%	2	1%						
Ibex	1	1%								
Ibex/Bezoar			1	0.5%						
Cat	1	1%								
Cape hare			2	1%						
Chicken	14	16%	51	23%	3	8%				
Chukar			1	0.5%						
Pigeon			1	0.5%						
Barn swallow					1	3%				
Emberiza sp.							1	17%		
Parrotfish	7	8%	1	0.5%						
Shell			1	0.5%						
Toad			1	0.5%						
Rat	1	16%	1	0.5%	4	11%				
TOTAL	**90**		**217**		**38**		**6**		**2**	

is located a few kilometers away from Ḥisbān. Chicken remains occur only in C102, M1 and M8. In particular, M1 shows the highest frequencies compared to the other samples of the same period (**Table 4**).

Wild species were quite rare in the village. The few remains of gazelle, ibex and hare indicate that, although hunting activities and game meat were probably a prerogative of the elite, the commoners living in the village also occasionally included this high-status meat in their diet. It is not possible to assess whether the carcasses of wild species were acquired as a luxury product, or whether the local peasants sporadically engaged in hunting activities (Brown 2016). Therefore, in this case, the scarce evidence available cannot be used to infer the consumption of high-status products in the village.

Chukar partridge and pigeon are the only wild birds identified, which probably played a minor role in the local diet. They only occur in the M1 sample, and were probably only occasionally consumed by the villagers. The presence of barn swallow and *Emberiza* sp. is most likely not related to anthropic activities.

The few remains of parrotfish suggest economic links with the Red Sea region. Zooarchaeological evidence indicates that, in the Mamluk period, the presence of this taxon decreased drastically from the diet (Brown and Reilly 2016).

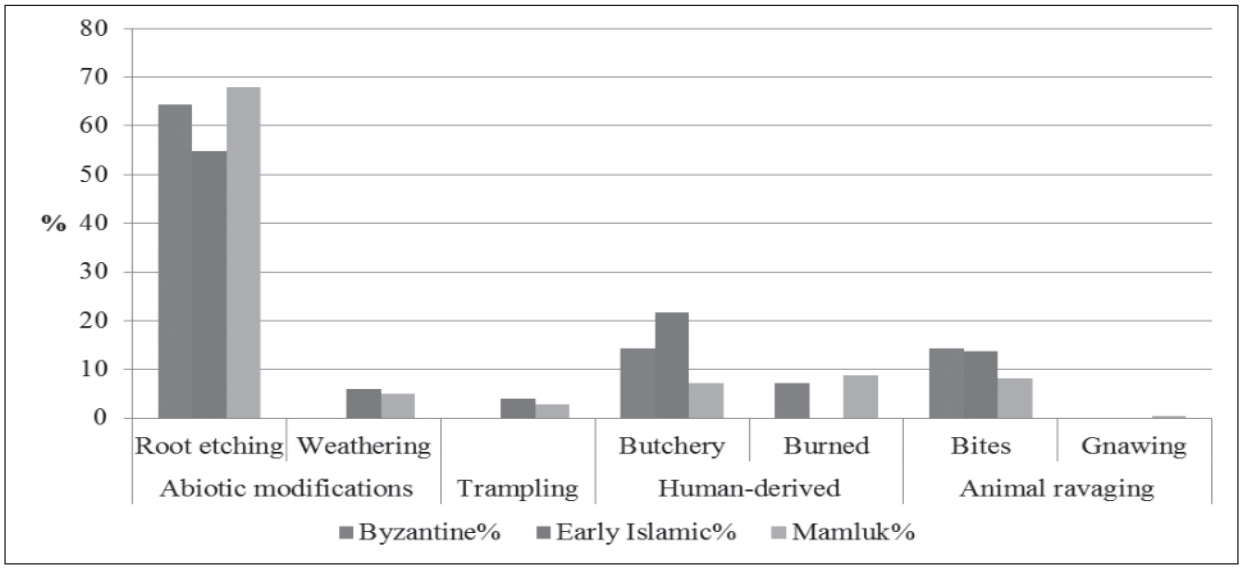
The presence of toad and rat remains is considered a natural occurrence. The archaeological data indicate that there was a leak in the water system nearby the M1 area in the Mamluk period (see discussion above in stratigraphic report on Field M). The presence of water would have certainly attracted toads.

The bones analyzed display a wide range of modifications, which include root etching, weathering (Behrensmeyer 1978), trampling, butchering marks, burning, bites and gnawing (**Table 5**). Overall, the material is very fragmented and heavily damaged by root etching and animal ravaging.

Conclusions

The analysis of faunal remains recovered from the village of Ḥisbān disclosed some

Table 5: Relative Frequencies of Post-Mortem Modifications by Period.



general trends on animal exploitation from the Byzantine era to the Mamluk period. A considerable decrease in the occurrence of pig/wild boar remains was recorded through time. This seems to correspond with an increase in sheep/goat and chicken frequencies. The introduction of Islamic dietary rules affected in part the meat diet of the inhabitants of the village at Tall Ḥisbān. Changes in the consumption of some animal species reflect religious and socio-cultural needs that are well represented in the faunal remains recorded at the site.

Furthermore, some suggestions about the use of space in the Mamluk village could also be inferred. Interesting results were obtained from the M1 sample for the Mamluk period. A higher variety of wild species and a higher chicken frequency, compared to the samples from other contexts of the same period located in the village, likely indicate that the midden located in M1 contained also waste from the citadel.

This study aims to reconstruct differences in the villagers' diet through time. Future research will focus on investigating the connections between the elite set in the citadel and the local population at Tall Ḥisbān.

Phytolith Report (by Sofia Laparidou)

Introduction to the Datasets

This preliminary dataset consists of eight samples that have been processed, counted, and analyzed for phytoliths. The samples derived from Square B10, as it was excavated during the 2014 season. Sample B10.52.71 comes from an ashy area immediately adjacent to the underglazed-painted jars excavated from Mamluk Pit #3 in Square B10. Sample B10.53.73 is soil taken south of Pit #3, deposited through the process of deposition of garbage/kitchen refuse. The pottery in this context is mixed, but the latest sherds are Mamluk, dating the period of deposition. Sample B10.48.67 represents the contents of Pit #3. While pottery is also mixed in this context, it is heavily Late Byzantine and Mamluk. The Late Byzantine sherds represent the soil layers before the pit cut through the Late Byzantine wall (B8.8), and the dominant Mamluk sherds represent the most recent period of deposition. Sample B10.49.69 was the ashy soil at the top of Pit #3. Although the pottery is mixed, as was the case in Pit #3, the Mamluk pottery was the latest and most dominant. The deposit is likely late 14th century, dated by the underglazed-painted jars found in the pit. Sample B10.52.71 was the fill from the middle of Pit #3. Although its pottery was also mixed, most of the sherds were Mamluk as well.

For every sample, a minimum of 200 single-cell and 100 multi-cell phytoliths were identified, under a light transmitted microscope, at x50 magnification. These samples are representative of all contexts from the fill layers from Pit #3, but additional samples have yet

Table 6: Sample Numbers and Context.

Sample Number	Date	Context
B10_l49_p69	14th century	Ashy context, top of Pit #3
B10_l49_p69	14th century	Next to ashy context, top of Pit #3
B10_l48_p67	Late Byz-Mamluk	Content of Pit #3
B10_l52_p71	Late 14th century	Fill from the middle of Pit #3
B10_l52_p71	Late 14th century	Fill from the middle of Pit #3
B10_l53_p73	Mamluk	Soil take south of Pit #3
B10_l48_p67	Late Byz-Mamluk	Fill from Jar1, found in Pit #3
B10_l48_p67	Late Byz-Mamluk	Fill from Jar2, found in Pit #3

to be processed for a complete analysis of the Pit #3 phytoliths. As an assemblage, they could give a general reflection of the plant content of the different layers of this pit and the state of preservation of phytoliths within their contexts. However, these initial processed samples do not as yet provide a definitive interpretation of the use of Pit #3. A complete picture for direct interpretation of the results for each context will be given after more samples are processed and analyzed from the same contexts. This analysis is a preliminary result, which gives an initial reflection of the spatial trends and an initial working hypothesis.

Identification and Quantification

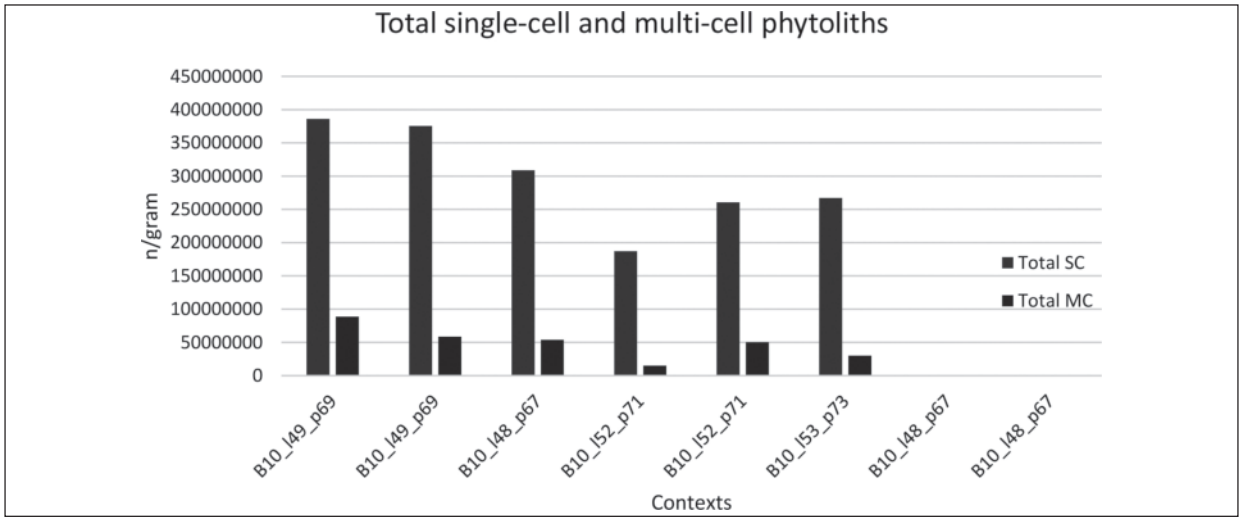
Identification was attempted at plant family and subfamily levels for single-cell and multi-cell phytoliths, while identification down to genus was made for multi-cell phytoliths of wheat and barley, when possible, based on specific morphological criteria of cereal husk multi-cell phytoliths (Rosen, 1992). More work needs to be done for the identification of multi-cell phytoliths present in the samples, and many multi-cells await confirmation. Absolute counts of phytoliths per gram of sediment were used to make possible comparisons between samples.

Preliminary Results

Preservation and Total Morphotypes

For graphic representation of data, the number of phytoliths per gram of sediment was used (n/per gram). The total counts of single-cell and multi-cell phytoliths in every sample are presented in **Table 7**. All samples included phytoliths common to most grasses, such as hairs, leaf/stem long cells, rondels or bilobes. Grasses, sedges and palms were the monocotyledonous plants present in the samples, while all samples were rich in dicotyledonous plant phytoliths as well (**Tables 14 and 15**). However, grasses were abundant, as well as Cyperaceae plants (**Tables 8 and 9**).

Table 7: Total Phytoliths Per Gram of Sediment.



In total, phytoliths were well preserved in most of the samples analyzed, and only the samples derived from the interior fill of the jars found in Pit #3 were low in phytolith counts. Pits are regarded as refuse areas and/or storage areas, thus a high recovery of phytoliths was expected for Pit #3 and confirmed after the analysis of the phytolith samples. Phytolith densities were lower in the samples from the fill in the jars. Regarding the latter, the fill may not have been an in-situ deposition, thus representing primary refuse.

Sample B10.49.69, which derived from an ashy deposit, was more likely a primary direct deposition of the plants in use at that time. Sample B10.53.73 is more likely to represent secondary refuse, as the pottery in this context was mixed, dating from the Byzantine to the Mamluk period. Samples B10.48.67 and B10.52.71 were likely a primary deposition of the plants used at that time. Sample B10.52.71, which derived from the earth directly below the pottery sherds, represents, likewise, a primary deposition.

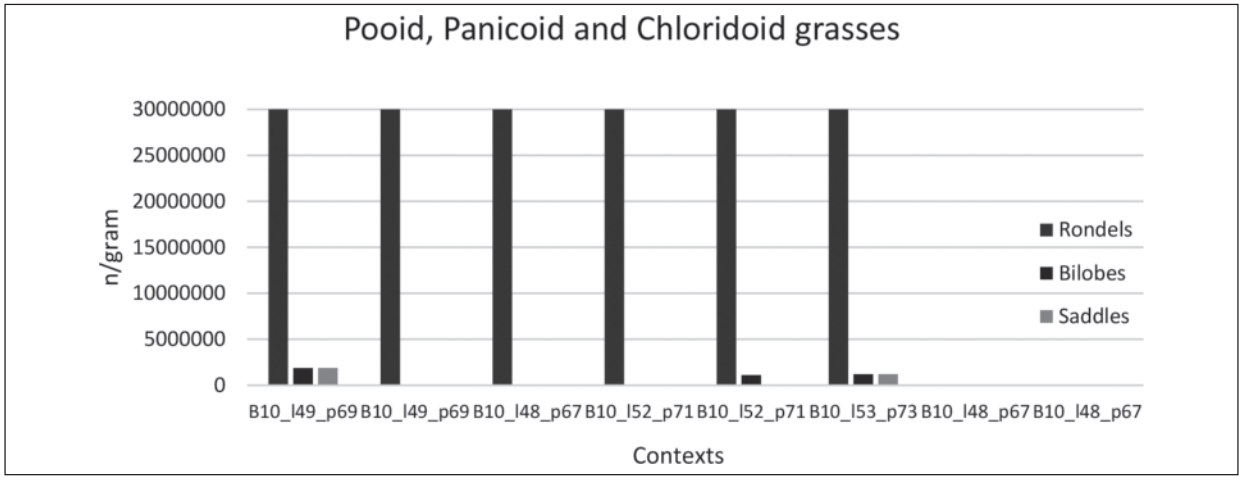
Grass Subfamilies: Single-Cell Phytoliths

Different morphotypes of phytoliths are formed in the three different Poaceae sub-families (Pooideae, Panicoideae and Chloridoideae). In general, Pooid grasses, which are C3 plants, are indicative of cooler, more arid conditions and produce rondel-shaped short cells; they could be indicative of temperate plants like wheat and barley. However, rondel-shaped short cells could be produced by Panicoid grasses also. Panicoid grasses grow in warm, wet, humid environments and produce bilobes and cross-shaped phytoliths. In addition, some Panicoids live in cooler, drier habitats. Chloroideae, which indicate dry land grasses and warm, dry habitats, create saddle-shape short cells (Twiss, *et al*, 1969, Twiss, 1992, Piperno, 2006). However, *Phragmites*, which is a reed grass that grows in marshy areas, also produces saddles.

The graph below documents that the dominant morphotype in all samples of this primary analysis was the rondel-shaped phytolith, indicating the predominance of Pooid grasses in all contexts. In general, this data suggests cool temperatures and humid conditions (Twiss, 1992; see **Table 8**). However, agricultural crops could have influenced the results. Wheat and barley, according to phytolith evidence, were important cultivated crops in Tall Ḥisbān (Laparidou and Rosen 2015) during the periods of study. Thus, the presence of cereal inside Pit #3 could have influenced the number of rondels present in the samples. This is confirmed by the presence of multi-cell silica skeletons of either wheat or barley in some of the samples from Pit #3 (see below).

At the same time, the presence of Cyperaceae plants is ubiquitous in the samples, suggesting that the environment never became extremely arid (**Table 9**). In general, the presence of sedges could indicate indirectly the choice of wheat and barley cultivation, favored by wetter conditions. A more complete picture of the wheat and barley content of the Pit will be presented in the future, after the analysis of the remaining samples has been completed.

Table 8: Pooid, Panicoid and Chloridoid Grass Phytoliths.



Cyperaceae phytoliths were present in six out of the eight samples analyzed. The sample derived from the ashy context at the top of the fill of Pit #3 had the highest quantities of Cyperaceae phytoliths, possibly indicating that sedges were used for fuel. Cyperaceae are forage plants, and their presence in the ashy sample could indicate the presence of dung, also. This sample had also saddle-shaped phytoliths that form in Chloridoid grasses and further suggests that dung was used for fuel. However, sedge phytoliths were present in all layers of the Pit #3.

Leaf/Stem Vs. Husk

Based on these primary results, there is no major divergence between the presence of the leaf/stem and husk phytoliths across contexts, in order to draw clear conclusions of crop processing activities (see **Table 10**). Cereal husk phytoliths were present in all contexts. Cereal husk phytoliths were present in higher densities in the samples derived from the top fill of Pit #3 (ashy contexts). Cereal husks were present in the fill from the two jars excavated from Pit #3, but the data is probably not related to the content of the jars.

Table 9: Total Cyperaceae Phytoliths Per Gram Sediment (Excluding High Value of H-00-1).

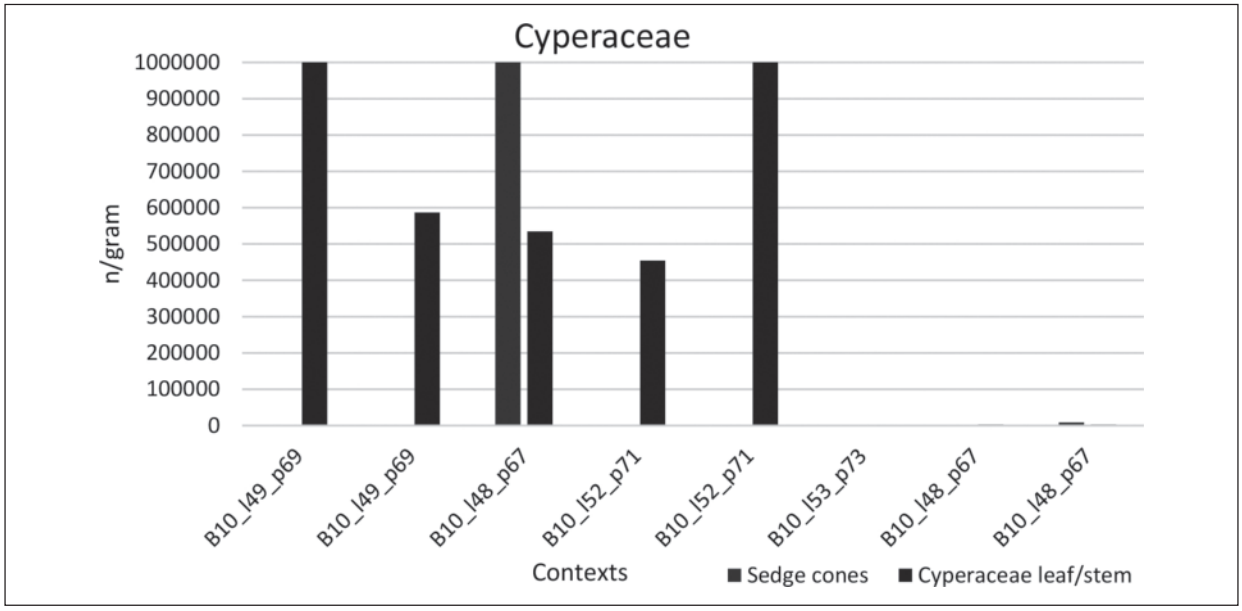
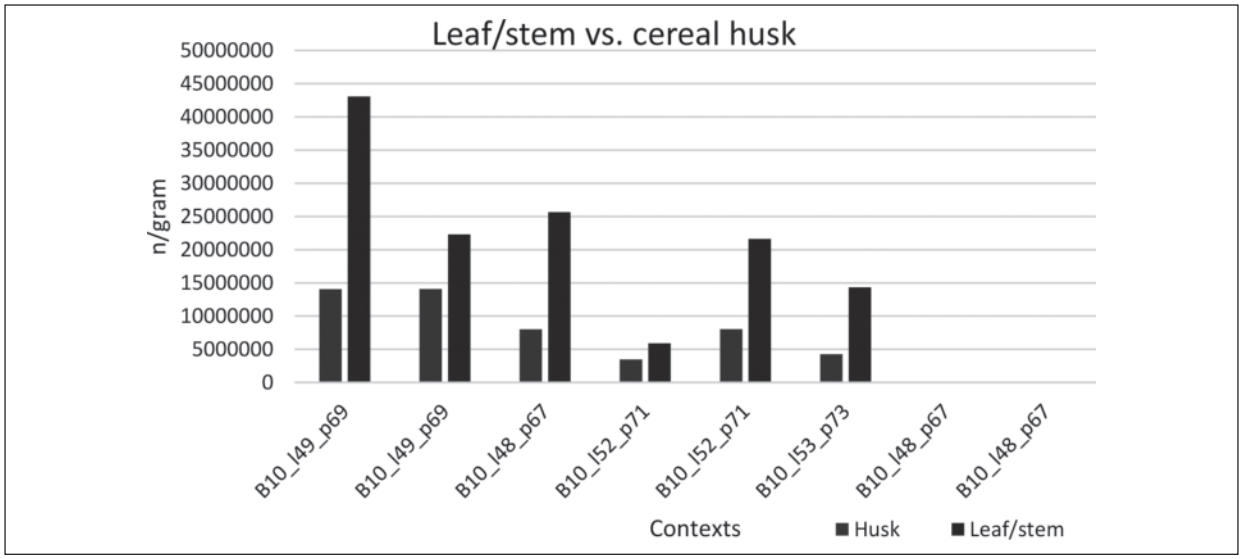


Table 10: Total Multi-Cells Leaf/Stem Vs. Votal Cereal Husk Multi-Cells.



Very low densities of cereal straw were recorded, as expected, in the samples derived from the jars, while its presence in the ashy context from the top of Pit #3 is noteworthy. Cereal straw was probably used for fuel, or it represents, alternatively, the remains of animal dung burnt as fuel (**Table 12**). Wood/bark phytoliths were present in the ashy context at the top of Pit #3 (**Tables 14 and 15**).

Wild taxa identifications can indicate crop husbandry practices and different crop processing stages (Bogaard, *et al* 2005, Hillman, 1981, Jones, 1992). The identification of the multi cell phytoliths of wild taxa present in the samples will take place at a later stage of analysis. However, it is interesting that high densities of Setaria-type husk phytoliths, as well as *cf.* Avena husk phytoliths, were present in the top ashy context.

Table 11: Wheat and Barley Husk Multi-Cells.

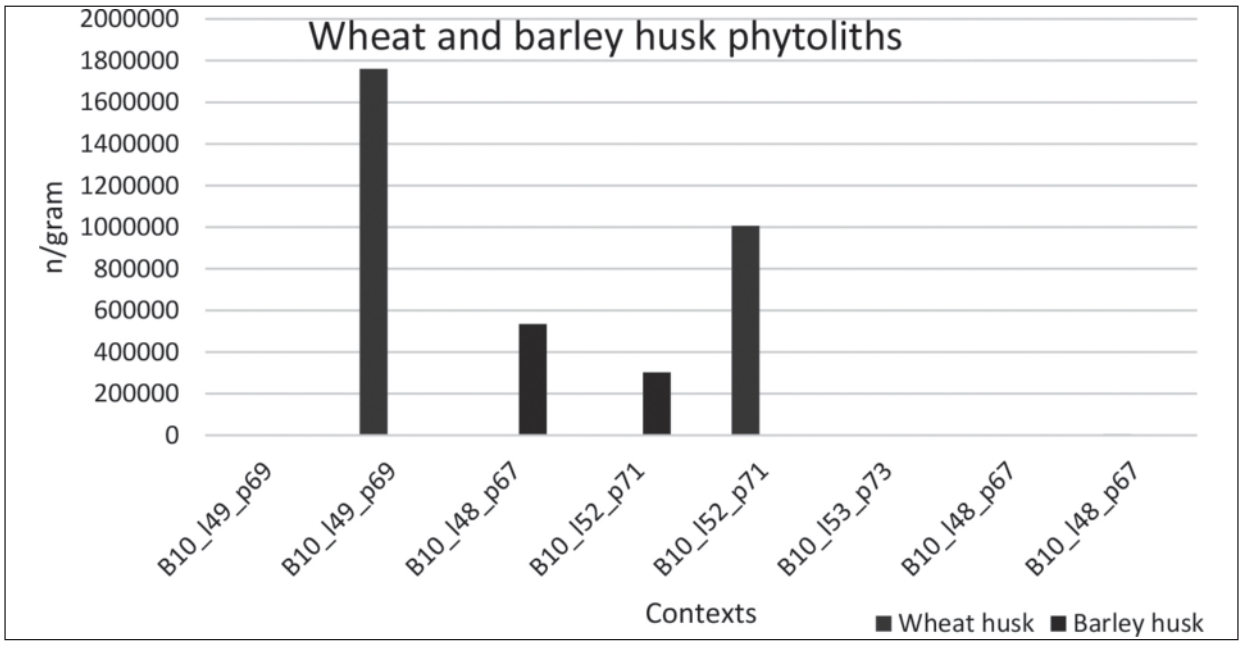


Table 12: Cereal Straw and Wild Grass Husks.

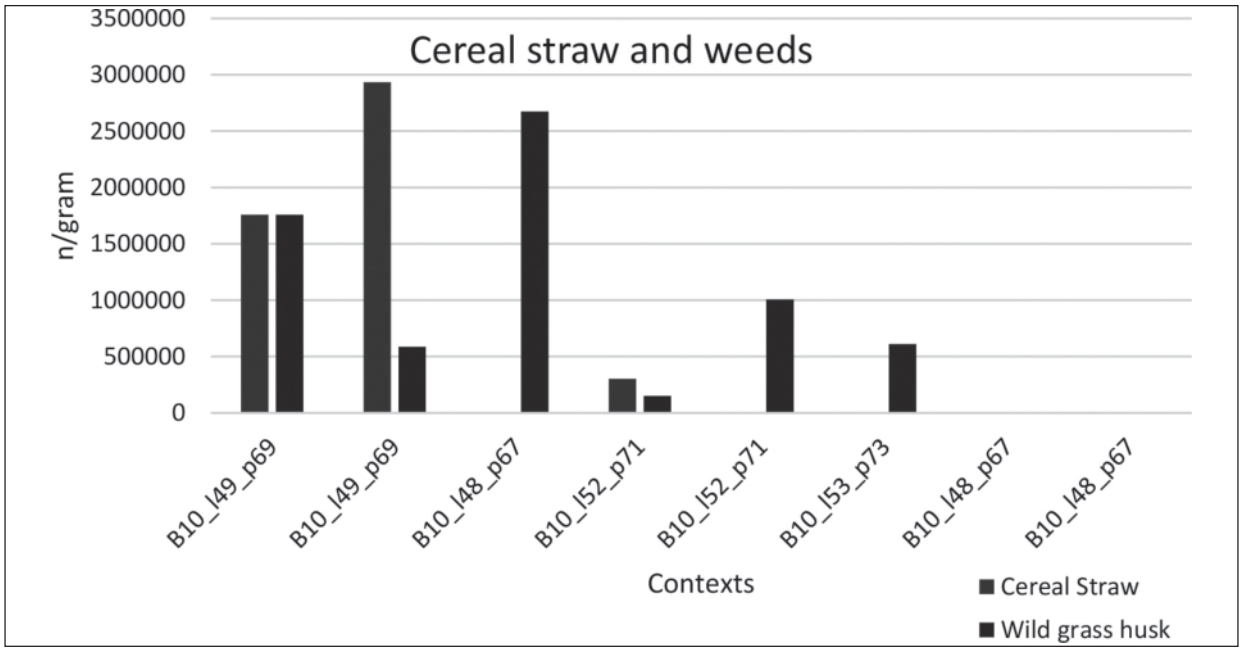
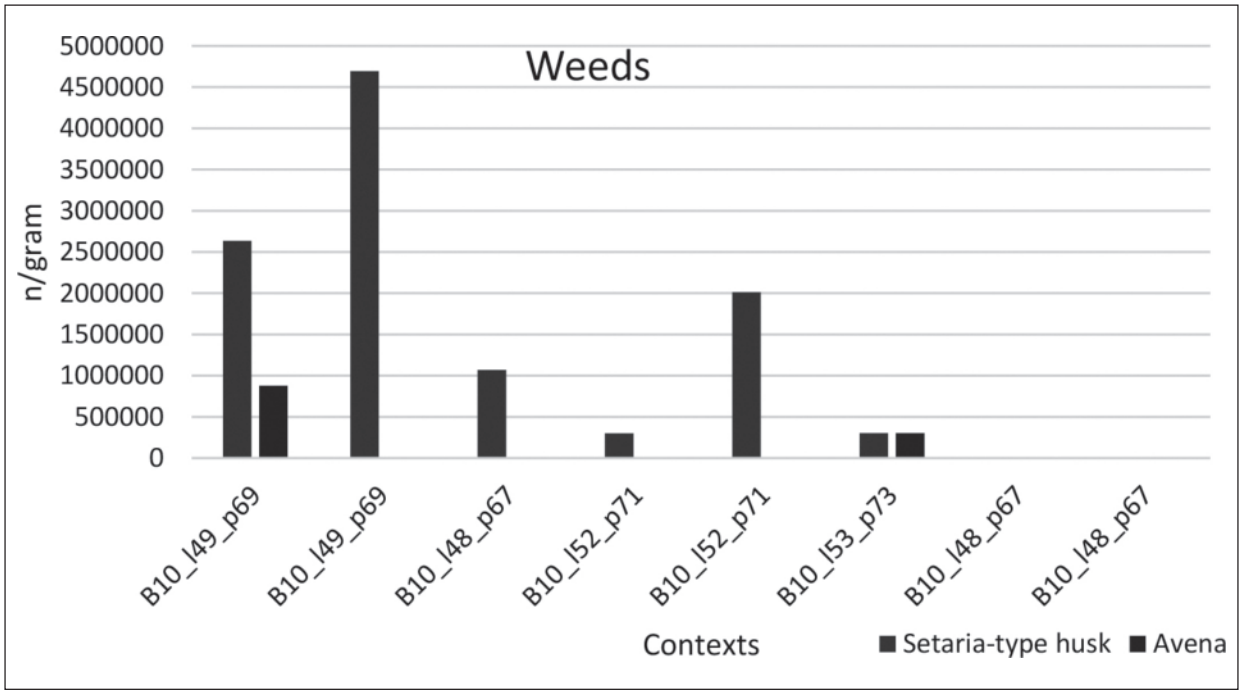


Table 13: Agricultural Weeds.



Final Comments

The phytolith data thus analyzed from various contexts at Tall Ḥisbān suggests that wheat and barley production during the medieval Islamic periods at Ḥisbān peaked under the Mamluks. Samples derived from contexts inside the Citadel at Tall Ḥisbān, such as the Citadel's storeroom floor, suggested that grain (wheat and barley) was irrigated in the 14th century (Laparidou and Rosen 2015). Phytolith data derived from the farmsteads around the Citadel at Tall Ḥisbān, such as in Squares M8 and O9, showed evidence of irrigated wheat and barley, as well as evidence of primary crop-processing by-products, such as straw, weeds, and husks. Their recovery from hearths and middens could be traces of fodder or dung. Palm single cell phytoliths were also present in samples derived from the farmsteads at Tall Ḥisbān, possibly reflecting the importance of dates (Phoenix dactylifera) for consumption. Overall, phytolith data from the farmsteads at Tall Ḥisbān showed that peasants adopted a mixed agro-pastoral economy at the village-level (Laparidou and Rosen 2015).

The data from Ḥisbān shows that the environment of the site is dominated by Pooid grasses and that these grasses suggest moderate environmental conditions. However, the single cell phytoliths of Pooid grasses (rondels) could be indirectly reflecting the use and presence of wheat and barley, the two main agricultural crops in use during all periods under study. The presence of the Cyperaceae plants suggests that the environment was not extremely arid and that wet conditions and marshy micro-environments could be close to the site. The low counts of Chloridoid grasses in the samples should not allow inferences for dry land areas around the sites.

Pit #3, Square B10, Tall Ḥisbān

The results so far suggest that phytolith analysis and phytolith assemblage should provide a good picture of the content of Pit #3 at Tall Ḥisbān, Square B10. However, analysis of the remaining samples is needed in order to give a complete result. Pit #3 contained wheat and barley husks in several contexts, but to what degree this indicates room function will require further excavation and sampling. Palm single cell phytoliths were present in the two samples derived from the top fill of the pit, one from the ashy contexts and the other from the area around the ashy context. It is possible that at least wheat and barley were being deposited, processed, and/or thrown in this area (if not dates too). These are the two main crops represented by husk phytoliths.

Table 14: Single-Cell Dicot Phytoliths.

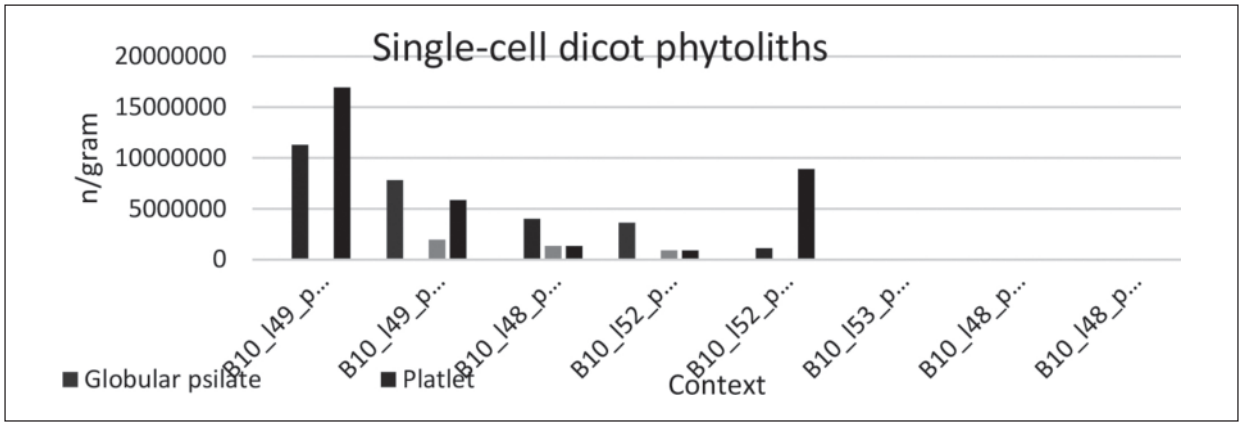


Table 15: Multi-Cell Dicot Phytoliths.

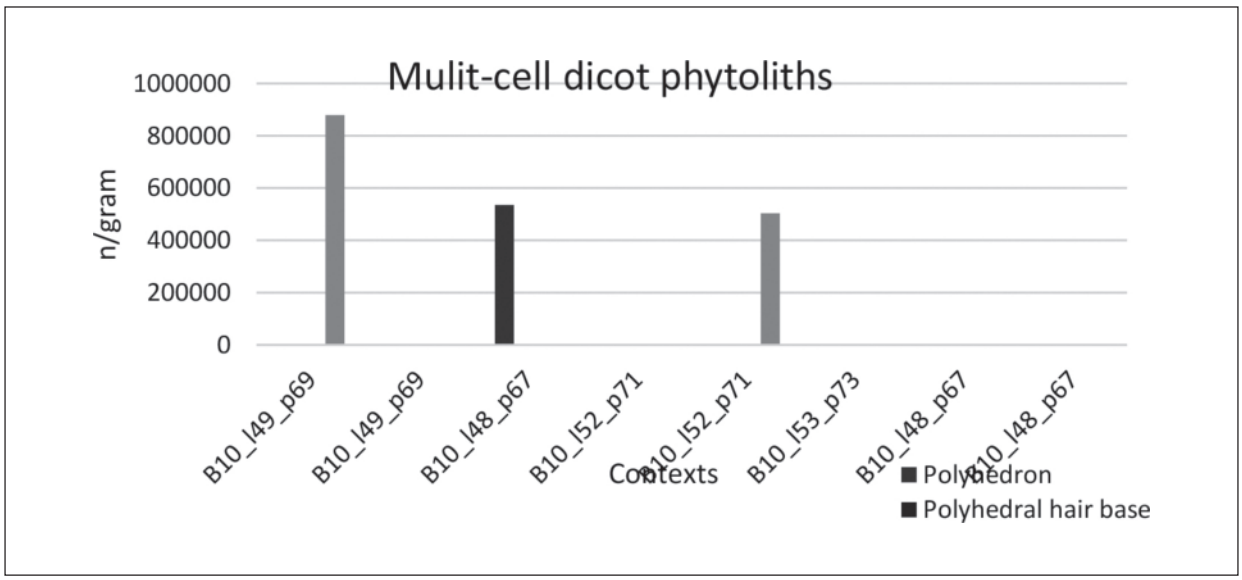
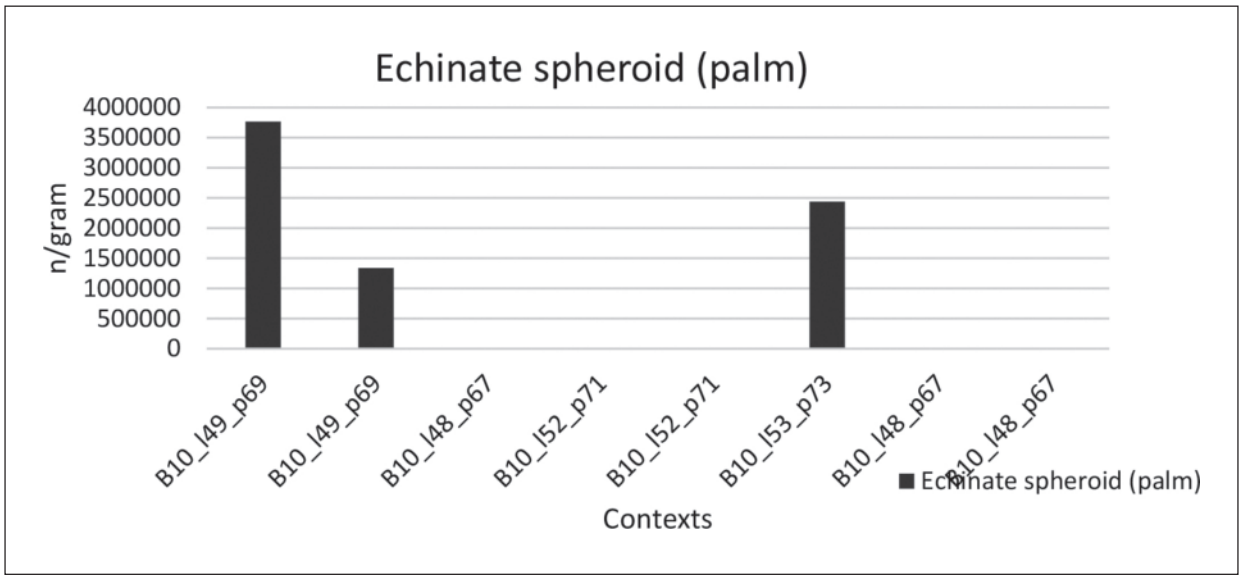


Table 16: Echinate Spheroid Phytoliths from Palm.



Macrobotanical Report
(by Annette Hansen)[14]

The following represents the preliminary results of the macro-archaeobotanical remains collected during the 2013, 2014 and 2016 field seasons at Tall Ḥisbān, as well as an overview of the contexts from which the samples originate. The remains recovered include seeds/fruits, cereal processing by-products (straw, rachis, glumes, palea/lemma), archaeological dung and wood charcoal, and reflect food preparation and consumption, crop processing, fuel use, and use of economic plants in architecture and construction of secondary products (e.g. ceramics) within their respective contexts. Samples taken for macrobotanical material originated from sealed contexts, including beaten earth surfaces, plaster surfaces, pits (including hearths), middens, and sediment within ceramic vessels.

The occupation layers sampled in this phase of the project have been relatively dated based on ceramic evidence from the early to the late Medieval periods (Byzantine-Early Islamic to Ottoman or late 5th to 16th centuries AD), though many samples originated from Mamluk contexts (13th to 15th centuries AD). Domestic contexts from both the village (Fields B, C, M, O, P) and Citadel (Field L), with varying degrees of activity and perhaps differing functions, have been sampled and compared.

While a total of 68 flotation samples were recovered during these three field seasons (**Table 17**), a number of hand-picked samples, mainly of wood charcoal that were taken in previous seasons, (1997, 2001, and 2004) were also evaluated, and selected for further analyses of wood taxa as a part of the study of the fuel economy of the site. These samples differ from the samples taken from seasons 2013, 2014 and 2016, as they were not systematically sampled (nor measured) from contexts around the site, and therefore were quite low density and contained few quantifiable botanicals. However, the samples that did contain seeds/fruits in addition to wood charcoal mainly reflected the settlement noise of the most common cultivated cereals at Tall Ḥisbān, being hard wheat and hulled barley. A list of the economic and wild plant taxa encountered in the macrobotanical samples thus far encountered has been presented in **Table 4**.

General Observations of Human and Animal Diet, Fuel, and Local Environment at Tall Ḥisbān through Archaeobotanical Evidence.

This study builds upon earlier archaeobotanical, vegetation survey, and ethnobotanical work which has been conducted at Tall Ḥisbān, with up to date methodologies identification and quantification allowing the more precise identification of plant remains in some cases (*cf*. cereals) down to the sub-species taxonomic level[15]. In regard to the consumption of plant foods at the site, there is no observable difference between the type of plant foodstuffs consumed by the inhabitants of the Citadel and in the village so far.

The botanicals from the village contexts, however, were very rich and diverse. The combination of foodstuffs reflects a diet that has been rooted in this region since the Neolithic, and is consistent with observations for other medieval agricultural villages in Bilād as-Shām. They could access a variety of foodstuffs, and forage in times of both plenty and scarcity, as the crops cultivated were primarily drought resistant and could produce sufficient yields in drier climates. The basis of the diet was cereals and pulses, supplemented by a diverse repertoire of fruits, nuts, and (likely) vegetables, and as evidenced by zoological and residue analyses, meat and dairy products and olive oil (for residue analysis, see

Table 17: Number of Floatation Samples Excavated Per Field Season.

Field Season	2013	2014	2016
No. Samples	23	25	20

14. For further discussion of preliminary results on macrobotanical remains for samples relatively dated to the Mamluk period, see the discussion in Walker *et al.* 2017b. The full report of all macrobotanical remains from Tall Ḥisbān appears in A.M. Hansen's PhD dissertation (University of Groningen), entitled "The agricultural economy of Islamic Jordan, from the Arab conquest until the early Ottoman period".

15. (Crawford and LaBianca 1976 and Crawford, LaBianca, and Stewart 1976)

Walker this report). Certain foodstuffs, such as vegetables (e.g. spinach) and certain fruits (e.g. date, watermelon), will be underrepresented in the archaeobotanical record for a number of reasons related to deposition, preservation and post-depositional processes. The diet of the kept animals at the site would have consisted of cereal processing by-products (straw, rachis, glumes), as well as a combination of cereals (e.g. barley), pulses (e.g. bitter vetch), and wild taxa (e.g. alfalfa). These signals may be gleaned in archaeobotanical samples in general through remains of dung in cooking contexts or from surfaces where there is evidence where animals were kept (Walker *et al.* 2017). Dung would have been a common fuel source for cooking and firing ceramics, along with cereal chaff and wood (Hansen *et al.* 2017).

Wild plant taxa found in the archaeobotanical samples reflect a semi-arid to temperate climate, much like that of today in southern Bilād as-Shām. Many of these taxa grow commonly on or along the borders of arable fields and therefore have remains present in the archaeobotanical samples (see **Table 20** and Walker *et al.* 2017).

Certain regional foodways, such as cooking and baking practices with clay ovens (*ṭāwabīn*), can also be gleaned from written and ethnographic sources, and reflected in the botanical data, both in the form of macrobotanical remains and in the impressions of macrobotanicals on the fragments of those ovens (Hansen *et al.* 2017). The plant impressions from clay oven fragments (i.e. ṭābūn) found in 20 different contexts collected during the 2014 and 2016 field seasons from Fields M and O were analyzed. These impressions not only reconstruct the production processes of these bread ovens, but also the different kinds of dung cakes used during cooking activities (ibid).

Context Descriptions

While there were few samples from the Citadel (Square L1 and 2), the bulk of the macrobotanical samples originate from the 'village' or respective houses and domestic spaces located in different areas along the outside of the Tall. While Field C102 was a re-occupied Byzantine farmhouse and Field P was an Ottoman re-occupation of an earlier house, Fields B, M, and O are mainly Mamluk domestic spaces built over earlier buildings. In the case of Fields O and P, there is a more clear demarcation between the space within the house and the courtyard outside the house[16]. Therefore, the descriptions below will focus on Fields B (8 and 10), C102, and P (102 and 104).

Field B

The occupation of Field B is interesting, as it is a domestic space a fair distance from the other houses built at the base (Field P) or along the sides of the Tall (Fields O and M), and its function has been difficult to discern. This space is likely to be a Byzantine period house that was later re-occupied in different phases during the medieval period. Excavations in 2013 (B8) and 2014 (renamed B10) were focussed on understanding the late to early medieval occupation of the square, which seems to be a 'squatter's' space of an earlier house in its latest phase, where trash was deposited. After the space was abandoned, the vaulting and walls collapsed and covered the square. The relatively low density of botanicals found within many of the contexts within this square would seem consistent with less 'intensive' use of the field as a permanent domestic space in the latter phases of occupation.

The late medieval house was constructed with Byzantine spolia (likely from the Citadel on site). The botanicals recovered from this square reflect both food consumption and fuel use during different phases of occupation. For instance, in one phase, Locus 49 Pail 69, there was a concentration of burnt material; this was originally labelled as a 'hearth' during a field reading and samples were taken from above, around, inside, and below this context for a full profile of the area. Since there were relatively few botanicals, this could point to the use of the area for shorter-term cooking / burning on or nearby the space, rather than a proper hearth. It contained a few highly burned *Triticeae* grain kernels (domesticated cereals). However, because of the relatively low diversity of foodstuff from this context, this was not

16. Detailed context descriptions of Fields L, M, and O and their respective macrobotanical sampling strategies are documented in the macrobotanical section of Walker *et al.* 2017b.

determined to be an established cooking area within the domestic space, and may indicate a small collection of burnt material from earlier cooking events.

There were some curious contexts within this space, including a fairly large pit located in the south-western corner of the square (B8), which was originally uncovered during the 2013 field season and completely excavated in the 2016 field season. This pit was situated underneath plaster surface B8.31, and just below the pit, another plaster surface was exposed and excavated (B10.67.90). The pit was extensive and was excavated in several loci, which are listed below (**Table 18**). Phytolith samples were taken from each level of the soil samples taken.

Another pit was also found on the western side of Square B8/10, north of Wall 56 (B10.56). In one of the lower layers of this pit (Locus 45 Pail 67), a small jar was recovered, which contained soil. The soil from this jar (250 ml) was sampled for macro- and microbotanical materials. While the macrobotanical remains from this sample reflected settlement noise, as a result of fill within the jar after it fell out of use, the residue analysis from the bottom provided additional insight into its use for cooking a milk product, which could be likened to a type of thick butter attested in ethnographic evidence as *samneh* (for further description, see the ceramic section in this report). The soil near this jar was also sampled, and yielded a few botanicals of the most common cereal crops and wild grasses at the site. Overall, the botanicals found within this pit seem to reflect the discard of food waste over time, and seems most like a midden context.

Based on the discovery of this small jar and two underglazed-painted jars (Loci B10.50.70 and B10.50 71), it has been suggested by Walker that this space could have been used as a storage area. Soil samples were also taken from the jars for macro- and microbotanical remains. The macrobotanical remains, similar to the small jar, reflected a signal of settlement noise as a result of fill after the contents of the jar had been emptied and the jars fallen out of use. The jars, found on their sides, even became residence to some small animals (see Corbino in this report). Once again, the residue analysis points to their use in the storage of olive oil as part of their original use (see ceramic report above).

Field C

Square C102 was excavated in prior field seasons 2004 and 2007. It is the north-western half of a domestic space, originally a Byzantine farmhouse, which was reoccupied several times, and part of a larger cluster of houses (**Fig. 21**)[17]. In the latter season, several surfaces were excavated down to a tumble layer (Locus 30), while the SW corner, with a complete section of the surfaces, was left in place. In exposing this corner, all of the surfaces were well articulated and all were built above an ashy layer. The concentration of ashy material in this corner is believed to be a potential cooking context. Therefore, excavation of this corner was re-opened by Annette Hansen in 2016, in order to explore this area. One fill layer was excavated (Locus 19c), followed by the packed burnt earth surface directly below it (Locus 25), followed by a plaster floor (Locus 26); for a profile of loci and their dimensions, (**Fig. 22**).The remaining loci will be excavated in the following excavation season.

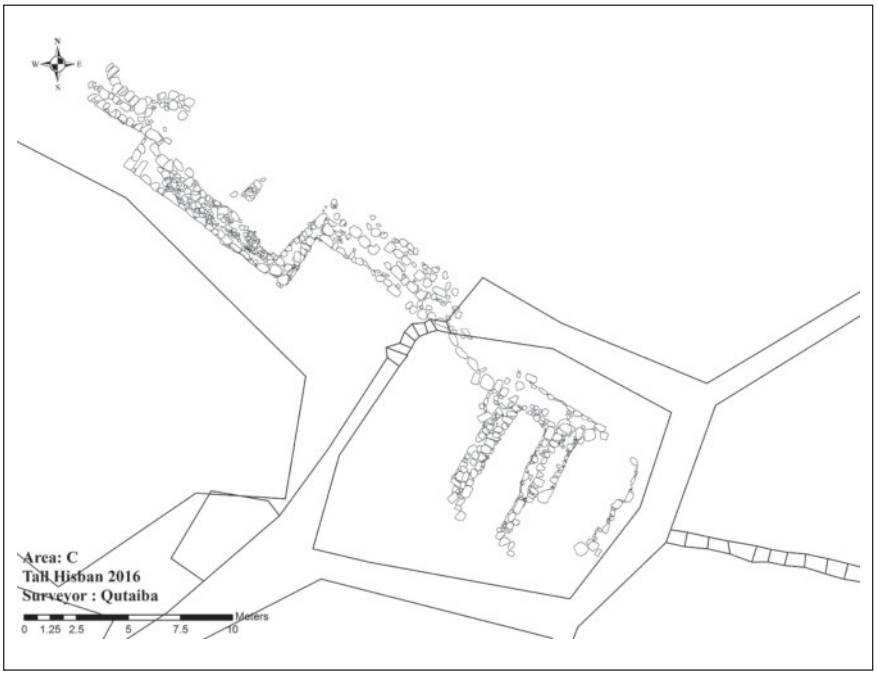
Table 18: Stratigraphy of the Large Pit in the South-Western Corner of B8.

Square	Locus	Pail	Soil Volume
B8	32	58	5
B8	33	57	4
B8	34	60	9
B8	35	59	5
B8	41	63	4
B8	45	67	2.5
B8	34	88	41
B8	34	88 Bottom 3 cm of pit	Included in above sample

17. After this, structures on the east end of the cluster, located upslope, were excavated in 1976 (Parker 1973).

Table 19: Profile of Loci for Surfaces and Potential Cooking Area in Square C102.

Square	Given Locus/ Matched Locus 2007	Given Pail/ Matched Pail 2007	Context	Loci Dimensions (cm)
C102	Cleaning/19c	1/47-50	Fill	49 x 39 x 33
C102	1/25	2/45-46	Plaster – 'Burnt/Red-Brown compact layer'; locus sheet defines it as 'fill plaster'	49 x 39 x 33
C102	2/26	3/51-53	Plaster floor	15 x 36 x 35
C102	3/27	4/54	Fill/Earth Surface/	10 x 35 x 20
C102	4/28+29	5/55-57	Ashy layer	3 x 40 x 5
C102	5/30	6/58	Tumble and fill below ashy layer	Not applicable



21. Plan of Field C farmhouse cluster (courtesy Qutaiba Dasouqi).

Field P

Two squares (P102 and P104) were re-opened during the 2016 field season, in order to explore the late to early medieval occupation layers within the house. P104, an area outside the house, did not yet reach contexts ideal for systematic sampling. P102 is the area within the house. This space is clearly demarcated by walls and a threshold, and is situated directly north of what appears to be the house's outside courtyard. This outside courtyard may have been an ideal location for keeping the resident family's beasts of burden; this will be an interesting focus for investigation in future seasons. Early Islamic occupation layers were reached, based on the pottery reading of the plaster floor in the Northeast half of the square (Locus 105.100a); a seed was selected from this context for radiocarbon dating. Two charcoal samples were taken from this square (Locus

22. Detail of cooking area inside Field C farmhouse, sampling for archaeobotanical analysis.

110) and five soil samples were taken from this context. One sample originated from a burnt concentration found within an earth surface (Locus 109 Pail 102). One earth surface (Locus 111.107) in the northwest corner of the trench, runs towards the east part of the trench for about 2 meters, with a width of about 43cm. Two 'breaks' in the plaster surface (Locus 105) were sampled separately (Locus 113.117 and Locus 114.116 respectively). Prior to the end of the season, a small beaten earth surface with a clay-like consistency was sampled. Macrobotanical remains from this field reflected signals of consumption of a variety of cereals, fruits and pulses, as well as signals of fuel from cereal processing by-products and likely dung.

Table 20

Economic Plants		
Scientific Name	**Common Name**	**Archaeobotanical Evidence: Plant Part**
Hordeum vulgare (hulled)	Hulled barley	Florets, rachis internodes/fragments
Hordeum vulgare cf. ssp. *distichum* (hulled)	2-row Hulled barley	Florets, rachis internodes/fragments
Triticum turgidum ssp. *durum*	Durum/Hard wheat	Grain kernels, rachis internodes/ fragments
Triticum turgidum ssp. *dicoccon*	Emmer wheat	Grain kernels, glume base
Triticum aestivum ssp. *aestivum*	Bread wheat	Grain kernels, rachis internodes/ fragments
Triticum turgidum ssp. *durum*/ *Triticum aestivum* ssp. *aestivum*	Hard/Bread wheat	Chaff (Palea/Lemma), Rachis internodes/fragments
Triticeae	Tribe within Poaceae (Grass Family), containing many domesticated cereals, including wheats and barleys	Indeterminate grain kernels, culm nodes and bases / straw
Pisum sativum	Common pea	Seed
Vicia faba	Faba bean	Seed
Vicia ervillia	Bitter vetch	Seed
Cicer arietinum	Chick pea	Seed
Lens culinaris	Lentil	Seed
Lathyrus sativus	Grass pea	Seed
Lupinus albus	White lupine	Seed
Olea europaea	Olive	Endocarp, seed
Vitis viniferra	Grape	Seed
Ficus carica	Fig	Seed
Prunis dulcis	Almond	Endocarp
Prunis persica	Peach	Endocarp
cf. *Prunis domestica*	Plum	Endocarp
Juglans regia	Walnut	Endocarp
Wild Plants		
Scientific Name	**Common Name**	**Archaeobotanical Evidence: Plant Part**
Bromus tectorum	Drooping brome	Seed/Fruit
Hordeum vulgare ssp. *spontaneum*	Wild barley	Seed/Fruit
Lolium temulentum	Darnel	Seed/Fruit
Phalaris sp.	Canary grass	Seed/Fruit
Alkanna sp.	Dyer›s alkanet / Alkanet	Seed/Fruit

cf. *Capparis spinosa*	Caper bush / Flinders rose	Seed/Fruit
Celtis cf. *australis*	Mediterranean hackberry	Seed/Fruit
Centaurea sp.	Centaury	Seed/Fruit
Echium sp.	Bugloss*	Seed/Fruit
Galium sp.	Bedstraw*	Seed/Fruit
Medicago cf. *sativa*	Medick / Alfalfa	Seed/Fruit
Silene sp.	Catchfly	Seed/Fruit
Ajuga / *Teucrium* sp.	Bugle weed / Germanders	Seed/Fruit
Brassicaceae	Crucifers / Cabbage family	Fruit and seed
Chenopodium sp.	Goosefoots	Seed/Fruit
Calendula sp.	Marigold	Seed/Fruit
Malva nicaeensis	Bull Mallow	Fruit
Malvaceae	Mallows	Seed/Fruit
Carthamus tinctorius	Safflower	Seed/Fruit
Coriandrum sativa	Coriander	Seed/Fruit
Phragmites australis	Common Reed	Culm/Straw

C14 Samples

Several samples were selected for C14 dating. All were excavated during the 2016 field season, except for three samples from Square L, where C14 dating had not yet been conducted. Four ash samples were taken from a sealed burn layer within the reservoir. Three single seed samples were taken from Field P; from one plaster surface (L105.100a), one ashy concentration (L109.102), and one beaten earth surface (L111.107). Two single seed samples were taken from square M8; one from an ash pocket within plaster in the NW corner of the square (L15.49) and one from within a pit (L16.48) that was underneath the plaster floor (Locus 15). One single seed sample was taken from a plaster floor in the SE quadrant of Square O (L7.10). The seed samples taken for C14 were photographed and identified to their lowest taxonomic level (**Table 5**). Three wood charcoal samples, L1.L38.57, L2.L12.P68, and L2.L12.P92 were excavated during the 2001 field season; two samples originated from a burnt shelf within a room believed to have been a storage room (L2.L12.P68 and L2.L12.P92); these shelves would have held ceramics. While storage was evidenced from substantial animal bones present within the square, only small soil samples were recovered from these areas that did not indicate a signal of storage. Macrobotanical remains, however, did give a signal of 'settlement noise' of some of the most common crops cultivated nearby the site, such as hard wheat (*Triticum turgidum* ssp. *durum*). Samples from each of these contexts has also been selected for analysis to determine the wood taxa[18].

Heritage Work and Community Development (by Øystein LaBianca)

Since 1998, Andrews University has been committed to heritage management, site presentation, and community engagement in developing the site for the general public as well as for the local village. This season, the interpretive path was refreshed by clearing all garbage from on and around the path, removing thistles and harmful plants. Work also included repairing and straightening the path's border, repairing six signs from the local blacksmith, refreshing the painted interpretation on the remaining signs, and adding a new map at the entrance, outlining the path.

In past years, the team had created a welcome garden, with the intention of displaying plants that have been used locally through the ages, hoping to engage and educate the community. After discussion with members of the Ḥisbān Cultural Association and the local community, it was decided to repurpose the space, and

18. For further context descriptions for Fields L, M, and O, see Walker *et al.* 2017a, and for Field B, C, and P see above.

create an area for the community to gather and celebrate culture and heritage. The center space was filled in with large stones and sand, a hedge was created between the pillars, and a smaller socio-economic garden was planted closer to the entrance. The Ḥisbān Cultural Association also organized two cultural events, which were held on the tall in the repurposed welcome garden. The first was a gathering of association members, representatives from the municipality, and local families, to share hopes that development of the site will assist to educate the public and celebrate their heritage. The second event was a celebration of the tall, which took place at the end of this excavation season. Many members of the local community told stories and recited poetry about Ḥisbān. We view this as a public commitment to the preservation of the site.

The team has completed work on an interpretive visitor map, and has nearly completed a site management plan. Throughout the season, Ivan LaBianca filmed various aspects of the fieldwork, not only to produce a film archive for the project, but also to produce educational films and short films for sharing via social media. In addition to work on the site, two rooftop gardens were installed, one at the girl's high school and one at the elementary school, in collaboration with the local community. These gardens will be used to teach how we can learn from the past about water and plant usage, caring for the earth, and that, by acting as ecological stewards, we can help to shape the future. Lastly, efforts have continued towards finalizing an agreement, which will allow the Nabulsi Heritage Buildings to become part of a new interpretive cultural heritage center for the Archaeological Park.

Conclusions

The emerging picture of village structure and village life at Tall Ḥisbān in the Medieval era is a complex one. Entire buildings, already in ruins and abandoned for possibly a couple hundred years, as well as parts of those buildings (standing walls here and there) were rehabilitated for occupation, and houses rebuilt and barrel vaulted in the Mamluk period. The village at this time seems to have been made up of neighborhoods, which might reflect extended families, with houses in a line facing a courtyard and cisterns.

What kind of settlement this was, however, is not entirely clear. Architecturally belonging to a common rural koine, but rather urban in terms of its material culture, the place is alternatively referred to as a "*qarya*" (village) and "*madinah*" (town) in contemporary (14th-century) Arabic sources. Its special relationship with the Citadel no doubt defined its changing status and ever-evolving relationships with larger markets and more urban social networks.

The year to come will be devoted to continuing faunal and paleobotanical work, which will now include analysis of wood charcoal and further residue analysis, as well as continued materials analysis, namely on glass and lithic. The next season of excavation is scheduled for June 2018, and represents the 50-year anniversary of American excavations at the site. Special programs are planned in Amman and in the village of Ḥisbān in celebration.

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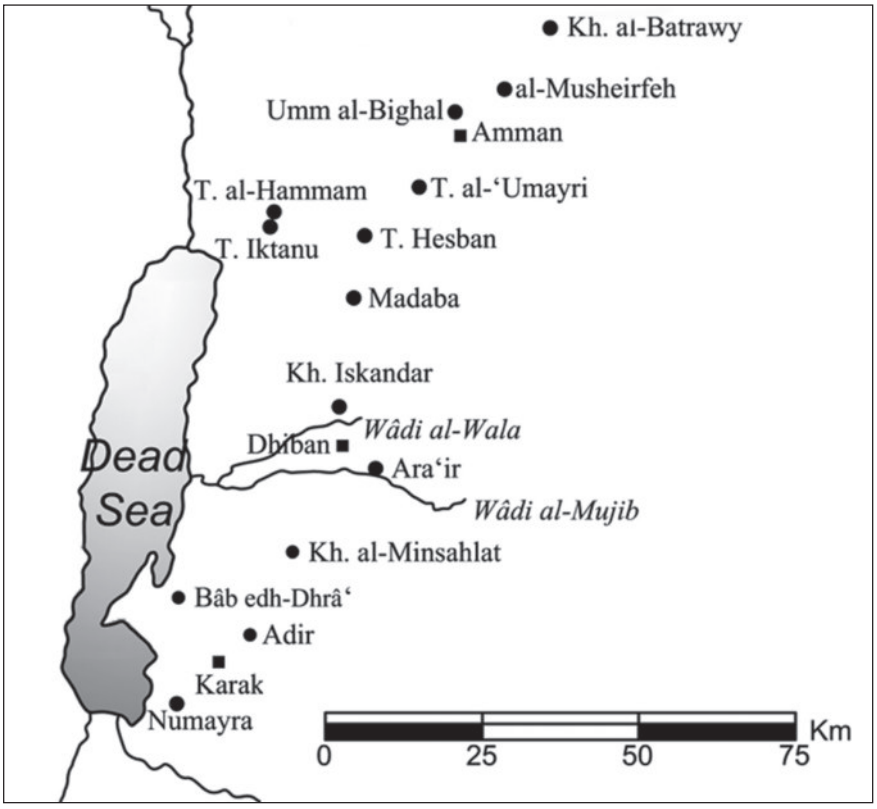
EXPEDITION TO KHIRBAT ISKANDAR AND ITS ENVIRONS: THE 2016 SEASON

Suzanne Richard, Jesse C. Long, Jr., Marta D'Andrea, and Rikke Wulff-Krabbenhöft

Introduction

This short preliminary report summarizes the four-week season of renewed work at the site of Khirbat Iskandar from June 24 -July 21, 2016. The project operates under a permit from the Department of Antiquities.

The site of Khirbat Iskandar, located on the Wādī al-Wālah about 20-25 km south of Mādabā and just north of Dhībān (**Fig. 1**)**,** is known as one of the major Early Bronze Age IV (EB IV) settlements in the southern Levant (c. 2500-1950 BC in the new, higher chronology; Regev *et al.* 2012). Its importance lies in the fact that it is one of the few sites to have substantial strata from both the EB III and EB IV periods extant on the mound. The fortified Early Bronze Age (EBA) site of Khirbat Iskandar owes its prominence to the perennial stream in the Wādī al-Wāla, to the caravan route ("the King's Highway") that passed close by the site, and to the expansive agricultural lands contiguous to the site (Cordova and Long 2010: 21-35; Cordova 2007: Figs. 5.8 and 6.6, and see pp. 189-90). Data show that erosion and destruction of the floodplain from the end of EB III through the EB IV period gradually diminished the carrying capacity of the landscape, eventually causing the abandonment of the site near the end of the period.



1. Map showing the location of Khirbat Iskandar.

This year represents the ninth major excavation season at the site, the previous seasons being 1982, 1984, 1987, 1997, 2000, 2004, 2010, and 2013 (See Richard *et al*., 2013 and bibliography cited therein). Along with two pilot seasons, Phase 1 in 1981 (Richard 1982) and Phase 2 in 1994 (Richard and Long 1995), two seasons were devoted solely to preservation and restoration; 1998 (Long and Libby 1999) and 2006, although restoration, preservation, and consolidation of walls is an integral component of each excavation season. The major archaeological periods investigated at the site thus far date to the EB III and EB IV, although earlier materials have been encountered on the *tall* and in the cemeteries (EB I and EB II).

