Department of Antiquities of Jordan Centennial
1923 - 2023

On Tuesday, the 27th of June 2023, the Department of Antiquities celebrated the 100th anniversary of the issuance of the decree of the late King Abdullah I Ibn Al-Hussein to establish it to preserve ancient antiquities in the country.

That decree was a starting point in the establishment of one of the oldest state institutions, and evidence of the great interest of the Hashemites in preserving antiquities and their awareness of the importance of the features of Jordan's civilization, which are deeply rooted in history.

The Department of Antiquities took the lead in preserving the Kingdom's tangible and cultural heritage by documenting, supervising and maintaining thousands of archaeological and heritage sites.

The honorable Council of Ministers approved the establishment date of June 27th as a national day under the name (**Jordanian Antiquities Day**), during which Jordanians are exempted from entry fees to archaeological sites and museums, and to raise awareness and promote the importance of conservation and safeguarding of Jordan's cultural heritage.

Notes for Contributors

The Annual of the Department of Antiquities of Jordan (ADAJ) 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. : +962 6 **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.

Preparation of the Manuscript

The manuscript should be **no more** than **10,000 words** (around **20 pages**) including bibliography, illustrations and figures and its captions. Please include name(s) and address(es) of the author(s) as you would like them to appear in the publication at the end of the manuscript. The order of the manuscript should be:

1. Title of the contribution and name(s) of author(s);
2. Body of text;
3. Address(es) of author(s);
4. Bibliography;
5. Footnotes (if any);
6. Captions of illustrations and figures.

Submission of the Text

Should be on computer diskettes, Macintosh or PC compatible, as well as double spaced hard copy. For Macintosh diskettes include a copy of the document saved as "text only" on your diskette. For PC compatible diskettes include a copy saved as "Rich Text Format". The manuscript should be submitted in final form with no substantive changes expected later.

Illustrative Material

Should accompany the manuscript at the time of submission. All illustrations (drawings as well as photographs) should be referred to in the text as "**Fig.**" in consecutive order.

Figures should not exceed 17×22cm in size. Illustrations in electronic form may be submitted, preferably in (**.jpg**) format (figures scanned into Word documents are **not** acceptable).

The resolutions should be **250 pixels/in** for photographs and **600 pixels/in** for line drawings.

Foreign Words and Italicized Words

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 romanization 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.

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System of Romanization from Arabic

Consonants

ء	’ (except where initial)	ض	d̲
ب	b	ط	t̲
ت	t	ظ	dh̲
ث	th	ع	‘
ج	j	غ	gh
ح	h̲	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	s̲	ي	y
ـة ة	at *or* ah		

Long Vowels		*Short Vowels*	
ا، ى	ā	ـَ	a
و	ū	ـُ	u
ي	ī	ـِ	i

Common Nouns

تَلّ	Tall	دَيْر	Dayr
جَبَل	Jabal	عَيْن	‘Ayn
خِرْبَة	KHirbat *or* KHirbah	وادي	Wādī

Doubled Letters (Tashdīd)

عَيّ	‘Ayy	ثوّاب	THawwāb

*Arabic Definite Article**

Solar Letters		الْغَوْر	Al GHawr
(أ، ب، ج، ح، خ، ع، غ، ف، ق، ك، م، هـ، و، ي)		الْكَرَك	Al Karak
		الْمَفْرَق	Al Mafraq
Sun Letters		الذَّريح	Adh DHarīh̲
(ت، ث، د، ذ، ر، ز، س، ش، ص، ض، ط، ظ، ل، ن)		الرَّمْثا	Ar Ramthā
		الشَّوْبَك	Ash SHawbak

** Please use (Nonbreaking Space) between sun or solar (Al) and the rest of the word.*

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

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Arabic Section

GHAZI BISHA
(1945-2022)
THE HUMAN, THE SCIENTIST, THE MANAGER AND THE FRIEND

Mohammad Najjar

Ghazi was born in 1945 in a small house at King Talal Street in the center of the Amman to a Circassian family living that had emigrated to Jordan in the eighties of the nineteenth century. His father was an officer in the Jordanian army. He studied primary and preparatory stages at the Islamic Scientific College and then completed his secondary education at Al Hussein College, after which he completed his studies at the University of Jordan in 1963-1967. In 1969, Ghazi left for the United States, where he received his master's degree from Ann Harbor University Michigan and then returned to work for the Department of Antiquities. Ghazi left again for the United States to the same university where he received his doctorate in Islamic Archaeology in 1979.

The beginning of my acquaintance with Ghazi was in 1982 when I was appointed as a "museum curator" at the Jordanian Archaeological Museum at Amman Citadel (Jabal Al Qal'ah). Ghazi visited the museum frequently either to study archaeological finds he had found in the Al Ḥallābāt Palace or to hand over archaeological finds that had recently been uncovered elsewhere. Ghazi was the typical field archaeologist example of a tall man, single, fluent English speaker and most importantly an excellent reader and follower of everything new in the field of archaeology.

All Ghazi wanted to become the happiest human being on the face of the earth was a good archaeological site (Al Ḥallābāt, Mushāsh, Ash SHawbak, Al 'Aqabah, Ṭabaqat Faḥl (Pella), Mādabā, and many others), a tent and an old Toyota vehicle.

In short, Ghazi was the model that we all looked forward to and tried to imitate, except for tallness and marriage from where we had exceeded the age at which we might become taller or where we could abandon wives.

In 1986, Ghazi headed the Jordanian archaeological team that carried out archaeological excavations at the Saar area in Bahrain, of which I was a member, and when Ghazi became Director General of Antiquities in 1988, he transferred me from the Citadel Museum to the main Department at the third circle in Jabal 'Ammān where I was appointed head of the Department of Excavations and Archaeological Surveys which he himself headed from 1982 to 1986.

Ghazi retired in 1992 to return after being for three years, the director of the Madaba Archaeological Project to fill the post of Director General of Antiquities for the second term. I can say that Ghazi was ascetic in administrative jobs and has been attracted by the field and the

library much more strongly than classrooms or luxury offices, but in spite of that he was flooded with jobs from an antiquity's inspector to the head of the excavation department to a projects' manager and a technical assistant to a director general of the Department of Antiquities.

Ghazi was never an aspirant in any administrative work and his acceptance of administrative positions was reluctantly the result of the enormous pressure exerted on him, but out of the motivation of commitment and duty Ghazi was successful everywhere he was placed. He told me in his last days in the Department of Antiquities that he would prefer to be an inspector of antiquities of Umm Qays rather than to be the director general of antiquities, but this was not achieved for him, after his second retirement from the post of director general of antiquities in 1999 he was appointed to superve the Jordan Museum project.

During his scientific career, Ghazi has completed many researches, articles and scientific reviews, including but not limited to his distinctive contributions to the series of exhibition trails "Museum Without Borders" on Islamic art in the Mediterranean region, and the comprehensive documentary book on Qusayr 'Amrah in cooperation with the French Institute of Archaeology in Amman, and his views were considered an argument in Islamic antiquities where Ghazi received great recognition and respect among archaeologists at the international and local levels.

The French State awarded Ghazi with the Orden of the Knight for his significant contributions to the preservation of Jordan's archaeological heritage in cooperation with the competent international institutions.

Ghazi was a lover and practitioner of sports, especially basketball and football, and he was a persistent fan of English football, and everyone in the circle knew that you could not call Ghazi or visit him during the World Cup matches, and some of the drivers in the Department of Antiquities were following the English matches and the local matches with the intention of discussing the details of each match with him, and the discussion was raging to become a discussion between enthusiastic and fanatical fans.

His height, his gray hair, with the intention of thick prescribed glasses and his features of rigidity, like any other Circassian, gave him a majestic and even deceptive appearance, for those who did not know him.

For those who met him for the first time he left the impression of a very serious and sober person who thinks only of scientific research and archaeology only.

But, to his friends, Ghazi (Abu Jameel) had a high sense of humor that many did not enjoy and saw a humorous aspect in the most serious things in life.

IN MEMORIAM: SIEGFRIED MITTMANN (12.10.1933 – 29.4.2022)

Zeidan Kafafi and Jens Kamlah

Prof. Dr. Siegfried Mittmann died on April 29, 2022 in Tübingen at the age of 88. He was a very well-known scholar and researcher on the national and international scales of the Ancient Near Eastern Studies and Biblical Archaeology. He served as a Director of the Institute of Biblical Archaeology in the Faculty of Protestant Theology at Tübingen University from 1978 to 1999.

Prof. Mittmann was born in 1933 at Goldau in Westpreusia. He studied Protestant Theology and graduated in 1959. In 1960 he was appointed as an assistant at the Institute of Biblical Archaeology in Tübingen, which was established that year. He participated and followed up in building this academic unit from its beginning. In 1962 he joined the "Lehrkurs" offered by German Protestant Institute of Archaeology (DEIHL).

During the years 1963-1966 Prof. Mittmann lived with his family in Jerusalem. From Jerusalem he travelled and wandered extensively in northern Jordan and conducted an intensive archaeological survey. In 1970 he published the results of this survey in his PhD dissertation:

"Beiträge zur Siedlungs- und Territorialgeschichte des nördlichen Ostjordanlandes". Abhandlungen des Deutschen Palästina-Vereins 83, Wiesbaden 1970.

In addition, for his habilitation which he received in 1971, he submitted a scientific study entitled "Deuteronomium 1,1-6,3 lietrarkritisch und traditionsgeschichtlich untersucht"; Beihefte zur Zeitschrift für die alttestamentliche Wissenschaft 139, Berlin/New York 1975.

Both monographs, as well as numerous scholarly articles, revealed Siegfried Mittmann to be a perceptive and resourceful researcher whose work was characterized by meticulous observations, careful analyses, and methodological thoroughness. His research method of combining archaeological studies with analyses of biblical texts has contributed significantly to our understanding of both biblical narratives and the archaeology and history of Jordan. Mittmann's interest, however, was not only related to the biblical period, but to all periods of Jordan's history. Of particular importance are his studies of Roman milestones and the Roman road system in Jordan.

In 1978 Siegfried Mittmann took-over from Arnulf Kuschke the Chair of Biblical Archaeology in the Faculty of Protestant Theology at Tübingen University, and he held that chair until his retirement in 1999. During this period Mittmann started an excellent scientific relationship with both national and international institutions. His sincere efforts made the Institute an international center for Biblical Archaeology.

Siegfried Mittmann gained experience in archaeological excavations in Kamid Al Lawz (Lebanon) and in Bāb Adh DHirā' (Jordan). With Paul Lapp, the excavator of Bāb Adh DHirā' at that time, an intensive cooperation connected him already since the survey in Northern Jordan. The pottery finds of the survey had been studied by Siegfried Mittmann with the help of Paul Lapp. The interest in the archaeology of Jordan led Siegfried Mittmann to his most important scientific work: the joint expedition to the Early Bronze Age site KHirbat Az Zayraqūn (1984-1994) in northern Jordan, which he conducted in cooperation with Yarmouk University represented by Mo'awiyah Ibrahim. Under the direction of Siegfried Mittmann and Mo'awiyah Ibrahim, a Jordanian-German team has excavated large parts of the Early Bronze Age city of KHirbat Az Zayraqūn, including a city wall, two city gates, a temple precinct, a palace, and an area with domestic houses. As a result of Mittmann's archaeological activities, he was appointed as a corresponding member of German Archaeological Institute in Berlin in the year 1988.

Another focus of his research was historical topography and settlement history. This is reflected among others by his research in the "Tübingen Atlas des Vorderen Orients" (TAVO), which he conducted together with Wolfgang Röllig and many other scholars at Tübingen.

Siegfried Mittmann influenced the scientific direction of the discipline of Biblical Archaeology in Germany by his involvement in two non-university institutions: The German Protestant Institute of Archaeology in Jerusalem and ʻAmmān (DEIHL) and the German Society for the Exploration of Palestine (DPV). It is thanks to his commitment that both institutes of DEIHL, the Institute in Jerusalem and the Institute in ʻAmmān, have been expanded and that the Institute in ʻAmmān, despite severe crises, has been preserved as an important research institute for archaeology and history of Jordan. On behalf of the DPV he was editor of the monograph series (Abhandlungen des Deutschen Palästina-Vereins; 1975-1999 together with Manfred Weippert) and of the journal (Zeitschrift des Deutschen Palästina-Vereins; 1975-1993 together with Manfred Weippert and 1994-1998 together with Dieter Vieweger).

Of Siegfried Mittmann's international activities it should be mentioned here that he organized in 1986 the third "International Conference in the History and Archaeology of Jordan" held in Tübingen. Moreover, in 1990 he was announced as an "honorary member" of the "South African Society for Semitics," which was followed in the years 1996 and 1999 by honorary awards of the universities Bloemfontein and Stellenbosch.

With the death of Prof. Dr. Siegfried Mittmann Jordan and the archaeology of Jordan lost an excellent friend and archaeologist who studied and presented the Jordanian archaeological heritage to the world. For Siegfried Mittmann we are very much thankful.

AZRAQ ‘AYN SAWDA RESERVOIR PROJECT (2014-2016) TOPOGRAPHICAL PLAN, INVENTORY OF THE CARVED BLOCKS AND ASSESSMENT OF THE STATE OF PRESERVATION OF THE ARCHITECTURAL REMAINS

Lorraine Abu Azizeh, Julie Bonnéric, Barbara Couturaud and Aurélien Stavy

Al Azraq Oasis occupies a large area in the Eastern Desert of Jordan. It is located at the centre of the Al Azraq basin and is bordered to the north by the basalt flow of the southern Hawrān. Human occupation in this area is attested from the Lower Palaeolithic period (Late and Final Acheulian, *ca.* 250,000 years BP) onwards, and was present due to the abundant water resources associated with a high-water table (Rollefson *et al.* 2001; Richter *et al.* 2007, 2010; Maher *et al.* 2011; Cordova *et al.* 2008, 2013). The Al Azraq Oasis actually consists of a paleo-lake, now a seasonally inundated saline mudflat (**Fig. 1**). ‘Ayn As Sawdā’ is one of the several natural springs which feed the oasis. It is located inside a reservoir-enclosure, which is one of the main archaeological remains in the Al Azraq area (**Fig. 2**)[1]. Its location in a marsh is particularly interesting as it involves construction techniques specific to a wet environment. This site is well known in art history due to the discovery of several basalt blocks carved in bas-relief.

Faced by uncertainties concerning both the function and the dating of the structure, the Department of Antiquities of Jordan (DoAJ) and the French Institute for the Near East (Institut français du Proche-Orient, Ifpo), entrusted Lorraine Abu Azizeh with a new archaeological project dealing with research in architecture and archaeology as well as with conservation issues. A preliminary architectural analysis was made in 2013 (Vibert-Guigue and Abu Azizeh 2013), followed by two field seasons of the new Azraq ‘Ayn Sawda Reservoir Project, consisting of architectural and archaeological studies in 2014 and 2015 (Abu Azizeh *et al.* 2014, 2015) and a study season in 2016 (Abu Azizeh *et al.* 2016)[2]. This paper will present the structures related to the reservoir-enclosure of ‘Ayn As Sawdā’ and some of the initial results of the Azraq ‘Ayn Sawda Reservoir Project, namely the topographical plan of the site, the study and inventory of the carved blocks and an assessment of the current state of preservation[3].

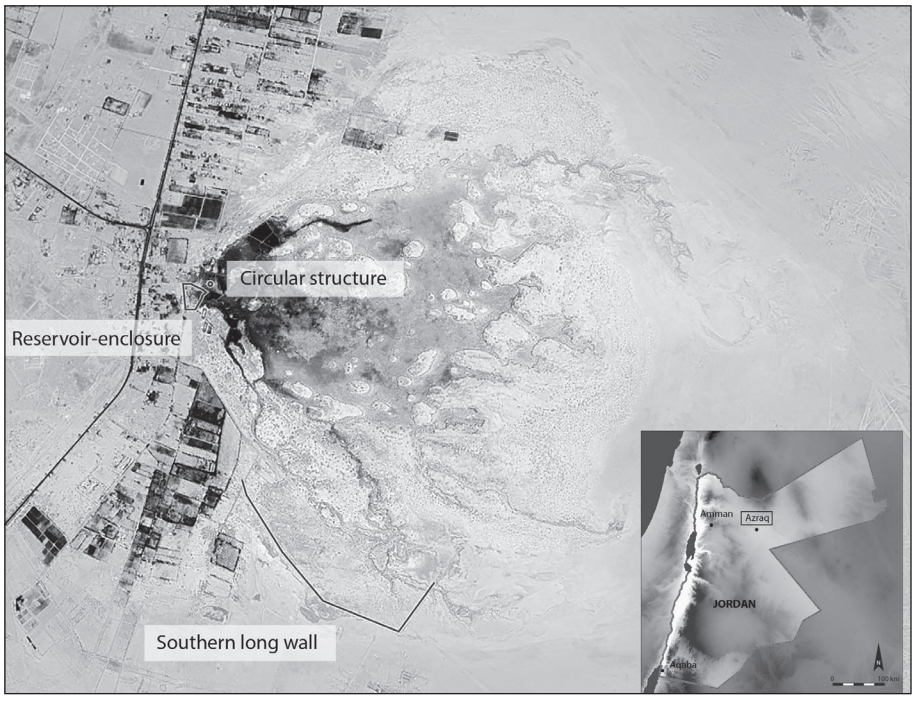
Previous Research

The site of ‘Ayn As Sawdā’ was first described by Alois Musil in 1927 (Musil 1927: 340-342) and then by Lionel W.B. Rees in 1929 (Rees 1929: 89-92), who erroneously named it “*Ain el Asad*” (**Fig. 3**). Their plans and illustrations contain many interesting elements; however, they lack precision and are somewhat rudimentary in nature. Moreover, the accompanying descriptions often contradict the architectural plan and require a cautious reading. Rees undertook excavations at the site, unearthing circular structures close to the northwestern corner of the reservoir enclosure that he interpreted as wells. He also dated the “reservoir” to the Byzantine period, interpreting its function as being for the storing

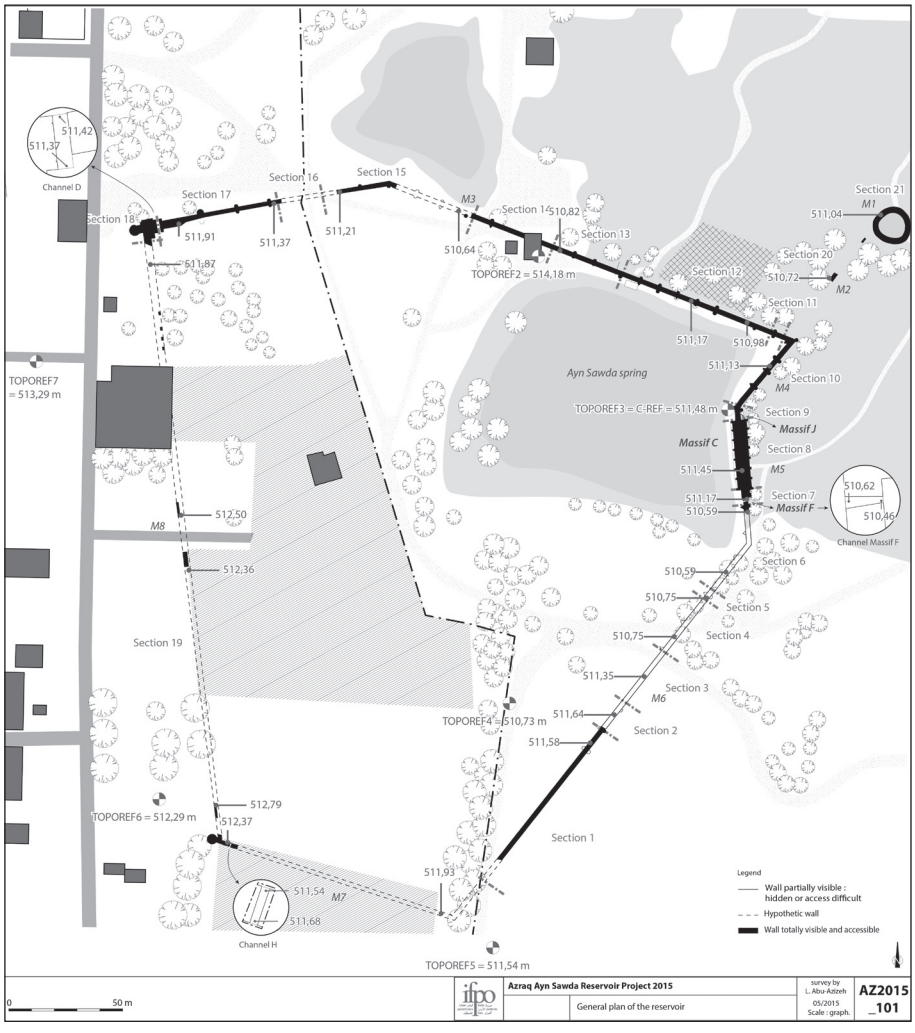
1. Nowadays, the archaeological site is partly in the Al Azraq Wetland Reserve, which is managed by the Royal Society for the Conservation of Nature (RSCN). It is also part of the Azraq Ash SHīshān Heritage Area, supported by the DoAJ.

2. The team included two architects; Lorraine Abu Azizeh and Aurélien Stavy, and two archaeologists; Julie Bonnéric and Barbara Couturaud.

3. The archaeological excavations program and its results will be presented elsewhere, see Abu Azizeh *et al.* forthcoming.



1. *Location of the architectural remains of 'Ayn As Sawdā', Al Azraq, Jordan (AASRP 2020, after Bing Map).*



2. *Plan of the reservoir-enclosure showing elevations, sections of the wall and location of the topographic references implemented in 2015 (AASRP 2015).*

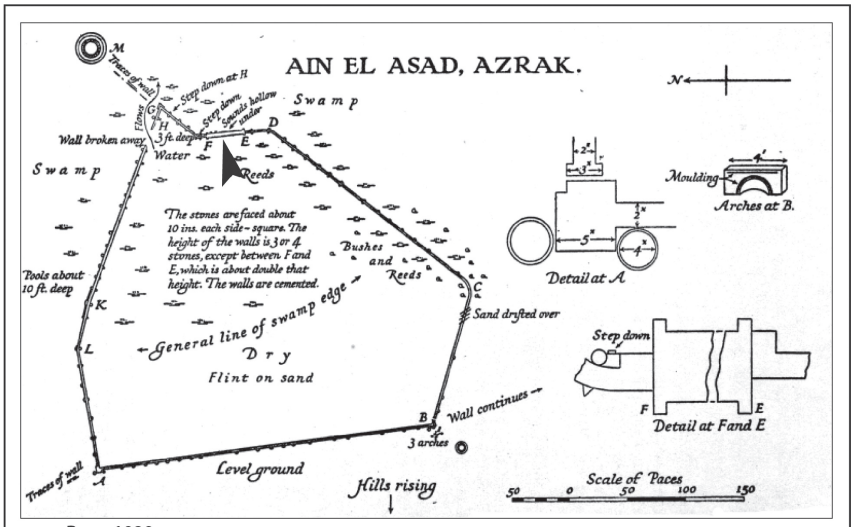
of fresh water. Interestingly, his plan indicates traces of wall going north and south from the western wall of the reservoir-enclosure that are no longer visible on the surface and are partly covered by modern dwellings. His plan also shows a small circular structure next to the southwestern angle of the "reservoir"; this structure may still exist but has not been identified on the surface, though it should be noted that it is located outside the reserve, among modern constructions. Fifty years after Rees, in a management plan for the Al Azraq Wetland Reserve, Peter J. Conder suggested that the wall of the reservoir-enclosure was intended to separate the fresh water of the 'Ayn As Sawdā' spring from the saline waters of the paleo-lake (Conder 1979: 13). He also associated the site with the Roman period and dated it around 300 AD. In 1982, David Kennedy proposed a new description of the "reservoir", based on aerial photographs and the plan established by Rees (Kennedy *et al.* 1982: 96-106). He was also the first clearly to describe and locate a long wall extending north from the reservoir-enclosure, probably corresponding to the traces of walls mentioned by Rees, which is no longer visible nowadays (**Fig. 3**).

In the early 1980s, because of excessive groundwater pumping for agricultural activities and urban water supply, the 'Ayn As Sawdā' spring started to dry out. In 1983, preoccupied by the drastically low level of the water in the reserve, the DoA sent Ghazi Bisheh to undertake rescue excavation works on the site of 'Ayn As Sawdā' (Bisheh 1986: 12-14). The first restoration of the enclosure wall was also initiated at that time. On that occasion, basalt blocks with mortise and tenon joints were discovered due to the lowering of the water level. Some of these blocks were decorated. They were concentrated inside the reservoir-enclosure, along a reinforcing buttress on its eastern wall, referred to here as Massif C. The refined ornamentation of the blocks suggested to Bisheh that Massif C corresponded to some sort of recreation platform. Fifteen years later, in 1997, an archaeological project, directed by Richard Watson and Wesley Burnett, resumed the study of the site (Watson and Burnett 2001). Three soundings were made during a single excavation season, leading to the discovery of a channel crossing the northern enclosure wall. The site was described in further detail and Musil's plans were corrected (**Fig. 3**). The function of the structure was interpreted as a reservoir that was supplied by the 'Ayn As Sawdā' spring, and intended to collect winter rainwater from outside through the channel. Contrary to most of their predecessors, they dated the site to the Umayyad period and attributed its construction to the caliphate of Al-Walid II (743-744). They believed that the "reservoir" could have been part of a larger but unfinished complex, perhaps intended to become a hunting reserve.

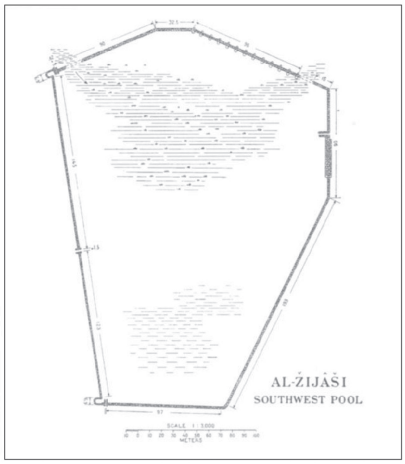
More recently, in 2004, Claude Vibert-Guigue undertook the study of the carved basalt blocks (Vibert-Guigue 2004, 2006, 2007, 2008, 2009, 2010 and 2013). He also published a plan, based on previous publications, but showing new elements, such as the visitors' track (**Fig. 3**). Five field seasons were conducted, entailing surface cleaning below the western face of Massif C and leading to the discovery of 71 additional blocks, like the first ensemble found in 1983 by the DoA, more than half of them adorned with bas-reliefs. An iconographical analysis led him to date their production to the Umayyad period and to suggest a strong Sassanid influence. Vibert-Guigue also proposed that some of the blocks might have formed a circular medallion organized around the largest block found (Vibert-Guigue 2010). Denis Genequand has also dated the site to the Umayyad period in his study of aristocratic settlements in the Near East under the Umayyad dynasty (Genequand 2012).

In 2013, due to the need to conduct further research at both an archaeological and an architectural level, and following the request of the DoA, the Ifpo implemented a new project in 2014, the Azraq 'Ayn Sawda Reservoir Project. The project lasted three years and was organized around four research axes: topography and architectural analysis of the site and the remains, inventory and morphological study of the carved blocks, assessment of the state of preservation of the architectural remains and archaeological excavations[4].

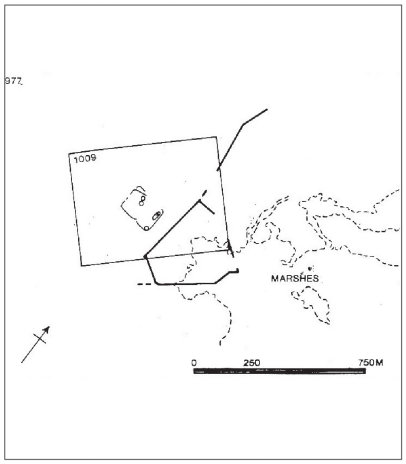
4. Only the first three axes are presented here. The archaeological excavations will be published separately; see Abu Azizeh *et al.* forthcoming.



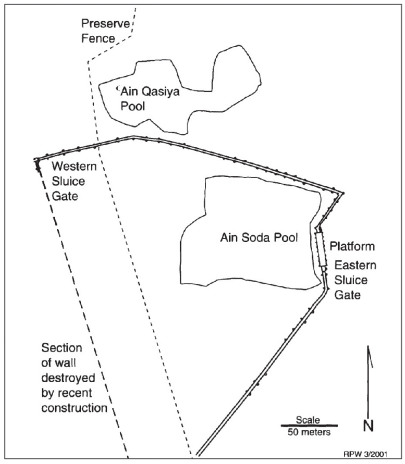
Rees, 1929



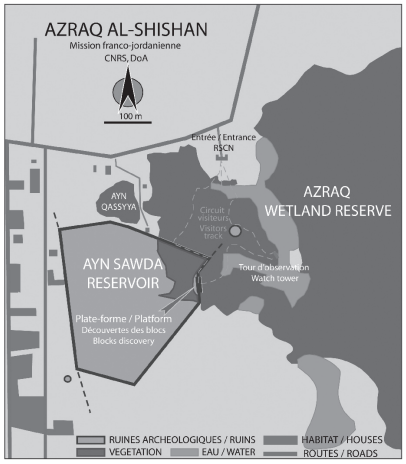
Musil, 1927



Kennedy & *al.*, 1982



Watson and Burnett, 2001



Vibert-Guigue, 2008

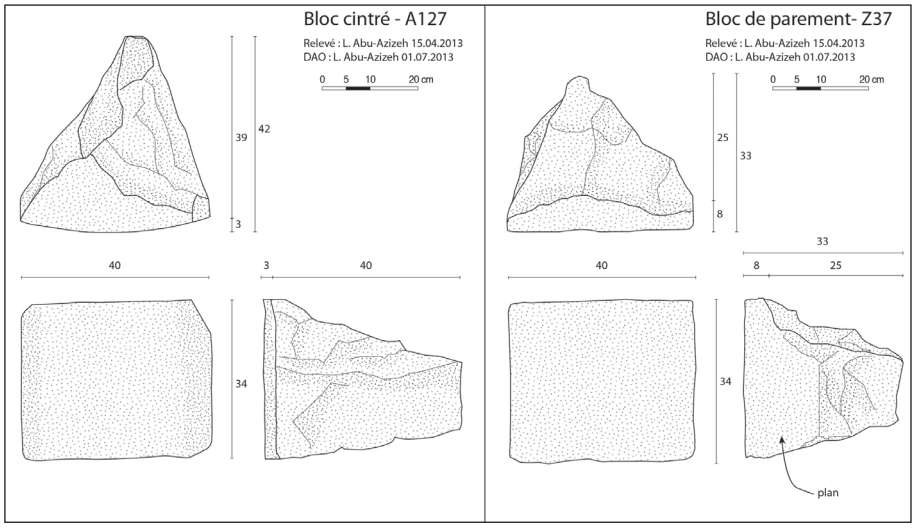
3. Previous plans of the reservoir-enclosure (after Musil 1927, Rees 1929, Kennedy et al. 1982, Watson Burnett 2001 and Vibert-Guigue 2008).

Architectural Description and Topographical Plan

The site comprises three main structures: the reservoir-enclosure, a circular structure north-east of the reservoir-enclosure, and a long wall located more than 1km south of the reservoir-enclosure (see **Fig. 1**). All three share similarities from an architectural point of view, even though neither their contemporaneity nor their connection has been clearly established.

The reservoir-enclosure is the most important structure on the site (see **Figs. 1, 2**). The inner and outer faces of the wall are made of basalt blocks in diamond tip shape (**Fig. 4**). The width of the wall varies from 1.70m to 2.15m. The height of the preserved masonry varies from a barely visible line in the ground on the worst preserved sections, to four stone courses above the natural soil, as on Massif C and its surroundings (**Fig. 5**). The original height of the wall is difficult to reconstruct, but it probably would not have exceeded four to five courses. The height of the courses is regular, as they measure between 28cm and 40cm. The width of the basalt blocks varies from 15cm to 70cm, while their depth varies from 35cm to 70cm. The internal filling of the wall consists of medium to large basalt rubble stones in mortar (**Fig. 6**). In some areas where the wall was heavily damaged, it was possible to see that the internal fill was clearly made up of several layers corresponding to the stone courses and separated by a thin layer of hard, compact mortar; it can be assumed this was the case for the entire wall, but it has not been possible to verify it. The top surface of the wall is currently composed of the facing blocks of the highest existing course and the internal fill between the two wall faces (**Figs. 6, 7a, 7b** and **8**); no evidence of a wall covering system was found.

Formerly known as the "platform" (Bisheh 1986; Watson and Burnett 2001; Vibert-Guigue 2004), the long Massif C on the eastern wall M5 measures 30.5×6.10m (**Fig. 9**). There is an adjoining, smaller massif at each end of Massif C. Massif J, on the north end of Massif C, measures 4×1.5m and borders the outer face of wall M5 (**Figs. 9, 10a**); its main function has yet to be identified. Massif F, located south of the long Massif C, measures 3.4×1.6m and presents the same building technique as Massif C (**Figs. 9, 10b**). Partially collapsed, it clearly shows that it is not linked with the main wall of the reservoir-enclosure.



4. Drawings of two diamond tip-shape basalt blocks used in the architecture of 'Ayn As Sawdā' (AASRP 2015).

5. Massif C: a) general overview from the north; b) triangular buttresses on the inner side; c) foundation bench on the inner face (AASRP 2014).

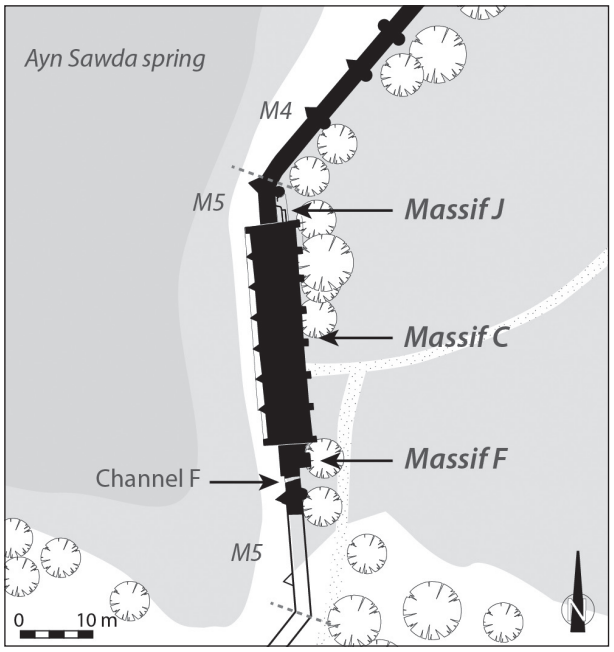
There are 55 buttresses distributed along the wall of the reservoir-enclosure, clearly bonded with it (**Figs. 7, 11**): 41 are semicircular in plan (diam. 1.18m to 1.75m) and are distributed along the northern and eastern walls M3, M4, M5 and M6 (**Figs. 7a, 2**); the 13 others are triangular (width 95cm to 2.25m) and are systematically positioned on the inner face, along the northern and eastern walls M3, M4 and M5 (**Figs. 7b, 2**). Two additional buttresses were unearthed during the excavations, located on the western ends of the southern and northern walls M7 and M3 (**Figs. 8, 2**); these are roughly indicated on Musil's plan (see **Fig. 3**). They are different in terms of shape, since they are larger than the others, and completely circular (diam. 4.82m and 4.50m). On the outer face of Massif C, 8 rectangular buttresses were built (approx. width 68cm, approx. depth 95cm) (**Fig. 9**); on its inner face, there is a rectangular one at the southern and the northern ends (approx. width 66cm, approx. depth 82cm to 94cm) (see **Figs. 5c, 7c**), and 6 triangular ones in between (approx. width 1.15m), built on a foundation bench made of long basalt headers block (see **Fig. 5b**).

6. Example on the wall of the reservoir-enclosure showing the internal fill linked with the one of the buttresses (AASRP 2015).

7. The three types of buttresses: a) semicircular; b) triangular; c) rectangular (AASRP 2014).

8. Circular buttresses: a) in the north-western corner of the reservoir-enclosure; b) in the south-western corner of the reservoir-enclosure (AASRP 2014).

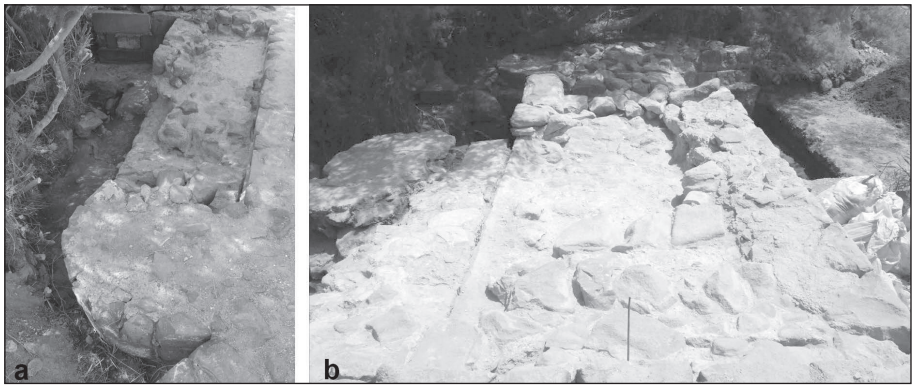
Although the study of the masonry was occasionally obstructed by restoration works carried out by the DoA and the RSCN on Massif C, the eastern wall M4 and the eastern part of the northern wall M3, the architectural analysis has proved the homogeneity of the ensemble, which most probably indicates a single construction phase. Indeed, the wall face is systematically and regularly interrupted by the buttresses and the internal fill of the wall is clearly linked with one of the buttresses (see



9. Plan of Massif C (AASRP 2015).

Figs. 6, 7), contrary to previous observations (Watson and Burnett 2001: 76). Furthermore, most of the buttresses still visible have facing blocks penetrating into the masonry of the main wall, proving, here again, their connection. These observations, combined with the typical Umayyad shape of the buttresses (Genequand 2012) allows the wall to be dated *a priori* to this same period.

Approximately 50m northeast of the northeastern angle of the reservoir-enclosure is a circular structure, covering an area of 105m^2 (see **Figs. 2, 12**). The structure seems linked to the reservoir-enclosure by a possible wall, from which some stones have been excavated. Its wall (length 50m, approx. width 2.40m) is similar to the reservoir-enclosure, both the inner and outer faces being made with basalt blocks cut in a diamond tip shape, and the fill consists



10. Small massifs next to Massif C: a) Massif J view to the south; b) Massif F view to the south (AASRP 2014).

11. Two examples from Massif C showing the link between the wall and the buttresses: facing blocks penetrating into the main wall's masonry (AASRP 2015).

12. Circular structure north-east of the reservoir-enclosure: a) mortar partly covering the steps; b) inner steps (AASRP 2014).

of small basalt rubble stones and mortar. The three courses that define the wall's elevation are built in a step-like way on both faces, each step being around 15 to 20cm wide. The height of the courses varies from 20 to 30cm. The lower course is made of large, roughly squared blocks, unevenly flat on the superior facing; the middle course is made of a series of large, cut rectangular blocks; lastly, the upper course is composed of small, cut rectangular blocks. It seems that the structure has been subjected to many modern restorations, especially on the upper course where one additional course was set on the inner face, made of small cut basalt blocks. It should be noted that the structure is unevenly covered by a white mortar (**Fig. 12a**).

Lastly, situated to the south of the reservoir-enclosure, a long wall should be mentioned, previously described by Kennedy (Kennedy *et al.* 1982: 96-106). During the fieldwork of the Azraq 'Ayn Sawda Reservoir Project, the 1.6km remains of this wall were surveyed (see **Figs. 1, 13**). It runs roughly southeast, bordering the marshes, and three changes of direction have been identified before reaching a corner that marks a clear shift in orientation towards the northeast and the core of the wetland. The architecture and the building techniques are similar to those of the reservoir-enclosure. The width of the wall varies from 1.20 to 1.50m. There are also buttresses along both faces; most of them are no longer visible and only 8 circular ones were identified (diam. 1.05m to 1.43m).

Until 2014, only five basic plans of the 'Ayn As Sawdā' structures were available, made by Musil in 1927, Rees in 1929, Kennedy in 1982, Watson and Burnett in 2001, and Vibert-Guigue in 2008 (see **Fig. 3**). None of these plans was based on topographical surveys of either the area or the structures, and thus remained inaccurate. Therefore, a first topographical plan of the site was created and integrated in a geodetic system. The overall survey of all visible structures –*i.e.* the reservoir-enclosure, the northern circular structure and the southwestern long wall– was completed by hand, in the field (see **Fig. 2**). Seven topographic reference points were placed along the reservoir-enclosure wall. Their position was then verified, in order to guarantee the accuracy of their placement, which varied from 1cm to a maximum of 3cm, a gap considered as very acceptable since the scale of the site is of several hectares and the distance between the total station and the farthest points surveyed was approximately 500 metres.

The establishment of the general plan of the site offered the opportunity to work on the elevations of the different structures (see **Fig. 2**). The accurate study of the levels of the reservoir-enclosure revealed a variation in the elevation of the top of the wall of about 2 metres (510.75m on the northern wall M3 to 512.79m close to the southwestern corner).

A certain regularity (511.48m to 511.58m) is visible along the eastern walls M4, M5 and M6, whereas a clear difference appears on the western part, both on the northern wall M3 where only one course is preserved (511.91m), and on the entire western wall M8 (512.50m).

The topographic survey also showed an important gap between the altitudes of the

13. The long wall located south of the reservoir-enclosure and its different states of preservation: a) with the facing preserved; b) with the facing damaged causing collapse of internal fill; c) badly preserved (AASRP 2016).

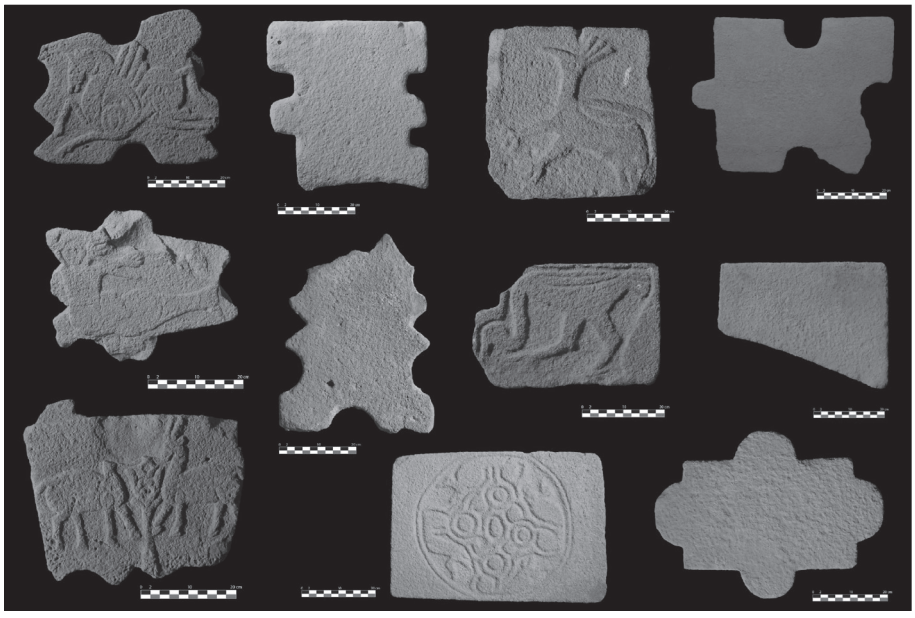
northwestern channel (sector D, max. elev. 511.42m), the southwestern channel (sector H, max. elev. 511.68m) and the eastern channel (sector F, max. elev. 510.50m). The question of elevation is crucial here, especially when related to structures containing water, and this comparison shows a difference of 1.18m between the channels located in the southwestern corner, which is the highest, and the one situated on the eastern wall, which is the lowest.