Research Design

The expedition's overriding research design includes two major objectives; to study culture change at the end of the third millennium BC in the southern Levant (a dramatic transition from urban institutions to non-urban (rural) economies), and to investigate the rise and collapse of urbanism at the site during the Early Bronze Age (3600-1950 BC). The substantial and well-preserved remains from the EB IV period have demonstrated there was a high level of complexity in the rural EB IV period, as well as strong continuities with Early Bronze Age tradition. Khirbat Iskandar is one of the major sites evidencing the permanently settled agricultural population which is gradually becoming better known in light of recent archaeological activity in the southern Levant (Richard and Long 2010). Excavations at Khirbat Iskandar and at other sedentary sites support an alternative view of EB IV society, which contrasts with the traditional model of pastoral-nomadism for the period. Strong cultural affinities with the preceding Early Bronze Age culture, as well as growing evidence for continuity with the succeeding Middle Bronze Age (D'Andrea 2013), raise questions about the term "Intermediate Bronze Age (IBA)", which is alternatively used for the period (Gophna 1992; Prag 2014; Mazar 2006). For the urban period, Khirbat Iskandar is revealing a typical pattern of multiple rebuilds of fortifications in the EB III period, adding to our knowledge about EBA occupation and settlement in the central/southern Transjordanian plateau region.

Goals of the 2016 Season

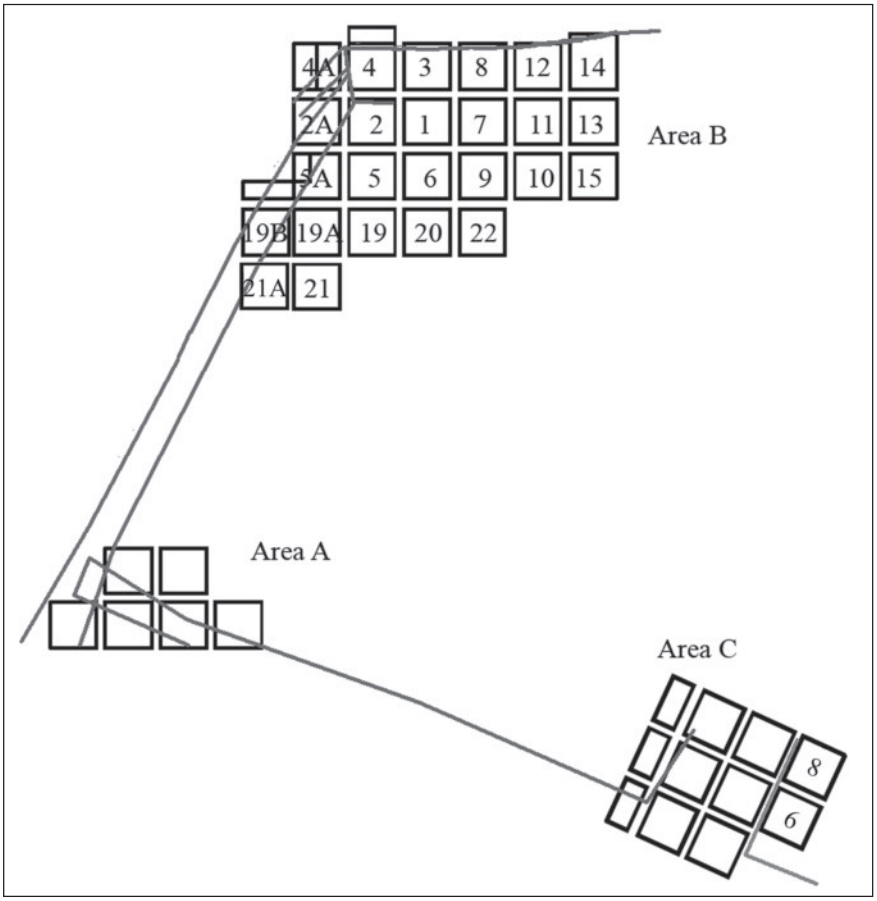
The purpose of the short four-week season was to clarify a few issues relevant to the publication of Vol. 2 of the Khirbat Iskandar Expedition Series, which is a final report on the EB IV settlements in Area B. One of these issues concerned the relationship of the EB IV phases in Area B with those in Area C, the latter field previously published in Vol. 1 of the Expedition Series (Richard *et al.* 2010). The intent, likewise, was to achieve more horizontal exposure of the EB III settlement, as well as to recheck connections with the fortifications (Richard *et al*. 2013; Richard 2016). In order to address these issues, the following strategies guided the work of the 2016 season (see topographic plan in **Fig. 2**):

1) Reopen Squares C06 and C08 in Area C (the "gateway") to recheck the three-phase EB IV phasing and to enhance our comparative ceramic analysis with Area B.
2) Reopen Square B01 in Area B to expose more of the earlier Phases C-D structures.
3) Reopen Squares B4A, B5A/B, and B21 to recheck the fortifications and their relationship to EB III and IV interior phasing.
4) Recheck all drawings and sections for Area B; continue to consolidate standing walls.

The 2016 Season

Area C

As mentioned above, although the work in Area C had been completed, the architecture restored, and the final report published (Richard *et al.* 2010), the decision was made to reinvestigate the critical EB IV phasing uncovered in this area: the latest Phase 3a-b gateway, the Phase 2, and the Phase 1 domestic levels. We focused on Squares C06/C08 at the eastern perimeter of the gateway, where features, objects, and considerable debitage suggested a lithic workshop through several phases (**Fig. 3,** and Long 2010: Figs. 3.11, 3.26). Importantly, excavation had revealed remains of an earlier (Phase 1) settlement on the eastern side of the gateway, which appeared to yield transitional EB III/IV pottery (Long 2010: Figs. 3.1-2; Richard 2010: Fig. 4.5).



2. Plan showing excavation areas at Khirbat Iskandar.

Square C06

The restoration of Square C06 (Long and Libby 1999) was intended to illustrate the superimposition of three EB IV phases. Thus, the northern half preserved the Phase 3 structures, the southern half the remnant of a Phase 2 wall (6039) sandwiched between the later Phase 3 Wall 6005 and the preceding remains of a Phase 1 (6034) domestic structure (Long 2010: Figs. 3.19-20). The goal was to excavate soil layers west of these walls to obtain larger samples of pottery from more exposure of associated surfaces. Specifically, we endeavored to excavate the northern half of the square to the Phase 1 surface visible in the southern half.

Removing the Phase 3 table and benches (which will be returned in the future to their previous restored state), the team excavated the underlying surface, which may actually have been a restored surface, to reveal more of the Phase 2 wall. The rest of the season devoted itself to tracing more of the Phase 2 and Phase 1 surfaces and associated walls in Square C06 (**Fig. 4**). Excavation confirmed that a plaster surface sealed against the Phase 2 wall (6039), and that it overlay an apparent makeup layer of concrete-like and mud-brick material (6046). The latter covered a plastered interior surface made up of pebbles and flint inclusions (6045) that sealed against Phase 1 W. 6034. The latter was new information about the construction history of Phase 1 W.6034 emerging from a foundation trench (filled with reddish mudbrick material), which showed that Surface 6045 was laid subsequently to the wall's construction.

Importantly, excavation in Square C06 revealed there was a layer of mudbrick and ash lying beneath the Phase 1 surface, primarily collapse material in the south, whereas in the north there was some alignment of mud bricks. It is almost certain now that this pre-Phase 1 layer witnesses the destruction of the EB III settlement encountered everywhere in Area B below EB IV remains. Moreover, excavation revealed that the Phase 2 surface west of Wall 6039 was an outdoor surface(see below).

3. Plan of Area C (Richard et al. 2010).

Square C08

Square C08 had previously been excavated with the dimensions of 5.0 x 2.5m. Significant remains from three EB IV phases convinced us to return to expand the square to 5.0 x 5.0m, thus aligning it with Square C06, and to revisit the exposed but undated walls discovered in the short 2007 excavation in the area. As published in Vol. 2 (Long 2010: Fig. 3.26), Square C08 comprised two major structural features; a (Phase 3) paved room with a doorway at the north, and a southern area with a central massive stone base jutting out of the east balk. Excavation to expose the presumed northern extension of the Phases 1-2 architecture encountered in Square C06 had been attempted in 2007. Unfortunately, at the end of the season, the exposed wall lines (mentioned above) which emerged in the constricted area remained unexcavated and undated (see Long 2010: Fig. 3.25).

In 2016, confirmation of the previously hypothesized 3B phase in C08 (Long 2010: Fig. 3:28) came to light in the excavation of the eastern half of the square. An addition to east-west W. 8002 (8002A) had been constructed in Phase 3B, as seen in the difference between W. 8002 (1.25m in height) and W. 8002A (0.60m in height), as well as in the continuation of the structure's interior plaster surface, discovered to overlie a Phase 3A pillar base (8064). These two elements affirmed the existence of a Phase 3B room (**Fig. 5**). Interestingly, though, the wall line (W. 8024) previously apparent in the balk (Long 2010: Fig. 3.53) took an unexpected configuration; a partial wall with collapse at

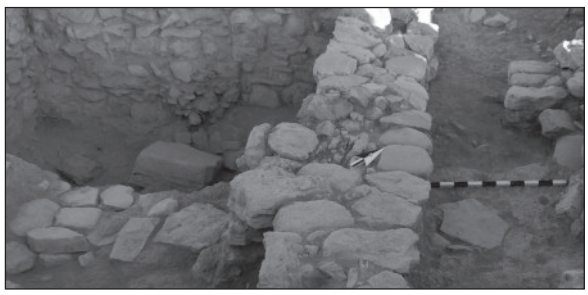
the south. As (**Fig. 5**) illustrates, there was an unusual curved wall/bench built against the southern and eastern faces of walls 8002A and 8051 respectively in the southern half of the square in Phase 3B. This structure connected with eastern boundary W. 8047; at the west, however, it ended short of W. 6009 to the south. Surface 8053 sealed against the four walls of this Phase 3B room: 8051, 8002A, 6009 and 8047.

In the earlier Phase 3A plan of the area, excavation confirmed the massive square stone base 8012 was correctly dated to this phase. Excavation revealed the base to be associated with a type of cobbled pavement/platform (8055), or row of pillar bases (including pillar base 8064 discovered at the north end). This new feature ran under and thus antedated the Phase 3B room just described (**Fig. 6).** The Phase 3A plan showed that the room included a doorway/threshold at the southeast juncture of eastern boundary W8047 with east-west W.6009. The complete Phase 3A architectural plan thus shows that the rooms in C08 and C06 were of similar dimensions, and that stone base 8064, located in the middle of the room, was, in fact, a pillar base, rather than a work platform; an option which had been considered previously.

Since the goal was to expose more complete architectural units of the earlier phases, the Phase 3B bench-like structure, as well as the newly recovered Phase 3A pavement, were removed once fully documented. Continuing excavation revealed the expected northern extent

4. Square C06: lower Phase 1 wall and surface, and upper Phase 2 wall and surface (photo: G. Kochheiser).

5. Square C08: the Phase 3B structure at top, the Phase 3A pillar base at bottom (photo: G. Kochheiser).



6. Square C08, a view of the Phase 3A pavement underlying Phase 3B Wall 8002A (photo: G. Kochheiser).

of the C06 Phase 2, W. 6049. It is now clear that this is the western wall of a structure, as it corners with W. 8066 (**Fig. 7).** The excavation of a foundation trench along the northern side of W. 6009 revealed that a Phase 2 surface of the building covered a leveling of mudbrick materials, below which a Phase 1 pebble and flint exterior surface (8071) came to light, the same stratigraphy of which was discovered in Square C06. Below the Phase 1 surface, mudbrick and ash materials appeared, undoubtedly the top of the EB III destruction layer discovered throughout Area B below EB IV levels. Regrettably, due to the short season, the intended investigation of the EB III phase and the several undated walls which had been uncovered in 2007 could not take place. Although in the past it was suggested that EB III structures were reused in Phase 1, we were not able to confirm this hypothesis this year, or determine whether there was a hiatus or not in this area between the end of EB III and the beginning of EB IV.

Area B

At the northwest corner in Area B, there are 25 5 x 5m squares, where two major EB IV phases (A-B) and multiple EB III phases (C-D-E) have come to light. Phase A at the top was a well-built and well-preserved extensive neighborhood village settlement (Richard and Long 2005: Fig. 5), while the earlier Phase B settlement was quite different, providing an intriguing accumulation of data reflecting unusual complexity for the period, including a public complex with storeroom and ritual activity areas (Richard 1990). The latter settlement was built into and atop the destruction layer of the EB III (Phase C1) settlement, with reuse and rebuilding of earlier walls evidenced, including the fortifications (Richard 2016). The Phase C1 settlement included what appeared to be a public building, or at least a central room for storage, auxiliary workrooms, and a large courtyard (Richard *et al*. 2013: Fig. 11), built within the fortifications.

7. Square C06-08, showing the continuation of Phase 2 W. 6039 cornering to the east (photo: G. Kochheiser).

An earlier Phase C2 settlement (the construction phase of the outer (later) fortifications) had been exposed only in limited areas. A Phase D level was mostly known from the inner (earlier) mudbrick/stone fortification. As for the western trace wall, it had been assumed that the "rubble" perimeter wall (B05A002), which abutted the northwest tower, was the only candidate for a western trace wall, although questions about this wall and its unusual construction abounded. In 2013, the discovery of a major EB III fortification (W. 4A006) just west of the "rubble" wall confirmed that the latter wall had been constructed subsequent to W. 4A006 (see below and Richard *et al.* 2013; Richard 2016: Fig. 3). Likewise in 2013, a small probe area in the western half of Square B01 provided new information about the depth of EB III occupation on the site, information we aimed to explore further in 2016 (see below). With this general background on earlier work in Area B, we turn to the 2016 excavation season.

The discussion will begin with Square B01. The eastern half of the square had been left at the C1 settlement level (below the destruction layer), while to the west the C2 settlement was represented by a lower surface associated with several hearths . The 2013 season had uncovered (below the Phase C2 hearth level/surface) the remains of a 1.0m high stone structure running under the Phase C tower platform (Richard *et al*. 2013). On the interior of the structure, excavation revealed a series of surfaces and mudbrick debris layers, the upper surfaces of which appeared to connect with Phase D surfaces to the west, while the lower surfaces and the founding level of the wall were at a great depth, making it difficult to associate with other architecture or phases thus far exposed. We very tentatively termed the lower surfaces and construction phase of the wall Phase E. The pottery appeared to be diagnostic for early EB III. With these discoveries in mind, we decided

in 2016 to investigate this enigmatic building further, by excavating in the eastern half of Square B01 (a Phase C1 wall was a natural boundary for the work). As we shall see, the nature of the discoveries here were such that it was not possible to trace the building.

Lying below the Phase C1 surface in the east, a layer of mudbrick debris and ash was encountered, within which excavation revealed an unusual mudbrick horseshoe-shaped *tabun/*bin (B01136) (**Fig. 8**). There was an extensive firepit, and much ash and mudbrick debris. Cook pot fragments were found inside the feature. The *tabun/*bin had been constructed on a plaster surface and contiguous to a wall (B01139), which emerged beneath and on a different alignment from overriding Phase C1 wall B01072. Found lying on the surface between the mudbrick feature and the wall were two very large perforated weights (**Fig. 9**). These new discoveries from this season have considerably clarified the Phase C2 settlement in this area. It is now clear that the lower level of mudbrick, ash, and burning encountered previously related to activity areas, not to an earlier destruction. The *tabun/*bin, in combination with multiple hearths discovered to the west, suggests there was a significant work area in this vicinity, differing considerably from the later Phase C1 remains above, which we termed a central room, probably for storage. Clearly, more work is needed to comprehend the plan of the Phase C2 settlement, but it is possible that the area so far excavated functioned as a kitchen, although the hearths might indicate other activities/industries, perhaps the firing of pottery.

8. Square B01, with a view of Phase C1 tabun/bin (B01126) and W.B01139 jutting out on a different alignment from overlying Phase C2 W.B01072 (photo: G. Kochheiser).

Fortifications

As mentioned above, we reopened several squares along the western perimeter of the mound, in order to recheck stratigraphic connections between the occupational phases and the fortifications. We expanded Square B4A into a full 5.0 x 5.0m square in order to investigate the new fortification line on the west, hoping to find a foundation trench, exterior surfaces or perhaps a road. Unfortunately, although a few compaction layers were encountered, there did not appear to be evidence of a surface/road, probably due to the eroded slope. The excavation did, however, uncover several interesting aspects about the wall. First, it stands to a height

9. Square B01 stone weights lying on surface associated with tabun/bin B01126 and W. B01139 (photo: G. Kochheiser).

of 1.75m, which, along with its width of 2.0m, reflects the remains of a substantial western fortification in Phase C, matching in depth and wall construction the northern outer wall trace. Its founding level lay below a layer of mud-brick, upon which remnants of a stone structure (W. 4A024) were found resting up against it (**Fig. 10**). The partial remains of the feature could have been large stones laid in a foundation trench or, alternatively, may have been a revetment or even the remains of a curvilinear "tower," a segment of which was found on the interior (eastern) side of the fortification previously. Of great interest was the discovery of EB IV pottery at levels associated with the lower levels of the fortification, and the remnant stone structure built against it, raising the possibility that the latter represented some sort of exterior revetment constructed in EB IV. In this same Sq. B4A extension, another remnant stone structure (W. 4A018) came to light in the western balk, whether it is the partial remains of a wall or simply rubble could not be determined.

10. Square B04a showing the remnant stone structure/revetment on the western side of EB III western fortification W. 4A006 (photo: G. Kochheiser).

In an attempt to determine the line of the western fortification trace wall (B4A006) downslope to the south, and to clarify a previously excavated segment of a wall line thought to represent the inner western perimeter "rubble wall" (B2A053), we reopened and extended Square B5A/5B to investigate the relationship of these two wall lines. Interestingly, the projected line of W. B4A006 did not materialize in the western edges of the square. Rather, in a northern extension of the square, a substantial wall segment came to light, although the season ended before it was possible to determine if a) it was the continuation of Wall B4A006 and/or b) what its relationship to Wall B2A053 (the "rubble" wall) was. It is possible that the two walls overlap at this point, but this is highly speculative; it is more probable that W. B4A006 is further to the west and down slope.

Hoping to uncover more of the inner western perimeter "rubble" wall (B2A053) further down slope, where Phase B EB IV architecture and whole and restorable vessels had been found in Square B21 (Richard *et al.* 2013), we opened a half square to the west (B21A). In the latter, an amazing number of walls emerged in this somewhat constricted space. Due to the considerable slope of the mound at this point, connections with walls to the east, on the other side of the balk with Square B21, were not immediately apparent. Thus, we extended the square further to the west in order to, hopefully, expose more complete architectural units and, especially, to investigate the stratigraphical relationship of Phases A-B walls to the "rubble" wall. In this extension we did encounter what appeared to be the inner line of "rubble" W. B2A053, against which the uppermost surfaces and wall lines seemed to abut. However, the season ended before we could excavate further to discern, definitively, the relationship of the Square B21A structures to the "rubble" wall. Presumably, the same stratigraphical relationships observed at several points along the western perimeter pertain here as well. It has been shown that the Phase A occupants built walls that abutted and/or partially overlay the "rubble" wall, while the Phase B occupants reused and rebuilt the "rubble" wall (Richard 2016 and Richard *et al*. 2013).

Consolidation of Walls

As in every season, the team continued the important consolidation of walls across the site, with a view toward facilitating ultimate preservation and restoration of the walls in Area B in the future (as in Area C). Although continued maintenance has been done over the years in Area C, it was necessary once again to consolidate several walls in danger of collapse. A number of EB III and EB IV walls were consolidated throughout Area B.

Summary and Conclusions

The 2016 season was extremely important for the new information uncovered about the architectural plan and the EB IV phasing/ceramics in Area C. We will, in the future, return to investigate the important EB III/IV transition and earlier EB III levels. In Area B, the excavations in Square B01 provided us, finally, with information about the Phase C2 settlement, about which little was known beyond the fact that it was the construction phase of the outer fortifications. The significant, newly revealed work activity area is of great interest, along with the clarification of the earlier mudbrick/ashy materials just below the Phase C1 settlement. Although there are still questions about the fortifications vis-à-vis the EB III-IV occupational remains, we believe that we have a good grasp of the construction history of the fortification system at the site, and hope to find even more definitive evidence in future.

Acknowledgements

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A PUBLIC BATH-HOUSE, A CARAVANSERAI AND A LUXURIOUS VILLA IN KHIRBAT ADH-DHARĪḤ (ṬAFĪLAH, JORDAN): REPORT ON THE 2013 EXCAVATION SEASON

Caroline Durand, Zeidoun al-Muheisen, Pauline Piraud-Fournet, Laurent Tholbecq

Introduction

A new excavation campaign was carried out in Dharīḥ between the 18th and the 30th of May 2013, on behalf of the French-Jordanian Archaeological Mission of Khirbat adh-Dharīḥ (dir. Profs. Zeidoun al-Muheisen - Yarmouk University, and François Villeneuve - University Paris Panthéon Sorbonne)[1]. Three operations were undertaken on different buildings, in order to complement the previous excavations (**Fig. 1**). Soundings and cleaning were undertaken by P. Piraud-Fournet in the northern house of village V1, which is the largest domestic building of the site, in order to determine its phasing and chronology. At the same time, work was carried out in Area A, about 150 m south of the sanctuary's southern entrance (second court), on both a Nabataean/Roman *mansio* (L. Tholbecq) and the associated public baths (C. Durand).

House V1. New Discoveries: a Stable, a Bathtub and some Elements of Dating

(P. Piraud-Fournet)

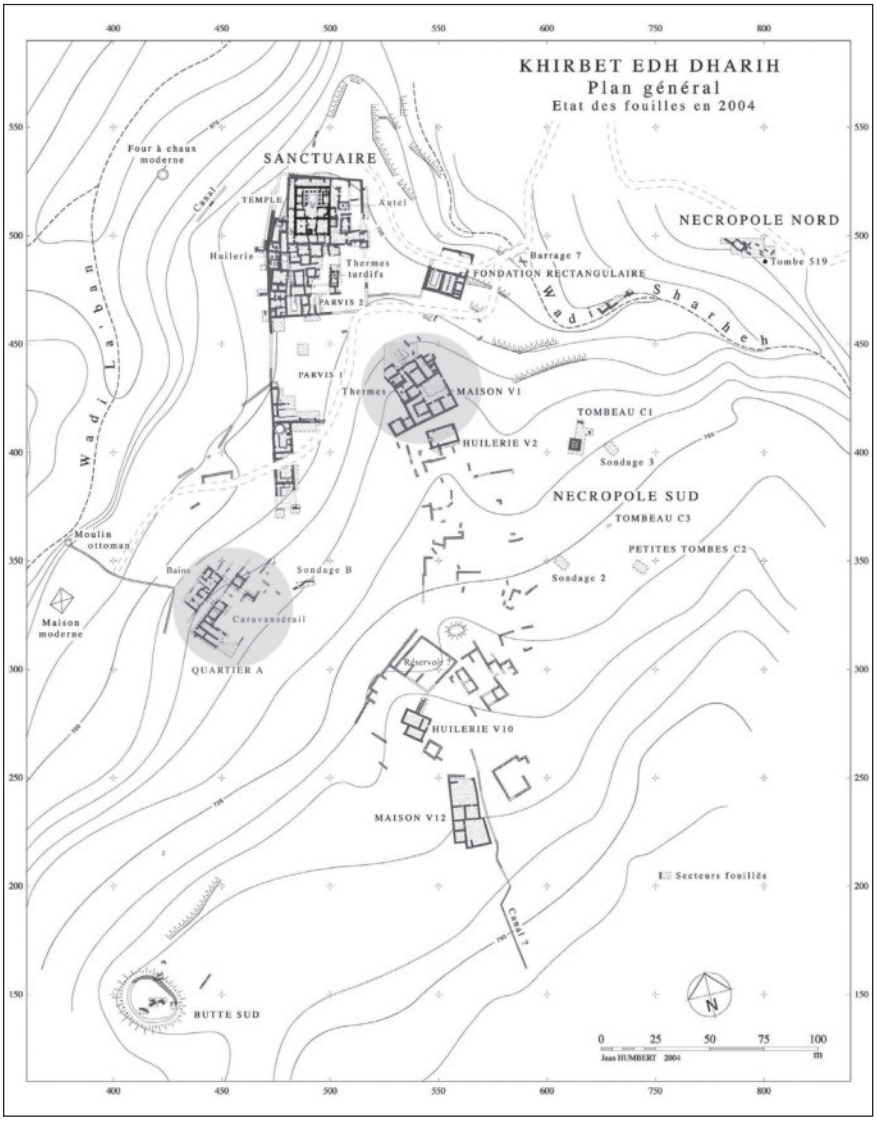
Around twenty domestic buildings were found in Dharīḥ, on the hill overlooking the Nabataean-Roman sanctuary. House V1, excavated between 1984 and 1996[2] is the largest, and has the most interesting features (**Fig. 2**; al-Muheisen and Villeneuve 2000; Villeneuve and al-Muheisen 2008). In 2007, the plan of the house was updated and, together with a review of its architecture, new clues came to light (al-Muheisen and Piraud-Fournet 2013). The finds from the excavations, which are currently being studied, suggest that the house was founded between the 1st and 2nd centuries AD, while the material from the destruction/abandonment layers is no later than the 4th century (al-Muheisen and Villeneuve 2000). The 2013 season was short, with specific goals. First, it was necessary to highlight the troughs between rooms D and E, by cleaning and replacing several fallen blocks to their original position. We needed to understand the original layout in room L, which may be a bathtub, better. Finally, soundings were conducted in the northern and southern parts of the house, in order to date their construction precisely.

Description of House V1

House V1, on the northern slope of the hill, is a compact block covering a surface of at least 900 m^2, and is comprised of three adjoining sections with two courtyards. The southern part of the house is organised around a trapezoidal courtyard (A, 118 m^2). The only known entrance is located on the east side of this courtyard. To the south, the platform provides access to two paved rooms, (B and C). To the west, it provides

1. We would like to warmly thank François Villeneuve and Zeidoun al-Muheisen, who allowed us to undertake this mission, for their help and support. The team consisted of six people: Pauline Piraud-Fournet (IFPO), architect and archaeologist, Laurent Tholbecq (ULB), archaeologist, Caroline Durand (IFPO), archaeologist and ceramicist, Moussa Ali Moussa Serbel, technician and restorer (Yarmouk University) and Gabriel Humbert, logistics. The Department of Antiquities was represented by Aimad al-Drous (DoA, Tafila). This campaign was funded by the University Paris Sorbonne and the CNRS, with logistical support from IFPO Amman. Many thanks are also due to Thibaud Fournet (CNRS-IFPO), for his help and suggestions about the private and public bath installations of Dharīḥ.

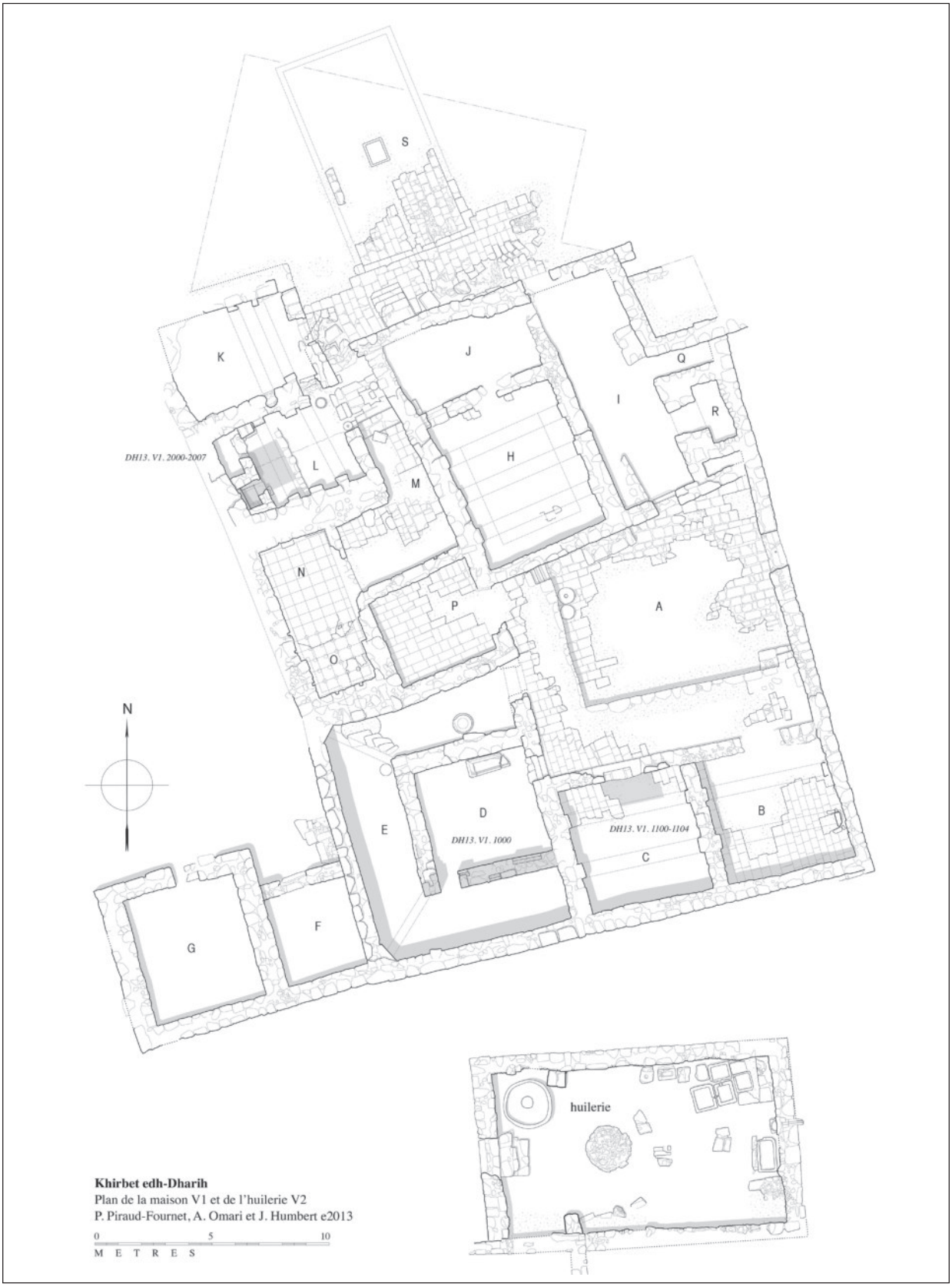
2. In 1984, François Villeneuve excavated Room G; the rest of the structure was excavated by Zeidoun al-Muheisen and his team between 1992 and 1996.



1. General map of Khirbat ad-Dharīḥ, illustrating areas investigated during the 2013 season (© J. Humbert 2004).

access, via two doors, to a central room (D), which is surrounded on three sides by a wide U-shaped corridor €. The northern section is different in its orientation and its installations. It is aligned 13.5° further to the west, and one of the most interesting installations in this part is a large paved courtyard, or esplanade (S) in front of the northern face of the vestibule (J). This esplanade has a dominant position and a panoramic view over Wādī al-Laʻbān and the hills of Wādī al-Ḥasā, as well as over the sanctuary, about a hundred metres lower down.

The western part of the house complex consists of six rooms. Two adjoining rooms to the north (K and L); one long, paved, L-shaped corridor (M) and two other, contiguous rooms (N and O); and a small, square, paved room (P). Rooms (N and O) form one room, with the imprint of a robbed clay tile floor still visible. This room has a kind of alcove, which becomes wider in its façade, with a T-shaped plan. The interior faces of the western and southern walls are cut by five vertical channels, characteristic of rooms heated by hypocausts. The underground part was well preserved until 2012, with the low surrounding walls of brick and the remains of twenty *pilae* stacks of fired clay, which carried the *suspensura* of fired clay slabs, still *in situ*. However, it has recently been completely destroyed. Several more or less contemporary houses, such as a beautiful villa at Wadi Musa and the az-Zantur houses in Petra (EZ III and EZ IV), also have heated rooms of this type, some of which have been interpreted



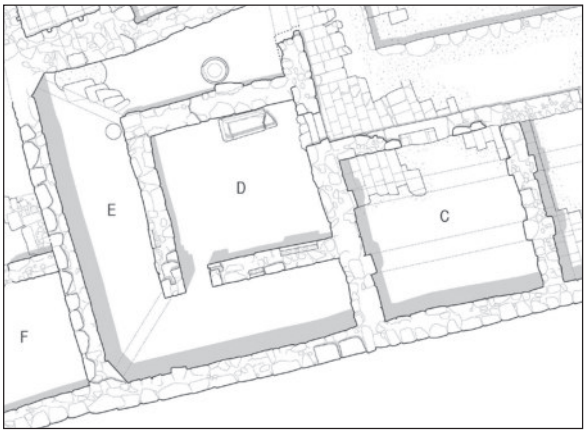
2. Plan of House V1. Grey sections indicate areas investigated during the 2013 season (© P. P.-F. 2013).

as private baths (Nehmé and Villeneuve 1999: 62-71; Kolb 2000; Kolb and Keller 2001: 319).

Field Operations in 2013

Cleaning and Restoration in Rooms (D) and (E) – A Room with Troughs

Rooms (D) and (E) present an unusual organization; a central room surrounded on three sides by narrow corridors, with the walls separating the central room and the corridor pierced by troughs (**Fig. 3**). This configuration is usually found in southern Syrian houses of the Roman and Byzantine eras (Clauss-Balty 2008: 62-70; Bodo and Clauss-Balty 2009). In the late 19th-early 20th centuries, Melchior de Vogué (Vogüé 1865) and Howard Butler (Butler 1914) interpreted these facilities as mangers for animals (horses or cows), with the feed stored in the central room while the animals were kept in the corridors. Since then, many such stables have been identified in domestic contexts in Syria (for example Clauss-Balty 2010); in the Negev, in Mampsis, Oboda and Sobata (Negev 1988 and 1981); in the Jowlan (or Golan; Al-Halabi 2012), etc[3]. The cleaning of the best-preserved wall in House V1, between (D) and (E), supports this hypothesis. One bevelled block (D1), inward sloping, was still in place 1.10 m above the ground-level (the correct height for animals). Three other stones with a similar shape had fallen to the floor, two on the northern side (D2 and D3) and one on the southern (E4). The wall has been consolidated with cement mortar, and many blocks have been reconstructed in their original placement (**Figs. 4 - 5**).



3. Rooms (C) and (D-E) (© P. P.-F. 2013).

The first interpretation is that these were feeding troughs for domestic animals. Nevertheless, access to rooms (D) and (E) may have been difficult for animals, due to their position in the house, relatively far from the main entrance. Another, less convincing, hypothesis is that these troughs were storage vats for crops or for the precious commodities of the house. In a second construction phase, the troughs were blocked with small stones in mortar and earth, and a plain wall was built to separate the room from the corridors; a door was also built into this wall. The blocks of this door, found on the floor, have also been reconstructed. As a large monolithic trough is still standing in room (D), we suppose that, during this second phase, animals (probably smaller, goats or sheep?) were kept in this room. This type of installation

4. Left, on the wall, the trough blocks (D1), (D2) and (D3). On the right, the trough block (E4) (© P. P.-F. 2013).

3. An international conference, held in Paris in May 2015, presented studies and hypotheses regarding ancient buildings or rooms with troughs found in North Africa and the Middle East. Concerning Dharih: see Piraud-Fournet, forthcoming.

5. Overview of the restored southern wall separating rooms (D) and (E) (© P. P.-F. 2013).

6. Excavation of the foundation trench of the front wall of room (C). Discovery of the soleplate (Locus 1101) supporting the pavement (© P. P.-F. 2013).

has rarely been identified in Jordan. However, other troughs are attested at Dharīḥ, in the *mansio* or caravanserai built along the access way to the sanctuary (see *infra*).

Excavations in Room (C)– Foundation Trench of a Main Wall in the Southern Section

During the 2013 season, a 1 m by 2 m square was opened inside room (C), along the threshold of the door. The aim was to determine the date of construction of this room and the southern part of the house. The paved floor in this area lies directly on the bedrock, or sometimes on a slab formed by small stones (**Fig. 6**). A trench was cut into the bedrock and the foundation of the wall with the threshold was built into it. This foundation is made of rows of stones and stone shards bound by a strong lime mortar. The earth inside the trench did not reveal any pottery, but three small sherds of Nabataean pottery were discovered in the wall foundation, dated from the end of 1st c. to the beginning of the 2nd c. A.D.

Excavation in Room (L)– a Possible Bathtub

Room (L) is a small rectangular room, mainly accessible from hallway (M) through a door with a broken threshold (**Fig. 7**). Cleaning of this room has allowed us to complete its description. An interesting installation is located

7. Plan of room (L) (© P. P.-F. 2013).

on the western side of the room. A large stone-niche seems to have been added to an existing room, or was built independently at the same time. A sunken monolithic basin was found in this niche in 1993, accessible by some sort of door in the front wall. Embedded in this wall was a square stone which formed a receptacle with a spout, allowing liquid to flow into the basin. This basin, of slightly trapezoidal shape, measures 0.80 m in length, 0.63 m to 0.56 m in width, and 0.40 m in depth for the most part. Above the monolithic basin, the inner walls of the structure are constructed of thin, horizontally placed sandstone slabs, embedded in a layer of mortar. None of the previous assumptions regarding this niche appear to be convincing; fortunately, the 2013 season provided new information. The southern part of the basin is cut so as to form a seat flanked by two small inclined ramps (**Fig. 8**). An outflow hole was found in the bottom of the basin. In order to understand the direction of the outflow, we opened a sounding of 1.50 m by 3 m in front of the stone niche.

The floor of the room no longer survives. We found only the thick layer of whitewash (thickness: 0.15 m) which supported it, which was based on another layer of earth and small stones. Both covered a layer of compact earth containing a lot of charcoal, animal bones and some pottery (all from the end of the 1st to the beginning of 2nd c. A.D.). Under these layers, as we expected, a large channel made of stone-blocks was discovered (**Fig. 9**). All the *loci* we dug inside this channel yielded, *prima facie*, Nabataean pottery (end of the 1st to the beginning of 2nd c. A.D.). We also sampled the ashy layer for future archaeobotanical studies. Since the liquid from the basin was removed by means of a wide channel, it is tempting to describe it as a bathtub. The bather entered the niche at the front, settled on the small seat and washed. It is possible that the drain was clogged and his body was partially submerged in the basin, or that the user washed himself with water flowing from the spout, which then flowed out through the drain. The two small inclined ramps beside the seat may have been designed to facilitate the water drainage. The channel is surprisingly large considering the small evacuation-hole of the basin (diameter 0.04-0.05 m). It was probably part of the main common sewer under the house, possibly coming from heated rooms

8. Sunken monolithic basin inside the niche (© P. P.-F. 2013).

9. The bathtub in the niche and the channel during excavations (© P. P.-F. 2013).

(N) and (O), or from the west, running under the basin of the room (L). Unfortunately, the material under the basin has collapsed, and it is not possible at this time to determine the source of this sewer.

In the Hellenistic world, small individual tubs, most usually "hip-baths", are well documented in private homes and in public baths, in Egypt (Fournet and Redon 2013) and Palestine (Hoss 2005). It seems that from the end of the 1st c. A.D., hip-baths from the Greek tradition tend to disappear in favor of immersion baths from the Roman tradition. In Jordan, recent works undertaken in Petra, on the top of Umm al-Biyara, uncovered a thermal building with small individual tubs (Schmid and Bienkowski 2011)[4]. These are not equipped with seats, but their walls are made of long slabs, set on their edges and joined with mortar. This building, dated by the excavators to the 1st c. A.D., may be a good parallel for the House V1 bathtub. Another interesting parallel comes from southern Syria, where many dwellings have been explored. Ancient houses from the villages of Amra and Hit (Bodo and Clauss-Balty 2009: 241-242), dated by architectural studies to around the 3rd c. A.D., have a niche in some rooms (approximately 1 m^2 and 1.80 m height). Some have a small basin inside the niche, while on the door jamb, outside the niche, is a protruding stone with a receptacle and a small conduit passing through the wall. Thanks to this installation, interpreted as a small sink, one can supply water from outside to the small basin inside the niche. This discovery allows us to imagine that, in House V1, a servant discreetly provided water to a person sitting in the bathhouse. If it is indeed a bath, Room (L) could be a bathroom, but we need to confirm this through further exploration.

Conclusion

Elucidating the trough system and discovering a probable small, sophisticated bathtub contribute to our knowledge of ancient habitation in Jordan. The southern side of this house seems to be a domestic area, with three residential rooms with paved floors and plastered walls, a stable and a large service courtyard with elements specific to domestic activities (kitchen items). On the northern side, we can perhaps recognize a luxurious area with a heated chamber, a possible bathroom, a room which may have stored betyls, a terrace overlooking the main sanctuary and a hypothetical large reception room. These two parts have undergone a transformation, and the first is probably older than the second, although the material collected during excavation does not yield conclusive evidence. The organization of the house and the findings of this season further support the suggestion that it could have belonged to a wealthy owner, perhaps the family who built the sanctuary, administered its possessions or took care of the religious services.

Area A

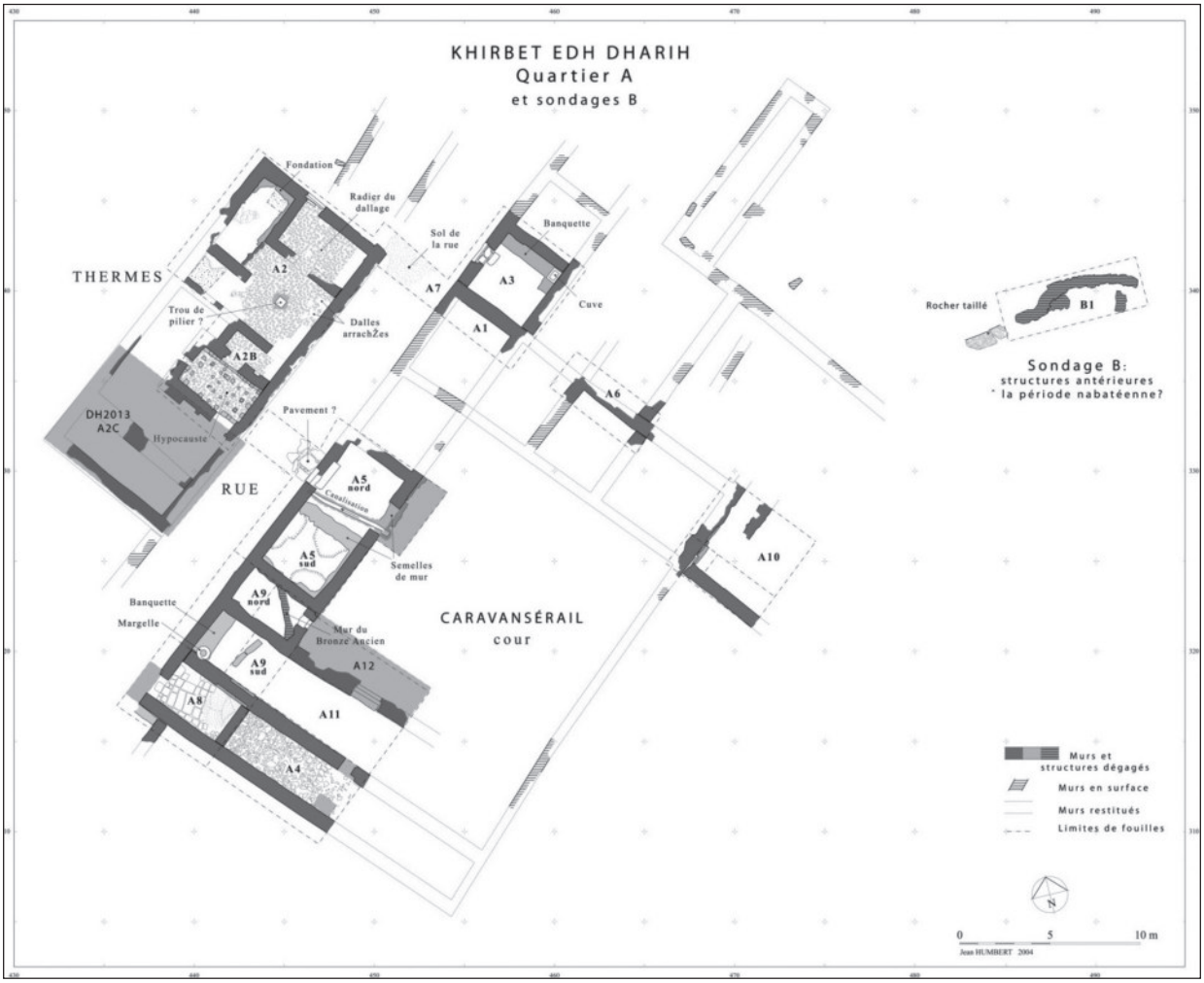
In 2001 and 2004, soundings were opened in a relatively flat area (alt. *ca*. 710 m) situated between the wadi (alt. 685 m) and the village (735 m), at about 150 meters south-west of the sanctuary (Villeneuve and al-Muheisen 2008, 1504-1506). They revealed the presence of an ancient caravanserai and its associated bath-complex on both sides of a *c*. 4 m wide unpaved way (**Fig. 10**).

A Roman Mansio (L. Tholbecq)

A *c*. 30 m by 20 m building, organized around a courtyard (*c*. 19 m by 12 m) and surrounded by independent rooms was discovered at Khirbat ad-Dharīḥ during the 2001 season, on the southern access-way to the temple area. It was partly excavated in 2001, 2004 and 2013. The general layout of the building has been defined through several probes, the main work focusing on the south-western rooms of the building (Villeneuve and al-Muheisen 2008: 1504-1506)[5]. The maximum preserved

4. The discoveries of the "International Umm al-Biyara Project" were presented by Piotr Bienkowski at the ICHAJ conference in Berlin in May 2013. See also online reports 2010 (http://www.auac.ch/iubp/season2010/iubp_2010_text03c.html) and 2012 (http://www.auac.ch/iubp/season2012/iubp_2012_text03b.html), Figs. 9 and 11.

5. The excavations were directed jointly by François Villeneuve and Zeidoun al-Muheisen. Square supervisors were Laurent Tholbecq (Squares DH01-A1, DH01-A3, DH01-A4, DH01-A5North, DH01-A6; DH04-A5South, DH04-A10; DH13-A12); Béatrice and François Villeneuve (DH04-A7), Nural-Dîn al-Saad and Mohammad al-Mearaj (DH04-A4, DH04-A8, DH04-A9, DH04-A11).



10. Plan of Area A. The mansio and the bath-complex. Grey sections indicate areas investigated during the 2013 season (© J. Humbert 2004).

elevation of the rather poorly built walls reaches *c*. 1.50 m. Due to the position of the excavation squares, and despite the opening of a probe on the supposed north-eastern angle of the building (A10), the plan of the complex and the limits of the inner open-air court remain hypothetical. The complex is interpreted as a *mansio*, which housed visitors to the sanctuary, as nothing in its construction method or the finds seem to point towards a military function or occupation of the building.

The building opens on its western side through a *c*. 1.90 m wide gate. So far, this seems to be its only existing access, as no other opening has been identified in the northern (probe A6) and southern walls (probe A4) of the complex (although its eastern limit remains unexplored). This gate connected the path from the neighboring bath-complex (see *infra*) to a 3.80 m by 8.2 m porch (room A5), which opened on its eastern side by a second gate, accessing an open-air inner court. This western porch was originally divided into two square rooms of equal size by a very poorly built E-W wall, which supported two N-S arches on both sides of the wall. Surprisingly, this internal dividing wall and the eastern wall of the porch sit directly on Iron Age and/or Bronze Age structures (**Fig. 11**). The floor of the porch is crossed by a roughly built water channel, running from the east (inner court) to the street; its function (sewer?) remains unclear. The connection between this water channel and the baths is not established. On the west, in front of the main gate, the surface of the road has been paved with heavy flagstones (a *c*. 2 m by 1.5 m paved surface). The porch is apparently flanked on the north by two unexcavated rooms. The

11. Iron Age and/or Bronze Age structures located under the mansio (© L. T. 2013).

northwestern exterior corner of the caravanserai has been unearthed (probe A1). South of the entrance porch is a 3.7 m by 2 m room open to the inner court (room A9 north).

South of the central inner court, two large parallel rooms were partly excavated in 2004 (rooms A8+A4 on the south, of at least 12 m by 2.5 m; rooms A9 South+A11 on the north, of at least 12 m by *c*. 3 m). This last room, accessed by the northern room through a 2.05 m wide gate with a grooved threshold stone *in situ*, was originally closed by a double door. Due to the existence of V-shaped feeders in the parting wall *c*. 1 m from the floor, they are interpreted as stables, probably used to shelter animals (horses, mules or donkeys; **Fig. 12**). If one considers that this door is centered on the inner court, one can possibly imagine a *c*. 19 m wide room.

This feature is not unparalleled in Jordan. For instance, an early Roman *mansio* excavated in Khirbat as-Samra and connected to the *Via Nova Traiana* exhibits similar patterns, with long rooms reaching *c*. 17.5 m and almost 22 m (Humbert 1993: 92-93, Fig. 40-41). The presence of feeders, together with the absence of exterior buttresses, platforms, ventilation systems or specific storage vessels, exclude here an interpretation of these rooms as granaries or *horrea* (see *e.g*. at Lejjûn, Crawford 2006: 235-240, Fig. 9.; Fig. 3.3).

The possible existence of an eastern row of rooms is suggested by symmetry with the western row (*c*. 5 m wide). In this case, the main entrance gate to the stables would have been centered on the main N-S axis of the building. A 2 m by 2 m probe in the eastern

12. View of the beveled feeders in the "stables?" (© L. T. 2013).

sector of the southern room (A4), opened in 2004, proved that the rough pavement made of boulders was built on a 2/3 cm thick yellowish mortar connected to the foundation of the southern wall. It appears to demonstrate that this pavement was built together with the southern wall of the caravanserai. Due to its mediocre quality, and unlike the other pavements of the complex from both the rooms and the inner court, this rough pavement was not repaired during the Byzantine period.

During the 2013 season, a 7.5 m by 2 m square was opened north of room A11 (open space A12). The aim was to have a better understanding of the inner court partly identified by the probe opened in 2004 east of the main porch. Surprisingly enough, no tumble or destruction of the upper elevation of the walls was discovered in the eastern half of the probe. This leads us to the conclusion that some of the building material was looted in this area, unlike the western side of the court, where the tumble of building material was found. The excavation

uncovered the base of a pavement, which was probably looted during the Byzantine period. We reached a similar conclusion in 2004 from the opening of the probe east of A5, where dumped ceramic material from the late 1st c. A.D. was found to be connected to this base (see *infra*). There is so far no evidence of any inner portico. The excavation of the building is indeed rather frustrating, as part of the construction material was looted both after, and seemingly before, the destruction of the building. In the exposed rooms, the destruction debris/tumble covered what is interpreted as the base elevation of the pavements, of which no single element has so far been found *in situ*. The date of the building can be established from several converging chronological clues delivered by independent *loci*. The earliest data connected to the building's use dates from the end of the 1st or the beginning of the 2nd century AD (**Fig. 13**). When identified, occupation levels can be dated to the 2nd and 3rd centuries. Ceramic finds associated with the destruction levels are dated to the late 3rd or early 4th c. AD.

Several shops were built along the road. Room A3 (3.70 m by 3.70 m) abuts the northwestern angle from the caravanserai, and Room A8 was opened during a secondary stage in the south-western angle of the building, reducing the original length of Room 11.

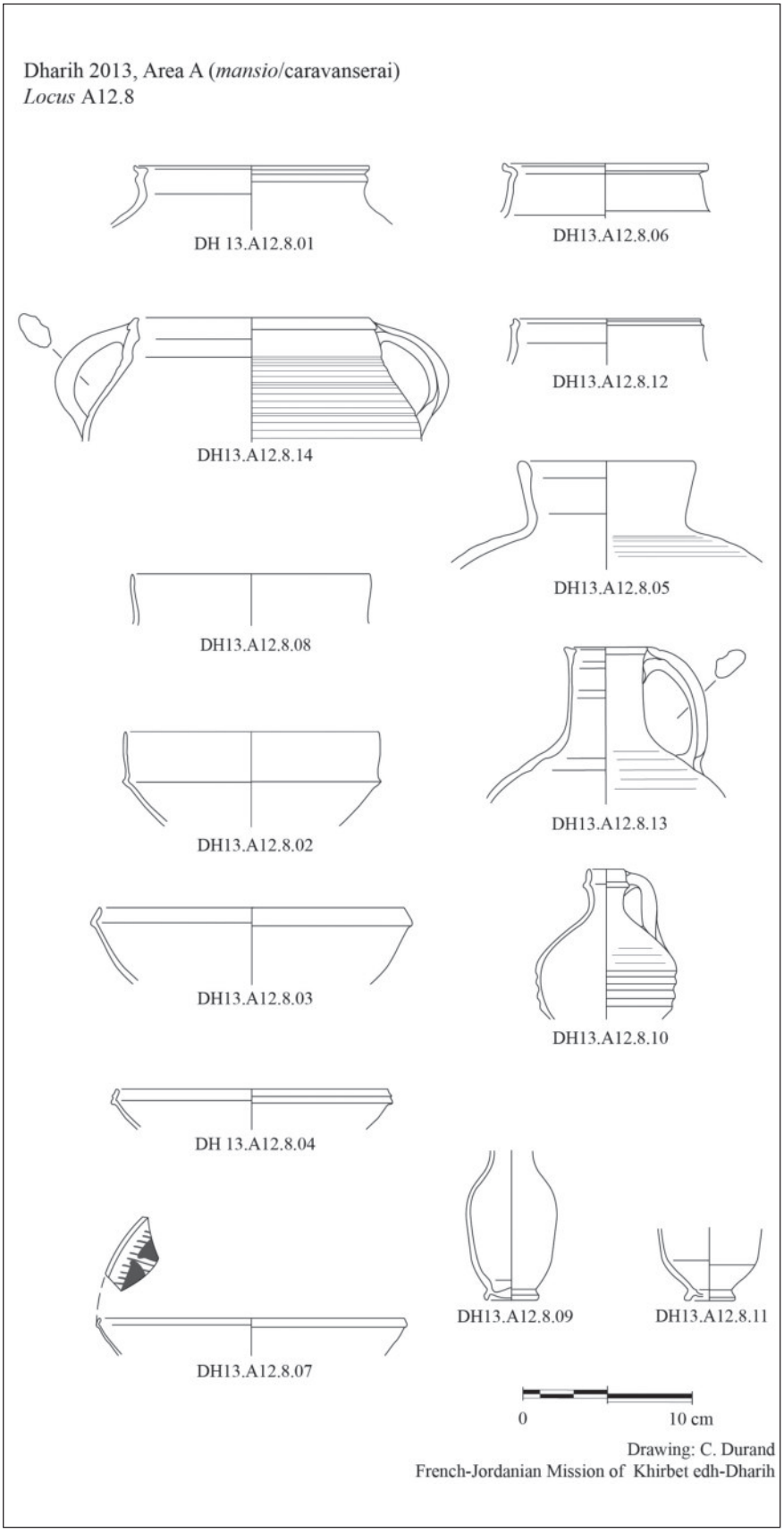
Looking for general comparisons, in addition to the *mansio* of Kh. as-Samra, one could point to several settlements identified through surveys and excavations as Nabataeo-Roman caravanserais built along the Petra-Gaza road; *e.g*. in Mo'a, Sha'ar Ramon/Qaṣr al Mahale and Oboda (Cohen 1992: 1135-1145; Erickson-Gini 2010: 17-24). As far as one can tell, Qaṣrr at-Tayyiba, in the Wādī Arabah, seems typologically and chronologically close to our building (Smith *et al*. 1997: 62-63; Smith 2010: 36-37).

A Public Bath-Complex (C. Durand)

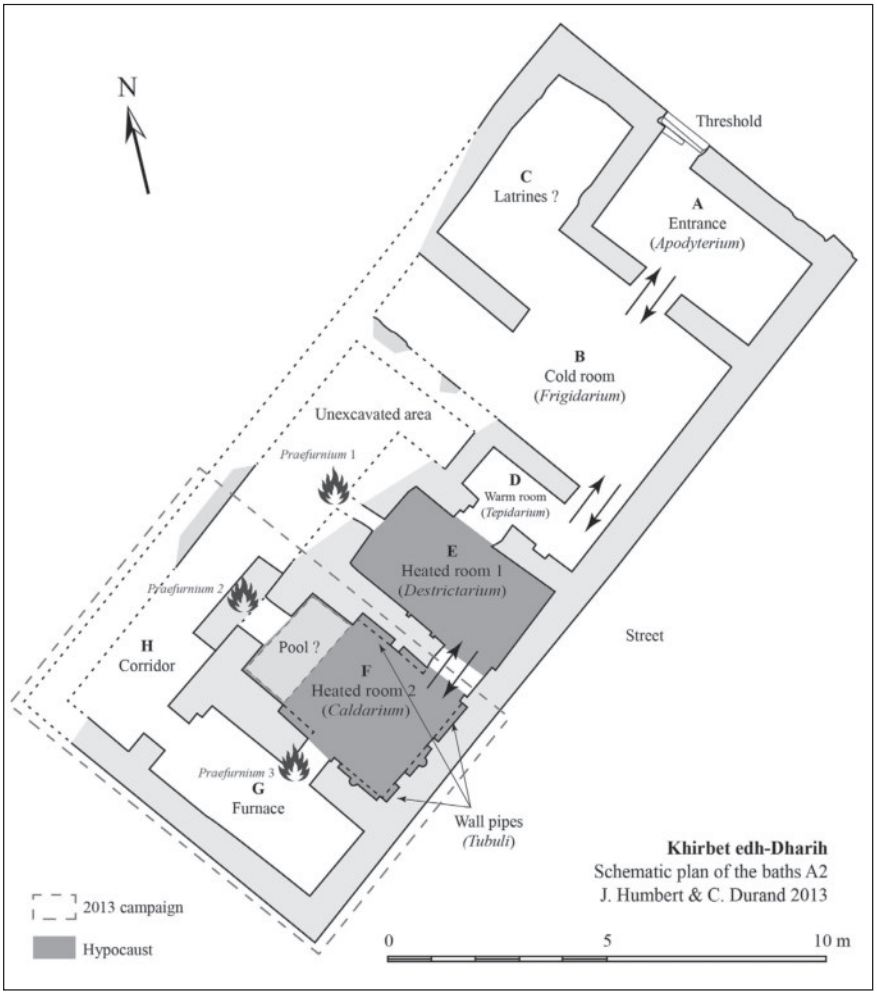
As well as the caravanserai/*mansio*, the public bath-complex was discovered in 2001, and excavation continued in 2004 and 2013. A first restoration, with identification of the rooms and bathing circuit, was proposed in 2008 (Durand 2015). However, the southern part of the building was not completely excavated, and restoration was still hypothetical. The main objective of the 2013 campaign was to complement this excavation in order to obtain the general plan of the bath complex (**Fig. 14**). Our goal was also to better understand its organization, particularly the water and heating systems.

The 2001 and 2004 campaigns have established that this building belongs to the axial row type (Krencker 1929: Abb. 234-240 (Type 1); Nielsen 1990 (vol. II): 51, Fig. 1; see also Rebuffat 1991). The rooms adjoined each other, and the bather had to come back the same way in order to leave the building. The entrance of the building (Room A, *apodyterium*) is located in the north. It is a small rectangular room (4 m by 3 m), with a paved floor. Only two rows of rectangular slabs against the eastern wall were found *in situ*. The rest of the pavement has been removed, probably during the Byzantine period, when a small Christian community settled in Dharīḥ and built a village in the first court of the ancient Nabataean temple. This entrance leads to a second, larger and square room (Room B, 5 m by 5 m). Its pavement has been removed, together with that of Room A. It was the cold room of the bath complex (*frigidarium*). In the center of this room, we found a square cavity, formed by four large blocks embedded in the ground under the paving. Its function is still undetermined; it could correspond to the location of a central supporting pillar, possibly of wood. The western part of the building is extremely damaged and leveled, due to the slope of the hill. Therefore, the rooms located in this part could not be formally identified. The small room located in the north-west corner of the building (room C) was interpreted as a latrine, because of its situation close to the entrance and to the cold room. A deep sounding in the northeastern corner of this room demonstrated that the walls, as in the caravanserai, were partially founded on former rectangular structures, probably dating from the Bronze Age.

Room B opened to the south, leading to a small room (1 m by 3 m) which was interpreted as the *tepidarium* (warm room, Room D). This room was a connecting zone between the cold part of the building, and the heated rooms. The following room (Room E, 2 m by 4 m) was heated with a hypocaust system, fueled via a



13. Pottery assemblage from Locus A12.8 (© C. D. 2013).
DH13.A12.8.01 *Cook-pot, light red to orange fabric, reddish-brown slip (ext.), small white inclusions. Diam. rim 14 cm.*
DH13.A12.8.02 *Carinated bowl, fine ware, light red to orange fabric, white slip on the exterior of the rim. Diam. rim 15 cm. (close Schmid 2000: Fig. 100, 117)*
DH13.A12.8.03 *Carinated bowl, light red fabric, traces of white slip on the exterior of the rim, small black and white inclusions. Diam. rim 18 cm. (Schmid 2000: Figs. 49-51, Group 6)*
DH13.A12.8.04 *Carinated bowl, fine ware, light red to orange fabric, white slip on the exterior of the rim, red slip on the interior. Diam. rim 16 cm. (Schmid 2000: Figs. 54-56, Group 7)*
DH13.A12.8.05 *Jug with everted neck and rounded rim, greyish-brown fabric, traces of greyish-white slip, white inclusions. Diam. rim 10 cm.*
DH13.A12.8.06 *Jar/cook-pot with inverted neck and everted rim, pinkish fabric, white slip, small white inclusions. Diam. rim 12 cm.*
DH13.A12.8.07 *Painted Nabataean bowl, fine ware, light red to orange fabric. Diam. rim 18 cm. (Schmid 1996: 206-207, Figs. 700-701, Phase 3b)*
DH13.A12.8.08 *Carinated bowl (?), fine ware, light red to orange fabric, small white inclusions. Diam. rim 14 cm.*
DH13.A12.8.09 *Small bottle/juglet, fine ware, light red to orange fabric, red slip outside. Diam. base 3 cm.*
DH13.A12.8.10 *Globular juglet with ribbed body, light red to orange fabric, grey core, red slip outside, small white inclusions. Diam. rim 2 cm. (Schmid 2000: Figs. 324-325)*
DH13.A12.8.11 *Small bottle/juglet, fine ware, light brownish fabric, grey core, white slip outside. Diam. base 3 cm.*
DH13.A12.8.12 *Cook-pot, light red to orange fabric, traces of white slip outside, white inclusions. Diam. rim 12 cm.*
DH13.A12.8.13 *Jug, light red to pinkish fabric, white slip outside, white inclusions. Diam. rim 5 cm.*
DH13.A12.8.14 *Cook-pot with beveled rim, two ridges on the interior, ribbed body, light red to orange fabric, grey core, reddish slip outside, small grey and white inclusions. Diam. rim 14 cm.*



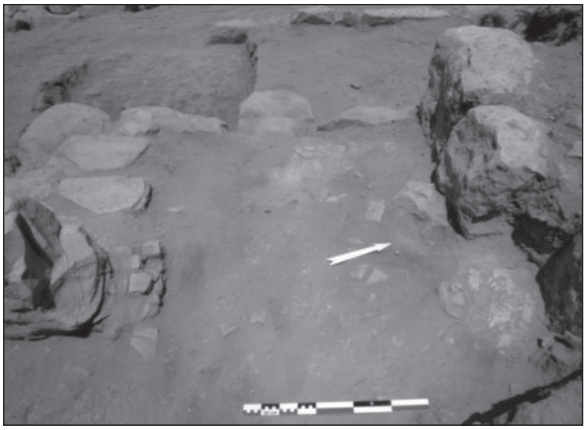
14. Plan and restoration of the Nabataean-Roman baths of Dharih (© C. D. 2013).

heating channel in rectangular bricks located in the western wall of the room (*praefurnium* 1). Warm air was diffused vertically and horizontally through the rows of *tubuli* placed against the walls of the room. It was evacuated from the roof by several embedded chimneys, as evidenced by the vertical grooves regularly placed in the walls. This kind of device is known in Syria between the 2nd and the 4th c. AD, for example in the Roman baths of Bosra (Fournet 2007: 253). According to the traditional plan of Roman baths, this room must have been a cleaning/sweating room (*destrictarium-laconicum*). Although the rest of the building remained unexcavated at the end of the 2004 season, the presence of a second heated room to the south was already suspected, as there were four channels running under the southern wall of Room E.