It should also be noted that the base of the foundation of the northern wall M3, through which the northwestern channel is pierced, is at the same elevation as the top of Massif C (511.42m and 511.45m). This difference shows that the structure is not a large water reservoir with an entry channel located in the northwest and an evacuation channel in the east as previously proposed (Watson and Burnett 2001), since it is evident that the first one could not have been lower than the second one. This suggests that the structure was more of an enclosure wall, at least its western part (wall M8) (Abu Azizeh *et al.* forthcoming).

The Carved Basalt Blocks

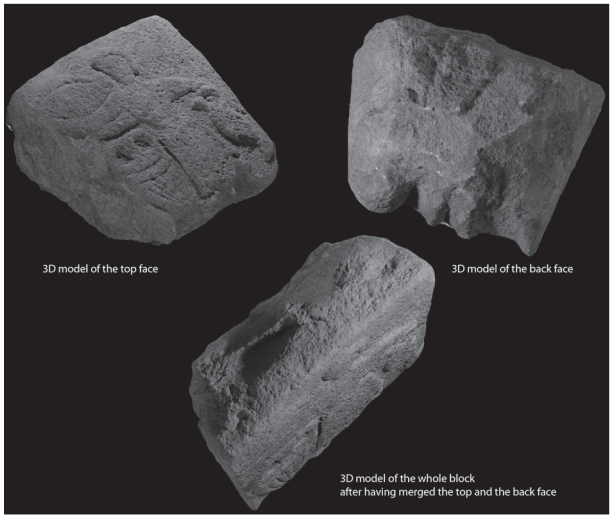
The carved basalt blocks discovered between 1981 and 2013 in the reservoir-enclosure of 'Ayn As Sawdā' form an exceptional archaeological collection, which, until now, has no known iconographic parallel (**Fig. 14**) (Abu Azizeh 2015). The corpus consists of 106 blocks: in 2016, 92 blocks were exhibited in the archaeological depot of Qal'at Al Azraq, 10 were presented in the Museum of Jordanian Heritage at Yarmouk University in Irbid and 4 of them have disappeared since their discovery. Ninety-five blocks have a carved upper face (52 bas-reliefs, 7 high-reliefs) with figurative representations that assimilate the ensemble to the Umayyad period (Bisheh 1986: 13-14; Vibert-Guigue 2006: 327). Reliefs depict animals (fishes, game animals, wild animals, eagles, dogs, *etc.*), ornamentation with plants (trees, pomegranates in a vase, *etc.*), mythological creatures (winged horses, sea horses, *senmurv*, mermaids, *etc.*), human beings (women, men) and geometrical shapes (interlacing, sun, *etc.*). Differences of colour between blocks were noticed, varying from black to a rusty colour due to being in water for a long time.

The common point of almost all the blocks is the presence of mortise and tenon joints on one or several of their faces. This system is composed of two elements: one presents a male extremity and the other a female extremity, which is mainly used in carpentry and joinery (Aurenche 1977: 118, 166). Blocks are of different shapes, *i.e.* rectangular, square, circular, trapezoid or irregular, and the mortises and tenons are either rectangular, triangular or circular (**Fig. 14**). Only the upper face is cut precisely and flat (**Fig. 15**). The lateral faces and the back face are roughly and approximately

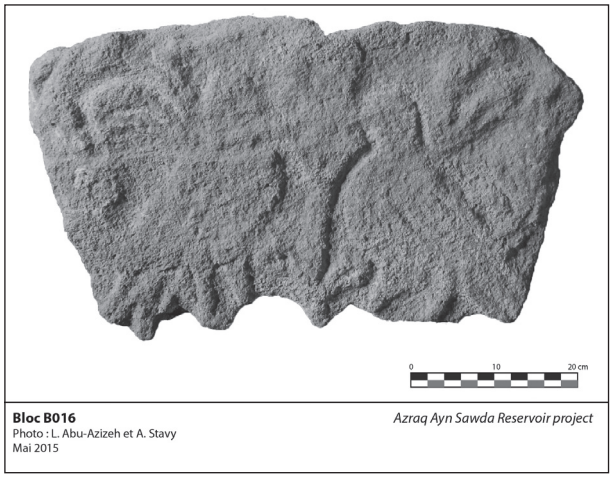


14. Some of the decorated basalt blocks found in the reservoir-enclosure (AASRP 2015).

flat –they do not present the same profile as the architectural blocks that compose the walls of the reservoir-enclosure– *i.e.* cut with a diamond tip shape. The thickness of the blocks varies from one to another, up to 36cm. The state of preservation of the blocks is relatively good: only two blocks are broken and fragmentarily preserved, but breaks were noted on 77 blocks. The upper face is sometimes very damaged, making the reading of the relief difficult, as on block B016 for instance (**Fig. 16**).



15. Multiple views of carved basalt block bearing a relief (AASRP 2015).

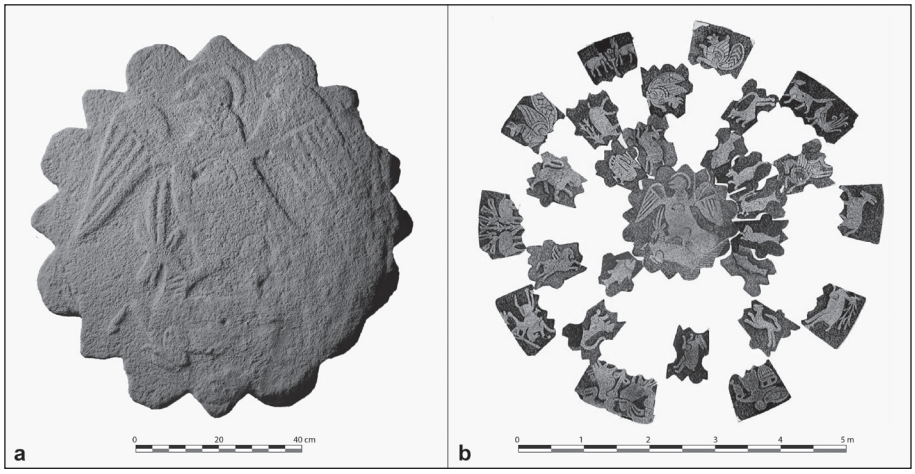


16. Block B016 showing a relief depicting two birds and a tree (AASRP 2015).

The function of these blocks is difficult to understand. Vibert-Guigue has proposed that part of the blocks belongs to a specific set that he describes as a circular medallion (Vibert-Guigue 2010) (**Fig. 17b**). This medallion, half of the blocks of which would be missing, would be organized in three circular registers around the central block B093 (**Fig. 17a**); its total diameter would then be 3.10m. This hypothetical reconstruction has never been tested with the real blocks as their manipulation is very complicated due to their weight and size.

One of the aims of the Azraq 'Ayn Sawda Reservoir Project was not only to document the blocks, but also to use new techniques that allow new approaches to their study in order to better understand their function. A database was set up, integrating the list of the blocks, the new graphic documentation and the details observed on site (description of the assemblies, surfaces, measurements, *etc.*). This exhaustive catalogue has since been used by the DoA of Al Azraq as a control tool for the collection.

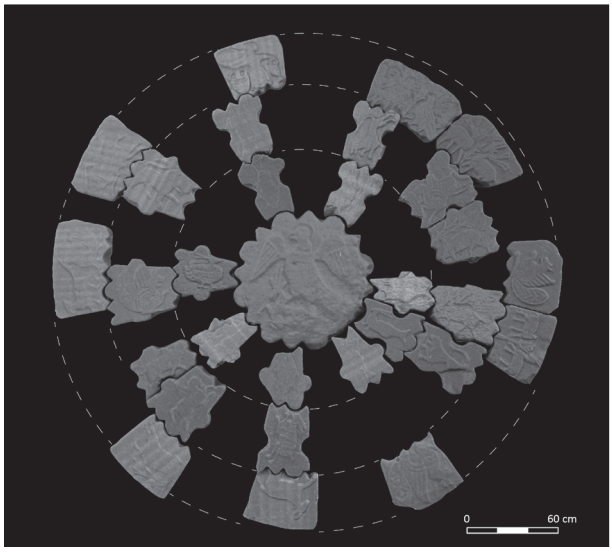
The new documentation of the blocks bearing a relief also allowed 3D scaled models to be generated thanks to photogrammetry. The 3D models are easily manipulable in 3D display software and constitute a unique documentation which allows the whole corpus of blocks to be worked on virtually. In this context, a collaboration was set up between the Ifpo and



17. Circular ensemble of adorned basalt blocks: a) central basalt block B093 (AASRP 2015); b) reconstruction of the medallion suggested by Claude Vibert-Guigue (Vibert-Guigue 2010).

an engineering school in France, the CESI in Ecully, in order to make 3D prints of the 59 blocks bearing a relief decoration (**Fig. 18**). The blocks were printed at scale of 1:5. The weight of every element varies between a few dozen grams and approximately 200g, allowing their handling in order to test not only the organization of the blocks between each other but also to better define the integration of the blocks in the general architecture and the reservoir-enclosure. More particularly, the 3D prints of the blocks allowed previous hypotheses to be tested, in particular the reconstruction of a circular medallion by Vibert-Guigue. If certain fittings of tenons and mortises seemed to work in 2D, the tests with the 3D printed blocks showed the incompatibility of these combinations (see **Fig. 17b**) and seems to refute the hypothesis of a circular medallion placed on a vertical wall. The work is still in progress but the printed blocks clearly are an exceptional study tool to propose new hypotheses based on the previous results, with blocks fitting into each other to create three levels encircling a central medallion, even though some of the rectangular blocks do not take part in the composition (see **Fig. 18**).

Finally, the archaeological excavations around Massif C did not lead to the discovery of new carved blocks; no architectural or stratigraphical link could thus be established beyond doubt between the reservoir-enclosure and the ornamental blocks. However, the precise study of the blocks during the documentation phase revealed the presence of mortar remains on the back face of 20 blocks. This indication, as well as the variable thickness from one block to the other led to the idea that they might be elements belonging to a pavement. The irregular shape of the back face of almost all the corpus works in favour of this hypothesis (Abu Azizeh *et al.* forthcoming).



18. New proposal for the combination of the basalt blocks based on 3D printed blocks (AASRP 2015).

Assessment of the State of Preservation

The architectural and archaeological analysis carried out over the three years of the Azraq 'Ayn Sawda Reservoir Project also entailed an assessment of the condition of the remains in order to draw up a plan for their preservation. Although located in a protected environment, the vestiges face several threats. Indeed, the state of preservation of the wall varies greatly, depending on its location either inside or outside the Wetland Reserve (**Fig. 19**). Outside the reserve, traces of the wall of the reservoir-enclosure are still visible and are located on non-fenced private property. Since these areas are accessible, the visible masonry is at serious risk of looting and destruction. The long wall located south of the reservoir-enclosure also faces major threats (see **Fig. 13b**). Some of the structures inside the reserve, such as the northern wall M3, the eastern walls M4 and M6, and Massif C, form part of the tourist track and therefore also face serious threats. These are the impacts from visitors and water buffalo inside the reserve, the recent aridity of the soils on an architecture made to be in a wet environment, and abundant vegetation. The combination of these three phenomena accentuates the visible damage to the masonry. Despite several restorations led by the DoA in the 1980s and the day-to-day attention from the RSCN, the general state of the reservoir-enclosure continues to deteriorate, putting the structure as well as the visitors at risk.

One of the objectives of the Azraq 'Ayn Sawda Reservoir Project was to establish an inventory of all the visible features of the reservoir-enclosure, therefore combining an architectural description of the construction, a description of the pathologies of the masonry and a complete photographic documentation.

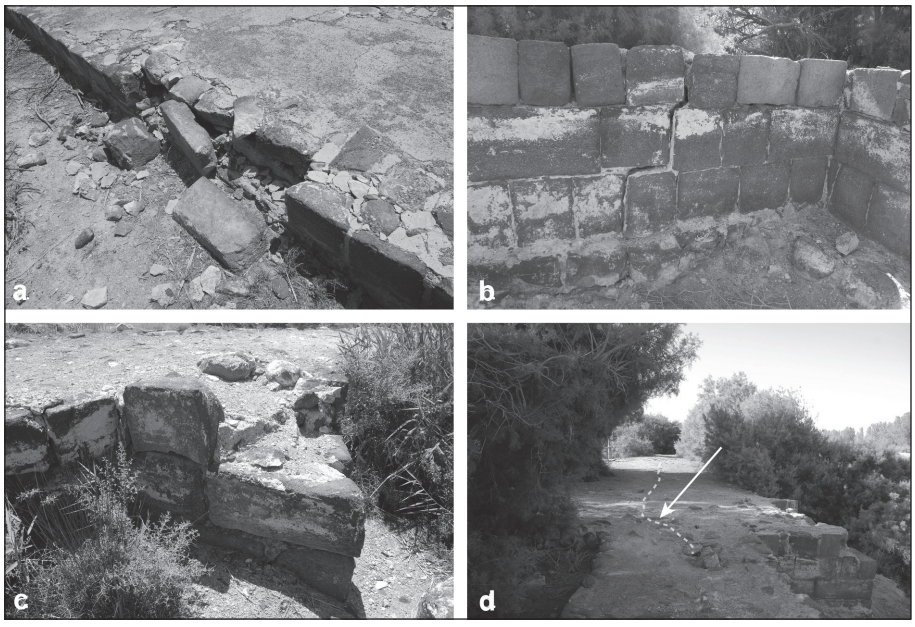
19. Views of different states of preservation of the architectural remains of the reservoir-enclosure: a) in section 1, the wall is located inside the Wetland Reserve, recognizable because of the topography of the terrain, but no longer visible; b) in section 2 (zone I), the wall is located inside the reserve but out of the tourist track and has not been restored; c) in section 11 (zone II), the wall is located inside the reserve, on the tourist track, and has undergone some modern restorations; d) in section 19 (zone III), the wall is located outside the reserve, on non-fenced properties (AASRP 2015).

Such an assessment of its condition constitutes a necessary base for establishing a protection and restoration plan for the reservoir-enclosure that is able to define the priorities and urgency. To carry out this assessment, a specific methodology was used: the wall was divided into 21 sections, each one identifiable by an important change in terms of visibility or of construction (see **Fig. 2**). A description sheet was created and systematically filled for each of the 21 defined sections of the wall. The sheet contains graphics as well as descriptive elements concerning general data, for instance length of the section, width of the wall, presence or absence of buttresses, but also more specific data related to the architecture, such as the number and height of the visible courses, the presence of mortar or coating, details of building technique, *etc.* Finally, it mentions the pathologies detected and their probable causes. On every sheet, a distinction is made between data related to the interior and the exterior of the reservoir-enclosure.

Of the total of 21 defined sections, 19 belong to the reservoir-enclosure itself. Section 20 deals with features located between the northeastern corner of the reservoir-enclosure and the circular structure to the north (sector E) and section 21 corresponds to the circular structure (sector A). Sections 1, 3, 14, 16 and 19 are areas where the wall is no longer visible (**Fig. 19a**). The other sections refer to the zones where the architecture is visible, either partially or entirely; for instance, in some sections, such as sections 2 and 17, only one course is visible, while sections 8 and 9 presents at least four courses. Although it is clear that the wall is in a poor state of preservation, it is nevertheless possible to distinguish three main zones.

Zone I includes all sections from 2 to 7, section 13 and section 15. This zone is relatively well protected given that it is located inside the reserve and away from the zone accessible by tourists (**Fig. 19b**). Here, the wall is still in its original state as it has had little or no modifications and has not undergone any restoration. Only the dense vegetation is present and covers some of it, especially sections 4 and 6. In terms of protection, maintenance and control of the vegetation is definitely required and the systematic backfilling of the wall's base will insure that the foundation is covered and better protected.

Zone II comprises sections 8 to 12 and section 21. It is part of the mandatory path followed by tourists visiting the reserve (**Fig. 19c**). Access to the wall itself starts from the western end of section 12 facing the observation platform, and the exit is located on Massif C, in section 8, on a wooden bridge leading the tourists to a



20. Damage on the wall of the reservoir-enclosure located inside the reserve, on the tourist track (zone II): a) lifting of facing blocks; b) transverse cracking in the wall; c) falling of blocks; d) longitudinal crack on Massif C (AASRP 2015).

second viewpoint. This zone is heavily restored and underwent significant modifications; consequently, it has lost its main original features, especially on the upper courses, which were systematically rebuilt. In general, multiple problems can be seen on the wall that are due to the restoration, the impacts of the visitors and the animals of the reserve, but also due to the aridity of the soil. Many of the facing blocks have collapsed, the connections between the wall and the buttresses are at risk, and large fractures can be seen on Massif C for instance (**Figs. 20b, 20d**). The recent mortar needs to be purged *i.e.* the modern mortar needs to be removed and the face of the wall reconstructed. Secondly, it is important to consider moving the visitor's path or maybe protecting the wall with a wooden footbridge.[5] It is also necessary to consider the problems related to the aridity of the soils, which is especially the case in sections 8 and 9, on the inner face of the reservoir-enclosure. Indeed, the excavations near Massif C (soundings C2 to C5) revealed the presence of peat and clay in the lower levels, proof of significant water stagnation and of an unfavourable soil for construction. A geotechnical study is necessary to understand better the stability limits of the soils.

Finally, Zone III, comprising sections 17, 18 and 19, is located outside the Wetland Reserve on private non-fenced properties (see **Figs. 19d, 21**). In this zone the wall is clearly at risk, and the threats are greater than those inside the reserve, especially since this area is subjected to looters digging holes into the wall, around it and even below it. Even when these diggings do not cause direct destruction, they nevertheless weaken the archaeological remains, especially when they are not backfilled. It needs to be enclosed urgently to limit looting and the deposition of garbage from the neighbouring areas. In section 19, excavations should be planned as it will allow to verify the presence of a fourth canal, previously drawn on Musil's plan (Musil 1927; see **Fig. 3**).

The condition assessment also provided a basis on which further maintenance could be suggested, specifically by identifying zones in which urgent operations were crucial. Based on this, work was initiated in 2015 with maintenance in two zones where action seemed urgent: in sections 15 and 5.

In sector G (section 15), some preventive protection was begun. In fact, a previous sounding had uncovered the entire first course of the wall, as well as the top of the foundation, but it had never been backfilled, putting the basalt course in danger. Therefore, in 2015, it was decided, after documentation, to backfill the entire zone with earth up to half the height of the preserved course. Following the same method, a systematic backfilling of every sounding opened in 2014 and 2015 was conducted.

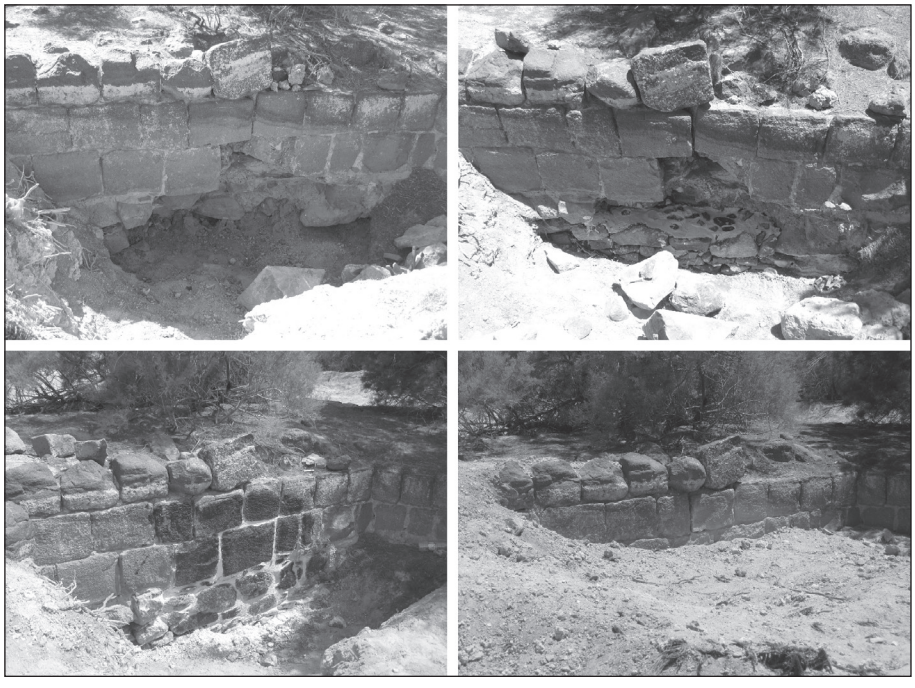
The second intervention was made south

5. These recommendations were issued in 2016.

of Massif C (section 5), where there again, a sounding had been made by previous projects, aiming to study the wall's foundation. The sounding was located inside the enclosure, on the western facing of the wall. The wall presented three levels of cut basalt courses and a foundation of approximately 70cm deep. It was in a very poor state of preservation: the foundation had completely collapsed and one block from the lower course of the facing stones had fallen down. The aim of the restoration was to secure the wall and the area in general. Therefore, the operations were carried out in two steps: restoration of the wall, then backfilling of the sounding (**Fig. 22**).

These interventions were very urgent. Zones that need restoration are numerous; portions of the eastern wall M4 and the northern wall M3, which form part of the visitor's path in particular, will need attention. Another project should focus on the composition of ancient mortars, in order to make the modern mortars as similar as possible to the original ones. The assessment made here is only one step towards

21. Examples of the current state of preservation of the wall of the reservoir-enclosure outside the reserve (AASRP 2015).



22. Different stages of the restoration and backfilling of the wall of the reservoir-enclosure in section 5 (zone I), inside the reserve but away from the tourist track (AASRP 2015).

the preservation and revitalization of this landmark of history and natural ecosystem that is the reservoir-enclosure of Al Azraq.

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KHIRBAT MARBAṬ BADRĀN: AN ARCHITECTURAL PATTERN OF AN AMMONITE PRODUCTION CENTER

Adeeb Abu Shmais

The Excavation results: Building site consists of two complexes called Production Center. *Mustaqarr* in Arabic, Site preparation: Coordinates: Pal. G. 23910-15275. 913.575m ASL. The site grid divides the ruins into four areas by X and Y coordinates and the surveyor set out each square according to the overall grid pattern established for the site (**Fig. 1**: **a** and **b**).

The excavated area was in the middle of western structures of complex A. These accumulated ruins were examined and removed to allow excavations progress. It is located beside the north of structures III and IV and among structures II and I which was designated Complex A. Here the landscape slopes towards a branch of a valley located to the south of the whole site where a water reservoir/cistern was found collecting water draining from the area of the complex. This branch joined with Marbaṭ Valley in the southeast edge of the settlement. A Wine Press is located on the east bank of Marbaṭ Valley (See **Fig. 7**: **b**) and the remains of Iron Age architecture represented good archaeological evidence of the settlement (*Mustaqarr*) (**Fig. 2**: **c** and **d**).

Complex A

These buildings are located to the west of complex B on a flat area. From archaeological evidence, this position looks to have been the administrative sector for the whole center of *Mustaqarr*. Structures in both complexes are close together, designed as one unit of a workshop or factory. This indicates that Complex A and B are combined as a workshop or factory (Abushmais 2005).

This complex has four structures surrounded by courts. The walls of these buildings are 1.7m in height. Courts are used as stores or shelters (*Ḥawsh* in Arabic) without a roof, perhaps for seasonal work as in harvesting, dying or for any other material production. The walls were built from one row of rough-cut stones (1m to 80cm wide) built on the natural surface of the exposed bedrock. However, in some cases the bedrock was leveled to enable to be the foundation and the site was constructed on the virgin soil. (Structure II) (**Fig. 2**: **e** and **f**).

Structure I

This structure is rectangular in shape 17.36×15.75m and the building has right angled corners of unorganized interconnecting stones. The top view shows four rooms examined from a new passage running from the north wall to the south wall. The middle part of the south wall has been damaged by human activities, its stones pushed into the structure and the entrance jambs laid between the collapsed stones area. The north wall had been destroyed from the middle sector, which looks like the main entrance of the building. The conservator reconstructed the upper course of the north wall to protect the structure/course from damage. Pottery sherds, found just under these stones, which removed, but to enable excavations going on, machinery will be required to remove the megalithic blocks scattered on top of the building. This structure has two courts located, one on the side of the west wall and the other on the side of the south wall, extending 5m alongside this structure (**Fig. 1**: **d**).

Signboard

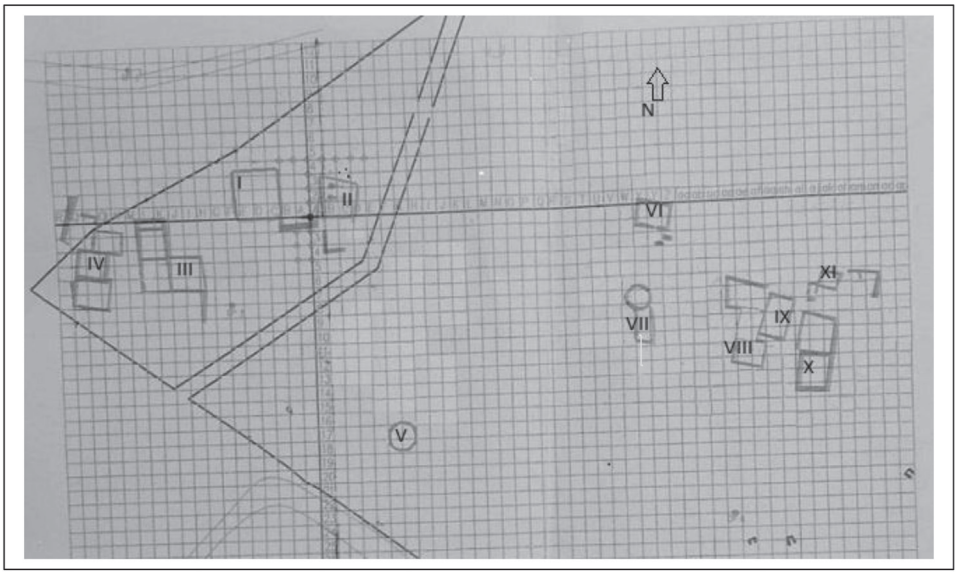
The excavated area: Complex A the western section of the site, part of structure II, silos and workshop rooms.

Structure VI

Fig. A

BEIOW: Top Plan of site structures according to the grid point.

Fig.B

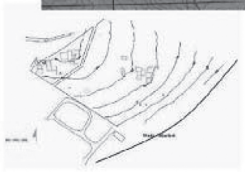


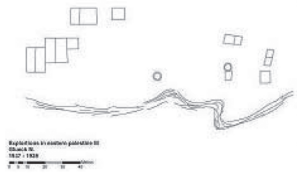
1. The grid points, the excavated sector and Site top plan.

C: Google earth. Site location

C: Geographical view of site location

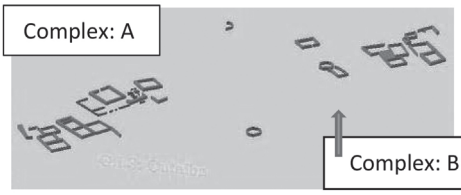
D: Reconstructed the upper part the east wall of structure I





E: Major sites of Ammonite culture, site top plan including counter.Glueck top plan 1937AD

F: Swaileh Geographical map, yellow mark is the site location. Above: map from Amman



G: The workshop in purple color the excavated section. Structures of the production center; group A and B.

3D Top plan

2. Maps: Arial view and top plan and reconstruction.

Structure II

Structure II is a large rectangular shaped building, 13.22×12.7m and the plan. shows it has walls dividing it into rooms similar to structure I. Excavations revealed the two faces of the west wall (**Fig. 3**: **a**, squares A2, A3). In addition, in area B. sq. B2 includes part of this structure. Along the south side of structure II, a silo was recovered, and the layer looks to have been reused during 14th century, due to the Mamluk pottery (**Fig. 3**: **b**).

The exterior face of this wall consists of a row of large megalithic stones and the inside face of this wall was embedded with small and medium stones just to make regular façade to the rooms. The courses were built in an irregular pattern and the height of this wall was 3.86m indicating that these structures had two floors (**Fig. 4**: **a** and **b**).

The excavations revealed on the bedrock of square B: B2. an ashy layer 25cm thick containing an Iron II pottery jar sherd, few loom weights mixed with black soil and two sherds of Attic ware. This occupational *stratum* dated to late Iron II/Persian (**Fig. 4**: **c**).

The storehouse (basement) was constructed of parallel walls in the east-west direction and a 1.3m passage was discovered amongst them. Sq. A: A1: L2, A: A2: L4, B: B1: Obvious on the surface. **Fig. 4**: **a** in sq. B:B2:L2 it is constructed from medium rough-cut stones, without connection with the exterior walls of structures II, so this may have been added later. This distinctive location was prepared as a storeroom (**Fig. 4**: **b**).

The walls were standing on bedrock, and had pillars supporting the roof; the height of the walls is 2.3m. This building looks as it was belonging to one period of history. 85% of pottery sherds were found in *stratum* IIB. These rooms have been used as a storeroom or a workshop, gathering and storing produce, like oil or wine and clothes dyes. Production techniques flourished in the south Levant (Wright 1985). Finds of the same context and the design of the administrative production center supports the occupational and stratigraphic finds.

Structure IV

Structure IV is a large, elongated building 20.56×13m (**Fig. 10**) with the wall's foundation, lintels and entrance frame *in situ*, and made from rough-cut stone and erected on the surface of the exposed bedrock. The walls of this structure are 1.7m in height.

Square C: Q6 illegal digging has exposed part of a basement room being 1.1m in height. The roof is still preserved in a good condition, consisting of slabs 1.2×0.75×0.4m thickness. These slabs built in an accurate technical way to hold and support the upper floor as mentioned (**Fig. 4**: **b).** The structure itself seems to be a building for defensive purposes located at the edge of the complex, (the limited boundary of the site today), but part of this structures looks damaged.

The basement rooms prepared as the main storeroom for their production. Therefore, the same architect technique of constructions used in these centers of 'Ammān area, but the design varied from one structure to another within the same production center according to their requirement and environment (*Mustaqarr*, Umm Suwaywīnah center is the same type as this center) (**Fig. 5**: **a**).

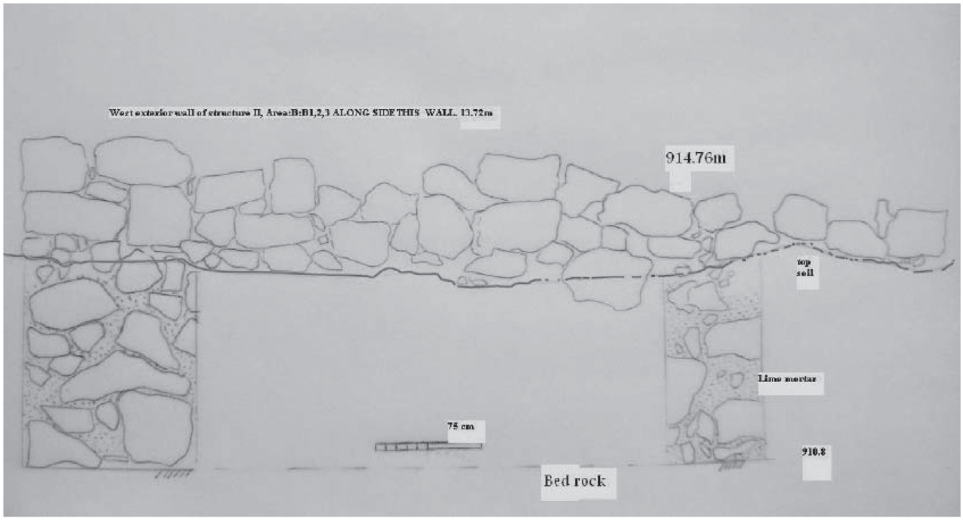
Structure. V

Structure V is a circular building located in the center part of the complexes (Tower). It might be controlled the interior road between the two complexes, and overlooking the water collecting system, cisterns situated in this location to collect rainwater entered three reservoirs/cisterns carved into the bedrock. This watchtower guarded this position, standing on the south edge of the settlement (**Fig. 5**: **b**).

Structure VI is a rectangular building 12.43×9.69m whose walls are constructed from rough megalithic stones 1.8×1.3×0.8m. Two to three courses are still standing 2.1m high, the entrance 0.92m wide and 1.7m in height. A passageway divides the structure into four rooms or maybe two halls and the walls of this pathway have 10 stone pillars. This is parallel to the sites at Jāwā, Jalūl and Khaldā, which have pillared rooms within the rectangular structure (**Fig. 6**: **c**, **d** and **e**).

Excavating Square C:

Q6. L. 1.25cm the topsoil contained a few pottery sherds, 3 pieces of carbonized branches mixed with terra Rosa soil. L2. A flagstone



A: One row of rough-cut stones built on the natural surface of the exposed bedrock.. The height of this wall is around 3.86m.

B: The walls were standing on the bedrock and it had pillars supported the roof of the basement. The deposit of the silo reused in Mamluk time: pottery 1300AD.

3. Excavation revealed elements of establishing the buildings, for example Structures II and I.

covered the entrance to the pathway, and a fragment of a rolling stone found *in situ* beside the doorjamb. This pathway ended by two pillars *in situ* and there are three more still *in situ* in another area, but the other pillars have collapsed in their position. In some areas, the bedrock is still visible.

This structure was reused at the later part of Ottoman period (*ca.* 1880-1916 AD), because its virgin soil without organic or deposited remains. The late occupational remains were reused as an animal fold. Seven pottery sherds were found, six of them dated to the late Ottoman period (heritage pottery type), and one sherd is a domestic offset rim dated to late Iron II b (**Fig. 6**: **f**, Ammonite, Mortaria).

This Structure Represents The Following Characteristics:

1. The exterior walls consisted of natural megalithic rocks (the interior walls built from rough-hewn stones).
2. The surface of the location was prepared, but the structure in general founded on a natural flat land. This building stands alone like a ritual kind of house.
3. The structure reused as animal fold during the last century.
4. Excavations recovered the threshold and the jambs of the entrance *in situ*. Doorframe is set on the threshold vertically and almost consisted of hewn stones.
5. The passageway of the entrance paved by flagstones; rooms still have a few paved areas.
6. Ten pillars used to support the roof or the interior walls. Five of the pillars still standing *in situ* and the other have fallen beside their positions.
7. These pillars may have produced four room designs.

Natural caves used as tombs, (**Fig. 7**: **a**). The structures of complex B. on the top plan, only a few tests were done, but nothing excavated after structure VI. These structures built from rough-cut stones like complex A, it may have been used to clean the wool and/or to gather the animals, close to the water reservoirs. Cup holes presented here (near this complex), this could be means that the population continued to exploit this land probably for their requirements.

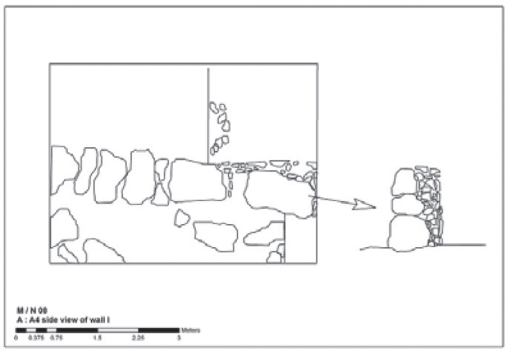
There are two wine presses on both banks of the *Marbaṭ* valley, discovered by the survey team. Medium size basins cut into the flat areas of the natural rock surface of the site (workshop, see **Fig. 7**). These observations confirm how big the settled area belonged to the center (the workshop buildings, group B) (see **Fig. 2**: **g**).

These complexes (monumental structures) could have been tribal territories. Settled societies, like farmers, surround the administrate centers, as in ʻAmmān, KHirbat As Sūr, KHirbat Al Hajjār, Jāwā, Rujm Al Kursī, Al ʻUmayrī and Umm Ar Rujūm (ʻAyn Al Bayḍā), which all had a similar structures. Therefore, the domestic complex was just for industrial preparations (Storage pottery pots; oil and wine jars, potter's marks as Aramaic impressions or ostracon, and pieces of Attic ware imported in the late sixth century to the fifth century BC).

A Summary of the Excavated Artifacts.

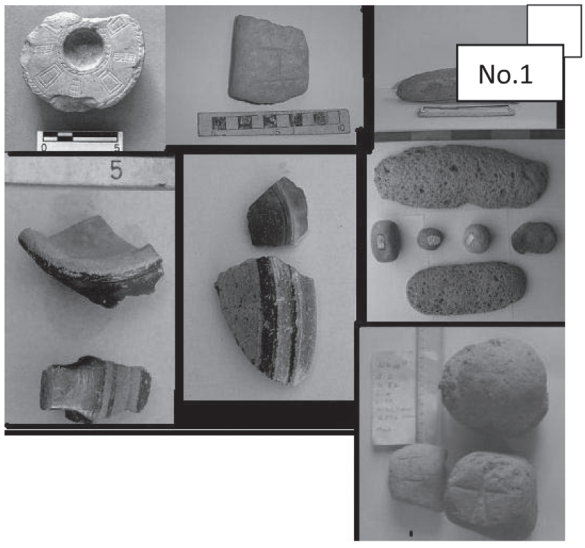
Several layers of debris, 2.2m in depth accumulated on top of *stratum* IIb (*stratum* IIb consisted of hard beaten soil inserted in the bedrock gaps). These layers in A: A1:16-17, A: A2:15-13, A: B4:20, 9 B: B2:9 contained fill soil mixed with a fair number of rocks, especially unhewn stones (distributed walls). This material represents the remains of the destruction.

The varied artificial material within this fill includes loom weights (Abu Shmais 2005), fragments of scale armor, fragments of stone vessels (mainly basalt millstones, pestles, mortars, the upper part of a millstone, weights and stone pendants). A fragment of soft limestone with a depression in the center, a type of mortar, used for grinding, but unfortunately it was in a bad condition. The second type of mortars have shallow bowls with three legs and made of basalt. The third type is made of basalt with a shallow nicely smoothed bowl with a curved wall, offset rims and with a ring base. Also discovered were fragments of bronze (ring shape), cosmetic discs, figurine fragment, potter's mark (Aramaic letters: *Alef* and *Zain*), animal bones and carbonized grain seeds. Everything was recorded. In addition, these layers yielded pure late Iron II/Persian pottery. Pottery sherds included a few black burnished ware 6th to 5th century BC, found in



A: The exterior face of this wall consisted from a row of a large megalithic stones

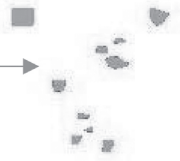
B: structures have two floors. Here Illegal excavation. The left picture Pillars constructed from stones



C: These finds from the same occupational level. A destruction strata among structures II and I .there are a Greek pottery sherds, this connected to the powerful of administrative production center.

4. Roof function, pillars, objects and finds.

A: archaeological center (Mostaqar), a production center consisted of 10 structures and occupied plateau looking over fertile plan located south of Amman today. Reused in Roman and Islamic period; Especially Mamluk period. The watchtower excavated by Yazeed 'Olayan



Top plan of Umm Suwayweneh structures,the location of watch tower , removed after resque excavation.

B: Structure V: Watchtower location where the reservoirs area founded.9m in diameter, unexcavated. Looking over the main road where the weak part of the settled center.

Watchtower looking over the natural valley

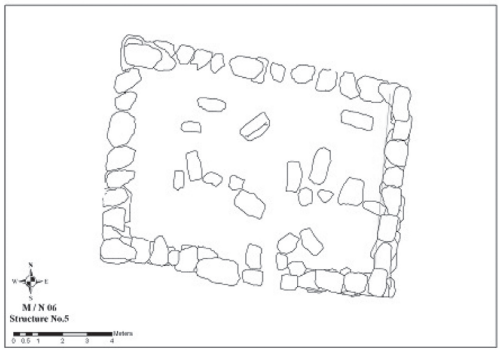
See: Plate 1. Figs.G

5. Umm Suwaywīnah center, watch towers in both sites.

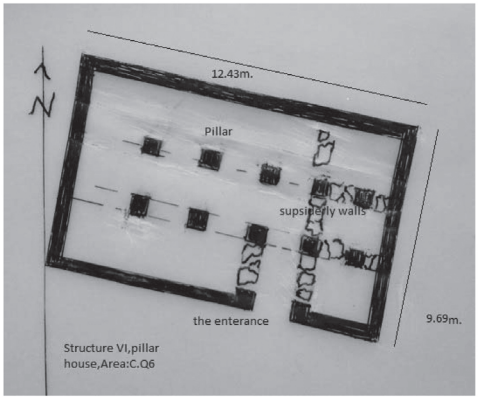
C; StructureVI,before excavted

C; StructureVI,before excavted

D; Top plan of structureVI



D; Pillar house Recostruction and sketch



E: flagstone pavement used in the passage way leaded to the rooms, the door lentil reconstructed. Black painted on a rim of Ammonite mortaria

F:Mortaria

6. The inner face of structure VI, the Pillars and flagstone pavement.

the foundation trench of A: B4:20 the rocky sediment, wheel burnished bowl rims found almost in *stratum* BII. Parallel of this found in Hisbān, Al ʻUmayrī, Jalūl and ʻAmmān citadel (see **Fig. 7**: **c**).

Bones found in *stratum* IIa (A: A1:14-15, and A: A2:11 included cattle, sheep, goats and horn of wild imported deer (European Dama and Persian fallow deer, Dama from Mesopotamia. Heltenorth 1959). Sheep and goats continued to dominate the assemblage of their products, (wool, milk and meat) assuming as part of their industry. This information seems to indicate the occupational level of the site at this period had a high intensity of a commercial production system (LaBianca 1995a).

The presence of fallow deer would seem to indicate a relatively heavy grass habitat and balanced approach to the removal of the forests for agricultural purposes (Younker 1989a).

Note: Bones of fallow deer traced as holy relics during the Iron Age and Roman era (Heltenorth 1959).

Analysis of Characteristic Pottery Vessels and Sherds.

The data presented from the cultural remains indicates that this center inhabited during the late Iron II/Persian period. Therefore, there are no good remains to indicate any other period.

Pottery sherds developed slowly through this phase of Iron Age. The excavated areas revealed 1,870 of the pottery sherds dated to Late Iron II/ Persian and few to the early Hellenistic era. A few Roman and very few Mamluk sherds were also found.

Stratum IIa and IIb in areas A, B, and C considered a destruction *stratum*, has a great quantity of mixed pottery sherds. Jars, oval, with a round base, short vertical ridged neck and narrow opening, with incision lines on the shoulder, buff to reddish color, wheel made and a whitish slip. Triangular rim profile was common too and some stoppers for the jars made of clay. This market refers to the quantities of wine and oil jars in production.

The second style of jar has straight walls, two thickened loop handles attached to the body jar, round base and folded thick rims with low neck. The surface color pale brown.10YR7/3. Sausage jar (Yassine 1988), whitish color and courseware (see **Table 1**).

Recovered from area A: C4:9, coarse and grey core. Storage jars, without neck, black core 10YR5/3, round base with a straight body.

One whole mouth krater jar, decorated with wedge impressions on the rim. It looks like slightly curved jar with handles. Parallel to that at ʻAyn Ghādī (Stern 1982) (**Fig. 7**: **c**). There were many various styles of whole mouth jars (kraters), some with inverted rims and others with elongated and thin round rims. The interior was black, and some were ridged, open mouth and grooved outside rims (**Fig. 8**: **a**).

Sherds of vats (deep bowls), coarse ware, and number of pierced sherds were found indicating the repair and reuse of these sherds.

There are two styles of bowls, mostly have wheel marks inside, indicating a fast wheel was used. The main characteristic is the offset rims, this appears to be the common surface treatment, with a red burnished surface, but there are a few black wares poorly burnished. The earliest styles of bowls have black painted bands, late Iron IIb, and double disk base, hemispherical in shape, which are black burnished to a high standard. There are a few sherds of Attic wares, dated to sixth century BC, one of which has a white band near the base (See **Fig. 4**: **c**)

Another style of bowls called *mortarium* is a shallow circular bowl, blackish ware with disk base (**Fig. 9**: **a**). This looks like an imitation of the basalt ones (the end of 7th century BC). Red burnished pottery, *mortarium*, and another sherd looks like fish scales, which had open incurved rims, this type appeared in Persian period.

Cooking pots, with folded out rims, loop handles attached to the rim. Bad firing coarse ware 5YR6/4 light reddish-brown, having chert and limestone inclusions and a round base (Sauer in Hisbān after 25 Year 1994; Dornemann 1983; Herr 1994).

Interpretations

The short knowledge of the Ammonites, their territory, culture and history, was based on ancient Biblical texts. This means that more excavations and research are required to increase the knowledge of their history and culture. This study will bring new evidence to the historians and added to the Biblical knowledge already

Tabel 1: The Corpus of this Pottery Sherd is 6th/7th centuary BC. Light red, wheel burnished few black ware L. Iron II- Persian, storage Jars have over lapped rims, However, there were a few Early Roman/Hellenistic pottery sherds.

Area Sq. L.	Jar	Storaage	Krater	Bowl	Cooking	Lamp	Jug	Juglet	Strainer	Cup	Decenter	Plate	Morter	Others	Remarks
A:A1:1	11	16		11		1					1				L.IrII
A:A1:3	2	27		10		3	1			1					L.IrII L.Hell/ER
A:A2:7		7		6		3									L.IrII L.Hell/ER
B:A1:22		3			1		1								IrII
B:A2:1	2			3									1		ER
B:A2:2	1	4		3											ER.IrII
B:A2:4	1	6		2											L.IrII
B:A2:6		7			1	1									L.IrII
B:A2:9	4	8			2										L.IrII
B:A2:11	6	2			2										L.IrII
B:A2:13		4			3										L.IrII
B:A2:10		9		2		1									L.IrII
B:A2:17	3	7			2	1		1							L.IrII
	55	80	2	96	28	17	6	3	2	0	2	0	2		L.Ir/II
	16	15	0	7	11	0	1	0	0	2	0	0	0	1 0tt.	Hell/ ER

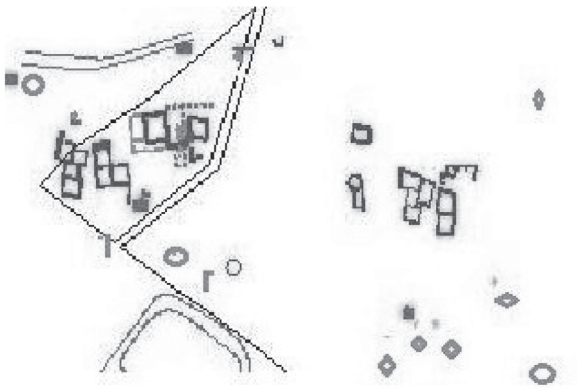
known will enhance the history and culture of the Ammonites[1]. The archaeological evidence of the Ammonites at the *Mustaqarr* production centers was not seen in use elsewhere. (called Ammon Towers).

The building technique and architectural features, which are present at this site reveal good evidence for the Ammonite era (*Mustaqarr*, KHirbat Marbaṭ Badrān). This center characterized by the use of megalithic stones, and the architecture looks like a fortification system, the major style of the workshop structures *rujum*.The native population of the central plateau of Jordan, used these types of building materials, construction technique and building designs. They embedded during cultural periods and presented architectural interaction, which spread in the south Levant through the ages (Jordan, Palestine and south Syria). This means it was a peaceful time with good relationships between the people. Culture produces a traditional design of regional architecture. The study produced a description of the specific techniques of construction that was evident from the excavated site and the correlation of these techniques with the building diagram, and the patterns of divisions arranged in the complex buildings. In addition, expression of their culture with group builders, the rules and the classification of building style, stones used in this style of fortifications, the variation of buildings and the comparisons of these centers.

Limestone and chert boulders were used to construct these buildings and rooms. The exterior walls of the fortification styles consisted of large boulders and large chert slabs. These stones range in size from 2.0m to 1.4m and such large stones were most common in these tower-like structures. The stone shape brought limited evidence of which coarse forms they were. Chert also used as the capstone over the basement (storeroom). It was lying flat to form the floor of the second room, some slabs had been prepared.

Most of the boulders were unhewn, nothing dressed, but they flattened the outer face of the stone to form the exterior face of the

1. Temple structure embedded to the Ammonite structure of Rujm Al Kursī which has the moon carved on both side of the entrance dated to 5th century BC,this produce the traditional design of regional deity. it is consisted of hewn limestone. Therefore, this is not just interaction, this religion spread in all parts of the region/Levant (see **Fig. 10**).



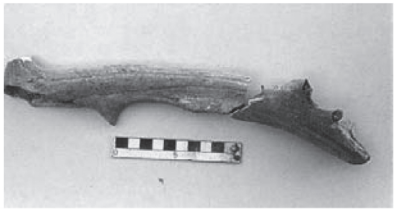
Green shapes:circles;presses. lines;reservoirs.lozenges; caves.

A: Cleaned and reused in 1967-1973. 5 caves

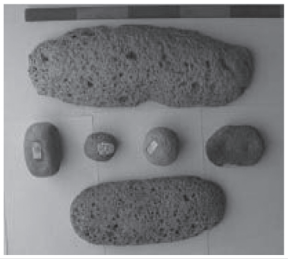
One press on the other bank of Marbat valey

B: types of presses.

C: Objects: Deer horn, bronze sickle. Assyrian; Sausage jar, grinders & Persian impression on jar

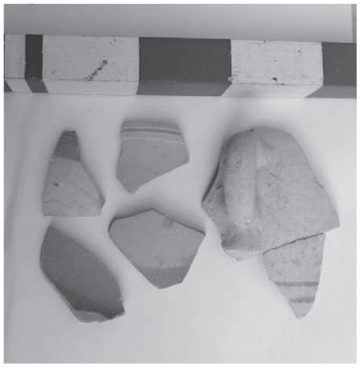


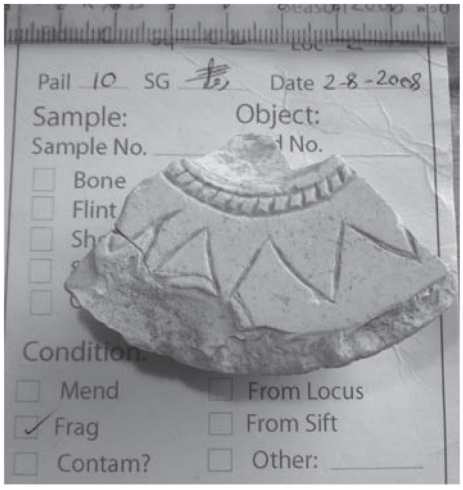
C: Discoveries

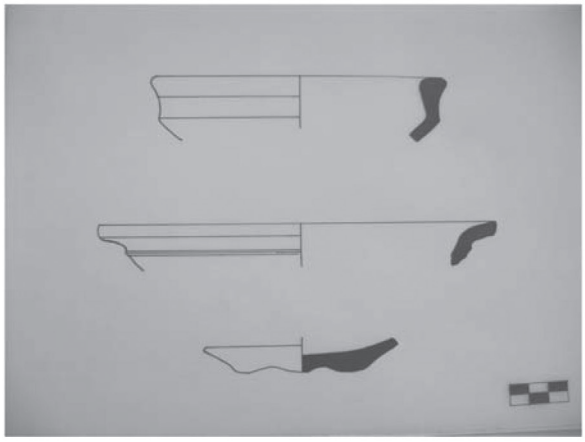


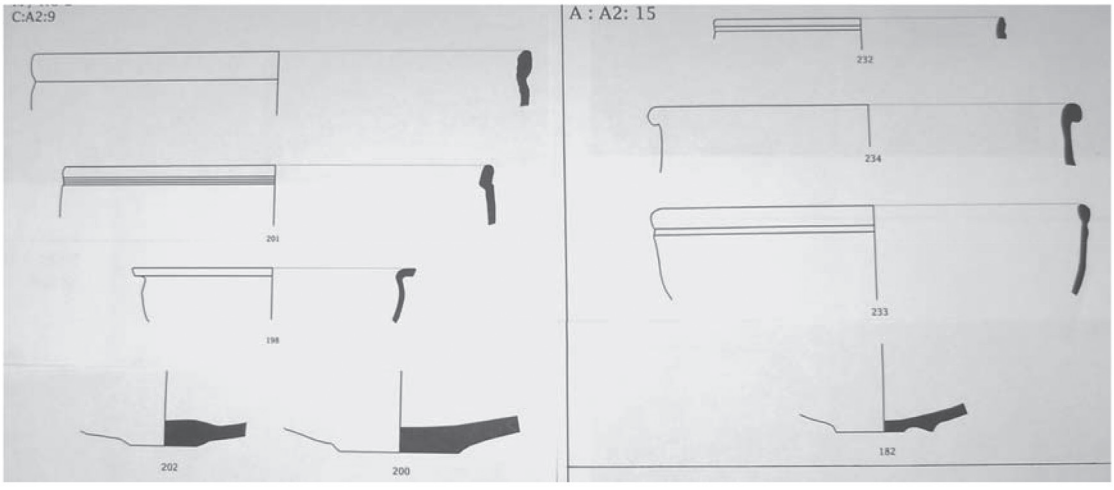
7. Reusing the caves, Presses and findings.

Red painted bands on a pottery sherd, this type parallels to Phoenician pottery (7th century BC,)

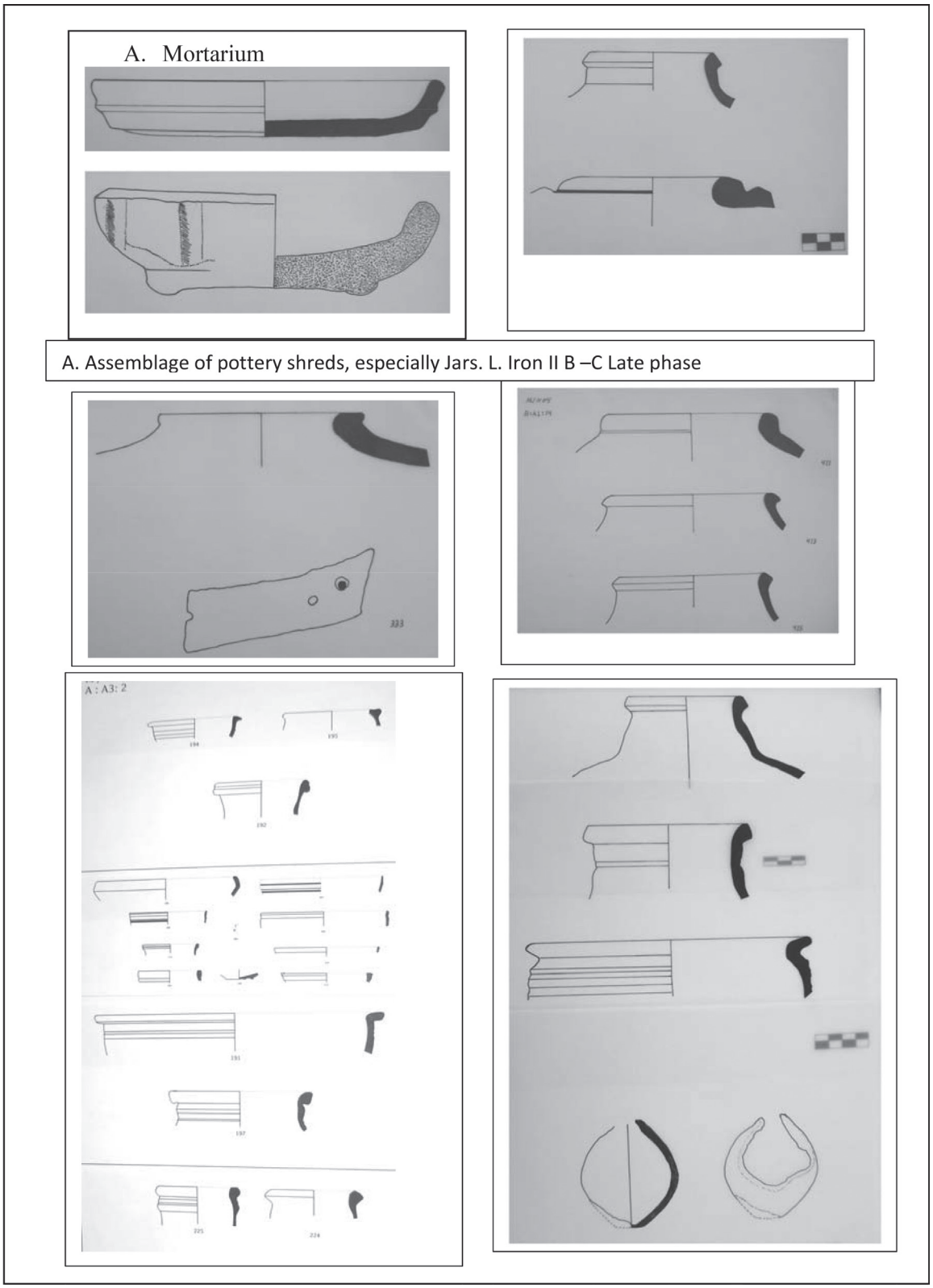




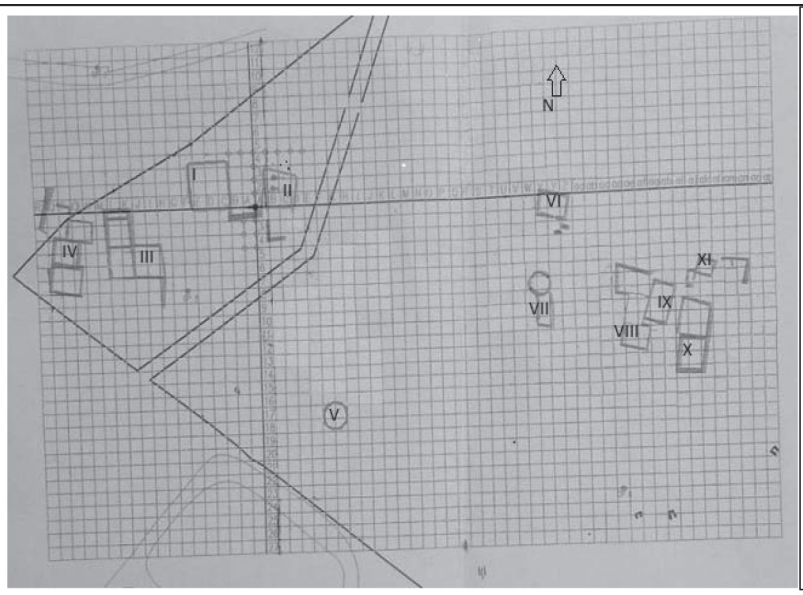




8. Pottery sherds with drawing. Loom weights.

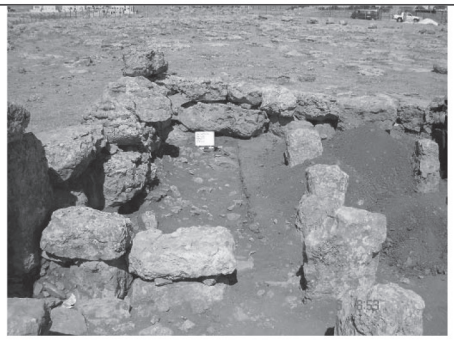


9. Assemblage of pottery shreds.



Structures measurements: Complex A Structure one=13.22X12.56.m. Two=17.30X15.57m three=26.30X22.87m. Four=20.56X13m.

Complex B Structure five=diameter 9.28m. Six=12.47x9.23m. Seven= (11.44x6.83m) +dia9.23m. Eight=10.97x9.55m+15.42x11. 39m. Nine=15.74x9.16m. Tin=25.83x12.49m. Eleven=7.66x6.83m



Excavated the north section of structure VI

Fig.No. 6 ,
ative temple.Levant

This temple found in Rujum el-Kursi site/ Amman area. where they reused Iron II Structure

East façade of structure VI

10. Measurements of site structures and photos from structure VI.

wall structure. Therefore, the boulder seems rectangular from the first glance. Most of the fortification buildings here have a second room (so-called Ammonite Towers, late Iron II/Persian). However, it is completely of Iron IIB-Iron IIC buildings with a second roof, of which structures at Jalūl, Al ʻUmayrī and Umm Suwaywīnah are examples. These structures founded on the natural bedrock, (the small rooms) which served as a base. Squares; A: A1. A2. B: A1. A2. A3 and B2. (Younker 1999; Herr 1995a. Daviau 1992).

The exterior walls were bonded at the corners; however, it was not only bonded, but also in some cases tied together with diagonal stones. This function was clearly seen in structures II and I. This style was also seen in contemporary late Iron II age outside Ammon region.

Variation of Buildings.

The style of the outline of the structures has the same forms in most of ʻAmmān centers. This means that each center has a pattern complex established on an open field to protect the agricultural productions and looks over surrounding land which ensures a special location to guard the complex, the road and local production. In addition, what is interesting is the tower building (usually circle style) built as a guard overlooking the trade road and the structures of the complex. Therefore, the complex contained a watchtower guarding the weak points of the settled central area, the water resource, the trade road and the store buildings.

The complex consisted of circular and rectangular fortified structures, varied in size (Structure Measurements Written Down**)** and the most significant fact is that it not built on a previous ruin, but it is built on a virgin soil.

Notes

First Technique

1. The fortified building is divided into rooms by interior pillared walls, connected with partition walls. Pillars served as foot support, raised above floor level (1.5-1.7m). Rooms have various shapes from one structure to another.
   This is contemporary building in the regional sites, but the patterns of upper floor rooms are unknown, and it might be bigger than the basement rooms. There is evidence of ceiling material found in square B: A2 and structure IV *in situ*. Excavation revealed wooden carbonized branches mixed with packed mud fallen on the floor of the room used for daily living. (Nothing dated by Carbon 14). In structure, VI a roof roller was excavated, mixed with the debris. It is used to press the roofs earthen surface after each rainy season. Examples are recorded in Al ʻUmayrī, Khaldā, Jāwā and Jalūl.
2. The second style in late Iron Age was the doorjamb entrance, standing upright, regular in shape and hewn, used to reinforce the doorway (See **Fig. 6**: **e**). parallel example Qasr ʻAyn Al Baydā or Umm Ar Rujūm site.
3. The third style the structures connected with the open courts. It may have used as an assembly area for the camel caravans, oven production place or collecting crops or animals.
4. The fourth style was the division of the rooms inside structure II, square B: S2. The function of the sandy stonewall was used as a part of the oven structure, for boiling or smelting. The stones here were shattered from heating, and there was a large quantity of ash, 1.3m thick, found on the floor. It is a workshop room, which could be used for dying textile. A great number of loom weights discovered. In addition, there was no evidence of organic material mixed with this ashy layer, but only pottery sherds of jars.
5. In the fifth style, small and medium stones to regulate the inner face of the room walls had covered the inside of the exterior walls of this structure. The whole structure stands on flattened bedrock. It is the common typology of the excavated centers in the late Iron II era. Domestic rooms found outside structures II and I, silos in C: C2: 7 and in C: C4:3 discovered south of these structures and outside of courts. The excavated portion of structure II in sq. B: D2 and B: B2 exposed more than 85 percent of this structure, which was covered with modern debris, so the view of the structure raised above the ground about 0.7-1.2m, but excavation exposed another 2.40m, so the walls were preserved around 3.75m in height.
6. The sixth style was fortification type of

buildings, which adds and provides stability to these centers. This indicates that:

1- This society has a good economic situation.
2- The center had powerful and organized leaders.
3- They protected their local production.
4- The style of narrow entrances 97cm. wide was a good function to protect the agricultural-industrial productions instead of casemate wall or city wall; it is a way of defense. In addition, the regulatory of style buildings referred to an administrate leaders.
5- These structures not intended for defensive purpose nor represented the border for Ammon Kingdom. (There were no weapons or evidence of any military action. What is important was the watchtowers used to protect these centers). They were satiable from long time, and this referred to their culture. In was not solely an Ammonite feature. In Omari and Tabqet Phahel, late Bronze Age structures produced the prototype of Iron II L Iron II structures.
6- The measurements of all structure recorded in Plate 6.

Acknowledgements

This project succeeded under the encouragement of General Director, friends of the Dept. of Antiquities Abu-Deiyeh, Dept. team: Dasoqi. Q. surveyor and draft's man, Sarhan M., Zaben I. Archaeologist, Photographer and Researcher of Ammon State/late Iron II period, Adeeb Abushmais. Note: this article continued the architectural style, which called Ammonite towers.

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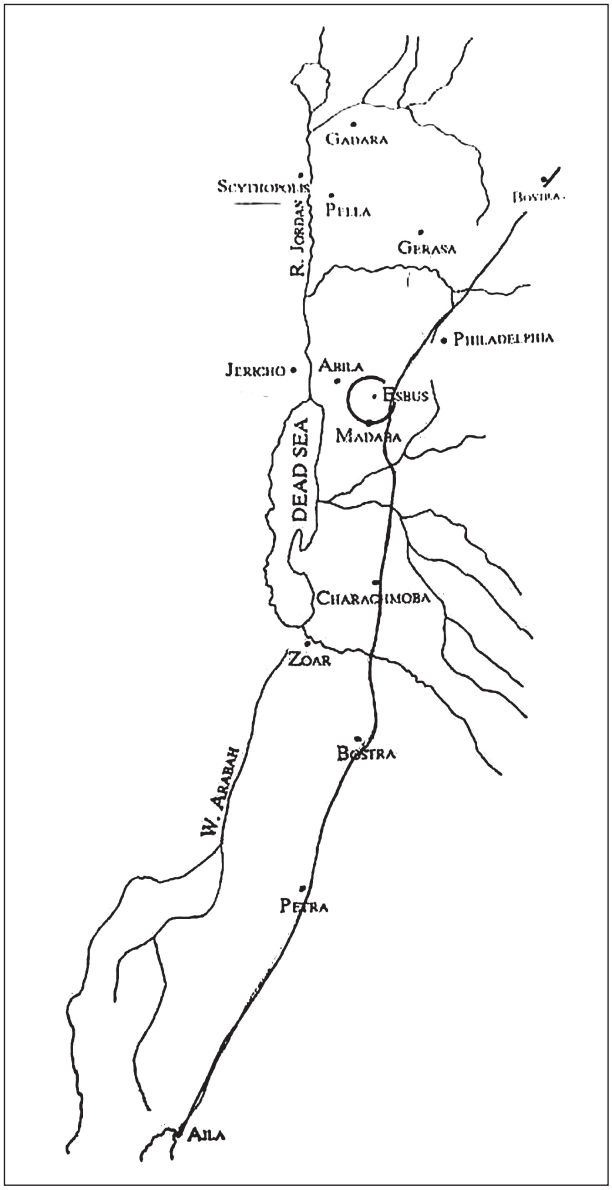
NEW INVESTIGATION ON THAMUDIC E INSCRIPTIONS DISCOVERED IN HISBĀN 2001

Adeeb Abu Shmais

Introduction.

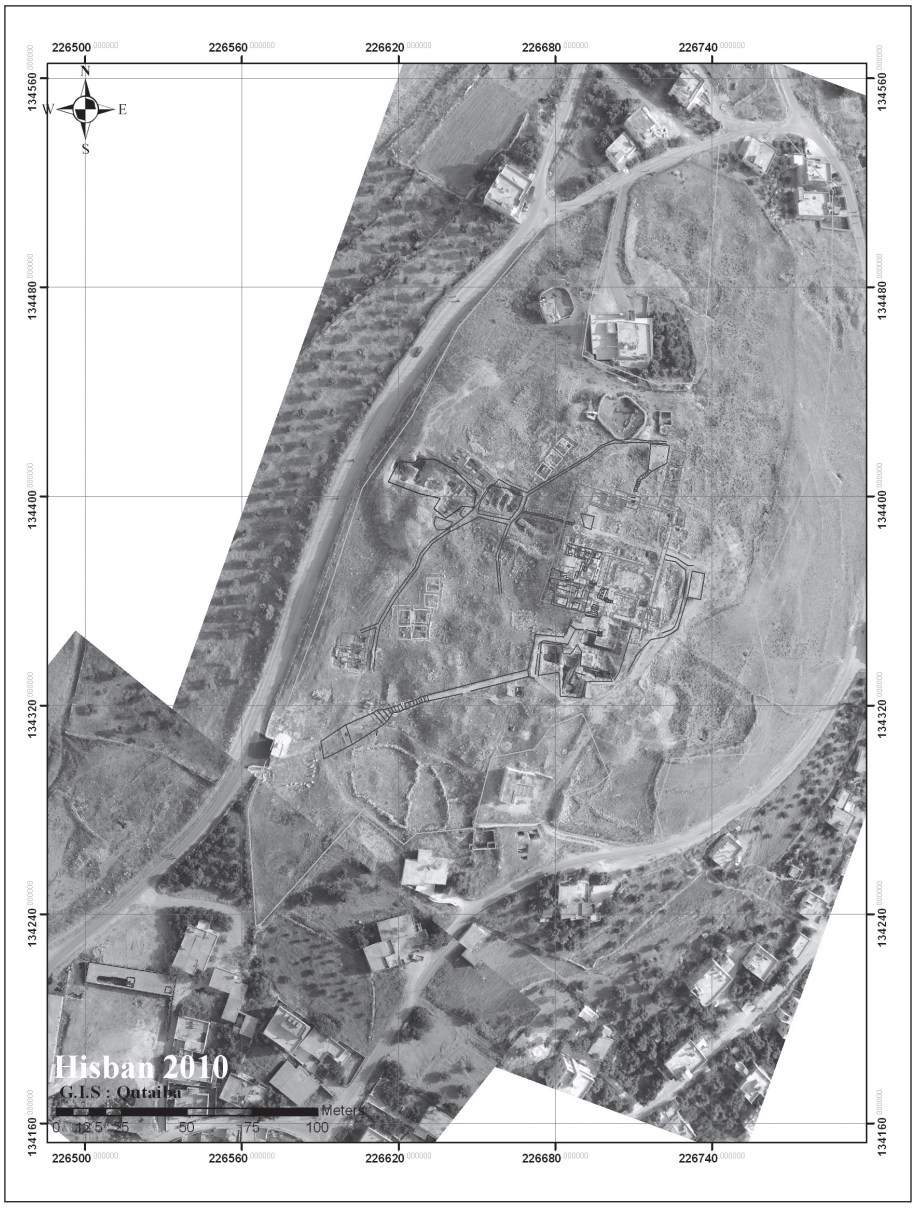
The pre-classical Northern Arabic language goes back to 4th century BC (2000 الخريشة). The pre-Islamic[1] language called Thamudic E flourished in central and north Arabia (South East Jordan, Syria and south west Iraq). The other parallel language was called Safaitic that persisted until 6th century AD (Literature). If we follow the influence of these languages, we will find names mentioned in the Bronze Age scripts, Bible and some other names mentioned in the *Quran*. This research is on the background on the Arabic people from their literature which include the reaction towards cultures through the history of the region.

Hisbān is a village situated 10km north of Mādabā city. Tall Hisbān stands like a watchtower overlooking Mādabā's fertile plans on the King's highway that lead to the two Roman roads Esbus-Levies and Esbus-Jericho (Ibach and Robert 1994) (**Figs. 1**, **2**). The village retained its importance on the main road from 'Ammān to Mādabā until the present. Phase I excavations, took place in 1968 and restarted in 1971 to 1976. The ongoing Phase II excavations began in 1996 conducted by LaBianca and covered the Islamic period. The project has provided valuable evidence that explained the regional history of the sedentary



1. Map showing Hisbān location on the King's highway road; via Nova Traiana.

1. Before the innovation of Islam at the middle of 7th century AD there were north Arabic and south Arabic languages that included Ethiopic, but these two dialects have the same root in spite of the difference of Ethiopic. The south Arabic language is more sophisticated since it contained all of the Arabic and the mixed part of Aramaic (Nab-Palm) as a result of the pre-urbanized life style. So I can say the old Arabic language. Thamudic E inscriptions (King 1990).



2. Tall *Ḥisbān excavations.*

area of Ḥisbān. They referred to the earliest occupation on the *tall*, the late Iron Age I cave and moat, the Iron II reservoir and its destruction, the Aramaic inscriptions, the late Hellenistic fort, the Roman road, the stairway leading to the Roman temple on the acropolis, the Byzantine churches and related cemetery and the early Islamic occupation level until the late middle Islamic period (650-1300AD), and some evidence to the late part of Ottoman period.

This inscription was discovered on a boulder of a Mamluk fort which reused the foundations of the Late Hellenistic fort. (Moreover Thamudic and Safaitic inscriptions discovered on some stones used to build the Apse of Stephanus Byzantine complex too; Umm Ar Rasās). One of the most significant outcomes was the recovery of Ḥisbān inscriptions which record the historical events.

1- The merchant inscriptions: The 7 Aramaic Ostracons are records of goods dated to 6th century BC (Studies 1969). Recent studies clarified some Arabic and Canaanite names mentioned in it, as 'bin' rather than 'ber'. It represents a list of names of Aramaic; Arab traders who moved along the caravan routes (The King's Highway) which crossed Ḥisbān. (Cross 1994; Richelle and Wrigl 2009: 127-138 said that there is Safaitic and Thamudic names in the Aramaic Ostraconns too). They used to say

Ammonite Inscriptions[2] was limited to the Old Testament.

2- Studies in 1969 and 1976 discovered the impression of a seal written in Latin on Rhodian jar handle from the Hellenistic period. Various Greek inscribed coins dating from Hellenistic to the late Byzantine period were also classified and studied.
3- An Umayyad glass weight, (Studies 1976; Van Elderen 1993), and other Arabic inscribed coins.
4- An Arabic Inscription found on a dressed stone which was reused in the Nabulsi Turkish building in the traditional village belonged to the Umayyad structure.
5- Temple priests inscription: Fragment of plaster in the acropolis church. (Studies 1969). Three Greek mosaic inscriptions recovered outside the mound, North chapel. (Merling and Geraty 1994).
6- In 2001 a new discovery of part of a Greek inscribed lintel, it might belong to the main entrance of the acropolis church. Unpublished report 2001 in the information center at DoA.
7- Talmudic E. inscription discovered (Abu Shmais 2001). The text was written in square script. I was requested by Dr. LaBianca to publish this inscription.
8- Administrative inscriptions as well as coins from the Hellenistic to the Ottoman period.
9- Funerary stone inscriptions.
10- Safaitic and Thamudic inscriptions discovered in ‘Ammān. ‘Ammān citadel, Jabal Al Luwaybidah Byzantine church, Abū Jābir cistern, Al Yādūdah, (more than one cistern,it was called Rufya‘ah caves), Mādabā city, Abū Nusayr tomb and Al Jubayhah cistern. More texts first long discovered by Knauf 1982 at Uraynibah, more than one found by Daviau *et al.* 2000 and under one of Nabulsi’s palaces in Hisbān, there are several inscriptions found on pieces of Roman column/shafts exposed by vandals looking for gold. This column was reused as a foundation or basement of Nabulsi traditional building[3] (**Fig. 3**). Many Wusum of this epigraphy was observed.
11- An Arabic cursive line inscribed on the glazed medieval Islamic pottery that referred to the congress of Hisbān during Mamluk period. (Walker 2003).
12- There is evidence of ‘Amrat tribe’[4] around Mādabā, from the mid-2nd century BC until 2nd century AD (Harrison 1996)

The discovery of these inscriptions confirms the importance of maintaining and preserving historical records. This inscription has been carved into hard limestone on a medium size flat smooth surface of rough cut stone. Geological name ‘Nubian”. (Abed *et al.* 1994). It was found on the north east corner of a previously excavated Mamluk fort. The stone was found on the second course from the top of the massive tower wall by Adeeb Abu Shmais in June 2001 after 3 years excavations.

Tall Hisbān (see **Fig.1)** is standing on the King’s Highway like a watchtower looking on Mādabā ’s fertile plain, and leads to the two Roman roads of Esbus-Levies and Esbus-Jericho (Ibach and Robert 1994)

The four lines of text inscribed on the flattened surface of this boulder reads from right to left. Measurements of the stone 146-143cm long, 74-64cm high and 60cm thick, the height of letters are 5-2.5cm and consists 67 letters. The inscriptions are very faint and like small tiny dots on the surface of the stone, indicating that it was inscribed by a sharp iron chisel. The rock was broken at the right corner at the beginning of the script resulting in the loss of a small section of the first letter. This could have occurred during the rebuilding of this boulder in the Mamluk fort (13AD) (**Fig. 4).** Damage to other letters occurred during this period.

Transliteration:

1- (..)fsh b(..) qdm bnty zn jy bd
(..)ف ش ب (..) ق د م ب ن ت ي ظ ن ج ي ب د
2- h ysh‘ h s dh s r l njl b(..) yq dh dl

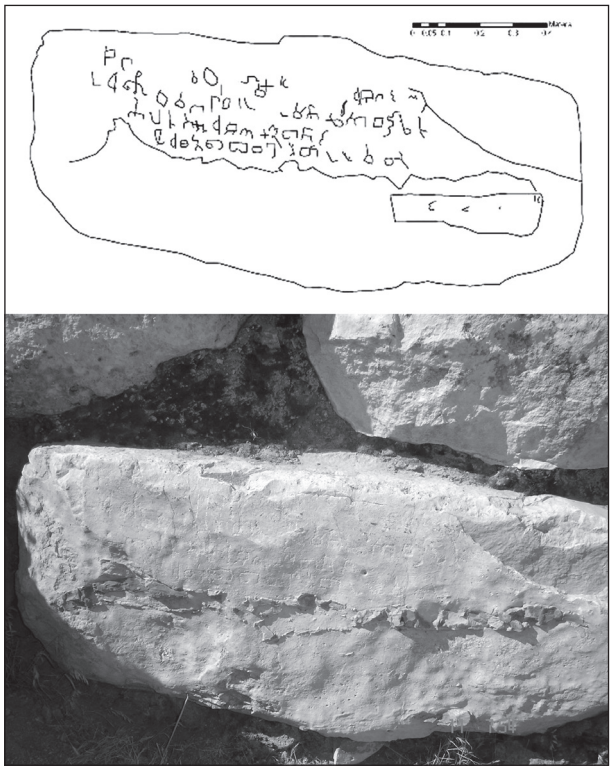
2. They used to say Ammonite Inscriptions which means the limited area mentioned in the Old Testament. As we known the background of old researchers of Hisbān related to Biblical studies, so they always have in their mined the regions and the names mentioned in the Old Testament and the language, so in the Ammonite region the language is Ammonite and in Moab region it became Moabite language and so on. But we have to consider it all from the old Arabic known as Aramaic language in this period.

3. These inscriptions were found during a visit in 2018.

4. During the Hellenistic period a Nabataean tribe the ‘Amrat tribe’ 160 BC, mentioned in Maccabees 9:35 are amongst other tribes during the later Greek era.

3. Shaft of Roman column used as a foundation or basement of Nabulsi traditional building.

4. The fort reused during Mamluk period.



5. Drawing of the inscription. The lime composition shows the chert layer.

هـ ي ش ع ح ص ذ ص ر ل ن ج ل ب(..) ي ق ذ د ل

3- shkr flt hdd
(.. It could be (the) instead of H, the space could have two letters)
the kz dh
ش ك ر ف ل ت ح د د
(.. الاقرب ال بدل هوالفراغ لاكثر من حرف)
ال ك ظ ذ

4- h ‘y al dh al ‘mrt wdd
هـ ع ي ال ذ ال ع م ر ت و د د

There is some scratching at the bottom of the inscription (maybe part of the letter ‘m’ is still clear, this could be the name of the writer). The letters are well made and engraved by a sharply pointed chisel the average depth: 0.5-1mm The forms of letters are quite correct. Letters, in general, take square or angular shape (well known as south Arabic, Thamudic style).

An inscription inscribed on a rough cut elongated stone boulder of a memorial structure (**Fig. 5**).

Translation:

1- L (..)fsh (b..) qdm bnty zn jy(..) bd
This Stone was erected as a memorial to the spirit of the lost leader (..fash son of qadim), where his tribe wished to dedicate this remote area to his memory.

2- h ysh‘ h s dh s r l njl (bn) yq dh dl
The writer of the inscription was “*Najl* son of Yaq”, referring to a ‘bad disease’ (a tribal dispute) that hit their tribe and resulted in their dispersion into groups (family tribes, Sar, dal and ‘Ay) to settle in the empty lands by the guide *Najl*.

3- shkr flt hdd (..)the kz dh
Here they spent the hot and dry season. They prayed and begged to the Goddess Lat Hdd

to help them in this disaster. There is a new scratch on (..) this space

4- H ‘y al dh al ‘mrt wdd
‘Ayy’, a family tribe from the main tribe of ‘Amrat’, gave their large “salam”, peace and love to the Goddess who aided and helped them in this incident.

Language Analysis

If the missing letter is (n and l or more than one letter) then the complete word is Nfsh: “*nafs*” which in Arabic is a person’s name; *nafsah* himself, (his spirit). This was well known (Nab.Pal. J39.343a/2,343b; C1859). *qaber*, *qabrato*: his tomb/spirit. *Nafsh* is in Aramaic and colloquial Hebrew. (Ibn Manzur 1955/56, vol.6: 233).

The right corner of the rock was broken, destroying one or two letters at the beginning of the inscription, though the end part remained. This was followed by 3cm dotted line, apparently an attempt at writing. This could be *nafsh* which has the same meaning in Arabic. This represents a shepollith case known to happen in the Arabic/Semitic languages.

Qdm: *qadim* “comer” proper name is well known and attested in Safaitic, this means ‘the brave man’ (Ibn Manzur 1955/56, vol.12: 465; ICAP: 149, 777; CIS: 55; CIK: 454/2; SIJ: 22.35; WH: 27.151a; HCH: 107). The root of the word is *qdm*: come or pass this area. This was followed by a 5cm empty space.

Bnty: “*ban*” appear *bnnat*: ask about and stress on (Ibn Manzur 1955/56; ICAP: 506.694; CIS: 8.9.39; HCH: 100.101; LP: 640-1; SIJ: 313.423; WH: 3648) this was followed by a 2cm empty space.

Zn: *zann* thought, believe and doubt (ICAP: 4.608). The shape Z is definitely Safaitic. Mendenhall G. lectures. The name derivative is *Zanun*; person who has no attempt to do any thing. *Zan*: Branch of weakness, (Safaitic tribe) (Ibn Manzur 1955/56, vol.1.272; C155: 209; SIJ: 101,793; LP: 46, 572; WH: 2193; HCH: 37-44 *etc.*).

jy: *jayy*, watery or low land. *Jayya*: place where water settled, *Jeyyeh*, a valley in Macca (Ibn Manzur 1956, vol. 14: 159; R: 2786/2).

Bd: *bad* destruction, *Badda*: desire, to move from, (departure of the tribe). *Badi*: from *Bedouin* (Ibn Manzur 1955/56, vol. 11.78) *Badd*: desire (CIS: 473, 3339; WH: 1500, 1954).

H Ysh: letter *H* “article” means ‘the’. It’s dated from old south Arabic languages; here it is a case of Aramaic influence. The verb ‘*washa*’ means spreading out or dispersion into groups (Ibn Manzur 1955/65, vol. 8: 394)

h s: *h ss* a it means fast running also uncultivated or waste land (moor) (Ibn Manzur (1955/65, vol.7: 13). *hasas*: skin disease (WH: 984; CIS: 551,601; SIJ: 64,65; WH: 168,265).

Dh: from, of the tribe.

s r: s arr: storm, shout and escape, destructive windy days, and also cold weather (Ibn Manzur vol. 4: 45, Sar: cry; WH: 984; CIK: 537,2; (Sar family tribe, group of ‘Amrat’)

l *njl*: najel: the name of the writer, the son, noble. Najal: ploughing cut. The name Manjal: means sickle (Ibn Manzur vol. 11: 647).

Yaq: name, *ayq*; tie, the joint between hand and arm (Ibn Manzur vol. 10).

Dh: from, of the tribe

Dl: *dall*: to show, indicate. *dalil*; to guide (Ibn Manzur vol.11: 247; LP: 999 (Dal family tribe, group of ‘Amrat’)

Shkr: *shoker*, thank, thank god (ICAP: 343, 314). The letter K was recently closed, became as the D letter leading to confusion in later texts (Ibn Manzur vol.4: 423).

F Lt hdd, lat: crush. The mother Goddess is in both Nabataeans and Safaitic cultures, from the classical Arabic language. Later it was associated with god Hadad. Hadad: storm God, is well known among the North Arabic Tribes (Aramaic). The first ‘*d*’ letter is difficult to be considered ‘d’, it is a mistake. This example is mentioned in the letters list of Al Jawf (Winnett and Reed 1970; Rusan 1987: 474, 492; JS: 149, 150; ICAP: 48, 80; CIK: 244; WH: 2050).

’L lat: the deity appears to have been the chief of the Safaitic pantheon. In this inscription she asked for deliverance (*flt*) security (*Salam*) and acceptance.

The inscription provides a religious action; mentioning a Nabataean and Palmyrene Goddess written in the classical north Arabic dialect. This Goddess is well was known among the Arabic tribes.

Dh, the space could have more than one letter, but it is not clear: a part of the letter still appears here but the other parts were erased. It could be

the article 'the', used in Aramaic language, but it was from south Arabic language. 'H' is used also at the beginning of the second line of the inscription.

Kz: *qyz*: very hot, muggy, settled in summer season (Ibn Manzur 1955/56, vol.7: 457).

Dh: from, of the tribe.

h 'y al: *H*: the, an article mentioned above. *'y*: 'Ayya: no way to think, not accepting any order. 'Ayy' al: tribe or family of 'Jurm' tribe, al: of (Ibn Manzur vol. 15: 111; Impotent CI: 422.6; CIS: 168; WH: 2468; LP: 468).

Al: the element '*al*' is universally believed to refer to the family relationship of the person to whom he is related. It is comparable the Arabic al to express the individual's familial or tribal affiliation.

dh al: from the tribe of

'mrt: 'Amrat' name of tribe, there are thirteen texts written by members of this tribe, eight of them are in the square script, including this one. J.T. Milik suggested that the Amrt tribe were a semi-nomadic tribe in Mādabā area. These tribes have been familiar with the languages of settled lands, Nabataean and Greek, and with the nomadic tribes, though they had closer contact with their settled cultures (CI: 467, 1096, 1166; CIS: 17.431; LP: 270.377; SIJ: 277.54; W: 81206; ISB: 15.290). This leads me to the conclusion that the population of the semi-nomadic tribes were greater than nomadic tribes.

Wdd "*wodd*": name of an old Arabic god, mentioned in *Quran*. *Wadd*: love, "*salam*". Dad: paternal uncle (in Arabic and Aramaic language) (SIJ: 578, 83,190; Ibn Manzur vol. 14; CIK: 581; WH: 17, 159; CIS: 32, 1901; JS: 552; ICAP: 1051; SIJ: 578, 83,190) (one of the main gods in Al Faw area, South Arabia), indicating that the tribe had settled in this area. There are a few letters, words scratched, that were erased under the chert layer as mentioned above, and there are some scripts which were added later. These letters cannot be understood though the text letters are clearly complete. The chert deposit had a variable width from right to left 4-20cm this composition make the stone harder than any other kind of lime stone (**Fig. 5).**

Conclusion

The majority of the Talmudic E inscriptions contain useful information, referring to their culture and environmental events, festivals, land, animals and plants *etc.* The inscriptions usually contain the words "son of", proving the relationship of their Arabic affiliations and the tribal kinship. The inscription 'Dh' is the main evidence referring to kinship. The inscription was written in classical Arabic making it easy to read and understand.