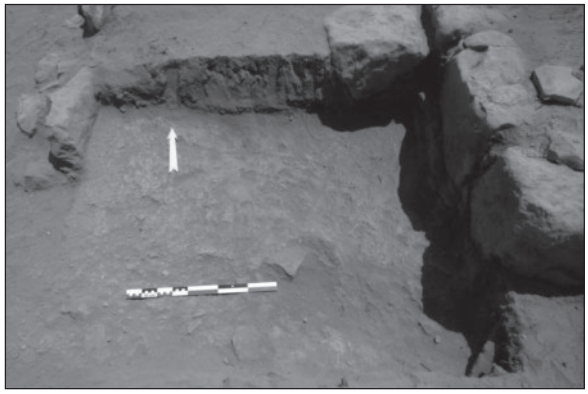
During the 2013 season, this room (F) was partially excavated. According to the plan of the building, it was interpreted as the *caldarium*, which is usually characterized by the presence of a hot pool. The room is slightly larger than Room E (*c.* 3 m by 4 m), becoming narrower in its western part (*ca.* 2 m wide). A thick destruction layer was excavated, containing numerous fragments of ceramic pipes (*tubuli*), together with different sized bricks and mortar pieces, which have confirmed the hypothesis of a second heated room. Due to the short duration of the campaign, the hypocaust was not excavated this year. On the northern, southern and eastern walls of the room, one can notice several rectangular projections, regularly disposed. These are characteristic of the heated rooms in Roman baths, which flanked the "*tubuli* panels" placed against the walls. In addition, at least two semi-circular grooves (chimneys) have been uncovered in the south-eastern corner of the room. In the western part of the room, the thickening of the

northern and southern walls probably indicates the limits of a large pool (*ca.* 2 m by 1 m) built against the western wall. A heating channel is visible in the center of this wall (*praefurnium 2*; **Fig. 15**), although it has not been excavated yet; two stacks of bricks appear on each side of the opening. This *praefurnium* appears to be embedded in a rectangular structure (*c.* 2 m by 0.7 m), built against the western wall in Room H. It could be the supporting base of a heated cistern, directly linked to the pool, just on the other side of the wall.

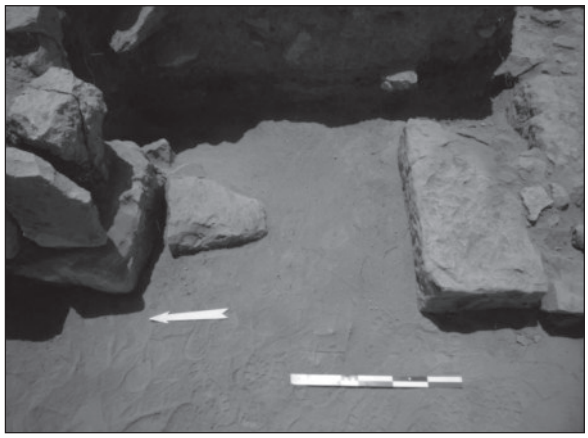
Room H was excavated in its southern part. It is a long, rectangular corridor type, located to the west of rooms F, G and probably E. This corridor facilitated entry of the fuel for the furnaces which heated rooms E and F (*praefurnia* 1 and 2), as evidenced by the thick layer of ashes (*c.* 30 cm) located just under its surface. This ashy layer was partly removed in front of the rectangular structure, by means of a sounding *c.* 1.50 m wide. This revealed a floor level which can probably be interpreted as the circulation floor (**Fig. 16**)[6]. Due to the slope of the hill, the north-south wall closing Room H to the west has almost totally disappeared. Consequently, the location of the access door to the corridor from outside the building cannot be determined. However, a door which opened to Room G, located to the south of Room F, and which was partly excavated on its eastern side in 2004, was discovered (**Fig. 17**). Unlike rooms E and F, it is a simple room without a heating system. A stack of rectangular bricks in the middle of its northern wall suggested the presence of another heating channel opening to Room F (*praefurnium* 3). This *praefurnium* was partly excavated in 2013, after removal of the deep destruction layer (**Fig. 18**).



15. View of praefunium 2 (© C. D. 2013).



16. View of the floor level under the ashy layer, Room H (© C. D. 2013).

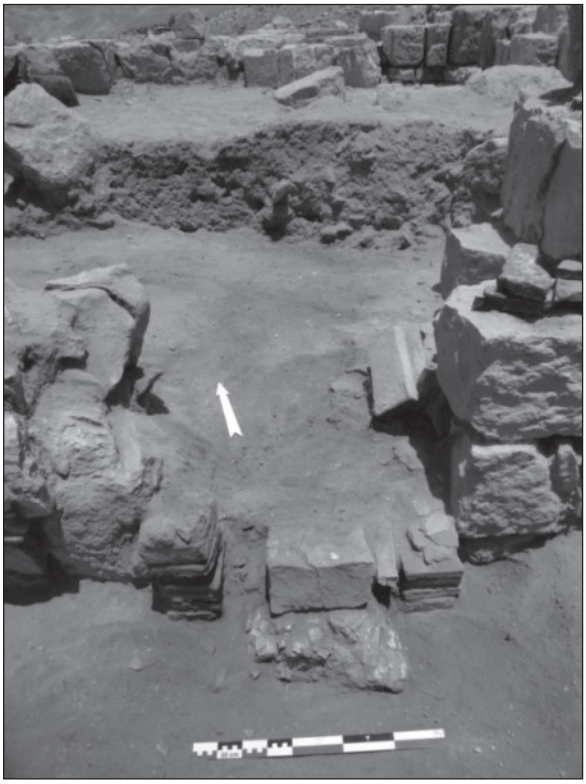


17. The door between rooms H and G (© C. D. 2013).

The water system for this bath-complex is still poorly understood; further investigation in the western part of the building, under the foundation level, would probably provide more information. Similarly, other than construction material (*tubuli* and bricks), the pottery found in the bath is very scarce and does not establish a definite date. Nevertheless, it does suggest a utilization period between the 2nd and the 4th c. AD. A complete Roman lamp, found near the *praefurnium* 2, is dated to the 2nd to 3rd c. AD (**Fig. 19**; same type: Durand 2011: 72, n. 32-37; ʻAmr 2004: 242, Fig. 5).

Based on its organization, this bath-complex seems to be inspired by the Campanian architectural model, which was diffused throughout the whole Roman Empire during

6. Some ash samples were collected in order to analyze the botanical remains. The study will be conducted by Charlène Bouchaud (Muséum d'Histoire Naturelle, Paris).



18. View of praefurnium 3 (© C. D. 2013).

19. Roman lamp from bath A2 (© P. P.-F. 2013).

the 1st c. AD. The closest parallel in the Near East can be found at Sleim (Southern Syria), where the baths are dated to the 1st c. AD or the beginning of the 2nd c. AD (Fournet 2010). Another close example, both in its plan and its date, is the Roman bath recently excavated in Xèron Pelagos, in the Egyptian Eastern Desert (Redon 2011).

Conclusions for Area A

The discovery of a *mansio* and its associated bath-complex in Dharīḥ is of special interest. The identical phasing of these buildings suggests they both belong to a single phase which was initiated at the turn of the 2nd century AD. Their construction seems therefore contemporary to the rebuilding of the main sanctuary. The association between a caravan-station and a bath is common in the Roman world. Examples in the Nabataean area include Sha'ar Ramon (Erickson-Gini 2010: 22), En Hatzeva (Cohen 1994: 205) and Mampsis (Negev 1988) in the Negev; Humeima (Oleson 1993; Reeves 1997), Bir Madhkur (Smith 2010: 39) and Gharandal (Darby and Darby 2012; Keller *et al.* 2012) in Jordan. Nevertheless, as far as we know, similar accommodation infrastructures have never been found in the Roman Near East within a religious complex; we can therefore assume that this complex was eventually used by pilgrims who frequented the regional sanctuary of Dharīḥ. Moreover, an eventual link between the construction of this complex and the Roman military presence in the region after the annexation of the Nabataean kingdom is not confirmed, since the caravanserai does not seem fortified (for the link between the bath and the army in Roman Egypt, see Redon 2010).

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NARRATING CONTESTED PASTS: LESSONS LEARNED AT TALL ḤISBĀN

Øystein S. LaBianca and María Elena Ronza

Abstract

This article begins by discussing the challenge of how to deal with conflicting views of the past, that frequently confound efforts to engage the local community in attempts to preserve and present particular cultural heritage sites. In the case of Tall Ḥisbān, Jordan, our solution to this problem was to emphasize the site's connections to global history. To this end, we have highlighted stories about continuities between the past and the present, about the changing environment, about changes in food procurement strategies over time, and about the resilience of the local population in coping with a long succession of imperial interventions. The article goes on to provide examples of twelve different strategies trialled at Tall Ḥisbān to engage the local community in heritage site preservation and presentation. It is posited that success in engaging the local community depends less on any one single strategy than on unabating persistence, willingness to be flexible, and on the synergetic interaction of multiple interconnected strategies, trialled over an extended period of time.

Heritage sites can be thought of as narrative nodes or dots on the round sphere we call Earth, where one particular event or a series of events of assumed importance to the story of humanity took place and/or continue to unfold. With such a global perspective as a point of departure, the operative question becomes: Important to whom? A related question is: How do particular nodes acquire importance as cultural heritage sites?

A case in point is Tall Ḥisbān in Jordan, which is one among hundreds of cultural heritage sites (all potential narrative nodes) along the highland plateau overlooking the Jordan River and the Dead Sea. From the perspective of numerous 19th century travellers to the site, and from that of the archaeologists who started excavations there nearly fifty years ago under the banner of the "Heshbon Expedition," its importance was its presumed association with the biblical account of the conquest of the "promised land" by the Israelites (Horn 1982). Early travellers also recognized the site as an important Hellenistic, Roman and early Christian (Byzantine) ruin (a supposition that has since been borne out by archaeological excavations). Renewed excavations at the site, begun in 1997, have brought into full view its significance as an important Islamic heritage site, adding valuable insight to narratives about the character of rural outposts in the hinterlands of the Umayyad, Abbasid, Ayyubid, Mamluk and Ottoman empires (Walker 2011).

But of what significance was this narrative node, this object of academic and pious inquiry by scholars and pilgrims from abroad, to the people who live in and around this ruin today and whose claimed association with the site is said to go back at least to the sixteenth century AD? There are many answers to this question. To begin with, discoveries on the site's summit of human interments from the Late Ottoman period attest to its importance as a burial ground. Ethnographic interviews with the local population revealed that certain of the tall's many caves were used by local families as shelters for people and animals on a seasonal basis. The tall's importance as a place to shelter flocks of sheep and goats is also attested by several circular enclosure walls made of field stones; the unmistakable residue of herding

stations. Also significant to the local population has been the large quantity of anciently quarried and cut stones contained in the collapsed and partially standing ruins of ancient buildings on the tall. These have provided ready-to-use building materials for new generations, as can be seen, for instance, in the Late Ottoman heritage buildings still standing in the village today. And, last but not least for antiquities hunters, the tall has been, and continues to be, a place to search for ancient objects, which are sold in the antiquities market; even if all such activity is illegal. Beside these many practical aspects, the tall may also, at one time, have played a sacred role in the life of the surrounding community, as is attested by the local name of the tall itself "al-Musallah," a place for prayer.

The commencement in 1968 of archaeological excavations at Tall Ḥisbān by Andrews University archaeologists, in cooperation with the Department of Antiquities of Jordan (DoA), had significant consequences for locals living near the tall. To begin with, the erection of a fence around its perimeter by the DoA changed the perception of the site, diminishing its centrality in the daily life of the village. The use of the area inside the fence thus became subject to government regulations and monitoring; not especially a welcome development from the point of view of many in the village, as it limited, temporarily at least, access to the site by local herders and their flocks. But the coming of the archaeologists and their government partners also had its up-sides. It brought a source of cash to many families in the village, as fathers and sons received seasonal employment, working for the expedition. It brought opportunities to connect with bureaucrats and other individuals from Amman and beyond, from whom favours could be sought on behalf of individuals, families, and the entire village, and it provided daily opportunities to learn a new language, and to form new friendships between the locals and the members of the archaeological mission.

But perhaps the most intriguing aspect of the encounter between the foreign archaeologists and their Jordanian hosts pertains to how the purpose of the expedition was understood by its various participants. During the early years of this encounter, there was much puzzlement about the many strange procedures introduced by the archaeologists, especially their seeming obsession with careful separation and documentation of layers of soil and with collecting broken pieces of pottery and animal bones. The notion that what the archaeologists really were after was Turkish gold, has remained a suspicion in the minds of locals for the entire time that archaeologists have been working at the site. To notions such as these can be added the troublesome idea that what the expedition really was after was proof that Tall Ḥisbān indeed was biblical Heshbon, the Amorite city which, according to Numbers 21:21-31, was conquered and rebuilt by the tribe of Reuben. This was, of course, indeed a much hoped-for outcome of the original Heshbon Expedition, at least in the minds of its founding director, Siegfried S. Horn, his faculty colleagues, students and of his financial sponsors (Horn 1982).

What emerges from this brief overview of various participants' engagements with Tall Ḥisbān as a narrative node is that the tall has, as it were, multiple pasts, each with their own constituencies and curators. From the perspectives of those who live there today, it is a link to past generations through its association with once vital burial grounds, residential caves, cisterns, herding stations, and pastures. From the perspectives of the early travellers, the founders of the Heshbon Expedition, and many of the tourists who continue to visit the site, it has special meaning as the leading candidate for the Heshbon remembered in 37 different passages in the Hebrew Bible. From the perspective of Classics scholars, it is an important junction town in the Roman Province of Arabia; strategically located where the Via Nova Triana intersects the road to Jericho and Jerusalem. To Christian pilgrims and early church history devotees, it is an important ecclesiastical center; the seat of a bishopric during Byzantine times. And to students of the history of the rise and spread of Islam, Tall Ḥisbān is important because of what it can teach us about rural livelihoods and governance along the often contested frontiers of successive kingdoms, caliphates and empires, including those of the Umayyads, Abbasids, Ayyubids, Franks, Mamluks, and Ottomans.

Given such a situation of multiple narratives,

each with their own curators and stakeholders, it should come as no surprise that decisions about which narrative(s) to highlight when presenting a site to the public can easily become a conflicted and challenging undertaking. Conflicts arise, of course, from the fact that each stakeholder has his/her own desired past (Scham 2009); stories about the past that have deep emotional meaning to a particular individual or group. A good example is the claim that Tall Ḥisbān is biblical Heshbon. As already indicated, this was a *desired past* of the original excavators of the site, and it continues to be a longed-after desired past that has deep significance to many Jewish and Christian pilgrims to the site. Muslim visitors have also come to see the site for this reason. At the same time, this claim is *contested* by many archaeologists (and staff of the DoA), who question it on archaeological grounds. In the case of some locals, the suggestion that Ḥisbān is biblical Heshbon is simply *forbidden*, as evidenced by their destruction of signage mentioning the Old Testament connection. Yet, it is a claim that members of the tourism industry have recently rallied to highlight, because presenting Jordan as "the land of the Bible" is a business model that seems to work well for many travel agents in and outside of Jordan. In this case, the Old Testament connection becomes part of a marketing scheme; a propaganda past[1].

Significantly, it is thanks to a long history of engagement with the local community that these conflicting desired pasts have gradually come to light. This engagement began during the first phase of excavations at Tall Ḥisbān (in the late sixties and early seventies), with the policy of involving the local clan headmen (mukhtars) in the process of hiring workmen, and resolving any conflicts that might arise between expedition staff and the locals. This fostered a sense of cooperation and trust between the village elders and the expedition leadership, which also allowed for occasional exchanges of ideas and concerns about the overall goals of the project. The participation on the dig not only of staff (representatives) from the DoA, but also of a number of archaeology students from the University of Jordan and elsewhere, ensured that the extensive Islamic remains unearthed by the seminarians from America were given their due attention (Sauer and Herr 2012) Finally, encounters in the local village, which resulted from the initiation in 1973 of ethnographic and taphonomic investigations by the author, his wife, and his students, which aimed to expose the processes by which the remains of domestic and wild animals enter the archaeological record. As the majority of the ethnographers who assisted with these inquiries were women, a way was thus opened up for local village women to be heard, and provide input with regard to the goals and activities of the expedition.

In contrast to the largely unplanned efforts at community engagement of the original Heshbon Expedition, the initiation in 1997 of a second phase of fieldwork (under the banner of the Hisban Cultural Heritage Project), was animated to a significant degree by a vision of engaging the local community in the maintenance and presentation of the site[2]. Perhaps the most important insight that has come from nearly two decades of deliberate trialling of different strategies for engaging the local community in Tall Ḥisbān is the importance of the power of *synergy and persistence; the realization that progress depends less on one single strategy than on the interaction of multiple interconnected strategies trialled over an extended period of time*. Furthermore, the most important lesson we learned is that *flexibility* is a key to successful community engagement, for as new facts emerge, one has to be ready to recraft ones strategies to suite new circumstances. Without striving to be exhaustive, the following are twelve examples of diverse strategies for engaging the local community, which have

1. See, for example, the following web-site maintained by the Jordan Tourism Board: http://pt.visitjordan.com/e_book/biblical_17-24.pdf.

2. The genesis of this explicit vision of engaging with the local community is attributable to three key factors. The first was the author's learning about community development theory and best practices research, through spearheading the development at Andrews University of a graduate program in international and community development. The second was the warm endorsement and offer of financial support of the Department of Antiquities when presented, in 1996, with a proposal to clean up and undertake restoration related excavations, focusing in particular on its Islamic remains. And the third was the enthusiastic welcome from the Municipality of Hisban and several local residents, on learning of our proposal to resume work in the site.

been trialled with varying degrees of success over these two decades:

1. *Making Capacity Building a Priority*. To illustrate, at Ḥisbān we have worked to gradually extinguish the notion of "workmen." Instead, we have made it a point to treat our local paid workers as students like ourselves; partners in discovering best practices for uncovering, restoring, preserving and presenting what we find. Whenever a teachable moment presents itself, we take advantage of it, thus deliberately investing in building understanding and knowledge among our local and visiting students. In this way, we have sought to win the allegiance of locals as allies in taking care of the site, and the commitment of foreign students as ambassadors, to alert the world of the precious and fragile Jordanian heritage.
2. *Investing in Building Local Allies.* To illustrate, when visitors from the local village show up at the site (including school age children), we take the time to explain something about what we are doing and what we are finding. In this way, local knowledge and attitudes about the project and the tall in the wider community gradually begin to change, in ways that are in line with the goals of a sustainable future for the site.
3. *Looking for and Affirming Local Care-Takers.* Local care-takers are not only allies, they are individuals who have shown a special interest in the site and in the work going on. They may or may not live near-by, but they are persons who hold the site and the project in high regard, and who report on their voluntary efforts between seasons in helping to look after the site. Such volunteers are critical in our attempts to build a cadre of local partners who care for the site, and their efforts need to be acknowledged and encouraged.
4. *Working with Local Teachers and Schools.* We have had one or more local school teachers working with us at the site nearly every season. We partnered with one of these local teachers to develop a curriculum for use in the local school, to teach children about the history of Tall Ḥisbān, and about the many ways a tall such as ours can be used to build interest in learning about science, the history of the world, and their own history. We have for many years now partnered with another school teacher, who has helped us paint and maintain the 35 explanatory signs we have placed throughout the site.
5. *Making Local Merchants and Craftsmen Our Partners*. Whenever feasible, we have made it a point to buy our supplies from local merchants. We buy our second breakfast from them and, when available in their shops, we purchase equipment used in the excavations. Similarly, if we need something made, such as the 35 signs that dot the hill today, we have the local ironsmith make the signs. This is a win-win situation for all, as it makes allies from these local businesses, as well as benefiting their bottom line.
6. *Seeking Cooperation of Local Government Agencies*. Critical to our efforts at engaging the local community has been the excellent support we have enjoyed with the DoA. In particular, we have benefitted greatly from the persistent efforts of certain of their staff, by helping us to forge collaborative partnerships between various government agencies. For example, over the past ten years, our site has been cleaned by the crews that regularly clean the village streets and empty the garbage. To allow these crews to go inside the fence of Hisban required negotiations and agreements in writing between the Municipality of Hisban and the DoA.
7. *Establishing a Visitor Welcoming Area.* It is important to have a welcoming area, where an overview of what the site is about can be shared with locals and visitors alike. In our case, our landscape team designed and constructed a seating area, where tour guides can give an orientation to their groups. We have also placed several large explanatory panels, all made by the local ironsmith, adjacent to this welcoming area. These panels explain how an archaeological mound or tall comes to be, and orients to the main historical periods discovered at the site.
8. *Making Insertion of Pathways and Explanatory Signage a Priority.* One of the

most important actions a team can take to engage the local community is to invest some time and effort in developing walking paths, viewing platforms and signage. As already stated, our signs were made locally, and the text is in Arabic and English. Such locally made signs may not have the sophistication of professionally produced signs, but if properly mounted, they have staying power, and are easy to maintain. We usually have the local school teacher do maintenance on the signs when we are in the field.

9. *Creating and Maintaining an Attractive Website*. We have found that our project and Facebook websites[3] have played a key role in keeping our local partners updated on our activities. Seeing pictures of their site, and of the project on the web, somehow makes the site significant in a whole new way; even though, for the time being, the information is still only in English.
10. *Hiring a Local Agent*. For projects such as ours, that spend only a few weeks in the field each year (and for many projects every other or every third year), it may make sense to hire a local agent on a part-time basis, who can assist with coordination of local efforts to protect and present the site. Such an agent can also be helpful with preparations for new field seasons, and with post-season follow-up. We have had such an agent assisting us for more than a decade.
11. *Organizing a Local Association of Allies (Friends).* By organizing a local association of allies or friends of the project, the benefits of civil society cooperation for a common good can be mobilized on behalf of the site. In our case, we created a local NGO (the Hisban Cultural Association), which has served as a sounding-board as we have moved forward with plans to establish a Visitor Center at the site. Our local agent played a key role in helping to formally organize and get this NGO approved by officials, such as the government.
12. *Emphasizing Continuities from the Past to the Present.* As will be explained further below, in our efforts to crystallize a narrative for Tall Ḥisbān, we have sought to emphasize continuities from the past to the present. To this end, historical questions have been re-framed as part of investigations of long-term continuities. Examples of such continuities are our research on cycles of food system intensification and abatement (LaBianca 1990), and more recently, the research on great and little traditions (LaBianca 2007). Still more recently are our efforts to situate the narrative of Ḥisbān within global history (LaBianca 2007). By these means, we have sought to avoid musealization of the tall and its remains, thereby rendering it distant, and often irrelevant, to the lives and concerns of its present-day inhabitants.

To this list of twelve strategies for engaging the local community trialled at Tall Ḥisbān, others could certainly be added, and we have no doubt there are strategies being trialled at other sites that might have relevance for our work. The point to emphasize here is that the process of engaging the local community is always a work in progress (*an emergent phenomenon),* where a number of different approaches are trialled over an extended period of time. Some approaches will show noticeable results right away, others will take more time, and some may not show any results at all, but may later on be reincarnated in ways no one had predicted. As stated earlier, what generates forward movement is not any one approach, but the cumulative effect of the cooperation of multiple approaches sustained over time. And in our case, we have still to find out how sustainable our multi-faceted intervention will turn out to be after ten years, twenty years and fifty years.

One encouraging indication for the future, however, is the growing awareness of the importance of local community participation, which we have noticed recently in conversations with local residents and government officials. The wall that once seemed to completely separate what was inside the fence at Ḥisbān from the local village is starting to come down, as local residents are expressing sentiments of pride and ownership in the archaeological site, and as such sentiments are no longer

3. Our web page is: https://.www.madabaplains.org/hisban and our Facebook page is: https://www.facebook.com/pages/Tall-Hisban-Archaeological-Park/305100879578008

perceived as a threat by DoA officials and other government stakeholders. Indeed, the emphasis on partnering with the local community in the care and presentation of archaeological sites appears to be gaining momentum as a priority within the archaeological community in Jordan.

Another noteworthy development in the case of Jordan is the emphasis now being placed on site protection and presentation by the DoA. With so many archaeological sites excavated and then abandoned, a policy of giving priority to projects that emphasize site rehabilitation and presentation has been put in place by the department. New projects have little chance of being approved if they do not include planning, expertise and funding for restoration and presentation. In the same vein, older on-going projects are also being asked to make site rehabilitation and presentation a priority. Thus, the days when archaeologists could come, dig holes, and leave, are now a thing of the past. The future of archaeology in Jordan is one in which concerns of basic research can no longer be separated from the concerns of site protection and presentation.

As we look to the future of archaeology in our region, and as the emphasis on site protection and presentation gains further momentum, increased attention will need to be given by policy makers, in cooperation with professional archaeologists, to establishing priorities and guidelines. For example, deciding which sites should be left dormant for the time being, which should be rehabilitated and made presentable, which urgently need to be salvaged, and which should be allowed to be opened as new excavations. As this conversation gets underway, consideration should be given to developing various local and regional "*narrative tours*", that incorporate selected narrative nodes; some already well-researched and readied for presentation, others to be studied and incorporated into particular narrative tours at some future time[4].

In the case of Jordan, such narrative tours might be period-specific, such as Neolithic Jordan, or Iron Age Jordan, or Mamluk Jordan. Others might emphasize the historical landscape, such as a history of water harvesting or of Roman roads. Still others might follow the careers of heroes such as Salah ad-Din or Lawrence of Arabia, and so on. Some of these narrative tours might be limited to certain regions of Jordan, others might criss-cross the entire country. Some might be designed primarily for individuals and small groups; others for larger groups. As more and more such narrative tours come on line, certain narrative nodes will be used over and over again, others less often and some only once or twice. Some tours may succeed spectacularly, some might fail spectacularly, and some will do neither. Some might eventually be discontinued, others expanded or modified; the routes and narratives of the tours should be seen as continually developing and adapting to new knowledge as well as to market demand. As experience with development and management of such tours accumulates, feedback should be provided to the teams responsible for restoring and presenting particular narrative nodes, so that the exhibits developed and the stories told there will cohere and inspire.

To conclude, we return to the problem introduced earlier in this article, namely the problem of multiple and often conflicting narratives confounding efforts to present and narrate the story of a particular site or node. In the case of Tall Ḥisbān, our solution to this problem has been, as already indicated, to emphasize continuities between the past and the present, by highlighting global history stories about the changing environment, changes in food procurement strategies over time, and the resilience of the local population in coping with a long succession of imperial interventions. We are also seeking to develop interesting ways to narrate the site as a node in global history; an effort that would no doubt be greatly enhanced, were we to someday become a node on a narrative tour that presents Jordan as a window on global history. By thus emphasizing a site's global history connections, a space can be created within which particular, sometimes conflicted, desired pasts can also be narrated. But what is ultimately the most important goal to strive for, when it comes to efforts to engage the local community in presenting heritage sites, is a compelling narrative vision, crystallized through careful scholarship,

4. A good example of a narrative path is the Abraham Path Initiative http://www.abrahampath.org/

respectful listening, collaborative learning, persistence and flexibility of action.

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FROM THE JORDAN VALLEY LOWLANDS TO THE TRANSJORDANIAN HIGHLANDS: PRELIMINARY REPORT OF THE WĀDĪ SHU‘AYB ARCHAEOLOGICAL SURVEY PROJECT 2016

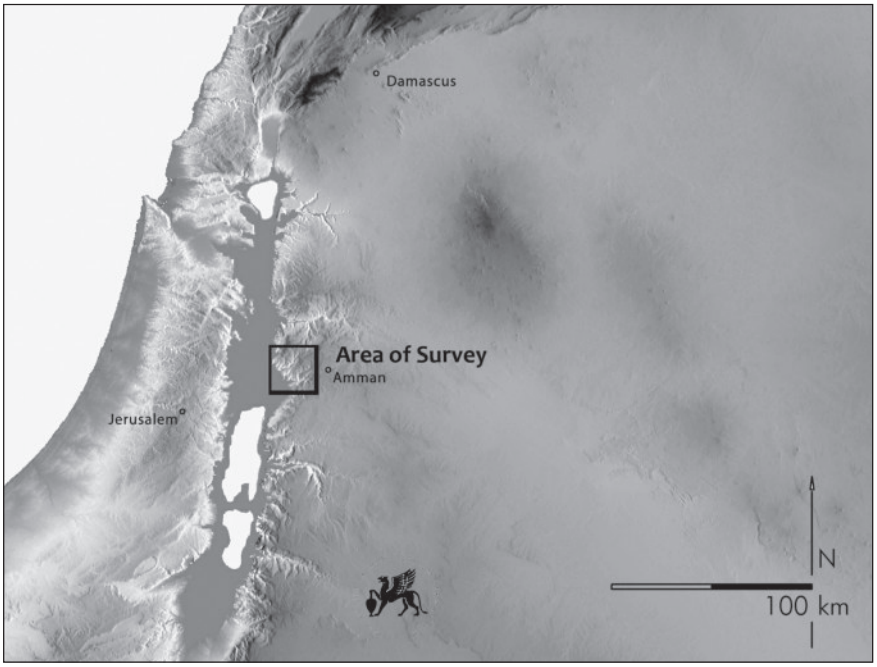
Alexander Ahrens

Introduction

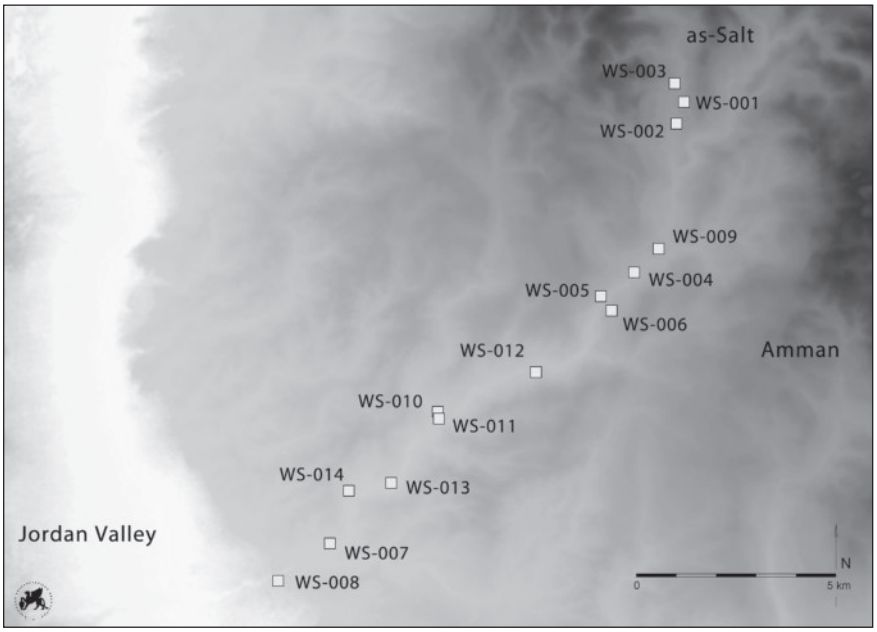
The Wādī Shu‘ayb constitutes one of the major routes connecting the southern part of the Jordan Valley (coming from Jerusalem and the oasis of Ariha/Jericho on the western side of the southern Jordan Valley) with the central Jordanian highlands in the region of as-Salt, then continuing towards Amman in the southeast and the Baq‘ah Valley in the northeast. While the upper reaches of the Wādī Shu‘ayb (here also referred to as the Wādī as-Salt), including its adjacent tributary wadis such as the Wādī al-Kafrat and Wādī al-Azraq, features fertile soils watered by the perennial waters of the wadi and abundant annual rainfalls, the southern part of the wadi’s course consists of dry lands, until it finally merges with the Jordan River. In general, the area receives about 200 mm of rain annually, which is sufficient for sheep and goat herding, but not for extensive agriculture. However, since the wadi carries large amounts of water, being fed by several natural springs in the vicinity of as-Salt in the north (e.g. the springs ‘Ayn Jazzīr and ‘Ayn Jadūr near as-Salt), as well as the heavy annual rainfall from the Transjordanian highlands, the wadi itself provides enough water throughout the year. In several places along the course of the wadi, the flat areas next to the wadi bed therefore allow intensive cultivation. The wadi encompasses three natural environmental zones: the Mediterranean woodlands in the north, the foothill steppe, and the riparian forest associated with the wadi bed and springs e.g., the various contributions in Ababsa 2013: 64-66, 77-90 ; recently also Farhan and Anaba 2015). Based on current evidence, agricultural practices in these areas did not include large-scale terracing, but were rather focused on the exploitation of moderate topographic niches, as well as soil pockets between lapies.

The alluvial fan of the Wādī Shu‘ayb, where the wadi enters the southern part of the eastern Jordan Valley and the Ghor, represents the southern end of the wadi (here referred to as Wādī Nimrin). The Jordan Valley (*ca*. 105 km long) lies entirely below sea level; from the freshwater Sea of Galilee (-212 m; aka Lake Tiberius) the Jordan River meanders south and empties into the Dead Sea at -394 m below sea level. The Jordan Valley only receives rain from October through May; and while the north receives ca. 380 mm rainfall in a year, the southern part receives only half of this, and must thus be considered a semi-arid desert environment. On the eastern Jordanian side, the Jordan Valley is dissected by numerous smaller wadis that flow from the Transjordanian Highlands, one of which is the Wādī Shu‘ayb.

While several surveys have been conducted in parts of this region before, it has, hitherto, never been properly surveyed as a whole; previous efforts either concentrated on the areas around as-Salt in the north, or sites in the Jordan Valley in the south. Thus, since previous explorations of the wadi itself have been very limited (see below, II. Research History), the initial intention of the *Wādī Shu‘ayb Archaeological Survey Project* (WSAS) was to thoroughly record and document all archaeological sites within the area of the Wādī Shu‘ayb, starting just south of the modern town of as-Salt in the north – including parts of the Wadis as-Salt and al-Kafrat – down to the town of South Shuna (Shunat Nimrin) in the eastern Jordan Valley (**Figs. 1, 2**). The total area surveyed comprises



1. Map showing the location of the survey area (Map: DAI, Orient Department, Th. Urban using USGS/NASA 3-arc second SRTM data; map compiled by A. Ahrens).



2. Map showing sites surveyed in 2016 by the Wādī Shu'ayb Archaeological Survey Project (Map: DAI, Orient Department, Th. Urban; map compiled by A. Ahrens).

a length of *ca*. 18 km from north to south, and covers an altitude difference of approximately 1000 m. The survey area extends two kilometers on each side of the wadi bed, while the wadi itself was chosen as a natural transect.

Research History

Given the particular importance of this wadi, it is surprising to note that only a few archaeological investigations have hitherto been conducted in the region, almost all of which focused on the regions near as-Salt or the Jordan Valley, but never on the Wādī Shu'ayb itself. Early descriptions of the landscape and archaeological sites of the southern Jordan Valley, mostly in relation to narratives and the identification of sites mentioned in the Old Testament, are given by, among others, Tristram (1874), Merrill (1881) and Thomson (1882), while Conder mapped the region for the first time in his "Survey of Eastern Palestine" for the Palestine Exploration Society (Conder 1889).

In 1905, coming from Jerusalem and heading to as-Salt, British orientalist and traveler Gertrude Bell probably traversed the Wādī Shu'ayb, although she does not mention archaeological sites in her account (Bell 1907 [2016]:15-16). Albright collected material from archaeological sites on various visits to the Jordan Valley, including the region immediately north of the Dead Sea (Albright 1924; 1926). Glueck surveyed several sites at the southernmost point of the Wādī Shu'ayb, at the juncture of the wadi with the Jordan Valley, during his extensive surveys from 1939–47; the wadi here referred to as Wādī Nimrin (Glueck 1943; 1951:366-371). In 1975, the eastern Jordan Valley was again surveyed thoroughly by Ibrahim, Sauer and Yassine (1976; 1988). The site of Tall Nimrin, located within the limits of the modern town of South Shuna at the southern end of the wadi's alluvial fan, was excavated from 1989–1995 (for results see Flanagan *et al.* 1996 and references therein). In the years 1998 and 2000, Ji and Lee (1999; 2002; Ji 2007:137-139) surveyed parts of the wadi at its juncture with the Jordan Valley as part of their survey in the region of Irāq al-'Amīr and the Wādī Kafrayn (Collins *et al.* 2015:5-7).

The area immediately south of as-Salt was initially surveyed by the priest and biblical archaeologist de Vaux in 1937 (de Vaux 1938). Later, several Neolithic sites in the Wādī Shu'ayb were briefly visited by Zeuner (1957), Raikes (1965), and Mellaart (1975). In 1988, the region of Wādī Shu'ayb between South Shuna and as-Salt was the focus of a preliminary archaeological survey, which doesn't appear to have developed into further and more detailed survey campaigns (Wright *et al.* 1989). Apart from these surveys, excavations were conducted in 1988–1989 at the Neolithic site of Wādī Shu'ayb, about halfway between as-Salt and South Shuna (see Simmons *et al.* 1998; 2001 and references therein). Additionally, construction work for a sewage plant led to the discovery of various well-preserved, intact Roman tombs in the wadi at the site of Khirbat as-Sūq (WS-003, see below), just south of as-Salt, in 1978 (Hadidi 1979).

All in all, it is clear from this brief survey of archaeological explorations that the Wādī Shu'ayb region still offers great potential for the detection of previously unknown archaeological sites. This is even more important when taking into account the large-scale threat against archaeological sites by modern construction work and illegal looting.

Methodology and Results of the First Survey Campaign in 2016

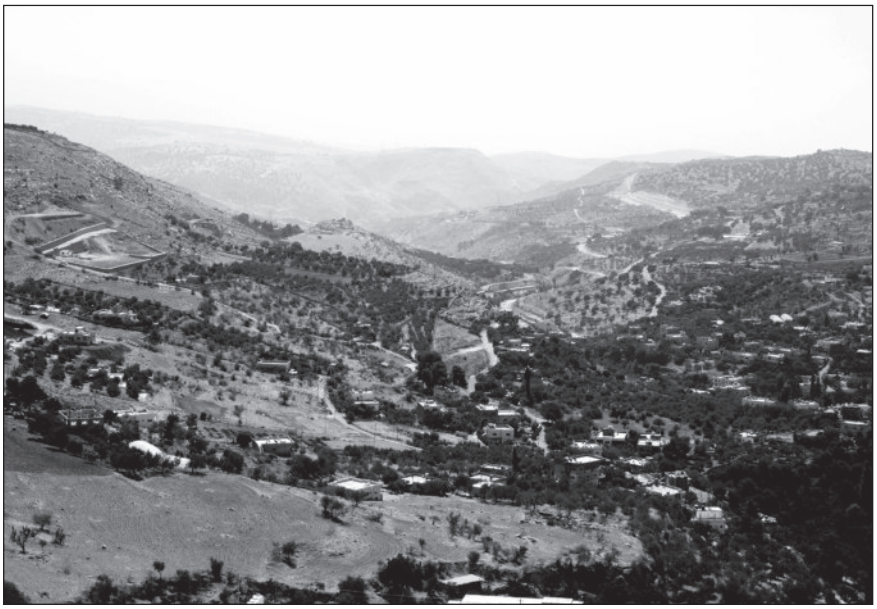
During the 2016 season three transects crossing the survey area from north-east to south-west were chosen, in order to ensure an adequate sample of each of the three natural environmental zones within the Wādī Shu'ayb catchment area (see above). Sites were formally defined on the basis of high surface artifact density, exposure of cultural deposits, the presence of architectural features, or a combination of these three. Larger sites, such as tells, which contained a range of different features, received a site number for the site as a whole, in addition to feature numbers for each individual feature. Each site, and, when possible, each feature at a specific site, was searched for datable artifacts and recorded, including detailed photographic documentation as well as technical descriptions, measurements and sketches of all features on the field recording form. GPS coordinates were also determined and recorded for all sites and features surveyed. Altogether, a total number of fourteen major sites were surveyed during the first campaign in 2016 (**Fig. 2**). Some of these sites were already known, such as Khirbat Jazzīr (WS-001), Khirbat as-Sūq (WS-003), Khirbat al-Mu'allaqa (WS-005), the Neolithic site of Wādī Shu'ayb (WS-009), Tall Blaibil (WS-007), and Tall Nimrin (WS-008), but often lacked detailed and thorough descriptions (including damage assessment and monitoring; see the gazetteer of sites, descriptions and **Appendix** below). In addition, associated diagnostic pottery has never been published in detail for most of these sites. Other sites, such as Khirbat Shu'ayb (WS-006), near the Mosque and Tomb of the Prophet Shu'ayb, were hitherto unknown and therefore surveyed for the first time. Diagnostic pottery and other finds, such as flints, were collected from all sites, recorded, and photographed or drawn. A description of each site surveyed in 2016 is given below (the acronym WS stands for Wādī Shu'ayb followed by the specific site

number; known names of sites are given in brackets). The numerical list of sites surveyed (provided in the gazetteer) follows the itinerary of the survey, which alternated between areas, not a strict north to south direction.

1. WS-001 (Khirbat Jazzīr)

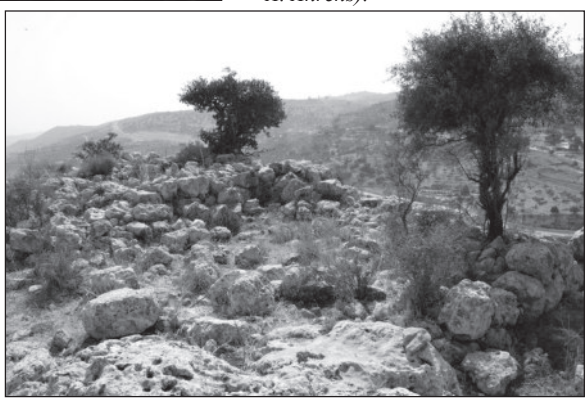
This site is located *ca*. 8 km south of as-Salt, on the southern bank of the wadi. The site was first visited and briefly surveyed by de Vaux in 1937 (de Vaux 1938: 405; 1941:25-27; 1967: 124-129), and again by Wright *et al.* in 1988 (Wright *et al.* 1989; referred to as "Site no. 17" in their report).

The entire site rests on a natural pointed rock outcrop measuring approximately 200 x 150 m, which slopes down towards the wadi bed (**Fig. 3**). The rock outcrop was in large parts artificially modified to create horizontal levels on which stone walls could be erected. Therefore, the flat plateau at the top, which could only be reached by a narrow passageway located at the eastern site of the rock outcrop, also appears to have been leveled, to make way for several rows of rooms and possibly a casemate system of fortifications which seems to encircle the entire plateau (**Fig. 4**). Just below the level of the plateau, several other wall structures were detected, which may have served as part of the fortifications, or as massive substructures of unknown/undetected buildings belonging to the structures on the plateau. In the middle of the plateau, a courtyard with no evidence of associated structures seems to have existed; a cistern (or tomb?) is located here. The buildings or rooms on the plateau were constructed of unworked stones of local origin; the courses sometimes preserved as high as 1-2 m (**Fig. 5**).



3. Khirbat Jazzīr (WS-001): located on the rock outcrop in the center of the photo, seen from north (Photo: A. Ahrens).

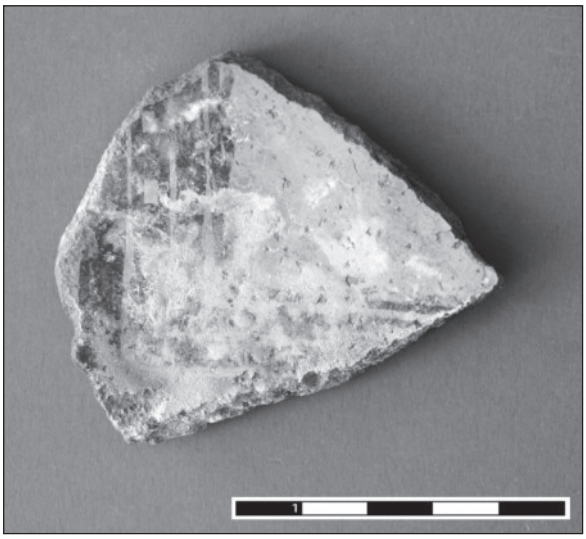
4. Khirbat Jazzīr: remains of fortification system (Photo: A. Ahrens).



5. Khirbat Jazzīr: remains of casemate buildings on the plateau (Photo: A. Ahrens).

The pottery collected consists of Hellenistic, Roman and possibly also Mediaeval Ayyubid-Mamluk Hand-Made Geometric-Painted/ HMGP sherds (**Fig. 6**). There is very little, if any, pottery found in the surrounding fields of Khirbat Jazzīr, so there is no factual evidence for the existence of a lower city in the vicinity of the site. It seems most plausible that Khirbat Jazzīr was not a city or village, but rather a hilltop fortification or watchtower-like structure, since it offers striking views of the wadi towards both the south and north, or perhaps even a rural farmstead perhaps connect to nearby Khirbat as-Sūq during the Roman and also Byzantine periods.

It is unclear which building structures should be correlated with the various periods reflected in the pottery repertoire, or even when exactly the buildings were erected. When de Vaux visited the site in 1937, he concluded that the site only yielded pottery dating to the Iron Age, (de Vaux 1938: 405, 8, pl. XVLL:1). De Vaux described the site as follows: *"le site occupe une position remarquable, au sommet d'une colline dominant l'ou. as-Salt et surveillant aussi vers le S.-O. la troué de l'ou. Azraq, qui sa rapproche en ce point de l'ou. as-Salt. (...) Là était campée, sur le roc nu qui affleure partout et forme le glacis, une forteresse dont il subsite des portions de murs et de casemattes en matériaux assez frustes (1938:405)".* Not conincidental, de Vaux assumed that Khirbat Jazzīr was to be identified with the biblical Jazer (de Vaux 1938: 405; 1967: 124-129. The site is mentioned, for example, in Num. 21:32, Josh. 13:25, and 2 Sam. 24:5). This tentative identification has been adopted and further elaborated by various scholars ever since (see the discussion and further references in Abel 1967: 356-357; Zwickel 1990: 219; Hübner 1992: 143; Gass 2009: 173, esp. footnote 921; MacDonald 2000: 106-108; Finkelstein *et al.* 2011: 140-141, with biblical and older references). Until today, however, no further archaeological work at the site itself, that is, excavations or survey, have hitherto been conducted.



6. Khirbat Jazzīr: Ayyubid-Mamluk red painted pottery fragment (Photo: A. Ahrens).

In light of the above mentioned chronological distribution of diagnostic pottery, this chronological frame needs to be revised accordingly. All in all, the site may be seen in direct connection with nearby Khirbat as-Sūq to the north (WS-003, see below), or even Tall Jadūr/Gadora (Jadūr/as-Salt) located farther to the north (Knauf and Lenzen 1987: 52-53; Hübner 1992: 139-140), at least during the Hellenistic-Roman and Byzantine period. There is also evidence, albeit very limited, for an earlier occupation in the pottery repertoire collected at Khirbat as-Sūq (according to the fabric, Late Bronze–Iron Age?, see below: site WS-003; also Wright *et al.* 1989: 347), so it cannot be excluded that the region generally was settled also during this early period.

As the survey in 2016 has indicated that a lower town did not exist at Khirbat Jazzīr, neither to the south nor to the north of the actual plateau, the settlement must, therefore, have been confined to the plateau itself. With an overall size of *ca*. 70x50 m (i.e. 0.35 ha, 0.86 acres), the settlement cannot have sustained a larger number of people. The site of Khirbat Jazzīr, it seems, may thus instead have functioned as an outpost for an actual settlement located in the wadi, most probably that of nearby Khirbat as-Sūq (WS-003, see below) on the opposite (northern) side of the wadi bed.

There is no imminent threat to Khirbat Jazzīr, although the lower parts of the rock outcrop are currently being used as animal shelters by locals, and concrete has been used for the construction of these shelters in parts. On the plateau, remains of modern human activities (such as remains of plastic bottles and

fire places) were found, as well as one pit in the corner of the remains of one of the buildings, which is probably a looting pit.

2. WS-002

This site is located *ca*. 700 m to the south of WS-001/Khirbat Jazzīr and consists of a round structure made of roughly worked stones of local origin (**Fig. 7**). The entire structure measures approximately 10 x 12 m in diameter, with one or two courses preserved in parts. The structure seems to rest directly on a rock outcrop which was artificially worked into a flattened, even surface, roughly resembling the specific technique already described for nearby WS-001/Khirbat Jazzīr (see above). Immediately to the north of the structure, the rock outcrop also features a flat space of approximately 50 m^2, though it was impossible to clarify whether this was man-made or a natural feature of the rock outcrop. It is evident that the worked stones in the building belong to an older structure, the location of which may be close by. The pottery collected is undiagnostic, but possibly dates to the Iron Age and Hellenistic-Roman periods, according to the fabrics. Given the lack of clearly diagnostic pottery it is, however, unclear if site WS-002 is contemporary with WS-001.

As there are good views of the wadi to the south, the structure would perhaps best be explained as a watchtower. Interesting to note here is that, during his survey in 1937, (de Vaux 1938: 405, pl. XVIII: 1) noted the existence of a "*bastion avancé*" located to the south of the main site of Khirbat Jazzīr, which most probably, albeit without definite proof, is to be located in the region where WS-002 is (See de Vaux 1938: 405, *"Au pied de cette acropole vers l´ouest et dominant immédiant l´ouadi es-Salt, qui court ici le long d´une falaise abrupt, un ressaut de la colline portrait un bastion avancé. C´est une construction rectangulaire de 10 à 15 m. de côté,* en *grosses pierres mal* táillées.". Unfortunately, since the region and landscape around sites WS-001, WS-002 and WS-003 have been drastically altered by modern construction work and agricultural exploitation, it has proved impossible to securely establish the location of the structure de Vaux found in 1937.

7. Site WS-002: overlooking the Wādī Shu'ayb, seen from north (Photo: A. Ahrens).

Arguing on the basis that only Iron Age pottery had been found at the site, although he did not publish any diagnostic pottery types were never published by him (de Vaux 1938: 405. *"La céramique n´abonde pas, mais elle est homogène et entièrement de l´èpoque du Fer. F. I et II.")*, de Vaux proposed a functional connection between the site and nearby WS-001/Khirbat Jazzīr. Since de Vaux regarded the site of WS-001/Khirbat Jazzīr to be a regular settlement site, he also assumed the site of WS-002 (if the identification with his "*bastion avancé*" is accepted) to be a fortress or a watchtower-like structure overlooking the course of the wadi towards the south and belonging to the settlement nearby (de Vaux 1938: 405: *"Elle [the entire site] comporte deux ensembles de ruine*s"). There is no proof which chronologically or functionally backs this presumed connection today, although the few pottery sherds collected at WS-002 and their date would, at least generally, be in concordance with the pottery collected at WS-001.

The structure is not in imminent danger, although Bedouins living nearby use the site for sheltering animals.

3. WS-003 (Khirbat as-Sūq)

The site is located to the north of WS-001, on the northern bank of the Wādī Shu'ayb, immediately north of the modern road leading from as-Salt to South Shuna. The exact extent of the site is difficult to ascertain, as it has been encroached by modern agricultural fields on almost all sides (**Fig. 8**). WS-003/Khirbat as-Sūq is already known from previous archaeological work (Hadidi 1979). The site contains a large number of rock-cut tombs

8. Khirbat as-Sūq (WS-003): seen from Khirbat Jazzīr (Photo: A. Ahrens).

and many limestone sarcophagi fragments, as well as masonry structures which have been dismantled, and sometimes also reused, for terrace walls of a more recent (modern?) date (**Fig. 9**). The site was first surveyed and then described in more detail by de Vaux (1938: 403, No. 2). Subsequently, (Wright *et al.* 1989:347) referred to it as "Site no. 16" in their survey report. This site is not to be confused with a site of the same name which is located *ca.* 8 km south of Amman.

Pottery collected at the site suggests major Hellenistic-Roman, Late-Roman and Byzantine occupation levels. However, a number of sherds might, according to the shape and fabric, also indicate earlier occupation (these fragments probably date to the Iron Age; for pottery dating before the Hellenistic period, see already Wright et al. 1989: 347).

The site has been largely destroyed, and requires immediate protection, as terrace walls (used for agriculture), which artificially cut the archaeological remains of the ancient site, have been constructed. Additionally, numerous modern looting pits, particularly in the vicinity of visible or suspected tomb entries, seem to have destroyed a large number of archaeological remains, including several tombs.

4. WS-004

The site is situated immediately north of the Wādī Shu'ayb viaduct bridge, but south of the village which is located in the vicinity. The site consists of non-diagnostic pottery and lithic scatters. Since the material was collected from an agricultural field which is in use, it is possible that the material actually comes from a different place close by, most probably an unknown archaeological site below the village north of the modern viaduct bridge, although no archaeological remains were found there (**Fig. 10**).

The material collected at the site evidences on-site preparation of cores, with primary production elements present. The raw material used consists of fine to medium grained flint, predominantly grey in color. The tools are not diagnostic, although some formal tools, such as perforators, a burin, a scraper, and notched and retouched blanks, are evident. All in all, the assemblage is, therefore, difficult to date.

The area of the site is under modern cultivation, being used as an agricultural plantation for olive trees, thus the exact boundaries of the site remain unknown. It is also unclear if the site of origin is destroyed, or located somewhere else in the vicinity.

5. WS-005 (Khirbat al-Mu'allaqa)

Site WS-005, know to locals as Khirbat al-Mu'allaqa ("The hanging ruin") sits on a plateau of sandstone and marl clay on the northern bank of the wadi, and is, in parts, slowly collapsing into the wadi due to erosion (**Fig. 11**). The ruins are impressive, with several masonry structures

9. Khirbat as-Sūq (WS-003): view towards as-Salt (Photo: A. Ahrens).

10. Site WS-004: seen towards the west (Photo: A. Ahrens).

11. Khirbat al-Mu'allaqa (WS-005): view from north to south, with the plateau of Khirbet Shu'ayb (WS-006) visible in the background (Photo: A. Ahrens).

still visible. Tumbled buildings consisting of large blocks are scattered all over the site. The collapsed remains of a tower-like structure, located close to a cliff near the wadi's northern bank, dominate the site; next to this structure are several smaller, indeterminate building clusters, which cover most of the plateau (**Fig. 12**). The walls of the tower-like structure stand as high as 4 m in some parts. It is difficult to trace the exact plans of these structures because of their poor state of preservation.

The pottery collected mainly suggests occupation during the Roman-Hellenistic and Byzantine periods, with a possible earlier occupation. The survey conducted by Wright (Wright *et al.* 1989) appears to list the site as "Site no. 19."

The site has been heavily destroyed in parts and requires protection, with a large number of looting pits over the whole. The fact that it is favored by the local population for recreational and leisure activities with no modern settlement nearby, has most likely led to an increase in plundering ("gold hunters").

12. Khirbat al-Mu'allaqa: walls of tower-like building structure (Photo: A. Ahrens).

6. WS-006 (Khirbat Shu'ayb)

This site was discovered and first visited by the WSAS project in 2016. It is located on a flat rock outcrop high above the southern bank of the Wādī Shu'ayb, next to the Mosque and Tomb of the Prophet Shu'ayb (**Fig. 13**). Until the 1990s, the site was occupied by the Jordanian army and therefore inaccessible, with many military installations (such as concrete trenches and bulldozed ramparts) still clearly visible today. The rock outcrop consists of (at least) four plateaus or flattened levels, that seem to be connected to each other and which all feature fragmented remains of walls located

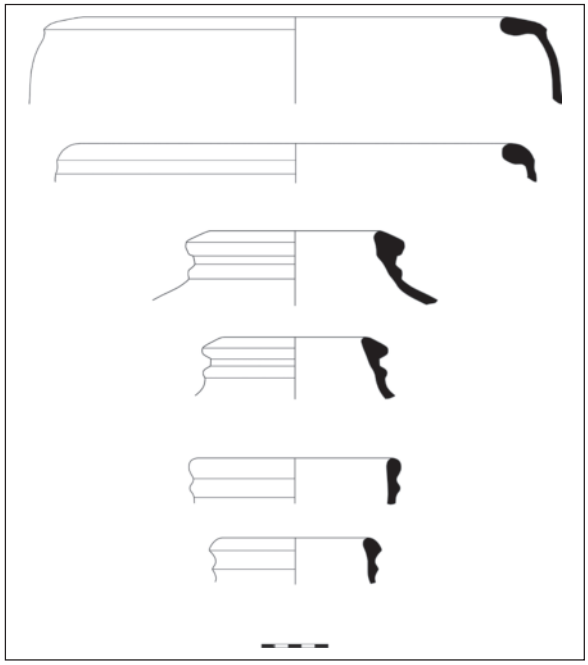
13. Khirbat Shu'ayb (WS-006): rock outcrop in center of photo, left of the shrine and mosque, seen from north (Photo: A. Ahrens).

at the corners of the levels/plateaux (**Fig. 14**). They thus seem to form the outer walls of several structures which occupied the plateaux, but which are mostly destroyed, due to either the army or erosion. The site offers very good views far into the Jordan Valley and the West Bank of Palestine, but also north towards as-Salt. One could imagine a fortification structure or a watchtower-like structure at this strategic location, as the site would be well-suited for monitoring all transits between the Jordan Valley and the Jordanian highlands.

It may be that the site is functionally and chronologically connected with site WS-005/ Khirbat al-Mu'allaqa (see above), which is located directly opposite site WS-006/Khirbat Shu'ayb, on the northern bank of the wadi. Perhaps, although this clearly needs further investigation, these two sites guarded a passage through the wadi. Since the landscape has been drastically altered by modern construction work, as well as the establishment of agricultural plantation and greenhouse compounds along the wadi bed, this cannot, unfortunately, be ascertained on the basis of the current course of the wadi.

The pottery collected, according to preliminary sampling, dates primarily to the Roman-Hellenistic period, although there are diagnostic forms and fabrics which may be even earlier, i.e. from the Iron Age (**Fig. 15**).

There is massive building activity next to the mosque just north of the site. So far, no damage to the site has occurred, but this should be monitored in the future. Ironically, the presence of the aforementioned military installations seems to have hampered the excavation of looting pits.



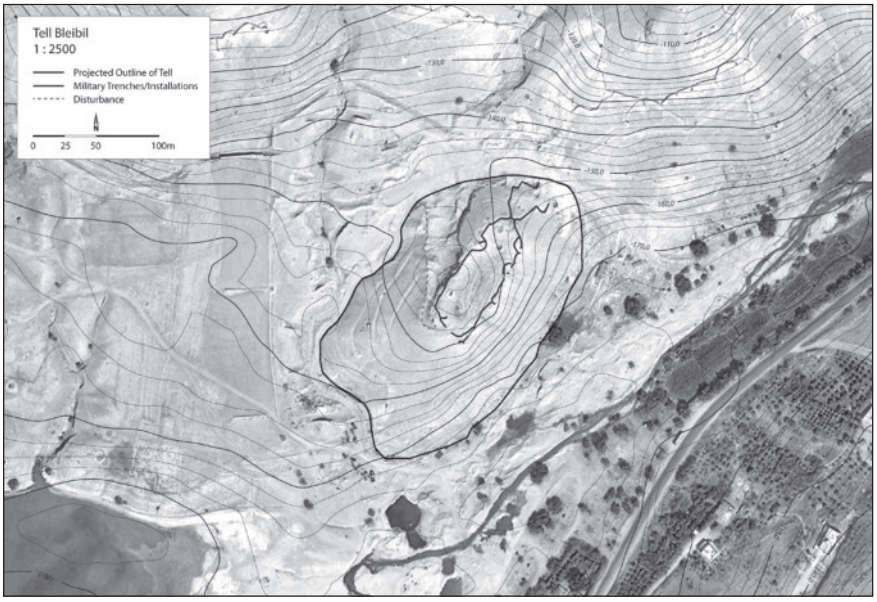
15. Khirbat Shu'ayb: selection of Iron Age pottery (Drawing: A. Gubisch).

7. WS-007 (Tall Blaibil)

Tall Beibil (sometimes also referred to as Tall Bulyabil in the literature) is a well-known site, located on the northern bank at the mouth of the Wādī Shu'ayb (called Wādī Nimrin here), which overlooks the Jordan Valley and the Wādī Juray'ah (**Figs. 16, 17**). The site had already been visited by Albright (1924: 3; 1926: 48-49) and (Glueck 1943: 11-12; 1921) as part of their surveys of the Jordan Valley in the first half of the 20th century. Subsequent surveys in the region of the Jordan Valley have always included the site (Ibrahim *et al.* 1988; Wright *et al.* 1989; Ji and Lee 2002), although no targeted excavations have so far been conducted at the site.

14. Khirbat Shu'ayb: terraces with wall foundations (Photo: A. Ahrens).

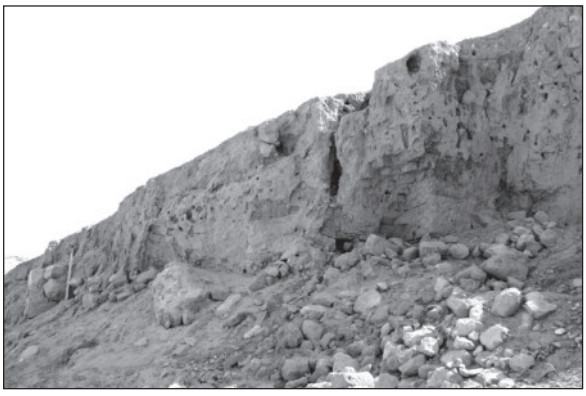
16. Tall Blaibil (WS-007): seen from northeast towards the Jordan Valley (Photo: B. Briewig).



17. Map of Tall Blaibil, showing modern disturbances (Map: N. Salamanek using SRTM data and satellite image courtesy of Bing Maps).

The site, which seems, at least partly, to rest on top of a rock outcrop, was occupied by an army outpost until the 1990s, and can be identified as Wright's "Site no. 1" (Wright *et al.* 1989). The summit has been completely bulldozed by military activities, and thus does not retain any archaeological remains. However, the military activities and the subsequent abandonment of their installations have led to a partial collapse of the northern flank of the tall site, thus exposing a large section of the stratigraphic sequence, including a massive mudbrick wall resting on a stone foundation (**Figs. 18, 19**). Additionally, several floor levels are discernible, at different heights, all along the northern section. In their survey report, (Ji and Lee 2002: 187-188, fig.9) described and interpreted several features, including a potential gate and a fortification system with several towers. Prior to this, the existence of a fortification system at Tall Blaibil had also been put forward by Glueck, on the basis of aerial photographs (Glueck 1951: 369-370, fig. 111).

One important find of the 2016 campaign



18. Tall Blaibil: remains of mudbrick fortification wall (Photo: A. Ahrens).

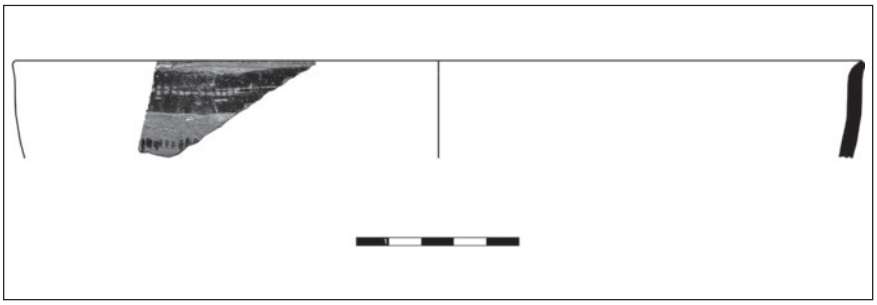
19. Tall Blaibil: remains of mudbrick fortification wall (Photo: A. Ahrens).

was the discovery of a rim fragment of the distinctive Cypriot White Slip Ware II bowl (WS II; the so-called "milk bowl" from the Late Bronze Age IB–IIB; **Fig. 20**) at this site, which thus far was believed to be devoid of Late Bronze Age occupation (Albright 1926: 48-49; Glueck 1943:11; 1951; Ibrahim *et al.* 1998: 192, No. 199; Ji and Lee 2002: 187-188. See, however, Wright *et al.* 1989: 347-348, referring to the site as belonging *"to large tells of Late Bronze and subsequent periods"* without giving further references or showing diagnostic pottery; see also Finkelstein 2014). The fragment belongs to the most common and popular form of this distinctive pottery type, i.e. the hemispherical bowl with "wishbone" handle (not preserved), which is characterized by a thick white slip and brownish vertical and horizontal bands of paint, with a net pattern in between. This unexpected find may close the apparent occupational gap in the region. Tall Nimrin/WS-008 (located *ca*. 1500 m south-west of Tall Blaibil, see below) features Middle Bronze Age IIB/IIC (or MB III) occupation, followed by Iron Age I and II remains with a hiatus in between these two periods, whereas Tall Blaibil was thought to feature Early Bronze Age remains, directly followed by Iron Age remains.