Nafsh spirit of Qadem: this pronunciation is Aramaic and written in the North Arabic dialect. This tribe would have been affected by the Aramaic language, as a result of being settled in previously occupied sites, situated on the main trade routes where the majority of the inscriptions were discovered. The Aramaic language replaced the Hebrew language which was later replaced by Arabic in the Middle Eastern countries. They would have been merchants related to their still Semi-nomadic tribes retaining their diplomatic and logistic functions.

This is the traditional way of building memorial structure[5] or cairn, but this boulder has a rectangular form. It is possible this cairn had an architectural shape representing the position of the horseman from the tribe of Ben Qadim (leader) which was probably well established and influential during the Nabatean period.

In addition to my research, ACOR undertook in 1993, a baseline study of the historic areas of Mādabā city. The survey team directed by Timothy Harrison looked to place data to the cultural and historical sites of the town of Mādabā.

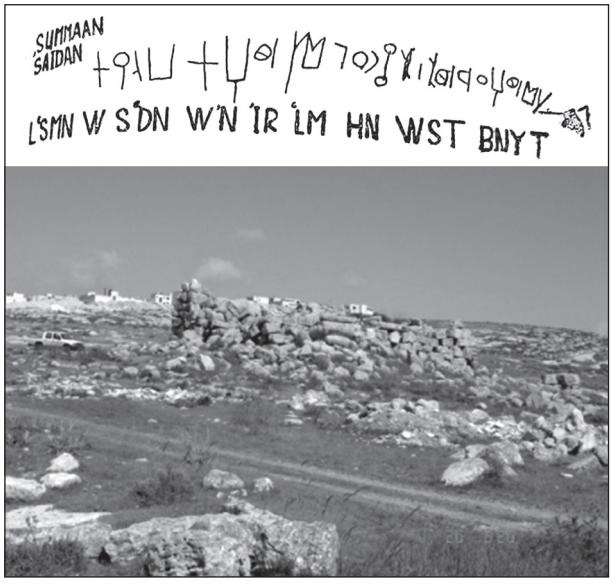
The work provided an overview of the occupational and archaeological remains and highlighted some facts mentioned in the historical records. The systematic collection of surface pottery sherds yielded reliable evidence

5. This is the traditional way of building memorial structure or cairn, it is a feature consisted of small mound of stones covered the grave and called in Arabic *rujm*. So this features/ Rujum covered a large area in the eastern Jordanian desert. It is like collapse of stones, which always has Safaitic and Thamudic inscriptions. But this boulder/the inscription are more rectangular in form. So this cairn possible has an architectural shape where the tribe settled as residential people whom used to build the tombs in a form.

of the areas settlements as well as archaeological remains. The preliminary analysis of the sherds distribution suggested that the town began to re-expand during Nabataean-Hellenistic period.

Historical records of Hellenistic period mentioned that Mādabā region played a role in the conflict, when John Hyrcanus1 captured the town of Mādabā (*ca.*130BC) in an effort to gain control of the commercial King's Highway (1 Maccabees 9; 35-42; *cf.* Josephus's Antiquities of the Jews 3.1.2 and 4). Hyrcanus II, his successor offered the town and other villages in Trans Jordan to the Nabataean King Aretas III. Evidence of inscriptions indicated Mādabā town remained within Nabataean influence until the region was annexed to the Roman province of Arabia in 106AD until the 3rd century AD. These funerary steles were erected by the commander (Strategus), during the 46th reigning year of Aretas IV, 38AD (CIS II, RES and Clermont Ganneau 1897c). The second funerary inscription mentioned a family that belonging to Beni Amrat Tribe (Harrison 1996).

The *stela* commemorated the erection of a tomb and crowning pyramid by Abgar Ision, son of Monoath, of the Amrat tribe, for the death of his son Selaman in 108 AD. (Milik 1958: 243-46; Milik 1980). For three centuries the Amrat tribe was present in and around Mādabā from the mid-2nd century BC to the beginning of the 2nd century AD.



6. Qaṣr 'Ayn Al Bayḍā inscription found on plaster of the cistern, and photo of the building, in addition it is called Qaṣr Umm Ḥulaylīfah and also Umm Ar Rujūm.

The Nabataeans and the Greeks had a much closer relationship with the genatic cultures of the Near Eastern settled areas.

The majority of the Thamudic square scripts are geographically spread in south Syria, north east part of Jordan and northern area of Saudi Arabia. A number of these are kept in the Jordan archaeological museum in 'Ammān. The present inscription, considered one of the best documents mentioned in the historical records, enables us to learn about the culture and historical events that took place in this area.

1- The greater similarity in the shapes of letters.
2- It was inscribed in an accurate and special way, *e.g.* (b, k, r, h and m), were placed in right angles. These letters are monumental in style and shape, *e.g.* Bani 'Amrat letters.
3- Each script was generally short.
4- It was a reused big cut stone, unable to be rolled, so its original place wasn't too far from the new position.
5- The economy and social life during Nabataean and Greek cultures had an influence on their inscriptions.
6- This style became the diplomatic line between Bani Amrat branches (the settled tribe and their relatives in the region).
7- Thamudic inscriptions found in Qaṣr 'Ayn Al Baiḍā in 'Ammān dated to Iron II, (*ca.* 580 BC). The Arab names discovered, in the inscription, goes back to late Bronze Age (Mendenhall 1974; 1975 العابدي**) (Fig. 6).**

Abbreviations

CI Harding, G.L.
CIS Corpus inscriptionum semiticarum, parts IV and V
ICAP An index and concordance of pre-Islamic Arabian names and inscriptions. USA Toronto Univ. 1971
CIK W. caskel, Gamharat an-Nasab das genealogische werk des Hisam ibn Muhannad al Kalbi, Leiden, 1966. 2vols. References are to vol.2, Register, by page and column.
HCH G.L. Harding, The cairn of Hani', in ADAJ II, 1953.
ISB S.G. Oxtoby, some inscriptions of the safaitic Bedouin, American oriental series, 50, New Haven, 1968.
J A. Jamme, texts nos. 1- 2127
JS A. Jaussen and R. Savignac, Mission archeologique en Arabie, vols. I-II and Atlas, Paris, 1909,1914.
LP Littmann E. Safaitic inscriptions, Leyden, 1943 (Pubs. of the Princeton univ. expn. To Syria, d.v.

iv, section C)
R repertoire d'Epigraphie semitique, tomes I-VIII.
SIJ F. V. Winnett, Safaitic Inscriptions from Jordan, University of Toronto Press, 1957.
WH F.V. Winnett, and Harding, 4000 Safaitic texts, forthcoming.
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FROM THE JORDAN VALLEY LOWLANDS TO THE TRANSJORDANIAN HIGHLANDS: PRELIMINARY REPORT OF THE WĀDĪ SHU'AYB ARCHAEOLOGICAL SURVEY PROJECT AND EXCAVATIONS AT TALL BULAYBIL 2018 AND 2019

Alexander Ahrens

Introduction

The Wādī SHu'ayb Archaeological Survey Project (WSAS) was initiated in 2016 and focusses on a thorough survey and reevaluation of all archaeological and historical sites in the Wādī SHu'ayb, ranging from the Neolithic Period to the Ottoman Period, starting from immediately south of the city of As Salṭ down to the city of Ash SHūnah Al Janūbiyyah (South Shuna) located at the mouth of the *wadi* in the Jordan Valley (see the previous reports with further literature on the project, its background and methodology in Ahrens 2016, 2018a, 2018b, 2018c, 2018d, 2019a, 2019b and 2020a; Ahrens - Rokitta-Krumnow 2017; Rokitta-Krumnow and Ahrens 2019).

One main goal of the survey project during the third campaign of the WSAS in 2018 concentrated on a thorough survey of the vicinity of the site of Tall Bulaybil (WS-007) in the southern part of the Wādī SHu'ayb, which itself was surveyed in detail during the survey campaigns 2016 and 2017. In 2019, due to the execution of the larger scale excavations conducted at Tall Bulaybil during this year presented in this report, no walkover survey was conducted in the Wādī SHu'ayb.

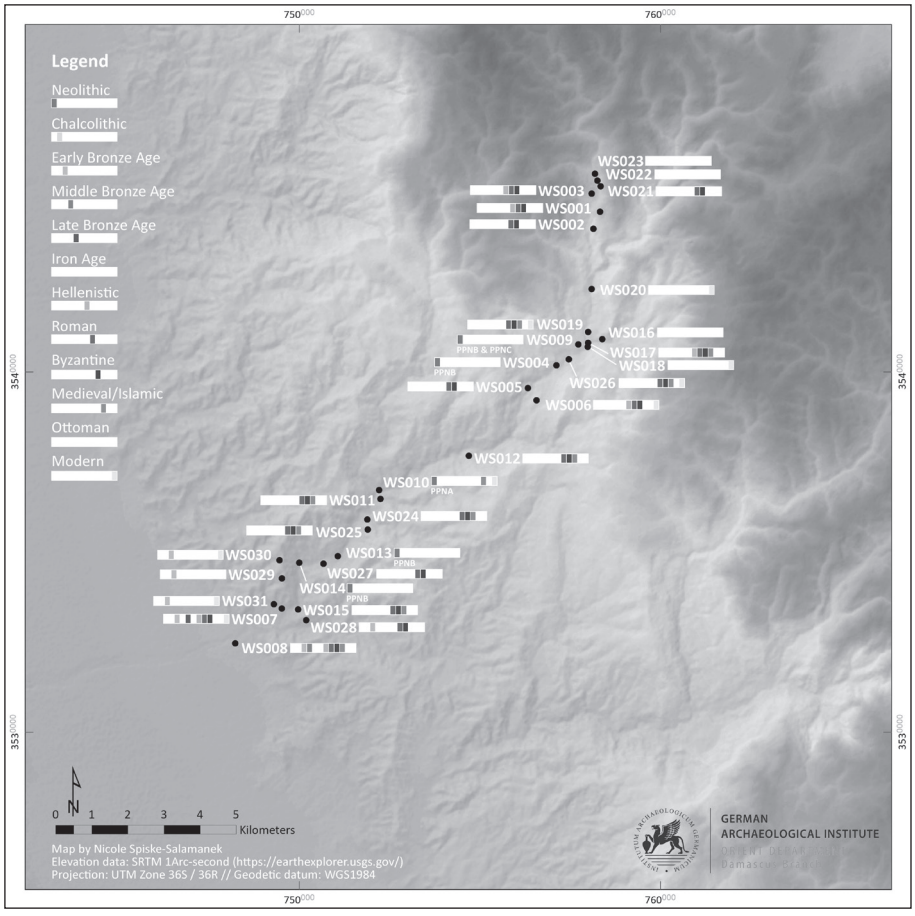
The survey of the vicinity of Tall Bulaybil led to the discovery of four additional archaeological sites, all of which were hitherto unknown. Apart from this survey work, several test trenches at Tall Bulaybil were conducted in 2018 and 2019 in order to further substantiate the results obtained by soil sampling for botanical analysis and radiocarbon dating in 2017. The excavations uncovered a massive stone foundation, which may have belonged to the settlement's city wall as early as the second part of the Iron Age (Iron Age IIB/C).

The Wādī SHu'ayb Archaeological Survey Project 2018

Altogether, a total number of four sites were surveyed in the third survey campaign of 2018, raising the number of sites prospected by the survey project to 31 now (see **Fig. 1** for the location and chronological distribution of all sites hitherto surveyed, *cf.* also the appendix of sites surveyed in 2018). A detailed photographic documentation and damage assessment of these sites was conducted, as well as technical descriptions of specific archaeological features, and the establishment of correct GPS coordinates. Diagnostic pottery was collected from all sites visited and were recorded and drawn. A description of each site surveyed in 2018 is given in the appendix below.

WS-028

The site sits on the southern mountain ridge of the Wādī SHu'ayb, overlooking the Wādī SHu'ayb and the Wādī Jari'a, as well offering good views into the southern Jordan Valley. It probably once covered an area of about 1.5-2ha in total, with an outer wall made of larger stones of about 2m width having encircled the entire site, albeit now destroyed and dismantled in many parts (**Fig. 2**). The internal structure



1. Location and chronological distribution of sites hitherto surveyed by the WSAS in the years 2016-2019 (map compiled by N. Spiske-Salamanek; courtesy of WSAS, DAI).

is difficult to discern, but several "tower-/or tomb-like" structures are found along the perimeter of the outer wall (**Fig. 3**). Additionally, the rock outcrop seems to have been artificially flattened in larger parts of the area in order to create a horizontal space for the foundations of buildings. The majority of the pottery dates to the late Chalcolithic and Early Bronze Age, but there is a small amount of pottery of later periods attested, presumably the Hellenistic, Roman or even Byzantine Period. The site has been partly bulldozed and destroyed to make space for two electric power poles in the northernmost part of the site, thus destroying large parts of the site.

The site was apparently already visited by Ji and Lee in the year 2000 (Ji and Lee 2002: 187-188), *i.e.* prior to the bull-dozing and subsequent destruction of the site, and had been referred to as "KHirbat SHu'ayb" by them.

WS-029 and WS-030

The two sites are found on the northern mountain ridge, just northeast of Tall Bulaybil (WSAS Site WS-007).

2. Site WS-028, remains of stone wall.

3. Site WS-028, tower overlooking the Jordan Valley.

Site WS-029 consists of three features (F 01-03), which seem to resemble the installations ("tower-/or tomb-like" structures) at nearby site WS-028 just across the *wadi* to the south. Their function and use is therefore undetermined, and all have been heavily looted and destroyed (**Fig. 4**).

Site WS-030 is located in the immediate vicinity of WS-029. It consists of a "tomb-like cavity," which has also been plundered. The dating of this site is unclear, since no diagnostic pottery could be retrieved at the site.

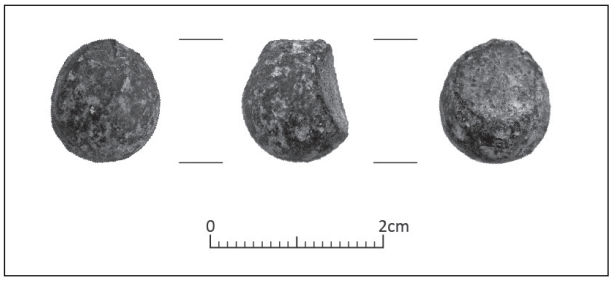
As an interesting side note, one lead ball belonging to a WWI British shrapnel shell bomb was found in the area of the mountain ridge, albeit no other installations dating to the Ottoman period or WWI were detected here (**Fig. 5**). However, it is historically well known that heavy fighting between British and Ottoman/German troops took place in this area during the so-called "Transjordan attacks" on Shūnat Nimrīn and As Salṭ by the British in the year 1918. Notably, sites WS-014 and WS-027, surveyed in 2016 and 2017 by the WSAS (see **Fig. 1** for their locations), both seem to represent Ottoman garrisons featuring military installations, which must be seen in relating to the find, since British troops entered Transjordan via the Jordan River Valley, and Ottoman defense lines ran along the *wadi* and the mountain ridges in the vicinity (for this find and a summary of the history of the region of the southern Jordan Valley during World War I, see also Ahrens 2020b).

WS-031

The site is located north of Tall Bulaybil (WS-007). WS-031 is a rock-cut tomb, presumably Early Bronze Age in date, according to the pottery found (**Figs. 6, 7**). Scattered pottery fragments are found outside in front of the tomb's entrance. The entrance giving access into the tomb consists of an opening measuring *ca.* 50×50cm, the bottom inside the tomb has been artificially flattened, while the remaining sides apparently have been left untouched. The inside cavity measures approximately 4×4m. The tomb is used as an animal shelter today, no pottery fragments were found inside the tomb. Modern dry walls have been placed alongside the tomb's entrance.

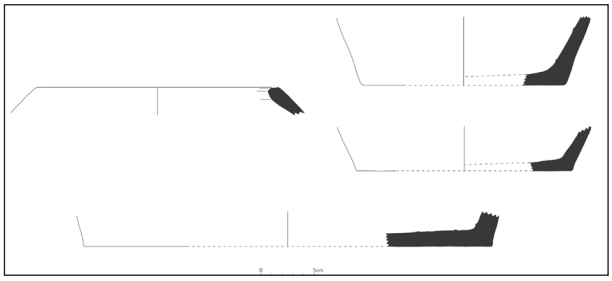
The tomb clearly must have belonged to the site of Tall Bulaybil during its use in the Early Bronze Age, as this phase (*i.e.* the EB II-III) is also attested in the survey material found at Tall Bulaybil.

4. Site WS-029, remains of tower.



5. Site WS-030, lead ball belonging to a British Shrapnel shell bomb of World War I.

6. Site WS-031, burial cave.



7. Site WS-031, late Chalcolithic/Early Bronze Age pottery from WS-031.

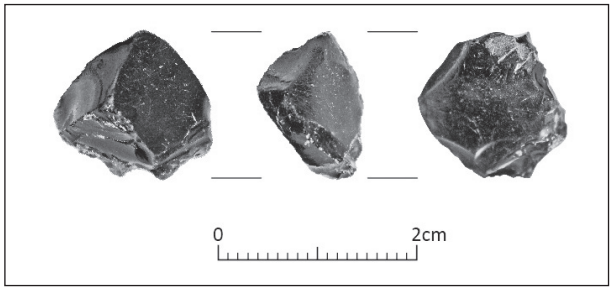
Addendum: WS-010 (KHirbat Jisr Al 'Irāqiyyīn)

Apart from these newly discovered sites, site WS-010 –already found and surveyed by the project in 2016 and visited subsequently in the survey campaigns 2017 and 2018– was revisited once more and found to date, on the basis of the lithic material, to the Epipaleolithic and PPNA periods, not only to the PPNB as previously assumed (for more details on this specific site, see Rokitta-Krumnow and Ahrens 2019).

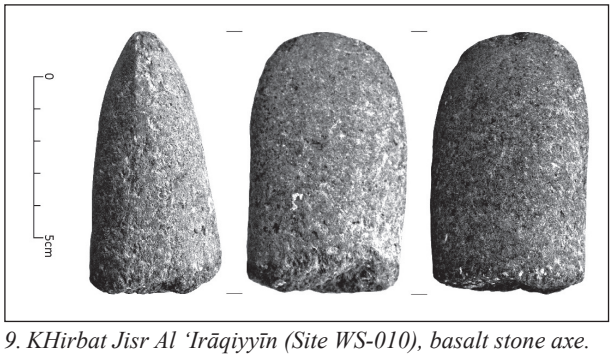
Apart from the lithic material retrieved, special small finds found at the site during the survey in 2018 include a fragment of obsidian (undiagnostic), presumably –but not analyzed scientifically yet– coming from the region of Cappadocia in modern Central Turkey (**Fig. 8**), as well as a basalt stone axe dating to the PPNA period (**Fig. 9**).

Excavations at Tall Bulaybil **in 2018 and 2019**

Apart from the survey work conducted in 2018, another main goal of the campaign was the inception of excavations at Tall Bulaybil. The site was already surveyed by the WSAS Project in the previous survey campaigns of 2016 and 2017 (see the project reports of 2016 and 2017 in Ahrens 2018a, 2020a). Since the entire northern site of the *tall* was found to be heavily destroyed by a modern bulldozer cut, it was decided that rescue excavations would seem feasible here to see whether or not archaeological remains are to be found along the destroyed section of the *tall*. For this reason, the first trial trenches were excavated in the campaign of 2018. Altogether three test trenches were conducted (T1-T3), all three of them located in the area of the destroyed (bulldozed) northern section of the *tall* (**Figs. 10-12**).



8. KHirbat Jisr Al 'Irāqiyyīn (Site WS-010), obsidian fragment.



9. KHirbat Jisr Al 'Irāqiyyīn (Site WS-010), basalt stone axe.

Trench T2, located in the northwest of the bulldozed section, reached the bedrock on which the entire site was founded quickly. It is therefore clear that no archaeological remains were left *in situ* here, but had all been destroyed by the bulldozer cut. Trench T2 therefore was not continued to be excavated. Test trenches T1 and T3, however, located next to each other in the center of the bulldozed section, successfully exposed archaeological remains. The excavations uncovered a larger stone wall, which was hypothesized to be part of the city's fortification system. The excavations in 2019 therefore continued to excavate in the area of test trenches T1-T3 and were able to expose a part of the actual fortification system of the settlement, preserved to a height of almost four meters. Additionally, the southwestern corner of a bastion or tower protruding from the fortification wall was revealed. The exterior side was coated with a layer of yellow chaff tempered plaster which was still partly preserved *in situ*.

The Iron Age Fortification System

Already partly exposed in the first season in 2018, the 2019excavation of the remains of what belongs to the settlement's city wall foundation in the northwestern part of the *tall* were continued, covering an area of approximately 50m^2 by the end of the field season. Given the general orientation and the location of the part of the foundations exposed, these seem to encircle the ancient settlement approximately along its outer perimeter, footed on the slope, arguing for an interpretation of a city wall and therefore as part of a defense system, rather than being a part of a larger monumental building of unknown orientation and proportions in this part of the *tall* (for general studies dealing with various aspects of ancient fortification systems, see Frederiksen *et al.* 2016; Muth *et al.* 2016; Ballmer *et al.* 2018). Due to the limited area of

10. Tall Bulaybil (WS-007), with location of trenches conducted in 2018 and 2019.

excavation, it must remain unclear for the time being if the exposed part of the fortification wall at Tall Bulaybil is a solid single wall, or actually part of a larger casemate wall system, with a second inner wall not yet attested.

The foundation of the city wall (Wall SU 25) is still partly preserved as high as 3.5m in height, with an average width of 2.5-3.0m (**Figs. 13-15**). Due to erosional effects and also the destruction caused by the aforementioned bulldozer in more recent times, the northwestern side (exterior outer face) of the city wall foundation is heavily disturbed in the excavated area, and it appears to have been eroded away diagonally, thus creating a "sloping effect," which virtually resembles a glacis or a rampart in many ways (**Fig. 14**). However, at the time of its construction, the wall foundation's exterior side was, beyond doubt, built up vertically, since originally a mudbrick construction was erected directly on top of this foundation. This mudbrick wall, albeit not preserved *in situ* in the area excavated, is protruding from the bulldozed section and still standing as high as approximately 2.5m immediately north of the

11. Tall Bulaybil, excavations in progress taking place in the northwestern part of the tall in 2019, view from southwest.

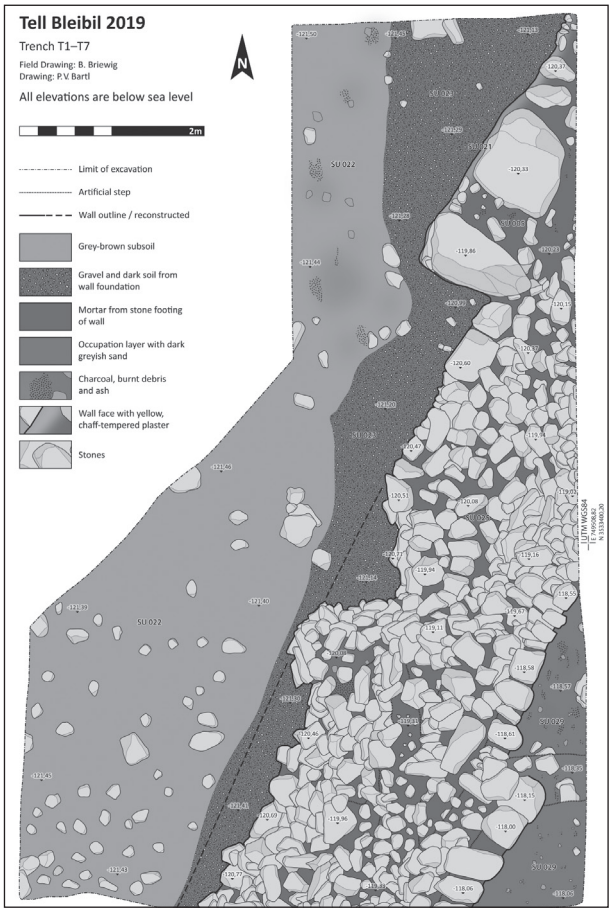
12. Tall Bulaybil, excavations in progress taking place in the northwestern part of the tall in 2019, view from northeast towards the Jordan Valley.

excavation area (**Figs. 16, 17**). The elevation of the lowest layer of mudbricks of this wall, as well as its general orientation, strikingly corresponds with the uppermost level of Wall SU 25. Therefore, it is very likely that the mudbrick wall once continued to the southwest, aligning with Wall SU 25 as its substructure and foundation. All remains of the mudbrick wall clearly have been destroyed due to the bulldozing that took place here prior to the excavations. The many stones found in the collapse directly west of the wall during the excavations also point to the fact that at least half of the city wall's foundations collapsed or have been destroyed by either erosion or by bulldozing. Although the absolute height of the mudbrick wall is not known, due to the erosion of its upper parts, the standing height of the fortification system altogether (*i.e.* the stone foundation/substructure Wall SU 25 and the mudbrick wall only attested in the northern section) must have amounted to at least 7-8m in total.

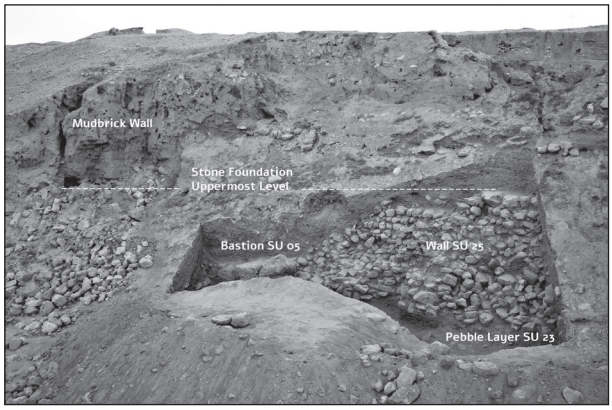
Wall SU 25 itself is formed of small to larger unhewn and semi-hewn limestone boulders (*ca.* 40cm) that were dry laid. The original topography of the site –with uneven levels of bedrock varying in height– may presumably have necessitated the construction of the fill layers of soil mixed with hard-packed, compressed pebbles, gravel and smaller cobbles in order to create an even surface for

13. Tall Bulaybil, foundations of defensive system (Wall SU 25 and Bastion SU 05), seen from west.

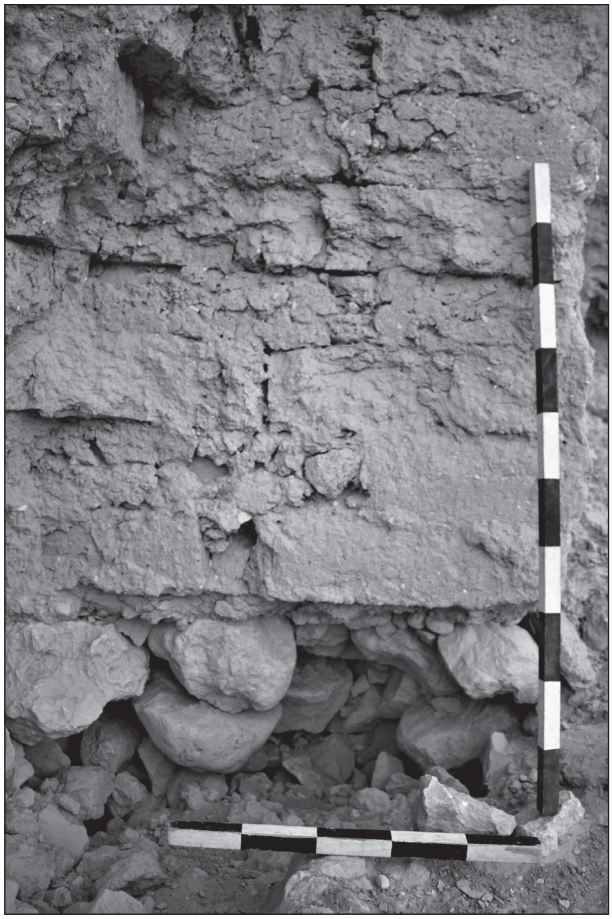
14. Tall Bulaybil, foundations of defensive system (Wall SU 25 and Bastion SU 05), seen from north.



15. Tall Bulaybil, ground plan of foundations of defensive system (Wall SU 25 and Bastion SU 05).



16. Tall Bulaybil, foundations of defensive system (Wall SU 25 and Bastion SU 05) with mudbrick wall protruding from bulldozed section in the upper left and pebble layers SU 23 in the lower right, seen from west.



17. Tall Bulaybil, detail of mudbrick wall protruding from bulldozed section.

the stones of the wall to be erected on (**Fig. 16**). Interestingly, this layer of soil mixed with pebbles also contained lithic material dating to the Neolithic period, but unfortunately no pottery, which then possibly must have come from somewhere at the site or its immediate vicinity when the city's fortification system was established at a later period, presumably the Iron Age. The first stage in the creation of the city wall therefore consisted of the build-up of soil layers mixed with pebbles and cobbles in the depressions and the original escarpment of bedrock existing in this specific area of the site (SU 23). This preparation phase is clear in the stratigraphy, since the fill layers are located under the first row of stones belonging to the foundation walls (*i.e.* Bastion SU 05, see below, and Wall SU 25). The fill layers (SU 23) thus serve to support walls, as is also visible in the top plan, where the orientation of the fill layers also seems to follow the general orientation of Bastion SU 05 and Wall SU 25 (see **Fig. 15**). The preparation phase then was followed by the construction of both the Bastion SU 05 and the foundation wall SU 25. The overall height of these fill layers is hitherto unknown, since the bedrock could not yet be reached in the excavated areas.

Yet to be exposed is also the area immediately east of the SU 05 and 25, *i.e.* levels inside the actual settlement abutting the city wall. Here, due to the destruction caused by the bulldozer, excavations could not be executed for safety reasons.

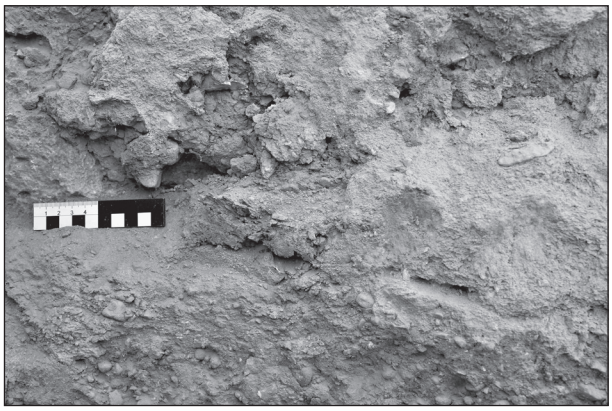
Although the wall's construction cannot yet be dated precisely since no diagnostic pottery or other datable material was found within the wall or the bastion, it probably continued to be used until at least the late Iron Age (Iron Age IIC) according to finds made in the debris of the wall that had accumulated to the west of it and which was not cut by the bulldozer (see below, small finds). A chronological hint as to when the fortification system was first constructed may perhaps be seen by the construction method described above: artificial fill layers to even out crevices within the bedrock prior to erecting walls are also amply attested at Iron Age II sites on the Transjordanian Plateau, *e.g.* at KHirbat Al Mudaynah - Ath THamad (Daviau *et al.* 2012: 276-277), the wayside shrine WT-13 in the Wādī Ath THamad (Daviau and Steiner 2017: 50-51, fig. 3.18), Al Lāhūn (Homès-Fredericq 2009: 175), and at Tall Jāwā (Daviau *et al.* 2003: 59-60). The debris of the Wall SU 25 also shows evidence for a conflagration event, with ashy soil lenses, charcoal pieces and burnt mudbrick fragments found mixed together. A

destruction event of the fortification system during the later Iron Age (Iron Age IIC) can therefore perhaps be surmised, but this is subject to further confirmation.

The Bastion

Bastion SU 05 –which due to safety reasons could only its southwestern corner could be excavated– consists of a single, massive stone-built unit, the walls of which are formed of small to larger unhewn and semi-hewn limestone boulders that were dry laid and apparently directly connected with the foundation wall SU 25 (see **Figs. 14, 15** and **18**). The southwestern corner is also formed by two large boulders measuring 1.4m each in length. The exterior of the bastion was covered by a layer of yellow chaff tempered plaster (SU 21; 10 YR 8/2), some of which was still partly preserved *in situ* (**Figs. 18, 19**). Unfortunately, but for reasons of work security, the excavations could not expose more of the bastion in the 2019 campaign. As also mentioned above, the bastion was directly erected upon the fill layers of SU 23, therefore it clearly dates to the first construction phase of the overall foundations, as does the actual wall foundation SU 25. Again, as with the fill layers, the existence of a yellowish chaff tempered plaster is also attested KHirbat Al Mudaynah - Ath THamad in the Iron Age II period (Chadwick *et al.* 2000; Daviau *et al.* 2012: 277), at Iron Age Al Lāhūn (Homès-Fredericq 2009: 169-170), and at Tall Jāwā (Daviau *et al.* 2003: 59-60).

18. Tall Bulaybil, Bastion SU 05, with the exterior still partly covered by yellow chaff tempered plaster in situ, seen from northwest.



19. Tall Bulaybil, detail of yellow chaff tempered plaster.

The Fortification System at Tall Bulaybil**: One or Many?**

Exceptional is the fact that a mudbrick superstructure can be clearly linked with the stone foundations excavated (*i.e.* its substructure) at Tall Bulaybil, giving potential new information concerning the general construction of Iron Age defense systems in Transjordan.

Additionally, as previous surveys of the site have already noticed before, stone foundations are also visible along the entire eastern side of the *tall* which faces the *wadi*, also consisting of semi-hewn and hewn limestone boulders protruding from the slopes of the *tall* (Glueck 1951: 370; Ji and Lee 2002: 187). Ji and Lee, reporting on the results of their survey and visit to the site in the year 2000 (2002: 187), mention that:

> *"(t)he survey team identified two or three defense walls on the eastern slope, which probably indicate that Tal Bulaybil was fortified at least twice in different periods."*

For the time being, it is not possible to say with certainty whether or not these stone foundations, which clearly were once part of a fortification system (or systems) encircling the site, belong to the same fortification system that was partly exposed in the northwestern part of the *tall*, as there is no clear archaeological connection between these two installations as yet. However, the general orientation, the height measurements, and also the building techniques of the foundations in the eastern and northwestern part of the *tall* seem to differ, making it more likely at the moment to conclude that these fortification systems date to different periods. This, however, needs further study.

Iron Age Fortification Systems: Parallels in the Southern Jordan Valley

Although only a small part of the Tall Bulaybil's fortification system has been exposed yet, and many details concerning its construction and dating are still unclear, general parallels for fortification walls and defense systems can be found at various sites in Transjordan. Most of the settlements during the Iron Age in Transjordan apparently were fortified with a casemate wall construction, where two parallel walls encircle the settlement with the space in between these walls subdivided into casemate rooms (see the compilation in Routledge 2018: 145-146). However, solid walls featuring protruding towers or bastions are also amply attested as defense systems at Transjordanian sites during the Iron Age.

In the region of the southern Jordan Valley, an Iron Age fortification wall consisting of a solid wall (width: *ca.* 3m) is attested at the site of Tall Al Ḥammām, located approximately 20km south of Tall Bulaybil (Collins *et al.* 2015: 234-236, figs. 8.4-8.5). This defense system apparently was built during the Iron Age IIA and continued to be used in the later parts of the Iron Age (at least until the Iron Age IIB). Close to Tall Al Ḥammām, the excavations at the site of Tall Al Kafrayn also revealed a small part of what can be interpreted as a solid Iron Age (Iron Age II) fortification wall with a width of 2.9m (Papadopoulos and Kontorli-Papadopoulo 2012: 367-369, figs. 8a-b).

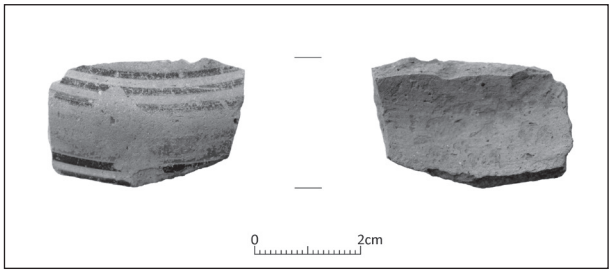
Small Finds from the Debris

With no datable material found within Wall SU 25, the bastion SU 05, and also the fill layers SU 23, the dating of the fortification system's construction is still not secured, although a date within the Iron Age II period is most likely based on the comparisons of the construction techniques with other sites in the Transjordanian Plateau given above. Within the debris of the wall that had accumulated in front of it (to the west), but which was also heavily disturbed by the aforementioned bulldozing of this area of the *tall*, several small finds where retrieved that for the time being can at least give a rough date for the last use of the fortification system and help to chronologically frame the date of the system at Tall Bulaybil.

One of the most peculiar finds made in the 2019 field season is the fragment of the shoulder part of a small amphoriskos/juglet belonging to the so-called "Cypro-Phoenician Bichrome Ware" dating to the Iron Age II, which features several lines of black and red concentric circles running around the shoulder of the vessel horizontally (**Fig. 20**). Parallels for this unique type of pottery are attested at archaeological sites covering the entire Iron Age Levant (Gilboa 1999; 2015: 485-487, 503, pl. 4.2.7; Schreiber 2003). In Transjordan, specimens of this pottery are found, among other sites, at Tall Al Ḥammām in the southern Jordan Valley just north of the Dead Sea (Collins *et al.* 2015: 235, fig. 8.9), the site of KHirbat Al Mudaynah Ath THamad (Chadwick 2016: 312-313, fig. 14:2-3), the wayside shrine at Wādī Ath THamad (Site WT-13) in northern Mo'ab (Daviau and Steiner 2017: 185-189, 188-189: fig. 7.1, esp. 7.1:12), and also in several tombs at DHībān (Tushingham 1972: 86-115).

Another small find from the 2019 campaign was the fragment of a perforated tripod cup in the lower part of the wall debris (**Fig. 21**); these vessels are often also functionally referred to as "incence burners," although often no traces of soot can be detected inside these vessels, as was the case with the object from Tall Bulaybil. A more functional use of these vessels as sieves is more likely (Daviau and Steiner 2017: 179-185, fig. 7.1).

A fragmentary stone vessel (alabastron)



20. Tall Bulaybil, fragment of Cypro-Phoenician Bichrome Ware (TB19-SF18).

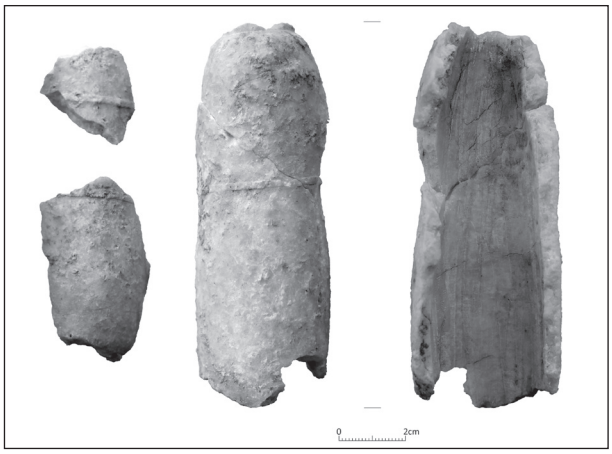
21. Tall Bulaybil, fragment of a perforated tripod cup (TB19-SF31).

made of soapstone is without exact parallels (**Fig. 22**). Its local manufacture is certain, but its date yet elusive. While the production technique –the interior has been chiseled out, with vertical chisel marks clearly visible inside the vessel– would fit with an Iron Age date, its form is without parallels for this period, arguing perhaps for an even later date.

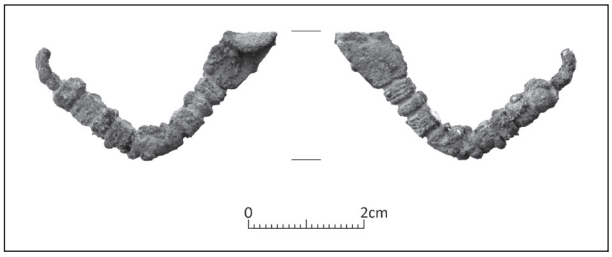
The body of a fibula made of bronze (*i.e.* found without the pin), which can be typologically dated to the second half of the Iron Age (**Fig. 23**), was also found. Good typological comparisons can be found within the corpus of fibulae found at Cemetery A at Tall Al Mazār in the central Jordan Valley, dating to the late Iron Age (Iron Age IIC), but apparently also continuing into the Persian period (see the parallels in Yassine 1984: 97-100, fig. 55, 153-165). Dating to the late Iron Age and the Persian period is also a fragment of a typical deep rounded carinated bowl with a simple rim (**Fig. 24**), a type which presumably emulates the shape of metal vessels (*e.g.* Yassine and van der Steen 2012: 35-37, type 5, Cat. P076; Stern 2015: 567, 581, pl. 5.1.1, 12-16; for the metal vessels, see Yassine 1984: 76, fig. 50, 48-50, fig. 7: 5), which unfortunately stems from a disturbed find context within the upper layers of the debris above the fortification wall, but attests to occupation levels dating to this period at the site (which was already noted during earlier surveys at the site, see Ibrahim *et al.* 1988: 199; Ji and Lee 2002: 187).

A fragment of basalt bar-handled bowl type with a stepped profile, which dates to the later part of the Iron Age (Iron Age IIC) was found within the debris above Wall SU 25 (**Figs. 25, 26**). Interestingly, the exact same shape is also attested at Tall Bulaybil within the pottery repertoire, with one rim fragment coming from the very debris above Wall SU 25 **(Fig. 27)**. Typologically, both seem to date to the same period, it being unclear which of the two forms appeared first, and which emulated the other (for this specific type, see Squitieri 2017: 60-61, 65, fig. 5.11:a-c). Find contexts at other sites in the Levant seem to suggest that the vessel were primarily used for food processing. Parallels for the type on the Transjordanian Plateau are attested at Iron Age Tall Jāwā and Sahāb (Squitieri 2017: 135, fig. 7.7).

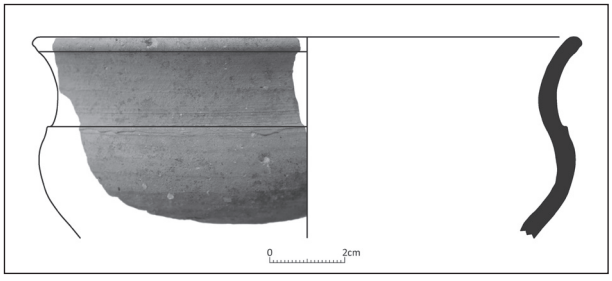
Curiously, a unique fragment of red painted gypsum plaster was found within the upper levels of the debris of Wall SU 25, but it is not clear yet, where this hitherto singular find originates from (**Fig. 28**). While an Iron Age date cannot be totally excluded, a later



22. Tall Bulaybil, fragment of alabastron made of soapstone (TB19-SF15).



23. Tall Bulaybil, body of fibula made of bronze (TB19-SF02).



24. Tall Bulaybil, late Iron Age to Persian period pottery bowl fragment (TB19-SF24).

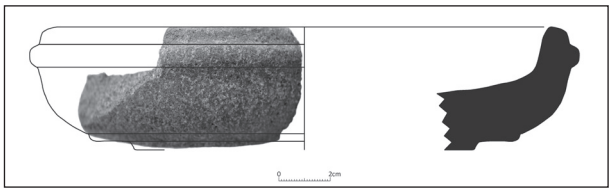
25. Tall Bulaybil, fragment of basalt bar-handled bowl (TB19-SF21).

date –since Hellenistic to Byzantine levels are also attested at Tall Bulaybil– would also seem possible. It could well be that due to the bulldozing, material from later levels was mixed with the debris of Wall SU 25. Perhaps future excavations can shed more light on this matter.