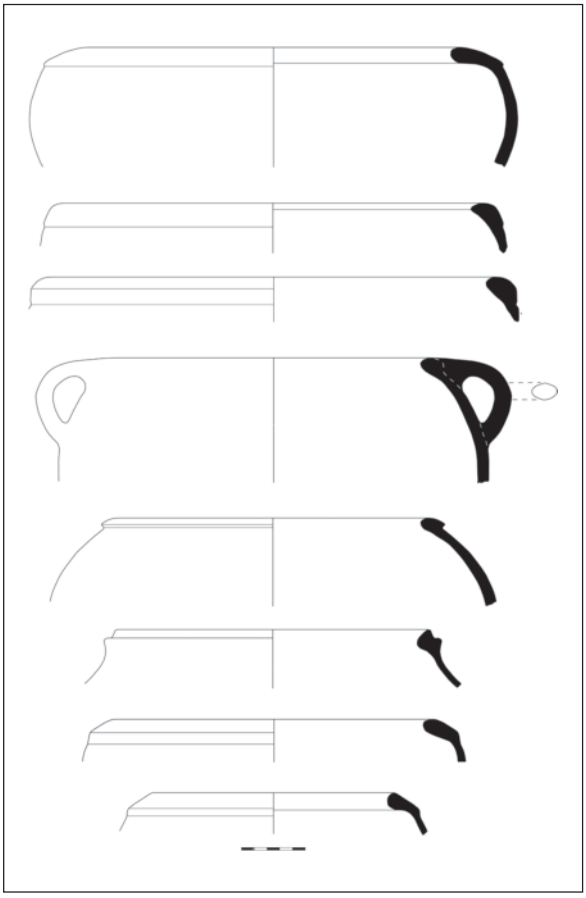
Thus far, specimens of WS II Ware have not been attested at sites in the eastern part of the southern Jordan Valley, in striking contrast to the northern part of the eastern Jordan Valley, where WS II Ware is attested frequently (Fischer 2001; Fischer 2006a; 2006b: 282-283, 286-287; Fischer 2014). The dearth of WS II Ware is, without doubt, primarily due to the fact that, south of the Zarqa Triangle, the eastern part of the southern Jordan Valley is thought to be devoid of substantial (if any) archaeological remains dating to the Late Bronze Age (Albright 1926: 48; Ji 1997: 25-26; Maeir 2010: 171). However, WS II Ware is present at Jericho, just across the Jordan River from Tall Blaibil, in the western part of the southern Jordan Valley (Sellin and Watzinger 1913: Pl. 21: no. G.2), and a further fragment of WS II Ware was recently discovered in deep soundings at Tall Damiyah, which is located in the southernmost part of the Zarqa Triangle, next to the Jordan River (pers. comm. L. Petit and Z. Kafafi; for the recent excavations, see Petit and Kafafi 2016; see also Albright 1926: 47).

Therefore, while this is only speculation and a moot point to discuss without further proof, one could argue that at least some of the WS II Ware specimens found at various sites on the southern Transjordanian plateau (often believed to have been channeled from the west to the east by the Yarmouk and Zarqa Rivers) may actually have reached these sites via a more southern transect. For example, fragments of WS II Ware found in tombs in the Baq'ah Valley/Umm ad-Danānīr (McGovern 1986: 200-201, Fig. 60.11, Pl. 37c) and in the Amman Airport Building/ Temple (Hankey 1974: 142) may also have reached their findspots *via* the Wādī Shu'ayb.

Without going into detail here, Tall Blaibil has for a long time been tentatively identified as the biblical site of Beth Nimrah ("House of the Leopard"), a town belonging to the tribe of Gad(Num. 32:36, Josh. 13:27), an identification which was already put forward by Albright (1926: 48-49) and (Glueck1943: 11-12; see also Hübner 1992: 143). However, it has recently been proposed that nearby Tall Nimrin (WS-008, see below), which is located *ca*. 1.2 km to the south-west of Tall Blaibil, is the site of biblical Beth Nimrah (see Hölscher 1910: 19), as several Aramaic inscriptions were found there (Dempsey 1993; 1996). A secure identification of Tall Nimrin as the site of Beth Nimrah is, however, still lacking, although Iron Age pottery (Iron Age IIA/B) is abundant at the site (**Fig. 21**).



20. Tall Blaibil: Cypriote White slip ware II pottery fragment (Photo: A. Ahrens; Drawing: A. Gubisch).



21. Tall Blaibil: selection of Iron Age pottery (Drawing: A. Gubisch).

There is no immediate threat to Tall Blaibil, and no apparent recent or larger looting pits were visible when the site was surveyed in 2016. The large section at the northern flank of the tell described above may, however, continue to collapse.

8. WS-008 (Tall Nimrīn)

Tall Nimrin is located in the eastern part of the town of South Shuna, cut by the road which leads from there to as-Salt. The tall is encroached by building activity on all sides, and its flanks have therefore been heavily destroyed (**Fig. 22**). Although Albright, visiting the site almost twenty years earlier, does not mention this striking feature at all (Albright 1924: 3; 1926: 48-49), the northern side of the tell had already been cut by the road which still exists today at the time of Glueck's survey (Glueck 1943: 11). Ibrahim *et al.*'s survey also includes the site (1988: 192, no. 182 referred to here as Tall ash-Shuna South).

22. Tall Nimrin (WS-008): northern road-cut section (Photo: A. Ahrens).

Excavations at the site were first conducted by Flanagan, J.W., McCreery, D. W., and Yassine, K. N. in the late 1980s and early 1990s (results summarized in Flanagan *et al.* 1996; see also Dornemann 1990). The site features remains from the Middle Bronze Age IIB, Iron Age, Roman-Hellenistic, and Medieval Islamic periods. Pottery from all these periods was found at the site, and remains of the excavation trenches are still visible today; these excavations thus corrected Glueck's dating of the site from the Roman through to the Medieval Period(Glueck 1943: 11). After the discovery of Iron Age I and II layers at the site, an alternative identification and location for biblical Beth Nimrah was put forward, namely Tall Nimrin; before the results of the excavations it had generally been assumed that Tall Blaibil (WS-007, see above) was Beth Nimrah. As already noted by (Albright 1924; 1926: 48-49) and (Glueck 1943: 11-12), the archaeological sites of Tall Blaibil (WS-007), (Tall Musṭaḥ is located *ca.* 500 m south of Tall Blaibil, and, due to the military presence on the Tall, could not be surveyed in 2016. See the results of surveys conducted by Ibrahim *et al.* 1988: 192, No. 200: Ji and Lee 2002: 191-192, Fig. 16), and Tall Nimrin (WS-008), which were located close to each other, clearly belong to one specific cluster of sites that Glueck considered to be "one historical site, occupied in three widely separated periods"(Glueck 1943: 11-13). It is obvious that all three sites are indeed located in one particular area, overlooking the entry to the fertile Jordan Valley, and at the same time also restrict access from the valley into Wādī Shu'ayb and the Transjordanian highlands. The locations for each of the three tell sites might also be a consequence of the meandering course

of the wadi itself during the periods in question.

Albeit close to the bustling town of South Shuna, only a single looting pit was observed. The tall itself is fenced along its northern section towards the main road, to protect potential visitors from falling, though apparently not to protect the site itself, as the other sides of the tell are not fenced.

9. WS-009 (Wādī Shu'ayb Neolithic Site)

The Neolithic site of Wādī Shu'ayb (dating to Pre-Pottery Neolithic B (PPNB) and Pottery Neolithic A (PNA)) has been known to scholars since the 1920s (Zeuner 1957: 23; Mellaart 1975: 63,68), but only identified as an important site in the late 1980s, when the road leading from as-Salt to South Shuna was enlarged (Rollefson 1987: 521). Subsequent to this, two seasons of excavations have been conducted at the site (Simmons *et al.* 1998; 2001), which lies on the northern bank of the wadi, right next to the main road (Rollefson 1987: 521-522). Today, archaeological features are only visible along the section which initially led to the discovery of the site, although random lithic scatters are abundant all over the surface. Today, the area is used for the cultivation of olive trees (**Fig. 23**).

Material recovered during the 2016 survey includes formal tools (e.g. perforators, burins, sickles, scrapers, a pick, and denticulates), together with notched flakes and blades, and retouched flakes and blades. The material shows typical PPNB elements, underlined by the presence of a variety of burins, as well as one naviform core. In addition, several pottery fragments found at the site clearly date to the Yarmoukian Period (PNA). All in all, the chronological sequence established by the excavations is reflected in the survey material. The trenches were apparently at least partly backfilled immediately after the excavations, and there is no imminent threat to the site at present.

10. WS-010 (Khirbat al-Jisr al-'Irāqiyyīn)

This site was first identified during the 2016 survey, and is located along the northern bank of the wadi bed. Locals refer to it as al-Jisr al-'Irāqiyyīn (the "Bridge of the Iraqis") or al-Jisr al-Khashab (the "Bridge of wood/trees") because a modern bridge crosses the wadi bed here; however, Khirbat al-Jisr al-'Irāqiyyīn is an informal, not an official, place name (**Fig. 24**).

It consists of an embankment/accumulation of stones, sand and gravel, which was formed by the wadi, on top of which are modern houses which seem to have been abandoned recently. It is not clear, however, if a distinctive tell structure exists, or if the houses rest on the aforementioned natural embankment. Next to these houses were several features, such as stone foundations and stone pavements or floors, which seem to be the remains of older structures, which have not been dated precisely. Further away, to the south, is another feature, which could tentatively be interpreted as the remains of an installation or large oven. A large number of lithic finds was found all over the site, possibly dating to the PPNB (Ahrens and Rokitta-Krumnow 2017: 37-42).

The lithic assemblage is interesting, with a predominance of blades, although blade cores have not been found. Bidirectional blades, as

23. Wādī Shu'ayb Neolithic site (WS-009): road-cut section (Photo: A. Ahrens).

24. Khirbat al-Jisr al-'Irāqiyyīn (WS-010): view towards the north (Photo: A. Ahrens).

well as crested blades, are also attested. The raw material consists of fine grained flint, with color ranging from purple, dark to light brown, and ivory. The tool kit is dominated by retouched flakes and blades, as well as notched blades and flakes. Burins are by far the most obvious formal tool type, and may date the site to the PPNB, as the assemblage is comparable to other known so-called burin sites in Jordan. Two of the burins found at the site were formerly used as sickles (as evidenced by the gloss).

Pottery is not abundant, but the few diagnostic sherds seem to date to either the Roman or Byzantine periods, and possibly also the Medieval Period. The site therefore seems to evidence a long period (or different periods) of settlement: the PPNB and later occupations sometime during the Roman-Hellenistic/ Late Roman to Byzantine Period, and/or the Medieval Period. A more detailed analysis of the pottery and lithic finds will hopefully refine this chronology.

The southern part of the site has been bulldozed in part to allow for a passage to the fields along the wadi, but there are no looting pits visible on the site itself. It is home to a family of Bedouins, who live in tents north of the abandoned houses, who use parts of these buildings as animal shelters.

11. WS-011

The site was first identified and surveyed by WSAS in 2016, and is located on the top of a rock outcrop immediately south of WS-010, along the southern bank of the wadi. The top of the outcrop measures *ca.* 100 x 100 m; at least one building, albeit heavily destroyed (see below), seems to have existed at its north-eastern corner. The building is rectangular, measuring *ca.* 7 x 7 m; the walls were built from unworked stones (**Fig. 25**).

The pottery seems to date exclusively from the Hellenistic Period, although the presence of Medieval pottery in the assemblage is possible; a more detailed analysis is needed for a final decision.

This site is completely destroyed. Bulldozers appear to have leveled the summit of the rock outcrop, leaving large heaps of stones which were once part of the walls of structures or buildings at various places throughout the area. Several large looting pits are also visible among the debris.

12. WS-012

The site was first identified during the 2016 survey campaign; it is located on top of a rock outcrop on the southern bank of the wadi. Several large looting pits at the bottom of the outcrop led the survey team to inspect the top. It appears to consist of two visible features: the first is a rectangular structure made of unworked stones, probably a watchtower, south of which is a second rectangular building, probably with two rooms (**Fig. 26**).

The pottery collected probably dates from the Late Roman and Byzantine periods; there may also be several fragments of Medieval pottery within the sample.

Agricultural fields surround the site on all sides, but the structures at the site appear to have suffered little damage, as they rest on a solid rock outcrop which is higher in elevation, and unlikely to be cultivated. There are a number of looting pits visible all over the site, some of which seem to have targeted the stone

25. Site WS-011. (Photo: A. Ahrens).

26. Site WS-012: seen towards the south (Photo: A. Ahrens).

foundations of the main structure.

13. WS-013

The site is located on the northern bank of the wadi. It sits on a moderate slope and consists of a lithic scatter, probably dating to the PPNB (**Fig. 27**).

Among the lithic assemblage collected at the site, core trimming elements and blanks hint at on-site production of flint tools. The raw material is dominated by fine grained flint, of grey and ivory color. Sickles and burins were not found, but perforators, scrapers and denticulates are present. Retouched and notched flakes and blades dominate the tool kit. Unfortunately, due to the absence of diagnostic finds, the dating of this site is difficult.

Pottery sherds are not abundant and they all seem to date to the modern era; the area is settled by Bedouins and features a number of concrete houses located around a large courtyard, which was apparently used by the Jordanian army until the 1990s. Archaeological (and architectural) features from older periods may, therefore, have been destroyed here, although the site was surveyed thoroughly and no remains of archaeological features were detected. WS-013 seems to correspond to Wright's "Site no. 13" (Wright *et al.* 1989).

There are no immediate threats to the site.

14. WS-014

Site WS-014 is located on a protrusion of sand and gravel on the northern bank of the wadi. It also was used as a military installation until the 1990s; several concrete ditches attest to that. Also, there are several older stone houses, which seem to date to the late 19th–early 20th century, but are now abandoned. A large number of lithic finds (PPNB) were also found in this area, as well as some pottery (**Fig. 28**).

The lithic assemblage from WS-014 predominantly features retouched and notched flakes and blades, followed by perforators, scrapers and sickles. One retouched blade exhibits heavy use wear on one edge. Core trimming elements and blanks hint at on-site production. Raw material is fine to medium grained flint, predominantly grey and dark brown in color. As with WS-013, the absence of diagnostics means dating is difficult.

The pottery seems to be modern. Some sherds may be earlier, but this cannot be determined at this time.

The site is not in immediate danger, and no looting pits were visible at the time of the survey. However, the houses described above are slowly collapsing.

Summary and Preliminary Conclusions

The first WSAS campaign has confirmed many results which have already been documented by previous surveys in the area. It has also verified that the region was inhabited from at least the Pre-Pottery Neolithic until the Islamic and Ottoman periods.

While evidence for an occupation of this region in the wadi during the Chalcolithic to the Bronze Age and Iron Age periods is still very limited (apart from the sites surveyed in the Jordan Valley and the Wādī Shu'ayb alluvial fan). A provisional suggestion is that a considerable increase in population and settlements is evident during the Hellenistic and Byzantine periods. While there is evidence for an Iron Age II A/B–Persian Period occupation, it is much sparser and more elusive compared

27. Site WS-013: seen towards the west (Photo: A. Ahrens).

28. Site WS-014, seen towards the north (Photo: A. Ahrens).

to the later periods attested. All in all, Iron Age I and the Late Bronze Age have so far only been attested at sites in the vicinity of the Jordan Valley (see above: Tall Nimrīn and Tall Blaibil, sites WS-008 and WS-007 respectively).

One important find of the 2016 campaign was the discovery of a fragment of the distinctive Cypriote White-Slip-Ware II (WS II) at Tall Blaibil, hence verifying (or at least indicating at) a Late Bronze Age occupation, contrary to previous literature. This may close the apparent gap in occupation in the area, as Tall Nimrin (located *ca*. 1500 m south-west of Tall Blaibil) features Middle Bronze Age IIB occupation, followed by Iron Age remains, whereas Tall Blaibil was previously thought to feature Early Bronze Age remains immediately followed by Iron Age remains.

Future survey campaigns aim to clarify settlement patterns and chronological distribution of archaeological sites within the Wādī Shu‘ayb; fieldwork so far is too preliminary to provide a detailed picture of diachronic settlement patterns for the region. Further research will also use soundings at selected sites to check the typological data from the survey. Once we have collected a more comprehensive databank, we hope to return both to the historical questions about the regional and transregional communication networks, and to the definition of the Wādī Shu‘ayb as an archeological landscape in its own right. Future work will also consider potential sites for excavation.

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Appendix: Gazetteer of Sites Surveyed in 2016.

Site Number	Local Site Name	Altitude (MSL)
WS-001	Khirbat Jazzīr	+674 m
WS-002	*Name unknown*	+598 m
WS-003	Khirbat as-Sūq	+639 m
WS-004	*Name unknown*	+333 m
WS-005	Khirbat Mu‘allaqa	+291 m
WS-006	Khirbat Shu‘ayb	+363 m
WS-007	Tall Blaibil	-118 m
WS-008	Tall Nimrin	-186 m
WS-009	Wadi Shu‘ayb Site	+393 m
WS-010	Khirbat al-Jisr al-‘Irāqiyyīn	-17 m
WS-011	*Name unknown*	+33 m
WS-012	*Name unknown*	+184 m
WS-013	*Name unknown*	-85 m

WS-014	*Name unknown*	-100 m

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PRELIMINARY REPORT ON THE 2014 AND 2016 EXCAVATIONS REVEALING PROCESSIONAL WAYS IN THE ABILA AREA E PILGRIMAGE COMPLEX

Robert W. Smith

Introduction

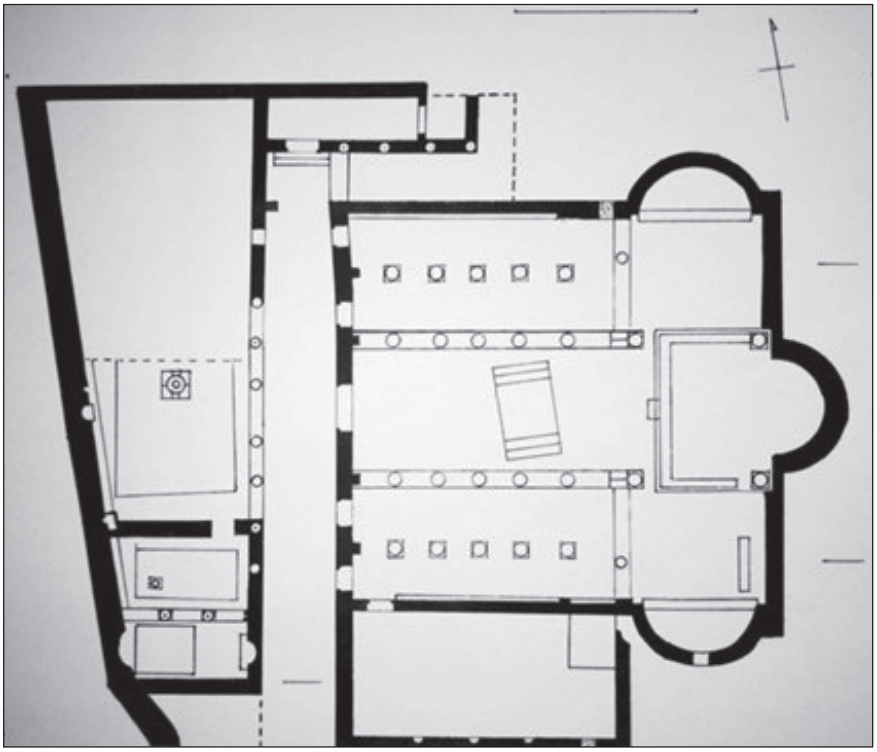
The ongoing Abila Excavation[1] at Quwaylibah, north of Irbid, Jordan exposed significant architectural remains and artifacts during the two short excavation seasons of 2014 and 2016 in the ecclesiastical complex space surrounding the Five-Aisle Pilgrimage Church identified as Area E (**Fig. 1**). These discoveries illuminate ritual activities which took place during the Byzantine and Umayyad periods, in a place considered sacred by both Christians and Muslims, as well as the salvaging activities in the early Abassid era following the great earthquake of AD 749. The expedition continues to build evidence for the ritual activities in the complex, and to evaluate the modern esoteric traditions associated with the site (Smith 2016: 219-232). This report particularly addresses the exposed processional passages within the pilgrimage complex.

The Excavation

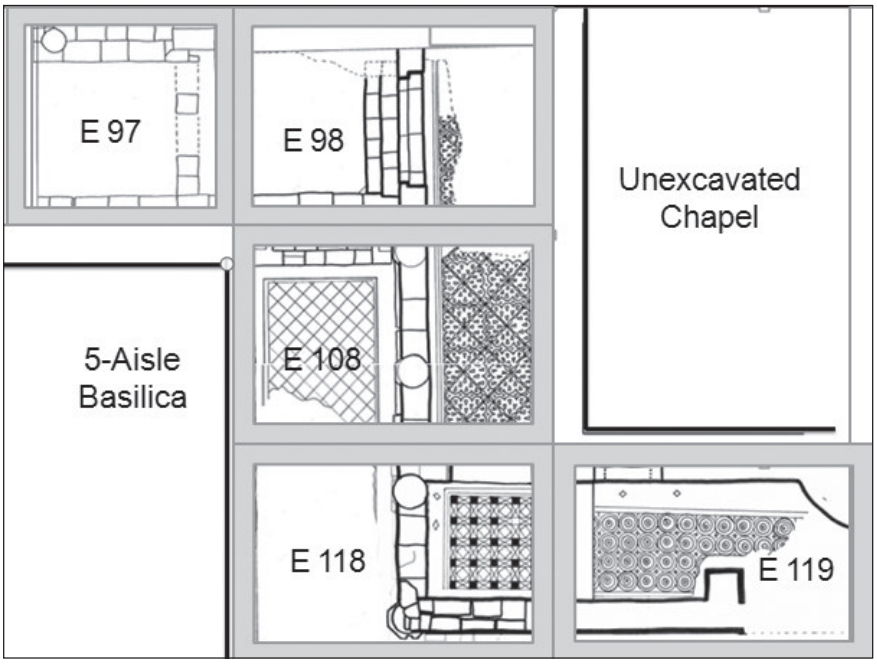
In 2014, excavations in Area E took place in four units, and revealed portions of the processional ways walked by pilgrims and clerics. In 2016, the Abila expedition worked in two additional units that exposed more of the passageways. The excavators expanded units E98, E108 and E118 beyond the typical "squares", in light of the monumental architecture that was evident prior to excavation. These six-meter long units lie on the northwest corner of the five-aisled pilgrimage church (**Fig. 2**). They expose the northern extension of a north-south walkway, which provided access to the five doorways of the five-aisle Pilgrimage Church under a covered portico on its east side, as well as access to the "Western Chapel," the "Atrium Court" and other special ritual spaces to the west. A preliminary report on the ritual spaces exposed during the 2016 excavations in Squares E87, E88 and 78 will be presented in a later report in *ADAJ*.

The essential stratigraphy was the same in all of the excavation units. On the surface is a layer of jedder soil (Munsell 2.5YR 5/2 Weak Red), which reflects erosion and the centuries of pastoral activities that took place within the city, as Abila declined in population and reverted to a more agriculturally dependent economy during the Abassid and Mamluke periods (Luke and Schmidt 2017). This layer contains a variety of worn pottery sherds, primarily from the Late Byzantine and Umayyad eras. A thicker layer of lighter colored, lime-rich sediment covers the area beneath the topsoil. This layer

1. The Abila Archaeological Expedition was initiated in 1980 by Dr. W. Harold Mare from the Covenant Seminary, St. Louis, MO, and is now directed by Dr. David Vila from John Brown University, Siloam Springs, AR. All research conducted at Quwaylibah, the site of ancient Abila in the Bene Kenana District, is authorized by a permit granted by the Department of Antiquities of the Hashemite Kingdom of Jordan (DoA), under the auspices of the Director General, Dr. Munther Jamhawi. The author of this report has been the Area E Supervisor from 2006 to the present. During the 2014 and 2016 seasons, Emad Obeidat from the Bene Kenana District served as the lead, on-site DoA representative for Area E. The work described in this report was also made possible through the concerted efforts of men from the surrounding communities, who labored in the warm weather before Ramadan in 2014, and the hotter weather immediately after Ramadan in 2016. Area E excavation staff members in 2014 included: David Clodfelder, Amanda Cox, Josafat Guillen, Adam Henley, Kari Miller, Daniel McCarley, Eric Seevers, Mic Silvers, Wesley Skopp, and Andrea Zerbini. Excavation staff members in 2016 included: Dr. Maxie Burch, Michael Bennett, Melissa Endicott, Josafat Guillen, Marissa Johns, Gabrielle Marcy, Jacob Russell, and Henry Vila.



1. The main architectural features of Area E, as drawn in 2014. (Created by the author).



2. The excavation units highlighted in this preliminary report. (Created by the author).

is material that washed down the slope of Tall Abila in the aftermath of the devastation of structures upslope, filling in and around a very thick stratum of disarticulated architectural elements. Within that later stratum, the excavators recovered some small intact ceramic and glass objects as they worked down towards the flooring which marked the surfaces of the processional ways that had served pilgrims to the Area E complex. The mid-eighth century floor surfaces of the processionals which abut the walls of the complex mark the end of the vertical exposure. No durable ritual items remained *in situ* on the flooring. Many sawn caliché ashlars and occasional column fragments were found scattered on the flooring,

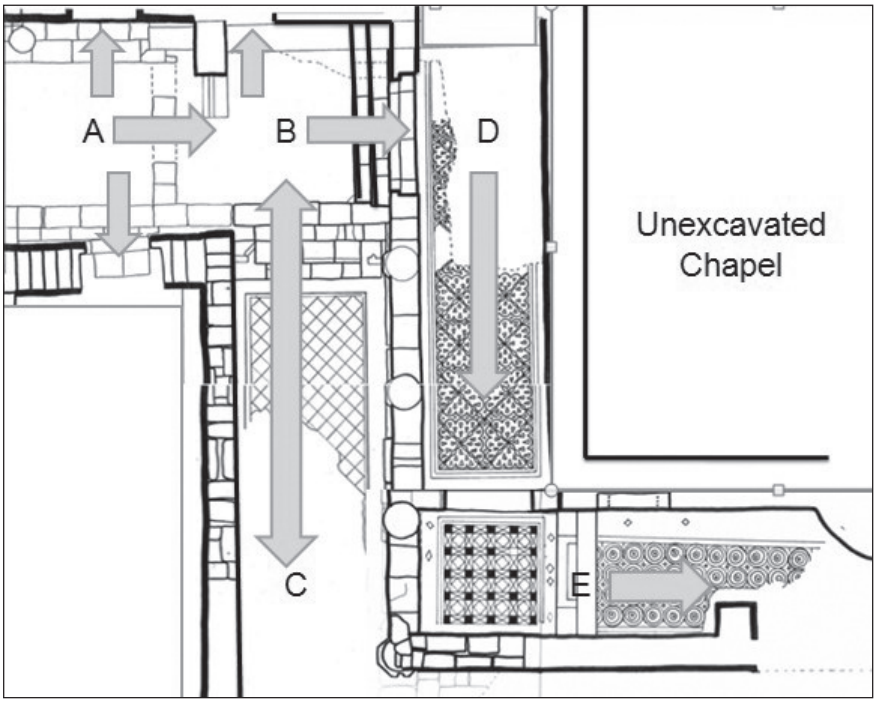
and a cache of metal items beneath a fallen monolithic limestone column indicate that the processional walkways, like the rest of the adjacent structures, were heavily salvaged in the period following the earthquake. Survivors, who retained memories of where reusable resources were located, mined the site soon after the earthquake. Precious metal ritual objects, concentrated in sacred spaces, were high priority targets. Other more common utilitarian metal objects such as iron nails and lead piping also represented value. Large dimension timbers from the doors and roofing were similarly valued, and extracted from the site. In a community seeking to rebuild, the marble *opus sectile* flooring and marble wall veneers were a resource from which the lime, used for mortar in walls and plaster for cisterns, could be produced. The preserved areas of flooring in the processional walkways of Area E are, as a result, those not finished in marble. In contrast, Abila salvagers did not find colored tesserae from mosaic floors worth recovering.

The Architecture of the Processional Passageways

The architectural remains exposed in the 2014 and 2016 excavations constitute the lower portions of the walls of monumental structures which had been built over earlier structures, reusing some spolia and large quantities of newly sawn ashlars. The preserved walls indicate that the structures flanking the processional passages were subject to significant modifications, as the Area E Complex served religious devotees as well as the purposes of local Bishops and other patrons of ecclesiastical construction at Abila. The huge investment of energy, creativity and resources indicate that worshippers venerated the destination at the north end of the processional on the western end of the complex, and that their movement through the passages was an integral part of the pilgrim experience (**Fig. 3**).

The Walls of the Processional Passageways

The exterior walls of surrounding structures form the sides of most of the processional passages in Area E, although two walls of Area E were constructed by the builders specifically to create protected passages. Since the walls described here proceed through multiple excavation units, and are known by several different locus numbers, they will be identified in this report by alphabetic designations (**Fig. 5**). The c. 4-meter wide, north-south passage exposed in Square E97 is a continuation of the portico covering the entrances of the five-aisle pilgrimage church. On the west side of the square, the six-column colonnade of



3. Directions of movement in the Processional Ways on the northeast side of Area E. (Created by the author).

recycled, second-century marble and granite monolithic columns capped with Corinthian capitals which supported the portico ended, and a wall of closely fitted, sawn limestone ashlars continued northward on the same line as the colonnade. This continuing wall will subsequently be identified as "Wall A." Most of Wall A is preserved to a height of four courses, and formed the western limit of excavations in 2014. The western wall of the passage retains evidence of being finished with a thin coat of plaster. A 1.3 meter wide entrance into a space to the west punctured Wall A at a point opposite the doorway to the northernmost aisle of the central pilgrimage church. The ritual space which lay beyond the threshold in Square 87 (excavated in 2016) will be discussed in a separate report. About one meter north of the doorway in Wall A, opposite the northwest corner of the central church, a short wall projects perpendicularly about one meter into the passage. In the floor at that point, a portion of an East-West limestone threshold lies *in situ*, suggesting that at one time a doorway controlled access to the transitional intersection in Square E98.

The western exterior wall of the Area E Pilgrimage Church formed the east side of the pedestrian passage; it will subsequently be identified as "Wall B." The section of this wall from the doorway to the northernmost aisle to the north end is made of recycled stones. The builders hid the poor quality of their construction behind a thick application of mortar and vertical Proconesian marble veneer affixed to the wall with molybdochalkos (copper and lead alloy) clamps. At the northwest corner of the five-aisled pilgrimage church, the exterior wall turns perpendicularly and runs unbroken for almost twenty meters to the east; it will subsequently be identified as "Wall C." Six courses from this exterior wall of the five-aisled church are preserved; it stands to a height of c. 2 meters and the exterior is finished with plaster. The plastering technique used on Wall C involved three steps. First, a 5 millimeter thick layer of light grey lime mortar with small carbon inclusions was first spread across the face of the ashlar wall. Into this, the plasterers impressed ribbed body sherds from bag jars and cooking pots, with the ribbing facing outwards. The ribbed exterior surfaces of the imbedded potsherds helped to provide a surface to which the thinner, smooth white finish-coat of plaster could adhere.

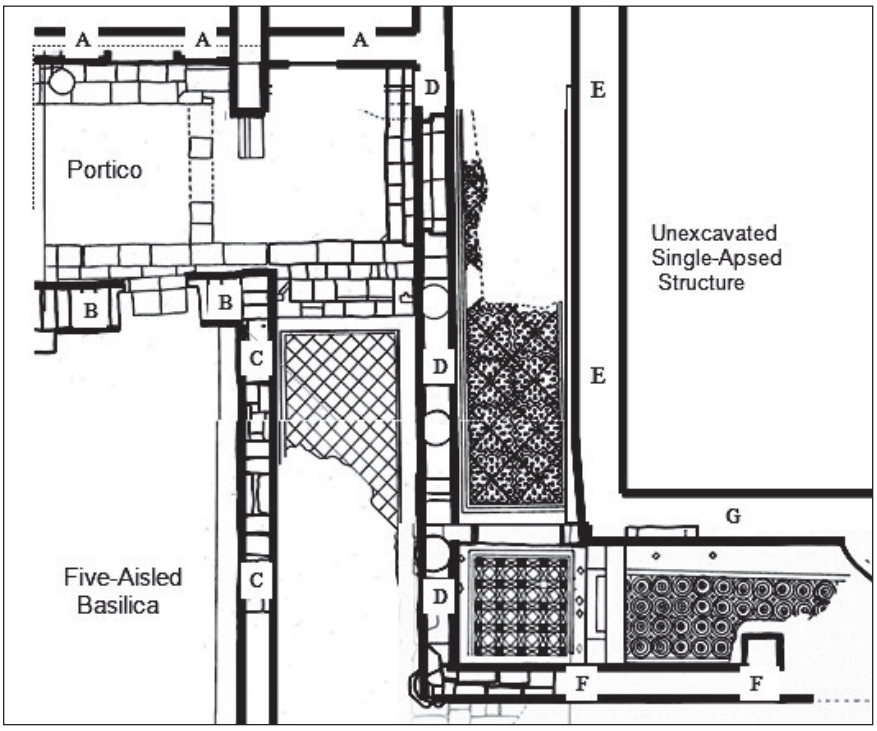
Wall A of the processional passage continues to the north in Square E98. On the west side of the passage, just past the previously mentioned projection, a c.1.3 meter wide doorway punctures the wall. The ritual spaces exposed in units E88 and E87 which lie to the west will be the subject of a later report. Subsequently, Wall A proceeds c. 1.5 meters northward from the threshold, until it encounters a west-east wall line, which is subsequently identified here as "Wall D." On the east side of Square E98, from the northern exterior wall of the Pilgrimage Church (Wall C) to a point three meters to the north, there is an opening with no obstructing wall until the previously mentioned west-east Wall D is encountered. Wall D is comprised of six uniform courses of limestone ashlars, custom-fitted to fill the gaps between standing limestone columns set at c. 2-meter intervals. The column drums have a torus at the bottom, and rest on bases which have an octagonal plinth surmounted sequentially by a torus, fillet, scotia and a double torus. Wall D stands c. 2 meters in height, and continues east into Squares E108 and E118. Wall D rises from a founding course of hard hematitic limestone. The octagonal bases of the limestone columns also stand on this course of stones, which is the lowest exposed course, and appears to be the stylobate of a previously existing colonnade. The gap between the northern exterior side wall of the five-aisled pilgrimage church (Wall C), and the parallel Wall D formed of ashlars filling inter-columnal spaces, creates a c. 3 meter wide passageway extending to the east which is exposed in the southern half of Squares E108 and E118 (**Fig. 4**).

An east west running exterior wall of an ecclesiastical structure is exposed on the northern ends of Squares E98 and E108. This wall, c. 2.3 meters north of Wall D, will subsequently be identified as "Wall E", and is primarily comprised of tightly bonded, newly cut caliché ashlars; it has five preserved courses. Wall E forms the north side of a processional passage, was finished in the mid-eighth century with a thin surface of lime plaster, and did not incorporate flat body sherds as did the exterior

4. Wall D, built on the stylobate, with ashlars filling the intercolumnal spaces and the mosaic flooring of Passage C in Square E108. (Photo: the author, 2014).

finish on Wall C. Exfoliation of much of the plaster in Square 108 reveals a vertical crack of unbounded ashlars, the reuse of a basalt ashlar, and a slight change in the direction of the wall at a point c.1 meter from the east side of Square E108. These indicators evidence a modification of Wall E, with an extension to the east. Wall E terminates at an opening marked by a masonry projection; the absence of pivot holes in the limestone threshold suggests that there was no door at this transition.

Excavations at the northern end of Square E118 in 2014 exposed a section of a north-south wall, which begins at the east end of Wall D and proceeds northward. This wall, subsequently identified as "Wall F", is comprised of irregular, recycled limestone ashlars. While the wall is thick, it is inferior in quality to all the aforementioned walls. It was not constructed with tightly fitted, uniformly sized sawn ashlars. Instead, small thin pieces of limestone were chinked between the courses to level the variously sized boulders and ashlars. The excavator's hypothesis is that Wall F, which had been damaged by one the earthquakes which struck the region c. AD 726 -746, was in the process of being reconstructed, and not yet completed by the finishing plaster coating in AD 749. The rebuilt Wall F appears to have largely survived the subsequent, more severe seismic event in spite of its inferior construction, because of the orientation of the wall. In 2016, excavation resumed in Square E118 and continued northward in the western half of Square E119. These excavations revealed four additional meters of Wall F to the north and its lower courses. Wall F preserves no evidence of interior plastering. The rough surface and chinking between courses would have required considerable quantities of plaster. Evidence found in the flooring of the passage confirms that Wall F was reconstructed, starting at its lowest level in the place of an earlier wall.



5. Map of the walls identified along the processional routes in the Area E Pilgrimage Complex. (Created by the author).

Wall G begins at the east end of Wall E, proceeding to the north parallel with Wall F. Wall G is comprised of well-fitted limestone ashlars, with some basalt ashlars employed in the lower courses, and is preserved to a height of three meters. At the south end of Square E119, Wall G is punctured by a c. 1 meter wide doorway, which has a 1.3 meter wide, undecorated basalt lintel. This doorway, which was originally c. 2.25 meter high, and served as a significant point of access to the religious structure to the west, had been carefully walled up prior to the severe earthquake. At the north end of Square E119, Wall G is bonded to the curved wall of an apse which protrudes to the east. The discovery of this apse leads the excavators to identify Wall G as the eastern wall of an ecclesiastical structure with a single exterior apse; it may have been a three-aisled basilical structure, with diaconicon and pastiphoria flanking a central apse. If this ecclesiastical structure is a martyr's chapel, a baptistery, or special ritual facility it may contain other architectural features.

The Floors and Thresholds of the Processional Passageways

The passageway portion identified here as Passage A lies between Wall A and Wall B in Square E97, and is c. 4 meters wide. Pavers of hard hematitic limestone laying on the west and east sides of the passage framed a c. 2.5 meter wide surface treatment, which covered the center of the passageway. The framing pavers corrected irregularities in the workmanship of the wall line at the northwest corner of the five-aisled pilgrimage church. Since salvagers have removed all the paving, the excavators suspect that the passageway, like the ambulatory beneath the portico to the south, was paved with marble *opus sectile*. On a 40 centimeter by 80 centimeter, hematitic paving stone just to the north of the doorway that punctures Wall A, is an inscription described subsequently in the discussion of artifacts (**Fig. 6**). A partially preserved line of pavers cuts across the north end of Square E97, in line with Wall C; it marks where a flooring transition took place, and where a threshold once controlled movement to the north.

Moving northward from Passage A into the south end of Square E98, there is a transitional

6. Kufic prayer inscription found in Passage A, Square E97. (Photo: the author, 2016).

portion of the processional, identified here as Passage B, the floor of which is framed by hematitic hard limestone pavers which continue, like Passage A, to create a central field, which is 2.5 meters wide and 2.3 meters long. The flooring in Passage B is largely missing. However, two remaining triangular pieces of red marble abutting the limestone frame suggest that a checkerboard red and white marble *opus sectile* decorated the framed space. Pilgrims could choose to proceed in four different directions. On the west, they could pass through Wall B into the ritual space excavated in Square E88. To the north, the pilgrim could ascend 50 centimeters by means of three 30-centimeter wide limestone steps, through a doorway into elevated Passage Section D. On the east side of the transitional portion of Passageway B, a limestone threshold in the floor indicates that previously, a c. 2 meter wide doorway had closed off access to the 3 meter wide Passage C which lies between Wall C and Wall D.

A carpet mosaic covers the floor of Passage C in Square E108; it is 3 meters wide, and has a 25 centimeter light-colored border made of medium size tesserae, around a 5 centimeter-wide inner frame of black, red and white. The central field is comprised of a checkerboard pattern of red limestone and black basalt tesserae (Munsell 10 YR 2/1) in c. 25 centimeter squares, set on the diagonal. The mosaic is preserved in the western 2.5 meters of Square E108, but then only continues along the base

of Wall D. It is not made of marble, and the excavator has no clear explanation for removal of the pavement. Future probes may reveal burials beneath the floor level in Passage C as it continues eastward into the southern portion of Square E118. Burials in a sacred area could explain the removal of non-marble tesserated flooring. The destruction of the mosaic could also be the result of earlier seismic activities, which had necessitated the rebuilding of Wall F.

A carpet mosaic also covers the floor of Passage D. The generally c. 2.3 meter-wide mosaic between Walls D and E is currently exposed for a distance of 7.5 meters from Square 98 and across Square E108. The western section of the floor in Square E98 currently remains unexcavated, since it is covered by fallen ashlars which support a compromised section of Wall D. An exterior band of light medium size tesserae forms the outer frame of the mosaic. The two inner frames have a combined width of c. 14 centimeters. The central field is comprised of a repeated pattern of c. 88 centimeter wide squares. Each square is divided diagonally from opposing corners with eight black lozenges, creating quadrants of right-angle triangles. Within each quadrant are six red flowers, which radiate from the center towards four small crosses on the hypotenuse. This repeated pattern thus creates many crosses (**Fig. 7**). This pattern was widely employed in Byzantine ecclesiastical construction in the Levant; it appears in the Pella Cathedral and pilgrimage sites such as Mt. Nebo, Nazareth and Jerusalem[2]. At the eastern end of Square E108, Passage D is slightly constricted by pilasters, with a c. 1.5 meter wide opening. The hard limestone threshold steps up c. 8 centimeters, and there is no evidence it had ever been closed by doors. Pilgrims stepping across the threshold faced Wall F, and turned north into Passage E.

Two carpet mosaics cover the two sections of the floor in Passage E. The first section of the passage lies in the northwestern corner of Square E118; the mosaic here is well preserved on the west side, and extends intact for c. 2 meters until it approaches Wall F. The edge of the mosaic flooring along the base of reconstructed Wall F was unrepaired at the time of the severe AD 749 earthquake. The mosaic in Square 118 consists of a c. 2 meter square field, which is surrounded by white tesserae (Munsell 2.5Y 8/1) and has two inner frames of white and dark red (Munsell 2.5 YR 3/6) tesserae outlined in black (Munsell 10 YR 2/1). The inner field is comprised of the same colors of dark red limestone, white limestone and black basalt tesserae, arranged in a regular pattern of triangles and squares, which create sixteen eight-pointed stars. On the north and south sides of the field, where the outer white framing is wider, four small designs are extant (**Fig. 8**). On the north side of the first section of mosaic in Passage E, as pilgrims moved northward they crossed a limestone threshold which had once supported a doorway. They then descended onto

7. Carpet mosaic in Passage D, between Walls D and E, in Square E108. Looking east towards the threshold into Passage E. (Photo: the author, 2016).

8. Looking down from Wall F to the faux opus sectile mosaic floor at the south end of Passage E in Square E 118, and the limestone and basalt steps in Square E119. (Photo: the author, 2016).

2. See Robert Houston Smith and Leslie Preston Day, *Pella of the Decapolis* Volume 2. Wooster, OH: College of Wooster 1989, pp. 74, 128-129. Smith identifies the pattern in Square E98 and 108 as Avi-Yonah's Design J-5.

a basalt step which extends across the passage, and down a second step onto the second section of mosaic flooring in Square E119.

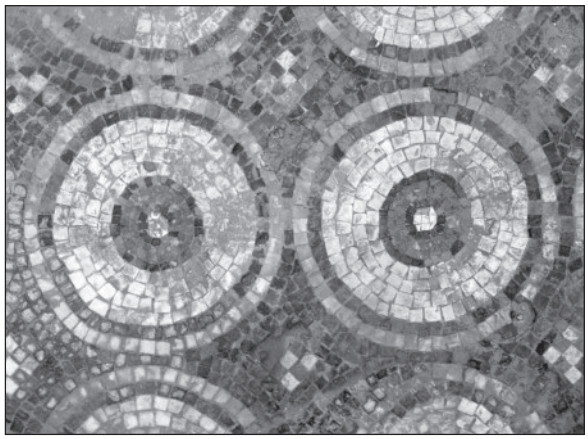
The carpet mosaic in Square E119, in the northern extension of Passage E, was in place prior to the installation of the southern mosaic in the passage. That the northern mosaic is earlier is evidenced by the fact that it continues under the basalt steps. The northern mosaic, like that in the south, is preserved intact along the west side against Wall G, but breaks off along the eastern Wall F (**Fig. 9**). It has a broad, white outer frame on the west side, and inner frames of red and white outlined in black. The inner field has a black background with four rows of superimposed circles. The 34-centimeter diameter circles are comprised of concentric rings of red, black, white, black, red, black and white tesserae. White crosses punctuate the black background between the circles (**Fig. 10**). This mosaic narrowed at a point 2 meters north of the basalt step, where a pilaster projects into the passage from Wall F. Fallen masonry obscures the northern end of Square E119, but the architecture appears to have permitted ambulation around the apse at the end of Wall G. A series of regular scorch marks preserved on the surface of the eastern side of the northern mosaic in Passage E evidence the presence of fire, possibly in conjunction with destruction of the earlier Wall F, but are not evidence of an incident at the time of the mid-eighth century earthquake (**Fig. 11**).

9. The mosaic flooring between Wall F and Wall G in Squares E119 and E118, looking south down Passage E. (Photo: the author, 2016).

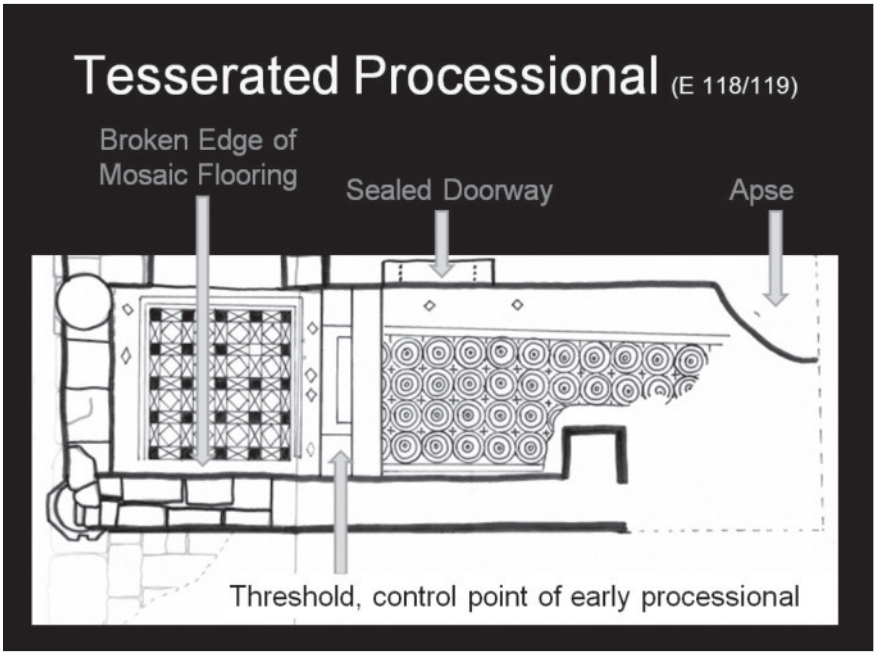
The Artifacts Found in the Passageways

Excavation revealed several largely intact objects amidst the fill in the passages. However, none of the recovered objects were found *in situ* on the pavements, hence as indicators of a venue for ritual activity, with the exception of the previously mentioned kufic prayer inscription. The objects' find spots were consistent with the eighth century destruction and subsequent salvaging of the pilgrimage site.

In Square E97 in Passageway Section A, the fill contained some body sherds from Byzantine and Umayyad forms, but none that were whole or possible to reconstruct. They also included random body sherds which had been embedded in the plaster finishing of Wall A. As mentioned above, no ritual objects were left *in situ* on the floor of the passage by the salvagers who removed the marble opus sectile. The most significant find in this passage is the two-line kufic inscription which is deeply scratched into a c. 80 centimeter by 40 centimeter hard, hematitic limestone paver in the flooring (**Fig. 6**). Using a well-known prayer formula, the writer calls upon "Allah" for forgiveness in Arabic. The inscription is located near Wall



10. Passage E in Square E119, detail of the polychrome concentric circles. (Photo: the author, 2016).



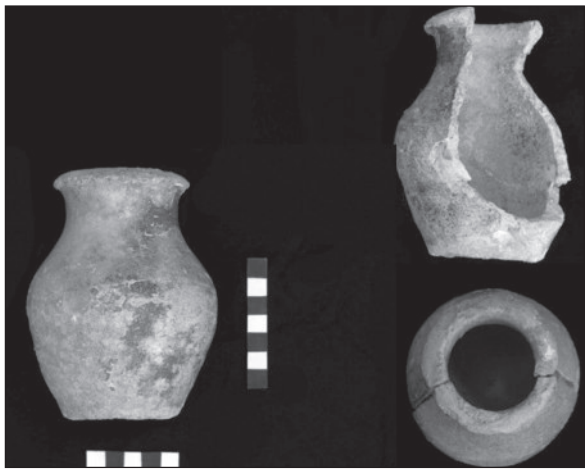
11. Location of Selected Features in Squares E118 and E119. (Created by the author, 2016).

A and never endured significant heavy foot traffic. The orthography is somewhat informal, but the edges of the inscription are very sharp. This suggests that the Arabic-speaking person who made the inscription did so in the mid-eighth century, close to the time of the severe earthquake. At least five other kufic inscriptions, which are similar in orthography and content to that found in Square E97, were discovered in the Pilgrimage Complex. A full discussion of all these inscriptions should be available soon, when the inscriptions from Area E are published (Smith, Zerbini and Firas, forthcoming).

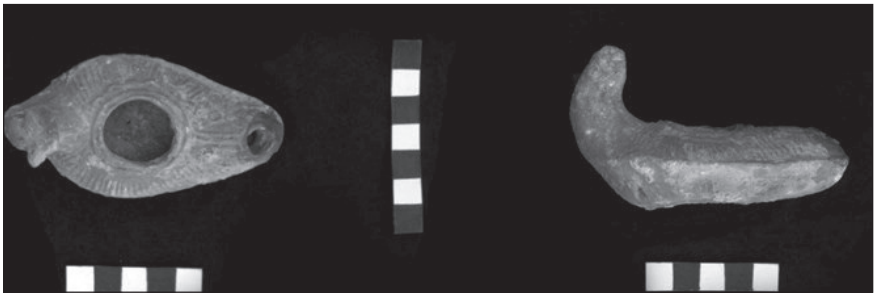
In Square E98, in Passage Section B and Section C, no intact or restorable special objects were discovered in the fill, nor were any ritual or other objects left *in situ* by the salvagers who mined the marble flooring. The previously described architectural finds of walls and doorways are the most significant results of excavation in Square E98.

In Square E108 in Passage C, no intact or restorable objects lay *in situ* on the mosaic floor. The Late Byzantine and Umayyad body sherds found there again came from a secondary use, from the plasterwork on Wall C. In the section of Passage D in Square 108, between Walls D and E, occasional ribbed body sherds lay amidst the fill, which was mainly comprised of a tumble of ashlars. Some small ceramic objects survived with them; most significant are two small blue-glazed jars (**Fig. 12**), an intact Umayyad oil lamp (**Fig. 13**), and a 20-centimeter tall basalt object with a shallow, circular depression in the 30-centimeter square top, which stands on a 15-centimeter square base with a low foot in each corner (**Fig. 14**). This basalt object appears to be an incense burner, which may have perfumed the passage.

In Square E118, Passage C, a number of small special objects were found in the fill, which was comprised of disarticulated, collapsed debris constrained within surviving architecture. The only isolated finds were a largely intact slipper lamp with Christian motifs, a piece of polished agate which was interpreted as a pos-

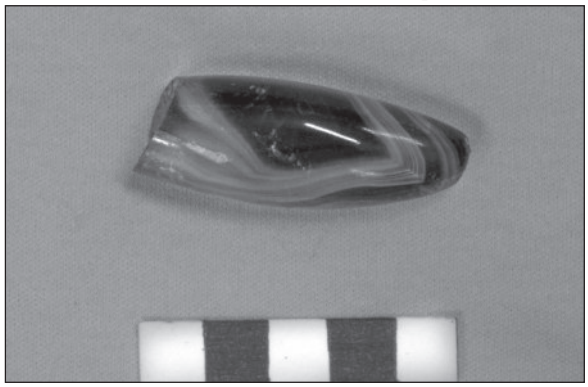


12. Blue glazed ceramic vessels from Passage C in Square E108.



13. Umayyad era oil lamp from Passage C in Square E108.

sible burnishing tool used in the application of gold foil to icons, and some largely intact glass objects (**Fig.15**). Most of these objects were found together, in the soil on the north side of the square, under a fallen monolithic limestone column (**Figs. 16 and 17**). The collection includes intact glass objects (**Fig. 18**) and a number of metal artifacts, including iron tools (**Fig. 20**), iron nails and large iron rings, all of which were in a bronze pan (**Fig. 19**), some bronze discs, a bronze two-spouted ladle (**Fig. 21**), a liturgical bell (**Fig. 22**), fragments of liturgical objects and a three-legged, one-handled bronze vessel with a short spout (**Fig. 23**). This collection of artifacts is considered to be a horde collected by people from Abila who were scavenging in the aftermath of the destruction of Area E, since it was hidden in a gap between some ashlars underneath the fallen column. Both the horde and the tools may have been abandoned because the salvagers were distracted by larger, more lucrative prizes, or perhaps because of resistance from those who still venerated the site, and were therefore opposed to those who were there for personal plunder.



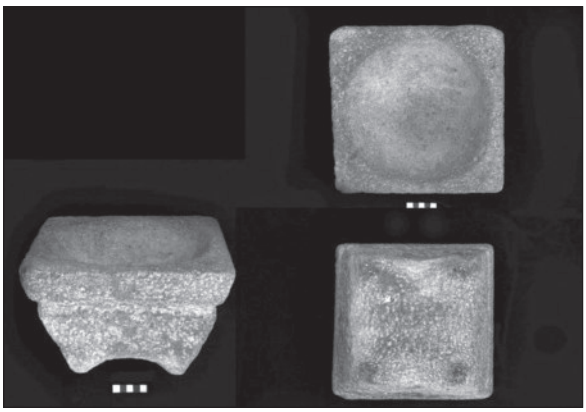
15. Agate smoothing stone, possibly used in the installation of gold foil on icons.

16. "Salvager's hoard" of metal and glass objects, Square E118.

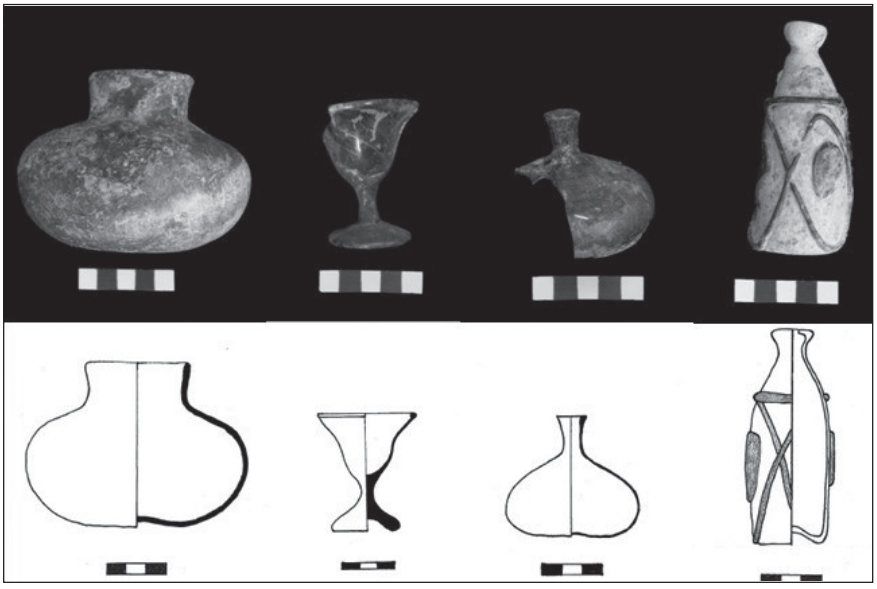
17. "Salvager's hoard" of bronze and iron objects, Square E118.

The Significance of the Discoveries

The architectural and artifactual discoveries in the Processional Walkways during the 2014

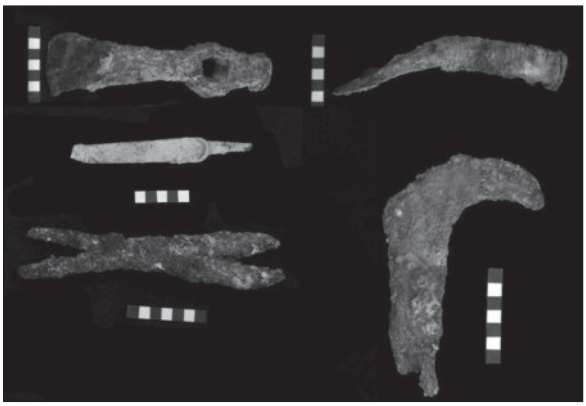


14. Basalt "incense burner" from Passage C, Square E108.

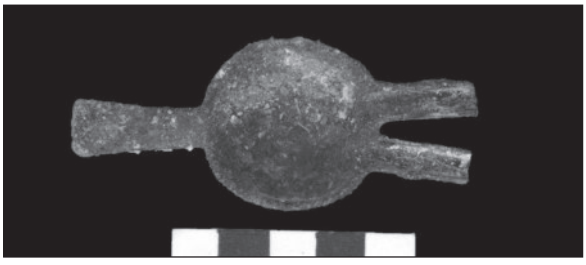


18. Selected glass vessels from the "Salvager's hoard", Square E118.

19. Bronze pan filled with iron nails and scrap metal, Square E118.

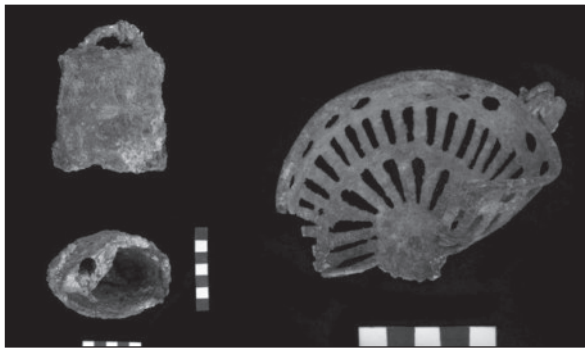


20. Metal tools from the "Salvager's hoard", Square E118. (Photo: the author, 2016).

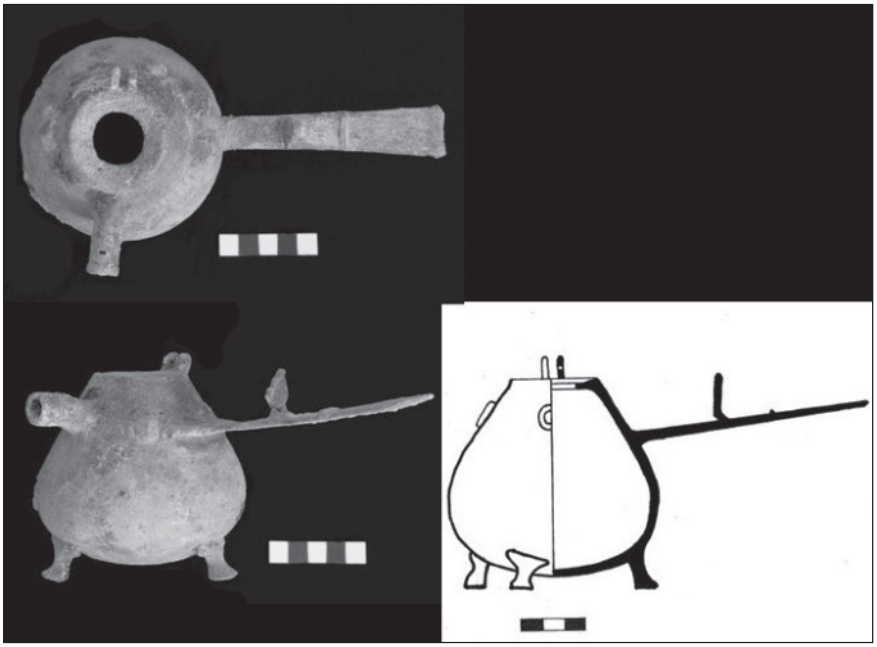


21. Bronze ladle for pouring wax or lead into amulet molds, E118 Hoard.

and 2016 excavations reveal a great deal about the ritual activities and the wealth invested in the Area E Abila Pilgrimage Complex. The plastered walls and expensive floors of tesserae and *opus sectile* were major investments, which contributed to the pilgrim experience. The mosaic and *opus sectile* paving add to the known corpus of decorated flooring from Abila, and our final publications will include a comparative study with the flooring from other ecclesiastical structures in the Levant. The mosaic pavements in the processional ways described here are consistent with other sixth to eighth century ecclesiastical mosaics found in the region, particularly the variously colored stones employed, which are common, while the hints of *faux opus sectile* mosaic patterns, exotic marble veneering and pavers bear testimony to the continuing affection for *opus sectile*. The inclusion of crosses and cross designs in the flooring affirms that it was not



22. Liturgical bell and censer lid from "Salvager's hoard", Square E118. (Photo: the author, 2016).



23. Bronze hot liquid dispenser from "Salvager's hoard", Square E118. (Photo: the author, 2016).

taboo to step on this religious motif (Habas 2015: 33-60). The sequence of wall construction and a closer scrutiny of additions to positively determine dates of construction are the subject of continuing study. The most hopeful strategy for tighter chronology is the carbon dating of olive pits found in the lime mortars in the walls and beneath the flooring.

24. Sealed doorway to the Ritual Structure on the north side of Square E119. (Photo: the author, 2016).

The Kufic inscription found in the paving of the processional way in Square E87 provides some indication of the breadth of the appeal held by the Area E Pilgrimage Complex. Pilgrims to the site included Arabic speakers and writers, who may have identified themselves as Muslims, alongside Greek speaking Christians in the mid-eighth century. The Area E Complex affirms the observation found at other regional pilgrimage sites such as Dayr 'Ayn 'Abata, that sacred sites venerated by Byzantine Christians were also significant to the early Islamic community (Politis 2010: 1-24).

The discovery that Area E was heavily salvaged, and that almost all of the marble wall veneers and flooring had been stripped away, points not only to the diminished value of the pilgrimage complex, but also to the pressing need for lime mortar needed for reconstruction in the aftermath of the AD 749 earthquake. The looter's horde found in Square E118 verifies that the Area E Complex still served liturgical purposes through the Umayyad Caliphate, and that the ruins were a rich resource to be salvaged, in the Abassid era. The presence of many blue glazed ceramic vessels affirms the need for ceramic typologists to recognize that they appeared in the late Umayyad era, and are not a unique marker from the Abassid era after AD 750.

The processional passages walked by pilgrims in the Abila Area E Pilgrimage complex provided access to highly controlled areas of ritual significance outside the central five-aisle church building. Passageways D and E served as an ambulatory around the as yet unexcavated one-apsed ecclesiastical structure in Square E99 and E109. The excavators anticipate that the mosaic paved corridor will continue north in Passage E, before turning west to complete the circuit around the unexcavated northern focus of pilgrimages to the Area E complex. When that portion of Area E and the one-apsed northwestern ecclesiastical structure is excavated, the reason why Abila was highly venerated by pilgrims may be further clarified.

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forthc. Inscriptions in the Area E Pilgrimage Complex at Abila.

المملكة الأردنية الهاشمية

حولية دائرة الآثار العامة

المجلد (٥٩)

عمّان

٢٠١٨

حولية دائرة الآثار العامة
تصدر عن دائرة الآثار العامة، ص.ب ٨٨، عمان ١١١١٨ - المملكة الأردنية الهاشمية

رئيس التحرير
د. منذر جمحاوي

هيئة التحرير
هنادي الطاهر
أروى مساعدة
هالة السيوف
علي الحاج
مريم إبراهيم

قام بمراجعة النصوص الإنجليزية
د. آن بيوبجي

الاشتراك السنوي
٢٠ ديناراً أردنياً (داخل المملكة الأردنية الهاشمية).
٣٠ دولاراً أمريكياً (خارج المملكة) بالإضافة إلى أجور البريد.

الآراء المطروحة في المقالات لا تمثل رأي دائرة الآثار العامة بالضرورة
تقبل المقالات حتى ٣١ أيار (مايو) من كل عام حسب التعليمات الواردة في هذا المجلد وتُرسل على العنوان التالي:

حولية دائرة الآثار العامة
دائرة الآثار العامة
ص.ب ٨٨
عمان ١١١١٨ - الأردن
فاكس: ٤٦١٥٨٤٨ ٦ ٩٦٢+

تعليمات نشر البحوث في حولية دائرة الآثار العامة

تعنى حولية دائرة الآثار العامة بالبحوث المختصة بالتراث الحضاري للأردن والمناطق المجاورة، بما في ذلك تقارير التنقيبات الأثرية ونتائجها.
ترسل البحوث في موعد أقصاه ٣١ أيار (مايو) من كل عام للنشر في مجلد العام نفسه إلى العنوان التالي: حولية دائرة الآثار العامة، ص.ب ٨٨ عمان ١١١١٨ الأردن، هاتف (٤٦٤٤٣٣٦).
ويمكن الاستفسار عن طريق الفاكس رقم (٤٦٥١٥٨٤٨ ٦ ٩٦٢+)، أو البريد الإلكتروني: (publication@doa.gov.jo).

لغة البحث

العربية أو الإنجليزية.

مسودات البحث

يجب ألا تتجاوز مسودة البحث ١٥,٠٠٠ كلمة (٣٠ صفحة تقريباً لتشمل قائمة المراجع، والمواد التوضيحية (الأشكال)، ويرجى تضمين اسم الباحث (أو الباحثين) وعنوانه في نهاية المسودة، ويكون ترتيبها كالآتي:

١- عنوان البحث واسم الباحث (الباحثين).
٢- النص الكامل للبحث.
٣- عنوان الباحث (الباحثين).
٤- قائمة المراجع.
٥- الهوامش إن وجدت.
٦- قائمة شروحات الأشكال.

تسليم النصوص

يُسلم النص على قرص حاسوب، إضافة إلى نسخة مطبوعة يكون تباعد الأسطر فيها مزدوجاً، والرجاء إضافة نسخة محفوظة على شكل Rich Text Format على قرص الحاسوب. كما يجب أن تكون المسودة بشكلها النهائي دون إجراء تغييرات كبيرة لاحقاً.

الصور والرسومات والمخططات

يجب أن ترفق مع النسخة الأصلية عند التقديم. ويجب الإشارة إلى جميع المواد التوضيحية سواء كانت صوراً أم رسومات أم مخططات، باستخدام مصطلح (الشكل) في متن النص، وترقيمها حسب تسلسل ورودها في النص (الشكل ١، الشكل ٢،... إلخ). ويجب ألّا تزيد أبعاد الشكل عن ٢٢×١٧ سم، حيث تكون حجومها ٢٥٠ pixels/in للصور الفوتوغرافية، و٦٠٠ pixels/in للرسومات والمخططات، وبالإمكان تقديم الشكل إلكترونياً بصيغة (jpg)، ولا تقبل الأشكال المحمّلة على برنامج Word.

الهوامش

يفضل الابتعاد عن الهوامش الطويلة قدر الإمكان، وتوضع المصادر والمراجع بين قوسين ضمن المتن، مثلاً: (الفلاحات ٢٠٠١: ٦٥-٦٧) أو (Brown 1989: 32-35) للمراجع الأجنبية.

قائمة المراجع:

يجب أن تكون ضمن جدول في نهاية البحث وحسب التسلسل الأبجدي، واتباع النموذج الآتي:

١- في حالة المقالات المنشورة في دوريات:

النوافلة، سامي

٢٠٠٠ تقرير عن حفرية الجي (جايا) في وادي موسى / ١٩٩١. **حولية دائرة الآثار العامة** ٤٤: ٤٢-٧١.

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٢٠٠١ فترات التاريخ العربي، نظرة شاملة. ص ٤٣-٥٩ في **أبحاث ودراسات في التاريخ العربي**، مهداة إلى ذكرى مصطفى الحياري ١٩٣٦-١٩٩٨. تحرير صالح الحمارنة. عمان: الجامعة الأردنية.

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٣- في حالة الكتب:

عباس، إحسان

١٩٩٠ **تاريخ بلاد الشام من ما قبل الإسلام حتى بداية العصر الأموي، ٦٠٠-٦٦١**. عمان: لجنة تاريخ بلاد الشام.

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الملكية الفكرية

من حق الباحث (الباحثين).

الفهرس

أعمال الصيانة والترميم لمسجد القسطل الأثري

أحمد لاش

Restoration and Rehabitation of Al-Qastal Mosque

Abstract:

Al-Qastal which consider as one of the most famous Umayyad ruin, is located 35 km south Amman. The most significant part in this site is the Umayyad mosque and its unique minaret, which consider as the oldest Islamic minaret in the Islamic world (still standing), the mosque was in very bad and dangerous situation. In this paper I'll speak about the restoration, rehabilitation, and protection works, particularly the reconstruction of the western wall, the protection of the courtyard and the restoration and rehabilitation of the internal part of the mosque. Also I'm going to follow the Mesopotamians influences which appeared in the Umayyad monuments in Transjordan in the eight century AD.

مقدمة

تعددت التفسيرات اللغوية لمعنى القسطل، فيورد ياقوت الحموي في معجم البلدان بأن القسطل في لغة العرب تعني الغبار الساطع، وفي لغة أهل الشام تعني الموقع الذي تفترق منه المياه، وفي لغة أهل المغرب تعني الشاه بلوط الذي يؤكل (وهي ما نطلق عليه "الكستناء". المؤلف)، ويضيف الحموي بأن القسطل موقع بين حمص ودمشق وقسطل موضع قرب البلقاء من أرض دمشق في طريق المدينة (الحموي ١٩٩٣)، كما يشير عبدالله الأندلسي في كتابه معجم ما استعجم من أسماء البلاد والمواضع، بأن القسطل موضعان متقاربان من عمل البلقاء بدمشق (البكري ١٩٨٣). هذا وقد أوردت المصادر العربية معانٍ متعددة لكلمة القسطل بالإضافة إلى الإشارة إليه كاسم موقع، فقد وردت بمعنى غبار الحرب، فكان من المشهور من شِعر عنترة بن شداد قوله (واختر لنفسك منزلاً تعلو به ..... أو مت كريماً تحت ظل القسطلِ)، وكذلك وردت كنوع من الشجر، كما يرد اسم القسطل بمعنى الأنبوب من الخزف أو غيره يجري به الماء. إن الغاية من ذكر هذه التعريفات هو تفنيد ما ذهب إليه البعض من احتمالية تحوير اسم القسطل من المصطلح اللاتيني (Castellum)، فالقسطل اسم عربي صريح وقد عُرفت الكثير من المناطق باسم القسطل، مثل القسطل بالقرب من حمص، والقسطل في فلسطين بالإضافة إلى قسطل البلقاء، كما أن قسطل البلقاء قد عُرفت بهذا الاسم قبل العصر الأموي، فقد ذكرتها المصادر التي تحدثت عن الخليفة الراشد أبو بكر الصديق وفتوحاته في بلاد الأردن عندما أشارت أنه قد بلغها جيش خالد بن سعيد (الطبري ١٩٦١: ٣)

منذ نهايات القرن التاسع عشر وخلال القرن العشرين وبدايات هذا القرن شهد موقع القسطل العديد من زيارات الباحثين والمستكشفين والذين

قاموا بالعديد من أعمال الدراسة والتوثيق لهذا المعلم الحضاري الإسلامي الهام، مثل الألمانيين برونو ودوماسفكي، والفرنسيان جسين وسيفنياك، ونلسون غلوك وكريزويل ولانكستر هاردنغ وهاينز جوبه وغيرهم الكثيرون، بالإضافة إلى بعض أعمال الصيانة والترميم والتنقيب، فقد قامت دائرة الآثار العامة بتنفيذ أعمال الصيانة لمسجد القسطل سنة ١٩٦٢، كما قامت البعثة الفرنسية برئاسة باتريشيا كارلييز وفريدريك مورين بالتعاون مع دائرة الآثار العامة بإجراء أعمال التنقيب والمسح الأثري لموقع القسطل والمنطقة المحيطة به خلال الفترة من ١٩٧٩- ١٩٨٥ وقد يكون هذا المشروع من أكثر المشاريع تعمقاً في الدراسة التحليلية للموقع من الناحية المعمارية والتي خلُصت إلى مالا يدع مجالاً للشك بأن قصر القسطل ومسجده هما بناء عربي إسلامي خالص، وتُرجّح نتائج عمل تلك البعثة، اعتماداً على مقارنة وحدة القياس المستخدمة في بناء الموقع وهي (الذراع) بأن القصر ومسجده قد بنيا في فترة الخليفة الأموي عبدالملك بن مروان والذي حكم خلال الفترة من ٦٨٥ إلى ٧٠٥ م (Carlier and Morin 1987)، كما قامت إرن أديسون بإجراء بعض التنقيبات الأثرية في الموقع سنة ١٩٩٩، وقد يكون من أهم أعمال الترميم التي تمت في الموقع هو ما قام به الدكتور غازي بيشة سنة ٢٠٠٤ من أعمال الترميم وإعادة البناء لمئذنة مسجد القسطل، والتي تُعتبر أيقونة معمارية مميّزة لهذا الموقع باعتبارها أقدم مئذنة مازالت قائمة على مستوى العالم.

أعمال الترميم و إعادة التأهيل للمسجد

الجدار الغربي

بالإضافة لأعمال الصينة والترميم اللازمة لهذا الجدار، فقد كان الدافع الأساسي للعمل به هو ما يشكله من خطورة كبيرة في حال انهياره وخاصة منطقة المدخل الرئيسي فيه والتي كانت معرضة للانهيار في أي لحظة وبسبب أي اهتزاز كما هو واضح في **(الشكلين ١، ٢)**، ولإجراء التقيّم الدقيق لحالة الجدار وتحديد طبيعة التدخل المناسبة كان لابد من تنظيف المنطقة الملاصقة للجدار من نباتات وأشجار نمت ما بين مداميكه كما هو واضح في **(الشكل ٣)**، وبعد إزالة تلك الأشجار والنباتات اتضحت الحالة الخطرة التي يعاني منها ذلك الجدار، فهذا الجدار الذي يمتد على طول (١٩,٢٥ م) وبارتفاع (٤ م) قد بني على أرض تنحدر نحو الشمال بحيث يتكون الجزء السفلي منه من جدار بُني من أربع صفوف من الحجارة بسماكة تصل إلى (١٢٥سم)، لتُشكل أساساً للجزء العلوي والذي تنحصر سماكته إلى (٦٥سم)، كما اتضح حجم الميلان في الجهة الجنوبية من هذا الجدار، حيث وصل حجم اندفاعه نحو الغرب (٣٧ سم) عن مستوى حجارة

١. مدخل الجـدار الغربي من الداخل قبل الترميم.

٢. مدخل الجـدار الغربي من الخارج قبل الترميم.

٣. الجدار الغربي قبل إزالة الأشـجار والنباتات.

الأساس على طول (١٢,٦١م)، ومما ضاعف من خطورة وضع ذلك الجدار وخاصة في الجهة الجنوبية منه، أن حجارة الأساس في معظمها مفقودة، ربما نتيجةً لاقتلاعها في فترات سابقة بحيث أصبح ذلك الجزء من الجدار يستند على التراب فقط، أما أخطر ما في ذلك الجدار فهو أن المادة الرابطة بين صفّي الجدار مفقودة في معظم أجزائه، بحيث لم يعد يوجد ما يربط صفّي الجدار ببعضهما سوى ثقل الحجارة المستندة على بعضها بطريقة خطرة جداً شكّلت خطورة بالغة عند القيام بأي تدخّل في ذلك الجدار كما يتضح من **(الشكلين ٤، ٥)** ، وأمام ذلك الوضع البالغ الخطورة كان الحل الوحيد المُتاح هو فك الجزء الأكثر خطورة في الجدار و البالغ طوله (١٢,٦١م) و إعادة بناء الأساس المفقود بطول (١٤,١٩م) وذلك باستخدام نفس الحجارة وإعادة كل حجر لموقعه الأصلي واستبدال التالف منها وملئ الفراغات الناتجة

٤. الجدار الغربي بعد إزالة الأشـجار والنباتات.

٥. عـدم وجـود المـادة الرابطـة بين حجارة الجدار.

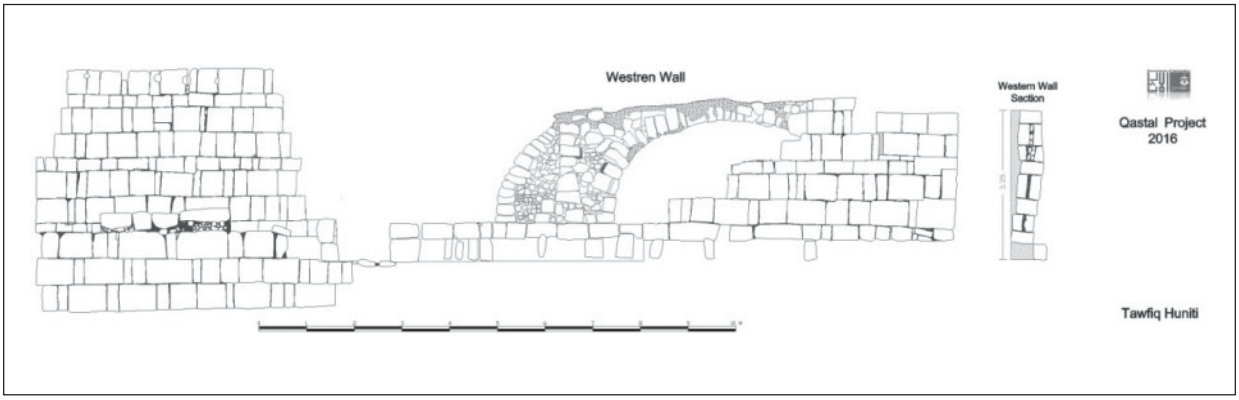
عن الحجارة المفقودة بحجارة جديدة من الحجارة المنتشرة في الموقع بحيث لم تتجاوز نسبة الحجارة المُستبدلة والمضافة على طول ذلك الجدار الخمسة بالمئة (٠,٠٥٪) من مجموع حجارة الجدار.

إن عملية إعادة البناء هذه قد وضعتنا أمام تحدٍ لمنهجية يجب اعتمادها قبل الشروع في عملية إعادة البناء، فلا يوجد خلاف حول وجوب إعادة كل حجر من حجارة الجدار إلى موضعه الأصلي وبالشكل الذي كان عليه، كما لا يوجد خلاف على عدم استخدام أي مواد حديثة خلال عملية الترميم والإقتصار على استخدام نفس المادة الرابطة التي كانت مستخدمة عند بناء الجدار في المرحلة الأموية، وهي الرمل والجير وحبيبات الحصى الصغيرة (رمل السيل)، إلا أن التحدي الأكبر يظهر عند العلم بأن هذا المسجد الذي بني في الفترة الأموية وتم استخدامه وأُعيد بناء أجزاء منه في الفترة الأيوبية والمملوكية والعثمانية وحتى في

الفترة الحديثة في مطلع القرن العشرين، وتتضح تلك التعديلات الطارئة على الجدار الغربي في المدخل الواقع في منتصفه بعرض (٥٩سم) وارتفاع (١٣٩سم) وكذلك في بعض الأجزاء الجنوبية من ذلك الجدار والمتمثلة بفجوتين على شكل نافذة، فلا يوجد أدنى شك بأن ذلك المدخل لا يتزامن مع الجدار الأموي (الجدار الغربي) فمن الواضح أن هذا الجزء من الجدار قد تعرض للإنهيار في فترات سابقة ثم أعيد بناء المدخل بشكله الحالي بحيث لا يتشابه نهائياً مع شكل المداخل الشائعة في العمارة الأموية والمنتشرة في أروقة قصر القسطل، وعند بحثنا في أقدم ما هو متوفر من صور لهذا الجزء من الجدار قام الأب جان ميشيل من معهد الدراسات التوراتية التابعة للأباء الدومنيكان في القدس بتزويدنا مشكوراً بما لديه من صور قام بالتقاطها الآباء الدومنيكان جيسن وسفنياك لهذا الجزء من الجدار في تسعينيات القرن التاسع عشر **(الشكل ٦)**، والتي اتضح منها أنه لم يحدث أي تغير على شكل هذا المدخل منذ تلك الفترة على الأقل باستثناء حجر واحد يبدو أنه قد تم انتزاعه لاحقاً واستبداله بحجرين صغيرين غير منتظمين الشكل زادا من خطورة وضع المدخل، فخلُصنا إلى نتيجة أن المدخل بشكله الحالي يعود إلى فترة القرن التاسع عشر على أقل تقدير أي أنه قد أُعيد بناؤه بهذا الشكل خلال الفترة العثمانية أو المملوكية، وعليه فقد استقر قرارنا على إعادة بنائه بنفس الشكل وإعادة كل حجر إلى موضعه، إلا أنه نتيجة لفقدان حجارة مداميك الوجه الداخلي من الجدار فوق المدخل وضرورة ملئها بحجارة جديدة كان لابد من استبدال العتبة العلوية من المدخل بأخرى أكثر سمكاً بحيث تكون قادرة على حمل مداميك الوجه الداخلي والخارجي للجدار فوق المدخل. وعليه فقد تم اعتماد هذه المنهجية في إعادة البناء حيث تم فك ما طوله (١٢,٦١م) من الجدار (**الشكلين ٧، ٨**)

٦. الصورة التي التقطها الآباء الدومنيكان للجدار.

٧. مخطط ١.



٨. مخطط ٢.

وإعادة بناء ذلك الجزء من الجدار حجراً حجراً بشكل مستوٍ وإعادة كل حجر إلى موضعه الأصلي بنفس الوضعية التي كان عليها باستثناء ما هو تالف أو مفقود منها كما أشرنا سابقاً، وهذا ما تم بعد أن قمنا بتوثيق كافة التفاصيل في الجدار ورسمه وترقيم حجارته، وقد رافق تلك الأعمال إعادة دفن الخندق الإختباري الذي تم عمله خلال المشاريع السابقة ملاصقاً للجزء الشمالي من الجدار بجانب قاعدة المئذنة، كما تم إزالة كافة النباتات والأشجار التي كانت تخرج من أساسات ومداميك الجدار وحقن ما استعصى من جذور تلك الأشجار بالمواد الكيميائية المناسبة لقتلها وعدم نموها مجدداً. **(الشكل ٩)**

لقد شكّلت الدعامية الحجرية التي بنيت في الفترة الأيوبية المملوكية أمام الجدار الشمالي للمسجد نوعاً من الحماية لذلك الجدار، إلا أنها وبنفس الوقت وبسبب امتلائِها بكميات من التراب الذي تسربت له مياه الأمطار عبر مئات السنين، قد شكّلت مصدراً للرطوبة التي تراكمت في تلك التربة وانتقلت إلى حجارة الجدار الشمالي للمسجد وإلى الجزء الملاصق لتلك الدعامية من حجارة الجدار الغربي، ولهذا فقد قمنا عند بداية موسم الصيف ٢٠١٧ بتنظيف ما يتخلل حجارة تلك الدعامية من تراب ونباتات وخلق فتحات تسمح بدخول الهواء والحرارة إلى ما خلف حجارة تلك الدعامية بحيث تبقى متعرضة طوال فترة الصيف لأشعة الشمس المباشرة لتعمل على تبخير ما تخزن بين حجارتها من رطوبة، ومن ثم إعادة تكحيل تلك الفتحات قبل دخول الموسم المطري لعدم السماح لمياه الأمطار للتسرب مجدداً إلى ما خلف حجارة

٩. الجدار الغربي بعد الترميم.

تلك الدعامية، وذلك طبعاً بعد إغلاق كافة الفتحات الموجودة في سقف المسجد و حوافه والتي قد تشكل منفذاً تتسرب منها مياه الأمطار.

وبعد الإنتهاء من إعادة بناء الجزء الجنوبي من الجدار الغربي كان لابد من معالجة الجزء الشمالي منه وبالذات الوجه الداخلي حيث يتضح فقدان بعض الحجارة بالإضافة إلى فقدان مساحة كبيرة من حجارة الوجه الداخلي بعرض يتراوح من (١٠٠ إلى ١٦٢سم) وارتفاع (٢,٥٨م)،**(الشكل ١٠)** والتي كانت تشكل خطورة تهدد بانهيار جزء كبير من الجدار في حال تركها على هذه الحال، وعليه فقد تم إعادة بناء ما هو مفقود من حجارة في ذلك الجزء من الجدار كما هو واضح في **(الشكل ١١)**.

الساحة الخارجية للمسجد

بالإستناد إلى خطة العمل الموضوعة لأعمال الصيانة والترميم فقد تم إعادة دفن المجسات والحفر التي كانت تنتشر في ساحة المسجد وتنظيفها من الحجارة التي كانت منتشرة بها وترتيب تلك الحجارة في الساحة الملاصقة للمسجد من الجهة الشرقية، وكذلك تم تغطية فوهة البئر الموجود في ساحة المسجد بغطاء حجري يسمح بدخول مياه الأمطار إلى ذلك البئر، وبعد ذلك تم تغطية ساحة المسجد بطبقة من الحصى تسهيلاً لمسير مرتادي المسجد وتجنباً لتشكل الطين والوحل في فصل الشتاء في حال بقيت أرضية الساحة مغطاة بالتراب. **(الشكل ١٢)**.

ومن الأعمال الأخرى التي شملتها خطة الصيانة

١٠. الجـدار الغربي مـن الداخل قبل الترميم.

١١. الجـدار الغربـي مـن الداخل بعد الترميم.

١٢. ساحة المسجد بعد فرشها بالصحى.

والترميم هو ترميم الجدار الشمالي للساحة وبالأخص الجزء الواقع بين المدخلين الشماليين والذي يظهر منه على مستوى سطح الأرض مدماكين من الحجارة ويمتدان بطول (٥,٧٢م) و بارتفاع يتراوح من (٨٤-٨٩سم)، حيث يظهر في هذا الجزء من الجدار اندفاع واضح نحو الجنوب وفقدان لخمسة حجارة من حجارة المدماك الثاني فتم العمل على تعديل حجارة المدماك الأول و تركيب خمسة حجارة مكان الحجارة المفقودة وموازنة باقي أجزاء الجدار (**الشكلين ١٣، ١٤**). والجدير بالذكر أنه من المرجّح أن المدخلين الواقعين في الجهة الشمالية قد استحدثا في فترة لاحقة وعلى الأغلب خلال الفترة الأيوبية المملوكية نظراً لتساوي عتباتهما مع مستوى الأرضية الحالية للساحة وعثورنا على كسر من الفخار الأيوبي المملوكي بين مداميك ذلك الجدار خلال عملية التنظيف، في حين يظهر مدخل آخر بعرض (٩٣سم) يتوسط هذين المدخلين

١٣. جدار الساحة الشمالي قبل الترميم.

١٤. جدار الساحة الشمالي بعد الترميم.

إلا أنه على مستوى أكثر إنخفاضاً منهما بحيث لا تظهر عتبته التي تمتد أسفل مستوى أرضية الساحة الحالية إلا أن هذا المدخل قد تم إغلاقه بمداميك حجرية في فترة سابقة ربما تتزامن مع فترة إنشاء المدخلين الحاليين.

أما الجدار الشرقي للساحة والذي لا يظهر إلا وجهه على السطح والذي يبدو به اندفاع نحو الغرب مع عدم انتظام في قياسات عرضه والتي تراوحت بين (٦٦- ٧٦سم)، لاختلاف المسافة بين حجارة صفي الجدار بسبب ميلانه نحو الغرب، والذي قد يكون سببه مرور بعض السيارات أو الآليات من فوقه أو بسبب ضعف أساساته، والتي بنيت فوق طبقة من التراب، كما أشار الدكتور غازي بيشه عن نتائج المجسات التي أجراها عند الزاوية الشمالية الشرقية لذلك الجدار، ومن خلال الصور المتوفرة في قسم التسجيل في دائرة الآثار والتي تعود لحقبة السبعينيات من القرن الماضي يظهر أن ذلك الجدار كان أكثر ارتفاعاً ويتخلله مدخل عند زاويته الجنوبية ، وبعد تحديد مكان ذلك المدخل على أرض الواقع فقد قررنا رفع ذلك الجدار بمستوى مدماك واحد مع الإبقاء على مكان المدخل السابق بعرض (١٣٦سم)، علماً بأننا لم نعثر على ما يشير إلى وجود عتبة باب في ذلك الجزء من الجدار، مما يرجّح بأن ذلك المدخل قد تم بناؤه مقابلاً للمدخل الغربي في فترة متأخرة، ليبلغ طول ما تم إعادة بناؤه من ذلك الجدار (٥,٢٩م) بارتفاع مدماك واحد ارتفاعه (٥٣سم) وعرضه (٦٦سم)، بحيث يشكل هذا الجزء من الجدار مدخلاً واضحاً لساحة المسجد من الجهة الشرقية وليشكل ذلك الجدار مانعاً للسيارات والآليات للدخول إلى ساحة المسجد، دون إحداث تدخل ملحوظ في المظاهر المعمارية لهذا الجدار. **(الشكلين ١٥، ١٦).**

إعادة تأهيل المسجد من الداخل

أما الجزء المخصص للصلاة في المسجد فقد تم إزالة كل التمديدات الكهربائية السابقة فيه والتي كانت تشكل تشوهاً بصرياً داخل المسجد واستبدالها بتمديدات داخلية غير ظاهرة للعيان وإنارة المسجد من الداخل بمصابيح ذات طابع تراثي، كما تم تمديد الإنارة غير المرئية لتتوزع في زوايا الساحة الخارجية للمسجد لإنارتها ليلاً لمرتادي المسجد في صلاتي العشاء والفجر، كما قمنا أيضاً باستبدال الباب الحديدي للمسجد بباب آخر خشبي قام الفريق العامل بالمشروع بتفصيله يدوياً داخل الموقع بحيث يتماشى مع الطبيعة الأثرية لهذا المسجد، ولدى مخاطبة وزارة الأوقاف والشؤون والمقدسات الإسلامية بتأمين السجاد وأجهزة الصوت اللازمة للمسجد لم تتردد بتأمين تلك المتطلبات وقد كان للمهندس عبدالله العبادي من وزارة الأوقاف الدور الأبرز بتأمين تلك المتطلبات، والتي تم تركيبها وفرشها داخل المسجد **(الأشكال ١٧، ١٨، ١٩، ٢٠)** ، والجدير بالذكر أن

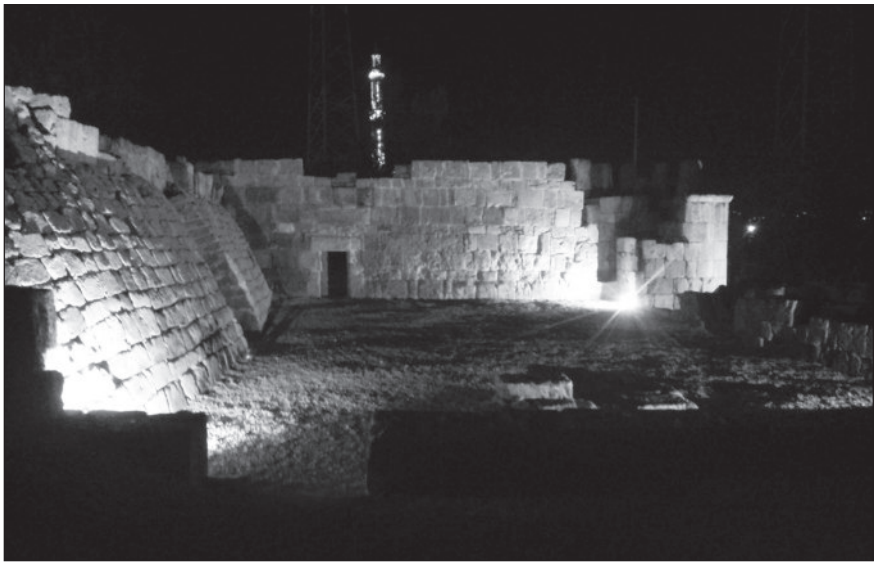
١٥. جدار الساحة الشرقي قبل الترميم.

١٦. جدار الساحة الشرقي بعد الترميم.

١٧. المسجد من الداخل قبل الترميم.

١٨. المسجد من الداخل بعد الترميم.

١٩. الباب الخشـبي الذي تـم تفصيله للمسجد.



٢٠. انارة الساحة الخارجية للمسجد.

وزارة الأوقاف والشؤون والمقدسات الإسلامية قامت منذ فترة بتعين إمام وخادم للمسجد ، وبهذا فقد تم إعادة مسجد القسطل الأثري للحياة مرةً أخرى بحيث يصدح به أذان "الله أكبر" من جديد وتُسمع في جنباته همسات المصلين وهم يرددون آيات الذكر الحكيم مستذكرين روح المكان وعبق التاريخ الذي شهد مجد المسلمين وحضارة دولتهم العربية.

مناقشة

من خلال دراسة أولية للمظاهر المعمارية في مسجد القسطل يتضح بما لا يدع لنا مجالاً للشك بأن الشكل الحالي وبالتحديد فيما يختص بالقسم المخصص للصلاة والساحة الخارجية يختلف اختلافاً كلياً عمّا كان عليه خلال المرحلة الأولى من البناء في الفترة الأموية، فكمية الحجارة المزخرفة، وحجم التاجيات وبقايا الأعمدة المتناثرة بجانب ساحة المسجد توحي بوجود عناصر معمارية غاية في الروعة والتي يبدو أنها قد تعرضت للتدمير والتحوير نتيجة للعوامل الطبيعية مثل: الزلازل، وعمليات إعادة الاستخدام المتكررة التي شهدها الموقع، فلم يبقَ شاهداً عليها سوى بقايا الأقواس التي كانت تزيّن الواجهة فوق باب المسجد وعلى جانبيه.

فمن الواضح أن الموقع قد شهد أوج نشاطه خلال الفترة الأموية ومن خلال شواهد القبور المؤرخة في مقبرة الموقع نستطيع الجزم باستمرار الإستيطان في الموقع خلال القرن الثالث الهجري أي بدايات الفترة العباسية، إلا أن أهم عمليات إعادة الاستخدام والبناء للمسجد قد حدثت خلال الفترة الأيوبية المملوكية، والتي تم خلالها بناء السقف النصف برميلي و بناء الدعامية الحجرية الملاصقة للجدار الشمالي للمسجد، فمن الواضح أن عملية إعادة البناء تلك قد تمت بشكل بسيط والذي من المرجّح أنه قد تم تنُفّذه من قبل مجموعة من السكان الذي استوطنوا المنطقة خلال تلك الفترة فقاموا باستخدام كل ما هو متوفر من حجارة دون مراعاة لشكل الحجر أو طبيعته أو ما يحتويه من زخارف، فيظهر للناظر الكثير من حجارة الأقواس التي تم استخدامها ضمن الحجارة العادية الأخرى خاصة في سقف المسجد من الخارج والداخل، ويرجّح بأن البدء بعملية إعادة البناء في تلك الفترة كان السقف الأصلي للمسجد منهاراً والجدارين الشرقي والغربي مائلين إلى الخارج بشكل ملحوظ، أما الجدار الشمالي فكان غير منتظم في استقامته مع ميلان باتجاه الشمال، بالإضافة إلى تهدم أجزاء من طرفه الغربي، فما تم عمله خلال تلك الفترة هو بناء سقف نصف برميلي يستند طرفيه الشمالي والجنوبي على الجدارين الأصليين من الداخل، بحيث يكون طرفي هذا السقف البرميلي ملاصقين للجدارين الشرقي والغربي دون أن يكونا مشرّكين بهما بحيث بقي هذان الجداران على وضعية الميلان نحو الخارج دون معالجة، ومما ضاعف في ميلانهما واندفاعهما عملية الضغط التي شكلها السقف نصف البرميلي على مداميكهما العلوية، ومما زاد الأمر سوءً بالنسبة للجدار الغربي هو تسرب مياه الأمطار إليه والتي كانت السبب الرئيسي في تآكل المادة الرابطة بين صفي الحجارة في ذلك الجدار والتسبب في نمو الأشجار والنباتات بين مداميكه، ومما زاد في ميلانه نحو الخارج هو فقدان معظم حجارة الأساس فيه، أما بالنسبة للجدار الشمالي فقد تم خلال تلك الفترة بناء دعامية حجرية ملاصقة له لتقوم بدعمه هو وقاعدة السقف نصف البرميلي المرتكزة عليه (**الشكل ٢١**)، كما تم إعادة بناء الجزء الغربي المتهدم منه بحجارة غير منتظمة الشكل منها ماهو حجارة أبواب كما يتضح من خلال (**الشكل ٢٢**)، حتى أن قاعدة القوس الخارج من الجدار الغربي باتجاه الشرق يبدو أنه قد تم حشوها بحجارة غير منتظمة مع الإبقاء على حجري قوس ظاهرين منها بحيث يتضح أن هذين الحجرين أيضاً غير متصلين ولم يكونا هما نفس حجري القوس السابقين وذلك لعدم تجانسهما (**الشكل ٢٣**).

من أهم ما تم الكشف عليه خلال عملية دراسة المظاهر المعمارية الداخلية للمسجد، هو حجر يقع إلى الشرق من المحراب أعيد استخدامه في الفترة الأيوبية المملوكية عند بنائهم للسقف نصف البرميلي ويبدو كما هو حال كثير من الحجارة المستخدمة في عملية إعادة البناء في تلك الفترة لم يلحظ من قاموا بإعادة استخدامه ما على هذا الحجر من خطوط وأشكال، وعند تدقيق النظر في ذلك الحجر يتضح بشكل مؤكد أنه عبارة عن ساعة شمسية أو ما كان يُطلق عليه اسم (المزولة)، والتي من المرجّح بأنها كانت مستخدمة

٢١. السقف نصف البرميلي والدعامية.

٢٢. استخدام حجارة عشوائية في بناء جزء من الجدار الشمالي والسقف البرميلي.

في أحد الأجزاء الخارجية للمسجد إبان الفترة الأموية، كونها تحتاج لمنطقة يتوفر بها سطوع لأشعة الشمس على مدى ساعات النهار، وذلك للتعرف على مواقيت الصلاة من خلالها، وهذه المزولة قد عُملت على حجر طوله (٤٦,٥سم) و ارتفاعه (٢٩سم) أما سمكه فهو غير واضح كون الحجر مثبت في الجدار، وقد نُحتت على وجه ذلك الحجر نصف دائرة يبلغ نصف قطرها (٢٢,٥سم)، وهي مقسّمة إلى اثني عشر مثلثاً تلتقي رؤوسها عند النقطة التي كان مثبتاً بها القضيب المعدني الذي يمتد ظله عليها لتحديد الساعة، ومازالت بقايا ذلك القضيب موجودة في تلك النقطة، أما قاعدة المثلثات والتي تشير كل واحدة منها لساعة من ساعات النهار فكل قاعدة من قواعد تلك المثلثات مقسومة أيضاً إلى نصفين بحيث تقوم هذه المزولة من خلال ظل القضيب المعدني المنعكس عليها بإعطاء التوقيت لأقرب نصف ساعة من ساعات النهار، هذا

٢٣. حجري القوس غير المتجانسين.

وقد تم تنظيف المنطقة الملاصقة لجوانب ذلك الحجر وتعبئتها بالمونة المناسبة للحفاظ عليها. (**الشكل ٢٤**).

إن من أكثر الأمور صعوبة للتعامل معها داخل المسجد هو إزالة كميات الإسمنت الكبيرة التي استخدمت بين حجارة السقف والجدران الداخلية خلال عمليات الترميم في ستينيات القرن الماضي والتي اشتملت أيضاً على إعادة بناء الزاوية الجنوبية الشرقية للمسجد من الخارج، فبالرغم مما شكله استخدام مادة الإسمنت من تماسك لأجزاء البناء إلا أن عملية إزالته حالياً تشكل عملاً بالغ الصعوبة و يتطلب وقتاً وجهداً كبيراً لا يقل عن سنة من العمل المتواصل، ولذلك فقد اكتفينا خلال هذا الموسم بإزالة ما هو موجود

٢٤. المزولة.

من إسمنت بين المداميك المحيطة بمدخل المسجد من الداخل والخارج واستبدال مادة الإسمنت بالمونة المناسبة والمكونة من الجير ورمل السلكا (رمل صويلح) و حبيبات حصى السيل.

لا يمكن الحديث عن موقع القسطل ومسجده دون الإشارة إلى مئذنة ذلك المسجد، تلك المئذنة الحجرية التي تعتبر أقدم مئذنة مازالت قائمة على مستوى العالم، والواقعة في الزاوية الشمالية الغربية من ساحة المسجد ذات الشكل الأسطواني المبنية على قاعدة مربعة، والتي يرجع الفضل في ترميمها والحفاظ عليها للدكتور غازي بيشة من خلال مشروع الترميم الذي قام بتنفيذه في العام ٢٠٠٤، (Bisheh 2007)

فمن المعروف أن بناء المآذن لم يكن شائعاً في الفترة الإسلامية المبكرة أي في عهد الرسول عليه أفضل الصلاة والسلام، أو في عهد الخلفاء الراشدين من بعده، بحيث كان يُكتفى برفع الأذان من على سطح المسجد أو من فوق أسوار المدينة، فلم يكن هنالك جزء مخصص في المسجد يُرفع الأذان منه، وإن كان معظم الباحثين قد ذهبوا إلى أن بدايات بناء المآذن كانت في بلاد العراق وبالذات في مدن البصرة والكوفة قبل انتقالها إلى بلاد الشام، وهذا موضوع لن نخوض به فقد لخّصه الدكتور غازي بيشه في مقاله عن مشروع ترميم مِئذنة القسطل بشكل وافٍ وشامل ويمكن الرجوع إلى ما كتبه الدكتور بيشه في هذا الخصوص لمزيد من الفائدة، لكن السؤال الذي نطرحه هو كيفية انتقال بناء المئذنة من بلاد الرافدين خلال الفترة الأموية إلى منطقة القسطل؟ ما يهمنا في هذا الخصوص هو وجود مثال مشابه لمئذنة القسطل في بلاد الرافدين وهي منارة (مجدة) وفي لفظ آخر منارة (موجدة) وهي التي تبعد ٢٢كم إلى الشرق من قصر الأخيضر في كربلاء، تلك المنار المبنية من الطوب المشوي بجسم دائري على قاعدة مربعة (**الشكل ٢٥**) والتي خلُص الباحثون على تأريخها إلى الفترة الساسانية، إذن فهذا الطراز المعماري كان معروفاً في بلاد العراق وإن كانت الغاية الأولية من تلك المنارة هو استخدامها لهداية المسافرين عبر الطرق التجارية، ومن ثم استخدام هذا الطراز كمآذن لرفع الأذان في بدايات القرن الثاني الهجري، ولتتبع انتقال الطرز المعمارية من بلاد العراق إلى منطقة البلقاء في الأردن لابد لنا من العودة لواحد من أهم الأحداث التاريخية في الفترة الأموية وهي التي أعقبت وفاة الخليفة الوليد بن عبدالملك واستلام أخوه سليمان بن عبد الملك مقاليد الحكم سنة (٩٦ للهجرة/ ٧١٥ م)، فمن المعروف ما كان من العداء بين سليمان بن عبدالملك ويزيد بن المهلب من جهة و الحجاج بن يوسف الثقفي والي العراق القوي وأتباعه من القبائل اليمانية من جهة أخرى، إلا أن مشيئة الله قد قضت بأن يموت الحجاج قبل أن يتولى سليمان بن عبد الملك زمام الأمور، لينتقل سخطه على الحجاج إلى أتباع الحجاج وآل بيته ولتكون الفرصة مواتية ليزيد بن المهلب الوالي الجديد والمقرّب من سليمان بن عبد الملك للإنتقام منهم، والذي يبدو من تتبع الأخبار التاريخية بأن نسبة من القبائل اليمانية التي كانت تشكل عصب الحكم للحجاج و ثُلة من أهل بيته قد انتقلت إلى منطقة البلقاء، فتذكر المصادر التاريخية بأن يزيد بن المهلب قد بعث إلى البلقاء من عمل دمشق وفيها خزائن الحجاج بن يوسف وعياله ونقلهم وما معهم إليه (عطوان ١٩٨١)، ويبدو أن حالة الضنك التي عاناها آل الحجاج وأنصاره قد استمرت خلال عهد سليمان بن عبدالملك إلى أن آلت مقاليد الحكم إلى الخليفة يزيد بن عبدالملك (سنة ١٠١ هـ/٧٢٠ م)، وفي تلك المرحلة كان الزمان قد دار دورته، فيزيد بن المهلب ألدّ أعداء آل الحجاج بن يوسف أضحى قتيلاً بيد يزيد بن عبدالملك وليعود الزمان ليبتسم لآل الحجاج أصهار الخليفة، فزوجة الخليفة هي زينب بنت محمد بن يوسف الثقفي، أي أنها ابنة أخو الحجاج بن يوسف، وهي الزوجة المحظية لدى الخليفة وأم الخليفة الوليد بن يزيد بن عبد الملك الذي ارتبط اسمه بالبادية الأردنية ويُنسب إليه مبانٍ عديدة مثل قصير عمرة وقصر طوبة والمشتى (لاش ٢٠١٢) بالإضافة إلى ما ذكرته المصادر التاريخية من إقامته في منطقة زيزياء حيث كان يُطعم هناك من صدر من الحجاج ثلاثة أيام (الطبري ٧: ١٩٦١). فيتضح لنا من خلال المصادر التاريخية بأن آل الحجاج و أعوانهم قد حظيو بالقرب من بيت الخلافة في عهد يزيد بن عبدالملك الذي ارتبط اسمه بموقعي الموقر والقسطل وهما اللذان يقول فيهما كثيّر عزة (سقى الله حياً بالموقر دارهم ..... إلى قسطل البلقاء ذات المحارب)، وكذلك كان الأمر في

٢٥. منارة مجدة قرب قصرالأخيضر في كربلاء.

عهد ابنه الوليد بن يزيد، فيذكر الدكتور حسين عطوان ما أورده المؤرخون مثل خليفة بن خيّاط في تاريخه وعلي بن حزم لأندلسي في كتابه جمهرة أنساب العرب، أن أخوة أم الوليد بن يزيد كانوا من كبار الموظفين في قصره وفي الأمصار الأخرى وكان أولاد عمّها الحجاج بن يوسف وحفدته يلون وظائف متعددة في دمشق وغيرها.(عطوان ١٩٨١). والذي قد نذهب إليه بأن المباني الأثرية مثل قصر الطوبة وقصر المشتّى ومئذنة مسجد القسطل قد شهدت تأثراً واضحاً بنمط العمارة الشائع في بلاد العراق سواءً من حيث طريقة وأسلوب البناء أو من حيث الزخارف والأشكال الحيوانية والأسطورية التي زيّنت بعض واجهات وجدران تلك المباني، وأن مردّ هذا التأثير هو تلك الحركة السكانية التي شهدتها المنطقة من بلاد العراق باتجاه منطقة البلقاء نتيجة للأحداث السياسية التي أعقبت تولي سليمان بن عبدالملك لزمام الحكم سنة (٩٦ للهجرة/٧١٥ م). والحظوة التي نالتها تلك المجموعة السكانية خلال عهد يزيد بن عبد الملك وابنه الوليد بن يزيد، ليظهر تأثير انتقال الطرز المعمارية التي كانت شائعة في بلاد العراق وفارس إلى المنطقة التي انتقلوا إليها في أرض البلقاء، وعليه فإننا نرجح أن تاريخ بناء هذا المسجد ومئذنته يعود إلى فترة الخليفة يزيد بن عبد الملك (١٠١- ١٠٥ هجري/ ٧٢٠-٧٢٤م). وفي ظل عدم وجود نص

٢٦. قبلة مسجد ابو بكر الصديق.

صريح مُكتشف حتى الآن يبقى هذا التأريخ ضمن باب الفرضيات التي تحتمل القبول والرد.

قبل الإنتهاء من هذا البحث لا بد لي من الإشارة إلى نقطة كان قد أوردها الباحثان الفرنسيان باتريشيا كارلبير وفريدريك مورين في مقالهما المنشور في حولية دائرة الآثار (Carlie and Morin 1987) عن نتائج عملهما في موقع القسطل، فمما لاشك فيه أن عمل هذين الباحثين قد يكون من أشمل المشاريع التي تم تنفيذها في قصر القسطل ومسجده وخاصة في الجانب التوثيقي والتحليلي للعناصر المعمارية في الموقع ومحيطه، إلا أننا قد لا نتفق معهما فيما ذهبا إليه من تحليلهما لانحراف اتجاه محراب مسجد القسطل و بعض القبور الإسلامية الأثرية في مقبرة القسطل كونها لا تتجه مباشرة نحو مكة المكرمة بل تنحرف نحو الجنوب الغربي قليلاً، وقد خلُص الباحثان إلى أن مردّ هذا قد يكون في رغبة الخليفة الأموي عبدالملك بن مروان باتخاذ بيت المقدس قبلةً للمسلمين وتعظيمها بدلاً من مكة المكرمة التي كانت تحت سيطرة عبدالله بن الزبير، وهذا كلام قد يكون انطوى على مغالطة بدون الإستناد على أدلة حقيقية، فكما هو معروف فإن قبلة المسلمين في بلاد الشام ومن ضمنها الأردن، هي باتجاه الجنوب، حيث توجد مكة المكرمة وقد كان تحديد اتجاه القبلة حتى وقت قريب يتم بدون أجهزة المساحة المتوفرة حديثاً، (كتلك التي استخدمها الباحثان)، فكان يكفي الاتجاه جنوباً عند الشروع في الصلاة وعليه كان يُحدد اتجاه المحراب عند بناء المساجد. وبعد اختراع أجهزة المساحة الدقيقة والتي يمكن من خلالها تحديد اتجاه بيت الله الحرام في مكة المكرمة بالنسبة للمنطقة التي يكون الشخص متواجداً فيها، فقد تم ملاحظة أن كثيراً من المساجد ومنها ما بُني في القرن العشرين قد تم بناؤها باتجاه ينحرف عن اتجاه القبلة، ولدينا في مسجد أبو بكر الصديق والمعروف بإسم مسجد الشيشان في مدينة الزرقاء والذي بُني في بدايات القرن العشرين خير مثال على ذلك، حيث قامت وزارة الأوقاف قبل ما يقرب من أربع سنوات بتعديل اتجاه القبلة فيه بعدما تبين من خلال أجهزة المساحة الحديثة انحرافها إلى الغرب عن اتجاه مكة المكرمة **(الشكل ٢٦)** وكذلك الأمر بالنسبة لمسجد عمر بن الخطاب في الزرقاء الذي بني في النصف الأول من القرن العشرين والكثير من المساجد الأخرى في المملكة، فإذا كان هذا هو الحال بالنسبة للمساجد فمن الطبيعي أيضاً أن نشاهد الإنحراف في اتجاه بعض القبور إذا أردنا استخدام أجهزة المساحة الحديثة عند تحديد اتجاهها.

وفي نهاية هذا البحث لابد من الإشارة بالشكر إلى فريق معهد مادبا لفن الفسيفساء لقيامهم بتنفيذ أعمال الصيانة الوقائية لبعض الأرضيات الفسيفسائية داخل غرف قصر القسطل تحت إشراف السيدة

سماهر عيسى. ومن الجدير بالذكر أن أعمال الصيانة والترميم وإعادة التأهيل لمسجد القسطل الأثري قد تمت من خلال كوادر دائرة الآثار العامة ومن موازنتها الخاصة بالإضافة إلى المساهمة المشكورة من وزارة الأوقاف والشؤون والمقدسات الإسلامية في تأمين السجاد وأجهزة الصوت للمسجد. ولابد لي من أن أتقدم بالشكر إلى فريق العمل الذي رافقني خلال هذا المشروع وهم الإخوة العمال، والسائق عامر الجبور والمسّاح توفيق الحنيطي، وأخص بالشكر الكادر الفنّي في دائرة الآثار الممثل بالسيدين شكري منّون وأحمد جميل اللذان كان لهما الدور الأبرز في إنجاز أعمال الصيانة والترميم بكل مهارة واحترافية.

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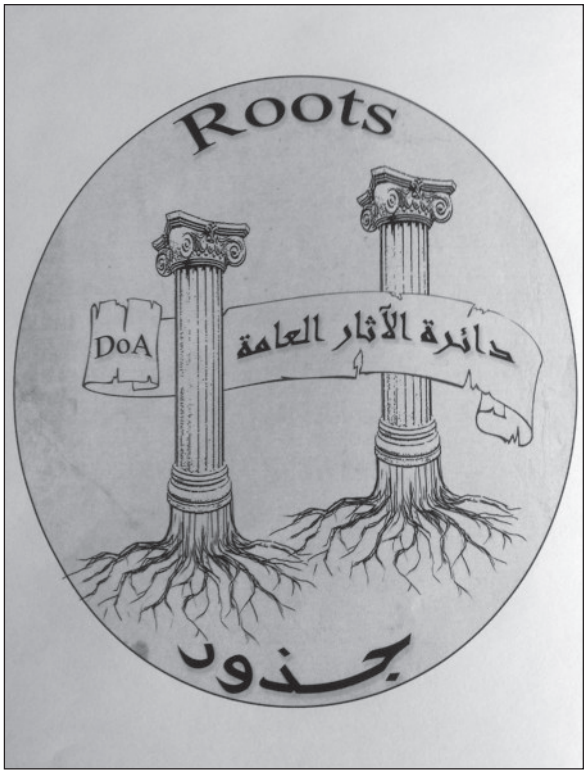
الاكتشافات الأثرية بين الحقيقة العلمية والصخب الإعلامي

أحمد لاش وهالة السيوف ونيرمين الفايز



١. شعار مشروع جذور.

مقدمة

ارتبط علم الآثار منذ نشأته ارتباطاً وثيقاً بما تنازعته النفس البشرية من ولعها بالإستكشاف وسبر أغوار الماضي واستحضاره والولوج إلى المجهول منه، فالنظرة العامة للماضي لدى الغالبية من الناس تتسم بنوع من التبجيل والحنين ونزع مافي ذلك الماضي من شوائب ليتوأم مع النظرة المثالية التي خلقناها في أنفسنا لذلك الماضي، كما قد يولع الكثير من الناس بوصف الكثير من الأحداث التاريخية أو المظاهر الأثرية بالتوصيفات التي تتسم بالغموض والخروج عن قوانين الطبيعة ومألوف الأشياء. في المقابل فإن علم الآثار هو علم يقوم على الدلائل والبراهين المادية والتحليلات العلمية بُغية الوصول إلى الحقيقة المجردة، ومن أكثر الأمور إشكالية هو ما يقوم به البعض من استنطاق المعلم الأثري وتقويله ما يريد الباحث سماعه، بناءً على تعصب الباحث الأثري لمعتقده الديني أو فكره السياسي، وذلك بالإستعجال في الحكم على المُكتشف الأثري باسقاط ما تشبّع به فكر ذلك الباحث من رواية تاريخية عن ذلك المُكتشف الأثري، ومما يزيد الطين بِلّة عندما يُسارع ذلك الباحث إلى وسائل الإعلام ليُخاطب العامة بنتائج اكتشافاته التي لم تنل نصيبها بعد من البحث والدراسة والتحقيق، ليدور حولها ذلك الصخب الإعلامي الذي تكون مضّاره في الغالب على المُكتشف الأثري أكثر من منافعه، وفي منطقة كمنطقة الأردن وفلسطين فإن التنازع على الرواية التاريخية يُلقي بظلاله على الحاضر ليكون أحد أدوات الصراع الحديث الذي تعيشه المنطقة منذ بدايات القرن العشرين. ومن خلال سلسة مقالاتنا ضمن مشروع جذور[١] (**الشكل ١**)، فإننا سنتطرق في هذا المقال لمثال عن المشاريع الأثرية التي حظيت بصخب إعلامي في بدايات النصف الثاني من القرن العشرين، والتي شغلت حيزاً من حديث العامة والصحافة والإعلام لفترة من الزمن ثم خبت تلك الضجة الإعلامية وكأن الحديث عنها لم يكن وذلك بسبب عدم تطابق الرواية الإعلامية مع الحقيقة العلمية المُكتشفة.

١. أحد المشاريع الاستراتيجية لدائرة الآثار العامة، والذي يهدف إلى توثيق وحوسبة كافة الوثائق والمراسلات والتقارير الخاصة بدائرة الآثار العامة منذ نشأتها.

اكتشاف مدينتي سدوم وعمورة
بعثة رالف بيني من سنة ١٩٥٩ إلى ١٩٦٥

لقد تناولت الكتب السماوية على اختلافها قصة أولئك القوم الذين كانوا يرتكبون الفواحش ولايتناهون عنها والذين أرسل الله لهم نبيه لوط عليه السلام لهدايتهم ونهيهم عما كانوا يفعلون، إلا أن جهوده في إصلاحهم لم تفلح فأمره الله سبحانه وتعالى بالخروج من أرضهم وأن يأخذ معه أهله إلا إمرأته، لينصب على أولئك القوم غضب الله وسخطه، وقد تطرقت بعض الكتب السماوية إلى تلك القصة بشيء من التفصيل كما ورد في العهد القديم على سبيل المثال، من تسميةٍ لبلدة أولئك القوم وهي سدوم وعموره ووصف موقعها، في حين لم يتطرق الخبر القرآني إلى تسمية بلدتهم أو مكانها بل اكتفى بذكر الفواحش التي كانوا يفعلونها والعذاب الذي وقع عليهم. وقد ظل تحديد مكان هاتين البلدتين مجهولاً لأتباع الديانات السماوية الثلاث، بحيث شكلت هذه النقطة هاجساً لبعض المشتغلين بالآثار ممن عملوا على اسقاط الرواية الدينية على الموقع الأثري، ومن هؤلاء السيد رالف بيني Ralph E. Baney رئيس جمعية التقارب المسيحي في مدينة كنساس الأمريكية، "والتي وجِد فرع لها في مدينة بيت لحم" وذلك بوصفه خبيراً في الغطس والتصوير تحت الماء، والذي تقدم لدائرة الآثار العامة في شهر كانون الأول من سنة ١٩٥٩ بمشروع للغطس في أعماق منطقة اللسان في البحر الميت للبحث عن بقايا مدينتي سدوم وعمورة الوارد ذكرهما في كتاب العهد القديم، وفي بلد كالأردن تتسم سياسته بالإنفتاح والتعايش الديني وقبول الآخر، لم يكن لديه ما يمنع من فتح باب الإستكشاف في تلك المنطقة، بل على العكس قام بتشجيع تلك البعثة والترحيب بها ودعمها، علّها تخرج باكتشافات أثرية تشكل مقصداً لمزيد من الزائرين والسياح لهذا البلد، ومن ناحية أخرى فإن هذا لايتعارض مع الرواية الدينية فيما يختص بقوم نبي الله لوط وما حلّ بهم من العذاب، والتي تؤمن بها الغالبية المسلمة من سكان المملكة. وعليه فقد تمت الموافقة على طلب السيد رالف بيني بتاريخ ١٩٦٠/١/١٠ وإعطاؤه التصريح الرسمي للبدء بتلك المهمة لغاية ١٩٦٠/٣/٣١، بالرغم من التحفظات التي أبداها البعض حول كفاءة السيد بيني والشبهات التي تحوم حوله. ويتضح من خلال المراسلات الأولى التي قام بها السيد بيني قبل مباشرته بالعمل، شغفه بوسائل الإعلام والظهور الإعلامي (**الشكلين ٢، ٣**)، فقد كان من ضمن فريقه مندوب صحفي لتغطية أعمال البعثة ونشاطاتها ونشرها في وسائل الإعلام الأمريكية، كما كان من ضمن جدول أعماله قبل البدء بمباشرة العمل عقد مؤتمر مع مدير عام دائرة الآثار في ذلك الوقت الدكتور عوني الدجاني وبعض المسؤوليين الآخرين والتقاط صورة لهم بجانب أدوات الغطس التي سيتم استعمالها، كما طالب بتنظيم معرض في نادي الملك حسين لمعدات الغطس التي سيقوم بجلبها ليتم تصويره ونشره في وسائل الإعلام، كما طالب بتوفير طائرة مروحية له للقيام بأعمال المسح والتصوير فوق منطقة البحر الميت ومحيطها وتأمينه بسيارتي جيب وعدد من الحراس ورجال الأمن. لم يمض وقت طويل على صدور الموافقة الرسمية للسيد بيني للبدء بمشروع الغطس حتى وصل إلى الأردن بمعية فريقه ومعداتهم ليبدأ عمله هناك مع بدايات شهر آذار ١٩٦٠، إلا أنه بعد بضعة أسابيع قام برفع تقريره الأولي إلى دائرة الآثار العامة بتاريخ ١٩٦٠/٣/٢٣ يزف إليها به خبر اكتشافه لما يثبت وجود مدينتي سدوم وعمورة مغمورتان بمياه البحر الميت، فقد أشار السيد بيني أنه من خلال عملية مسح شملت ٢٦٧ ميلاً من المصب الشرقي لنهر الأردن والشاطئ الشرقي والغربي للبحر الميت، وبعد الغوص لعمق ١٧٠ قدماً في مياه البحر الميت، فقد تم اكتشاف طريق قديم يصل شاطئ البحر الميت بجزيرة تقع في وسطه، كما قام باكتشاف ما مجموعه تسعة تلال متفاوتة الإتساع تغمرها مياه البحر الميت تنتشر بها بقايا جذور وسعف النخيل، وكذلك اكتشاف قناة قديمة تمتد من الشاطئ الشرقي للبحر الميت إلى منطقة اللسان، وأنه متيقن من وجود مدينتي سدوم وعمورة في تلك المنطقة المغمورة بالمياه بناءً على تلك الدلائل. مالبث خبر هذا الاكتشاف أن وجد طريقه للصحافة والإعلام، لينتشر خبر اكتشاف مدينتي سدوم وعمورة انتشار النار بالهشيم، وتتداوله معظم وكالات الأنباء العالمية والمحلية، بدون أن يتم التحقق من صحة ما أورده السيد بيني والتي يشير إليها كدلائل مادية دامغة على اكتشافه. وقد يكون صحة تصريح كهذا ينطلي على العامة وغير المختصين،

٢. جانــب من الحملــة الإعلامية لبعثة الإستكشاف.

٣. جانــب من الحملــة الإعلامية لبعثة الإستكشاف.

لكنه لا ينطلي على أي باحث أكاديمي مختص بالآثار، فما أن وصل تقرير السيد بيني إلى مساعد مدير عام دائرة الآثار في ذلك الوقت، الأستاذ محمود العابدي حتى نسفه عن بكرة أبيه وأوصى بأن لايتم التصريح للسيد بيني بالعمل كونه لا يمتلك أدنى المؤهلات التي تخوله للعمل الأثري والحكم على طبيعة الأشياء، فالقناة الأثرية التي يدّعي السيد بيني وجودها والتي تمتد من الشاطئ الشرقي للبحر الميت إلى منطقة اللسان، ماهي إلا قناة حديثة قامت ببنائها النقطة الرابعة الأمريكية لمنع تسرب مياه البحر الميت المالحة إلى مياه البرك الرومانية العذبة بالقرب من منطقة اللسان، أما الطريق القديم الذي يدّعي السيد بيني اكتشافه، فما هو في حقيقة الأمر سوى طريق حديث بعرض ثلاثة أمتار بني من قبل السيد شكري ديب لمصلحة شركة البوتاس الفلسطينية السابقة وذلك لنقل أكياس الملح من جنوب البحر الميت إلى كاليه، وقد رُدمت تلك الطريق أثناء الحرب العربية الفلسطينية سنة ١٩٤٨، أما بخصوص مدينتي سدوم وعمورة التي يدّعي السيد بيني اكتشافهما، فهو لم يأتِ بأي صورة يمكن أن يتم التقاطها لهما بواسطة آلات التصوير التي بحوزته كما

أنه لم يقدم أي دليل مادي على وجودهما، بالإضافة إلى أن منطقة الخطر للغوص في مياه البحر الميت المالحة المشهور بكثافته التي تزيد بنسبة ٣٥٪ عن باقي البحار لا يتجاوز عمقها ١٠٠ قدم، بينما يقول السيد بيني بأنه قام بالغطس لعمق ١٧٠ قدم، أما بقايا الأشجار التي أشار لها السيد بيني فهي ليست في موقعها الأصلي بل جرفتها مياه الأمطار والسيول من الجانب الغربي وقد لاحظ وجودها السيد لانكستر هاردنغ مدير الآثار الأردنية السابق، وكتب عنها قبل ثلاثين عاماً من وصول بعثة السيد بيني.

لم يلبث خبر اكتشاف بعثة السيد بيني لمدينتي سدوم وعمورة إلا أن خبا فجأة في وسائل الإعلام المختلفة كما ظهر فجأة، ولم يعد يتم التطرق إليه، بعدما ملاء الأوساط الإعلامية صخباً وضجيجاً. علماً بأن السيد بيني قد صُرّح له بالعودة والغطس مجدداً في مياه البحر الميت في ربيع عام ١٩٦٤، إلا أنه في زيارته تلك لم يتطرق إلى أي اكتشافات حديثة في حين قام بالتركيز على تسويق جهاز غطس حديث يمكن حمله بسهولة !!!.

وبهذا طويت صفحة من الصخب الإعلامي التي رافقت بعثة السيد بيني وادّعائه باكتشاف مدينتي سدوم وعمورة التوراتيتين، فعلم الآثار لا يعترف سوى بالحقيقة المادية المجردة وهي الفيصل في الحكم على أي اكتشاف أثري.

قراءاتٌ جديدةٌ لنقوشٍ وكتاباتٍ فسيفسائيَّةٍ بيزنطيَّةٍ ساسانيَّةٍ سريانيَّةٍ وأمويةٍ مسيحيةٍ، والمكتشفة في محافظة المفرق من خلال أعمال التنقيب والمسوحات الأثريَّة ما بين الأعوام ١٩٩١م-٢٠١٦م

عبد القادر محمود الحصان

مقدمة

تُعدُّ محافظة المفرق من أهم المحافظات؛ بدلالة العثور على مواقعٍ أثريةٍ تحوي العديد من النقوش والكتابات القديمةً ومنها: الفسيفسائيَّة المسيحيَّة، والصفائيَّة، والثموديَّة، واللحيانيَّة، والإسلاميَّة وغيرها، هذا من جهة، ومن جهة أخرى وقوع المحافظة ضمن مناطق هامة واستراتيجيَّة، وخاصةً تلك الطرق الدوليَّة ومن بينها: طريقي ترجانوس وديوكلتيانوس، وطريق الملوك القديم، وطريق الحاج الشامي في العصور العربيَّة الإسلاميَّة، وتوسطها على حدود الديكابوليس (المدن العشر المتحدة)، ومن خلال استقراء الواقع الحالي للمفرق نلاحظ بأنَّ التاريخَ يُعيد نفسه ثانيةً؛ لوجود الطرق الدوليَّة والتجاريَّة الهامَّة الواصلة ما بين الأردن، وسوريا، والعراق، والسعوديَّة، وكذلك طريق سكة الحديد الحجازي الأردني وصولاً إلى أوروبا، وكافة أرجاء آسيا (الحصان: ١٩٩٩).

إنَّ أعمال التنقيبات والمسوحات الأثريَّة الميدانيَّة التي قمت بها وأشرفت عليها على مدى ما يزيد عن ربع قرن من الزمان في ربوع محافظة المفرق وخاصةً في المواقع التالية: أم الجمال، والفدين، ورحاب، وحيّان المشرف والبادية الشماليَّة الشرقيَّة وغيرها فقد عُثِرَ أثناء ذلك على عشرات آلاف من النقوش والكتابات القديمة المتنوعة سالفة الذكر في أرجاء محافظة المفرق.

تناولت الدراسة نقوش لاتينيَّة جديدة تنشر لأول مرة، حاملةً معها مضامين تاريخيَّة، وأثريَّة، وأمّا المنهجية فجاءت بأسلوبٍ تحليلي وصفي، فقد قمت بقراءة النقوش، ونقحرتها، وقدمت شرح عليها، ولم أقم بتحليها مَعجمياً بهدف حماية مُلكية حقوقها، حيثُ سيتم تحليلها تحليلاً عِلمياً وفق النِظام المُتبع عند الدارسين والباحثين في الكتابات القديمة.

١. الكتابات الفسيفسائيَّة المسيحيَّة في موقع رحاب في العصور (البيزنطيَّة الساسانيَّة الفارسيَّة والأمويَّة)

الكتابة التذكاريَّة الإغريقيّة

النقحرة

+ΧΑΡΙΤΙΘΥΙΥΧΥΕΘΕΜΕΛΙΟΘΗSΕΤΕΛΙ
ΟΘΗΤΟΕΥΚΤΗΡΤγΑΓSSΝΙΚωΦΟΡΚωΝCΤ
ΑΝ
ΤΙΝγΕΠΙΤγΑΓΙωΠΟΛΥΕΥΚΤΟΥΑΡΧΙΕΠΙC
ΚSΜΗΤΡωΠΟΛΙΤ
-ΠΡΟΝΟΙΑCSΚΑΜΑΤΟCΚΑΙΟΥΜΟΥΠΡΟ
ΚΟΠΙγΚΟΜSΥΠΕΡΟΥΝCωΤΗΡΙΑCSΑΝΤ
ΙΛ
ΗΜΨΕCΕωCΑΥΤΟΥSΤωΝΘΕωΦΥΛΑΥΤΟΥ
ΤΕΚΝωΝ.
-SΔΙΑΦΕΡΟΝΤωΝCΠΟΥΔSΙωΑΝΝγsΓΕΡΜ
ΑΝγΕΥΛΑΒΒSΠΑΡΑΜΟΝΑΡΡ
-ΜΦΕΒΡΟΥΑΡΙωΚΗΧΡΟΝωΝΙΑΑΝΔSΤγΕΤ
ΟΥCΦΙΖΗΠΑΡΧΙΑS|+

القراءة

+χαριτιθεουΙησουχριστουεθεμηλιοθηκαιετελιοθητοευκτηριοντουΑγιουκαιΝικωφορουκωνσταντινουεπιτουαγιωτουπολυευκτουαρχιεπισκοπουκαιμητρωπολιτου

-προνοιαςκαικαματοςκαιουμουπροκοπιουκομιτουθπεροθνσωτηριαςκα ιαντιλημψεσεωςαυτουκαιτωνθεωφυλεστατωναυτουτεκνων

-καιδιαφεροντωνσπουδηΙωαννουκαιΓερμανουευλαβεστατωνπαραμοναρ

ιωνμηνιφεβΡουαριωκηχρονωνιαινδικτιονος

τουετουςφιζηπαρχιας+

الترجمة إلى اللغة العربيَّة

١- بنعمة وشكر الإله واليسوع والمسيح تم بناء هذا المعبد (الكنيسة) من أساساته وحتى نهايته في عهد جزيل القداسة رئيس الأساقفة المتروبوليت يوليقتوس وتم إهداءه للمنتصر (المظفر) القديس نقفور قسطنطينوس.

٢- وذلك بتجهيز وعمل من قبل قيّوم بن بروكوبيوس ويحتسبها لحبه الشديد لله ويسأله الخلاص وطول العمر والبقاء له ولإبنائه.