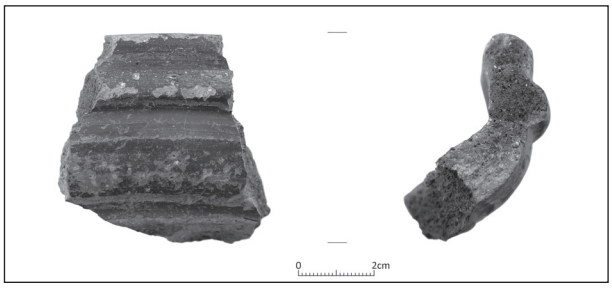
Three round discs made of pottery that show evidence of secondary burning are without good parallels. The objects seem to have been fired in their initial production and thus are not reworked sherds, but were clearly produced for a yet unclear purpose (**Figs. 29, 30**). All feature a concave depression along their narrow sides, its exact function unknown. Since the objects stem from the within debris above of Wall SU 25, their original context of use is not known, nor is their specific date. Perhaps these discs are to be seen in relation to weaving activities and textile production, serving as spacers or spreaders for threats. However, a function as gaming pieces or stoppers/lids for pottery vessels cannot be excluded (Daviau *et al.* 2002: 165-166, 177-179).

Conclusions

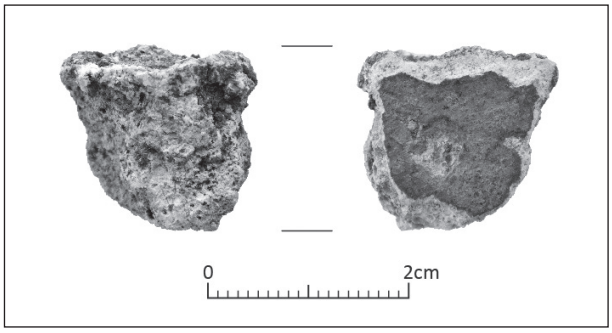
The third and fourth campaigns of the Wādī SHu'ayb Regional Archaeological Survey Project in 2018 and 2019 concentrated on the region in the vicinity of the site of Tall Bulaybil in the southern part of the Wādī SHu'ayb and the excavations at the site of Tall Bulaybil itself. Four sites in the vicinity of Tall Bulaybil were surveyed. First trial excavations at the collapsed northern flank at Tall Bulaybil (WS-007) in 2018 and 2019 possibly exposed a part of the settlement's city wall dating to the Iron Age. Exceptional is the fact that a mudbrick superstructure can be clearly linked with the stone foundations excavated (its substructure), giving potential new information concerning the general construction of Iron Age defense systems in Transjordan. The results obtained clearly allow for larger scale excavations, which are planned for the coming years. Future campaigns should also try to clarify why and to what extent the relatively modest size of the ancient settlement at Tall Bulaybil (<2ha) corresponds with such a comparatively massive defense system. This does not only hold true for Tall Bulaybil, but also for the other Iron Age



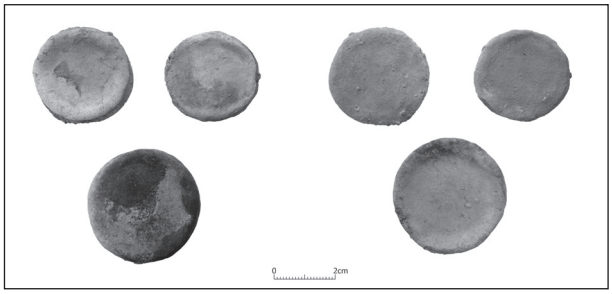
26. Tall Bulaybil, fragment of basalt bar-handled bowl, profile (TB19-SF21).



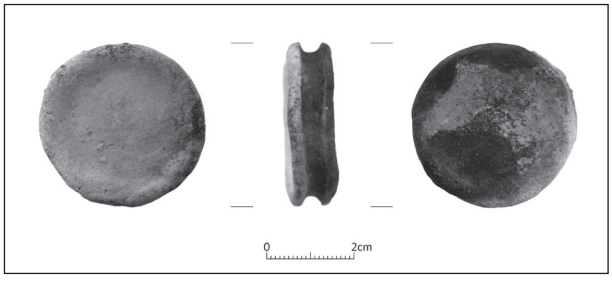
27. Tall Bulaybil, rim fragment of pottery vessel with similar shape to basalt bar-handled bowl (TB19-SF30).



28. Tall Bulaybil, fragment of gypsum plaster with red color pigments (TB18-SF08).



29. Tall Bulaybil, three round disks made of pottery (TB19-SF07+25+26).



30. Tall Bulaybil, detail of round pottery disk (TB19-SF25).

sites in the southern Jordan Valley mentioned above. For the time being, it could perhaps be hypothetically assumed that the apparent and at the same time striking defensive character of the settlement can best be explained by the strategic role it had controlling and guarding access into the Wādī SHu'ayb or from the *wadi* to the Jordan Valley. In this function, the settlement probably served as a stronghold of one of the Iron Age kingdoms attested in the historical sources.

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Appendix of Sites Surveyed in 2018

(GPS Coordinates were taken, but will not be published here; Site numbers are listed according to the WSAS Project, see Ahrens 2018a).

WSAS Site No./Name	Site/Feature	Altitude MSL
WS-028	Occupational Site	-9m
WS-029	Occupational Site	+45m
WS-030	Occupational Site? - Lithic Scatters	+70m
WS-031	Burial Cave (late Chalcolithic, EBA, modern)	-141m

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EXCAVATIONS TABAQAT AR RUṬŪBAH, A YARMUKIAN SITE IN WĀDĪ QUSAYBAH, NORTHERN JORDAN

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Abstract

During August 2018, the University of Toronto mounted excavations at a Yarmukian site called Tabaqat Ar Ruṭūbah (طبقة الرُّطوبَة WQ 117), which the Wādī Qusaybah Survey first discovered in 2012, and subjected to small test excavations in 2014. The site is about 0.35ha in size and in 2014 we encountered stone and mud-brick building foundations as well as pits. Although thick colluvium at the site obscures much of its area, where Neolithic deposits are closer to the surface, we have found up to 2m of stratification that may span a period from *ca*. 6200 to perhaps 5700 cal. BC. This provides an excellent opportunity to study changes in important aspects of Yarmukian material culture, including its pottery, over time. The site also exhibits some enigmatic aspects, including its rarity of sickle elements and a complete lack of mammalian bone, both of which are usually fairly abundant at sites of this period.

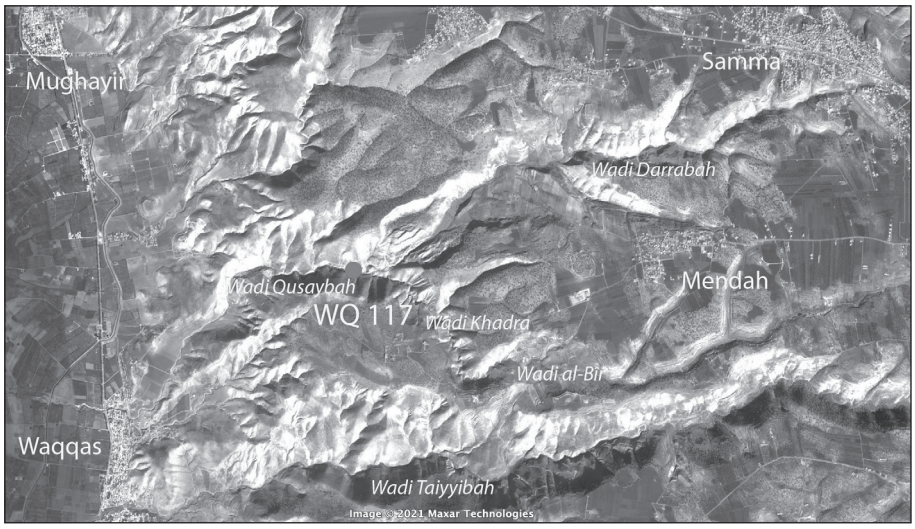
Introduction and Background

In 2012 and 2013, the University of Toronto's Wādī Ziqlāb Laboratory undertook surveys in the catchment basin of Wādī Qusaybah, west of the town of At Tayyibah, and in two small *wadis* on the edge of the Jordan Rift immediately north and south of Wādī Qusaybah's main channel. The main targets of the survey were late prehistoric sites, especially Neolithic ones. These sometimes lie buried under recent colluvium that makes visibility poor and renders them difficult to detect without subsurface testing by augers or small excavations (Field and Banning 1998), while other sites of the early Holocene have likely disappeared through *wadi* down-cutting and erosion. Consequently, the survey employed innovative Bayesian survey methods that focused search on spaces ("polygons" in our GIS predictive model) that were likely fragments of early Holocene land surfaces and whose probabilities of containing detectable Neolithic remains were updated in light of each day's survey results (Banning *et al.* 2013; Hitchings 2021; Hitchings *et al.* 2013; 2016; Stewart *et al.* 2016).

The survey discovered sites of various ages but also several "candidate" Neolithic sites where possibly Neolithic artifacts or only very small numbers of more definite Neolithic artifacts occurred. We tested three of these locations with small trenches in 2014, and found evidence for Yarmukian occupation at one of them to be sufficiently promising to warrant more substantial excavation in 2018 (**Fig. 1**). We describe the results of these excavations here.

Excavation and Recording Methods

As in previous field seasons in Wādī Ziqlāb and Wādī Al Bīr, we excavated each excavation unit or "Area" stratigraphically by *loci*, which we can subdivide further into "bags" or lots, so that "bags" are our smallest regular unit of spatial-stratigraphic context. In the remainder of this report, reference to contexts will be of the form J24.010, meaning *locus* 010 in Area J24, while artifact numbers are in the form WQ117.J24.6.127, meaning artifact 127 from



1. Location of Ṯabaqat Ar Ruṯūbah (WQ117) in Wādī Quṯaybah, northern Jordan (courtesy Google Earth).

bag 6 in Area J24. During the 2018 excavation, the sedimentary characteristics and several top and bottom levels of each "bag" were recorded on paper forms with additional information, mainly record photos, in a FileMaker Pro database on iPads, while additional photos were taken with a DSLR camera. We drew bag-by-bag sketch maps and section drawings on paper forms, and generated final architectural plans from photogrammetry using a digital camera mounted on a stadia rod. The 2014 test excavations, by contrast, relied on iPads for all recording except mapping, which was on paper forms.

With the exception of overlying colluvium, nearly all excavated sediments were screened with 3.5mm mesh. Excavation was mainly by trowel except for the use of picks and hoes to break up and remove thick colluvial sediment or very compact sediments.

From each context, we collected any lithics, pottery, faunal remains, basalt fragments, or other artifacts either *in situ* or on the screens. We also collected charcoal or other datable materials from useful contexts for radiocarbon dating, enclosing these in aluminum-foil pouches to protect them from contamination before putting them in plastic bags. We placed lithics in plastic bags but pottery in paper bags so that sherds could dry slowly and to prevent condensation that could damage them.

2. View of Ṯabaqat Ar Ruṯūbah from across Wādī Quṯaybah (K. Gibbs).

Physical Environment of Ṯabaqat Ar Ruṯūbah (WQ 117)

Ṯabaqat Ar Ruṯūbah occupies a terrace or bench at 32°33'23"N 35°38'7"E, between -10 and 20m asl, and about 380m downstream of the confluence of Wādī Aḍ Ḍarrābah and Wādī Khaḍrā, the two main tributaries of Wādī Quṯaybah (**Figs. 1, 2**). It is also just downstream from what was, until about a decade ago, a reliable spring called 'Ayn Tura'i; falling water tables recently caused this spring to dry up. Despite this, vegetation in the *wadi* channel is strongly hydrophytic, with abundant oleander, tamarisk and *Arundo donax* reeds.

The terrace is likely a remnant of the "Middle Terrace," typically a bedrock "strath" terrace that, on the basis of observations in nearby Wādī Aṭ Ṯayyibah and Wādī Ziqlāb, likely dates to the mid-Pleistocene (Maher 2011; Ullah 2013). There appear to be little to no remnants of the "Lower Terrace" in this part of the *wadi*, which is deeply incised. What may be the basal deposit of the terrace, below the Neolithic deposits, is a pale yellow (10YR 8/2) marl. Deep colluvium accumulated from the adjacent hillslope overlies the terrace so that its surface now slopes about 15°, with a SW (230°) aspect, and extends approximately 30m from

the colluvial hillslope before steeply plunging to the *wadi* channel about 15m below. Evidence of an old stream channel occurs in section about a meter below the toe of the terrace slope. A substantial gully divides the terrace into two main portions while several small, entrenched gullies, all originating in the colluvial slopes to the north, cross it before emptying into the *wadi* canyon at the southern edge of the site. A crudely bulldozed path or road bisects the site with a nearly east-west orientation (**Fig. 2**).

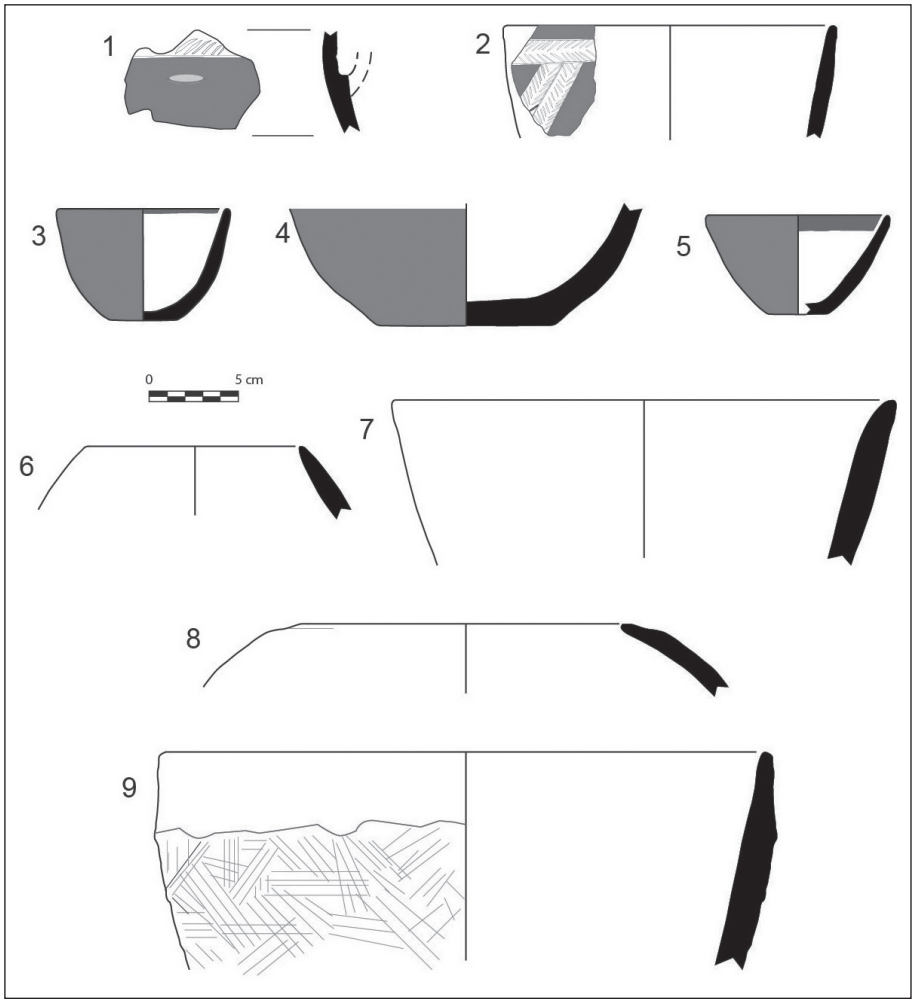
Finds from the 2012 Survey and Test Probes

Survey of polygons 117 and 118in Wādī Quṯaybah on 30 April 2012 involved three transects at approximately 4m intervals downslope of the road cut that someone had recently bulldozed into the slope. All three transects encountered lithics and some pottery on polygon 118, including a nearly complete bowl (**Fig. 3.3**, **Table 1**) that appeared to be Neolithic. Almost certainly, the bulldozing had redeposited these artifacts onto the modern surface. We defined site WQ 117 as a site occupying most of polygon 118 and at least part of polygon 117 to its west.

Given these promising surface finds, and with permission from the Department of Antiquities, on 15 May 2012 we excavated two 1×1m test probes, one on either side of the dirt road. We excavated Test Pit 1, upslope of the road, to a depth of about 0.9m, while Test Pit 2, below it, went to a depth of 1.05m.

Test Pit 1 yielded several lithics and just one sherd in its uppermost 10cm, and more abundant lithics from a depth of 40-50cm. Overall, this unit yielded little cultural material, and mainly colluvial deposits filled with angular cobbles (**Table 2**).

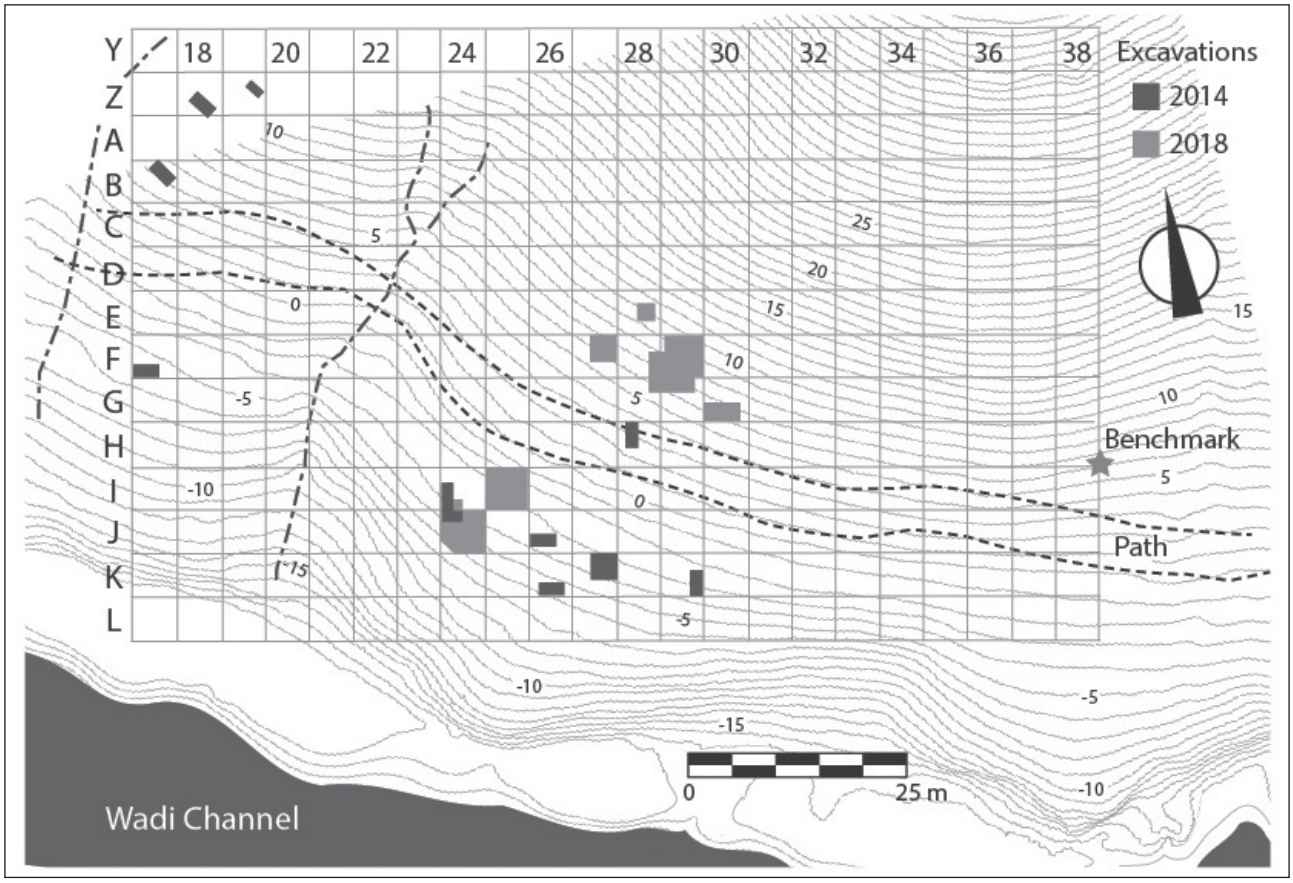
Test Pit 2 had colluvium with very few artifacts in its upper 40cm but, below this, lithic artifact density increased. Half of a limestone loom weight occurred at a depth of about 45cm. Most of the artifacts were below 80cm,



3. Diagnostic pottery from the 2012 survey and test probes (K. Abu Jayyab; for descriptions see Table 1).

Table 1. Sherds from the 2012 survey and test probes that appear in **Fig. 3**. Abbreviations are Art No (artifact number), Ext Col (exterior colour), Int Col (interior colour), Ext Core (exterior core), Int Core (interior core), Tr (trace), Lmst (limestone), Mod (moderate), Freq (frequent), Occ (occasional). Artifact numbers consist of the transect number, a period, then the individual artifact number, or site and test-pit number, spit number, and individual artifact number, separated by periods.

No	Art No	Ext Color	Int Color	Core	Ext Core	Int Core	Slip	Forming	Inclusions
1	10663.1	Red	Buff	Buff			Red	Coil	Mod Lmst
2	WQ117. TP2.8.105	Red	Buff	Buff			Red	Coil	Limestone
3	10691.2	Red	Buff	Grey	Buff	Buff	Red slip	Pinch	Freq coarse Lmst, Occ fine chaff
4	10652.1	Red	Red	Grey	Buff	Buff	Red slip	Pinch	Mod-rare chert, Occ Fine chaff
5	10701.1	Red	Buff	Buff	Buff	Buff	Red slip	Pinch	Mod fine chaff, Mod-freq Lmst
6	WQ117. TP2.4.101	Buff	Buff	Buff	Buff	Buff	None	Coil	Lmst & Chert
7	10622.1	Buff	Orange	Orange	Buff	Orange	None Scraped	Coil	Lmst
8	10691.1	Buff	Orange	Buff	Buff	Orange	None	Coil	Freq Chert & Lmst
9	10691.2	Buff	Buff	Buff	Buff	Buff	None Scraped	Coil	Very course Lmst and Chert



4. Locations of 2014 test trenches and 2018 excavations at Ṯabaqat Ar Ruṯūbah (S. Edwards, E. Banning, K. Gibbs and I. Ullah).

Table 2. Summary of the sediment characteristics and finds in the 2012 test pits.

Spit	Depth (cm)	Test Pit 1	Test Pit 2
1	0-10	Colluvial, one sherd, few lithics	Compact colluvium with angular cobbles (*ca.* 15cm) and grey matrix
2	10-20	Quite a few angular pebbles	Less rocks, less compact
3	20-30		Possible brick or tabun fragments near East section
4	30-40	Still very rocky, sediment slightly lighter	Sediment beginning to look lighter with more limestone content but most of the inclusions are small (*ca.* 5cm) angular limestone
5	40-50	Even more rocky, increase in lithics, no pottery	Many small (*ca.* 2cm) limestone pebbles, often fairly rounded, increasing angular limestone colluvium (*ca.* 15cm), half a limestone loom weight, lithic density…. (cut off)
6	50-60		Mostly fairly loose but with some larger stones (removed)
7	60-70	Decrease in the frequency of rocks and cobbles, matrix more compact	
8	70-80	Fewer rocks	Quite loose with many angular rocks and a pocket of ashy deposit at East side, whiter, more compact material near SW corner
9	80-90	No pottery, much more compact than above	Still quite loose and darker near NE corner, higher density of artifacts, especially lithics, nice Yarmukian rim with decoration
10	90-100		Goes to 105cm, possible mud brick in hard white (marl?) material at NW corner

including a herringbone-decorated rim sherd at about 85cm and what excavators then identified as a mud brick at about 100cm. In retrospect, this "brick" may have been a chunk of the marl that underlies the Neolithic deposits, and into which a series of pits is cut (see below).

Table 3: Locations of diagnostic pottery in Test Pit 2.

Spit	Depth (cm)	Test Pit 2 Finds
1	0-10	
2	10-20	
3	20-30	
4	30-40	holemouth rim sherd (Fig. 3.6)
5	40-50	bowl sherd
6	50-60	handle, rim sherd
7	60-70	
8	70-80	base sherd, rim (bowl) sherd (Fig. 3.5)
9	80-90	
10	90-100	no artifacts

2014 Test Excavations

The finds in the 2012 test pits led to further excavation at this site on a somewhat larger scale in 2014 with the goal of determining its size and assessing whether there were any well-preserved Neolithic deposits or architecture.

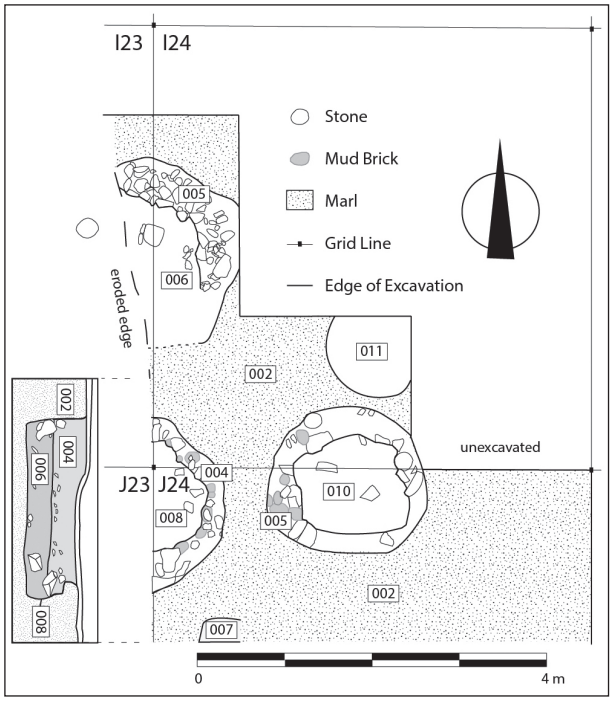
In 2014, we gridded the site into 5×5m squares ("Areas"), with a base line extending westward from a benchmark at H40, with a backsight of 270° onto a cell tower on the western horizon (**Fig. 4**).

We found pottery eroding out of the road cut at several points from Area B16 in the west as far as Area I3, some 80m to the east (**Fig. 4**), and this guided our selection of areas for excavation. The B16 pottery occurred in a cobble-filled deposit that may be the remnant of an ancient gully, and some, but not all, of the other pottery finds were in similar cobble-filled deposits.

Initial excavation units were 1×2m test trenches in Areas I24, J26, K26, and K29, and a 2×2m trench in K27. Later, we added a 1×2m trench in J24, and a 1×1.5m one in H28.

Most of the 2014 excavations at the site encountered thick deposits of relatively recent colluvium and never reached deposits of Neolithic age. Even though this colluvium sometimes contained Yarmukian sherds, there was little hope of reaching *in situ* Yarmukian material in ancient context without removing many cubic meters of colluvium.

The only 2014 test units that were able to reach Yarmukian levels below the colluvium were those in I24 and J24, on the edge of the broad gully that separates polygons 117 and 118. Here, the colluvium was much thinner than in areas even a few metres upslope, and excavations revealed two roughly circular pits cut into the marl, which erosion had truncated at the terrace edge. A small portion of a third pit was exposed just upslope of the J24 one. One of these pits (I24.007), contained a loose, ashy and stony fill (I24.004), and exhibited a curved stone feature, possibly remnants of a wall (I24.005), within its eastern perimeter. Similar pits occurred in Area J24 (**Fig. 5**) and one of these, in the western portion of J24, along the terrace edge, was similar to the I24 one except for its lack of ashy deposit and the presence of what appeared to be mud bricks, rather than a stone feature. Some stones and a conical lump of unfired clay accompanied the mud bricks at the bottom of this pit. The other J24 pit was not sufficiently exposed to reveal its nature or contents in 2014, but was exposed more fully in 2018.



5. Plan of the western portion of the South Field, including pit 010 at the boundary of Areas I24 and J24 (K. Abu Jayyab and E. Banning).

These pits yielded substantial amounts of Yarmukian pottery, mostly from I24.003 and I24.004, and a large fragment of an incised stone "pebble" figurine (see **Fig. 13a**). Excavations in J24.008, recovered a biconical spindle whorl and a fragment of a grinding stone in addition to Yarmukian pottery.

2018 Excavations

The 2018 excavations explored the vicinity of the old I24 and J24 test trenches and a new area north of the road cut. In the remainder of this report, we refer to these two portions of the site, above and below the road cut, as the "North Field" and "South Field".

Further excavations in the South Field began with a quickly aborted excavation in I25, where colluvium once again impeded investigation. Subsequently, we reopened the I24-J24 excavation but concentrated on completely excavating a single pit (J24.010).

Identification of pottery in the upslope part of the road cut informed our decision to add excavation areas above it in the North Field, initially with a 2×2m trench in G30, which we extended to 2×4m after encountering a curving stone wall. Another 2×4m trench in Area G29 encountered another curving stone wall that was better preserved, and we subsequently added further trenches in Areas E28, F27, F29, and G28. These yielded considerable exposures of architecture and, in some cases, evidence for multiple phases of Yarmukian occupation (see below).

Excavations in the South Field of WQ117

The first unit in the South Field subject to excavation in 2018, I25, did not progress deeply enough to penetrate the recent colluvium before reassignment of its excavators to the North Field.

However, after removal of colluvium and backfill from the entirety of Area J24 (aside from the SW corner, lost to erosion), the yellow-white (10YR 8/2), marly *locus* J24.002 extended across the entire unit, except near

the western end of the north section, where the 2014 excavation had previously caught the corner of a possible pit. Removal of a portion of the adjacent Area I24 to 1.5m north of the grid line exposed the remainder of this pit J24.005 and its fill, *locus* J24.010, as well as the corner of yet another pit (I24.011) in the NE portion of this small extension into I24 (**Fig. 5**).

Locus J24.010 (the pit fill) was excavated to a depth of 1.1m below the top surface of J24.002 (the marl surface). The pit's upper edges proved difficult to identify clearly, partly because the pit is markedly bell-shaped, and partly because chunks of the white marly material that presumably derives from *locus* J24.002 had often fallen in around the pit's periphery. In addition to those chunks of marly material, the pit also included randomly scattered mud bricks and brick fragments, as well as bricks along the pit edges. Otherwise, the matrix of the pit fill ranged from compact to loose, with many small, angular to subangular pebbles and occasional darker pockets of ashy sediment. This fill contained few sherds except in its deeper portions, all clearly Yarmukian. As in the 2014 excavation of nearby pits, this included relatively fine, well-fired pottery, with finely executed herringbone-incised patterns, especially in sediment at the bottom of the pit. The pit fill also included flakes of flint debitage, some likely fire-cracked rock, and a few pieces of crab claw and carapace, as well as many snail shells and shell fragments. Radiocarbon dates on charcoal recovered from J24.010 indicate this pit fill dates approximately 6200-6100 cal BC (UOC-7909, UOC-7910, and UOC07911; **Table 4**).

There was insufficient time to excavate *locus* I24.011 (another pit north of J24.010) to any depth, but removal of its uppermost fill revealed a layer of mud bricks or mud-brick tumble. This seems similar to the situation in J24.010, except that the bricks may possibly be arranged to cover the pit fill. Only future excavation will determine if this is the case.

Excavations in the North Field of WQ117

The results of excavations in this area were quite different than those in the South Field. Not far below the surface, and under recent colluvium, were linear and curvilinear stone walls, all with complex stratigraphic histories of additions, re-buildings, and renovations.

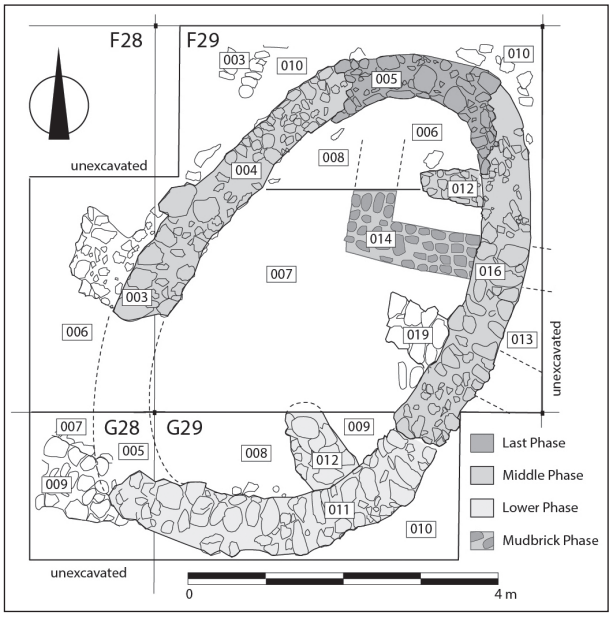
Area G30

G30 contained a curved wall, which at its east end was built against an outcrop of limestone bedrock. Unfortunately, if this wall was part of a larger structure, most of it must have been destroyed by bulldozing of the road and subsequent erosion.

Areas F28, F29, G28, G29

Our investigation of Late Neolithic occupation of this part of the site indicates that the builders of the architecture compensated for the slope by building large walls, backed by fill, to create terraces on which to construct buildings **(Fig. 6**).

The earliest phase that excavation in Area G28 reached revealed a straight, well-constructed, fieldstone wall (G28.009) running roughly east to west near the southern edge of the excavation. This substantial wall was wider than the one that overlay it (G28.011), preserved to three courses, and built more carefully than the walls of later phases. The fill adjacent to wall 009 (G28.007) contained few artifacts, but these included finely made Yarmukian pottery with a high incidence of herringbone incision. A mud brick packed against the first course of cobbles in the wall covered the leg of a clay figurine (see



6. Oval building in Areas F28-G29, and portions of earlier architecture, including the SW corner of the mudbrick building (loci F29.009 and F29.014), and stone walls F28.003, F29.019 and G28.009 (K. Abu Jayyab, E. Gibbon, I. Schwartz, and E. Banning).

Fig. 13b), while a pebble incised with parallel lines (see **Fig. 15a**) lay nearby. Perpendicular to the lowest course of wall G28.009 was a north-south wall (G28.010), preserved only to one course, that disappeared into the west baulk of G28. The identical founding level of walls G28.009 and 010 suggests that they are part of the same structure, but no surface associated with these walls was evident. Excavation continued below the base of these walls, 20cm into what appeared to be culturally sterile sediment, but it is possible that there is earlier cultural material deeper in Areas G28 and G29.

Excavation of the remains above wall G28.009 in G28-G29 showed that builders of a large structure that was mostly upslope in F28-F29 began by constructing a large stone wall (G29.011) running roughly east-west but curving northwards at its east end into Area F29. This wall was founded at a noticeably lower elevation in G28-G29 than what appears to be the founding level of wall F29.016, and wall 011 also varies in its preserved height from two courses in G28 to five courses close to the juncture between G29 and F29. A north-south wall (G29.012) that abuts the north side of wall G29.011 subdivides the presumably interior space and is not as well constructed. The base of wall G29.012 is also slightly higher than that of wall 011. The fill (G28.005, above G29.008) west of wall G29.012 has an exceptionally high density of sub-angular cobbles, chunks of mudbrick, flint flakes, as well as a high density of Neolithic sherds, several of them with characteristic Yarmukian herringbone incisions, and a small piece of soft limestone incised with lines (see **Fig. 15a**). Our first impression was that this was a colluvium that had accumulated against wall 011, but later excavations in F28.006 demonstrated that this was intentional fill placed to level off an area extending north into Area F29 (and possibly farther) on which to build a Neolithic structure, whether the oval building to be discussed below or another whose plan and size are currently unknown. It was also used as a foundation for the south end of the oval building. Consequently, we interpret wall G28/G29.011 as a retaining wall and foundation. Where it begins to curve northward at its west end, it has apparently been lost to erosion, and the cobble-filled *locus* 005 also terminates on approximately the curve one would expect if wall 011 was the southern part of an oval or subrectangular structure. The lighter-coloured fill (G29.009) east of wall G29.012 was substantially different than G28.005, consisting mainly of angular pebbles, and this difference, too, is consistent with the interpretation that both it and *locus* 005 were intentional fills.

A mud-brick structure that was partially exposed in F29 may have been built on this terrace, unless it belongs to a still earlier phase. Its full extent is currently unknown. We were only able to expose the top of its SW corner (F29.014), so most of its stratigraphic relationships are yet unknown, although walls F29.012 to the north and F29.016 to the east clearly overly it. Large, flat stones over an area of 0.6×0.8m just south of the mud-brick wall (*locus* F29.019) may be a pavement but are more likely a remnant of yet another east-west wall, either from the same phase as the mud brick one or from yet another building phase. If it is a wall, it appears to have continued east, where it underlies wall F29.016 and deposit F29.013.

In a later phase, a new building with an oval plan was founded some 20cm above the mud brick, consisting of walls F28.003, F29.004, and F29.016, and with a later repair, F29.005. It used portions of older walls, including wall G29.011, as foundations (**Fig. 6**). Vertically arranged slabs, somewhat like orthostats, line the interior face of F29.005. Although the southern portion of this building has been lost to erosion along the slope, there is clear evidence that wall F28.003 overlies the G28.005/F23.006 fill and it is likely that the building originally extended some 7m from north to south and 4.5m from east to west.

Large amounts of Neolithic pottery were associated with deposits inside this oval building, including many flat-lying sherds on a surface about 20cm above the mud bricks of the earlier building's wall F29.014. However, a later surface within this building has a number of Early Bronze Age sherds, and it is possible that at least the latest phase of the oval building, including its curved northern wall, F29.005, dates to Early Bronze. We currently do not have useful radiocarbon evidence for the date

of this building, however, as the only charcoal available was from the interface between the top of wall F29.005 and deposit F29.001, very near the surface. Both these specimens returned dates in the early second millennium AD (see **Table 4**).

Area E28

The purpose of excavation in this Area was to determine whether occupational remains and architecture like that found in F29-G29 extended upslope and to explore the site's stratification. Excavation in 2018 was limited to a 2×2m portion of the unit. E28's stratification shows evidence for several distinct phases of occupation.

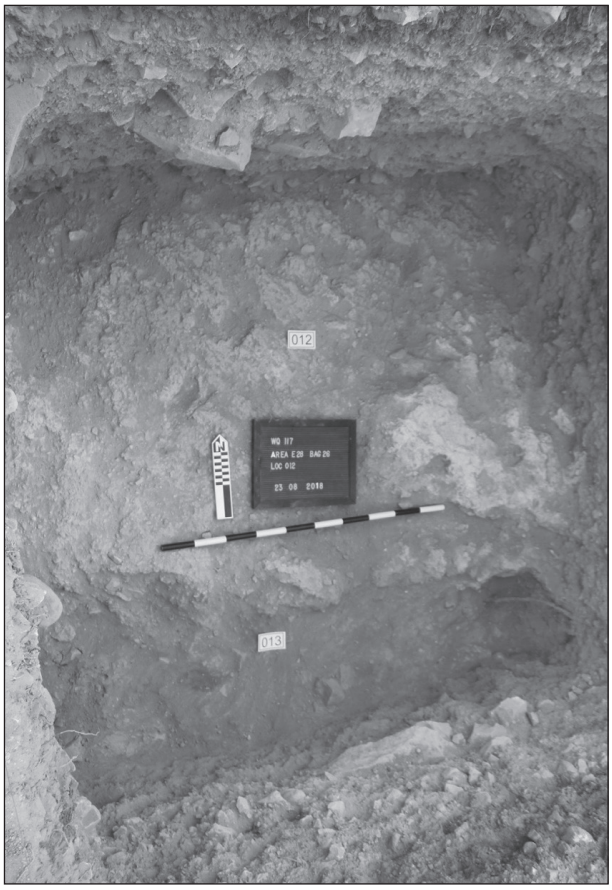
The deepest deposit reached in this unit was a marl, *locus* E28.012, with a hard, pale yellow-white surface (Munsell 10YR 8/3). A pit (E28.013) that cut into this marl contained somewhat ashy fill and large sherds of pottery, many lithic flakes, and snail shells, similar to the finds in I24-J24 and the deepest levels of F27. Pit 013 extended along the entire south baulk of the unit, indicating that its diameter exceeds 2m, but we were only able to expose a narrow portion.

Some 5cm above the E28.012 surface was a probable hearth (E28.009), circular or oval in shape, edged with mud bricks or their fragments. A number of sherds from the same vessel lay flat in the middle of this hearth, along with many brick fragments. The surface associated with the hearth is the top of *locus* E28.011.

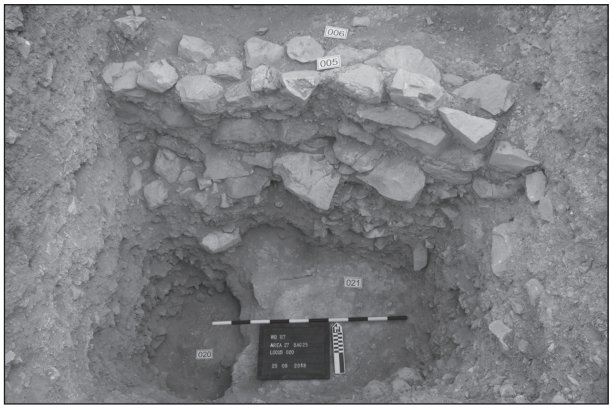
Locus E28.006 was an ashy deposit, 20-25cm thick, that occurred only in the western part of the excavation. It is possible that it was a pit dug into *loci* E28.007 and 008 but there was no clear pit edge, possibly because the loose, cobble-filled nature of the surrounding deposit (E28.007) made it hard to identify.

Higher up, *locus* E28.014 was a small fieldstone wall running SE/NW, with only one course preserved. It was not obvious what surface was associated with it, although *locus* E28.005 accumulated against its south face. As this wall runs roughly parallel to a similar wall (*locus* 005) in F27 at nearly the same elevation, it is possible that it is contemporary with both F27.005 and the oval building in F29-G29.

Just above E28.005 and the remnant of wall 014 was *locus* E28.004, apparently a colluvium with cobbles, sherds and lithics presumably carried downslope from a deposit to the north or northeast. This *locus* also contained a substantially intact jar base and a fairly large basalt quern, whose degree of preservation suggests they had not been transported very far. These finds demonstrate that the site extends at least somewhat farther to the north.



7. View of Area E28 toward end of excavation, with marly deposit E28.012 and top of pit E28.013 exposed (Rasha Elendari).



8. View of Area F27 near end of excavation, showing marly locus F27.021 and pit F27.020 well below wall F27.005 (Ahmad Thaher).

Table 4. Details of radiocarbon determinations from Tabaqat Ar Ruṭūbah. Calibrations are 95.4% credible intervals by OxCal v. 4.4 (Bronk Ramsey 2013) using the 2020 calibration curve (Reimer *et al.* 2020).