٣- وبإحسان وعناية وجهود (من يوحنّا وجرمانوس جزيلا الوقار والتقوى والورع المسؤولين، وذلك في شهر شباط من اليوم الثامن والعشرين منه، في الزمن الحادي عشر من الخمس عشرية للعام ٥١٧م من تاريخ المقاطعة.

٢. كتابات دير القديس نقفور قسطنطينوس التي أمام الهيكل الرئيسي والتي في وسط الدير

الكتابة اليونانيَّة التذكاريَّة لكنيسة القديس الشهيد يوحنا المعمدان ٦١٩م

النقحرة

-ΕΠΙΤΟΥΑΓΙωΤΑΤΟΥΚΑΙΜΑΚΑΡΙωΤΑΤΟΥ ΠΟΛΥΚΤΟΥ ΑΡΧΙΕΠΙΣΚΟΠΟΥς

-ΕΨΗΦΟΘΗΟΝΑΟCΟΥΤΟΤΟΥΑΓΙΟΥςΒΑΠ ΤΙCΤΟΥ ΙωΑΝΝΟΥΕΚΤωΝΤΟΥ ΝΟΥΤΟΥΚΑCΤΡΟΥς

-ΤΟΥΑΓΙΟΥΤΟΠΟΥΕΚCΠΟΥΔΗCΓΕωΡΓΙΟ ΥΠΡΕCΒς ΠΕΡΙΟΔΕΥ ΤΟΥ ΚΑΙCΕΥΗΡΟΥΟΙΚΟΝΟΜΟΥ

-ΕΝΜΗΝΙΑΠΕΛΛΑΙωΧΡΟΝωΝΟΓΔΟΗCΙΝ ΔΚΤΙΟΝΟC ΤΟΕΤΟΥC ΦΙΔ ΤΗCΕΠΑΡΧΙΑC

أسفل الكتابة التذكارية مباشرةً

ΑΥΔΝΑΙΟC----ΥΠΕΡΒΕΡΕΤΕΟC ςC

صور النقوش

ΔΥCTPOC --- ξΑΝΘΙΚΟC
ΓΙΟΝ ΑΡΤΕΜΕCIC ΔΑΙ
CIOC
ΕΥΡΑΤΗC ΤΙΓΡΙC

القراءة

-επι του αγιω τατου και μακαριω τατου πολυκ
του αρχι επισκοπου και μητροπολιτου
-εψηφοθη οναος ουτος του αγιου και βαπτισου
ιωαννου εκτωντου---νου του-καστρου και
-του αγιου τοποΥ εκσποδης Γεωργιου
πρεσβυτερου και περοδε
υ του και σευηρυ οικονομου
-εν μηνι Απεππαιω χρονων ογδοης ινδκτιονος
του ετους ΦΙΔ
της επαρχιαις

الترجمة إلى اللغة العربيَّة

أ- في عهد جزيل القداسة والوقار المبارك الاسقف بوليقتوس رئيس الأساقفة.
١- رُصفت أرضية هذا المعبد (الكنيسة) وأهديت إلى القديس يوحنا المعمدان على نفقة المال العام المقدم من أهالي الحصن (القلعة)
٢- وذلك بجهود وغيرة وحماسة الكاهن جورجيوس والزائر سيفيريوس المدير المنتدب (الاكونوموس)
٣- وذلك في شهر(التعين) تشرين الثاني في الزمن الثامن من الخمس عشرية وذلك في عام ٥٤١ من تاريخ الولاية (المقاطعة).

ب- الكتابة الثانيَّة
أسماء أشهر السنة باللغة المقدونية الإغريقية:
أودنايوس، أوبربرايتوس، دوستروس، كسانثيكوس، ارتميسيوس، دايسيوس.

ج- الكتابة الثالثة
أسماء نهر الفردوس الثلاث:
دجلة TIGRIC ، الفرات EYRATHC، جيون GION.

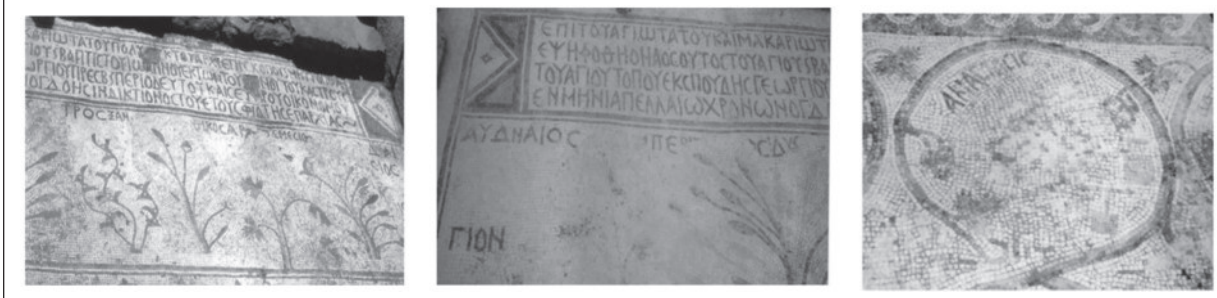
د- الكتابة الرابعة
أناستاسيس ANACTACIC: القيامة.

هـ- الكتابة الخامسة
أسماء الأشهر الأخرى غوربيايوس GORPIAIOS، ديوس DIOS، بريتيوس PERITIOS، بينهيموس PANHIMOS.

و- الكتابة السادسة
اسم النهر الفردوسي الرابع: فيسون FISON

الشرح:
بلغ طول الشريط الكتابي لكل سطر ٣٩٤ سم، وعرضه من الداخل ٥٢ سم، وعرض كل سطر على حده ٩،٥ سم، وبُعد كل سطر عن الآخر ٣سم، وأطوال الأحرف ٢-٨سم.

صور النقوش



٣. الكنيسة الوسطى في المجمع الكنيسي لرحاب، جنوب

كنيسة يوحنا المعمدان وتفتح عليها مباشرة، شباط، ٥٩٠م

القراءة

Ἐψηφώθη ἡ ἁγιωτάτη ἐκκλησία ἐκ τῶν
τοῦ [κ]οινοῦ τοῦ κτήματος (καὶ) τῆς ἐκλησίας
[ἐπὶ] τῶν θεοφιλλ(εστάτων) Προκωπίου (καὶ)
Σεργίου
πρεσββ(υτέρων) κ(αὶ) Κ[ο]μιτᾶ διακ(όνου)
κ(αὶ) οἰκονόμου ἐν ἔτι υπε΄ τῆς ἐπαρχ(ίας)
χρ(όνων) ἀρχ(ῆς) θ΄ ἰνδ(ικτιῶνος)

الترجمة إلى اللغة العربيَّة

١- فرشت أرضية هذه الكنيسة المقدسة بالفسيفساء.
٢- على نفقة عامة المواطنين في البلدة (القرية) وعلى نفقة الكنيسة (البطريركية).
٣- وذلك في عهد جزيل القداسة أحباب الله بروبوس وسيرجيوس والأسقفية والشماسي كوميتاس وكذلك المدير المالي المنتدب (ايكنوموس) في عام ٤٨٥ من تاريخ الولاية في الزمن التاسع من الخمس عشرية (بداية شهر شباط ٥٩٠م).

الشرح

تتكون الكتابة من خمسة أسطر بطول ٢٠٧ سم، وعرض ٥٥ سم، وإرتفاع الأحرف ٩ سم.

٤. الكتابة التذكارية للكنيسة الوسطى في المجمع الكنسي بداية اكتشافها كان في العام ٢٠٠٨م، رحاب

كنيسة القديس المظفر جورجيوس (الخضر عليه السلام)، ٢٣٠م

النقحرة

ENONOMTH[AΓSTΠΙΑΔOC+
EKSΠPOCΦ/ΘωNAΓA AHO
MOHOKTSC TSETEΛIωΘHΘHTO
EYKTEPTOYAΓSΓEωPΠOYEN
HAΠCΛΛEωXPHï HΔS TOY PKΔ EΓS
HCΠOYΔHCEPΓIOYΠAPAMS

القراءة

εν ονοματι της αγιας τριαδος+
-(ε)cκ προσφορα των θειωναγ αθων αγιου
ηγουμενου ο
μοηοκ τες τε ετελιωθη θη του-
-ευκτερου του αγιου Γεωργιου που εν
-μεηνι απc(ε)λλεω χρονων Hι ηινδικτιωνος
του ετου PKΔ εγραφη
-ησπουδη σεργιου παρα μοναριους.

الترجمة إلى اللغة العربيَّة

١- باسم الثالوث المقدس.
٢- تمت التقدمة من قبل أحباء الله السبعين وصاحب القداسة رئيس الدير.
٣- المحق وقد أنجزت باسم.
٤- المنتصر المظفر القديس جورجيوس وذلك في.
٥- شهر ابيلليون "آذار" في الزمن الثامن من الخمس عشرية لعام ١٢٤ وكتبت.
٦- بجهود وغيرة سرجيوس المسؤول

صورة النقش

٥. الكتابة التذكاريَّة لكنيسة المظفر القديس جورجيوس، الخضر -عليه السلام- ويلاحظ بأنها تختلف عن كل الكتابات من حيث الشكل والمضمون.

الكنيسة البيزنطية ٥٤٥م – شونة عواد الحراحشة. والى جانبها يوجد دير أموي على هيئة قاعة مقامة على أقواس وقد دمرت الكتابة التذكاريَّة والصور المقدسة وبقيت أنفورة تحيط بها شجرتي نخيل وأمامها عند المدخل صليب عملاق من الفسيفساء.

النقحرة للكتابة الأولى أمام حاجز قدس الأقداس

---- -ΕΨΗΦΟΘΗ----
---- -ΟΝΑΟC-----
---- -ΤΟΥΙωΑΝΝΟΥΑΡΧΙΕΠΙCK-----
---- -ΔΙΑΚΟΝΟΜΟΥ ΑΜΕΨΗΦωΘ------
---- -ΧΡΕΙΝΔ --- ΕΤΟΥ ΥΛΘ----

النقحرة للكتابة الثانية

---- -ΗΦ ΟΘΗΟΝΑΟC ΤΟΥ----
---- -ΕΛΟΥΕΚCΠΟΥΔΗCΚΑΙ----
---- -ΤΟΥΠΙC ΤΟΥΚΑΙΔΥξΟΝΙ----
---- -ΠΡΕCBs ΤΗC ΕΚΛΕC----
---- -ΟΡΔCΤΗC KωΜΗ-----

القراءة للقراءة الأولى

---- -εψη φοθη----
---- -Ο ναος-----
---- -επιτου αγιου τατου Ιωαννου αρχι επισκοπου-----
---- -διακονου ονομου αμονου εψηφωη------
---- -χρονων ε ινδκτινος του ετου Υλθ----

القراءة للكتابة الثانية

---- -εψηφοθη οναος του----
---- -ελου εκσποδης και----
---- -του πιστου και δυ ξονυ----
---- -πρεσβυτρου της εκλησιας----
---- -ορδς της κωμη----

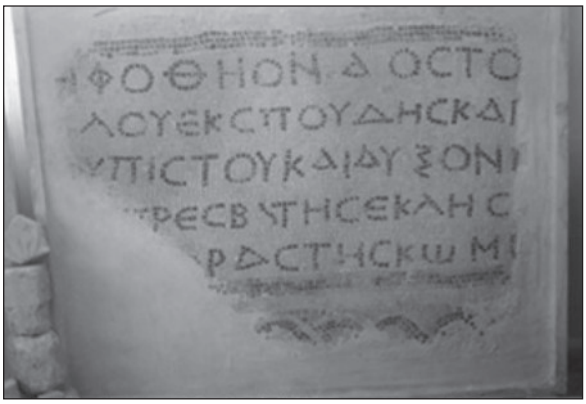
الترجمة إلى اللغة العربيَّة، الكتابة الأولى

١- فرشت بالفسيفساء .....
٢- أرضية هذا المعبد .....
٣- ..... في عهد جزيل القداسة يوحنا رئيس الأساقفة .....
٤- ..... باسم الشماس أمونوس فرشت بالفسيفساء .....
٥- ..... في الزمن الخامس للخمس عشرية لعام ٤٣٩ .....

الترجمة إلى اللغة العربيَّة، الكتابة الثانية

١- ..... فرشت أرضية هذا المعبد بالفسيفساء .....
٢- ..... بجهود وغيرة .....
٣- ..... المؤمن المحسن والمجيد .....
٤- ..... كاهن الكنيسة .....
٥- ..... للبلدة .....

صورة النقش



٦. إنَّ كتابة هذه الكنيسة غير متكاملة بسبب التخريب الذي حصل جراء البحث عن الكنوز فيها، ويلاحظ وجود كتابتين تذكاريتين الأولى موجودٌ فيها تاريخ، والثانية تجديدية على الأرجح وتقع هذه الكنيسة ذات الحجم الكبير بجانب الدير الأموي بطول ٣٦م وعرض ١٨م، ولها ثلاثة حنايا وصحن رئيسي وجناحين وأرضيتها الفسيفسائية ذات أشكال هندسية ونباتية خالصة وليس فيها أي تدمير أيقوني

الكنيسة السريانية القرن السابع الميلادي تقريباً في العام ٦٣٥-٦٣٦م، وقد اسميتها بهذا الاسم؛ لعثوري على كتابة فسيفسائية عند المدخل الغربي الرئيس للكنيسة باللغة السريانية اللهجة الفلسطينية المعهودة في مواقع رحاب وحيان المشرف والتي تذكر التالي بالعربية: من هذه البوابة يدخل المؤمنين

النقحرة

-ЄNONOMATITH
-AΓςKςOMTPIAΔOCANH--
-NЄωΘΗΨΗΦωΘCHTЄC---
-ΠΑΡΟΝΤςΑΓς ΕΥΚΤ---
-ςЄΝΔΟ ζγΜΑΘ---
-ЄΚCΠγΔςΚΙ
-TγΘЄΟΔΟΡς
-ΜΠΑΝ---ЄΤ-----ΧΡ---ΙΝ---

القراءة

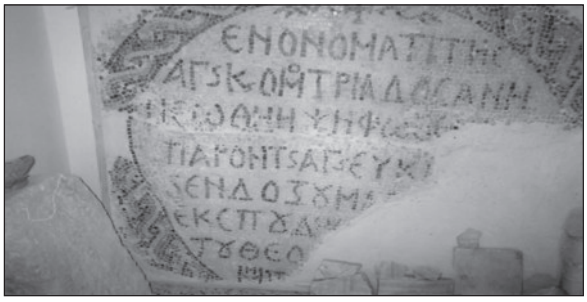
-εν ονοματι της
αγιας και ομοουσιου τραιδος ανη-
νεωθη ηψωφωθε Cητες-
-παραντος του αγιου ευκταριου
-του ενδο ζου μαθιου---
-του θεοδορου---εν
-μηνι παν(ηομο)(ετους)---χρον …

الترجمة إلى اللغة العربيَّة

١- باسم.
٢- الثالوث المقدس والمجسد.
٣- جددت وفرشت أرضية هذا المعبد بالفسيفساء هذا العام.
٤- بمشاركة المظفر القديس.
٥- للمجيد ماثيوس.
٦- بجهود وغيرة.
٧- لثيوذوروس.
٨- في شهر بانهيموس من عام.

الشرح على صورة رقم ١

الكتابة السريانيَّة التي عثر عليها عند المدخل الرئيس، والأخرى اليونانيَّة التي وجدت في وسط الصحن الكنيسة السريانية وقد تم نزعهما من مكانهما الأصلي وأحضرا إلى المتحف حرصاً عليهما من السرقة والتدمير.



الشرح على صورة رقم ٢

ويُلاحظ من خلال هذه الكتابة الفسيفسائيَّة الدائريَّة أن هذه الكنيسة جددت في عهد الأسقف ثيوذوروس وقد كان موجوداً بداية العهد الإسلامي ما بين الأعوام ٦٣٠ – ٦٣٨ م. وعلى الأرجح أن تكون قد أنجزت في العام ٦٣٦ م في عصر الفتوحات الإسلامية؛ بدلالة العثور على فخار إسلامي مبكر، بالإضافة إلى الكتابة السريانيَّة المرافقة عند المدخل الغربي الرئيسي على الأرضيَّة الفسيفسائيَّة والمكونة من سطرين، كما أن فسيفساء هذه الكنيسة ذات أشكال هندسيَّة خالصة، وليس فيها أي تدمير أيقوني كما في كنيسة القديس مينا المجاورة، وتقع هذه الكنيسة ضمن مبنى مطحنة القمح العثمانية المتأخرة أو ما يسمى **بخان أخو رشيده** كما تم الكشف عن أرضيات لكنيسة مجاورة لم تستكمل بعد وهذه صفة ثابتة في كنائس رحاب لوجود تجمعات كنيسة متجاورة لوجود المذهب النسطوري والأرثوذكسي في المنطقة والذي يحتم على المسيحيين عدم إقامة القداس مرتين في الكنيسة الواحدة في اليوم الواحد.

٧. كنيسة القديس فيلمون، ٦٦٣م

كتابة كنيسة القديس فليمون

النقحرة

XAPïTIXYANENEωθHïΨïΦω[ï[TγAΓςMAP
-+
-TYPO[ΦHΛIMO[‘EπI------o[TEΦANγΔïAK/
ςïΓγ
-EK[Πγ Δ/ς KAMATO[TςγθIωΔOPγΓOΛEγς+
AYTγTEKN
-ENM MAP/ïNΔςη Tγ[ΦNZ’+’ ΠETPO[OΓP
AΨA]

القراءة

-χαριΤι χρισ του ανενεωθηι ψιφωσισ του αγιω
μαρ-
-τυροσ φημοσ επι του αγιω τατου στεφανου
διακωνου και ιγου μενου
-εκσποδη καμα τος και του θιωδορου Γολεου
και+αυτου τεκνον
-εν μηνιμαρ τιω ινδικΓιονος η του ετους
ΦNZ+πετος Ογραψας

الترجمة إلى اللغة العربيَّة

١- بنعمة وشكر السيد المسيح جددت وفرشت أرضية هذا المعبد بالفسيفساء باسم القديس الشهيد.
٢- فهليموس وذلك في عهد استيفانوس الشماس مسؤول الدير.
٣- بجهود وغيرة وعمل ثيوذوروس ابن جوليوس + وابناءه.
٤- وذلك في شهر آذار من الخمس عشرية التسعين من عام ٥٥٧ + بطرس أوغرابساس.

الشرح

توجد هذه الكنيسة ضمن تجمع كنسي آخر في تل رحيبة بجوار كنيسة القديس سرجيوس الأموية الأخرى، ولكن هذه الكنيسة مجددة لاحقاً ولم يبق من آثار الكنيسة الأقدم سوى بقايا آثار حنيتها وأرضيتها الفسيفسائية وغرفة غربية مجاورة وهي ذات نظام القاعة الواحدة بطول ٢٠م، وعرض ١٠م، علماً بأنَّ حنية هذه الكنيسة مستطيلة الشكل وقد ألغيت الحنية نصف الدائرية لاحقاً. كما يلاحظ من آثارها على الفسيفساء. ومن حيث العمارة، والفسيفساء، والكتابات الفسيفسائية أيضاً، ونلاحظ أن اسم هذا القديس يستخدم بكثرة عند طائفة الأرمن وفي لبنان عند الموارنه. ونلاحظ جلياً أن عدد الكنائس التي دشنت في العصور العربيَّة الإسلاميَّة كثيرة منذ بدء الفتح الإسلامي لبلاد الشام ٦٣٥م- ٦٨٦م أي في العهدين الراشدي الأول، والاموي كاملاً زِدْ على ذلك أسمائهم العربية الواضحة أوبي، ومسكينة، وقيوم وغيرها كثير.

٨. كنيسة القديس سرجيوس ٦٨٦م

كتابة القديس سرجيوس

النقحرة

ΕΨΙΦΟΘΗΟΝΑΟCΟΥΤΟC ΑΓΙΟΥ CΕΡ-+
-ΓΙΟΥΕΠΙ ΤΗC ΥΚΟΝΟΜΙΑC CΤΕΦΑΝΟΥ ΠΡΕCΒΥΤΕ
-ΡΟΥ ΕΠΙΤΟΥΑΓΙω ΤΑΤΟΥ ΓΕωΡΓΙΟΥΜΗΤΡΟΠΟΛΗΤΟΥ
-ΚΑΙΑΡΧΗΕΠΙC ΚΟΠΟΥ ΠΑΡΑΝωΝΗΛΙΟΥΠΡΕCΒΥΤΕΡΟΥΚ
-ΑΙΘΟΜΑC Κ/ΚΑΙΟΥΑΥ ΤΟΥΑΓΙΟΥ ΤΟΠΕΤΟΥC ΦΠΕΤΗC ΕΠΑ
-ΡΧΙΑC ΜΗΝΟC ΦΕΒΡΟΥΑΡΙω ΠΡΟΤΗΧΡΟΝΟΝΤΕΤΑΡΤΗCςΔ/ΜΑΥΙ Τς

القراءة

εψιφοθη Οναος του αγιου σερ-+
-γιου επι τησ υκονομιας στεφανου πρεσβυτε
-ρου επι του αγιω τα τουγεωργιου μητροπολη του
-και αρχη επισκοπου παρανων ηλιου πρεσβυτε ρουκ
-αι θομας και καιου αυτου αγου τοπου ετους ΦΠ ετης επα
-ρχιας μηνος φεβρουαριω προτη χρονον τεταρ της διακωνου μαυι του

الترجمة إلى اللغة العربيَّة، الكتابة الأولى

١- فرشت أرضية هذا المعبد باسم القديس سرجيوس.
٢- في عهد الاقونومياس استفانوس الكاهن.
٣- وفي عهد جزيل القداسة جورجيوس المتروبوليت "الأسقف".
٤- ورئيس الأساقفة المسؤول هيليوس الكاهن.
٥- وتوماس وكايوس ، في هذا المكان المقدس وذلك في عام ٥٨٠ من تاريخ.
٦- الولاية في غرة شهر شباط في الزمن الرابع لعهد مسؤول الدير الشماس.

الترجمة إلى اللغة العربيَّة، الكتابة الثانية

١- اوبيوس و.
٢- صوفيا.

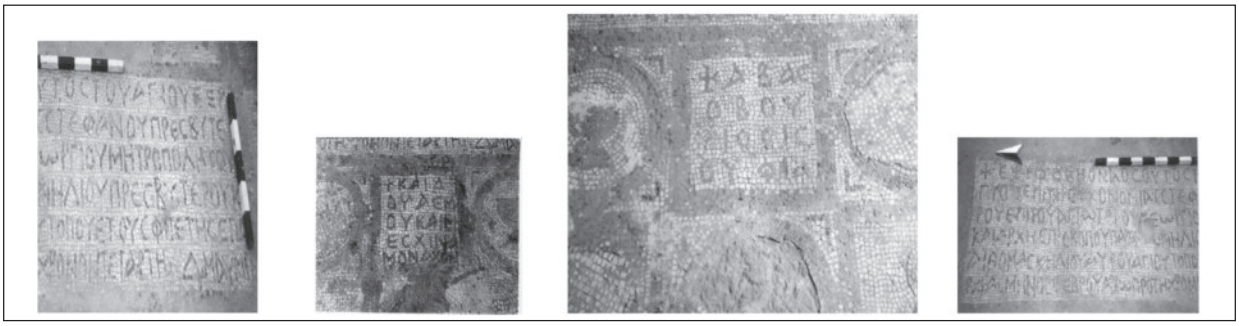
الترجمة إلى اللغة العربيَّة، الكتابة الثالثة

١- + والراهبان.
٢- دعيموس.
٣- ومسخينة "ومسكينه".

الشرح

الخمسعشرية: وحدة زمنية مؤلفة من ١٥ سنة كانت توضع في الإمبراطورية الرومانيَّة والبيزنطيَّة والأسقفيات المسيحية لتاريخ الأحداث العادية من بناء كنائس أو تنصيب أساقفة وبطارقة وغيرها.

صور النقوش



٩. كنيسة القديسة مريم ٥٣٤م

النقحرة الأولى أمام حاجز قدس الاقداس مباشرة

+ЄΨΗΦΟΘΗΚΑΙΕΤΕΛΕΙΟΘΗΟΝΑΟCΟΥΤ
ΟCΤΗCΑΓΙΑΙΜΑΡΙΑCЄΠΙΜΑΡΤΥΡΙγςΗΛΙ
γςΟΛЄΦγΥΙωΝΟΛЄΦΟΥ
-ΤωΝΜΑΚΑΡΥΠΕΡΑΝΑΠΑΥCЄωCΑΥ
ΤωΝςΤωΝΑΥΤωΝΓΟΗΕωΝΤγΕΤγCΥΚΗ
ΜΠΑΝΕΜγΘΧΡΙΑΙΝΧ
-ΝΥΝΔΕΑΝΑΝΕΟΘΕCΑΝΤΑΨΗΦΙΑΤ
ΑΥΤΑΕΠΙΗΛΙγΒΑCCγΤγΘΕΟCΕΒςΠΡΕ
CΒςΚΠΑΡΑΜΤγΕΤγCΥΟΖΧΡΆΙΝΧ

القراءة

+έΨηφŏθη και έτελειŏθη ŏ ναŏς οΰτος τής άγιας
Μαριας έπι Μαρτυριου και Ηλιου και Ολέφου υιων Ολέφου
-των υακαρ(ιων) Ὑπέρ αναπαυσεως αυτων και των αΰτων γονέων τοΰ ετους rΚΗ μη(νι) πανευου θ χρο(νων) ια ινδ(ικτιωνος(
-νΰν δε ανανεοθε[σα]ντα ψηφια ταΰτα επι Ηλιου Βασσου τοΰ θεοσεβ(εστατου) πρεσβ(υτερου) και παραμ(οναριου) τοΰ ετους rΟΖ χρ(ονοις) α ινδ(ικτιωνος).

الترجمة إلى اللغة العربيَّة، الكتابة الأولى: وهي كتابة كنيسة القديسة مريم ٥٣٣م

١- فرش بالفسيفساء وأنهي هذا المعبد باسم القديسة مريم في عهد مارتيريوس وهيليوس وأوليفوس وأبناء أوليفوس.
٢- طوبا لهم لراحتهم ولراحة والديهم في سنة ٤٢٨ في التاسع من شهر بانيوموس من الخمس عشرية الحادية عشرة.
٣- ولكن الآن أعيد تجديد الفسيفساء في عهد هيليوس ابن باسوس المتدين والمشرّف الكاهن في سنة ٤٧٦ من الخمسعشرية الأولى.

الترجمة إلى اللغة العربية، الكتابة الثانية: وهي كتابة كنيسة القديسة مريم ٥٨٢م

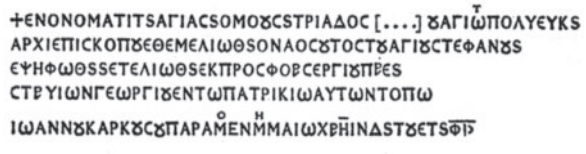
١- يا رب امنح الراحة ليوحنا ابن عزيزو.
٢- يا رب يا إله القديسة مريم وكل.
٣- القديسين ارحم.
٤- العالم أجمع وأنقذ.
٥- المتبرعين ويوحنا ابن أنائيليوس.
٦- كثير التقوى الشماء، في شهر "كسانثيكوس" من الخمس عشرية الأولى.

الشرح

تقع هذه الكنيسة بجانب مبنى البلدية مباشرة وسط بلدة رحاب وتعود للعام ٥٣٤م، وقد عثر على كتابتين تذكاريتين الأولى أمام الهيكل وهي موضوع البحث بطول ٥,٩١ سم وعرض نصف متر.

١٠. كتابة القديس استيفانوس ٦٢١م

النقحرة



القراءة

1-+Εν ονοματι της αγιας χαι ομοονςιου

Τριαδος επι του αγιωτατου Πολυευχτου
2-αρχιεπισχοπου εθεμελιωθη οωαος του αγιου Στεφανου χαι
3-εψηφωθη χαι ετελιωθη εχ προσφορας Σεργιου πρεσβθτερου χαι
4-Στρατωνας υιων Γεωργιου εν τω πατριχω αυτων τδπ
5-Ιωαννου Καρχουσου παραμοναριου εν μηνι Μαιω χρονοις ηινδιχτιωνος του ετους ΦΙΕ.

الترجمة إلى اللغة العربيَّة

١- + باسم الثالوث المقدس والمتوحد وفي عهد جزيل القداسة بوليقتوس.
٢- رئيس الأساقفة وضعت أساسات هذا المعبد باسم القديس استيفانوس.
٣- وفرش بالفسيفسات وأتم بتقدمة من الكاهن سرجيوس.
٤- وستراتون أبناء جورجيوس في موطنهم.
٥- ومن يوحنا ابن كاركوسو مسؤول الدير وذلك في شهر أيار من الخمسعشرية الثامنة من عام ٥١٥م.

١١. كتابة كنيسة القديس ميناس عام ٦٣٥م

النقحرة

القراءة

1- Χαριτι Ιησου Χριστου θεου χαι σωτηρος ημων εχτισθη χαι
2- Εψηφοθη χαι ετελτχθη ο ωαος του αγιου Μηωα επι Θεοδο
3- Ρου του αγιωτατου χαι θεοτιμητου μητροπολιτου εχ προσφο
4- Ρας Προχοπιου Μαρτθριου χαι Κομητισσης σθμβιου χαι τεχν
5- ων αυτων υπερ αφησεως αμαρτιων χαι αναπαυσε
6- ος γονεον Εγραφη εν μηωι Μαπτιω χρανον ογδοης ινδιχτιωονς του ετους ΦΚΘ.

الترجمة إلى اللغة العربيَّة

١- + بشكر من المسيح الرب ومنقذنا بني.
٢- وفرش بالفسيفساء وأتم معبد القديس مينا بعهد ثيوذوروس.
٣- صاحب القداسة والمشرف من الله بتقدمة.
٤- من بروكوبيوس ابن مايتيريوس وزوجته وأولادهم.
٥- من أجل إزالة الذنوب ومن أجل.
٦- راحة الوالدين، كتب في شهر آذار من الخمسعشرية الثامنة لسنة ٥٢٩.

كنيسة القديس عبيده، حيّان المشرف ٥٩٣م

النقحرة

1-+ΧΑ Ρ Ι Τ ï θ Υ Ι Υ Χ Υ Η Μ W Ν C W Τ Η
Ρ Ο C Є Π Ι Τ Ο Υ Γ Ι W Τ s s Μ
2-ΚΑ Ρ Π Ο Λ Ο Υ Ο Ϙ Τ Ο Υ Α Ρ Χ Ι Є Π Ι C
Ϙ Η Μ W Ν Π Α ΤΡ Ο ï Κ Ο Δ Ο Μ Η θHs Η
3-Τ Η Ą Τ Ο Δ ïΑ Κ Ο Ν s Є Κ C Π Ο Υ Δ s Ο
Β Є Δ Ο Υ Π Ρ Є Ν Є Τ Ι Υ ΠΗ ΧΡ Ι Β

القراءة

1. +ΧαΡιτι θεου Τη6οΧρι6 Τουημων Cωτυηρος Επι Του
2. ΑγIωτα Του Του ΜαΚαριου Πολουκ Του Αρχι Επι6 Κοπου Του ημων
3. Πατρων ïκονδομων ηθεμελιοθη Καi ηΤηλιοθη Το Δïα Κονου Εκ6πουδη Οβεδου Πρε6Βατε-ρου ΕνΕΤi ηΠΗ Χρονον ΙΒ+

الترجمة إلى اللغة العربيَّة

١- بشكر الله واليسوع المسيح مخلصنا ومنفذنا ، وفي عهد جزيل القداسة والطوبا بوليقتوس رئيس الاساقفة وتمت التقدمة لابونا ومؤسسنا الشماس من أساساتها وحتى نهايتها وذلك بجهود وغيرة الراهب عبيدة في عام ٤٨٧ في الزمن الثاني عشر منه .

٢- بإضافة الرقم ١٠٦ من تاريخ الولاية العربية يكون تاريخ هذه الكنيسة ٥٩٣م.

الشرح

لقد تم الكشف عن هذه الكتابة وكامل غرفة التعميد في موسم حفريات عام ٢٠١١م من قبل الباحث نفسه في حيان المشرف – المفرق .وتم استكمال أعمال التنقيب والترميم للكنيسة ذاتها والتي تجاورها أيضاً من جهة الغرب والتي يعتقد بأنها من أقدم الكنائس في العالم لتفردها من حيث العمارة وعدم وجود حنية بل هيكل فقط وينزل إليها بدرج وباب ضيق عرضه متر واحد فقط، ويبلغ طول الشريط الكتابي ٤٥٤ سم ، وعرضه يتراوح ما بين ٣٣-٣٤ سم، وأما عرض كل سطر على حده فيبلغ ٧-٨ سم.

ويلاحظ وجود ثلاثة خطوط فوق أحرف المختصرات، فالأول يوجد فوق (الله واليسوع المسيح) بطول يبلغ ٤٨ سم ، وأما طول الشريط الثاني الموجود فوق الأحرف الثلاث الخاصة بالتاريخ فيبلغ ١٧ سم، وأمَّا الشريط الثالث الموجود فوق الرقم (١٢) فيبلغ ١٠ سم، وبالعودة إلى الأحرف وأطوالها تتراوح ما بين ٥-٩ سم. وقد رصفت بالحجارة الصغيرة الخمرية المائلة للحمرة على أرضية بيضاء والشريط الخارجي رصف بالحجارة الصغيرة السوداء وهنالك خرطوش يحيط بالشريط الكتابي على شكل نصف دائرة بقطر ١٤ سم، ومن الجدير ذكره أن هذا الشريط الكتابي عثر عليه في الغرفة المستطيلة الموجودة أمام الكنيسة من الجهة الشماليَّة الغربيَّة والمخصصة على ما يبدو للتعميد لوجود إناء التعميد الحجري المتقن الصنع والكتابة أمامه ويبلغ طول الغرفة ٩,٥م بعرض خمسة أمتار.

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قائمة المصادر والمراجع

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ملامحٌ فنيَّةٌ لنقوشٍ عربيَّةٍ شماليَّةٍ (الصفائيَّة) من منطقة الضويلة

علي عطاالله الحاج

المُلخص

يَتناولُ البحثُ مجموعةً من الرسومات الصخريَّة التي رافقت نقوش عربيَّة شماليَّة، وهي نقوش صفائيَّة، عُثِرَ عليها أثناء المَسح الأثري الميداني بمنطقة الضويلة، الواقعة شَمال شرقي الأردن حيثُ قام بالمسح الأستاذ الدكتور سلطان المعاني، والأستاذ الدكتور مهدي الزعبي، والباحث[1]، وتشتمل الدارسة على تحليل الرسومات التي تكونت من صور آدميَّة، وحيوانيَّة، ورمزيَّة.

أمّا الصور الآدميَّة فهي عددٌ لا بأس به، تعددت صورها من فرسان يمتطون أحصنة يقاتلون، ويصطادون الحيوانات، بينما الصور الحيوانيَّة فهي كثيرة جداً تنوعت وتعددت أشكالها، فمنها الجمال، والأحصنة، والنعام، والبغال، والأغنام، وصورةٌ واحدةٌ لثورٍ، وأخيراً الأشكال الرمزيَّة التي جاءت أَشكالها متنوعة منها قرص الشمس، والخطوط السبع الطوليَّة، والعَرْضِيَّة، والدوائر السبع، والنقاط السبع، حيثُ سيتم دراسة كل الأشكال المذكورة سابقاً وِفْقَ المَنهج التحليلي في هذا البحث.

توطئة

بادىء ذي بدء لا بُدَّ لنا من الإشارة إلى الرسومات الصخريَّة، التي رافقت هذه النقوش، فهي تُعدُّ ذاتُ أهميَّةٍ بالغةٍ تعكسُ من خِلالها طبيعة حياة البداوة للقبائل العربيَّة الشماليَّة الصفائيَّة، والثموديَّة، التي قطنت هُناك، لا سيَّما الصفائيون وهم محور هذا البحث، حيثُ تشكلُ هذه الرسومات تصورات عدَّة حول سير الحياة اليوميَّة عند الصفائيين، فعند الحديث عن تلك الملامح نجد العدد القليل من تلك الدراسات التي اهتمت بهذا الموضوع، ناهيك عن عدم إعطائِها أهميَّة لائقة بها، وكذلك الحال، فإنَّ الدراسات السابقة قامت على تحليلِ ودراسةِ تلك النقوش دون تفسير رسوماتِها في أغلب الأحيان.

جاء هذا البحث؛ لبيانَ أنواع هذه الرسوم وهي من منطقة الضويلة، فقد حُللت نقوشُها من قِبل الباحث فجيئت برسالةٍ للحصول على درجة الماجستير معنونة بِـ "**دراسة نقوش صفويَّة جديدة من منطقة الضويلة في الباديَّة الأردنيَّة الشماليَّة الشرقيَّة**"، أما رسوماتها فسيتم تحليلها في هذا البحث، وتسليط الضوء على مكنوناتِها، وجمال إتقانها، وبيان أسلوبها.

تم اكتشاف نقوش هذه المنطقة من قبل الأستاذين الأكاديميين في الجامعة الهاشميَّة صيف عام ٢٠١٢، فقد جَمَعَا ما يقاربُ ألفي نقشٍ تقريباً مع رسوماتِها، وتم العودة للمنطقة نفسها صيف عام ٢٠١٥، ففي هذه الرحلة الميدانيَّة كان معهم الباحث بقصد التدريب، والبحث، والتوثيق، والتصوير لنقوش رسالة الماجستير، وتعددت النقوش في هذه المنطقة فمنها اللاتينيَّة، والصفائيَّة، والثموديَّة، والإسلاميَّة المبكرة.

أما بالنسبة لأول من لفت الأنظار على تلك النقوش فكان العالم جراهام (Graham)، أثناء رحلته في جنوب شرقي دمشق عام ١٨٥٧(Graham 1860: 280)، ثم تلت بعد ذلك رحلات أجنبيَّة كان الهدف منها الاستطلاع والاكتشاف، وأخرى التوثيق، والتحليل، ولم يخلو ذلك من إسهامات الباحثين العرب فكان لهم نصيب وافر في التحليل، والاكتشاف، والتوثيق، وبيان قيمتها الاجتماعيَّة، والسياسيَّة، والدينيَّة.

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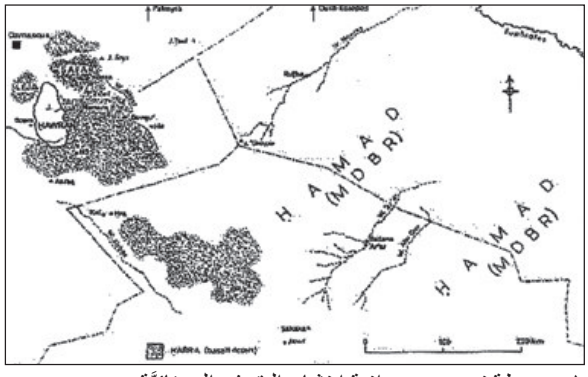
١. علي عطاالله علي الحاج، دائرة الآثار العامة، مديرية الدراسات، قسم الأبحاث والنشر.

إنَّ العملَ الفني الصفائي -الرسومات- عملاً مُختلفاً تماماً عن الأعمال الفنيَّة الأخرى، إذ يساعد في المفاضلة بين أعمال الفنانين المختلفين في نفس العصر الحضاري، أو في عصور مختلفة، فلكل فنان ذوقه، وابداعه في العمل الفني، فالطابع العام لهذا الفن هو طابع بدائي بسيط، تمثل في رسم البيئة البدويَّة التي تعايش معها، فمثلاً نجده يرسم على حجر بازلتي أسود أصم، باستخدام أداة حجريَّة حادة، وتارةً أخرى نجده يرسم على حجر كلسي، إلا إنَّ أغلب رسوماتهم كانت على الحجارة البركانيَّة ذات اللون الأسود، فهذه الحجارة شكلت لنا لوحات فنيَّة جميلة تعبر عن ذوق الفنان، وحسه الجميل، وتدور فيها أحداث، وأسرار، وخفايا.

ومن بين تلك الرسومات الجميلة، طريقة رسمه للجمال، فأحياناً نجده بسنامين، وأحياناً بسنام واحد، أو نجده إما مفرغاً من الداخل، وإما ممتلئاً، ونرى طريقته في رسم الأحصنة بطريقة جميلة تبين لنا مدى توافقه لشكل الحصان في أيامنا هذه، وغيرها من الأشكال التي هي مدعاة للبحث العميق في كيفية رسم هذه الحيوانات التي تعايشت مع الإنسان الصفائي العربي البدوي، على الرغم من عدم توفر أدوات الرسم بإستثناء الأداة الحجرية الصغيرة المدببة الحادة.

وبشكل عام كانت جغرافية انتشار النقوش مع رسوماتها على مساحات شاسعة شملت منطقة الحَرَّة في الصحراء الشرقيَّة الأردنيَّة على امتدادها ما بين حوران شَمالاً، ووادي السرحان جَنوباً، وأَجزاء من غرب العراق، وجنوب سوريَّة، ومناطق مُتفرقة من شَمال المملكة العربيَّة السعوديَّة (Macdonald1993: 303-313) **(الشكل ١)**.



١. خريطة توضح جغرافية انتشار النقوش الصفائيَّة.

ويمتد تأريخ تلك النقوش من النصف الأول قبل الميلاد إلى نهاية القرن الرابع الميلادي، وقد كُتِبَت جميعها بالخط المسند (ديسو ١٩٨٥: ٨٨-٩٠).

جغرافيَّة منطقة الضويلة

تقع منطقة الضويلة على بعد ٦٠ كيلومتراً من شرق منطقة الصفاوي إلى الجنوب من الطريق الرئيسي المؤدي إلى بغداد، ويمكن الوصول إليها أيضاً من خلال طريق غير معبد على بعد ١ كيلومتراً جنوب الطريق الرئيسي، ويصل إرتفاع المناطق الجنوبيَّة منها إلى ٦٤٠ متراً فوق سطح البحر تقريباً.

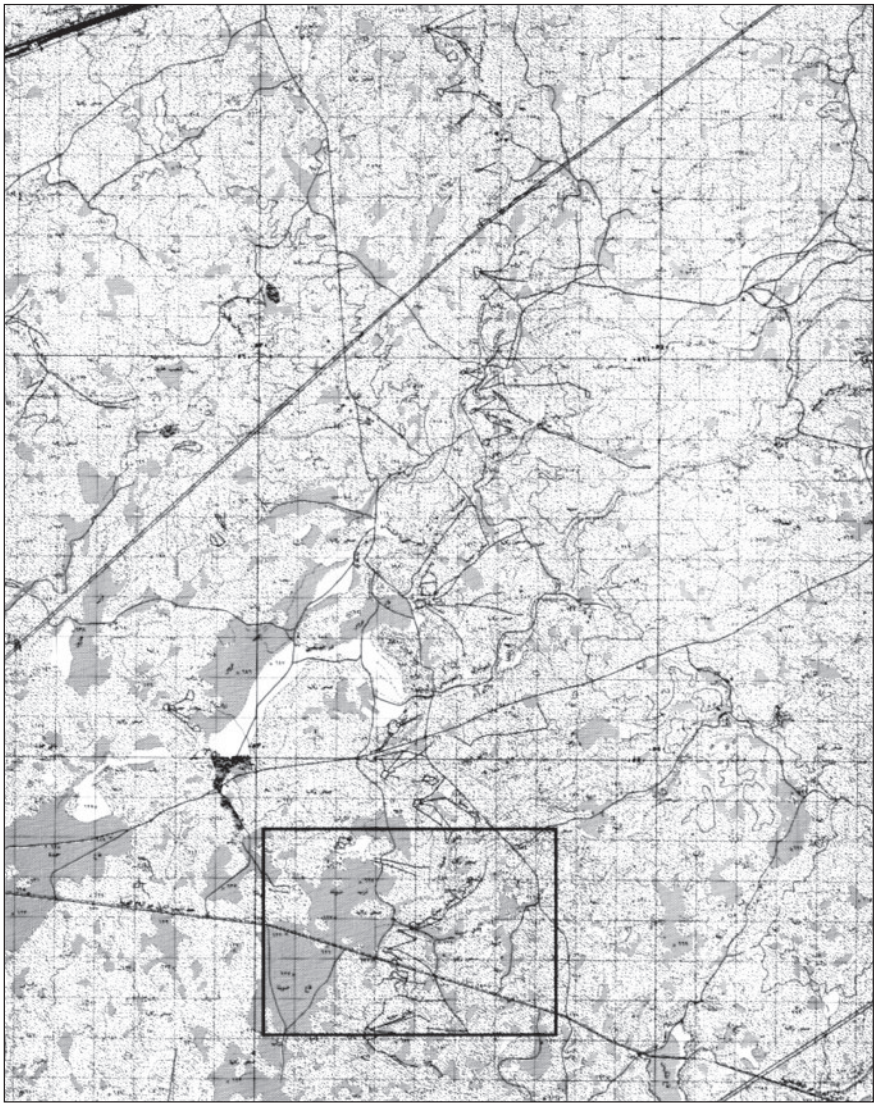
أمَّا الشماليَّة فيصل ارتفاعها إلى ٧٥٠ متراً، وتتألف المِنطقة من عدة مواقع تتكون بعضها من السهول الصحراويَّة والمناطق المرتفعة، ومن هذه المواقع: تلعة الضويلة، وشعب الضويلة، وتليلات الضويلة، وتغطي أشكال البراكين، والحمم البركانيَّة بالإضافة إلى الصخور البازلتيَّة مُعظم المنطقة، وتعترضها عدة وديان، وبحيراتٍ موسميةٍ سمحت بتشكل غطاء نباتي مناسب للرعي. وفي الفترة التي امتدت صيف ٢٠١٢ إلى وقتنا الحاضر جرى الكشف عن عددٍ كبيرٍ من النقوش الصفائيَّة، وُجِدَ أَغلبها على قمم رجوم من الحجارة، أمَّا بقيتها فوجدت في قاع الوادي في تلك المنطقة وعلى جوانبه، وقد شملت هذه النقوش على رسومات صخريَّة كشفت لنا طبيعة حياة القبائل الصفائيَّة (الحاج ٢٠١٥: ٧) **(الشكل ٢)**.

تحليل الرسومات الصخريَّة المرافقة للنقوش

١- *الرسومات الآدميَّة*

إنَّ الأشكالَ الآدميَّة التي رافقت النقوش في هذه المِنطقة، لم تتسمْ بتفاصيل جسديَّة واضحة، كملامح الوجه مثلاً، وغيرها من الأشكال الآدميَّة الأخرى الواردة هنا؛ نظراً إلى عدم وجود فكرة مرتبطة بالموضوع هذا من جهة، ومن جهة أخرى لم يكنْ للفنان الصفائي الإهتمام بشكل على حساب آخر، وهكذا، فقد كانت الرسومات الآدميَّة ذات طابع بدائي، تجريدي، مع اختلاف في رسم كل شكل عن الآخر **(الشكل ٣: ٢٥-٣٣)**.

لقد ظَهَرَ رسمُ الرجالَ في هذه الرسومات وهم يحملون الأسلحة مثل التروس، والرماح، والسيوف،



٢. خريطة طبوغرافيَّة تبين لنا منطقة البحث وما حولها.

وكان الهدف من ذلك إمَّا الصيد، أو القتال، إلاّ إنَّ الصفة الغالبة العامَّة هي الصيد **(الشكل ٤: ٣٤، ٣٥، ٣٩، ٤٠)**. فطريقة حمل السلاح كانت بيدٍ واحدةٍ، واليد الأخرى ماسكة للجام الفرس، أو الجمل.

فالأشكال الذكوريَّة والأنثويَّة في الرسومات الصفائيَّة بشكل عام تختلف من حيث العدد، إذْ إنَّ النصيب الأكبر كانت للأشكال الذكوريَّة على العكس تماماً في الأشكال الأنثويَّة، أمَّا في هذه النقوش فيُلاحظ إنَّ الرسومات الحيوانيَّة كان لها الحيز الكبير من مجموع تلك الرسومات.

لم تكنْ رسوم الحيوانات مفردة، وإنَّما رافقها رسومات آدميَّة؛ لتكتملَ اللوحة الفنية مَعْناً ومضموناً، فمثلاً عندما نجد ملامح فنيَّة مثلت مشهد من المشاهد الحياة اليوميَّة، ولتكن مشهد صيد، نجد الفنان قد رسم هذه الأشكال بصورة عريضة يخرج منها خطوط تمثل الأرجل واليدين، ونلاحظ أيضاً وجود سمات عامَّة نرى من خلالها أن رفع اليدين للإنسان في الرسومات الصفائيَّة كانت بقصد الدعاء، ونجزم هذا القول من خلال النقش المرافق لهذه الرسمة التي خطها الفنان، ومن جهة أخرى نرى عدد من السمات منها: أن نجد أيدي الإنسان بدون أطراف، أو نجد الرأس قد رسم بطريقة دائريَّة، أو شبه دائريَّة، إذاً؛ ومن هذا المُنطلق نستنتج أن الفنان الصفائي لم يكنْ لديه تلك المهارات التي نلاحظها في عصور تاريخيَّة سابقة، فقد كانت قدراته محدودة ولكن بنفس الوقت كانت مُتقنة، بمعنى أنه قد رسم، وأتقن، وفكر دون إظهارٍ لتفاصيل الوجه،

والجسد الإنساني، فلم نجد مكان العينين، والأذنين، والفم ونحو ذلك، وإن اجتهد في رسم الشَّعْرِ فنلاحظ شكله بطريقة خطوط مستقيمة، أو متعرجة.

٢ـ *الرسومات الحيوانيَّة*

أ- الجمل

تعددت الرسومات الحيوانيَّة في هذه النقوش فمنها: الجمال، والأحصنة، والأغنام، والغزال، والثور، والنعام، وغيرها، إلاّ إنَّ الجمالَ كانت لها مكانة خاصة في نفوس الصفائيين؛ نظراً لأهميتها عند المجتمع الصفائي في عملية الحِلّ، والترحال، والإستخدام اليومي لها، وفوائدها الجمَّة، ناهيك عن صعوبة المنطقة، فالجمال سريع التكيف في هذه الظروف القاسيَّة، لا سيما الباديَّة الصحراويَّة ذات الحجارة السوداء المُلتهبة عند توسط الشمس في السماء، فلم يطلق عليه اسم سفينة الصحراء من عبث، فاستفادت القبائل الصفائيَّة من تلك الجمال استفادةً عظيمةً، فأنتجوا حليبها، ولحومها، وفي عملية النقل والتجارة.

جاء اهتمام العرب بالجمال منذ القدم فأطلق عليها مسميات عدة تِبعاً لنسبها، ولونها، ونوعها، وقبل التطرق عن الحديث عما ذُكِر، فيجب معرفة معناها لُغوياً كما جاءت في المعاجم العربيَّة، لقد جاء معناها عند ابن منظور صاحب لسان العرب بـ الجمل: هي الذَّكر من الإبل، وأجمال، وجمالات، وجمائل، والجمالة هم أصحاب الجمال، وقيل: إنَّما يكون جَمَلاً إذا أَرْبَعَ، وقيل: إذا أجدع، وقيل: إذا بزَل، وقيل: إذا أثْنَى، قال:

"نحن بنو ضَبَّه أصحاب الجَمَل الموت أحلى عندنا من العسل" (ابن منظور ٢٠٠٠: ٢٠٠-٢٠٢).

وفي المعجم الوسيط جاءت بالكبير من الإبل من الفصيلة الإبلية، من رتبة الحافِريّات المجترة، ومنه ما هو ذو سنامين (إبراهيم وآخرون ١٩٦٠: ١٧٦-١٧٧).

ووردت عند الرازي صاحب معجم مختار الصحاح بـ الجمل من الإبل الذَّكَر، والجمع جِمَال، وأَجْمَال، وجِمالات، وجَمَائل، وقال ابن السّكّيت: يُقال للإبل الكُّور خاصة جِمَالة، وقُرِئَ "كأنه جِمَاله صُفْر"، والجَمّاله أصحاب الجمال كالخيَّالة والحمَّاره (الرازي ١٩٢٥: ١١١).

وذكرها الزبيدي صاحب معجم تاج العروس في جواهر القاموس، قلت: وهي لغة صحيحة وبه قرأ أبو السمال حتى يلج الجمل بسكون الميم: وهو ذكر الإبل، وقال أبو الفراء: زوج الناقة، وقال شمر البكر: والبكرة بمنزلة الغلام والجارية، والجمل والناقة بمنزلة الرجل والمرأة (الزبيدي ١٩٦٥: ٢٦٢).

أمَّا أسمائها فقد تعددت فمنها: الداعرية، والأصهب، والنظارية، وبحتر (الأصمعي ٢٠٠٣: ١٢٥-١٢٨)، وفي النقوش الصفائيَّة ورد الجمل بعدة صيغ منها (هـ ب ك ر ت)، وتعني الناقة الصغيرة (Oxtoby 1968:40)، وصيغة أخرى وهي (هـ ج م ل)، وتعني الجمل (Winnett and Harding 1978: 370, 516).

اختلفت رسومات الجمال في نقوش هذا البحث، فلم تظهر جمال ذو سنامين، بل كانت جميعها بسنام واحد، وذات أعناق طويلة، مع وجود انحناءات بسيطة في قممها، وما يميز الجمال هو ظهور حجمها الضخم بالإضافة إلى ظهور خطوط واضحة عند نهاية أجسامها، وبعضها الآخر ظهر بخطوط رفيعة تكاد تخلو من وجود انحناءات في النهايات، أما السنام فقد ركز عليه الفنان الصفائي بصورة رئيسيَّة، فنلاحظ تناسقة بالنسبة لحجم الجمل هذا من جهة، ومن جهة أخرى نرى عدم التناسق أي وجود مبالغة في رسم حجمه، ومن الملاحظ أيضاً عدم توفر البعد الثلاثي للرسم، فنجد الطرف الأمامي أو الخلفي فقط، ودائماً ما نرى الجمل في هذه الرسومات واقفاً، وذيله يكون بشكل ملتوٍ، أو شبه دائري للأسفل، أو للأعلى، وكذلك الأمر بالنسبة للرسومات الجمال نلاحظها مفرغة من الداخل، وأحياناً ممتلئة، كأنَّ الفنان الصفائي يريد منَّا أن يُبين لنا إبداعه، وإتقانه، واستخدم الألوان بطريقة بسيطة جداً، أو أراد أن يوضح لنا نوع تلك الجمال من خلال تفريغها، أو امتلائها من الداخل بواسطة أداة حجرية دقيقة جداً دون أن يفسد الشكل، وبطريقة جميلة، تعكس لنا مدى مهارة هذا الفنان العربي البدوي **(الشكل ٥: ١-١٥)**.

إنَّ بعض الحجارة البازلتيَّة التي وجدت عليها هذه الرسومات، قد احتوى الحجر الواحد منها على جمل أو مجموعة من الجمال، حملت بعضها مشاهد مثلث

بعملية إرضاع لجمل وفصيلها، فقد رسمت رقبة الناقة بشكل طويل، ومنحني، وكانت الأرجل بشكل منفرد، أما الذنب فهو منحني مرفوع للأعلى، ويبدو فصيلها صغير الحجم، ورقبته على هيئة خط عريض يتصل بالناقة **(الشكل٥: ١٠)**.

وظهرت في بعض هذه الرسومات ناقتان، وجدت على الناقة الأولى شعيرات ظهرت على السنام، وجاء الذنب بخطوط طويلة واضحة، بينما الناقة الثانيَّة فقد ظهرت الشعيرات على السنام بخطوط قصيرة، مما يدل ذلك على الخير الذي تتمتع به الناقتان، أو ربما دَلَّ ذلك على حلول فصل الربيع؛ لكثرة الوبر الذي ظهر عليهما أيْ: الشعيرات **(الشكل ٥: ٨)**.

ب- الخيل

عُرِفَت الخيل قديماً، حيث تعد في المرتبة الثانيَّة في الرسومات بعد الإبل، وانتشرت رسوماتها بكثرة، ولقد وردت للخيل معانٍ لغويَّةٍ جَمَّة في العديد من المَعاجم العربيَّة فعند الرازي جاءت بمعنى الفرسان، ومنه قوله تعالى "وأجْلِبْ عليهم بِخيْلك ورَجِلِك"، أيْ: بفرسانك وَرَجَّاتِك، والخيل أيضاً الخيول، ومنه قوله تعالى "والإبل والبِغَال والحَمِير لِتَرْكبُوها"، والخيّالة هم أصحاب الخيول (الرازي ١٩٢٥: ١٩٥)، ووردت عند الزبيدي فقال: الخيلُ في الأصل اسم للأفراس والفرسان جميعاً مستشهداً بقوله تعالى "ومن رباط الخيل"، ويستعمل في كل منهما مفرداً (الزبيدي ١٩٦٥: ٣١٥).

وللخيول العربيَّة أسماء عدة منها: الوَرْدُ، واللطيم، ومَصَاد، والأَجْدل، واليعسوب، وشِادِق، ورزّة، والدُّهم، والجَازِيَات، والمُرْتجز، والسّكب، واللحيّف، والظلّيم، وظَبْيَة، والشيّط، والحشّاء، وحَزْمَة وغيرها الكثير من الأسماء العربيَّة الصَّرفة (بشر ٢٠١٢: ٥٥-٥٧؛ ابن الكلبي ١٩٨٥: ٤٤-٥٣).

ومن ألوانها: الأشْهَب، والأحوى، والكُميت، والأبرش، والأشْهَم، والشُقرة، والعُفْرى (السيوطي ٢٠٠٩: ٥٨-٦٧).

ووردت صيغ الخيل في النقوش الصفائيَّة بكلمات مختلفة منها (هـ ف ر س)، وتعني الفرس (Winnett 1957: 43)، وكلمة (ف ر س)، وتعني الفرس (Winnett and Harding 1978: 438)، وكلمة (هـ ف ر س ت)، وتعني الفرسة (Clark 1979: 367).

جاءت رسومات الخيل في هذا البحث على النحو الآتي:

١- رَسَمَ الفنانُ الصفائي لفارس يمتطي فرس وبيده رمحاً، ورسم الفارس بطريقةٍ بسيطةٍ، ورأسه دائري الشكل دون وجود ملامح تبرز عيناه، وأنفه، وأذناه، وبقية الملامح، وجاء رسم الفرس كذلك دون أذنان، وأطرافه كانت عاديَّة مع عدم ملاحظة أي تفاصيل دقيقة أخرى، أمَّا ذنبه فجاء رفيعاً وعليه شعيرات على طوله **(الشكل ٤: ٣٥)**.

٢- رَسَمَ الفنانُ الصفائي فرسان يمتطون أحصنة وبأيديهم أرمحه، فقد مثلت هذه اللوحة مشهد صيد، ربما أنهم يصطادون خِرافاً، أو ماعِزاً، جاءت أشكال الفرسان عبارة عن خطوط، أما رأسهم فكان دائري الشكل تقريباً، وأذيلة الأحصنة جاءت على شكل خطوط **(الشكل ٤: ٤٠)**.

٣- رَسَمَ الفنانُ الصفائي لفرس دون فارسه، فجاء الفرس على شكل خطوط متصلة مع بعضها البعض، مع ظهور رأسه دون تفاصيل كافية، والشيء المميز في هذه الرسمة هو أن ذنبه جاء على شكل ثلاثة شعب رسمها الفنان على طريقة الخيوط المستقيمة والمتقاربة **(الشكل ٤: ٣٦)**.

٤- رَسَمَ الفنانُ الصفائي فارس يمتطي حصان وبيده سيف وهو في حالة وقوف، أمَّا يده اليسرى فقد كانت حاملة للجام بقصد التوجيه، ويبدو من هذا المشهد حالة قتال أو غزو. لقد ظهر الفرس بسرج على ظهره، وكان ذنبه معكوفاً باتجاه الأعلى، وظهرت أرجل الحصان الأمامية بخط مستقيم وكانت طويلة، أما الأرجل الخلفية فقد ظهرت معكوفة أي أنها بحالة استعداد للمواجهة والقتال **(الشكل ٤: ٣٤)**.

ج- النعام

كان لرسم النعام نصيب وافر من رسومات الصفائيين، ففي نقوشهم ورد بصيغ عدة منها (هـ ن ع م ت)، وتعني النعامة (CIS 1950: 4627)، وبصيغة أخرى (هـ ن ع م ت ن)، وتعني النعامتان (Winnett and Harding 1978: 767)، لقد رسم الفنان الصفائي

في هذه الرسومات مجموعة من النعامات، ورسم جسدها بشكل دائري يخرج منها خطين إلى الأسفل ليمثلا الأرجل، وخط طويل للأعلى ليمثل الرقبة والرأس **(الشكل ٦: ٥٠)**.

د- الثور

ورد ذكر الثور في النقوش الصفائيَّة بصيغة (هـ ث ر)، (الحاج ٢٠١٥: ٣٢)، فقام الفنان برسمه بطريقة بدائيَّة، فقد خَطَّ الجسد بأربعة خطوط صغيرة داخليَّة، وظهرت أرجله الأربعة على شكل خطوط مستقيمة عريضة بعض الشيء، وعلا رأسه قرنان طويلان متشابكان في نهايتهما وكأنه تاج، وخلا وجهه من تفاصيل، أما ذنبه فكان عريضٌ وقصيرٌ **(الشكل ٦: ٤٤)**.

هـ- البغل

جاء رسم البغل في هذا الشكل بخطوط عريضة وبسيطة، وظهر جسده طويلاً، وتخرج منه الرقبة نحو الأمام، وجاءت الآذان بطريقة غريبة تبدو وكأنها عريضة، وفمه عريض مستطيل الشكل **(الشكل ٦: ٤٩)**.

و- الغزال

إنّ كثرة رسومات الغزلان في المجتمع الصفائي لها دلائل عدة منها: مصدراً للغذاء، والاستفادة من جلده وغيرها من الفوائد الكثيرة، فلقد ظهرت في هذه اللوحة مجموعة من الغزلان، أبدع الفنان في رسمها، وما يميزها هو طول قرونها في بعضها، وقصرها في بعضها الآخر، وجاءت الغزلان بخطوط عريضة، حيث ظهر جسمها ممتلئ، وأرجلها اتخذت الشكل الرفيع والطويل **(الشكل ٦: ٤٥، ٥١)**.

ز- الأغنام، والضأن والماعز

ظهرت هذه الأشكال بطريقة كبيرة في الرسومات الصفائيَّة؛ كونها مصدراً رئيسيَّاً في الغذاء، والاستفادة من صوفها، وجلودها، وحليبها، ولبنها، وغيرها من الفوائد التي لا تعد ولا تحصى لهذه الحيوانات، فالناظر لهذه الرسومات يجدُ أَنَّ الفنان قد أتقن رسمها، فظهرت لوحة جميلة أبرزت مجموعة من الأغنام حملت جميعها قرون صغيرة، وهي صفة عرفت في المناطق الجبليَّة فقط، جاء رسمها في هذه اللوحة عبارة عن خطوط بسيطة، مع وجود جسد ممتلئ، وأرجل عريضة، وأذناب قصيرة جداً **(الشكل ٦: ٤٣)**.

الأشكال الرمزية

ظهرت العديد من هذه الإشكال في رسومات البحث منها: النقاط السبع، وقرص الشمس الذي يخرج منه خطوط طولية، والخطوط السبع الطوليَّة، والعريضة، والدوائر السبع، والتي ما زالت بحاجة إلى الكثير من التفسير؛ نظراً لعدم وجود نقوش تفسر هذه الرموز، وعدم القدرة على ربط هذه الأشكال بالعلامات السحريَّة، أو الرموز الدينيَّة، إلاّ أن بعض النقوش أظهرت مفردات تطلب من الإله حمايتها من الاندثار أو الخراب، أو العبث بها من قبل الأشخاص، ولكن هل لهذه الرموز علاقة بعلم الفلك والنجوم عند هذا المجتمع العربي؟ أو أنها حسابات فلكية لديهم؟ إنّ المرجح من تلك العلامات أنها حملت الطابع الديني؛ بدلالة وجودها بجانب النقوش باتجاهاتها المختلفة، وأن اللفظ الدال من خلال ترجمتها هي الاستغاثة، والحماية، وطلب المساعدة **(الشكل ٧: ١٦-٢٤)**.

الخاتمة

تعكس هذه الرسومات من موقع منطقة الضويلة اختلافات في الرسم من حيث التنفيذ، والأساليب، وهو ما يعكس ثقافة مُنفذيها، ويمكن القول بأنَّ الصفائيين الذين عاشوا في هذه المنطقة قد تأثروا بغيرهم من القبائل المجاورة لهم، بينما تجسدت رسوماتهم بعمليات صيدٍ، وقتالٍ، ورعي، فكان أسلوبهم بسيط، وواضح، وبدائي، انعكس ذلك على عمق الحياة اليوميَّة وتفاعلهم معها من كونهم أناس كان الطابع البدوي هو مُشَكِّلَهَم، ولم يخرجوا من هذا النطاق.