Lab ID	ID and *Locus*	Material	14C yr BP		F14C		D14C ‰		14C ‰		cal BC
UOC-7912	935128a F29.001	charcoal	972	21	0.8910	0.0023	-108.99	2.29	-116.28	2.27	1023-1153 (27.9%) 1077-1156 (67.6%) cal AD
UOC-7913	235128b F29.001	Arbutus sp charcoal	825	21	0.9024	0.0023	-97.59	2.32	-104.98	2.30	1177-1193 (7.1%) 1203-1269 (88.3%) cal AD
UOC-7916	935138 F27.009	charcoal	7202	27	0.4080	0.0014	-592.03	1.38	-595.36	1.37	6160-6151 (0.08%) 6090-5991 (94.7%)
UOC-7909	450445 J24.010	charcoal	7212	30	0.4075	0.0015	-592.51	1.53	-595.84	1.52	6216-6187 (4.9%) 6177-6142 (5.4%) 6095-5996 (85.2%)
UOC-7910	450472a J24.010	Quercus sp charcoal	7334	26	0.4013	0.0013	-598.67	1.29	-601.96	1.27	6236-6084 (95.4%)
UOC-7911	450472b J24.010	charcoal	7276	29	0.4043	0.0015	-595.74	1.47	-599.05	1.46	6222-6071 (95.4%)
UOC-7917	J24.010	Oxy-chilus sp shell	8983	28	0.3269	0.0011	-673.15	1.13	-675.82	1.12	8286-8173 (82.1%) 8114-8091 (4.1%) 8076-8062 (1.2%)
UOC-7918	F27.010	Mela-nopis sp shell	11193	32	0.2482	0.0010	-751.77	0.99	-753.81	0.99	11216-11137 (95.4%)

Area F27

F27 is the westernmost unit opened in the North Field during 2018. As in Area E28, excavation was restricted to a 2×2m area in the northeast corner of the unit. Its goal was to determine whether the occupational levels exposed in F28-G29 continued to the west and to obtain a long stratified sequence. Excavation here revealed three discrete occupational phases, each with pottery diagnostic of the Yarmukian.

The earliest phase discovered in F27 is associated with a yellow-white, marly deposit (F27.021, 10YR 8/3) very similar to *locus* E28.012 and *locus* 002 in Areas I24 and J24. As in those Areas, it was cut by a pit (F27.020). Although the excavation only exposed a small area in the northeast corner of this pit, with insufficient room to allow excavation to a depth greater than 50cm, it appears to be roughly 40cm in diameter at the top, assuming it is roughly circular. Pit F27.020 was filled with loose, ashy, sediment dense with angular cobbles. This deposit also included pottery sherds, incised pebbles, and a crude limestone "mortar." It seems likely that this pit, like *locus* E28.012, belongs to the same occupational phase as the pit features discovered in I24 and J24 on the basis of both similarities in artifacts, including incised pebbles and limestone mortars, and the basal marl deposit into which they are cut.

The most distinctive feature of the middle

phase is a double-leaf mudbrick wall F27.015), preserved to a height of two courses, running roughly north-south, and founded on top of the compact *locus* F27.019. The excavation uncovered too little to discern the nature of the building to which it belongs, other than that it may have been rectangular. Its associated surface may have been the top of *locus* F27.019, but this was not entirely clear. This phase may be contemporary with the mud-brick phase below the oval building in Areas F28-G29. Above it was a thin, compact clay layer (F27.014) that produced a large quantity of fine herringbone-decorated sherds and clearly separated it from the following phase.

The latest phase in F27 includes a double-leaf fieldstone wall, preserved four courses high (*locus* F27.005). It appears to have been constructed on top of *locus* F27.012, and deposits 011, 010, 009, 008 and 007 accumulated against its south face. Most of the pottery recovered from these sediments is coarse, with only a few sherds exhibiting herringbone-incised decoration. One, *locus* F27.009, yielded a radiocarbon date of 6090-5990 cal BC at 94.75 credible interval (**Table 4**). Given the large proportion of coarse wares and the similar elevation of wall F27.005 to the oval building in F29-G29 (founded about 1m lower than F29.005 but similar to elevation of G29.011), they may belong to the same phase.

Radiocarbon Chronology

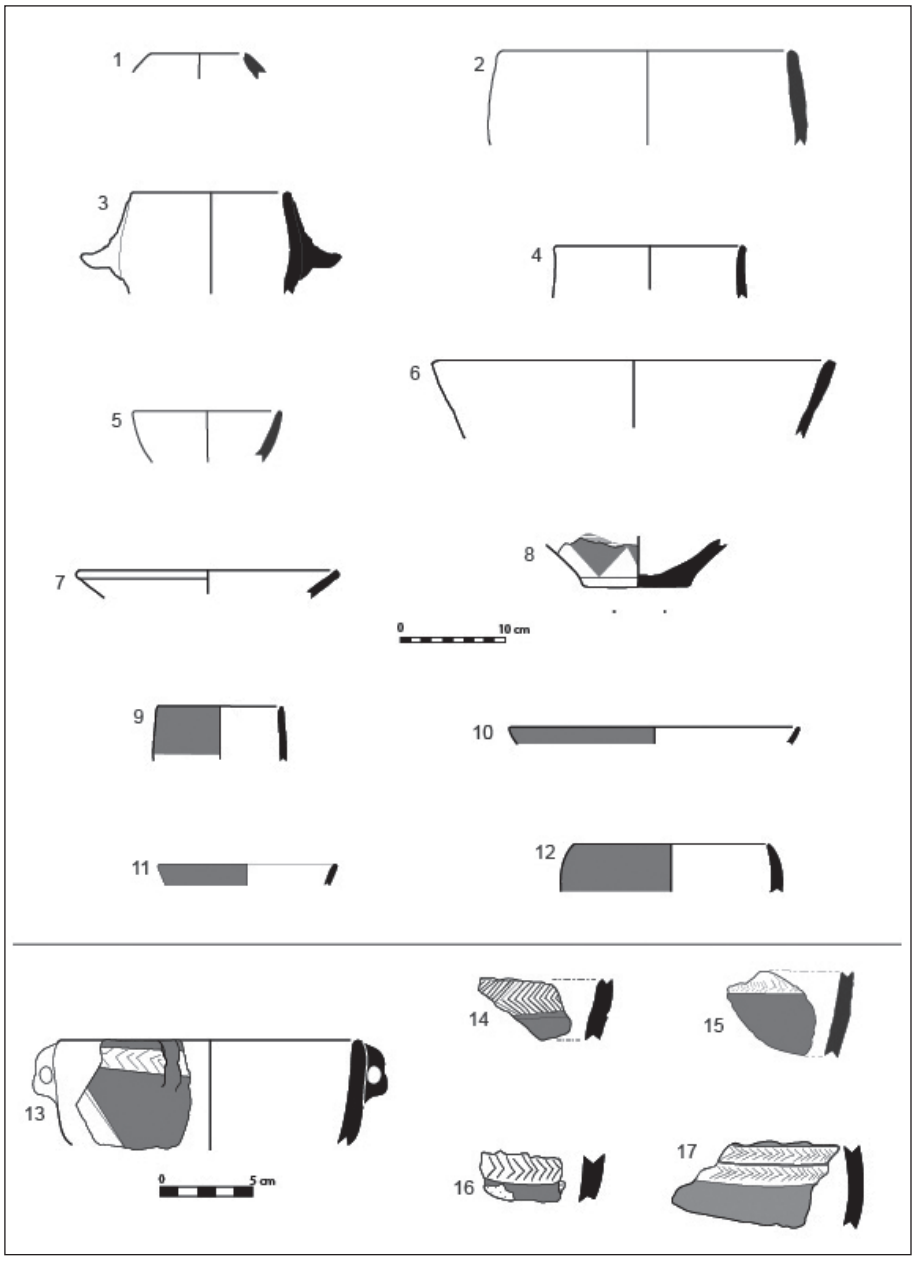
To date, we have submitted eight small charcoal fragments and two snail shells to the A. E. Lalonde AMS Laboratory at University of Ottawa for radiocarbon assay. Two of the smallest charcoal fragments were undatable.

Of the remaining six charcoal fragments, four yielded dates consistent with the Yarmukian Late Neolithic, in the late seventh millennium cal BC (**Table 4**). Three of these came from the pit fill, J24.010, and one from F27.009. A Bayesian analysis of the three dates from the pit on the assumption that they all pertain to the same phase is currently unconstrained by any other evidence, so only gives a very broad indication of the beginning of occupation at the site, between 6910 and 6075 cal BC at 95.4% probability, with considerable left skew, and the end of this first phase between 6215 and 5645 cal BC, with large skew to the right (overall agreement 86.2 and individual agreements all above 97.1). If we make the assumption that the three charcoals from J24.010 are all dating the same event, they provide a combined date of 6221-6118, 6111-6073 cal BC at the 95.4% credible interval.

A single date on a small piece of charcoal from F27.009 yielded a date of 6090-5990 cal BC at 94.75 credible interval. As this came from sediment piled against one face of wall F27.005, it unfortunately does not provide strong evidence for its date, as the charcoal could be residual, although it is consistent with the Yarmukian.

Two dates on small charcoal fragments from the interface between the top of wall F29.005 and bottom of F29.001, provided date estimates less than one thousand years old. As this was very close to the modern surface and from a context that clearly post-dates the destruction of wall F27.005, it is likely that the charcoal originated from shrubs burned in a brushfire or perhaps a shepherd's hearth in the 11th or 12th century AD (Fatimid or early Ayyubid period).

The two dates on snail shell were only to establish whether they were old, and potentially contemporary with the Neolithic use of the site, or recent intrusions. As land snails burrow down as much as 25cm seasonally, to protect themselves from heat and aridity in summer or, in the highlands, from winter cold, it is necessary to ask whether they are likely to be contemporary with the Neolithic materials or are intrusive. Radiocarbon dating land-snail shell is complicated because there are potentially large reservoir effects due to snails' incorporation of carbon from limestone into their shells. In published studies, this can result in an offset of 300 to several thousand years (Douka 2017). The resulting dates, uncorrected for this reservoir effect (**Table 4**), are both substantially earlier than those from the charcoals. Notably, snail determination UOC-7917 comes from the same context (J24.010) as three of the charcoals discussed above. The 82% credible interval for this shell is some 2000 years earlier than that of the charcoals. The difference between the charcoal date from F27.009 and snail date from F27.010 is even greater, some 5000 years.



9. Selection of diagnostic pottery from the 2018 excavations at Ṯabaqat Ar Ruṯūbah (K. Abu Jayyab and E. Banning; for descriptions see table 5).

These would be plausible reservoir offsets, with the particularly large one for *Melanopsis* sp. perhaps resulting from its habitat in highly calcareous spring waters, and indicate that the shells are quite old, although we cannot be certain that they entered those deposits during its Neolithic occupation.

Neolithic Pottery

Our preliminary assessment of pottery from Ṯabaqat Ar Ruṯūbah indicates that it belongs almost entirely to the Late Neolithic period. Apart from a very small number of Hellenistic, Roman or Byzantine and Islamic sherds recovered as surface finds on the site's western terrace, and some Early Bronze sherds in the uppermost phase of the oval building in F29 and in upper colluvial rubble, the pottery has its strongest parallels to such Yarmukian sites as ʻAyn Rāḥūb, Jabal Abū Ath THawwāb, Al Munhaṯṯah and Shaʻar Hagolan (Stekelis 1951, 1972; Garfinkel 1992, 1993, 1999; Kafafi 1989; 1993; Garfinkel and Miller 2002). This includes numerous sherds with incised herringbone pattern, often on a reserved band adjacent to fields of red slip (**Fig. 9, Table 5**). In addition to herringbone-incised pottery, we recovered a number of sherds with red slip, red

Table 5. Descriptions of sherds that appear in **Fig. 9**. Abbreviations are Art No (artifact number), Ext Col (exterior colour), Int Col (interior colour), Ext Core (exterior core), Int Core (interior core), Tr (trace), Lmst (limestone).

#	Art No	Ext Col	Int Col	Core	Ext Core	Int Core	Slip	Forming	Inclusions
1	E28.7.3	10YR8/3	10YR8/4	5YR5/1	7YR8/4	7YR6/6		Coil rim	Tr Mica, 3% Lmst, 0.5% Chert, 1% Oxide, 1% Voids
2	E28.16.103	10YR8/3	7.5YR7/3	10YR6/1	10YR8/1	10YR8/1		Coil rim, neck	8% Lmst, 2% Calcite, 5% Chaff
3	E28.14.102	7.5YR7/2	7.5YR8/1	10YR/7/1				Coil rim, neck, shoulder	2.5% Lmst, 2.5% Calcite
4	E28.4.101	10YR8/1	10YR8/2	10YR8/1				Col rim, neck, shoulder	n/a
5	E28.7.2	7.5YR7/4	7.5YR7/4	7.5YR8/3	7.5YR7/3	7.5YR8/4		Coil rim, body	Tr Mica, 2% Lmst, 1% Calcite, 3% Chert, 5% Grog
6	E28.21.101	10YR8/4	10YR8/4	10YR6/1				Coil rim	5% Lmst, 15% Voids
7	F28.21.103	10YR8/3	10YR8/3	n/a	10YR8/1	10YR5/1	5YR5/6	Coil rim	105 Lmst, 15% Voids
8	F28.9.105	5YR7/8	5YR7/6	5YR8/2	5YR8/2	5YR8/2		Coil body, slab base	Tr Mica, 3% Lmst, 1% Chert, 5% Voids
9	F28.19.104	7.5YR7/4	7.5YR7/4	10YR7/1				Coil rim, neck	5% Lmst
10	F27.12.101	10YR8/2	10YR8/3	10YR8/2			5YR6/6	Coil rim	2% Lmst, 1% Calcite, 3% Voids
11	F27.20.101	5YR8/2	5YR8//2	10YR8/1			10R5/4	Hand-made rim, body	3% Lmst, 2% Oxide, 2% Chaff
12	F28.19.102	10YR8/2	7.5YR8/3	10YR7/2				Coil rim, body	3% Lmst, 4% Calcite, 5% Voids
13	F27.6.101	10YR8/4	7.5YR7/4	10YR8/1			2.5YR5/6	Coil rim, neck shoulder	n/a
14	E28.23.104	10YR6/3	7.5Yr7/3	7.5YR6/1	7.5YR7/2	7.5YR7/2		–	2% Lmst, 1% Calcite, 2% Flint
15	E28.16.101	10YR7/4	10YR7/2	10YR8/3			5YR6/6	Coil rim, body	3% Lmst, 1% Flint, 3% Chaff
16	E24.1.101	2.5YR7/6	5YR7/4	5YR7/3				Coil body	Tr Mica, 10% Lmst, 3% Chert, 3% Oxide, 5% Voids
17	F27.12.103	10YR8/3	10R7/3				5YR5/4	Coil body	1% Lmst, 4% Grog, 5% Voids

slip and burnish, and red painted designs that include fine parallel lines, triangular motifs, and wide bands. However, the painted pottery from the site appears to lack the burnish and cream or white slip associated with Jericho IX/ Lodian painted pottery (Garfinkel 1999: 68).

In the descriptions that appear here, we classify sherds according to Garfinkel's (1999) typological labels for ease of comparison with other sites. The Late Neolithic pottery is handmade, mainly by coiling where forming can be determined, and is generally well fired. Some sherds are thin-walled and carefully executed, while others are coarse and thick,

sometimes with roughened surfaces, and appear to derive from very large vessels, such as large jar types E1, E2, E4 or F1 (Garfinkel 1999: 21, 34-43, 50-53). Most of the pottery could be locally produced but a petrographic analysis of sherds from the 2014 excavation indicates the presence of volcanic inclusions in some vessels. These may be imports from a source to the north, perhaps in the vicinity of Tall Ash SHūnah Ash SHamāliyyah, where basalt outcrops are extensive, or potters may have used basalt from broken grinding stones as temper, since there are no basalt outcrops in Wādī Qus̱aybah's drainage basin.

Many of the forms associated with the Yarmukian occur in our sample. They include small and medium-sized, deep and shallow bowls, medium and large hole-mouth jars, and necked jars, types C1, C2, C5, E1, D1 (Garfinkel 1999: 21-48). Also present are large *pithoi*, "chalices" (type C4), at least one example of a miniature bowl or cup (type A1), and a possible jar lid.

Handles include small strap handles on both deep bowls and necked jars, often at the juncture between the neck and shoulder of jars, as in types D1 and F2 (Garfinkel 1999: 21, 43-49, 53). These are usually oriented vertically, although we have some examples that were clearly oriented horizontally. Lug handles, sometimes pierced, and small knobs and ledge handles are often located near the rims of holemouth jars or bowls, as in types E1 and F1 (Garfinkel 1999: 21, 34-3, 50-53). We have one example of an intentional piercing of the vessel wall within the opening of a strap handle, its purpose unknown.

Flat, disk, and round bases all occur, along with a few ring bases, type C4 (Garfinkel 1999: 32). There are several examples of bases with rounded impressions, possibly by pebbles, to give a lumpy appearance (*cf.* Garfinkel 1999: 58-59).

Surface treatment and decoration are among the most useful distinguishing characteristics of Yarmukian assemblages, and the pottery from T̲abaqat Ar Ruṯūbah displays most of the range of such treatments. Bands of herringbone incision, often in reserve within a red-slipped field are common, either singly or in double bands, and in horizontal, zig-zag and triangular arrangements. In rarer instances, somewhat random placements of incisions or rows of incised longitudinal dashes replace the nested chevrons in these bands. Sometimes there are triangles or zigzags that extend below horizontal bands with incision. However, red or brown slip or painting are also fairly common surface treatments, sometimes in combination with incised bands, the most common cases being broad bands of red or brown paint or slip, especially below the rim. Diagonal and triangular patterns of broad or narrow red lines and large, nested chevrons (*cf*. Garfinkel 1999: photo 35), often depending from either a band on the rim or an incised band, also occur, but are less common.

Much of the pottery came from fill deposits, pit fills, or deposits with high densities of cobbles that may be remnants of ancient gullies. However, some flat-lying sherds indicate deposition on prehistoric surfaces. For example, in Area F29 (*locus* F29.007), there were many refitting fragments of a necked jar that appears to have broken where it was found, on top of *locus* F29.014.

Aside from the Early Bronze Age pottery that may indicate a brief re-use of the site, and very few Hellenistic or later sherds already mentioned, the Yarmukian pottery seems to exhibit some spatial and probable chrono-stratigraphic variation that warrants more detailed analysis. Many of the finer herringbone-incised sherds, with relatively narrow and well-executed bands of incised chevrons, come from the pit features in South Field Areas I24 and J24 or in the deepest *loci* of the North Field. By contrast, many of the vessels associated with the later stone architecture in Areas F29, G29 and G30 tend to be coarser, thick-walled vessels with more limited decoration. Lug handles and knobs are also relatively common on this later pottery. Pottery with incised herringbone decoration does occur in these deposits, but its execution is often cruder than that of incised pottery in older deposits below the stone architecture and some of the better examples could be residual. This suggests some changes in the decoration and *chaînes opératoires* of pottery at the site over time. Our preliminary impression is that painted decoration, often on thick-walled

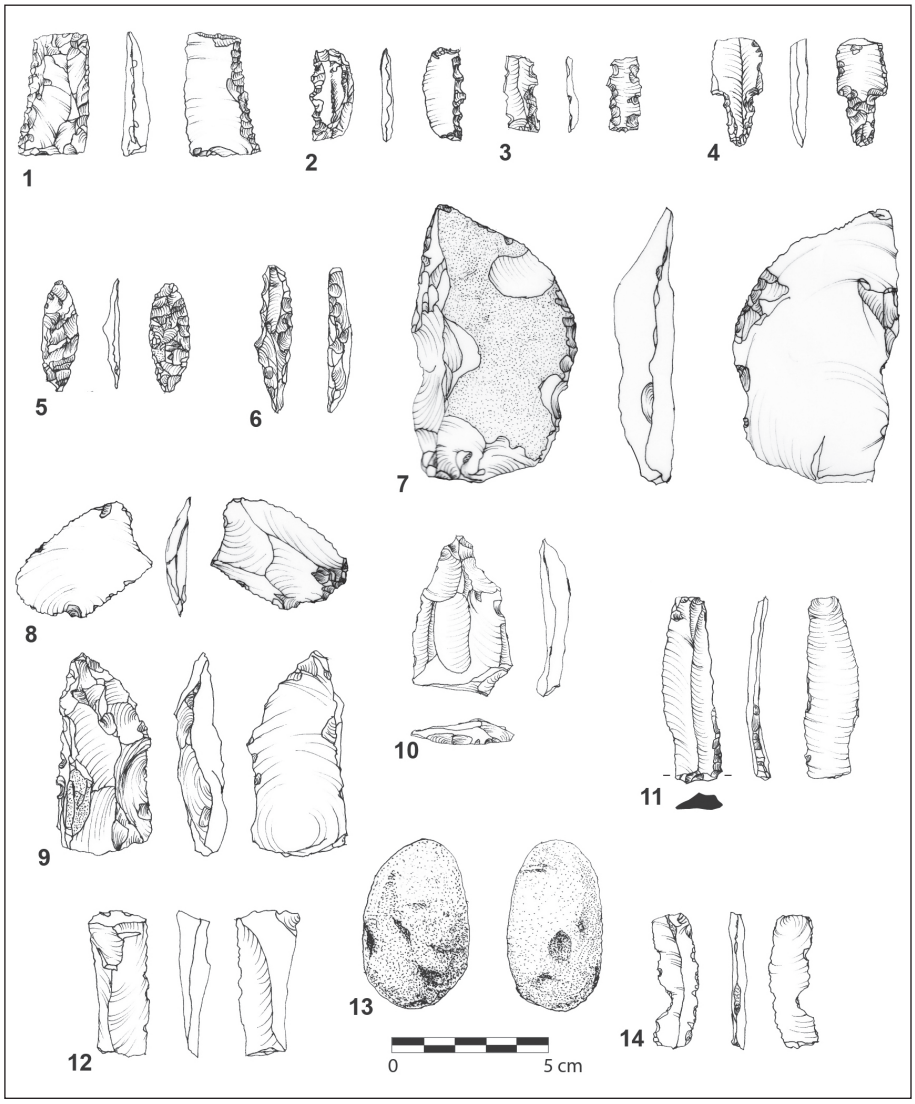
vessels, is also more common in association with the later stone building and in the road cut in B16, including thick lines and triangle motifs, than in deeper deposits or I24 and J24. If this preliminary observation is accurate, we may have evidence for the gradual development of Yarmukian pottery production over the course of several centuries, although without adoption of traits that would associate it with Jericho IX or Wādī Rabāh, as conventionally defined. This will be a focus for further research and evidence from further radiocarbon dating may also help to confirm or refute this hypothesis.

Lithics and Ground Stone

Lithic debitage from relatively high-quality flint, easily available in the site's vicinity, is common at Tabaqat Ar Ruṭūbah, but formal tools are very few in number. Otherwise, the assemblage appears similar to Yarmukian assemblages from Al Munhattah (Gopher 1989), Beisamoun (Groman-Yaroslavski and Rosenberg 2010), Sha'ar Hagolan (Matskevich 2005), Jabal Abū Ath THawwāb (Wada 2001), 'Ayn Ghazāl (Rollefson 1993), and Tall Abū As Suwwān (al-Nahar 2013).

The most easily recognizable formal tools are sickle elements, although these are surprisingly rare (**Fig. 10.1-3**). The 2014 excavations found a small one of Gopher's type D and an average-size one of his type C/E with steep unifacial backing and fine denticulations made by bifacial retouch on the cutting edge (Gopher 1989; Barkai and Gopher 1999). Two of these came from the same pit in I24. We have observed no sickle elements at all among the lithics from the 2018 excavations.

In the North Field, F29.001, unfortunately



10. Chipped-stone tools and hammerstone from Tabaqat Ar Ruṭūbah, including sickle elements (1-3), projectile points (4-5), borers (6, 10), scrapers (7-8), backed knives (9, 11), utilized blade (12), hammerstone (13), and retouched and notched blade (14) (C. Solomon).

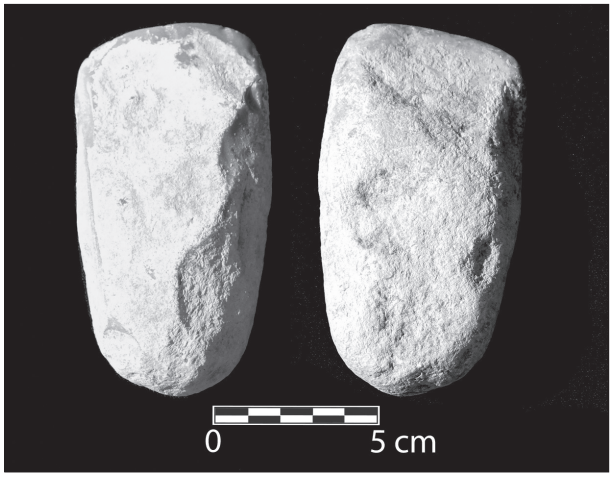
a recent colluvial context, yielded a ground flint adze. The adze (**Fig. 11**) is 117.5mm long, 61.3mm wide at its widest, and 28mm thick, and shows cortex over a good deal of its surface but use polish and some small chips along its working edge.

A small, leaf-shaped arrowhead from I26.002 (**see Fig. 10.5**) appears to be a Herzliya point similar to two from Al Munhattah (Gopher 1994: fig. 5.17.20-21) and one from Jabal Abū Ath THawwāb (Wada 2001: fig. 8.5). The 2018 field season also yielded a single, broken, projectile point from a surface context (**Fig. 10.4**) whose remaining tang and shoulder indicate that it is a small Jericho point whose barbs are not very prominent.

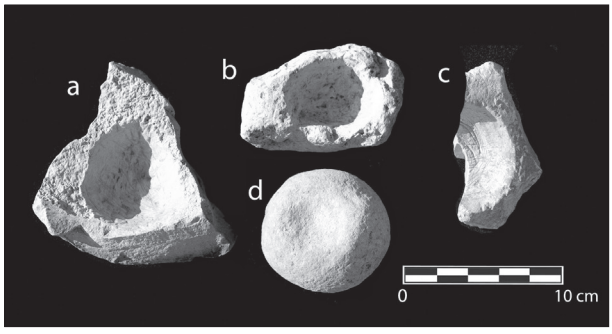
Most of the chipped-stone material consists of unretouched flakes, some of which may have been expedient tools, while the majority are unused debris.

Most of the cores from the site are amorphous and indicate expedient manufacture. The most abundant types are multiplatform cores and single-platform cores with uni-directional removals. Dual-platform cores also occur. The majority of removals are consistent with flake-based technology.

Groundstone tools were reasonably common at the site, including fragments of upper grinding stones and complete handstones or polishing stones. One complete basalt upper milling stone from F29.004 is 27cm long, 18cm wide and 10cm high, with a mass of 8.6kg. A preliminary report on starch recovered from its milling surface appears below.



11. Stone adze from F29.001.



12. Limestone "cup-hole" mortars (a, WQ117.J24.35.935153 from locus 010; b, WQ117.J24.33.935152, from locus 010; c, WQ117.F27.24 from locus 020), and an unfinished pierced cobble (d, WQ117.F29.8.174329 from locus 005), possibly intended as a weight.

Table 6: Summary of lithics from excavations at Tabaqat Ar Ruṭūbah.

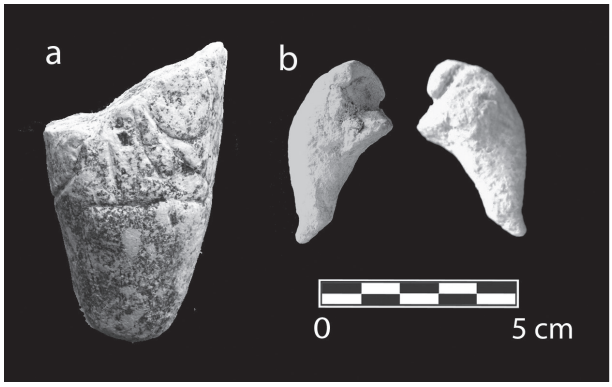
		Count	%
Tools			
	Utilized Flakes	8	9.6
	Utilized Blades	8	9.6
	Retouched Flakes	11	13.3
	Retouched Blades	8	9.6
	Arrowheads	2	2.4
	Sickle Elements	3	3.6
	Burins	5	6.0
	Borers	3	3.6
	Denticulates	2	2.4
	Notches	4	4.8
	Scrapers	14	16.9
	Cortical Scrapers	9	10.8
	Truncations	1	1.2
	Backed Pieces	0	0.0
	Axes, Adzes, Chisels	1	1.2
	Bifacial Knives	1	1.2
	Backed Knifes	1	1.2
	Choppers	0	0.0
	Core Tools	1	1.2
	Tool Fragments	1	1.2
	Retouched Tool Total	83	1.5
Waste Products and Unretouched Debitage			
	Cores	65	1.2
	Flakes	2840	52.8
	Blades and Bladelets	228	4.2
	Core Trimming Elements (CTEs)	1017	18.9
	Chunks	1103	20.5
	Chips	111	2.1
	Indeterminates	10	0.2
	Waste Total	5374	98.5
Total		**5457**	**100.0**
Groundstone Tools and Fragments		**63**	

A common category of groundstone tool at the site consists of small concave hollows in angular and subangular limestone cobbles that may have been meant as capstones for bow drills, as door sockets, or as small mortars. However, only one of them (**Fig. 12c**) shows rotary striations that you would expect to result from such a use, most instead showing linear chisel marks from their manufacture (*cf*. Rosenberg and Garfinkel 2014: 77-82) and no clear evidence of either pounding or rotary use damage. Two of these came from the same context in the J24.010 pit, and one of these looks somewhat similar to, though generally cruder than, stone "bowlets" at Sha'ar Hagolan (**Fig. 12b**, Rosenberg and Garfinkel 2014: 90-111). Another was observed but not collected in the gully immediately west of I24. Similar "mortars" or "bowlets" occur at other Late Neolithic sites in the region besides Sha'ar Hagolan, such as Nahal Zehora II (Gopher 2012: fig. 24.12), although the examples from our site tend to be made from very irregular fragments of soft limestone rather than from rounded pebbles or cobbles. Given that Sha'ar Hagolan is next to the Yarmuk River, a convenient source of rounded cobbles, this difference may just reflect the predominant available raw material.

There were also fragments of probable pestles while a limestone slab and a round cobble show attempted piercings. In the slab, abandonment of the attempt was because the two conical indentations did not line up, while in the cobble the piercing may just be unfinished (**Fig. 12d**).

Figurines, Incised Stones, Spindle Whorls, and Pierced Disks

As noted above, the small 2014 test excavation of a pit remnant in I24.007 discovered a broken stone figurine. Its exact features, or even its proper orientation, are difficult to discern, but it has curvilinear incisions possibly intended to represent arms (**Fig. 13a**).



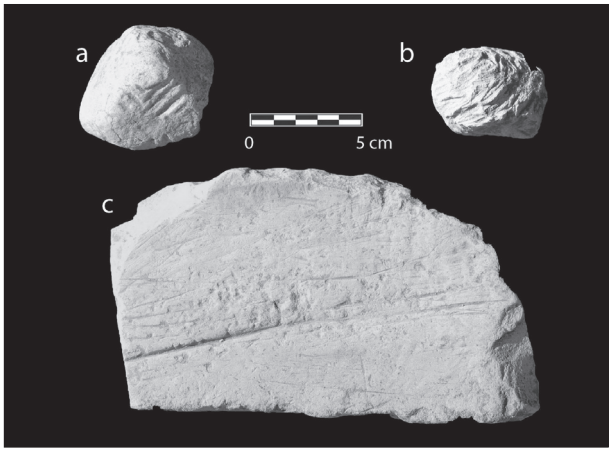
13. Broken stone figurine (a) from I24.006 and leg from a clay figurine (b, G28.11.174301 from locus 005).

Locus G28.005 also produced the leg of what was almost certainly a seated, cowrie-eyed clay figurine (**Fig. 13b**), similar to some of those that occur in large numbers at Sha'ar Hagolan (Garfinkel and Miller 2002: 188-200).

Another notable find from the site was a flat, sub-triangular stone with a linear groove (**Fig. 14**). This was in the same deposit (F29.005) that contained a biconical spindle whorl, a possible unfinished loom weight, and one of the small "mortars." While this could have functioned as a "shaft straightener" or a tool for sharpening bone tools (Vered 2013), it seems likely that it also has symbolic connotations.

Other instances of probable symbols are unusual, incised pebbles, about 5-8cm in maximum dimension. One of these incised stones, from G28.005, has a roughly pyramidal

14. "Shaft straightener" with possible symbolic connotations (F29.8.174328 from locus 005).



15. Incised pebbles (a, G28.11.174302 from locus 005), (b, F28.13.935147 from locus 006), and a limestone slab with incised lines (c, J24.33.450465 from locus 010).

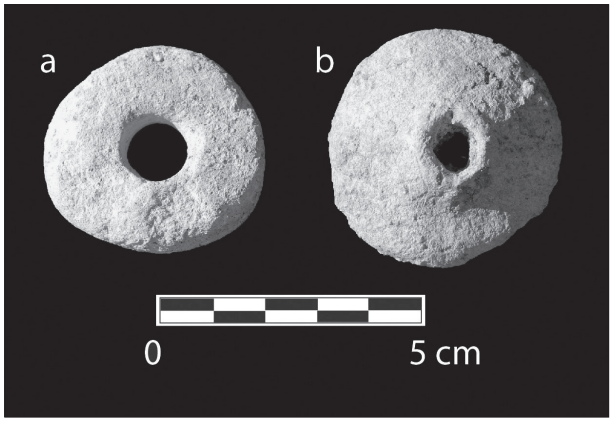
shape with a few short incisions on one side in a pattern that recalls a herringbone motif (**Fig. 15a**). It is possible that this could have served as a stamp seal or a gaming piece (*cf.* Garfinkel 2014; Kafafi 2006: 86). Another soft limestone pebble from F28.006 is ovoid and covered with short, somewhat random incisions, giving it the overall effect of a walnut shell (**Fig. 15b**).

A flat, limestone slab from the pit fill, J24.010, shows some sub-parallel incisions, one of them somewhat deep and with V-shaped section (**Fig. 15c**), but it is not clear if these were intentional or resulted from use as a cutting board while slicing some material.

A biconical ceramic spindle whorl from F29.005 (**Fig. 16a**) is similar to another found in Area J24 during the 2014 test excavations. Such spindle whorls often occur in Yarmukian assemblages in the region, such as Al Munhattah (Garfinkel 1992: fig. 85.15-28) and Sha'ar Hagolan (Garfinkel and Miller 2002: 31, fig.2.28). A pierced limestone disk from G30.004 (**Fig. 16b**) could also have been used as a spindle whorl (Stekelis 1951: 10; Heidkamp 2015: 34-37), although other functions are possible.

Faunal Remains

As in the 2014 test excavations, the 2018 excavations recovered no mammalian faunal macro-remains at all. This is unusual, as Yarmukian sites typically yield substantial amounts of bone and teeth. Yarmukian levels at Sha'ar Hagolan, for example, admittedly from a much larger excavated area, yielded more than 18,000 bones or fragments with a NISP greater than 1900, mainly from goats, sheep, and pigs (Marom 2011: 62, 69).



16. A pierced stone disk (a, G30.9.935132 from locus 004) and a biconical but rather unbalanced spindle whorl (b, F29.8.174330 from locus 005).

Unusually, the rare faunal remains from Tabaqat Ar Ruṭūbah are neither mammalian nor avian, but represent species we might expect in streamside habitats.

One fragment of shell from a freshwater mussel (Unionidae, possibly *Unio terminalis*), and one claw fragment of freshwater crab (*Potamon potamios,* Gherardi and Micheli 1989) were found in excavations at this site in 2014, both in Area J24. In 2018, excavations uncovered further crab claws and fragments from pit 010 in I24/J24.

The excavations also recovered a fairly large number of land snails' shells in multiple contexts. These include the large *Helix engaddensis* as well as generally much smaller snails, including, according to preliminary analysis, *Xerocrassa stimulata*, *X. mienisi*, *X. langloisiana*, *Melanopsis ammonis/ buccinoidea.*, *Oxychilius sp.*, *Sphincterochila sp.*, and a few others that are less common (identifications based on Heller 2009; Heller *et al.* 2005; Neubert *et al.* 2015).

Of the species that occur at the site, only *H. engaddensis* could have served as human food (Bar 1977), and we have no evidence that they did, but some of the others are good environmental indicators (*cf.* Colonese *et al.* 2013). For example, *Xerocrassa stimulata* aestivates on the lower branches of *wadi*-bottom shrubs during summer, and moves up the slopes in winter to feed on vegetation there, and is well adapted to very dry conditions (Heller 2009: 62-63). The Oxychilidae and some of the Spincterochilidae tend to forage under and around boulders and damp leaf litter, while *Melanopsis sp*. are fresh-water snails that favour stream-side habitats where they subsist on leaves, algae and cyanobacteria, but especially wet willow leaves (Heller 2009: 210-212). Thus we might expect most of these snails to have been present when the Qusaybah stream was very close to the foot of the site, rather than some 15m below, as it is today. This could also contribute to explanation of some of the crab remains, which may or may not represent food, as crabs walk some distance away from their streams. However, freshwater snails like

Melanopsis sp. can also enter the site in the clay used for mud bricks.

It is difficult to say how common mulluscan species are in other Yarmukian assemblages, as most of the faunal reports only include mammals and birds, and most mentions of molluscan remains from Neolithic sites more generally focus on imported marine shell. Marom (2011), for example, does not mention molluscan remains from Sha'ar Hagolan while, not surprisingly, small snail shells do occur in micromorphological samples (Arpin 2005).

Potential Diagenetic Effects

We have attempted to determine whether the absence of mammalian remains at the site is due to diagenetic destruction, even though we might expect that bone would be subject to much the same preservation opportunities as mollusk shell and crab carapace. pH below about 6.0 should break down the inorganic components of bone, mainly bioapatite, which is most stable at pH 7.8 (Berna *et al.* 2004; Kendall *et al.* 2018: 26; Nicholson 1996). Our extensive sampling of site sediments (**Table 7**) demonstrates pH levels that, as expected, are slightly basic (8.4 ± 0.3, n = 26). The limestone environment of Wādī Quṣaybah, not surprisingly, has produced slightly alkaline conditions that should not be especially destructive of the inorganic components of bone or teeth, although we can expect them to be destructive of collagen. Another potential destructive mechanism is fluctuating hydrology. Having once been close to the stream, and in an environment that would have experienced occasionally heavy rains during winters, separated by long, dry summers, we could expect the mid-Holocene water table at the terrace to have risen and fallen seasonally for perhaps a millennium after site abandonment, as is also consistent with the deposition of calcium carbonate deposits on many of the site's artifacts. Cyclical wetting and drying can be very destructive of bone, especially once the alkaline environment has removed collagen, leaving the bone more porous (Kendall *et al.* 2018: 26). However, these pH and climatic conditions are common to most Neolithic sites in the region, many of which still preserve substantial amounts of bone and teeth, albeit often in poor condition. Many of the bones found in the terraces of Wādī Ziqlāb, for example, have thick encrustrations of carbonate, and have suffered considerable destruction, yet identifiable bone fragments nonetheless occur in the hundreds or even thousands at those sites (Banning *et al.* 1994: 156; Kadowaki *et al.* 2008: 121). Currently, the most compelling hypotheses for the general absence of bone at the site may be that the site's users were unusually thorough about disposal of animal remains in the nearby stream, or that they did not process or consume mammals at the site, although this problem will require further research.

Plant Remains

Flotation of sediment samples from the site yielded light fractions containing very little evidence for charred seeds or charcoal,

Table 7: pH values for sediment samples from Tabaqat Ar Ruṭūbah, along with mean and standard deviation.

Square	Bag	*Locus*	pH	Comments
E28	6	004	8.0	
E28	8	006	8.5	Ash layer
E28	15	009	8.3	Burned mudbrick
E28	15	009	8.1	Hearth
E28	18	011	8.2	Under hearth
E28	23	010	8.3	Dark spot with FCS
E28	26	013	8.5	
E28	28	013	8.4	Pit fill
F27	9	009	8.5	
F27	18	017	8.4	
F27	21	019	8.6	
F29	14	006	8.4	
F29	4	006	8.6	
F29	13	007	8.5	
F29	13	007	8.4	
F29	38	007	8.2	
G30	12	004	8.1	
G30	5	004	8.4	
I24	30	010	8.6	
I24	57	010	8.9	
J24	30	010	8.8	
H10	52	012	8.1	
H11	18	010	8.8	
H11	21	011	8.8	
H11	28	014	8.8	
H12	16	010	8.0	
Mean			8.4	
s.d.			0.3	

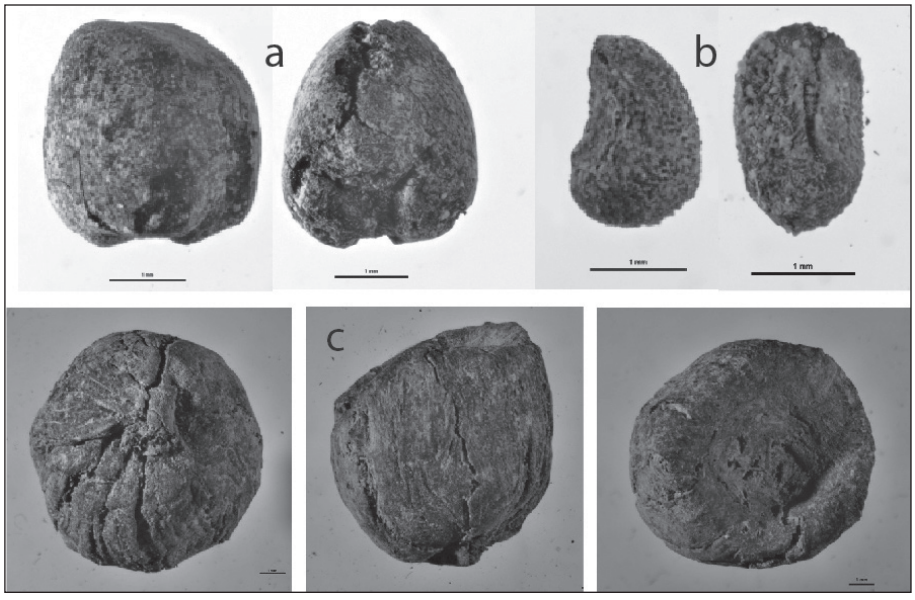
along with very small snail shells. The examination of heavy fractions for various classes of micro-refuse, although interrupted by pandemic-related lab closures, is underway. We also have some evidence for plant use from starches detected on some of the grinding stones found at the site.

Preliminary results from analysis of light fractions from 22 flotation sample elements in 14 different contexts has yielded low quantities of botanical remains. Volumes of sample elements ranged from 1.2 to 5.6 L. Only 29% of contexts yielded any wood charcoal, with a maximum density of only 0.002 g/L in *locus* F27.017. The fragmentary nature of this wood charcoal makes identification to species level very difficult. Other carbonized plant remains occurred in similarly low quantities. Fragmentary plant remains with no identifiable characteristics occurred in about 86% of contexts analyzed, with highest densities in *loci* I27.019 (0.002 g/L), E28.006 (0.001 g/L), and I24.010 (0.001 g/L). Only three carbonized seeds were recovered, each from different contexts. Thus, seed densities are of little interpretive value, but we nonetheless report them here. *Locus* E28.009 yielded one weedy legume (density 0.1 seed/L), likely a vetch (**Fig. 17a**, *Vicia sp.*). *Locus* F27.009 yielded an unidentified seed with distinctive ridging and measuring 2×1mm (density 0.213 seeds/L; **Fig. 17b**). We have found no matches to reference images for it to date but a larger reference collection may allow us identify it in future. Excavators labelled a large, heavily damaged seed from J24.010 (density 0.233 seeds/L) as an olive pit in the field (**Fig. 17c**) but experimental grinding and breakage of modern charred olive pits sheds doubt on this identification. Unfortunately, heavy wear on this specimen inhibits identification even to a taxonomic family.