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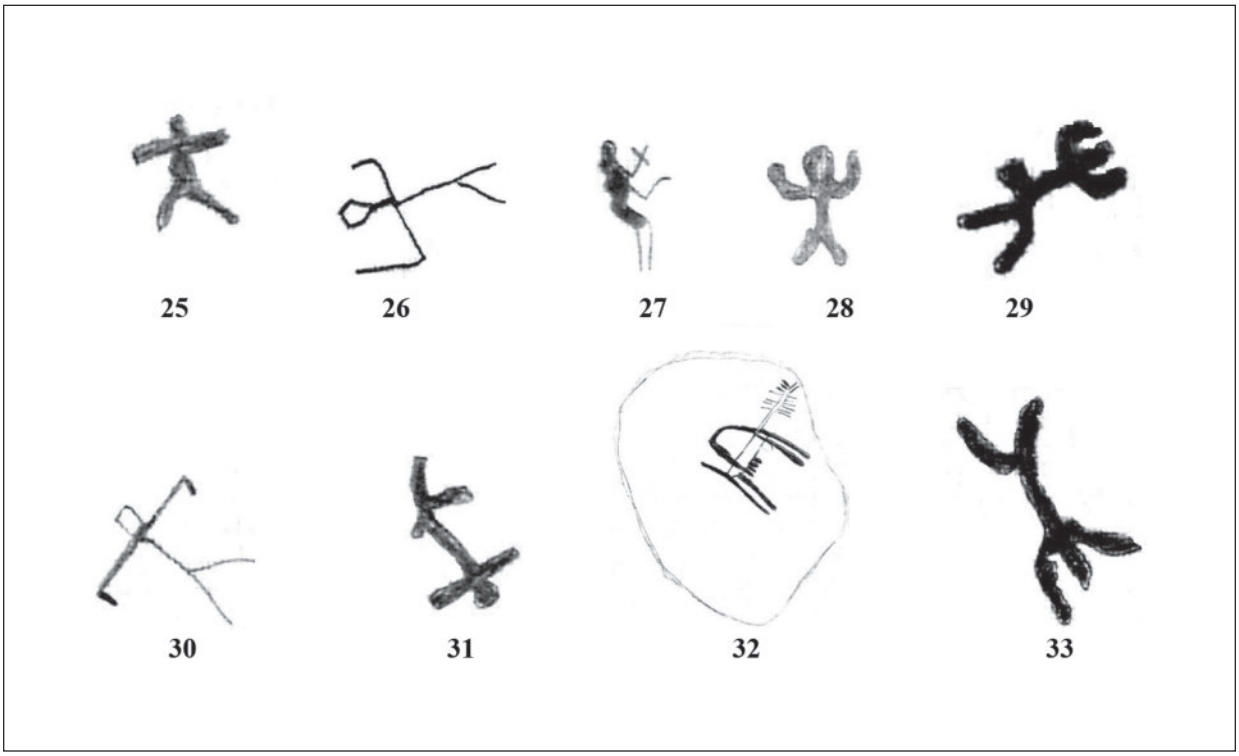
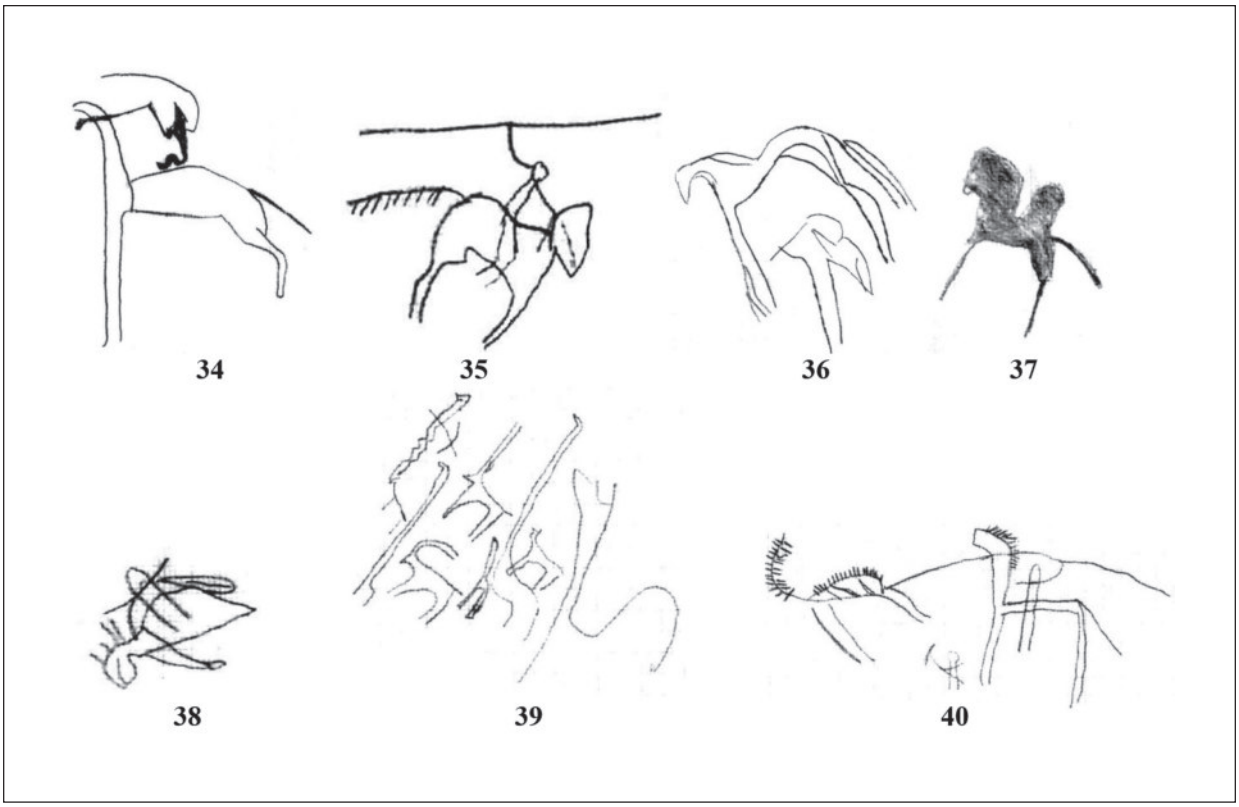
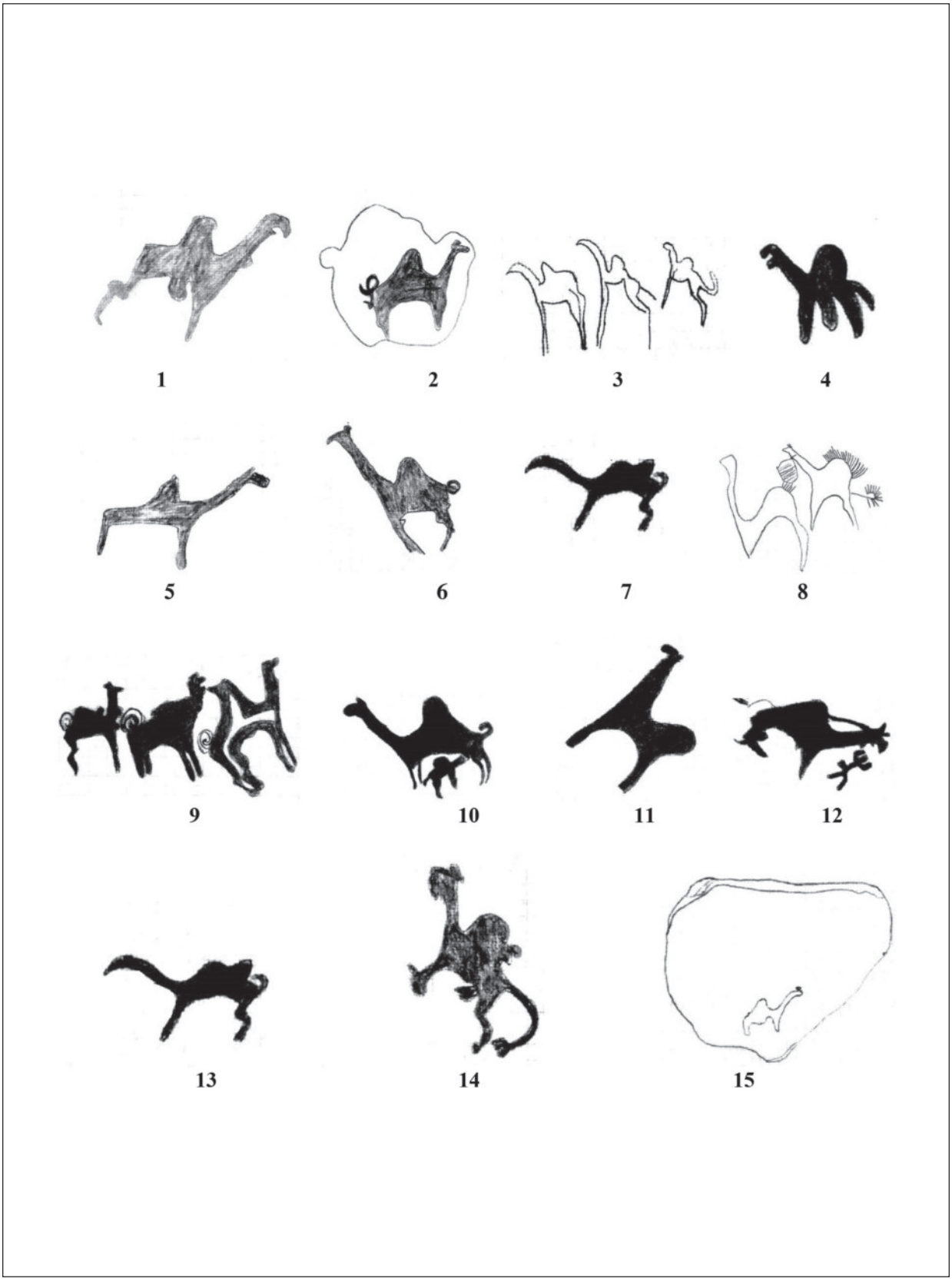
الملاحق



٣. الأشكال الآدمية.

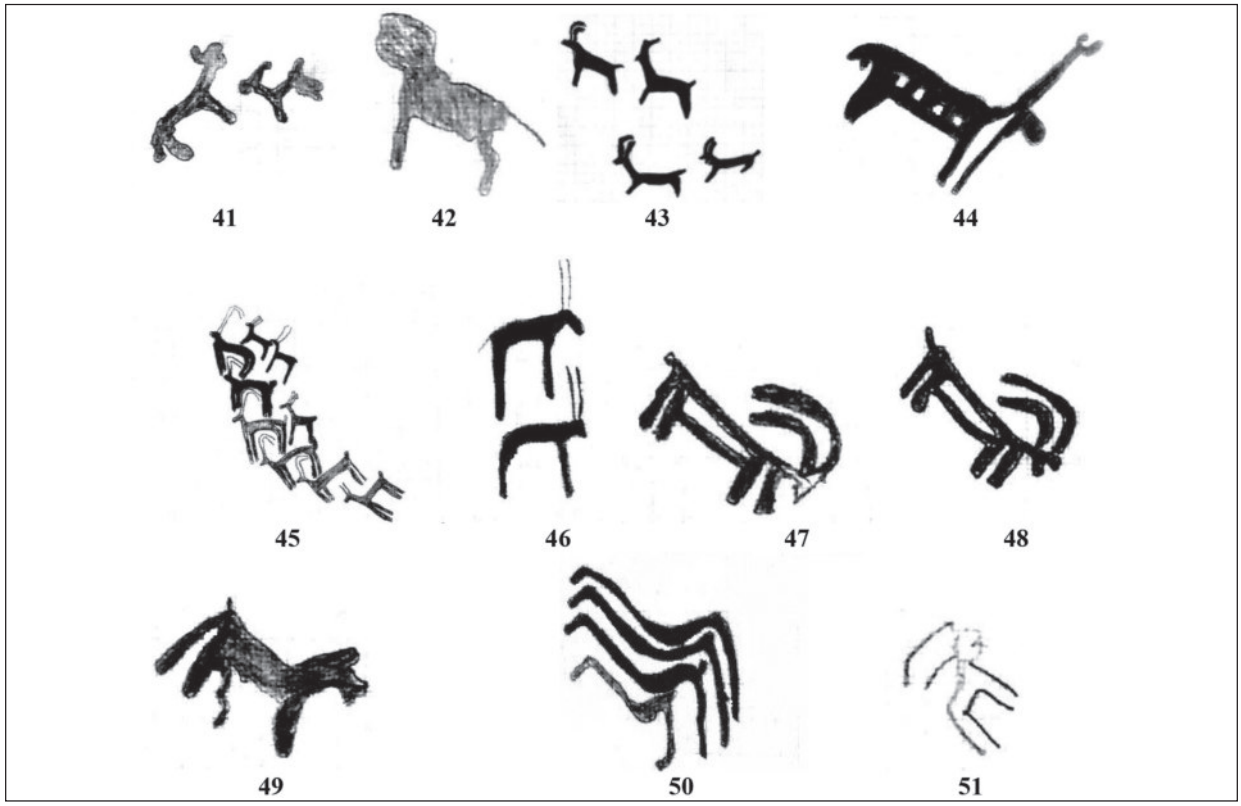


٤. الخيول.

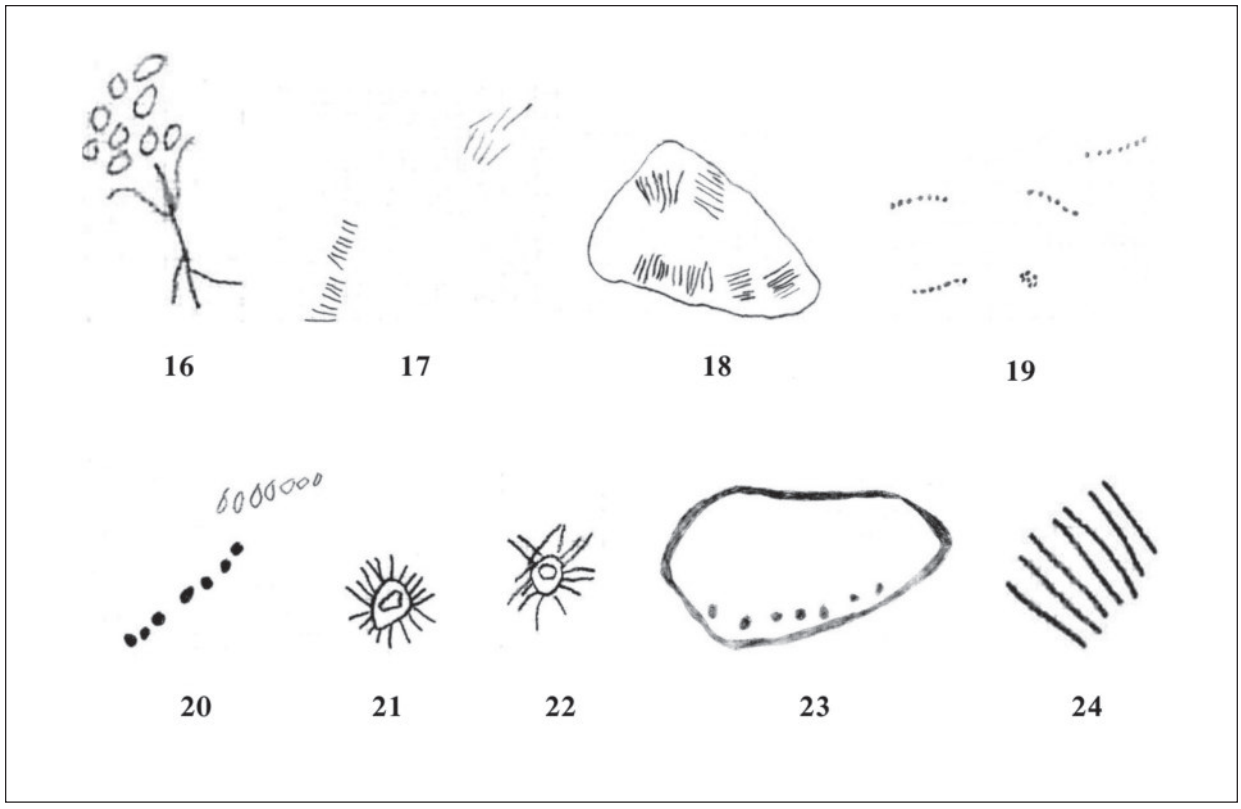


٥. الجمال.

الحاج: ملامحٌ فنيَّةٌ لنقوشٍ عربيَّةٍ شماليَّةٍ (الصفائيَّة) من منطقة الضويلة



٦. الأشكال الحيوانية.



٧. الأشكال الرمزية.

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كل الطرق تؤدي إلى مكّة: سيراً على الأقدام، على ظهور الجمال أو عن طريق الآلة البخاريّة، درب الحج الشامي (بين القرن ٧ والقرن ٢٠) قراءة جديدة بالاعتماد على تطبيقات نظم المعلومات الجغرافية

الجزء الثاني

كلودين دوفان، محمد بن جدو، جان ماري كاستاكس

Abstract:

Literary, archaeological and cartographic data were collated to reconstruct the Ottoman Darb al-Hajj al-Shami (16th-early 20th centuries), probably planned by Sinan, the famous architect of Sultan Suleiman the Magnificent, as well as the Hijaz Railway. Examination of the relationship between the Mediaeval Route (described in Part I of this article, in ADAJ 58, 2016: 85-112), the Ottoman Route and the Hijaz Railway, and landscape elements (altitude, slope, relief, orientation, distance to hydrographic network, springs), while also taking into account visibility, security, climate and obstacles on the terrain, enabled us to define environmental parameters, which were integrated into GIS analyses. These proved how the Umayyad to Mamluk route adaped to the changing terrain, whilst the Ottoman route was an artificial creation that moulded the environment according to a global project of civil engineering.

المصادر التاريخية

ذكرت لنا بعض المصادر التاريخية ولا سيما العربية منها التي تعود إلى فترة ما بعد الحكم العثماني العديد من المقتطفات المتعلقة بدرب الحج الشامي، ولعل أهمها: كتاب منزل الحج من الشام إلى مكة، والذي يعود إلى فترة ١٥٦٢-١٥٦٣، حيث يحتوي على مخطوطتين باللغة التركية وهي عبارة عن ترجمة عن اللغة العربية تم الاحتفاظ بهما في المدينة المنورة، يحتوي هذا المصدر على دراسة مفصلة عن أسماء الأماكن كما يتضمن وصفا دقيقاً حول مراحل درب الحج الشامي. (Jasir, al- 1969: 174; Bilge 1979: 213).

قام أولياً جلبي بزيارة العديد من المناطق منذ التحاقه بالبلاط السلطاني ولمدة أربعين عاماً داخل الدولة العثمانية وخارجها، خاصة منطقة البلقان، شمال افريقيا، الشرق الأوسط وكذلك السعودية، حيث وصفها وصفاً دقيقا من خلال مؤلفه الذي يتكون من ١٠ أجزاء (السياحتنامه)، وذُكر أن والده قام بتصنيع

١. حجـاج فـي طريقهـم إلـى مكّـة، لوحـة زيتيـة، ١٨٦١، ١٦١ سم/٢٤٢سـم، صورة هيرفي ليفاندوفسكي (© متحف دورسـيه، باريس).

مزراب الكعبة المشرفة من الذهب، وقد التحق بقافلة الحج الشامي متوجها إلى الحجاز سنة ١٦٧٢ م، وترك لنا معلومات دقيقة عن محطات الحج، المباني، وكذلك الحجاج وأحاديثهم (Seyhatnâme IX, von Hammer 1846 ed.).

وذكر لنا مرتضى بن علوان وهو رحالة صوفي من دمشق في كتابه عن رحلته التي قضاها في الطريق إلى مكة المكرمة في مناسبتين: ١٦٧٧-١٦٧٨ وكذلك سنة ١٧٠٩، وفي طريق عودته من مكّة إلى المدينة، تعرض مع بقية رفاقه إلى نهب بدو من بني هذيل، حيث تركوه في العراء ليلاً في الصحراء (Haarman 1979: 250).

يعتبر المؤلّف محمد أديب (فقيه وقاضي عثماني عاش في جزيرة كريت وسافر من القسطنطينية إلى مكّة سنة ١٧٧٩ ميلادي) من أدق المصادر التي تحدّثت عن الخانات والفنادق والمباني التي عرفت بنشاطها التجاري بسبب موقعها الهام على طريق قوافل الحج والتجارة (Bianchi 1825 éd. ; Petersen 2012: 5-6).

وباعتبار تحريم دخول غير المسلمين مكة والمدينة، فقد انضم الرحالة السويسري يوهان بركهارت لودفيج ١٧٨٤ – ١٨١٧ ميلادي إلى قافلة متجهة إلى مكة تحت اسم مستعار: إبراهيم بن عبدالله: حيث وصفها ووصف عادات أهلها وتجارتها، وهو الذي أرسلته الجمعية الأفريقية من بريطانيا، لكشف مجاهل أفريقية، وقد أمضى سنوات في سوريا، ولبنان، والأردن، وفلسطين، ومصر، والسودان.

سلك بركهارت طريق الحج السوري الأردني من دمشق إلى معان، ووصف المناظر الطبيعية والمراحل في الملحق الثالث من عمله والذي صدر بعد وفاته (Travels in Syria and the Holy Land 1822)

وأقام الرحالة بركهارت في مكة والمدينة المنورة من تموز ١٨١٤ إلى حزيران ١٨١٥ فقد وصل اليها عن طريق مصر والبحر الأحمر ونزل في جدة.

كذلك، فإن من أهم كتب أدب الرحلات والسفر التي تحدثت عن مسألة درب الحج الشامي، يمكن ذكر كتاب الشاعر والرحالة الإنجليزي تشارلز داوتي، والذي كان شغوفاً بالآثار النبطية، مثل مدائن صالح: المدينة الأثرية في شمالي الحجاز، ولمشاهدتها انضم إلى قافلة للحج من دمشق إلى مدائن صالح، حيث قام بتوثيق النقوش الأثرية والتي طبعت لاحقاً في منشورات اكاديمية المخطوطات وفنون الأدب بفرنسا وقد ترجمها ارنست رينان ١٨٩١ إلى اللغة الفرنسية (Charles Doughty 1926 1843-).

وبدلاً من العودة إلى دمشق مع قافلة الحج، توغل داوتي في الصحراء الكبرى في الجزيرة العربية (خيبر والطائف وجده) ليعود إلى بريطانيا بحراً إنطلاقاً من جدة.

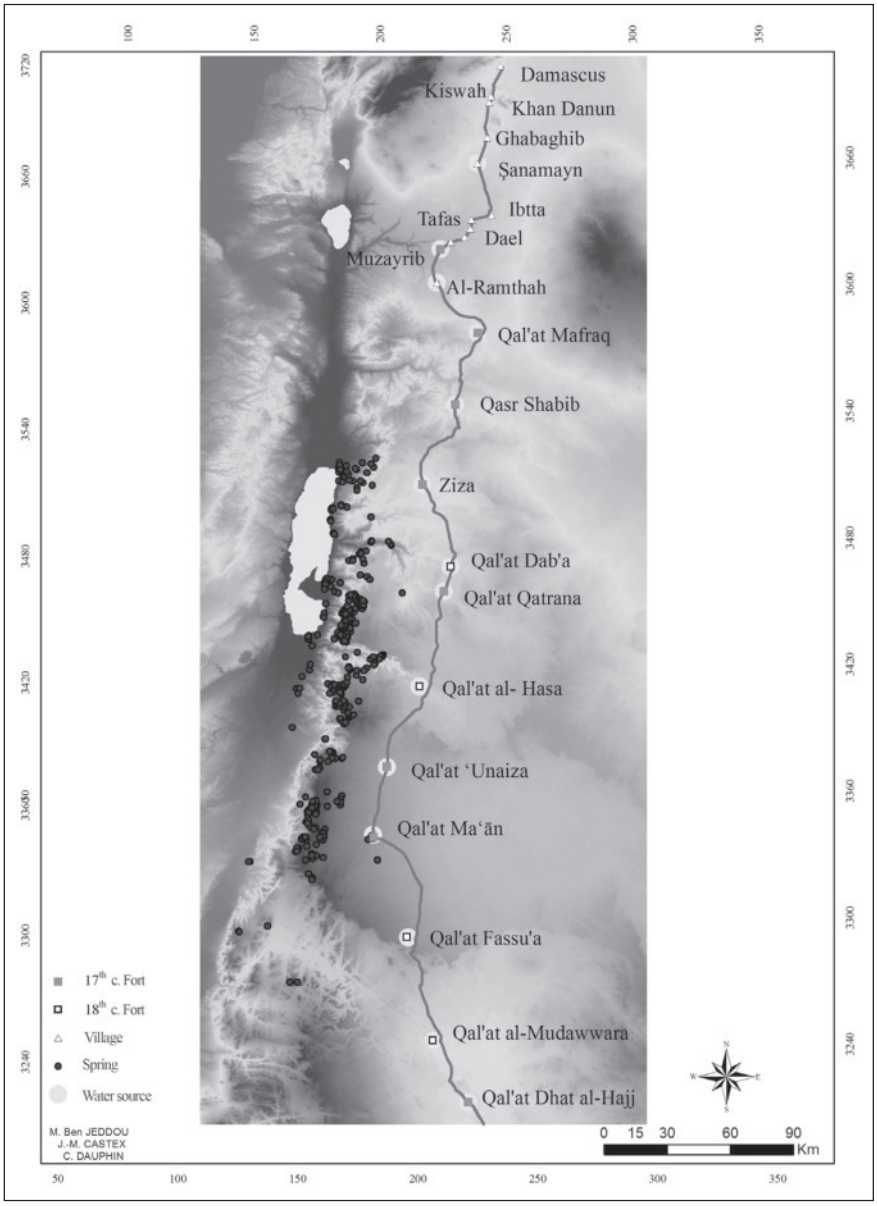
لم يكن داوتي يخفي ديانته المسيحية، وقد جاء في البداية مدعياً أنه طبيب شامي يحمل اسم (الشيخ خليل)، كما كان مصحوبا بخرائط ورسومات المباني وبعض النباتات، وقد التقى أبرز مشايخ البادية في ذلك الوقت ودوّن عن حياتهم الكثير، وسجّل من خلال روايته معلومات كثيرة عن الحياة الإقتصادية، والاجتماعية، والبيئية والجغرافية للحجاز وخاصة طبيعة العلاقة بين السكان والسلطة العثمانيّة (Doughty 1888, re-ed. 1979; 1931).

المسار العثماني لدرب الحج (الشكل ٢)

خلال العهد العثماني، لم يكن الراغبون في الحج بمدينة دمشق ينتظرون بالمسجد الأموي حتى موعد إنطلاق القافلة، بل كانوا يقيمون بالتكيّة السليمانيّة، وهي مكان استعمله المولويون لإعاشة الدراويش (المريدين المولويين) والإقامة والاستراحة للحجاج القاصدين مكّة.

وصمّم المعماري التركي "سنان باشا" (١٥٦٦-١٥٥٤) التكية وسميت نسبة إلى السلطان سليمان القانوني الذي أمر ببنائها (١٥٦٦-١٤٩٤)، وهي محاطة بسور له ثلاثة أبواب رئيسية، يحتوي على صحن سماوي فيه بركة ونافورة، وفي الجهة الجنوبية من المبنى نجد المسجد، في حين يتألّف القسم الشمالي من المبنى من ٢٢ غرفة لتوفير احتياجات الحجاج، وقد تم إضافة مدرسة وأراستا (صف من المحلات المتخصصة) في وقت لاحق (Goodwin 1978; 1987: 255-257).

حظيت دمشق بمباني هامة على الطريق السلطاني خلال القرن السادس عشر (وخاصة المبنى الديني الذي اقامه سنان باشا بين ١٥٨٦ - ١٥٨٨)، وهو



٢. درب الحـج الشـامي العثماني إلى جانـب القـلاع ونقـاط الميـاه (© كلوديـن دوفـان، محمد بـن جدو، جان ماري كاستاكس).

الشارع الذي يربط المركز الإداري والتجاري للمدينة مع الميدان، وهي منطقة واسعة بعرض ٤٠ متراً، تمتد على ٥ كم وتتخللها المباني الدينية ٢١ مسجد (بينها مسجد مراد باشا الذي يعود تاريخه إلى ١٥٦٨-١٥٧٠)، بالإضافة إلى ١٧ ضريح وستة حمامات ومستودعات مملوءة بقمح حوران، وقد عكست هذه المباني فترة توجه المدينة العثمانية نحو طريق الحج (Petersen 2012: 54).

كانت مدينة دمشق منطلق ركب الحج الشامي إلى الديار المقدسة في الحجاز: مكة المكرمة والمدينة المنورة، وقد جرت العادة أن يرافق الدمشقيون قافلة الحج سيرا في الطريق السلطاني إلى الميدان، حتى قبة "يلبغا"، حيث المسجد الذي بني في العهد المملوكي خارج سور دمشق، والذي تم ترميمه في عهد والي دمشق سيف الدين يلبغا اليحياوي حاكم دمشق بين أعوام (١٣٤٥-١٣٤٧)، وقد أعيد ترميم القبة في بداية العهد العثماني واشتهرت باسم "قبة الحج"، باعتبار أنها أصبحت المحطة الأولى لقافلة الحج الشامي (Bakhit 1982: 113, n. 135).

بعد ذلك، يدخل الجميع إلى قرية القدم حيث تكيّة أحمد باشا التي اشتهرت لاحقاً باسم تكيّة أو قبة جامع "العسالي" ، وكان من أوائل من زارها ووثقها الرحالة

العثماني المعروف اوليا جلبي (Seyhatnâmesi IX: 295).

يمر المحمل بعد هذه القبة على **مسجد القدم**، وهو عبارة عن قبة صغيرة نحاسية مذهبة تحتها حجر أسود، به أثر قدمين يقال إنهما للنبي محمد صلى الله عليه وسلم. وهنا، ينتظر تجمّع الحجاج ٣ أيام، بعدها تواصل القافلة، بقيادة أمير الحجّ، طريقها إلى الأراضي المقدسة بالحجاز.

المحطة الأولى في طريق الحج هي قرية **الكسوة**، وقد تطورت القرية منذ العصور الوسطى، حيث كانت تحتوي مسجداً وحماماً وخاناً صغيراً وجسراً مرصوفاً يمتد على النهر، على جانبيه حدائق كروم عنب (Evliya çelebi, Seyhatnâmesi IX: 28; Burckhardt 1822, Ch. 2: 2).

من الكسوة إلى **خان دانون** على بعد ٢ كم إلى الجنوب، تقطع القافلة سهلاً منبسطاً تنتشر فيه بعض القرى الصغيرة.

مرّ الرحالة اوليا جلبي على قرية خان دنون سنة ١٦٧٢، والتي كانت حسب وصفه مجرد محطة استراحة للقافلة يعود تاريخ نشأتها إلى العهد المملوكي ١٣٧٦(Sauvaget 1935-1945).

وقد كان الخان يوفر للعائدين من مكّة حاجياتهم من الغذاء، وهو مستطيل الشكل تقريباً، يتألف من قسمين يحيطان ببركة وباحة تحيط بها القاعات من كل الجهات؛ وبالإضافة إلى ذلك، كان هذا الخان يحتوي خمسة أبراج دائرية في الزوايا الخارجية، وفي وسط الضلع الغربي كان هناك ١٠٠ قدر لإعداد الحساء للحجاج.

سبق للرحالة بورخات، أن زار هذا الخان سنة ١٨١٠ميلادي وروى أنه كان في حالة قريبة من الإنهيار (Burkhardt 1822: Ch. 2: 3).

تعتبر غباغب المحطة الثانية بعد الكسوة وترتفع حوالي ٧٥٠ متر، حيث ذكرها صاحب منازل الحج (Jasir, al 1969: 184)، وذكرها بورخارت تحت اسم غبايب (Burkhardt 1822: Ch. 2: 3)، اما تسميتها إلى فتعود للقرن السادس عشر تحتوي على خاناً صغيراً في حالة منهارة يقع على يسار الطريق، يقابله من اليمين خزان ماء، إضافة إلى مقام يعلوه قبّة يعرف ب "مزار العشاء".

من الناحية الطبيعية، تقع غباغب في سهل ضيق، على مقربة من تكوينات جيولوجية قديمة (تعود إلى البليستوسين والميوسين الأوسط) وعلى مر الزمن، تحوّلت هذه التكوينات إلى تربة داكنة صالحة للزراعة، مع وجود مختلف الصخور البركانية، وهي ما تشكّل الحافة الغربية للجهة ذات النطاق الصخري الغني بجميع أنواع الصخور البازلتية الصلبة والهشة.

وعلى مسافة ١٣ كم جنوبا، تقع مدينة **الصنمين**، وقد ذكرت للمرة الأولى على أنها محطة على طريق الحج خلال القرن التاسع (Jasir, al- 1969) كما مر عليها ابن بطوطة خلال رحلته سنة ١٣٢٦.

تقع مدينة الصنمين على سهل فسيح يقطعه نهر العرام (بعمق أقل من ٥ أمتار) المنحدر من سفوح جبل الشيخ، والذي يصب مجراه في وادي اليرموك؛ أمّا تربة السهل البنية، فهي مستمدة من البازلت البليستوسيني، كما تتميّز هذه المدينة بمناخ متوسط معتدل شتاءًا، وجاف نسبيّا في فصل الصيف، ويبلغ معدل تساقط الأمطار ٢٧٨ مم.

شيّد العثمانيون قلعة بنيت من الحجارة السوداء في وسط هذا السهل، بين سنتي ١٥١٦ و١٥٢٠ في عهد سليم الأول (Barbir 1980: 134).

يحدثنا الرحالة التركي أوليا جلبي في كتابه (سياحتنامه ١١:٢٨) عن مدينة الصنمين، فيذكر أن عدد السكان كان حوالي ٢٦٠٠ نسمة، وهي تقع على منتصف الطريق الرئيسي مع دمشق، الأمر الذي أعطاها الأهمية كمركز استراتيجي هام، فكانت مركز تقاطع لشبكة طرقات رئيسة بين سوريا وفلسطين ولبنان، ولهذا اعتبرت أحيانا المدينة الثانية بعد مدينة دمشق على طريق قافلة الحج الشامية، وهي تتميز بمبانيها ذات الحجارة البركانية السوداء.

من الناحية العمرانيّة، تحتوي المدينة على حمّامات أثرية وآثار اسلامية عديدة، منها المسجد الكبير والذي أمر ببنائه الخليفة عمر بن الخطاب، إلى جانب مسجد عثماني وخان كبير؛ وكان في الزاوية الشمالية الغربية لجامع عمر مئذنة مقطعها مربع الشكل ولها ثماني نوافذ، وتقوم على أربع قناطر، وكانت تبرز للقوافل التجارية من مسافة بعيدة.

أشار أوليا جلبي إلى أنه على الرغم من عدم وجود سوق في المدينة، فإن عدداً من البغايا ينتظرن الحرفاء على طول الطريق، كما شاهد جسر جنوب

المدينة يعود حسب محمد اديب إلى السلطان سليم الأول (Bianchi 1825: 122).

يواصل طريق الحج مساره مروراً **بازرع** (حوالي ٦٠٠ م) نحو الجنوب - الجنوب الشرقي، على أطراف الهضبة التي تفصل بين التكوينات البازلتية والأراضي السهلية المجاورة والغنية بتربتها.

على مسافة ٦ كم غرباً، يمر الطريق على بعض القرى الأخرى التي تنتمي إلى نفس المشهد الطبيعي عامة: **شيخ مسكين** (٥٣١م)، **ابطا** (٤كم جنوباً) و**داعل**.

تستمر القافلة في سيرها نحو الجنوب الغربي مسافة ١١ كم، لتصل إلى المزيريب، وهي على ارتفاع منخفض (٤٥٦ متر)، ويتميز المشهد الطبيعي برتابته: سهل فسيح مع أودية قليلة العمق، تحدّه منطقة رعوية تنتمي إلى الجزء الجنوبي من وعر اللّجاة القليل الأعشاب.

ربما قررت القافلة البقاء في مزيريب يوماً أو يومين، للتزود بالحاجيات وليلتحق بهم المتخلفون، وهو ما ذكره الحاج الإيطالي لودفيكو دي فارتيما أو بارتيما والذي سمى نفسه "الحاج يونس" وقد ترجمت رحلاته إلى العربية من قبل عبد الرحمن عبد الله الشيخ، وقد قضى ٣ أيام في مزيريب أثناء مروره بها سنة ١٥٠٣ ويذكر أنّه لم تكن توجد بها مباني ذات قيمة (transl. Jones in Badger 1863 ed.: 16). تم ذكر قلعة المزيريب لأول مرة سنة ١٥٦٣ في الأرشيف العثماني، كان بها حامية متكوّنة من ٥١ جندياً (Bakhit 198: 98) في نفس السنة، نجد أن كتاب منازل الحج يذكر مزيريب على أنها محطة (al-Jasir, 1969: 174).

ووفقا للمصادر العثمانية الرسمية، توقفت القافلة لمدة سبعة أيام في المزيريب حيث كان يحتوي على سوق كبيرة للإبل، وقد استخدمت قلعتها للمعاملات المالية لمحافظ دمشق ولجمع ضرائب التجار.

كان أمير الحج الشامي مسؤولاً عن قافلة الحج، وقد تم تخصيص مبالغ من المال عرفت (بالصرر) كانت توزع على رؤساء القبائل البدوية، لتأمين سلامة الحجاج على طول الطريق (Petersen 2012: 55).

يعتبر أوليا جلبي أوّل من ذكر قلعة مزيريب في كتابه (سياحتنامه ٩:٢٠١) وذلك خلال مروره بها سنة ١٦٧٠، وهي عبارة عن مبنى مربع الشكل طول ضلعه الخارجي نحو ٨٠ م، مزودة بسبعة أبراج، يتوسطها مسجد وحمام صغيرين، ويبدو أن هذه القلعة كانت تتكون من طابقين، توجد في الطابق الأرضي قناطر ذات أقواس أقرب وظيفياً إلى مخازن للحبوب لها علاقة باحتياجات الحجاج الغذائيّة، في حين يحتوي الطابق العلوي على غرف نوم كانت تخصص لمبيت الحجاج.

كان بهذه الحامية قائد عسكري مصاحب للحامية المكونة من ٨٠ جندي، وقد تقلص هذا العدد إلى ١٢ جندياً خلال القرن الثامن عشر (Kiel 2001: 104).

وهو ما أكّده الرحالة الألماني بورخارت خلال بمروره بالمدينة سنة ١٨١٢ (Ch. 4: 19 ,1822).

في أوائل ثمانينيات القرن التاسع عشر، أشار شوماخر، الذي ترك رسما للقلعة الواقعة شمال شرق البحيرة، وكذلك القرية والمطاحن المحيطة بها، أشار إلى أن القلعة بدأت تسقط في الخراب "فلا وجود للحامية، بل هناك عدد قليل من الأكواخ الطينية والحجرية التي يمكن أن تأوي الحجاج" (شوماخر ١٨٨٦: ١٥٧-١٦٦). في عام ١٩١٩، كانت القلعة مهجورة وذلك حسب شهادة مؤرخ الفن الإسلامي والهندسة المعمارية كريسوال (K.A.C. Creswell) الذي زارها بمناسبة إعداد جرد مؤقت لمباني حلب التاريخية (Petersen 2012: 56).

اقتصر طريق الحج، منذ بداية القرن السادس عشر، على **مزيريب** وتم الاستغناء نهائيّا عن **بصرى**.

على بعد ١٨ كم جنوب شرق مزيريب، يبدأ التباين في البروز بين الهضبة التي تقع عليها قرية **الرمثا** والتي تنتمي لنفس التكوين التكتوني الذي يبدأ في الإرتفاع تدريجيا انطلاقا من درعا، (التشكيلات الصخرية الكلسية المتآكلة بفعل الانجراف وعوامل التعرية) وبين التكوينات الرسوبية نحو الجنوب، حيث التربة فقيرة وقليلة السمك، وهي بذلك توفر اطار زراعي هش (يتراوح معدل كميات الأمطار بين ٢٥٠ و٣٠٠ مم) قد تبيت القافلة ليلتها بمدينة الرمثا، حسب داوتي (Doughty 1931: 40-41). وذلك لتجديد حمولتها من ماء الشراب حيث تقع خزانات المياه على مقربة من المدينة (Burckhardt 1822: 657, Appendix III).

تواصل القافلة رحلتها نحو الجنوب الشرقي على مسافة ٣٤ كم حيث تصل قلعة **المفرق** (٦٨٦م) حيث

يتكون المشهد الطبيعي من سهل بازلتي في الشرق، وهضبة من تكوينات الحجر الجيري المارلي، تتخللها أودية غير عميقة (تنخفض كميات الأمطار إلى ١٥٠ مم) تاريخيا، بعد فترة وجيزة من غزو سوريا في عام ١٥١٦، أمر السلطان سليم الأول (١٥٢٠-١٥١٢) ببناء ثلاث حصون جنوب دمشق وذلك بالصنمين، مزيريب وتل المفرق (Barbir 1980: 134, n. 68).

وبمحاذاة حصن المفرق مر داوتي سنة ١٨٧٥ وكتب أنها عبارة عن قلعة مهجورة (Doughty 1931: 47).

كما نجد في مسار مصطفى باشا سنة ١٥٦٣ اشارة للمفرق على أساس أنها محطة بين مزيريب وقصر شبيب-الزرقاء (Petersen 2012: 60-61).

يحدثنا أوليا جلبي عن زيارته لقلعة قصر شبيب سنة ١٦٧٢ في كتابه (سياحتنامه ٩:٢٩٢) ويذكر أنه عبارة عن مبنى مربّع أنشئ في وسط الصحراء من طرف قبائل بني هلال، كانوا يستعملونه كإسطبل للماشية. غير أنه من الناحية التاريخية، يعود هذا القصر إلى الفترة الرومانية (القرن ٣)، وقد أعيد بناؤه في القرن ٦ م من طرف الحارث الغساني، وفي العهد العثماني كانت توجد به حامية لتأمين سلامة الحجاج أثناء مرورهم على المدينة.

كان على رأس هذه الحامية ضابط برتبة اغا، وهو من القبائل التي تقطن حول المدينة وتتعاطى زراعة الحبوب والذرة والعنب بحسب بورخارت، الذي كتب عن سكان البلقاء البدو، أنهم كانوا يخزنون فيه حاجياتهم من الحبوب لاستعمالها أو لبيعها للحجاج الذين يبيتون ليلتهم بالقرب من المدينة (Appendix III :657 ,1822).

أوّل إشارة في المصادر العثمانية لقلعة الزرقاء كانت سنة ١٥١٩ وذلك في اطار الصراع بين الحجاج وبدو قبائل المفارجة (Bakhit 1982: 221).

وفي سنة ١٧٧٩ يتحدث محمد أديب عن الزرقاء على اعتبار أنها قرية مهجورة، تحتوي على حصن يحتوي على بئر مياه صالحة للشرب (Bianchi 1818-1825: 123).

في رحلته المسماة "إلى الشرق من الأردن"، يرى الكولونيل سيلاه ميريل، القنصل الأمريكي بالقدس آنذاك (١٨٣٧-١٩٠٩)، أن قصر شبيب كان يستقبل الحجاج وفي نفس الوقت يعتبر مخزناً لمواد الفلاحة للبدو(Merrill 1883).

تواصل القافلة سيرها مسافة ٣٣ كم جنوب قصر شبيب-الزرقاء (٥٨٢م) إلى غاية **الجيزة** (٧١٣م)، وهي محطة على طريق قافلة الحج، كمعظم المحطات الصحراوية الأخرى، تستند إلى قلعة وبركة ماء ضخمة لتأمين الحماية والماء، وهو نفس المسار الذي تسلكه قافلة الحج في العصر الوسيط. في عام ١٥٦٩، أمر السلطان العثماني حاكم دمشق بإصلاح القلعة القريبة من بركة الجيزة (Bakhit 1982: 213) ، ويبدو أنها استعملت كمقر لقوات البادية الأردنية في القرن الماضي (Petersen 2012: 66-68) إلا أننا لا نجد ما يفيد بوجود جامع أموي على مقربة من القلعة والذي ذكره جينيكان (Genequand 2012).

ومن الجيزة، تواصل القافلة رحلتها في اتجاه الجنوب الشرقي على مسافة ١١ كم، لتصل قلعة **ضبعة**، وهو مبنى عثماني شيد في عهد السلطان العثماني سليم الأول (١٥١٧ – ١٥٢٠)، على ارتفاع ٧٠٨م، في بيئة جافة نسبيا، حيث لا تزيد معدل كميات الأمطار عن ١٠٠ مم سنويا. وهي بذلك تمثل الخط الفاصل بين السهول والصحراء، غير أنها تستفيد من قربها لوادي الخريم.

القلعة عبارة عن حصن مربع يتألف من طابقين (٢٥ × ٢٥ م) دعمت اركانها بأربعة أبراج، ٣ منها مجهزة بخراطيم مطرية نافرة تساهم في تغذية البئر داخل القاعة، كما تحتوي على ساحة مربعة (٩/٩٢م) وغرف بشكل مربعات وعلى مقربة منها، نجد خزانين كانا يستخدمان في تجميع المياه الجوفية (الخزان الأكبر ٢٢,٤م/٢١,٢م).

إلى الجنوب من القلعة تقع مقابر للبدو الذين استقروا بالمكان، والذين مارسوا الزراعة والرعي ونصبوا خيامهم حول القلعة حسب ما ذكره الرحالة بورخارت (Appendix III: 657-658 ,1822)

وكان المستشرق رودلف برونوف، قد سجّل نقش باللغة العربيّة بتاريخ ٢٣ /٢/ ١٨٩٨ (Pls 31- :1905 33).

وتفيد المصادر أنه تم ترميم القلعة على فترات: في عام ١٧٦٧ من خلال أمير الحج (عثمان باشا) (Petersen 2012: 75). وفي سنة ١٨٧٠ في عهد

السلطان عبدالحميد، خلال مشروع خط سكة حديد الحجاز – الشام بين سنتي ١٩٠٠ – ١٩٠٨ وأخيرا سنة ٢٠٠٨.

حول قلعة ضبعة، يتألّف المشهد الطبيعي من تلال مدورة وتربة فقيرة تغطيها صخور جيرية وترسبات طباشيرية تتخللها الأودية (صلصال طباشيري ينتمي للموقر الايوسيني) ويختلط في هذا النطاق بمجموعة التربه الفتية/ مبتدئة التطور.

يغادر ركب الحجاج قلعة ضبعة في اتجاه الجنوب ليقطع مسافة ٤٠ كم، فيصل بعد ذلك إلى قلعة **قطرانة** (٧٧٤م).

تم بناء القلعة **(الشكل ٣)** سنة ١٥٥٩ بناءاً على أوامر السلطان سليمان القانوني (Hesan, al- 2007).

وربما بنيت ربما على أنقاض مبنى يعود للعهد المملوكي ارتبطت وظيفته بخدمة القوافل التجارية.

تتكون القلعة من بناء مستطيل الشكل (٢٢,٢م / ١٧,٣٥م وبارتفاع ١٠م)، وتحتوي من الداخل على فناء مستطيل (٤,١ م/ ١٨,٦٠ م) وبئر. إلا أنه لا وجود لمسجد بها، مثلما نقل لنا الرحالة التركي اوليا جلبي في كتابه (٩:٢٩٤).

وإلى الجهة الشرقية من القلعة، حيث المدخل الرئيسي (على بعد ٢٦ م) نجد معلم معماري مائي مكون من سد ترابي (٧٥ م من موقع القلعة)، قناتين ناقلتين للمياه (قطرها ١٠٣م) وحوض للترسيب (٣٥,٥ م / ٩,١ م) وبركه ضخمه (٧٠ ×٧٠م وعمق

٣. قلعة القطرانة والمنشـئات المائية القريبة منها (خزان المياه) وقد كانـت هذه القلعـة إحدى المراحـل الرئيسية علـى طريق الحج؛ تقع على الطريق التي أمر بشـقّها السلطان سـليمان القانوني (© صورة كلودين دوفان).

٥,٢ م) وقد أمر سليمان القانوني بإعادة تظهيرها بعد أن كانت قد تساوت مع الأرض.

يتكون المشهد الطبيعي حول قلعة القطرانة من مجموعة من التلال والهضاب التي تتخللها روافد لوادي الموجب، مع رواسب غرينية وغطاء لويسي يغطي الأحجار الكلسية والفوسفاتية، بالإضافة إلى رواسب نهرية في أسفل المنحدرات والوديان الصالحة لزراعة الشعير، وفي جنوب القلعة نجد **وادي حنيفة** الذي يسير في اتجاه الشمال ثم الغرب.

ومن القطرنة تتابع القافلة سيرها نحو الجنوب على مسافة ٤٠ كم، لتصل إلى قلعة **الحسا** الواقعة على الجانب الأيمن من الطريق الصحراوي على مسافة ١ كم من وادي الحسا.

ما يميّز منطقة الحسا بصفة عامّة هو الطابع الجبلي، ففي هذا النطاق، تنحدر التضاريس نحو الغرب باتجاه البحر الميت، مخلفة طبقات من الصخور الجيرية والمارل والطباشير والتي تعاني من الانجراف والانسياب.

جنوبا وعلى المنخفضات، لا سيّما في مجاري الأودية، تكون التربة منقولة مع السيُول وترتفع بها نسبة المواد العضوِّية، وتكوّن بذلك اطارا يمكّن من تعاطي نشاط زراعي موسمي، وذلك على الرغم من الميلان الفوضوي للوحدات التضاريسية.

ورد ذكر قلعة الحسا كمحطة استراحة للتجار والمسافرين والحجاج، في مسار مصطفى باشا والي الشام سنة ١٥٦٣ (Jasir, al- 1969: 184-185).

وهي عبارة عن مبنى مربعا (٢٤م /ضلع)، يتكون من طابقين، يحتوي الطابق الأرضي على غرف وفناء مربع (١٢,٥م /ضلع) - وبئر ماء (كانت توجد بها نافورة) وأدراج تصل إلى الطابق العلوي، كما يحتوي هذا الأخير على مسجد متواضع وعدد من الغرف مسقوفة بأقبية برميلية، كانت تستخدم لراحة الحجيج.

بالاعتماد على نقش وجد في محراب المسجد، يرجّح أن بناء القلعة تم في عهد السلطان العثماني مصطفى الثالث (١٧٥٧ – ١٧٧٣)، وتحديدا سنة ١٧٦٠ (Brünnow and Domaszewski 1905: 18).

توجد بركة للمياه شرق القلعة (البركة: ٢٠,٣٥ م / ٢٠,٣٠ م) وهي تتصل بالقلعة من الداخل عبر قناة حجرية مغطاة بشبائح حجرية منتظمة.

على وادي الحسا، قريباً من القلعة، بالإمكان مشاهدة بقايا جسور(١٨٥م شمال غرب القلعة)، حيث بقايا جسر مبني من ٣ أقواس من الحجارة، يبلغ طوله ٣٠ م وعرضه ١٢م، ومن المرجح أنه شيّد بين سنتي ١٧٣٠ و١٧٣٣ بأمر من والي دمشق عبدالله باشا لتامين سلامة القافلة والمسافرين (Barbir 1980: 138).

وبالإضافة إلى ذلك، نجد بقايا طريق مرصوفة بالحجارة البازلتية والصوانية، على مسافة ٣كم (١٠م عرض)، لتسهيل مهمة سير القافلة وخصوصاً في فترة نزول الأمطار (Salameen, al- 2010).

تخبرنا النصوص أن هذا الوالي العثماني أقام كذلك طريقاً معبداً بين دمشق والقنيطرة في الجولان، إضافة إلى إعادة تأهيل ضفاف الأنهار المتدهورة بين الصنمين ومزيريب، وحسب بيترسون، فان هذا الوالي أمر بتعبيد الطريق الذي يصل جسر وادي الحسا (Petersen 2012: 92).

على مسافة ١٦٨٥م جنوب القلعة، سجل فريق المسح بوادي الحسا حظيرة كبيرة الحجم، حيث بلغ قطرها ٢٤٠م، وباعتبار موقعها على طريق القافلة، فمن الممكن أنها كانت مأوى لإبل الحجاج أثناء مرورها، وهو ما يدعمه وجود أكوام من الحجارة، ذات اشكال هندسية بسيطة، صالحة لاحتضان خيام الحجاج، وذلك بالتوازي مع انتشار اكوام الرماد مع بقايا عظام وخزف (MacDonald, Rollefson, Banning, Byrd and D'Annibale 1983: 322, Pl. 72, no. 2; MacDonald 1988: 277-280).

وبالإضافة إلى ذلك، فقد أظهرت عمليات المسح الأثري حول القلعة تواجد بقايا قرى صغيرة، يبدو أنها كانت تمارس النشاط الزراعي، لا سيما الذرة (Burckhardt 1822, Appendix III: 658).

يرحل ركب الحجاج من الحسا على مسافة ٤٥ كم، إلى قلعة **عنيزة** جنوبا (١٠٠٠ م)، وهي تقع على هضبة تنحدر نحو الشرق، أرضها سوداء وحجارتها بركانية غالبا من نوع الفتات الصغير الأملس، على مسافة قريبة من جبل عنيزة، وهو بركان خامد (١١٤٤ م)، كما تبعد ٣٠٠م على وادي صوفان الذي يجري نحو الشرق باتجاه واحة الجفر.

شيدت القلعة في النصف الثاني من القرن ١٦ (حوالي ١٥٨٧) لحماية الحجاج، ويعتقد أنها انشئت على أنقاض اصطبل للخيل في العهد الروماني على الطريق العسكرية (Findlater 2002: 141-142).

القلعة عبارة عن مبنى أقرب إلى المربّع (٢٨ م من الشرق إلى الغرب، و٢٨,٨٥ م من الشمال إلى الجنوب) وقد استعمل في بنائها مزيج من الحجارة البازلتية السوداء والكلسية البيضاء، حيث ترتفع جدرانها اليوم على علو هام ومتباين، وهي بذلك تصنّف من ضمن أعلى القلاع العثمانية بالأردن.

تتكوّن القلعة من طابقين، مدخلها الوحيد يقع في الجهة الشرقية، بناؤها من الحجر الأسود والطين، يقودنا المدخل المغطى إلى فناء مربع (٥٠ م / ضلع) تحيط به ١٨ غرفة متباينة المساحة ومسقوفة بطريقة القبو البرميلي.

مما تبقى من جدران القلعة، يمكن بوضوح ملاحظة آثار بقايا سقف الطابق الثاني، ويمكن الوصول اليه عبر درجات من جهة الجنوب، كما يبدو أن الساحة الرئيسية كانت بها بئر مسقوفة بنفس طريقة الغرف والممر، وكانت تصل اليها قناة ماء من الناحية الجنوبية الغربية للساحة.

يشتمل موقع القصر على بركة على مسافة ٢٠٠م غرب القلعة وهي عبارة عن حوض طوله ٢٠م وعمقه ٨ م، يتصل بالقلعة من الداخل عبر قناة (طولها ١٥ م / عرضها ٢م) (Petersen 2012: 95-105).

يذكر محمد أديب والعديد من المسافرين الآخرين حصن ثاني أقيم على التل المقابل، ربما كان مستودعا للبضاعة وخاصة الشعير بحسب ما تشير اليه وثيقة تعود إلى ١٧٤٢(Barbir 1980: 141, n. 98).

بعد مسير يوم كامل، تصل قافلة الحجيج إلى قلعة **معان** (١٠٠٠ م)، وهي من حيث موقعها الجغرافي بمثابة همزه الوصل بين الجزيرة العربية وبلاد الشام، تحتل هضبة شبه منبسطة تتخللها بعض المرتفعات التي لا يزيد ارتفاعها عن ١٣٠٠م وتحيط بالمدينة من جانبها الغربي والجنوبي.

وقد زار بيركهارت معان وكتب أن: الحجاج يقبلون على شراء الرمان والخوخ بشغف كبير، في الوقت الذي تقبل حيواناتهم على الأعشاب البرية التي يجمعها الأهالي (بيركهارت ١٩٦٩: ١٥١). تم البدء في إنشاء القلعة العثمانية (السرايا) سنة ١٥٥٩م (Bakhit 1982: 98 n. 43 and 223).

خلال عهد السلطان سليمان القانوني، وهو ما يؤكده نقش يعلو المدخل الرئيسي مقسم إلى ثمانية خراطيش في أربعة نطاقات أفقية، على مساحة مستطيلة يتوسطها مربعان متقاطعان في شكل نجمة مثمنة الرؤوس، كُتبت بالخط العربي واللفظ العثماني نصها: " بُنيت القلعة في عهد السلطان سليمان القانوني"، إضافة إلى حجر آخر رُسمت عليه صورة جرَة ماء، دلالة على أن هذا المبنى كان يزود السكان بمياه نظيفة للشرب.

بالإضافة إلى دورها في استقبال قوافل الحج الشامي وتزويدها بالمستلزمات، كانت القلعة مقراً للفيلق العثماني الثامن الّذي كان تعداده ثمانية آلاف جندي، وهي عبارة عن مبنى من طابقين، مربعة المسقط (٢٣,٦ م لكل ضلع تقريبا)، وارتفاع ٩م. ويوجد المدخل الرئيسي بالجهة الجنوبية الشرقية (٢,١٠ م علو/ ١,٤٠ م عرض)، كما يوجد بالمدخل ٣ كتل زخرفية محفورة في الحجر الجيري إلى جانب زخارف نباتية.

مدخل القلعة يؤدّي إلى ساحة مستطيلة مكشوفة، تتوسطها بئر وتحيط بها غرف مختلفة المساحة ومغطاة بأقبية برميلية، ٤ منها في الجهة الشمالية و٤ في الجنوب، بالإضافة إلى إيوان فسيح، وعلى الجانبين درجان يقودان إلى الطابق الثاني الذي يحتوي بدوره على ممر تحيط به ٦ غرف، حيث كانت تستخدم الغرفة الأخيرة كمسجد، ونلاحظ وجود مساقط تسمح بإلقاء السوائل، مع وجود مخابئ جانبية وفتحات دقيقة للمراقبة.

توجد حول القلعة مرافق مائية، وهي مكونة من قناة مغطاة بطول ٥٠٠ م، تتصل بالبساتين القريبة من القلعة وتقع على مسافة ٤٠٠ جنوب القلعة وتسير بمحاذاة وادي صغير (٠,٨٥ م عرض/طول ٧,٤ م)، بركه الحمام في جهة الشرق، ويعتقد أنها شيدت زمن الغساسنة، وهي مربعه الشكل (ضلعها ٧٠ متر/ عمق ٧ م)، استعملت لتجميع المياه القادمة للاستعمال الزراعي مثلما هو الشأن للغدير في الجهة الشمالية للمدينة، وأخيراً نجد **بركة** كبيرة لتجميع المياه (١٩,٥٢ م / ٢٥,٢٩ م) في الجهة الجنوبية الغربيّة للقلعة ويعود تاريخ إنشاءها إلى فترة تشييد القلعة، وحسب بيترسون، فإن مياه معان لم تكن من النوع العذب (Petersen 2012: 109).

يواصل ركب الحجيج سيره جنوباً على مسافة ٧٠ كم من معان، فيقطع هضاب جيرية، متفاوتة المساحة والارتفاع، تكسوها بشكل عام بقايا حطاميه من صوان وحصى وحصباء ، ليصل إلى قلعة **فصوعة**، وهي تعرف كذلك بقلعة مبروكة أو سرايا كويك كما كانت تعرف كذلك بعقبة الصوان، وهي تقع على حافة أودية سحيقة أشهرها بطن الغول.

يقع الحصن العثماني على ارتفاع ١١٣٠ متر فوق مستوى سطح البحر، في أسفل وادي صغير، وموقع الحصن مهم باعتباره الحصن الأخير على الأراضي المرتفعة قبل أن ينحدر درب الحج من ممر ضيق من بطن الغول إلى صحراء الجزيرة العربية.

أول إشارة إلى حصن فصوعة، توجد في كتابات محمد أديب، أثناء حجه في عام ١٧٧٩، أشار إلى أن الحصن كان في وادي خال من الماء ومغطى بالحجارة والرمال (Petersen 2012: 114).

تأخذ هذه القلعة شكل المربع (٢٠,٧٠ م/ ٢٠,٢٠ م شمال جنوب) وترتفع عن سطح الأرض حوالي ٧ م، وقد استعمل في بنائها صخر البازلت، صخر الصوان، صخور حمراء مثل الحجر الرملي، بالإضافة إلى صخور جيرية وكلسية.

تتكون القلعة من طابقين، مدخلها من الجهة الشمالية (اتساع ١,٤٠ م)، ويؤدي هذا المدخل الرئيسي إلى إيوان مستطيل الشكل (٣,٩ م / ٤,٩ م) ذو سقف مدبب، على جانبه ٤ غرف متباينة المساحة ومسقوفة بأقبية برميلية.

من هذا الإيوان، مدخل يؤدى إلى فناء داخلي مكشوف ذو شكل مستطيل (٨,٨ م / ٨,١ م) يحتوي على خزان للمياه "بئر" فتحته على شكل مربع (٠,٦ م / ضلع) (Petersen 2012: 120).

تنتهي القلعة في الأعلى بشرفات بارزة، تضم فتحات (وقع سدها عن طريق الحجارة الصغيرة) لرمي السهام أو لإطلاق النار. أربعة أبراج ترتفع بمعدل ٥ م عن سطح الأرض، وتحتل الزوايا الأربع للقلعة، وهي تبرز عن الجدران ٣٠ سم، وعلى الواجهة الجنوبية للمبنى، صمم محراب يتجه إلى القبلة بارتفاع ٥ م عن سطح الأرض ونتوء بمعدل ٤٠ سم، أما الطابق العلوي، فهو يحتوي على ٥ غرف من الناحية الشمالية و٤ من الناحية الجنوبية، مع وجود تطابق عامة مع

الطابق الأرضي، حيث نجد كذلك المحراب والمسجد ولكن بمساحة أقل (Petersen 2012: 115 and 216).

إلى الشمال من القلعة، بحوالي ٦٠م، توجد بركتين لتجميع المياه من الأودية المحيطة (الأولى ٢٤ م / ١٦,٨ م والثانية ٢٣,٦ م /١٦ م)، وكل منها تعاني من الترسبات الطينية المستقرة في القاع والناتجة عن ترسب الرمال والأتربة، على الجانبين الشرقي والغربي، كما توجد درجات تصل إلى قاعها، إضافة إلى وجود ٥ فتحات تسمح بالاتصال فيما بينها ومع امكانية مرور المياه من الأولى إلى الثانية، كما يوجد رواق بين البركتين.

وعلى مسافة ٥٠٠ م شرق القلعة، أقيم برجين على هيئة شكل مربع منتظم (٢,٩ م / ضلع) بارتفاع ٢م، من المرجح أنه لعب دور المنارة في ارشاد الحجيج والمسافرين ليلا.

ويبدو أنه قد تم احتلال هذا الحصن لفترة وجيزة فقط، حيث أنّه في تقرير ينسب لمهندس في الجيش المصري، كان قد أرسله إلى نائب الملك في مصر سنة ١٨٢٥، محمد على (في إطار مهمته الموكلة اليه من طرف السلطان، والمتمثلة في وقف زحف الحركة الوهابية)، يتحدث المهندس عن الحصن فيقول أنّه كان في حالة خراب بالإضافة إلى انه مهجور.

من فصوعة، تواصل قافلة الحاج الشامية طريقها وسط صحاريٍ صخرية قاحلة، سالكة مسار شاق وعسير، حيث يذكر أوليا الجلبي التركي أنه في هذه المنطقة، من المستحيل تقريبا ركوب دابّة (Seyhatnâmesi IX: 577; Bilge 1979: 218).

إذ يضطر الحجاج إلى السير على الأرض الصخرية (محمد أديب ١٧٧٩)، في الوقت الذي يجلس أمير الحج مراقبا حركة القافة تحت مظلة تقيه مَنْ حَرَ الشمس، في حين يتناوب الفريق المكلف بالماء على توزيع حصص الشراب على المسافرين. ويقدر الرحالة السويسري بورخارت النزول إلى **بطن الغول** بحوالي نصف ساعة مشيا على الأقدام، كان الحجيج يرددون خلالها: رحم الله كل من نُزل بطن الغول (Burckhardt 1822: 658-659, Appendix III).

بعد مسير القافلة لما يقارب ١٥ ساعة نحو الجنوب، تصل قلعة **المدوَّرة** ، وتستمد هذه الأخيرة اسمها من جبل صغير مدور قريب منها، وهي المحطة الأخيرة على طريق قافلة الحج الشامية بالأردن (**الشكل ٤**)، كما أنها تقع في بداية السهل الرملي بشمال شبه الجزيرة العربية.

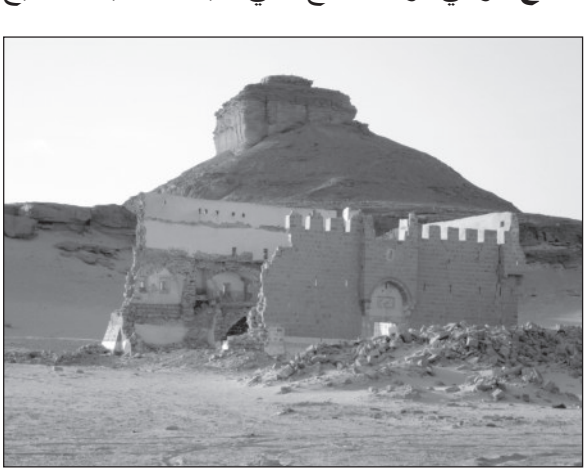
تتخذ القلعة شكل المربع (١٩ م / ضلع)، مدخلها الرئيسي من جهة الشرق (١,٣ م / عرض) يغطيه قبو نصف اسطواني (٤ م / ٢,٦ م)، على جانبيه توجد أدراج تفضي إلى الطابق الأعلى.

يقودنا البهو إلى فناء مستطيل (٧,٥ م / ٧,١ م) ينتهي بإيوان وتحيط به ٤ غرف مستطيلة ومسقوفة ذات عقود نصف برميلية وأبواب باتساع ٠,٧ م لكل غرفة. تحتوي القلعة من الداخل على ساحة مركزية مستطيلة كما يوجد بها من الخارج أبراج أو دعائم حجرية في كل زاوية باستثناء الزاوية الشمالية الغربيّة.

وفي جنوب القلعة، نجد بقايا خزان مياه ذو شكل مستطيل (٣١,٨ م / ١٥ م)، ينقسم بدوره إلى ٣ أجزاء مستطيلة، مع وجود درج للنزول إلى اسفل الخزان المملوء حاليا بالتراب، غير أن الخزان الثاني الذي ورد ذكره في تقرير مرفوع إلى محمد علي باشا، يبدو أنّه أصبح مطمورا بالتراب ويستحيل رؤيته.

خلال زيارتنا للموقع، لاحظنا وجود بقايا من الطريق القديم المؤدي للقلعة (على طول ٥٥٠ م) وهو مرصوف بالحجارة الصوانية والرملية، وعرضه يتراوح من ٤ إلى ٥ أمتار. يعود تأسيس القلعة إلى القرن ١٨، كما أنّه في الخمسينات من القرن الماضي كانت تستغله قوات البادية.

تترك القافلة قلعة المدوّرة في اتجاه قلعة **ذات الحاج**، وهي أوّل القلاع التي بنيت لحماية الحجيج



٤. قلعــة المــدورة، آخر محطــات قافلة الحج الشــامي على الأرض الأردنية (©٢٠١٤ صورة كلودين دوفان).

بالعصر العثماني على الأراضي السعوديّة، وبها محطة من محطات سكة حديد الحجاز، ويذكر في كتب الرحلات أنّ بها بركة ماء.

هنا، يتكون المشهد الطبيعي من أراضي تتنوّع بين كثبان رمليّة وسبخات صغيرة المساحة إلى جانب مراوح غرينيّة، يكون فيها الطريق عبارة عن ممرات ضيقة من التربة الرملية الخشنة.

مقاربتنا للموضوع

التحاليل المكانيّة

اهتمت الأبحاث التي تناولت موضوع القلاع والخانات على امتداد طريق الحاج الشامي في الجزء الأردني منه بالأساس بالجانب المعماري التاريخي، ونذكر من الباحثين الأردنيين بالخصوص: عبد القادر محمود الحصان (٢٠٠٧) وزياد السلامين (٢٠١٠)، إضافة إلى الدراسات الغربيّة: باترسون (٢٠١٢) وكينيدي (٢٠١٢).

تختلف مقاربتنا للموضوع عن الدراسات السابقة من حيث إنها تعتمد على دراسة المخلفات الأثرية في علاقة بالمشهد الطبيعي بالإعتماد على قاعدة بيانات جغرافيّة مع القيام بتحاليل مكانية واحصائيّة وذلك للإجابة على أسئلة ثلاث:

- بماذا يفسّر تغيير مسار الحج الشامي؟
- إلى أي مدى كان كل مسار استجابة لعوامل طبيعية أو لاختيار انساني؟
- هل أن طريق الحج في مختلف فتراته، كان هو المسار الأمثل فعليّا؟

ما يميز مقاربتنا للموضوع عن المقاربات الأخرى، هي أنها تعتمد على دراسة درب الحج في علاقة بأهم العناصر المكونة للمشهد الطبيعي: ميلان التضاريس واتجاهها، نموذج الارتفاعات الرقمية، نقاط المياه: الآبار والعيون، حساب منطقة الأمان من خلال تحديد مجال الرؤية، طبيعة السطح والغطاء النباتي، تكلفة المسافة، التجمعات السكنية ومعوقات الطريق.

بصفة عامة، يمكن تقسيم المشهد الطبيعي إلى قسمين من الشمال إلى الجنوب:

يتكوّن القسم الأول من خط دمشق - معان، حيث يتكون المشهد الطبيعي من سهول وهضاب، في نطاق يتراوح فيه معدل كميات الأمطار من ٣٠٠ ملم في السنة إلى ٤٠ملم، في حين أن الإمكانات السنوية للتبخر النتحي يرتفع من ١٤٥٠ملم إلى ٢٤٠٠ملم، كما يتآكل الغطاء النباتي كلما اتجهنا إلى الجنوب، ليقتصر على تكوينات نباتية قصيرة، في مناطق يغلب عليها الحجر الرملي والجرانيت، مع وجود نباتات حولية في مجاري الوديان، وبدوره يصبح المناخ قاحلاً بشكل متزايد من الغرب إلى الشرق.

أمّا القسم الثاني فيبدأ من معان حتى نهاية درب القافلة الشامي على الحدود الأردنية السعودية، وفي هذا القسم، كان الحجاج على موعد مع الصحراء الحقيقية، في رحلة ممتلئة بالمشقة والمغامرة بين تلال ورمال، حيث تشح الموارد، إضافة إلى مواجهة الحر الشديد في فصل الصيف أو البرد والسيول في فصل الشتاء.

عمليات التحليل المكاني:

حساب تكلفة السطح

تشكل التضاريس بمختلف مكوناتها جملة من العوائق أمام تحرك القافلة خلال رحلتها من دمشق إلى الحجاز، لذلك كان من الضروري محاكاة صعوبة التنقل طيلة الطريق، بمعنى المسافة القصوى التي يمكن للقافلة أن تقطعها خلال سيرها، وفي هذا الإطار، سنستعرض أهم هذه المعوقات الطبيعيّة، وبشكل عام، كان طريق القافلة يتكون من أراضي قليلة التباين، صخرية، طينية أو رمليّة وتتواجد على السهول، الهضاب والتلال.

في اطار قياس تكلفة السطح، نجد أن هناك معادلات رياضية عديدة قد وقعت تجربتها، غير أنّه لا يمكن استعمالها مع مختلف التضاريس، وتعتبر معادلة توبلر أكثرها شيوعاً واستعمالاً لتمثيل صعوبات الواقع، وهي تعتمد بالأساس على قياس سرعة الحركة اعتماداً على قيمة انحدار السطح (Tobler 1993).

$$\text{Velocity} = 6 \times \exp\{-3.5 \times \text{abs}(S+0.05)\} = 5.4 \text{ km/h}$$

S = طبقة الانحدار بوحدة الدرجة

غير أن ما يؤخذ على هذه المعادلة هي إنها لا تأخذ بعين الاعتبار اتجاه الإنحدار، بمعنى آخر، هل أن انحدار الطريق أمام القافلة، هو للأسفل أم للأعلى؟ ولذلك وقع تعديل هذه المعادلة حتى تكون مطابقة للواقع:

$$T = [(a) \times (\text{Delta S})] + [(b) \times (\text{Delta H Uphill})]$$

+[(c)×(Delta H Moderate Downhill)]
+[(d) * (Delta H Steep Downhill)]

T = الزمن، ويعبر عنه بوحدة الثانية.
Delta S = وهي المسافة الافقية.
Delta H = وهي المسافة العمودية.

بالاعتماد على المصادر التاريخية والاثنوغرافية، يمكن القول أن السرعة العادية لقافلة الحج كانت تتراوح بين ٢,٥ إلى ٣ كم / الساعة (Burton 1893: I: 244; Peters 1994: 71-73).

وهذا المعدل، اكّده لنا السيد أبو هيل ضيف الله رضا درويش من قبيلة السطول من بني صخر، والذي يذكر لنا أنه في الثلاثينات من القرن الماضي، أيّام طفولته، كانت قافلة الحج تقطع أراضي اجداده وتستريح لبعض الوقت في قلعة ضبعة.

وبالعودة إلى المعادلة الرياضية السابقة، وبغاية تعديلها لتكون متطابقة مع قافلة الحج، قمنا بتحويلها لتصبح كالاتي:

Velocity = 6×exp {-3.5×abs (S+0.05)}/ 2
= 2.7 km/h

(**الشكل ٥ و٦**).

كيف تبدو العلاقة بين طريق القافلة ومكونات المشهد الطبيعي؟

العلاقة بين المسار وانحدار التضاريس

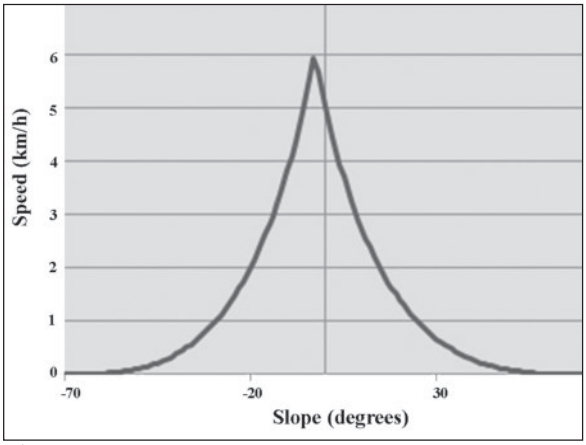
أثبتت نتيجة عملية التحليل المكاني أن هناك ارتباط وثيق بين المسار وطبيعة الإنحدار، ولذلك نلاحظ أن هناك تفضيل للتضاريس ضعيفة الميلان، على أن لا يتجاوز هذا الإنحدار ٦ درجات، وهذه القاعدة تنطبق على الطريقين الإسلامي والعثماني.

العلاقة بين طريق القافلة ونوعية التربة

من الضروري في اطار هذا البحث، دراسة التربة والغطاء النباتي، واستخدامات الأرض المختلفة بالمناطق التي يمر عليها الطريق، بل أن نوعية السطح كانت من العوامل الأساسية في تحديد مسار القافلة، (**الشكل ٧ و٨**) وفي هذا الإطار كان لا بد من القيام بعملية تصنيف لأنواع التربة الموجودة بطريق الحج، وذلك حسب مقياس ينقسم إلى ٧ أقسام، بداية من الأصعب حتى الأسهل:

Slope (degrees)	Speed (km/h)
-70	0.00
-50	0.11
-30	0.95
-10	3.86
-2.8	6.00
0	5.04
2.8	4.23
0	2.72
30	0.67
50	0.08
0	0.00

٥. جدول يوضح العلاقة بين انحدار التضاريس وسرعة التنقّل (© كلودين دوفان، محمد بن جدو، جان ماري كاستاكس).



٦. رسم بياني يوضح العلاقة بين انحدار التضاريس وسرعة التنقّل (© كلودين دوفان، محمد بن جدو، جان ماري كاستاكس).

١- الأراضي الصخرية والمحجرة وهي غير ملائمة لسير القافلة رغم احتوائها أحيانا على نسبة من التربة اللوسيّة
٢- التربة الطينية أو التربة غير المستقرة وخاصة إذا كانت على سفوح المنحدرات أو ضفاف الأودية لا سيّما في فترة نزول الأمطار.
٣- الأراضي التي تغطيها طبقة من الصخور البازلتية والكلسية والتي تسمح بسير القافلة، غير أنها

٧. طريق قافلة الحج الشامي بين قلعة ضبعة وزيزيا (الجيزة)، على اليسار، الطريق الحديثة (©٢٠١٦ صورة كلودين دوفان).

أحياناً لا تتناسب مع الطريق إذا كانت المنطقة تتخللها أودية أو عروق رملية.

٤- الأراضي التي تغطيها طبقة من الرمال والحصى وهي من التربة الملائمة، إلا أنها غالباً ما تكون في شكل شرائط أو ممرات ضيقة بين المرتفعات أو في مجاري الأودية وتكون بصفة عامة متعامدة مع اتجاه الطريق.

٥- الأراضي الواسعة المستوية، وخاصة السهول التي تحتوي على تربة بازلتية.

٦- أراضي شاسعة تغطيها طبقة من الرمال والحصباء تتخللها أودية ضيقة أو مسيلات وروافد.

٧- الأراضي التي تغطيها ذرات الرمال الدقيقة ناتجة عن حركة الرياح، ويمكن أن تترسب في مستويات منخفضة إلا أنها ليست شائعة على طريق القافلة.

ختاماً يمكن القول أن أفضل الأراضي التي تلائم طريق القافلة، هي التي تغطيها الرمال الدقيقة أو الحصى، والتي تتواجد خاصة بمجاري الأودية.

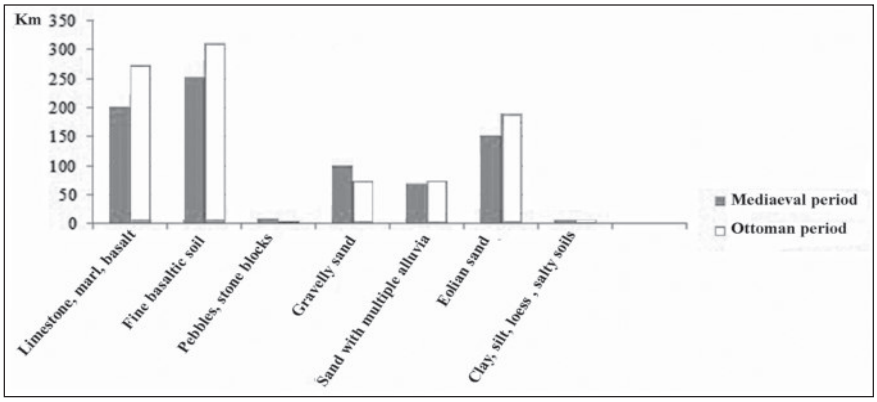
العلاقة بين طريق القافلة وتحديد مجال الرؤية

أثبتت نتائج عمليات التحليل المكاني عدم وجود ارتباط بين الطريق ومدى وضوح الرؤية، على الأقل بالنسبة للعهد الإسلامي، وعلى العكس من ذلك، فإن هذا العامل كان قد لعب دوراً اساسياً خلال العهد العثماني، إذ كانت القافلة تحرص على السير في طريق يتوفّر فيه قدر من الأمان من خلال رؤية أي خطر من مسافة بعيدة، ولعل طبيعة التضاريس قد ساعدت على ذلك، حيث أنه لاوجود لحواجز طبيعية أو مرتفعات عالية من شأنها حجب الرؤية؛ وهذا ما يؤكّده الرحالة داوتي (١٨٤٣-١٩٢٦) من خلال رحلته إلى الحجاز سنة ١٨٧٦ انطلاقاً من دمشق، حيث لا يخفي اعجابه من المشهد الطبيعي الذي كان مترامي الأطراف، ثم من الصحراء التي تمتد إلى ما لانهاية، فلا يحدها سوى الأماكن المقدسة، إذ يقول في هذا الصدد "في البداية، تقطع القافلة سهلاً فسيحاً يكثر فيه الرمل إلى جانب الطين الصلصالي، لمدة ١٠ أو ١٢ يوم حتى مدينة معان الواقعة على جبل أدوم والتي لا تبعد كثيراً عن البتراء" (Doughty 1931: 36).

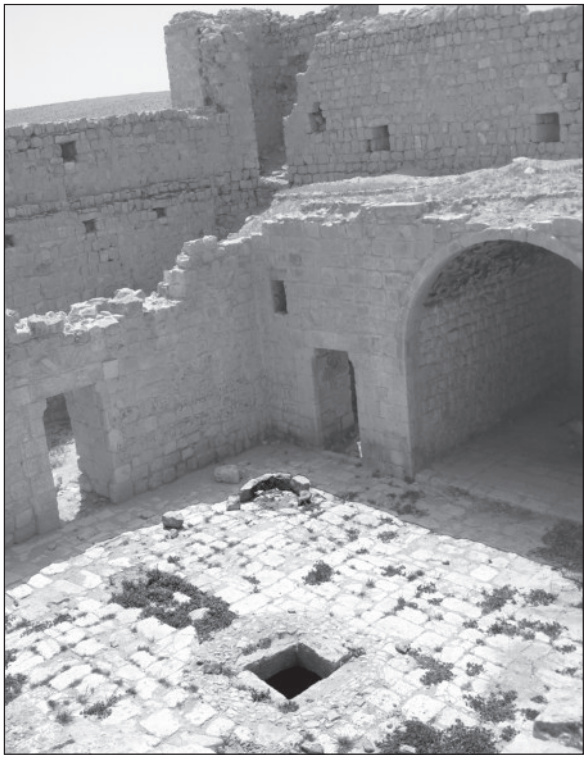
حساب المسافة الموزونة

العلاقة بين طريق القافلة ونقاط المياه "عيون / خزانات / برك" (**الشكل ٩**).

خلال مختلف مراحل عمليات التحليل المكاني، لم يقع الاخذ بعين الإعتبار عنصر الآبار، وذلك لغياب معلومات حول تاريخ إنشائها؛ وقد اثبتت لنا نتائج التحاليل المكاني أن هناك ترابط هام بين طريق القافلة ونقاط المياه، خلال الفترتين الإسلامية والعثمانية (**الشكل ٢**)، وهي لاشك، وضعية موروثة عن العهود السابقة: البيزنطية والمملوكية.



٨. العلاقة بين طريـق القافلة ونوعية التربة (© كلودين دوفان، محمد بن جدو، جان ماري كاستاكس).



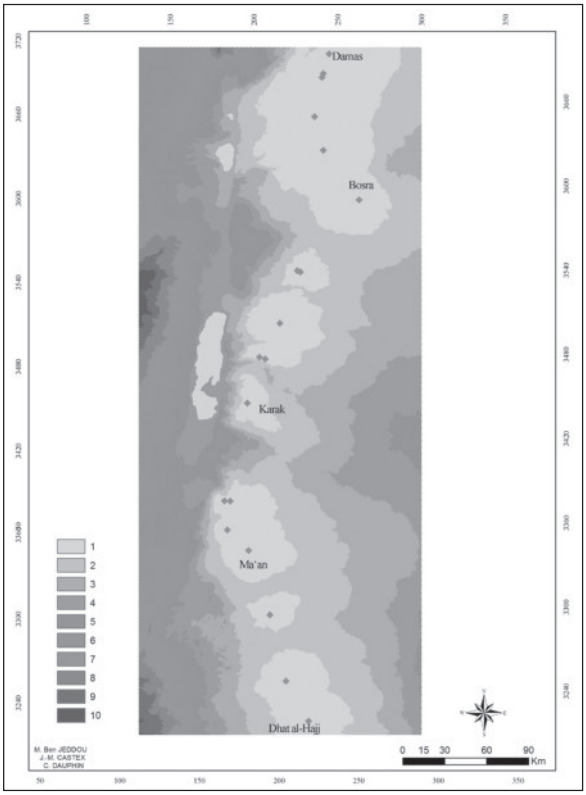
٩. بئر ماء يتوسط الساحة الرئيسية لقلعة ضبعة (© كلودين دوفان ٢٠١٦).

وبالنظر إلى الخريطة، نلاحظ تركّز العيون بصفة خاصة على مرتفعات ادوم ومؤاب، لا سيما حول خط تقسيم المياه ونقاط تقاطع الطرق، ولعل ذلك من بين الأسباب التي تفسّر تواجد المدن والقرى بشكل مكثف (**الشكل ١٠**).

إلا أن هذه العلاقة تبدو جليّة خلال العهد العثماني، حيث نجد العديد من الخزانات والبرك لتجميع مياه الأمطار على مقربة من القلاع والحصون، وذلك باعتباره برنامجاً مخططا له سلفاً من طرف السلطة المركزيّة، وهي تعود إلى القرنين ١٦ و١٨، حيث أنشات الإدارة العثمانية نقاط مياه حول القلاع التي تقع على طريق قافلة الحج (**الشكل ١١**) بهدف توفير الماء إلى القافلة، في هذا الإطار، كلّف محمد علي باشا فريقا لصيانة هذه المنشآت المائية، كما يوضح تقريرا صدر عن هذا الفريق سنة ١٨٢٨(Petersen 2012: 214-222).

العلاقة بين طريق القافلة والتجمعات السكنيّة

بعد الاطلاع على قواعد البينات: **جاديس** و**ميغا** بموافقة من دائرة الآثار، أمكن لنا ميدانيا معاينة طريق



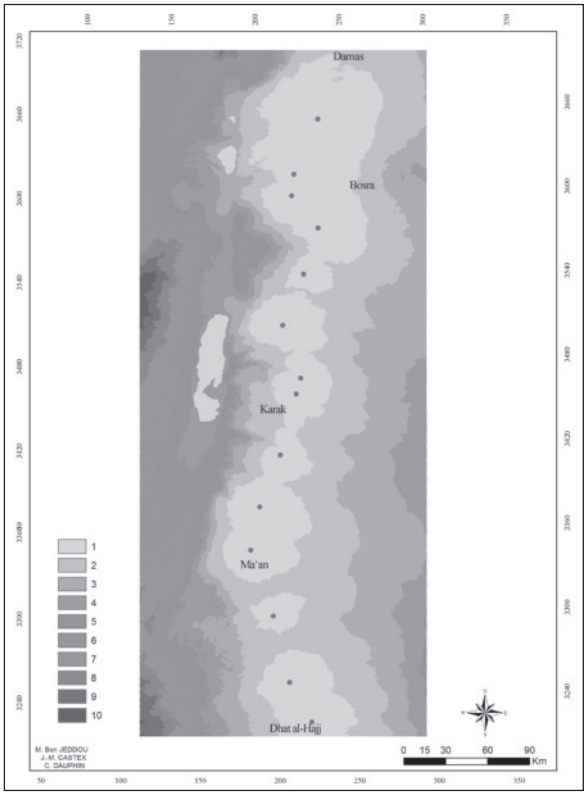
١٠. العلاقة بين درب الحج الشامي والتجمعات السكنيّة في الفترة الإسلامية، التدرج في الألوان يجسّد المسافة الفاصلة (© كلودين دوفان، محمد بن جدو، جان ماري كاستاكس).

الحج بمختلف محطاته، بداية من الرمثا على حدود سوريا إلى المدورة القريبة من الحدود السعودية، كما أمكن لنا مراجعة ما يقارب:

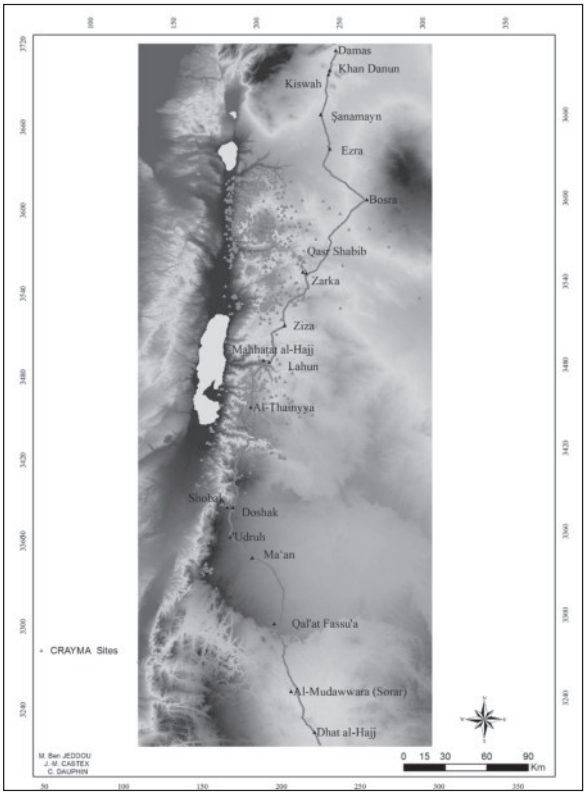
- ١١٨١ موقع أثري من الفترة الإسلامية: الأموية، العباسية والفاطمية.
- ٨٩٤ موقع أثري من العهد الصليبي حتى المملوكي (**الشكل ١٢**).
- ٩٩٥ موقع عثماني (**الشكل ١٣**).

ومن خلال عمليات التحليل المكاني والاحصائي التي قمنا بها في اطار هذه الدراسة، لاحظنا وجود تراجع هام على المستوى الديمغرافي بين الفتح الإسلامي وفترة المماليك، تبع ذلك فترة تعافي خلال العهد العثماني.

شكل الطريق السلطاني حاجزاً طبيعياً منذ العهد البيزنطي إلى غاية العهد المملوكي (باستثناء مدينة الكرك)، حيث نلاحظ وجود تجمعات سكنية شرق هذا الطريق، وقد صاحب انشاء طريق الحج العثماني انزياحا للسكان نحو الشرق وكذلك جنوب الكرك، بل انها تكونت كذلك نقاط استقرار جديدة، أنشئت حول



١١. العلاقة بين درب الحج الشامي ونقاط المياه خلال الفترة العثمانيّة، ، التدرج في الألوان يجسّد المسافة الفاصلة (© كلودين دوفان، محمد بن جدو، جان ماري كاستاكس).



١٢. درب الحج الشامي وتوزّع المواقع الاثريّة خلال الفترة الصليبية، الايوبية والمملوكيّة (© كلودين دوفان، محمد بن جدو، جان ماري كاستاكس).

طريق القوافل، والأكيد أنها كانت في ارتباط وثيق بطريق الحج، إذ أنها كانت توفر الاحتياجات اللازمة للقافلة وخاصة الغذائية منها.

خلال الفترة الإسلامية، نلاحظ أن طريق القافلة كان يتجنب المرور بالتجمعات السكنية مباشرة، وهو امر منطقي بالنظر للعدد الهائل المكوّن للقافلة، وقد أمكن قياس المسافة الفاصلة من١٥ إلى ٣٠ دقيقة سيراً على الأقدام، ولذلك فإن القلاع والخانات تتواجد عادة خارج هذه التجمعات، مثلما هو الشأن بالنسبة للكرك والثنية.

أمّا في الفترة العثمانية، فإن أغلب المواقع الأثرية أنشئت غالباً على حافة الطريق أو على مسافة قريبة جدا منه وذلك بهدف توفير كل مستلزمات القافلة أثناء ذهابها إلى الأماكن المقدسة أو عند العودة منها.

النماذج الديناميكية التنبؤية لمحاكاة ونمذجة الطريق: هل أن مسار القافلة كان فعلا هو المسار المثالي؟

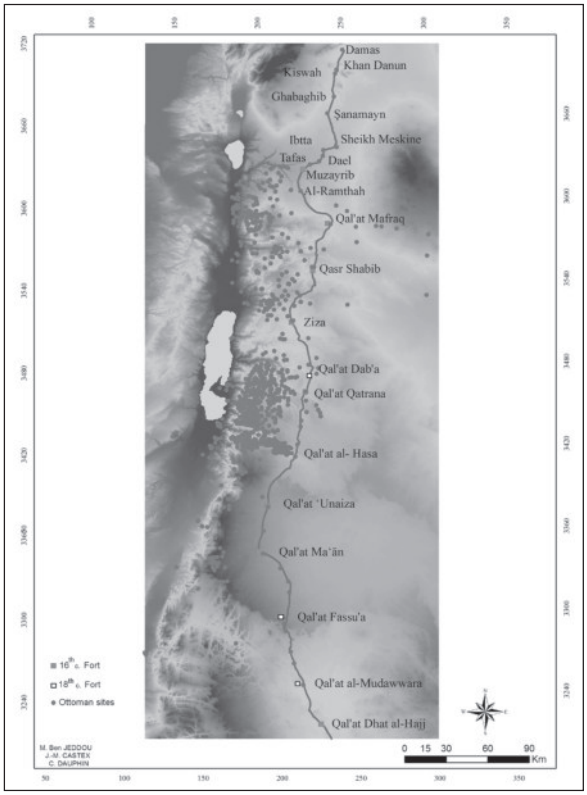
أثبتت نتائج عمليات التحاليل المكانية والاحصائية وجود اختلافات هامة في استراتيجية إنشاء طريق قافلة الحج الشامي خلال الفترتين الإسلاميّة والعثمانيّة، وعلى ضوء ذلك، وبعد اختبارالعديد من النماذج الجغرافية التنبؤية، كان من الضروري الاعتماد على نموذجين مختلفين لإيجاد المسار الافضل بالنسبة لكل فترة تاريخية، مع مقارنة كل منهما بالطريق الفعلي للقافلة.

الفترة الإسلامية

استخدام التطابق الموزون

في اطار بحثنا عن الملائمة المكانية لإنشاء طريق نظري أقصر وأسهل للقافلة عبر منهجية تحليلية مكانية استنادا إلى مجموعة العناصر الطبيعية ، كالتضاريس وطبيعة السطح والانحدارات، يمكن القول أن العوامل المفسرة لإختيار طريق القافلة بالنسبة لهذه الفترة هي كالاتي:

- ضعف قيمة الميل (لا تتجاوز ٦ درجات).
- وجود مسافة فاصلة بين طريق القافلة والتجمعات



١٣. التجمعات السكنية والقـلاع العثمانية (© كلودين دوفان، محمد بن جدو، جان ماري كاستاكس).

السكنية (تتراوح بين ١٥ إلى ٣٠ دقيقة سيرا على الأقدام).

- طبيعة التربة التي تسير عليها القافلة: رمليّة أو حصباء صغيرة.

الفترة العثمانية

استخدام المنطق الضبابي

تتيح لنا هذه التقنية إمكانية الربط بين جميع العوامل والمتغيرات المؤثرة في انشاء الطريق، وإعطاء أحدها وزناً، ونسبة أكبر من باقي المعايير تبعاً لأهميتها، كما أنّه من الممكن استعمال هذه التقنية في حالة امتلاكنا لمعطيات أو قيم تقريبية، دون التأكد منها بصفة قطعية، وذلك بتقدير وزن لكل عنصر يشارك في عملية النمذجة التنبؤية، مع تحديد درجة الافضلية، ومن بين المعطيات التي تدخل في عملية اختيار طريق القافلة بالنسبة لهذه الفترة، يمكن أن نذكر:

- ضعف قيمة الميل (لا تتجاوز ٦ درجات في خارطة الميل).
- وجود مسافة فاصلة بين طريق القافلة والقلاع تقل عن ١٥ دقيقة سيرا على الأقدام.
- طبيعة التربة التي تسير عليها القافلة: رمليّة أو حصباء صغيرة.
- تحديد مدى الرؤية.

النتيجة

في اطار بحثنا عن المسار الأفضل لقافلة الحج الشامي، نلاحظ أن كل من التقنيات المتبعة لتحقيق هذا الهدف، قد أعطت نتائج لا تتطابق تماما مع الطريق الفعلي، إلا أنه يمكن القول أن استخدام المنطق الضبابي، كان في أغلبه مطابق لطريق القافلة العثمانية، ولعل ما يؤكد نجاح هذا النموذج هو أن المهندس بالجيش العثماني "مختار باي" وقع تكليفه من طرف السلطان عبدالحميد بتتبع قافلة الحج من دمشق إلى الحجاز سنة ١٩٠٠، وتسجيل ملاحظاته لاختيار أنسب الأماكن بهدف إنشاء سكة القطار الحجازي (Nicholson 2012: 15).

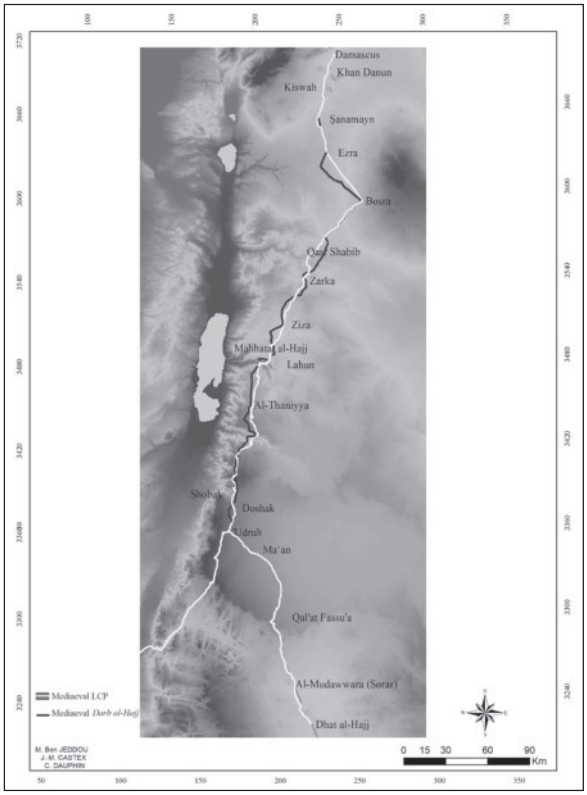
تحليل خرائط أنسب مسار للطريق (الشكل ١٤)

من بصرى إلى الزرقاء، نستطيع أن نلاحظ تطابقا جليّا بين الطريق الأفضل "النظري" والطريق الفعلي للقافلة، وهو نفسه طريق تراجان الروماني، الذي يمر على مدينة بصرى الأثرية بسوريا وصولاً إلى العقبة على ساحل البحر الأحمر (Roll 1999: 109).

وقد أمر الإمبراطور تراجان بإعادة توسعته ورصفه بالحجارة على الجانبين (a finibus Syriae usque ad Mare Rubrum).

من الزرقاء إلى زيزيا (الجيزة)، يمر الطريق إلى الشرق من العاصمة عمان، ليس ببعيد عن قصر الموقر الذي يحتوي على بركتين لتجميع مياه الأمطار(إضافة إلى ٩٠ خزان مياه صغير وحمامات مبلطة بالفسيفساء) وهو ما يمكن أن يفسر مرور الطريق بهذه المنطقة وتجنّبه فيلادلفيا - عمّان (Creswell 1932: 496-497).

من الجيزة إلى الكرك، تتضارب المصادر التاريخية في تحديد مسار درب الحج الشامي، فمنها من تخبرنا أنه كان يمر عبر اللجون، في حين تشير مصادر أخرى إلى قرية اللاهون / الياهون.



١٤. درب الحج الشامي خلال الفترة الإسلامية وتحديد المسار الأفضل. (© كلودين دوفان، محمد بن جدو، جان ماري كاستاكس).

وبالعودة إلى الطريق الأمثل، وباعتبار معيار المسافة بين المناطق الواقعة من ١٥ إلى ٣٠ دقيقة من الطريق، نلاحظ أن درب الحاج كان يتجنب المدن أو القرى الكبيرة، ولذلك، فمن الطبيعي أن يميل المسار نسبيا إلى الشرق.

اذا ما استحضرنا الصعوبات التي تواجهها قافلة مكوّنة من آلاف من الإبل والحجيج كان عليها أن تعبر وادي الموجب، يبدو لنا أن نزول القافلة بمحطة الحاج أمر غير مستبعد، كما كان عليها أن تعود ادراجها بعد قضائها ليلة أو ليلتين، لمسافة ٢,٥ كم إلى قرية اللاهون، لتواصل طريقها عبر وادي الموجب وهذا الافتراض يتطابق مع الطريق الأمثل الذي تم تحديده عن طريق قياس العلاقات المكانية لتحديد المسار الأقل تكلفة.

يواصل درب الحج الشامي مساره نحو الجنوب بالتوازي مع المسار الأمثل، فيعبران معاً منطقة ما بين الثنية والكرك، ثم يلتقيان تقريباً في أذرح ليتخذ كل منهما مسارا مختلفا بعد ذلك.

علينا أن لا ننسى أن درب الحج كان في الفترة الإسلامية الأولى يواصل طريقه إلى غاية العقبة، وهو ما يؤكّده لنا مخطوط يرجع إلى العهد الأموي، يذكر أن الخليفة كان قد أصدر أمراً إلى الراغبين في الحج من مصر بلقائه عند مدينة العقبة، وهناك يلتحم درب الحاج الشامي بدرب الحاج المصري ثم تواصل القافلة مسيرها على ساحل البحر الأحمر (Kennedy 2012: 92).

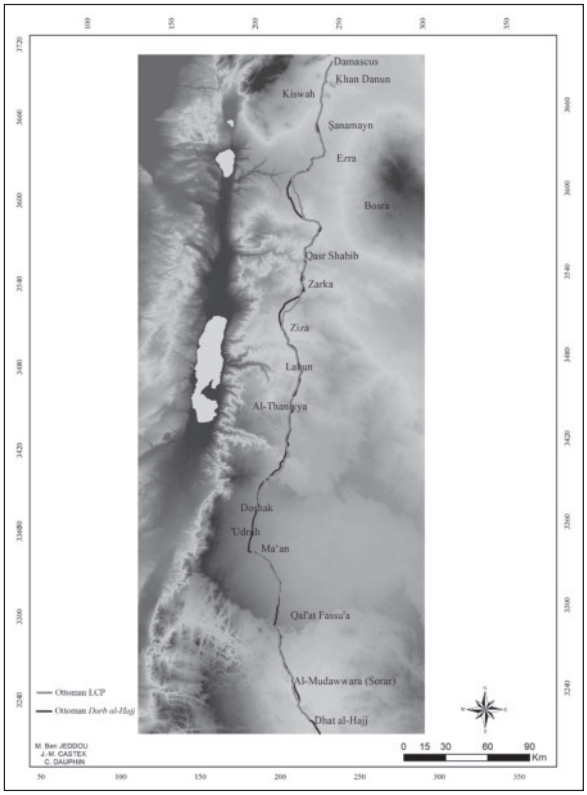
نعتقد أن طريق هذا الخليفة للذهاب إلى الحج، كان من دمشق إلى العقبة، ثم يسلك الطريق الساحلي الذي يسير بمحاذاة ساحل البحر الأحمر مروراً بمدينتي الوجه وينبع، متجنباً بذلك الطريق الداخلي الذي يمر من دمشق إلى معان وتبوك والمدينة المنورة فمكة المكرمة.

مع بداية القرن الثاني عشر، احتل الصليبيون القدس بالإضافة إلى مناطق واسعة من سوريا الشمالية والساحلية، وكذلك أراضي شرق نهر الأردن: الكرك، قلعة مونتريال/الشوبك، البترا والقلاع المحصنة الأخرى. ففي سنة ١١١٦، كانت مقاطعة مونتريال تمتد حتى خليج العقبة بما فيها القلعة.

وإلى غاية ١١٨٧، تاريخ انتصار صلاح الدين في معركة حطين على الصليبيين، كان الصليبيون المتواجدون بأراضي فلسطين والأردن يهددون أمن الطرق البرية بين سوريا ومصر، ويهاجمون قوافل التجارة والحجيج، وهو ما أجبر القوافل على تغيير مسارها شرقا والتوغل في الصحراء، وبصفة موازية، شهد درب الحج المصري فترة حرجة بسبب تواجد الصليبيين في الشام ممّا أجبر الحجاج الذين كانوا يمرون سابقاً عبر سيناء والعقبة على البحث عن طرق جديدة (Peters 1994: 90).

درب الحج العثماني والطريق الأفضل (الشكل ١٥)

اظهر استعمال التحليل المكاني أن تحديد المسار الأمثل بالنسبة لقافلة الحج في العهد الوسيط يكاد يتطابق مع الطريق القديم على الأقل حتى الكرك، على العكس من ذلك، نلاحظ أن درب الحج العثماني، لا يتبع المسار الأمثل في بعض الاحيان، بقدر ما هو مرتبط عضويا بالقلاع التي أنشأتها الإدارة العثمانية لتسهيل سفر الحجيج إلى الديار المقدسة، بالإضافة



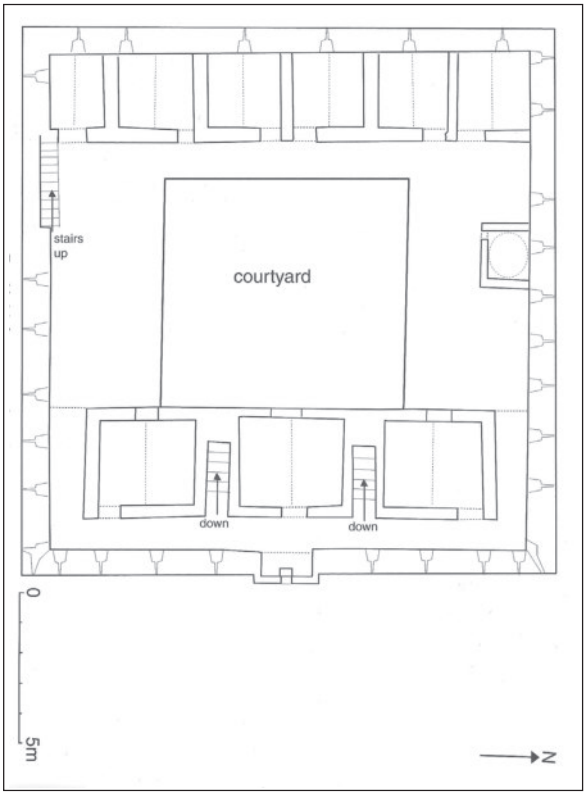
١٥. درب الحج العثماني وتحديد المسار الأفضل (© كلودين دوفان، محمد بن جدو، جان ماري كاستاكس).

إلى ربط البلاد الإسلامية مع بعضها بطريق حيوي، واحكام السيطرة العسكرية على الولايات التي يمر بها القطار (الشام والحجاز).

على أثر الاحتلال العثماني لسوريا، أمر سليم الأول بإنشاء قلاع بكل من الصنمين، مزيريب والمفرق، ومنذ ١٥٧٠ امتدت حركة إنشاء القلاع إلى منطقة الحجاز، مرورا بقطرانة، عنيزة، معان، ذات الحاج، تبوك، الأخيضر، العلا وهدية (Petersen 2012: 20).

وقد شهد القرن ١٨ مرحلة جديدة في انشاء الحصون والقلاع، حيث أنشأت قلعة ضبعة، الحسا، فصوعة، مدوّرة (**الشكل ١٦**) ومدائن صالح.

من جهة أخرى، وفي اطار الصراع بين البرتغاليين والعثمانيين من أجل التفوق في الخليج الفارسي والبحر الأحمر، كانت القلاع التي شيدت على طريق الحج جزءا من نظام الدفاع على ساحل البحر الأحمر في شبه الجزيرة العربية، كما أنها لعبت دور وسيلة اتصال بين الحجاز وسوريا وشمال الأناضول والقسطنطينية، وقد سمح خط حديد الحجاز- الشام بدوره، بتسهيل تنقل



١٦. صورة للطابق الأول للقلعة العثمانية، المدوّرة، الأردن (©٢٠١٢، صورة ٣٩ بيترسون).

الجنود العثمانيين، والمعدات بسرعة كبيرة من ساحل البحر الأحمر إلى مكة والمدينة المنورة ، بل حتى إلى اليمن الذي احتله العثمانيون في ١٥٣٨ وبصفة نهائية سنة ١٥٤٩ (Hess 1974: 27-29).

كما مثلت هذه الحصون وجوداً عسكرياً على الجانب الغربي من البحر الأحمر - خط الدفاع الاخير ضد أي غزو محتمل من قبل القوى الغربية: ففي سنة ١٨٨٢ كانت سفن البحرية الملكية البريطانية تتواجد بشرق البحر الأبيض المتوسط كما كان لها قواعد في مصر.

القلاع والحصون

يمكن القول أن تركيز الحكم العثماني على مواطنيهم العرب "الأجانب"، كان مرتبطا بإخضاع القبائل ووضع حد لتعديات البدو، التي كانت تستهدف طرق التجارة وقوافل الحج، وذلك بتشجيعهم على الإستقرار؛ وأمام تأزّم الوضع خاصة خلال القرن ١٨، عمدت السلطة العثمانية إلى استراتيجية إعادة بناء أسوار مدينة القدس العتيقة علاوة على بناء شبكة

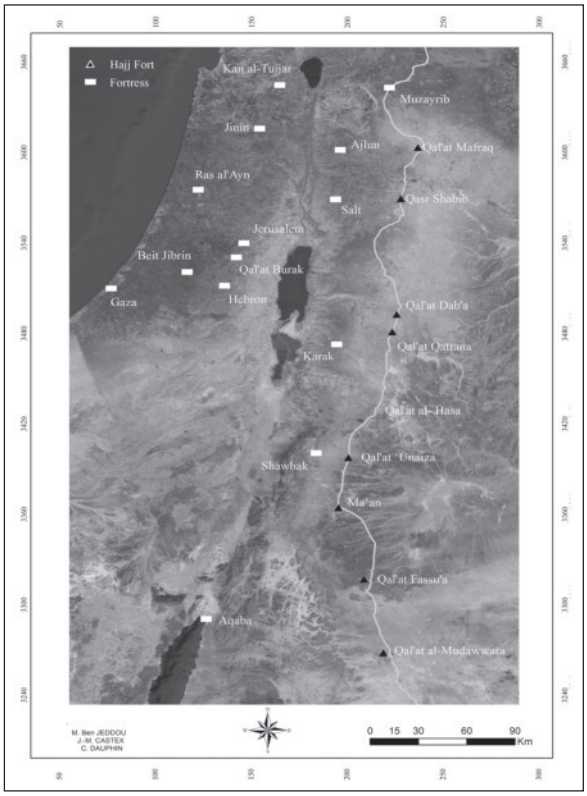
من الحصون الحديثة في فلسطين (**الشكل ١٧**) مثل راس العين، بيت جبرين، خان التجار، قلعة براك وجنين (Petersen 2012: 25-26 and 38-50).

مع نهاية القرن ١٧، أدى الجفاف إلى تدفق جديد للقبائل العربية وخاصة منها "شمّر وعنزة"، وهو ما صنع واقعا هشّا على حواف الصحراء العربية؛ وبالإضافة إلى ذلك، فإن اقتناء الأسلحة النارية التي أصبح بالإمكان امتلاكها خلال القرن ١٨، ساهم جزئيا في فاعلية هجمات البدو.

وتماشيا مع المعدات الدفاعية، يمكن القول أن هناك تطور تاريخي من الناحية المعمارية، حيث نرى أن القلاع التي يعود تاريخها إلى القرن ١٦ والتي أنشئت على طريق قوافل الحج بالأردن (مدوّرة، فصّوعة، ضبعة والحسا) كانت تتلاءم مع استعمال المدافع صغيرة الحجم؛ وعكس ذلك، فإن قلاع القرن ١٨، كان بها أربعة أبراج تحتل الزوايا الأربع، وهو ما يسمح للحامية العسكرية المتواجدة بها من الدفاع بشكل أفضل وصد هجمات البدو المجهزين ببنادق.

كما أتاحت الأسلحة النارية التي كانت بحوزة القبائل البدوية بمنطقة نجد، والتي كانت الأكثر اضطرابا وطموحا وتعطش للدماء تحت زعامة رجل دين، محمد بن عبدالوهاب (١٧٠٣ – ١٧٩٢) وبقيادة البيت السعودي، من أن تشكل قوة سياسية هامة بوسط الجزيرة خلال القرن ١٨، وتستحوذ على مكّة سنة ١٩٢٥ (Petersen 2012: 18-19 and 27).

من المرجح أن طريق الحج تم تصميمه على يد المهندس العبقري المعماري سنان باشا (١٤٨٩ – ١٥٨٨) والذي قام أيضا بإنشاء الجسور والقلاع والحصون الحربية، وهو من حدد المسافة الفاصلة بين مراحل الطريق (المرحلة تعادل تقريبا مسافة ٥٠ كم)، كما أن المشروع الأصلي كان يتضمّن كذلك إنشاء الطرقات المتقاطعة مع الطريق الرئيسي بالإضافة إلى مد الجسور على الأودية التي كانت تشكل خطرا على القوافل خاصة في أوقات الفيضانات، إلى جانب تصميم القلاع والبرك.



١٧. الحصون والقلاع العثمانيّة على طريق قافلة الحج الشـامي (© كلودين دوفان، محمد بن جدو، جان ماري كاستاكس).

خيام الحجاج

كانت المخيمات البدوية موزعة وفقا لنظام عشيرة هرمية، ويطلق على مضرب الخيام اسم الحي وأعضاء الحي الذين يرتبطون بأواصر النسب، يطلق عليهم اسم القوم (Hitti 1949: 26).

لم تكن مخيمات الحج أقل تنظيما، حيث أنها كانت تتألف من مختلف المجموعات التي تضم الحجاج حسب جنسياتهم، وهكذا فان المؤرخ دواتي انضم إلى مجموعة يقودها فارسي مقابل بعض جنيهات استرلينية، (وهو المشرف على أمور حجاج بلاده، يأتي كل عام من الشرق، عن طريق بغداد، حلب ودمشق، حيث يضم قافلته لقافلة الحج العثماني) (Doughty 1931: 35-36).

وبالاعتماد على داوتي أمكن لنا إعادة تركيب مشهد خيام الحجاج على طريق الحج الشامي نحو الأماكن المقدسة (Doughty 1931: 41-42).

في كل منزل من منازل الحج وحال توقف القافلة تنصب الخيام على شكل مدينة صغيرة ذات أزقة متعددة، ويكون الموقع عبارة عن أرض مسطحة وربما يكون منحدر يحده وادي مثلما هو الشأن بالمفرق، وتكون خيام الحجاج على شكل دائرة على مقربة من القلعة، في وسط هذه الدائرة تنصب خيام أمير الحج وإلى جانبها خيام المؤونة والهدايا والصرة

الهمايونية، بالإضافة إلى وجود حظيرة ضخمة حيث يتم تجميع الآلاف من الجمال المكونة لقافلة الحج.

غير بعيد عن المركز، تتشكل حلقة أخرى من الخيام، وهي خاصة بالتجار، كما نجد صفا من الخيام بمعدل كل ٦٠ خطوة وهي خاصة بالمشرفين على مهمة تأمين سلامة القافلة: فرسان على ظهور الجمال أومشاة؛ كما كانت الأزقة تضاء بالمشاعل بداية من منتصف الليل، أمّا داخل الخيام فتستعمل الشموع، ويحمل الحارس، الذي تدوم مهمته حتى الفجر، عادة حلقة تميزه عن الاخرين.

كان لكل مجموعة من المضارب مواقد لطهي الطعام على الطريقة البدوية، وهي عبارة عن حفر صغيرة تحتوي على أغصان من شجيرات الصحراء التقطت أثناء المشي، يوضع فوقها القدر أو المقلاة.

بعض هذه العناصر التي تشير إلى مضارب خيام الحجاج بالإمكان رصدها باستعمال الصور الجوية او جوجل ايرث (**الشكل ١٨**)، وقد مكّننا المسح الميداني من التعرف بدقة على مواقع الخيام قرب القلاع العثمانية، وكذلك الحظائر التي كانت معدة للإبل وحتى مواقد الطهي التي كانت خاصة بالحجاج.

الخط الحديدي الحجازي: الحج عن طريق القطار

(١٩٠٠ ـ ١٩٠٨) أنشأ الخط الحديدي الذي يربط دمشق بالمدينة المنورة.

وهو ما نتج عنه تلاشي استعمال درب الحج القديم مع ما رافق ذلك من تحقيق مكاسب على مستوى التكلفة واختصار وقت الرحلة (**الشكل ١٩**)، فقبل ذلك كان يستلزم قطع مسافة ١٣٠٣ كم (المسافة الفاصلة

١٨. استراحة القافلة في محطة على طريق الحج بالأردن، بداية القرن ٢٠.

بين دمشق والمدينة، منها ٤٥٢ داخل تراب الأردن) حوالي شهرين؛ وبإستعمال السكة الحديدية، أصبحت الرحلة لا تتجاوز ٥٥ ساعة (**الشكل ٢٠**).

مع نهاية القرن ١٩، فقدت الإمبراطورية العثمانية مقاطعاتها الأوروبية (اليونان، رومانيا، بلغاريا، صربيا والجبل الأسود) فأصبح تركيز السلطان عبد الحميد الثاني على المقاطعات العربية الخاضعة للسلطة العثمانيّة.

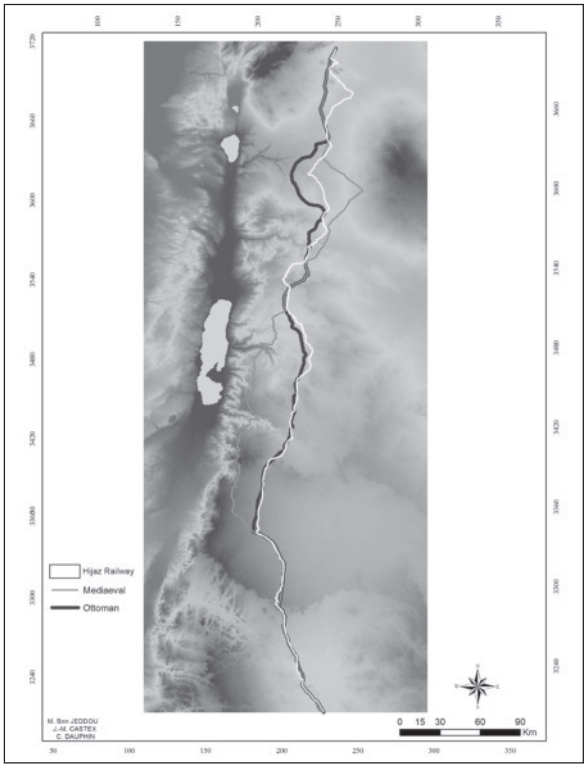
وفي ٢ أيار سنة ١٩٠٠ وجه عبد الحميد نداءً إلى العالم الإسلامي يحث فيه المسلمين على جمع التبرعات الماليّة لإنشاء خط حديدي يربط الأناضول بالجزيرة العربيّة ويمكّن في نفس الوقت من دعم حركة الجامعة الإسلامية وتوحيد صفوف العالم الإسلامي (**الشكل ٢١**).

اعتبر الخط الحديدي من زاوية الشرع بمثابة وقف إسلامي، وقد سمح للسلطان العثماني على المستوى الداخلي من زيادة بسط نفوذه السياسي، لا سيّما في المناطق الجبليّة والصحراويّة والوصول إلى القبائل التي تسكنها، وخارجيّا من التعامل بفعاليّة ضد الاطماع والسياسات العدوانيّة لكل من بريطانيا وفرنسا، لا سيما، في المناطق العربية التي كانت تابعة للسلطة العثمانية وأصبحت محتلّة من طرف القوى الغربيّة: مصر، السودان، عدن، إضافة إلى إمكانية عقد تحالفات مع المقاطعات التي تقع على الخليج الفارسي مثل الكويت.

بتاريخ ١ أيلول ١٩٠٦، كان مد الخط الحجازي قد تجاوز المدوّرة، اخر محطة على طريق قافلة الحج بالتراب الأردني قبل أن تدخل مدينة تبوك في الجزيرة العربيّة (**الشكل ٢٢**) (Nicholson 2012: 40).

تم تسيير أوّ رحلة لقطار الحج من دمشق إلى المدينة المنورة يوم ٢٢ آب ١٩٠٨، حيث كانت العربات من الدرجة الثالثة (**الشكل ٢٣ و٢٤**)، وقد أضيفت له سنة ١٩١٣ عربات من الدرجة الأولى والثانية، كما تم تخصيص عربة كمسجد أقيمت فوقه مئذنة؛ كان سير القطار يستغرق عمليّا يومين ونصف، إلا أن الرحلة فعليا كانت تدوم ٥ أيام (**الشكل ٢٥**)، يخصص فيها الوقت الباقي لوقوف القطار في المحطات وتغيير القاطرات وكذلك لضمان سير القطار بأمان أمام هجمات البدو الذين عارضوا المشروع في

١٩. خريطة رسمها المهندس بالجيش العثماني مختار باي سنة ١٩٠٠ انطلاقا من ملاحظاته الميدانية اثر تتبعه لقافلة الحج، بهدف مد سكّة القطار الحجازي (توكابي، ساراي، إسطنبول).



٢٠. درب الحـج الشـامي خلال الفترتين الإسـلامية والعثمانية، إلى جانـب خط سـكّة حديد الحجـاز (© كلودين دوفـان، محمد بن جدو، جان ماري كاستاكس).

البداية، باعتبار حرمانهم من كراء جمالهم أو تأمينهم لسلامة الحجاج مقابل المال.

خلال الحرب العالمية الأولى، واجه لورانس العرب سنة ١٩١٧ بمناطق الحجاز صعوبة في القيام بمشروعه بتحريض القبائل العربية الثائرة، وتدريب رجالها على كيفية استعمال الأسلحة الخفيفة، وتفجير الخط الحديدي باعتبار أنّه لعب دوراً هامًا في ثبات العثمانيين في الحرب، خاصة وأنهم كانوا حلفاء الألمان (Nicholson 2012: 44, 58, 94-151).

الجدير بالذكر أنّه تم تسيير آخر رحلة للقطار الحجازي لنقل الحجيج من دمشق إلى المدينة في سنة ١٩١٨.

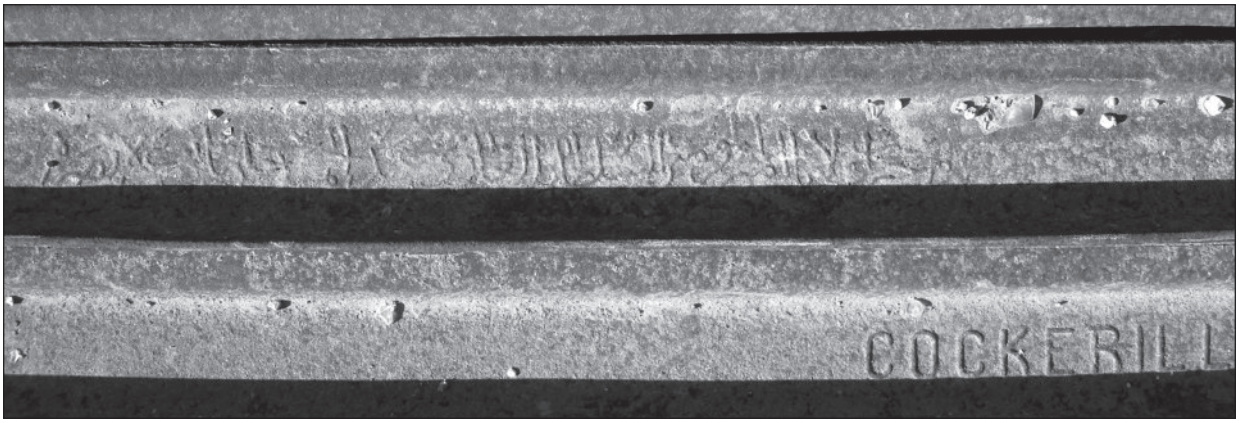
شكر وتقدير

تندرج هذه الدراسة ضمن مشروع السكان المستقرين والبدو جنوب بلاد الشام: مجالات التعبير الفني المرتبطة بديناميات السكان، تحت اشراف مجلس الأبحاث البريطانية في بلاد الشّام وبتمويل من منظمة (Augustus Foundation Monaco-London).

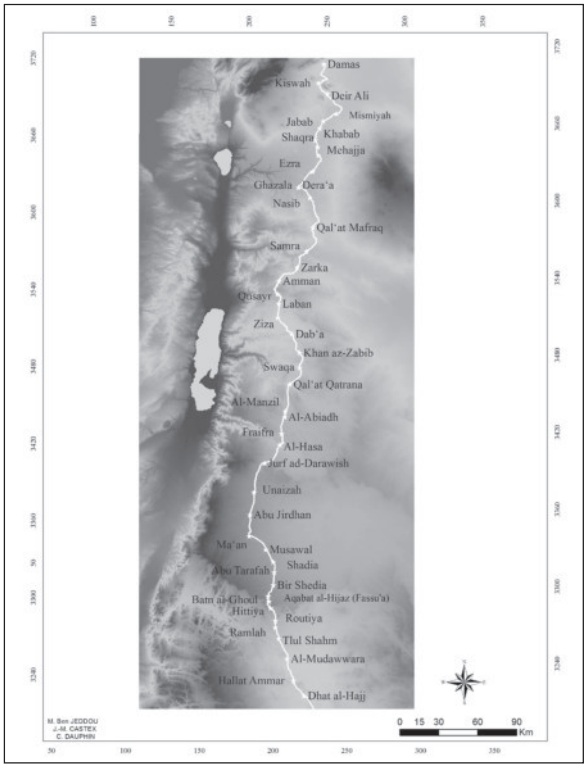
ونحن جداً ممتنون للدعم المادي والمعنوي الذي تقدمه هاتين المنظمتين، منذ كانون الثاني ٢٠١٤، فضلا عن اهتمامهما الصادق بعملنا؛ ونذكر بالخصوص د. بيل فينلايسون، مدير مجلس الأبحاث البريطانية في بلاد الشام، لندن، لدعمه لهذا المشروع لدى دائرة الآثار العامة الأردنية، وهو ما سمح لنا بالإطلاع على قاعدة بيانات المواقع الأثرية الأردنية JADIS. وكذلك برنامج توثيق وإدارة التراث الوطني الأردني MEGA.

وما لمسناه نحن، الأستاذة كلودين دوفان، أستاذة فخرية في علم الآثار واللاهوت بجامعة ويلز، ترينيتي، سانت دافيد، من تعاون مثمر منذ سنة ٢٠١١.

كما نتقدم بشكر خاص إلى مدير عام دائرة الآثار العامة د. منذر الجمحاوي لمساعدته لنا في الحصول على مختلف الخرائط من المركز الجغرافي الملكي



٢١- محطة قطار الحجاز بالمفرق: على سـكّة الحديد كتابة (السلطان الغازي عبدالحميد)، وكذلك اسـم الشـركة البريطانية كوكريل (© كلودين دوفان٢٠١٤).



٢٢. خط سـكة حديد الحجاز ومحطاته (© كلودين دوفان، محمد بن جدو، جان ماري كاستاكس).

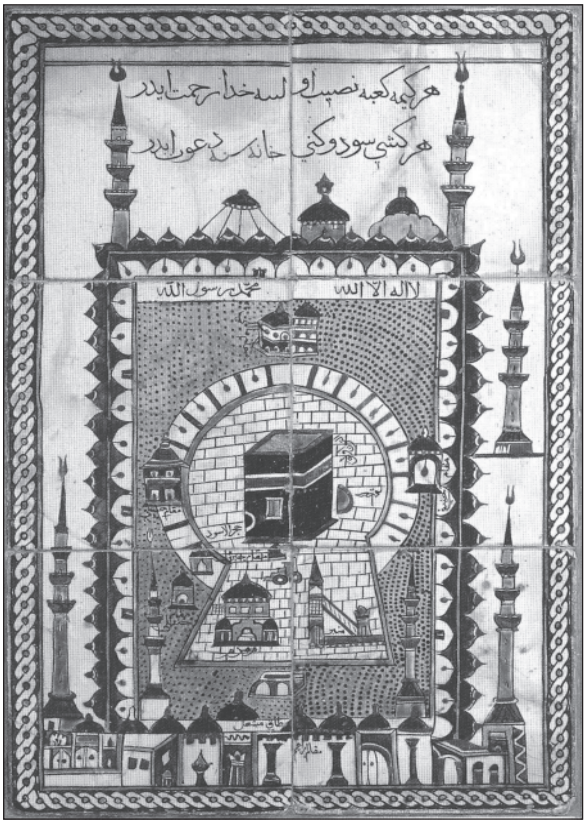
٢٣. محطة قطار الحجاز بالمفرق (© كلودين دوفان٢٠١٤).

الأردني، دائرة الأراضي والمساحة، وزارة الطاقة والثروة المعدنية ومن وزارة المياه والري.

كل هذه الخرائط تمّ تحويلها، من طرفنا، إلى خرائط رقمية، كما تم تجميعها وضبط الإحداثيات وتحويلها إلى بيانات رقمية.

نتقدم بالشكر كذلك إلى مساعد مدير عام دائرة الآثار العامة جهاد هارون لمساعدته القيّمة خصوصا في ما يتعلق بالإجراءات الاداريّة، وكذلك قتيبة

٢٤. قاطـرة بخارية من قاطرات الخـط الحديدي الحجازي تقف إلى جانب محطة المفرق (© كلودين دوفان٢٠١٤).



٢٥. بلاطة خزفيّة من انتاج ازنيك (تركيا) لمكّة (٧٣×٤٩,٥ سنتم) تعـود إلى القـرن ١٧، وقع اقتناءها من مصـر، متحف بيناكي (أثينا، اليونان).

الدسوقي (مساح طوبوغرافي بنفس الدائرة) لمصاحبتنا إلى مختلف المؤسسات في إطار سعينا للحصول على الخرائط، دون أن ننسى نادية القيسي، سكرتيرة بالمجلس الثقافي البريطاني بعمّان لمساعداتها الثمينة.

وفي النهاية، لا يمكن أن ننسى مساندة فتوح البنّا،

مسؤول سابق عن قسم الإعلام بدائرة الآثار العامة، توفّي سنة ٢٠٠٩، خاصة وأنه كان قد تنقّل مع بعض أعضاء المشروع إلى سوريا سنة ٢٠٠٨، رجوعا بنفس طريق قافلة الحج الشامي في العهد العثماني.

بعد انقطاع دام حوالي ٦٠ عاماً، قام هذا البحث بإحياء كتابات الصحفية ران دوفان التي كانت تهتم بصفة خاصة بهذا الموضوع، لا سيّما في جانبه الأردني.

من خلال تناول مسألة درب الحج الشامي بالإعتماد على منهج علمي وتقنيات بحث جديدة، نأمل أن يكون هذا العمل تكريماً لكل من ورد ذكرهم في هذه الصفحات.

Claudine Dauphin,
Mohamed Ben Jeddou
Jean-Marie Castex
Darb al-Hajj Part 2

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