Overall, the low densities of wood charcoal, seeds and other plant fragments at WQ117 suggest either poor preservation or that little plant processing or disposal of plant refuse occurred in the excavated parts of the site.

Starches recovered from several of the groundstone artifacts from the 2018 excavations may shed light on their likely uses. Extraction of starch residues involved spot sampling with disposable pipette tips and distilled water, and targeted pitted areas on and around ground surfaces. To test for environmental or contamination-related residues, comparative samples were taken from areas of the artifacts that were less likely to be working surfaces, such as breaks, bottoms, possible handles, and unaltered faces. In addition, traps of distilled water on microscope slides were placed around the laboratory space to check for possible contamination, and all equipment and materials used in the analysis process were regularly checked for modern starches.

The large basalt upper milling stone from F29.004 had starch within the recesses of its rough use surface. Most of the starch grains coming from this stone are small and likely from some sort of grain. They are altered or damaged in such a way that more research will



17. Charred seeds: (a) weedy legume, probably Vicia sp., from E28.15, locus 009, (b) unidentified from F27.9, locus 009, and (c) damaged specimen from J24.31, locus 010 that was doubtfully identified as olive in the field, but possibly belongs to Arbutus sp. Small scales in the photos are all 1mm.

be necessary to identify them securely. None of this starch is obviously pea or lentil, although a few grains from this stone and one of the mortars may come from a legume. Unfortunately, they are not sufficiently diagnostic and further analysis will be necessary.

Discussion and Conclusions

Tabaqat Ar Ruṭūbah is more substantial than early work at the site led us to suspect, even though it remains a rather small site. Given the distribution of sherds in the road cut through the site and finds in the North and South Fields, it probably has a current area on the order of 0.35ha, but the large gully that separates the western and eastern terraces has likely eroded away at least 500m^2 and the site has also lost an unknown area to erosion along its southern edge. Its size before these losses was probably no more than 0.5ha. The very substantial architecture in the northern part of the site was a surprise, with considerable use of mud brick as well as stone architecture to form large, well-constructed buildings, to judge by the several phases of the oval building and its predecessors in Areas G28 to F29, and glimpses of buildings in other units.

The finds from the pits in the lower part of the terrace in Areas I24 and J24 appear somewhat different than the Yarmukian artifacts associated with some of these buildings, and the discovery of similar pits dug into what may be the same marly surface in the lowest levels of Areas F27 and E28 would seem to confirm that the pits belong to an early phase of the Yarmukian. The stratigraphy and phasing of the stone and mudbrick architecture that succeeded the pits offers an opportunity to "fine-tune" our understanding of Yarmukian chronology and technological development, especially in ceramics, as the Yarmukian is more typically treated as an indivisible category. Given that it may have lasted for some 800 years (Banning 2007), it would be surprising to find no change at all in its material culture, and Tabaqat Ar Ruṭūbah seems an excellent place to interrogate the data for cultural and technological change in the period of the Yarmukian›s florescence, and perhaps also to understand its relationship to Jericho IX/Lodian assemblages at other sites.

The site is also interesting for its close parallels to Al Munhaṭṭah, where there were also many Neolithic pits, and strong differences, in some respects, from the much larger settlement at Sha'ar Hagolan. It provides another example of the highly diverse types of site that coexisted in the centuries around 6000 cal BC.

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A MILLENNIUM OF UNBROKEN HABITATION IN JARASH'S SOUTHWEST DISTRICT: THE 2017 SEASON OF THE LATE ANTIQUE JARASH PROJECT

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Introduction

This article accounts for the 2017 campaign of the Late Antique Jarash Project (henceforth LAJP). The campaign comprised the excavation of five trenches (Trench 5-9), survey of a large residential area, analysis of finds (especially ceramics and archaeobotanical samples) and conservation of copper coins retrieved through excavation in 2015 and 2017.

LAJP studies the development of Jarash's southwest district over the longue durée (**Fig. 1**). The project was initiated with an objective to investigate the infrastructure and daily life of a residential area with an emphasis on the city's development in the Late Antique and Islamic periods. The project thereby aims to cast light on a hitherto little explored aspect of Jarash's history as the focus of most past excavations has been on monumental remains of the Roman and Byzantine past. Previous seasons of the LAJP have focused on surveying the architectural surface remains (2011), on geophysics and key-hole excavation (2015) and on analysing the ceramic assemblage retrieved through these excavations (2016) (Blanke 2016; 2018a; 2018b; Blanke *et al.* 2015; 2021; Pappalardo 2019).

Following the results of our field work in 2015 and 2016, the 2017 campaign sought to address three main research questions concerning the establishment of a large reservoir in Jarash's southwest district, its design, use and eventual disuse; the residential usage of the southwest hilltop and the layout and extent of its rebuilding after the earthquake in 749AD; and the development of the district's streets with an aim to date their construction and the gradual encroachment of residential structures onto these streets. Finds' studies and conservation were carried out contemporaneously.

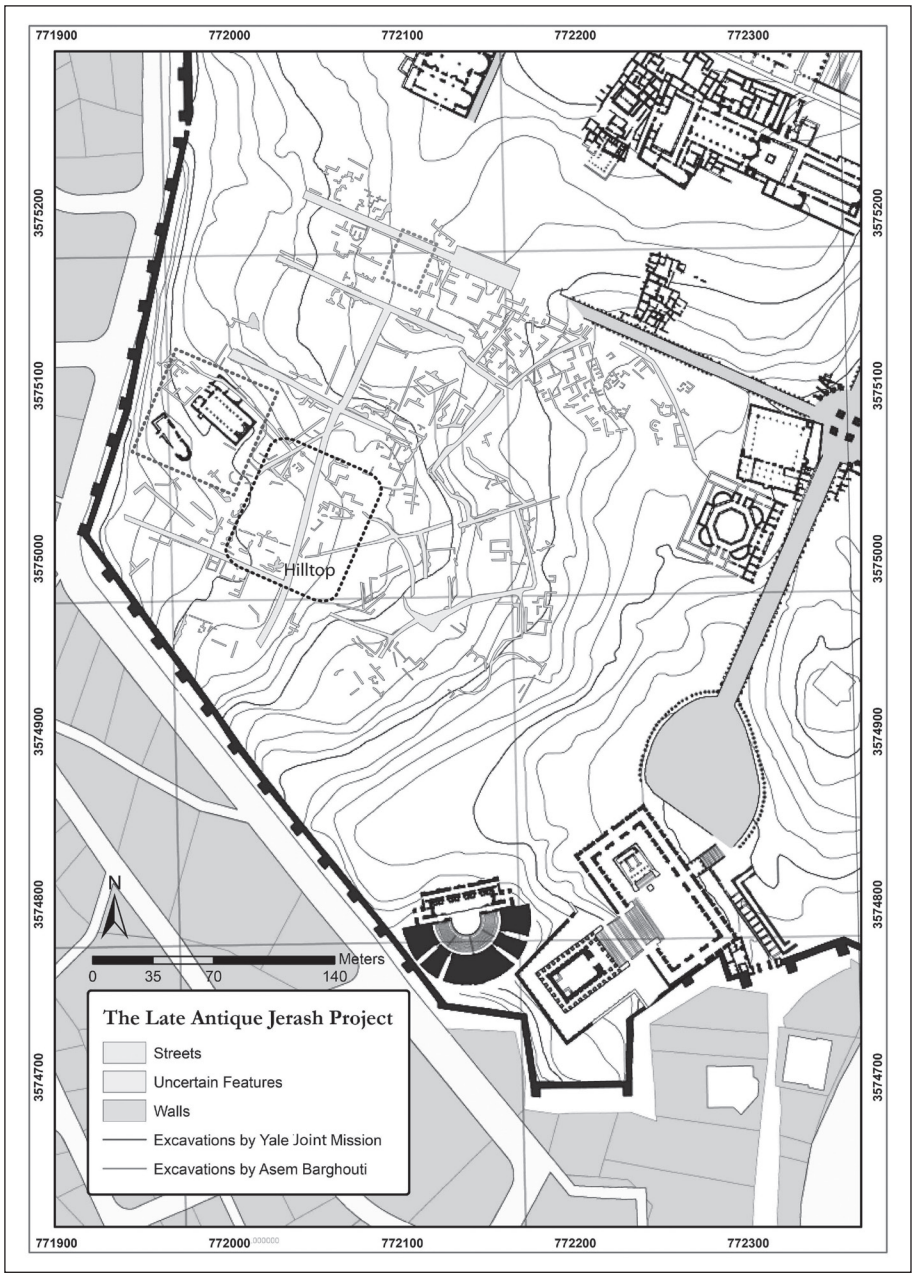
Below follows an account of the main results from these different areas of study. The presentations are followed by a summary of how these new data affect our understanding of Jarash as a whole.

A Reservoir in Jarash's Southwest District (Trench 5)

In 2011, a large (40m E-W by 15m N-S) rectangular structure was identified near the summit of the hilltop in Jarash's southwest district (See Area C in Blanke *et al.* 2015). The structure is defined to the south and west by long and straight bedrock cuts that join at a 90-degree angle. The layout of the structure, its location near the highest point in Jarash's southwest district and its proximity to several water related features led to the interpretation that it, at some point, served as a reservoir and probably also as the main water supply for the southwest part of the city. It resembles in layout and size the reservoir in Jarash's northwest quarter (Lichtenberger *et al.* 2015). In 2017, a trench was excavated at the southwest corner of the structure (Trench 5).

Trench 5

Trench 5 is the westernmost of the areas opened for excavation as part of LAJP's 2017 season (**Fig. 2**). It was originally planned as a



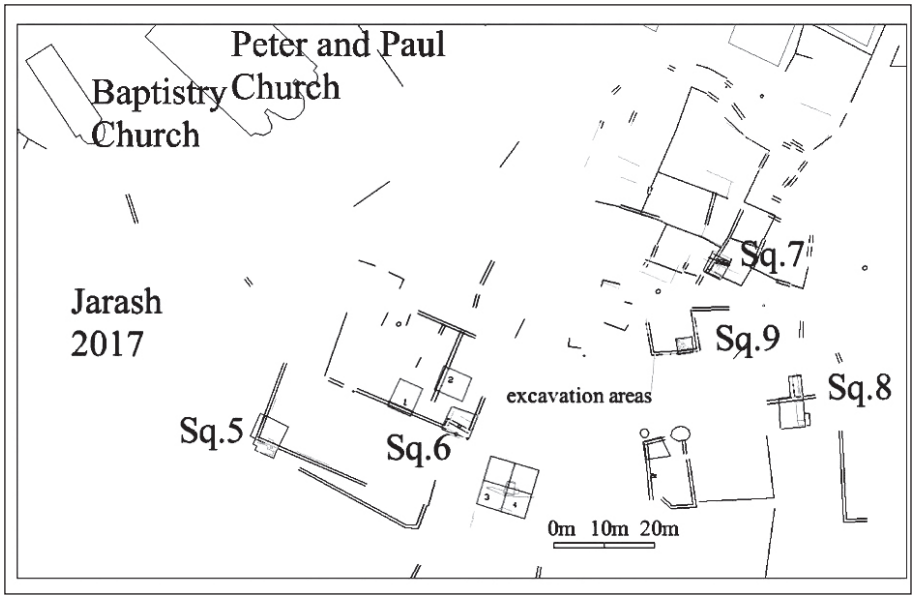
1. Map of Jarash southwest district. Note streets running perpendicular from south decumanus and diagonally from the town centre towards the hilltop © LAJP.

6×5m square, with a later extension of 4×1m to the south. The resulting rectangle, with a NNE-SSW orientation, had at least 1m of bedrock visible from the unexcavated surface. The area was positioned at the SW corner of a large visible structure, identified in 2011 as a reservoir, probably Roman in date and bound by the remains of an ashlar wall (Blanke *et al.* 2015; Pickett 2015). The main objectives of the excavation were to identify the different phases of quarrying, construction, use, and disuse of the reservoir, while secondary objectives were to identify and understand the way the reservoir functioned, how it was fed, how it was covered and, more generally, its overall functioning.

Results and Stratigraphy

The excavations have revealed a full chronologic sequence, ranging from the pre-Roman period to the 20th century, providing us not only with constructive and stratigraphic sequences, but also with a well-defined and characteristic material culture. The sequence of these phases is relative, but the dating is suggested by the results of the ceramic analysis.

The first horizon corresponds to the bedrock, an off-white pinkish limestone, which bleaches to grey after exposure to direct sunlight and erodes by crumbling into smaller lumps of



2. Survey map showing location of Trench 5-9 on the southwest hilltop © LAJP.

limestone. This stone was used for building material throughout Jarash's southwest district.

The first clearly-defined historical phase (Hellenistic I) corresponds to a water supply system, probably public in nature which consists of a rock-cut stepped entrance giving access from the street level to a cavity in the rock (**Fig. 3**). The staircase, 1.4m wide and over 2.6m long, goes down 1.8m in a mere 6 steps, each step on average 0.3m deep and while the first platform forms an uneven surface, the other steps are more regular. All steps have deep grooves running parallel to their edges, which can be linked to the evacuation of run-off or spilled water. At the bottom of the structure the steps turn to the right towards a cavity, probably the point where water was stored or from where it sprang. The structure is securely dated before the 1st century BC, a *terminus ante quem* given by the finds in the layers that seal and block the steps (*cf.* ceramic report, this article).

These well-dated steps are built in parallel to a much larger structure, which is usually identified as a Roman rock-cut reservoir. This structure forms a large rectangular area, *ca.* 40×15m, of which only the SW has been included in the excavation. The cut into the bedrock forms a 90° corner with an overall vertical face (**Fig. 4**). The faces of the vertical cut are largely smooth, with some potential quarry marks. The quarried stone from this reservoir (which goes beyond 3m deep) would have provided a large volume of construction material (several hundreds of cubic metres), perhaps related to a main building phase in this part of Jarash. As the structure remains only partially excavated, it is impossible to refine its chronology. Because it is dug perfectly in parallel (the walls of the steps and the reservoir

3. Rock-cut flight of steps leading into the cave in Trench 5. Grooves are carved at the edge of each step, facilitating water to run off if spilled © LAJP.

4. South-West view of the excavations in Trench 5, where the large cut in the bedrock and the caving are visible © LAJP.

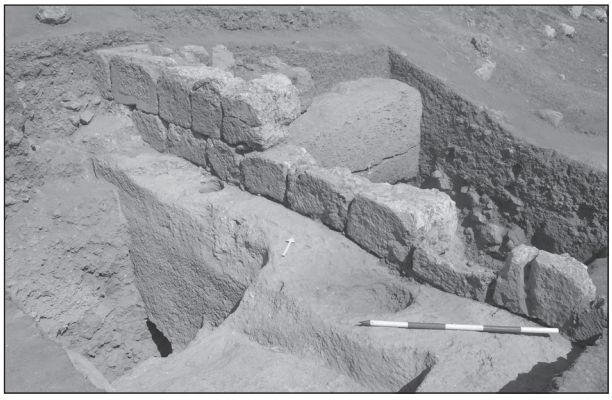
are roughly 1m apart) and not truncating the Hellenistic water steps, it is possible that the two structures are coeval. The reservoir and water steps are connected by the cavity, but the picture is too incomplete yet to determine if these are two truncating cuts or rather part of the same construction effort.

The reservoir is surrounded by a perimeter wall, built directly on top of the bedrock, which in Trench 5 was preserved as two rows of finely-cut square and rectangular ashlars, with a finished exterior and a coarse inside (**Fig. 5**). The wall has only one face of blocks of dry ashlar masonry and in its current state of preservation, it is difficult to understand what the purpose of this wall may have been.

The second historical horizon (Hellenistic II) corresponds to a moment of re-configuration of the area as the stepped access was blocked and backfilled. The material from this layer is homogeneous and has been dated to the 1st century BC. The reasons behind this blocking are not clear. Perhaps belonging to this phase was a shallow cut into the blocking level for the deposition of various burials into a single grave. This accounts for the re-burial of at least seven different individuals (minimal number of individuals, based on a preliminary assessment of the human remains). The remains were all found disarticulated, badly damaged, and largely incomplete, which may be partially a result of the pH of the soil or the lime content of the backfill. This secondary burial suggests that there might have been an inhumation necropolis in this area, disturbed when further constructions were carried out in the surroundings of the water cave. This potentially suggests a Hellenistic chronology for these inhumations.

In the Roman period, we find a series of levelling deposits (**Fig. 6**) laid on top of the blocked access to the cave and built against the wall. They consist of large layers of compacted mortar, orange in colour, with a concentration of early Roman ceramics (1st-2nd century AD), which have been preliminary interpreted as a bedding or a working surface. These *strata* were later sealed under a succession of loose sandy white mortar layers (0.2m thick) with many fragments of pottery in them, all of which were late Roman (3rd-4th century AD) in date. The purpose of these layers is not clear as they were too loose and soft to form a surface or a bedding, so they can perhaps be linked to a levelling, or else to the dismantling of a large mortared construction.

The next recognisable phase of Trench 5 consists of a homogeneously flat and compacted backfill of yellow, beaten earth found within the



5. South ashlar wall bordering the cut in the rock, separating the steps from the main quarried area in Trench 5 © LAJP.

6. Layer of orange mortar, probably 1st century AD in date, which seals the steps leading into the cave, and built against the perimeter walls of the reservoir in Trench 5 © LAJP.

reservoir. The mixed pottery retrieved from this layer suggest a 7th to mid-8th century date, and the water cave and the reservoir would have been abandoned long before then. This floor surface can probably be related to two cuts into the bedrock, with the first at a meter above the surface (which appears to be a rope hole) and one at the top edge of the bedrock (probably a beam slot; **Fig. 7**). Together, these three elements can be interpreted as a reutilization of the reservoir as a covered space - perhaps a dwelling? Such usage would correspond with the modifications of the bedrock that were found in Trench 3 and 4 during LAJP's 2015 season of excavation. Here, rope-holes, beam-slots, post-holes and door-posts were cut into the disused quarry in order to utilize the space as a dwelling (Blanke *et al.* 2021).

At a later date (Early Islamic I), two intersecting rubbish pits were cut into the beaten earth floor. The fills of these pits had remains of metal slag and other by-products of metal working, although there is no direct evidence for this activity taking place in this corner of the abandoned reservoir (no furnace, hearth, or charred/burnt spots have been identified). These pits were subsequently covered by a dark, indeterminate layer (probably reflecting disuse), before being sealed by 8th-century construction debris.

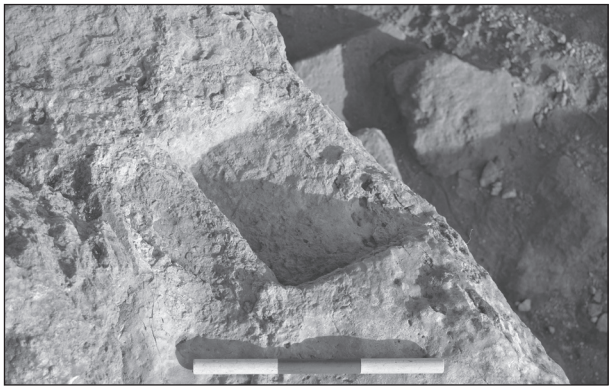
The next horizon (Early Islamic II) can be dated to the 8th century. These layers form a coherent phase, although only identifiable inside the reservoir. The chronology is securely given by the pottery, which include channel lamps that represent an early to mid-8th century date. These layers can be broadly described as the phase of final abandonment and transformation of this area into a large dump. The earliest context in this phase forms a sandy layer that may be related to demolition or construction debris linked to the dismantling of the reoccupation of the reservoir. This is then followed by a sequence of diverse dumping events, overall characterised by the banding of mixed soils alternated with large ashlar blocks. All of this suggests that by the 8th century the SW corner of the reservoir was being used as a spoil heap in some sort of clearing event, dumping in a large amount of ashlar blocks - perhaps the remains of the walls surrounding the reservoir itself or some other nearby structure. The soil slowly accumulated against the bedrock and the dumped ashlars, and together with the windblown and colluvial washing-in of material from the upper terrace began to form a slope of mixed redeposited material, that eventually reached the top of the bedrock and fully backfilled the reservoir.

After this, the sequence is followed by a series of layers of plough soil concluding with 20th-century, plastic filled layers.

Discussion

Having presented this sequence there are a series of questions that require further consideration. The first is the date of the water supply system. The large rock-cut structure identified as a reservoir is generally dated to the Roman period and seen as an example of pre-planned Roman construction effort where the construction of a water supply systems is preceded by a large quarrying event (Boyer 2016: 528; Blanke 2018a: 46, 50-52). However, as presented above, the preliminary results of 2017 raise a doubt about its Roman chronological adscription, and only further excavation will reveal if the alignment of the water steps with the rock-cut reservoir is coincidental or deliberate.

A second issue would be the nature of the water supply system. It is assumed that this reservoir would have been fed by an aqueduct system and that it would have, in turn, fed into various smaller cisterns, like the ones identified by LAJP in previous seasons (Blanke 2018a). While a water outlet from this reservoir has been identified, the inlet is still unknown. It is assumed to exist because of parallels not only from other reservoirs in Jarash, but also from Jerusalem (Wilkinson 1974) and elsewhere



7. Beam slot(?) cut into the rock in Trench 5, perhaps linked to the dwelling occupation of the reservoir in Late Antiquity © LAJP.

in the Levant (Wilkinson and Rayne 2010). Moreover, old aerial photography has revealed a linear feature leading into the city potentially identified as an aqueduct (Stott *et al.* 2018), which might feed into this reservoir. However, the presence of the water steps and the cavity into which they lead raises the issue of whether this was originally an access point to a spring (other springs are known inside Jarash - Boyer 2016; Lichtenberger and Raja 2016) rather than an aqueduct-fed reservoir. It might have been a water drawing point not that dissimilar to the water grottoes of Hellenistic Rhodes (Rice 1995) or, perhaps, the access to a karst system (Parise and Sammarco 2015) or an underground aqueduct. Such underground aqueducts are known from the Decapolis (Lucke, *et al.* 2005), 6th century BC Athens (Christaki, *et al.* 2017; Angelakis, Voudouris and Mariolakos 2016) and early Roman Tarragona (Burès, García and Macias Solé 1998).

A third point would be the purpose of the ashlar wall that surrounds the reservoir. Only two courses are preserved in the excavated corner, and a single one along most of the perimeter, which limits our interpretations. Looking at other large cisterns in Jarash, it could be put forward that the wall was the foundation for a series of sequential, self-buttressing barrel vaults, but other forms of roofing cannot be ruled out. Neither should be the possibility that it was an open-air cistern, like those found in Constantinople (Crow, Bardill and Bayliss 2008) and at nearby Birketein.

The final question that future excavation could answer relates to the nature of the south-west area in the pre-Roman period. The secondary deposition of human remains into the layers sealing the water steps (and covered by an early-Roman *stratum*) shows that an inhumation necropolis was disturbed in the Hellenistic period, probably located in the immediate surroundings of the water steps. The exact location and the chronology of this burial area is unknown. One possibility (of many) is that the blocking of the water steps was parallel to the excavation of the reservoir, an area previously used for burials[1]. In any case, the presence of burials in this area before the 1st century BC shows that in the Hellenistic period this part of the site was suburban even if not fully peripheral (as suggested by the water steps).

Additionally, we should consider the apparent chronological gap which exists in this area, with no recorded activity between the 4th and the 7th centuries AD. This suggests a potential clearing event in the early Islamic period which removed all post-Roman layers (see also Trench 6) rather than a lack of activity (which future excavation may unearth at the bottom layers of the reservoir fill).

A Cluster of Residential Buildings in Jarash's Southwest District (Trench 7, 9 and Area F)

The excavation of Trench 1 in 2015 uncovered a section of a room within a housing complex that collapsed in a sudden catastrophic event - possibly an earthquake - which sealed the room below 1.5m of wall tumble (the room forms a part of Area D, see Blanke *et al.* 2015: 232; 2021). The ceramic assemblage uncovered from the room was mainly Late Antique (including Umayyad) and Abbasid in date (Pappalardo 2019). Importantly, the architectural stratigraphy of the building revealed that it was constructed directly on bedrock, with only few architectural modifications identified. Our current interpretation of the room is that it was either built from new or massively restored after the earthquake in the middle of the 8th century AD.

A major objective in 2017 was to further investigate the residential structures on the hilltop in order to expand our understanding of the layout, size and fabric of the city in the Abbasid period, while also addressing questions of the organization of the residential structures themselves. Two trenches (Trench 7 and 9) in two different housing units were excavated and within a large (80×50m) area, known as Area F, all standing surface remains of walls were drawn (**Fig. 2**).

Trench 7

Trench 7 is located within the cluster of residential structures defined as Area F (see below). Following the results of the excavation of Trench 1 (Blanke 2016; Blanke *et al.* 2021) the aim was to further examine the extent of

1. Note that this would imply a late Hellenistic date for the reservoir (and not a Roman one).

the Abbasid period residential usage of Jarash's southwest district as well as investigate the area's development over the longue durée. The trench was laid out according to two walls that were visible on the surface and constituted the western and southern limits of a 4×4m trench. The excavation revealed several occupational sequences and displays the different construction techniques applied in this area through different periods.

Results and Stratigraphy

The earliest use of the area (defined here as Phase 1) saw remains of a Roman period occupation (**Fig. 8**). Given the small space available, the excavation was stopped in Trench 7 before reaching the bedrock. At present, a stone bench is the earliest occupation identified within the excavation, but it was probably not the first construction in the area. The top of the bench was uncovered *ca.* 2m below the current surface level. Partly obscured by the construction of later walls, the eastern face was made from stone blocks showing no regular layout, bonded with medium stones and fixed with white lime mortar. At first glance, it could be interpreted as a foundation but unfortunately, comparanda with other Roman period underground construction techniques are scarce within Jarash (but see Gawlikowski 1986, plate IIIB; Blanke 2015). The layout of the bench suggests that it served as foundation for a building of substantial size. It is associated with a collapse layer of large ashlar blocks and the same white lime mortar that is found within the bench. It is not possible to speculate on the use of the building, but a careful ceramic analysis dates its destruction to the Roman period (see ceramic analysis, this report). It is also associated with a thick sealing deposit (0.30m) on top of the collapse, which consist of light brown soil with inclusions of glass, bones, metal, *tesserae* and chunks of marble. The remains of the structure add to the list of several Roman period discoveries made by the LAJP in 2015 and 2017 (see Trench 5, 6 and 8, this report, and Blanke *et al.* 2021).

The Roman abandonment deposit was cut along the western end of Trench 7 in order to use the above-mentioned bench as a foundation for a new north-south running wall. The associated ceramic material suggests that this second phase of use should be dated to the 7th or 8th century (**Fig. 9**). Importantly, the area appears to have been untouched for centuries since the filling of the cut (*i.e.* the foundation trench) contains typical transitional period ceramics, such as Umayyad buffware and a white painted Jarash bowl. The new north-south running wall is associated with an east-west running wall in the northern part of the square; both are made of roughly cut medium-sized stones on top of which squared limestone blocks were laid. A thin but compacted red clay layer has been interpreted as the remains of a walking surface, but nothing remains on the floor to suggest the purpose of the new room. Directly on top of this surface, a structural collapse was identified across the entire trench. The collapse layer consists of a mix of lime mortar, *terra rossa* and lenses of yellow clay. The deposit is rich in organic residue (a soil sample has been collected for further analysis), which is typical for flat rooftops in the Eastern Mediterranean, which would commonly comprise wooded beams

8. Stone bench and tumble (Roman period) and south section of Trench 7 © LAJP.

9. Trench 7: top of the make-up layer dated to the Abbasid period © LAJP.

and branches with a packed surface of clay. It is important to note that in the section, the organic soil deposits appear as horizontal lines suggesting that the rooftop did not experience a long-term decay but rather a sudden collapse. Considering the period under study, it is possible that the collapse was associated with the earthquake that took place in the mid-8th century AD and is well attested throughout Jarash and nearby cities (for a detailed list on earthquakes in the region, see Ambraseys 2009).

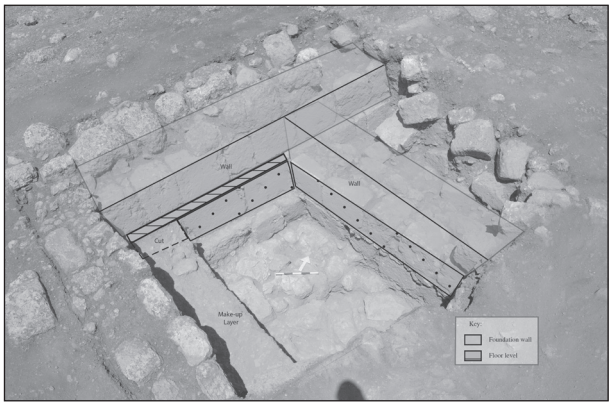
The third phase was initiated with a cut through the western end of the Phase 2 destruction in order to use the remains of the north-south running wall as a foundation for the rebuilding of this wall. Phase 3 also saw new courses added to the east-west running wall (**Fig. 10**). The rebuilding of the wall was accompanied by a make-up layer (5cm along the cut to 40cm in the western section) to level the room and serve as a foundation for a packed soil surface. The make-up layer was rich in ceramics dating to the Abbasid period comprising an abundance of *e.g.* cut ware and egg shell ware (see ceramic report).

Finally, the room was discovered filled with a packed earth deposit that was rich in finds such as jewellery, glass, disused construction material (wall tiles, *tesserae*, marble, basalt and wall plaster). As no proper abandonment layer or clear pattern of sudden destruction has been identified, one can hypothesize that the deposit was obtained from a nearby destroyed household.

The final use of the area (Phase 4), comprise construction activity after a sudden destruction that brought an end to Phase 3 (**Fig. 11**). First, new courses of rough stones were laid along the east-west running wall in the northern end of the trench, which delineated an area to the north which remained untouched and filled with collapsed building material. Second, the southern part of the trench saw the construction of a new east-west running wall that was bonded with the rebuilt north-south wall. The medium-sized stones used for this rebuilding bear no proper cut marks, and the stones are bonded with fist-sized stones set within a thick earthen mortar. It has not been possible to date Phase 4, but in the newly constructed room, a deposit associated with the destruction of Phase 4 contains a large quantity of discarded building material (medium-sized stones, brick, tegulae, marble, *tesserae*, glass *tesserae* and plaster) as well as domestic waste (ceramics, metal fragments, bones and a soapstone fragment). Following the destruction of phase 4, the area was abandoned.

Discussion

Four phases ranging from the Roman to the Abbasid period were identified in the excavation of Trench 7. As described above, the interpretation of Phase 1 is meagre, but added to the numerous discoveries made by LAJP (Blanke 2018a and this article) one can begin to assert the extent and general use of the area in the Roman period. During Late Antiquity, this area seems to have been disused as demonstrated by the *hiatus* in occupation until the construction of the foundation trench prior to the reuse of the Roman building remains in the Umayyad period. Even if it is not currently possible to understand how the building was used, the continuous use of the north-south wall suggests that the Roman-period structure remained an



10. Trench 7: Phase 3 construction © LAJP.

11. Structural collapse over Phase 4 © LAJP.

architectural node for centuries: the inhabitants maintained the memory of the antique building, which was probably already in ruins.

The excavation shows how the area underwent major breaks during the early Islamic period. Following the Umayyad occupation, Trench 7 was used twice as a dumping area during the Abbasid period offering a large quantity of artefacts and construction material. The Abbasid-period dumps probably originated from a nearby residential area. Importantly, the material retrieved from the sealed context in Trench 9 (see below) contains the same ceramic horizon as that found in Trench 7 suggesting a wider use of the area at this time and perhaps also suggesting that nearby buildings were in use while others (such as that found in Trench 7) had been transformed to be used for the disposal of rubbish.

Trench 9

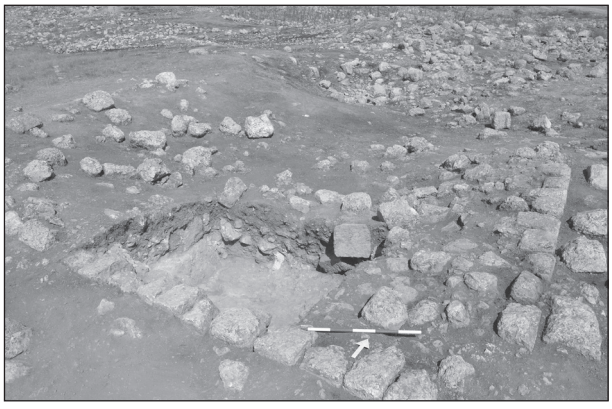
Trench 9 is located in the southernmost part of Area F (see **Figs. 2** and **12**). An east-west running wall that was visible on the surface prior to excavation marks the southern extent of the trench. The area slopes toward a depression, which was interpreted as an internal courtyard. However, the quantity of stones spread over the 3×3m trench revealed that the excavation would not expose an open area but a room. The progress of excavation revealed that the roof and walls collapsed as the result of a fire, which sealed the room and its content. We excavate a 1m wide sondage along the western edge of the trench followed by a 1m extension of this sondage toward the east in order to improve the stratigraphic documentation. The following discussion will focus on a single phase of the occupation discovered in the western part of Trench 9.

Results and Stratigraphy

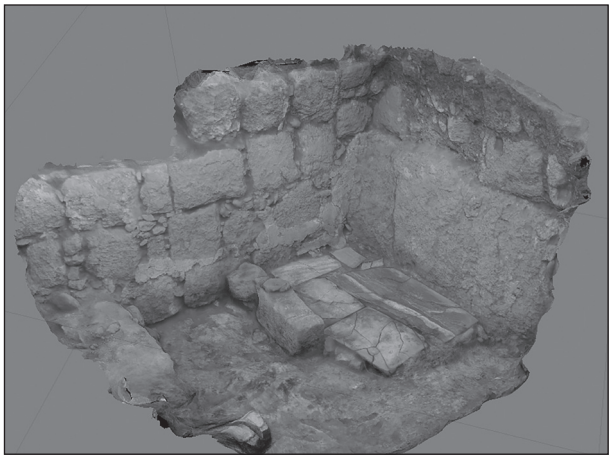
The east-west wall that was visible on the surface constitute the southern limit of the room within Trench 9. It is built with limestone ashlar blocks that were laid in regular patterns and joined with an earth mortar and medium-sized packing stones. To the west, the room is demarcated by a north-south running bedrock cut, on top of which, a couple of limestone blocks remain. The two walls form the southwest angle of a room that expands to the north and east beyond the limit of the excavation.

Abutting the bedrock wall, the excavation revealed a structure (1.50×1m) made of five marble slabs of varying sizes, the southern half is bordered to the east by two limestone blocks. The marble platform and the adjacent stones seem to be sitting on the floor (**Fig. 13**).

The marble platform is associated with a plain white plaster (only the lower part is preserved) that covers sections of the south wall. The stucco appears moulded to create two embossed pillars, which have led to an interpretation of the marble structure and the associate stucco as a prayer platform. Prayer platforms are rare but have been documented in other early Abbasid domestic contexts like the published example in Madinat al-Far (Haase 2007: 458) and Baysan (Fitzgerald 1931: plate XXIII-2; reviewed in Vernet 2016). Similar to these examples, the platform in Trench 9 is set in the corner of a room and consists of a low platform associated with a decoration on the wall facing the *qiblah* direction, which means



12. Overview of Area F with Trench 9 in foreground © LAJP.



13. Post-excavation 3D model of the prayer platform in Trench 9 © LAJP.

the structure is roughly directed toward Mecca.

In the middle of the same wall, two different plasters were applied: a preparation plaster on top of which a second layer appears to have been decorated with deep incisions making a geometrical pattern of herringbone between horizontal lines, which seems different from random patterns of hatching for preparatory purposes (see Umm al- Walīd, Genequand 2008: 140, fig. 5). It is premature to be conclusive about the decoration of this room, but it is important to note that for the early Islamic period, apart from the aristocratic palatial architecture, examples of plaster and stucco decoration are still deficient in urban residential contexts (Vernet 2018).

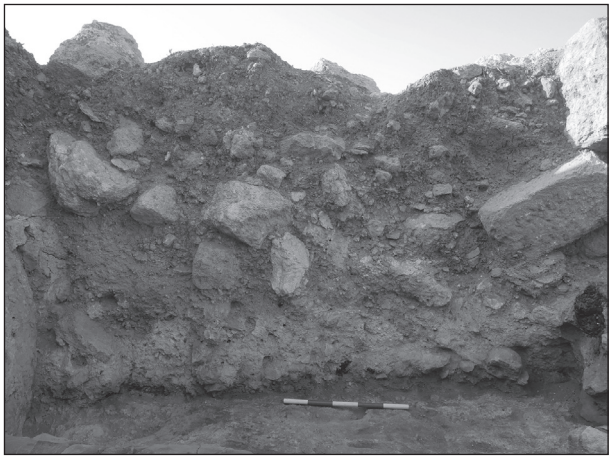
A wide range of artefacts were discovered on the floor (**Fig. 14**). These included a small reused marble capital with a smooth top surface found in the eastern part of the sondage, which could have been used to spread the dough for flat bread. Basalt is generally used for grinding purposes and limestone to spread dough (Boas 2010: 162): an example of an upturned capital had been found in the courtyard of House G in Pella dated to the Umayyad occupational phase (Walmsley 2007: 257). Several ceramic objects (jugs, a filter jug, a casserole with a lid and a pithos) were uncovered crushed on the floor below the collapsed roof (see ceramic report). The destruction deposit contained charcoal chunks and burnt botanical remains (see archaeobotanical report). The type and quantity of crops stored in the ceramic containers provide a rare insight into the diet of the residents of Abbasid-period Jarash. The material assemblage also contained a ceramic lamp of Abbasid date, which was discovered intact, as well as several types of nails, coins (unfortunately still illegible) and broken bluish glassware.

The clay floor, which is visible in the western part of the sounding shows black and reddish patches, which probably resulted from the heating process –the eastern part of the floor preserves its whitish colour–.

Several important observations have been made regarding the destruction of the building. First, the fire probably started in another part of the building since no flame burning residues were visible on the walls and no ash deposits have been uncovered. Second, the fire in the room appears to have occurred in a no-oxygen context (pyrolysis) as exposed previously with charred botanic remains and smouldered charcoal beams visible in the western section (Doroszenko 2001: 42). Third, the red patches on the floor testify that this burning process had reached high heat intensity.

Owing to the sudden collapse of the roof, it is possible to reconstruct its layout (**Fig. 15**). The burnt floor surface is covered by a thin red soil that could be interpreted as dissolved

14. Destruction deposit in the eastern part of the sondage in Trench 9 © LAJP.



15. South-facing section of Trench 9 © LAJP.

reeds and straw covered by *terra rossa*. This organization suggests that the room was covered with load-bearing beams supporting a flat roof, which was packed with yellow clay mixed with loose soil and fist-sized stones. The building collapsed inwards, which matches the ceramic spread of pots falling on to the floor from an elevated position with a scatter from south towards north. Following the collapse of the roof onto the floor, the masonry walls tumbled inwards, thereby sealing the roof and the floor deposits. The area was abandoned with no further usage until its excavation in 2017.

Discussion

The excavation of Trench 9 shows a wall construction technique that is consistent with that documented in Trench 1 and 2 in 2015, but in Trench 9, tumble stones are less numerous and there were no indications of an upper storey.

Although speculative, we currently suggest that the fire started elsewhere in the building and that the destruction ended with the collapse of the roof onto the floor, which was closely followed by the collapse of the walls onto the roof.

So far, Abbasid residential structures have been excavated in Trench 1, 7 and 9, while Trench 2, 5, 6 and 8 testify to the diversity of activities taking place on the hilltop after the mid-8th century AD earthquake. The differences between the construction techniques hosting Abbasid contexts inform that several types of buildings are standing in the same neighbourhood in that period. The substantial amount of tumble excavated in Trench 1 along with the presence of piers may suggest that the building had an upper storey above the excavated storage room, while the preliminary conclusions from Trench 7 and 9 suggest that both structures occupied a single floor.

The range of material uncovered in Trench 9 is exceptional. The assemblage of glass, ceramic and metal objects gives a rare snapshot of the utensils used in an Abbasid-period household, while the charred organic remains bring new insights about diet and consumption practices and promises to provide a radiocarbon date for the collapse (analysis in progress).

Considering the small size of the area uncovered, it is still a conundrum that the material assemblage and organic finds associated with storage are found alongside a space dedicated to prayer. It is possible that we are looking at two phases of usage in which the early phase saw the use of the room for prayer while in the second phase, the space was transformed to be used primarily for storage. Alternatively, the space served two simultaneous functions with material shifting within the room depending on its usage. Importantly, the incised plaster and the prayer platform, which was made from recycled marble slabs, underline that this room was a part of a wealthy dwelling, which was built during the Abbasid-period settlement on Jarash southwest hilltop.

Area F: A Late Antique and Early Islamic Housing Cluster

LAJP Area F is an 80×50m area with substantial structural debris, namely worn limestone blocks, extending over a gently sloping plateau to the northeast of the main LAJP excavation areas (defined in Blanke *et al.* 2015: 231). The western boundary of the area follows the dirt road that descends from the hilltop towards the southern *decumanus* (see **Fig. 2**). The southwest corner of the area and the western edge along the dirt road partially coincides with Area E defined in 2011. To the north, traces of stone architecture terminates south of the dirt road that runs below the hilltop towards the West Gate. To the east, the ruins open onto a pronounced slope towards the central part of the antiquities area along the *cardo*. To the south, Area F adjoins Areas A and B on the hilltop. In topographical terms, Area F can be divided into a northern and southern half by a steep east-west slope dropping some 4 to 5 metres towards the north. While the gradient may have become more pronounced through the accumulation of structural debris from past occupation above the slope, the latter most likely indicates a natural escarpment in the underlying bedrock, which is relatively close to the surface in this area (*cf.* worked bedrock outcrops no more than two metres below the present surface in LAJP Trench 1, 2, 6, and 9 (see details in Blanke *et al.* 2015 and this report).

Considering the insights gained from recording visible architecture in Areas A, B, C, and D during the 2011 season (Blanke *et al.* 2015: 231-235), it was deemed feasible to develop a rough plan of standing architecture

visible in Area F to complement excavation results from Trench 7 and 9. Some limitations to the retrieved information should be noted from the outset. First, it was not possible to thoroughly clean the area of spring vegetation prior to actual drawing and plotting of visible architectural features. Second, Area F is littered with a substantial amount of limestone building blocks in various states of decay, often creating topsoil matrices with a very high amount of limestone rocks and flecks. Many of the walls traced in the area appear to have collapsed from natural erosion followed by the gradual accumulation of loose, silty soils.

All wall lines recorded here were documented by laying out baselines for plan drawings and plotting said baselines with a total station. A total of 38 walls were recorded in this way, extending over anything from a couple of metres and up to more than ten metres in length. The extent and degree of preservation of these vary, but very few of the walls found protrude more than a couple of centimetres above the surrounding soil surface. Most were regular housing walls of a type also encountered in Area D, *i.e.* with an average width of 70-80 centimetres, made from worked limestone arranged in double rows. Some exceptions appear, however, *e.g.* W31 on the western slope, likely a terracing wall built to support the plateau on its higher western side, and W2 on the northeast fringe of Area B, which is a later and relatively crudely set field wall to mark out the field terrace to its west. There is no clearly observable chronological sequence in the architectural features recorded here, except from what can be deduced from their relative stratigraphy and their association with archaeological *strata* in Trench 7 and 9.

Architectural Units in Area F

The southeast quadrant of Area F holds the major part of identified wall lines, and further shows some interesting topographical variation. An enclosure marked by W1, W3, and W4 (where Trench 9 was laid out) is adjoined by a depression further north, between the former cluster of walls and W5, W7, and W8. This area presumably formed a courtyard space of an 8th or 9th century AD date (based on findings in Trench 9) and may have held a cistern in its western end, given the pronounced circular depression in this area. Roofed areas adjoining this courtyard space appear evident in the comparably higher elevation of stone debris to the north and south of this depression.

West of Trench 7 and north of W5, W7, and W8, a second depression appears to indicate another courtyard space opening onto rooms on its western, southern, and eastern side. Based on findings in Trench 7 (see ceramic report, this article), a potential 9th century occupational date of this structural unit should in all likelihood be located less than a meter below the present surface. This unit adjoins another courtyard space on its north, bounded along the escarpment by several wall lines running east-west (*e.g.* W14, W15, W17). It is not clear if the structures extending north to the escarpment from W6, W7, and W8 is a single occupational unit or several. Another structural unit is located below the escarpment and seems to open towards the slope on the eastern side of Area F. This occupies the southeast corner of a field terrace that seems otherwise free of architecture. The unit presumably held roofed spaces south of W34 and north of W35. The perimeters on the northern (W37 and W38) and eastern (W32 and W39) sides are clearly visible.

The area west of the courtyard depressions, beyond the north-south line marked by W20 and W6, is characterized by a much more modest amount of larger stones lying free on the surface, even if there does not seem to be a marked reduction in the number of walls that can be traced in this area. The walls found here, *e.g.* W21, W22, W24, and W25 are mostly in the surface rather than protruding above it, and later soil accumulation overall seems more regular and even than what is the case further west. While some structural units seem apparent in the soil surface close to W19 further south, the southwest corner of Area F is largely void of visible architecture (except W26). This may be due to soil accumulation stemming from the field terrace further south (in Area B), which also partly overlies features around Trench 9.

General Alignment of Walls

The alignment of walls within Area F is fairly regular and adheres to either of three general patterns. Terracing walls, *e.g.* W2,

W31, and perhaps W33 are irregular, and follow topographical variation rather than any particular grid. All other walls except for W1, W3, and W4 seem to adhere to the Roman orthogonal grid (on a *ca.* 20°-200° alignment) with varying degrees of accuracy. The latter three walls, situated around Trench 9, are the only walls in the general area that follow a different alignment, perhaps associated with the diagonal street running SW from the congregational mosque by the *tetrakionion* in the centre of town (*i.e.*, on a *ca.* 350°-170° alignment) (Blanke 2018a; Rattenborg and Blanke 2017).

Overall, excavation results from Trench 7 and Trench 9 would suggest the visible structures in Area F to be remains of 9th-10th century AD residential occupation, as these are the youngest *strata* associable with the visible wall lines (also discussed in Rattenborg and Blanke 2017: 326-327 and fig. 13). Findings from Trench 7 also indicate remains of earlier Roman-period structures on roughly the same alignment as later walls. Both are commensurate with the patterns of spatial alignment described above and discussed in previous reports (Blanke *et al.* 2015; Blanke 2018a), and would therefore suggest an extensive set of houses across the plateau in the southern part of Area F. The arrangement of roofed areas around presumed courtyard spaces is mirrored closely in visible surface remains from Area D (Blanke *et al.* 2015: fig. 2). Collating excavation results from these squares and the topographical variation observed on the surface, most of the eastern half of the structures recorded in Area F seem to extend from occupational layers located no more than a metre below the present soil surface, perhaps up to two metres along major wall lines. Field terracing in Area F appears to be limited to the area west of W5 and W3 and around W26, thus extending from the level plateau encompassed by Area B to the southwest. The structure below the escarpment, including W32, W34, W37, W38 and W39, is interesting because of its relation to the adjoining field that extends east from the dirt road. Excavation in this area would enable a clearer view of the relationship between domestic structures and the intramural fields, which should be dated to the Early and Middle Islamic periods or even later (see discussion in Rattenborg and Blanke 2017: 324-328).

Excavating Jarash's Thoroughfares (Trench 6 and 8)

A careful reading of aerial photos from the early 20th century supported by the geomagnetic survey that was carried out in Jarash's southwest district in 2015 have identified a series of streets leading from the town centre towards the hilltop. Two of these streets are of particular interest to the LAJP (see **Fig. 1**). A north-south running thoroughfare can be traced over the course of 300m from the triple church complex of St George, St John and Sts Cosmas and Damian across the so-called south *decumanus* to the top of the hilltop. This thoroughfare is currently perceived to have been constructed during an expansion of the city's street grid during Late Antiquity and possibly associated with the construction of the triple church complex. The second street runs diagonally from the congregational mosque in the centre of town toward the southwest hilltop.

Excavation of the Central Bathhouse carried out as a part of the Islamic Jarash Project (henceforth IJP) under Alan Walmsley's direction, revealed a street grid that matches the diagonal street and pre-dates the Roman re-orientation of the city –as seen through the construction of Jarash's main thoroughfares–. The results from the IJP suggest that the diagonal street grid dates to the Hellenistic period, remained in use throughout the city's history and became a main thoroughfare after the earthquake around 749 AD. The excavations of Trench 6 and 8 was undertaken to investigate the chronology of the development of these street systems: to examine when they were founded, how they were maintained, and when they went out of use.

Trench 6

During the first season of the LAJP in 2015, the results from Trench 2 offered an example of domestic building expansion onto the street running south from the south *decumanus*. Trench 6, a 5×5m unit, was placed adjacent to Trench 2 in order to examine that street (see **Fig. 2**), and to examine its connection to the large rock-cut reservoir identified in Area C of the

2011 field survey and 2015 geophysical survey (Blanke *et al.* 2015: 231-233; 2021). However, upon excavating Trench 6, we learned that the housing-encroachment continued further than we previously thought.

Results and Stratigraphy

The excavation of Trench 6 revealed four walls that outline two rooms (Room A and B) extending eastwards from the eastern wall of Trench 2. This structure was found to have four main phases of construction, development, and reuse (**Fig. 16**). A 1×3m sondage was made parallel to a bench-like platform in Room B that revealed the earliest phases of occupation. Based on an in-field assessment of the ceramic material, we believe that this area can be relatively dated to the Late Hellenistic period. This phase of occupation coincides with early material found in Barghouti's excavations in 1975-1976 just north of the LAJP sector, and further adds that Hellenistic occupation of Jarash existed beyond the construction of the so-called forum in the southern sector of the city (Barghouti 1982: 219-221; Kraeling 1938: 27-28). However, in Trench 6, this material was only found in the context of construction layers made of *terra rossa* and compacted yellow clay between the bedrock and the main occupational surfaces (**Fig. 17**). Thus, any insight into the nature of habitation during the Late Hellenistic period cannot be assessed from this narrow trench.

Above the Late Hellenistic layers in the sondage, we identified two main occupational surfaces. The first, again based on an in-field assessment of the ceramic material, can be dated to the Roman period due to the quantity of *terra sigillata* found. Hard-stamped yellow clay with some small stones were used to create this occupational surface. The bedrock was also incorporated into this surface at the western end of the room. Similar floor construction can be found in Trench 1 of the LAJP 2015 season, as well as in Trench A of the Danish-German Jarash Northwest Quarter Project (Kalaitzoglou *et al.* 2013: 58-63). The second occupational surface was built directly on top of the surface identified above (**Fig. 18**). Unfortunately, no artefacts were left *in situ* on this occupational surface when the building was abandoned. Thus, we have no way to precisely date when this floor was constructed. In any case, this surface covered the entirety of Room B and provided evidence for continuous habitation from the Late Roman and into the Abbasid period. However, over the course of that time, the layout and arrangement of the space changed considerably.

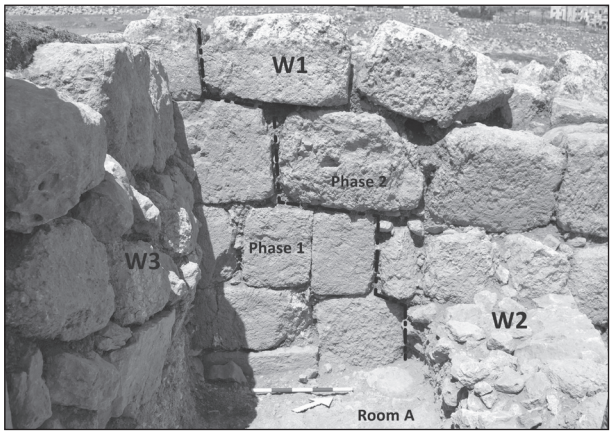
The western wall of the structure, running north-south (W1), which continues as a part of

16. Overview of Trench 6, fully excavated including sondage © LAJP.

17. Trench 6, west facing profile of the sondage exposing the stratigraphy below W4 © LAJP.

Trench 2 has three phases of construction and repair. Only parts of W1 were identified in Area D of the 2011 survey, and, based on the results from Trench 2, we believed that this wall marked the furthest extent of the street encroachment (Blanke *et al.* 2015: 231-233). The southern and northern ends of W1 are composed of finely-cut limestone blocks, which appear to be *in situ* from its original construction. Then, at some point, this wall was rebuilt, as the middle section is remarkably different in form compared to the end sections of the wall. The middle section is made of roughly-cut ashlar blocks with small packing-stones and *terra rossa* (**Fig. 19**) –a typical technique used during the Late Antique/ Early Islamic periods at Jarash–, as well as other large urban centers in *Bilad al-Sham* (al-As'ad and Stępniowski 1989: 206-210; Blanke *et al.* 2011: 320-325; Tsafrir 2009: 77-79; Walmsley *et al.* 2008: 113-118).

18. Overview of Trench 6 excavated to its main occupational surface © LAJP.



19. Eastern face of W1 in Trench 6 showing two phases of construction © LAJP.

20. Construction technique used to join W1 and W2 in Trench 6 © LAJP.

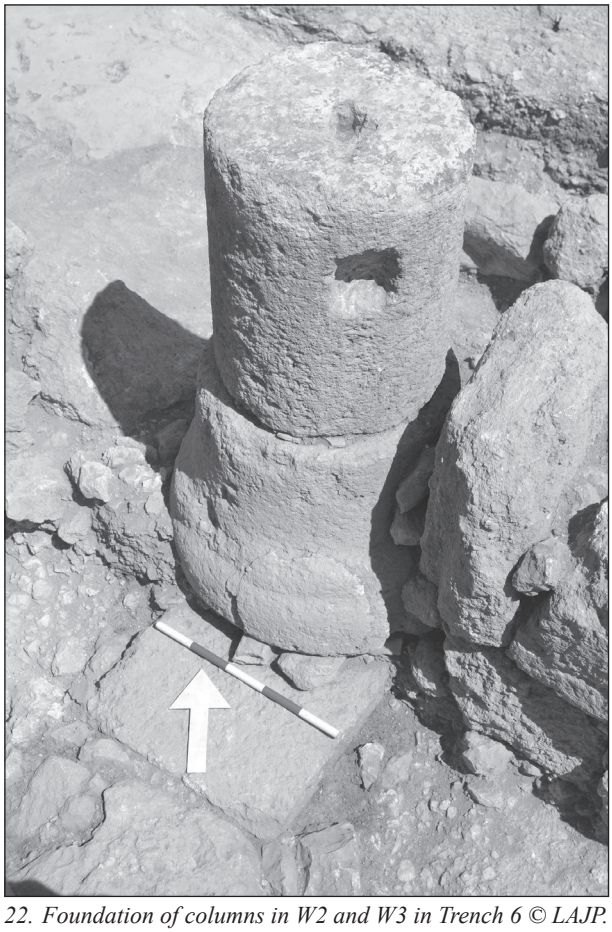
The third phase of this structure is marked by the addition of three walls, creating Room B and the addition of Room A: two parallel walls running east-west (W2 and W3), and another wall bonded to W2 running north-south (W4). The extent of Room B continues north outside of Trench 6. Both W2 and W3 applied the same construction technique and material as the mid-section of W1 as well as incorporated Roman-period limestone columns into the walls for structural support. It is clear that when W1 was rebuilt, W2 and W3 were constructed to further divide the interior space. The builders attached W2 to W1's mid-section with yellow clay and plaster (**Fig. 20**). As for W3, this wall merely abuts W1 with a small foundation trench for the wall's architectural support (**Fig. 21**). The two columns in W2 and W3 were intentionally placed and used as a part of both walls' construction. The columns sit upon two smooth limestone foundation stones with small stones wedged between the column and foundation (**Fig. 22**).

Recycled columns are commonly found in Jarash during the Early Islamic period in both the GO area around the Umayyad congregational mosque, and in the Northwest quarter

21. Foundation trench of W3 abutting W1 in Trench 6 © LAJP.

(Gawlikowski 1986; Walmsley *et al.* 2008; Blanke *et al.* 2011; Lichtenberger *et al.* 2016). However, there are no comparable examples so far in Jarash of columns being incorporated inside the walls for structural support within a domestic context. This will likely change with further excavations of private residences.

W4 was bonded to W2 to close off Room B. It has no foundation and was placed directly on top of the occupational surface. It is entirely possible that W1 initially marked the extent of street encroachment. However, it is likely that the street running south from the southern *decumanus* was no longer used and housing development overtook the newly available space. When the wall extensions were built in Room B, a small bench was also installed that ran the entire length of W2. This bench was constructed by a line of irregularly shaped stones, and the space between those stones and W2 was filled with *terra rossa*. The fill was then covered with the same yellow clay as the occupational surface. A specific function for this bench was not immediately identified.



22. Foundation of columns in W2 and W3 in Trench 6 © LAJP.

Since W2 is not completely perpendicular to W1, it creates a trapezoidal shape for Room B, which then in turn forms Room A into a smaller trapezoid. It is puzzling that W3 does not connect to any other wall in Trench 6, creating a small opening eastward. We concluded that there was no door there, because there was no recognizable threshold and no occupational surface. In the fill above W3's foundation, we came across a variety of material including glass *tesserae* covered in gold foil, glass beads, and a few unidentifiable bronze coins. We believe this space was not occupied and acted as a small dump area that accumulated over time. This theory is further supported due to there being few tumble stones from the building collapse compared to the extent found in Room B and other areas in the southwest quarter of Jarash.

We still do not know the purpose for the construction of W3 and the building that it formed, as its southern side was not excavated. This structure saw no habitation or use following the Abbasid period. Although speculative, it is likely that the building was already abandoned by the time it collapsed, since there was no material assemblage found *in situ* on the latest occupational surface (contrary to Trench 1 and 9).

This residential extension occurred when the north-south road from the south *decumanus* went out of use. We can tell from the ceramic material found inside W2 that the extension was completed in the Late Umayyad and Early Abbasid period. If we are correct that a road continued into the southwest quarter of the city –which seems evident from aerial photos and geophysical surveys (Blanke 2018a; Blanke *et al.* 2015)– a reorganization occurred with the spatial layout of the residential area where individual houses were creating internal divisions and outward expansions. The reorganization of both public and private space around the south *decumanus* began as early as the 3rd and 4th centuries AD (Kraeling 1938: 281-294; Jacobs 2009: 208). These, sometimes ad-hoc, programmes continued into the Umayyad period– in tandem with the construction of the congregational mosque under Hishām ibn ʿAbd al-Malik (r. 723-743) (Rattenborg and Blanke 2017: 319-324). Trench 6, as well as Trench 2, are examples of

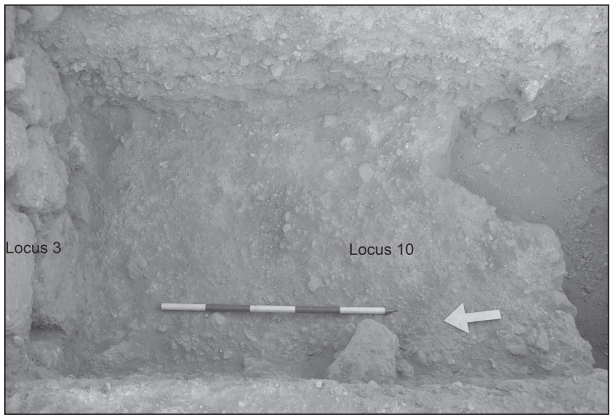
how Jarash's urban space was never static. The domestic areas of the southwest quarter moved and were reorganized to accommodate the needs of the local community members.

Trench 8

The excavation of Trench 8 was undertaken to examine the street that runs diagonally to the *cardo* and south *decumanus* from the city centre toward the hilltop (henceforth described as the east-west road) (see **Figs. 1 and 2**). Trench 8 was set up on the basis of the suspected location of the east-west road, encompassing one of the walls flanking the street from the north, and excavated in an elongated patch *ca.* 10m long (N-S). Our primary goal was to investigate the use, transformation, chronology, and disuse of this area from antiquity to the Islamic period, as well as to corroborate the hypothetical identification of the "negative linear anomalies" (identified by the geophysical survey, see Blanke *et al.* 2021) as streets. However, as described below, the excavation material has provided only partial evidence for answering this question.

Results and Stratigraphy

The excavation revealed evidence for a long sequence of activities in the area, with the pottery and coin finds pointing to dates from the Roman to the Abbasid periods. We found a large amount of ceramics, most of which were deposited intentionally either as a dump or as foundations under walking surfaces and structures. The extent of the Islamic period layers allowed only a limited insight into the use of this area in the Roman period, and the lowermost *strata* containing stone-built Roman period structures were not possible to excavate in their entirety. It was, however, clear that the southern part of the trench featured two deposits abutting a Roman period structure, both of which featured compact clay surfaces, and the lower one was established on top of Roman-period ceramic sherds forming packing beneath the surface. Conversely, the later surfaces were identified in the central part of the trench abutting the wall (**Fig. 23**, *locus* 3), whereas the southern part was subsequently filled with a *terra rossa* deposit containing many stone inclusions, probably in order to even the ground level. At the bottom of this deposit a well-preserved Roman coin was found (see coin catalogue, this article, **Fig. 39a**), which was minted in Antioch under the reign of Philip I (r. 244-249 AD) (McAlee 2007: no. 1081).



23. Clay surface (Trench 8, Locus 10) before excavation, probably used as a street surface in Late Antiquity © LAJP.

The lowest identified surface (**Fig. 23**, *locus* 10) in the central part of the trench forms a compact clay deposit on top of a 0.30m deep packing layer, which appears to have been a part of the same building sequence as the wall (*locus* 3) along its north site. The wall is *ca.* 0.75m wide, built of roughly shaped limestones with smaller stones filling the gaps between them, and with no identified bounding material. The majority of the ceramics in the deposit, *locus* 10, is dateable to the 3rd and 4th centuries AD, including African Red Slip ware and its local imitations produced in Jarash in the 4th century. This context along with the wall may thus be roughly dated to Late Antiquity.

The excavation has revealed two additional clay surfaces on top of *locus* 10, which indicate that this area was used and maintained over a long period of time. After the last of these clay surfaces had fallen out of use, the area was covered in a thick, *ca.* 0.60-0.80m, layer of yellowish deposit, forming a new surface that was used with the wall (*locus* 3). The deposit contained a large amount of Abbasid-period pottery, including cut ware and cream ware. Two installations have been identified on top of this deposit: a ceramic basin probably used, as suggested by the pinkish soil inside it, as a firing place (**Fig. 24**), and an "L"-shaped structure, probably a bin, abutting the wall and consisting of a single course of stones.

If the clay surfaces, as it might be proposed, were used as a street, that would mean that the

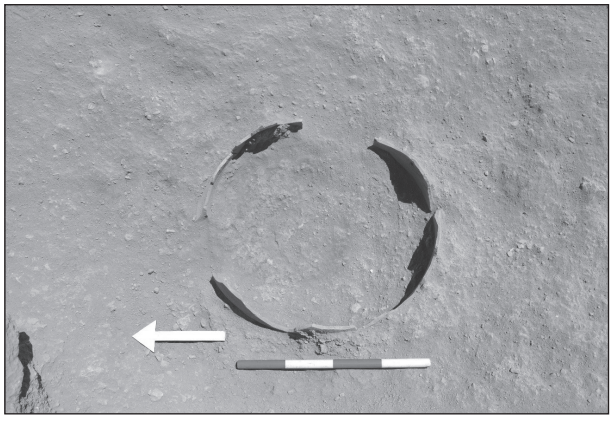
layout of the street shifted towards the north, similarly to what can be observed elsewhere on the same "negative linear anomaly" of the geophysical survey (see **Fig. 1**). It presents the "east-west road" with some of its parts running on parallel patches, suggesting that the road, at least partially, changed its layout over time.

Preliminary Study of the Ceramic Assemblage from Trench 5-9

The analysis of the ceramic assemblages was carried out alongside the excavations of the trenches. During the 2017 season, the pottery retrieved from Trench 6, 7 and 9 was fully processed and, due to a lack of time together with the considerable amount of pottery found, only 14 *loci* from Trench 5 and 4 *loci* from Trench 8 were processed. To summarize, the total number of sherds analysed is 28,774 with 1,676 sherds identified as diagnostic. Below follows an overview discussing the ceramic assemblages from each trench and the related phasing of usage (see also **Table 1**).

Trench 5

Trench 5 has revealed a great quantity of pottery. Only 14 *loci* have been processed (6,297 potsherds, revealing 598 diagnostic vessels). According to the ceramic analysis, four main phases have been identified. The assemblage of the first phase is composed mainly of carinated dishes with flared rounded rim, the body is irregularly painted in brownish or red colour, so called brown-red washed (**Fig. 25: 1-2**). These vessels seem to be a local production imitating Eastern Sigillata A shapes (Braemer 1989: 164, fig 1, A1 group; Breamer 1986: fig. 16, n. 5-8). In the fine ware assemblage, the local imitation of black gloss is attested as well, unfortunately only some body sherds were found. In the common ware assemblage, the discovery of an almost complete libation cup with high-footed base, carinated body and flared rounded rim is noteworthy (**Fig. 25: 3**). This vessel could be compared with specimens displayed in the Jarash Museum and dated to the late Hellenistic period. Another parallel for this type of libation cup is found in the rock cemetery or funerary gardens south of the upper Temple of Zeus and dated to the 1st century AD. (Kehrberg 2004: fig. 1, 3). The cooking ware is mainly comprised by carinated casseroles with a flanged rim, sometimes with a slight ridge on the top of the rim; these vessels show a shape quite close to the Greek-Hellenistic *lopades* tradition (**Fig. 25: 4**) (Parallels: Tall Mādabā, Ferguson 2014: fig. 6, n. 22; Homs area, Reynolds 2014: fig. 4, CA4, CA4A). Only one small fragment of a lamp nozzle was found (Temple of Zeus: Breamer 1986: fig. 16, n. 14; Hippodrome: Kehrberg 2011: fig. 1, n.7-8; Hippos: Mlynarczyk 2011: n. 116; Capernaum: Loffreda 2008: LUC 1.1). This assemblage is very homogeneous and can be dated as early as the 2nd or the 1st century BC.



24. Pottery basin in Trench 8 dated to the Umayyad period, and probably used as a firing place © LAJP.

The second phase of Trench 5 can be dated from the late 1st to the 2nd century AD. The discovery of a complete profile of a Pompeian

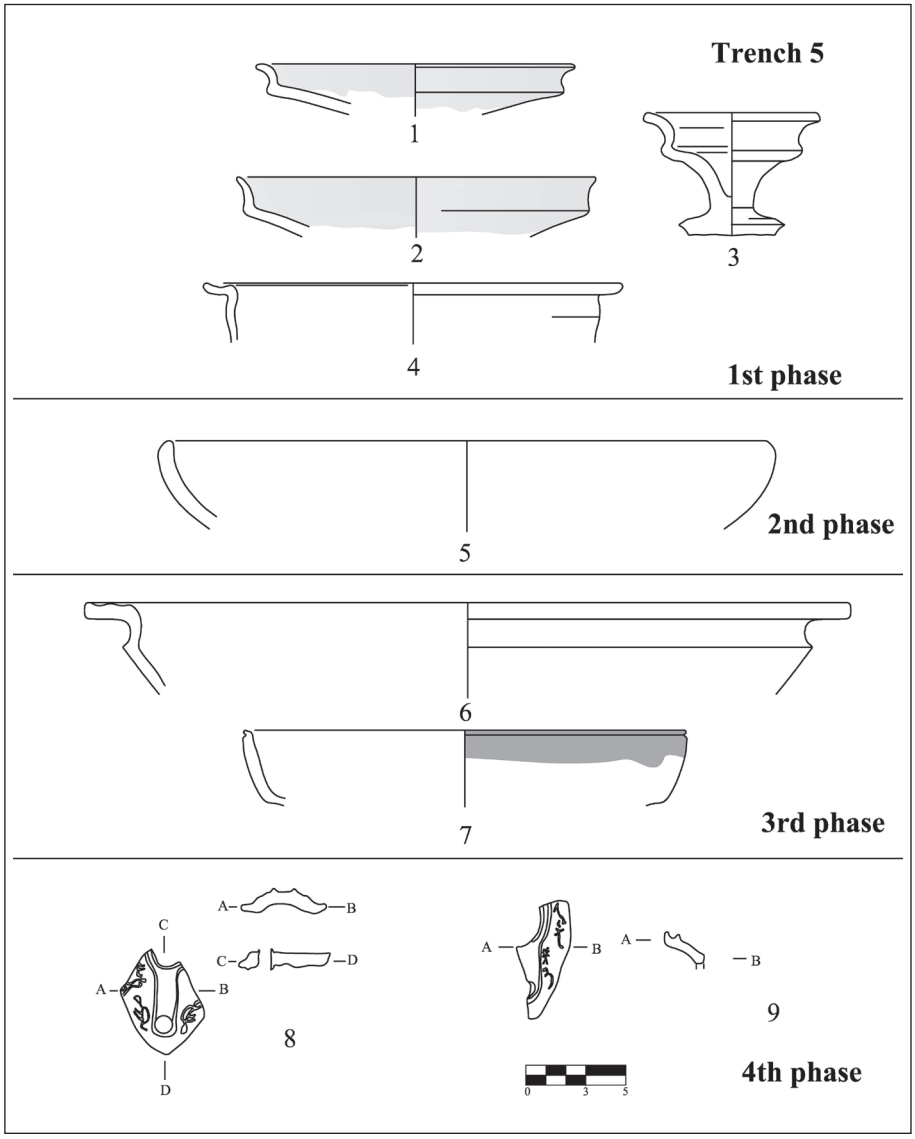
Table 1: Overview and description of the ceramic assemblage from Trench 9.

	Late Iron/ Hellenistic	Late Hellenistic	Early Roman	/Late Roman	Byzantine/ Umayyad	Late-Umayyad	Abbasid
Trench 5		Phase 1	Phase 2	Phase 3	Phase 4	Phase 4	
Trench 6	*residual sherds phase 1*		Phase 1			Phase 2	Early Abbasid?/ Phase 2 ?
Trench 7			Phase 1		Phase 2		Phase 3
Trench 9							Phase 1
Trench 8							*Locus* 2

Red Ware casserole is noteworthy. It shows the characteristic fabric of the Phlegraean Fields area (Capania region, Southern Italy) with many volcanic black sand inclusions mixed with tiny lime inclusions (**Fig. 25: 5**). The fabric and the thick inner bright red slip are a peculiarity of the Cuma area production. This production is well recorded in the ancient sources; Apicius and Martial recommend the usage of the *Cumanae testae* (*cumano rubicundam puluere*) for cooking food (Apicius, *De re coquinaria*: IV.11.138, V.2.196, V.4.198, VI.2.238, VI.5.241, VII.7.302; Martial, *Epigrams*: XIV, 114. Further information about these types can be found in Cavassa 2016; Morra *et al.* 2013).

These types of vessels are not completely uncommon in the east. Pompeian Red Ware is also documented in Umm Qays, Qasr al-Bint and in Antakia, providing further evidence of long-distance trade of the Campanian goods (Umm Qais: Daszkiewicz *et al.* 2014: fig. 5, n. 1, 149; Qasr Al Bint: Presented by F. Renel at *The International Congress for the History and Archaeology of Jordan* 14 (forthcoming in publication); Antakia: personal observation, 2015. For further information see Pappalardo forthcoming). This type of casserole dates to the late 1st century AD (Goudineau 1970, Type 15). The presence of several round lamps within this context support the 2nd century AD date (Kehberg 2015: lamp group 2; Kehberg 1989: fig. 2).

The third phase is mainly characterized by common ware showing the same composition as the late Roman assemblage found in the Temple of Zeus area as well as in Pella (Rasson



25. Ceramics assemblage from Trench 5 (1st, 2nd, 3rd and 4th phase) © LAJP.

1986: fig. 17; Smith, McNicoll, Watson 1992: 170-173, plate 108) (**Fig. 25: 6, 7**).

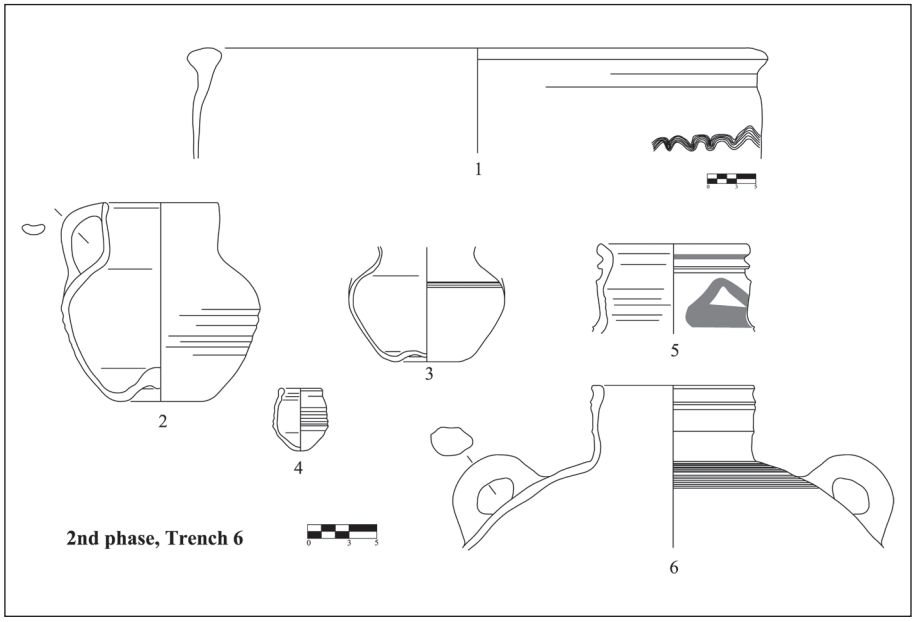
The final phase analyzed in Trench 5 correspond to a large pottery dump where the handmade basins are the most attested vessels in both the Light Brown Handmade Ware (LBHW) and the Light Grey Handmade Ware (LGHW) (Pappalardo 2019). The assemblage is fairly homogeneous, and it is important to highlight two lamps showing fragmentary Arabic inscriptions with pronounced channels between the filling-hole and the nozzle (**Fig. 25: 8, 9**) (Scholl 1986: Group V; Gawlikowski 1986: plate XIII, C-D). This type of lamp dates to the mid-8th century. Within the same horizon there seems to be different body sherds with red painted decoration both with and without buff slip, which could be dated from the late Umayyad to the early Abbasid period (Walmsley 1995: ware 8, 661, fig. 6; Vriezen 2015: 95). Due to the lack of a clear marker of the early Abbasid period (*e.g.* cut ware; channel lamps decorated with scrolls, grape clusters and birds; cream ware) it is likely that the chronology of the fourth phase is no later than mid-8th century AD. Further analysis on the unprocessed pottery is required to clarify the chronology of the latest usage of this trench.

Trench 6

6,100 sherds were retrieved from Trench 6, 453 of which are diagnostic. Two main phases have been identified.

In the lower layers, both common ware and red/brown washed ware is attested. In this *locus*, sigillata vessels have been found in a remarkable quantity compared with other assemblages (23 vessels). In particular, one sherd of *Terra Sigillata Italica* (Aretine Ware) and two complete profile bowls of Eastern Sigillata A (Atlante 58 and 28 form) should be noted. This vessel type suggests that the assemblage from the first phase should be dated to the 1st to early 2nd centuries AD. However, the discovery of 11 sherds of buff/light brown handmade coarse ware with many vegetal inclusions seems to be related to an earlier phase, probably dated to the late-Iron Age/Hellenistic period. For comparison, see vessels on display at the Jarash Museum.

The ceramics assemblage of the second phase is composed by a large amount (up to 2500 sherds) of local Orange-Red ware (O-RW), Light Grey ware (LGW) and LBH/LGH ware (Pappalardo 2019). The most recurrent type is the LGH basin with a thickened rim and rouletted as well as incised combed decorations (**Fig. 26: 1**). Different types of almost complete jars and jugs have been found; these vessels were made from a peculiar pale fabric (PW: buff-buff tending to pink) and pale painted decoration comparable to the vessels found in the 2015 season in Trench 1 (**Fig. 26: 2, 3**) (Pappalardo 2019). One of the jugs has a high neck with a straight rounded rim, carinated body, ovoid section handle and inner omphalos-shaped base. Found with



26. Trench 6 ceramics assemblage (2nd phase) © LAJP.

these vessels was an intact miniature jar with almond shaped body, rounded rim and pointed base (**Fig. 26: 4**). The Red Painted Orange Ware with buff slip (RPOW) is mostly attested with high neck jar with rounded or ridged rim (**Fig. 26: 5**). Imported wares are not common, but sherds from an amphora was found with a well-preserved upper part, with buff tending to white fabric, cylindrical neck and a straight squared rim; the body is completely covered by thin grooves (**Fig. 26: 6**). The shape and fabric of this amphora seems to match the so-called Mafjar ware (Pella: Walmsley 1995: ware 7, fig. 5, n.3; Al ʻAqabah: Whitcomb 1989: fig. 5, K; Capernaum: Loffreda 2008: ANF 49 type). These *comparanda* suggest, an 8th century AD date for the second phase, although some vessels could be dated to the early Abbasid period (*e.g.* Red Painted Orange ware with or without buff slip as well as Pale Ware).

The upper levels of Trench 6 contained one body sherd and one handle, which probably relate to the handmade medieval coarse ware (12th-14th century AD) and one fragmentary wheel-made lamp in common ware, the shape of which matches the glazed lamps with long nozzles (Avissar and Stern 2005: 126, fig. 52, n. 5-6 "12th-14th century AD"). It is not possible to define these few sherds as a proper phase of usage.

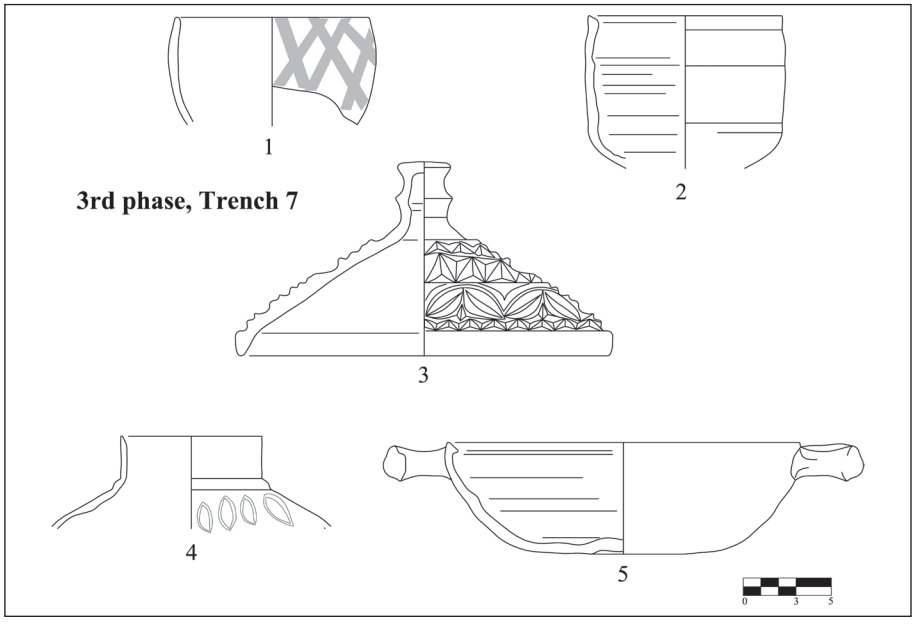
Trench 7

4.450 sherds, 217 of which are identified as diagnostic, have been retrieved from Trench 7. In this trench, three distinct phases were identified. In the first phase, the ceramic assemblage shows mainly the same composition as the phase 1 assemblage of Trench 6 with a medium quantity of "red and brown washed ware". Of note are one complete profile of a bowl in Eastern Sigillata A, Atlante 22 (2nd century BC to 10th century AD) and one sherd of thin walls ware with rouletted decoration.

In the second phase, the assemblage is composed by O-RW, LGW and LBH and LGH basins; one sherd of white painted Jarash bowl and one sherd of Jarash Red Slip ware with a stamp decoration, which is possibly residual (Uscatescu 1995: 374, stamp 1; Uscatescu 2001: 611-612). This phase dates from the 7th to the 8th century.

The third phase is the main phase of Trench 7. It represents the most common early Abbasid-period domestic assemblage and dates to the early 9th century. The Red Painted Orange Ware (RPOW) category contains one complete profile bowl with red painted cross-hatch, another bowl shows a similar fabric and shape with straight body and rim, but without any decoration. This type of vessel was most likely made in Jarash in the late Umayyad-early Abbasid period (**Fig. 27: 1-2**) (Gawlikoswski 1986: 117, plate XII.).

The most outstanding vessel retrieved from the trench is a complete Cut ware lid (**Fig. 27: 3**) (Macellum: Uscatescu 1996: fig. 108, n. 754-755; Temple of Zeus: Bessard



27. Trench 7 ceramics assemblage (3rd phase) © LAJP.

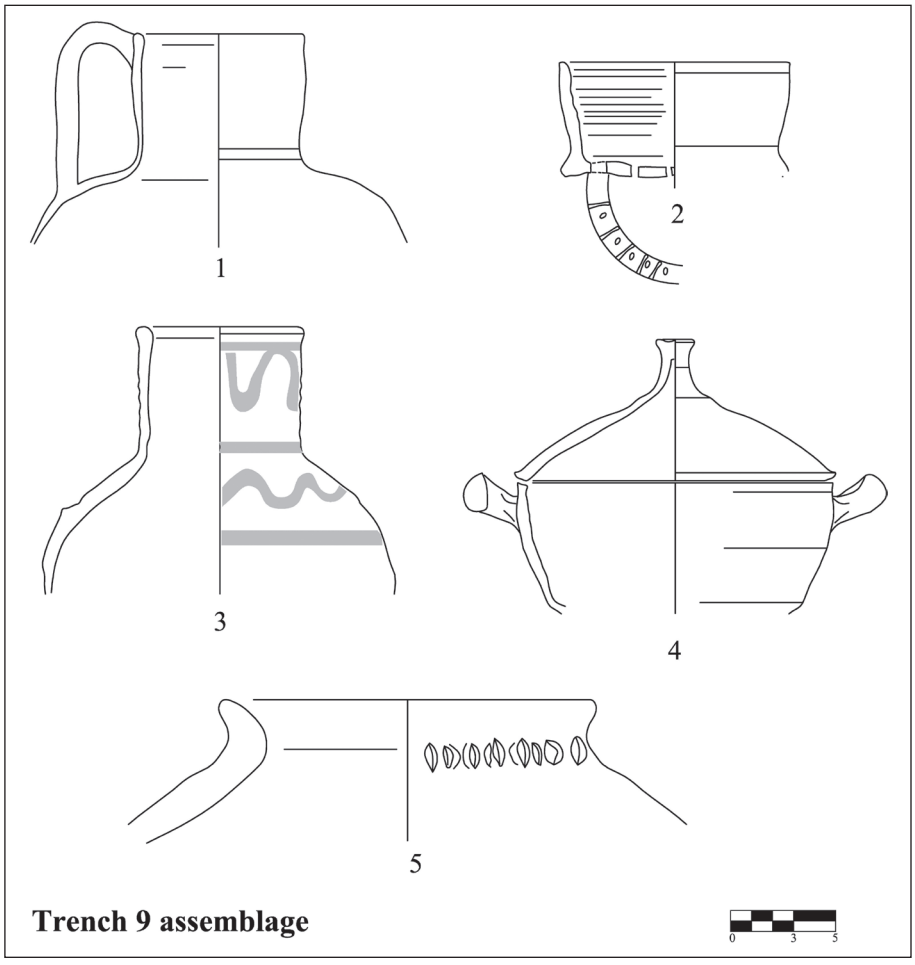
2013: fig. 14; Rujm Al Kursī: ‘Amr 1990; Pella: Walmsley 1995: fig. 9, n. 6; KHirbat Al Mafjar: Whitcomb 1988: fig. 1, period 2, fig. D; Tiberias: Stacey 2004: 94, fig. 5.8). The fabric colour is red-orange with scattered tiny inclusions of grit; the body is truncated cone shaped with a straight rounded rim. The cut decoration is the peculiar feature: it is made of cut triangles overlapping in three lines with cut petal-shaped lines in the middle. The decoration is very well made, the carving work is deep and accurate, which would probably have increased the vessel’s fragility. Two sherds of grey fabric cut ware were found in this context but they do not display the same high quality of carving.

The discovery of an eggshell ware jug with cylindrical neck and straight rim is equally remarkable; the fabric is very fine, whitish in colour, with no clear inclusions are visible (Walmsley 1995: ware 18). The shoulders are decorated with incised oval patterns (**Fig. 27: 4**). The cooking ware assemblage contains a complete casserole with an inward cut rim, hemispherical body, concave foot and ear-shaped handles. The fabric features appear quite different from the Byzantine-Umayyad cooking ware (**Fig. 27: 5**). In particular, the body walls are thicker, the fabric contains numerous large and medium-sized lime and quartz inclusions that are noticeable to the touch (Walmsley 1995: Ware 13A, fig. 8, n. 6).

From the same context it is also important to highlight the discovery of an almost complete “kiln waste” jug showing white painted decoration on the body, on the handle and on the rim.

Trench 9

The excavation of Trench 9 revealed a sealed context, corresponding to a single room. The ceramics assemblage comprise eight nearly intact vessels dated to the Abbasid period. Alongside these vessels, only 343 tiny sherds were found. The vessels are mostly in a fragmentary state and are in need of restoration (**Fig. 28**). **Table 2** summarizes the main features of each vessel.



28. Trench 9 vessels © LAJP.

Table 2: Summary of the ceramic phases for LAJP 2017.

Vessel number	Fabric description	Shape description	Chronology
1 (Fig.28,1)	Cream ware. Very fine, colour white tending to green, scattered tiny voids.	Jug, only upper and lower half preserved. Flared neck with indistinctive rounded rim, cylindrical handle running from the rim to the shoulder. Short ring foot.	Abbasid period- (9th cent.)
2	Completely burned, impossible to describe the fabric feature.	Intact lamp, channel type, almond shaped decorated with scrolls, grape clusters and birds (Scholl 1986, group VI) .	Abbasid period- (early 9th cent.)
3 (Fig.28,2)	Completely burned, probably buff tending to green.	Filter jug, only the upper part is preserved. Flared neck, indistinctive rounded rim. The filter has radial carved lines. The lower part is not preserved and the clean break on the base of the neck is probably indicating a second usage of the broken jug.	Abbasid period- (9th cent.)
4 (Fig.28,3)	Completely burned, probably red fabric white slip.	Jug with cylindrical neck and indistinctive rounded rim, ovoid section handle running from the rim to the neck. Red painted decoration: straight and wavy lines.	Late Umayyad-early Abbasid (mid 8th-early 9th cent)
5 (Fig.28,4)	Red fabric, many medium lime inclusions; scattered tiny quartz inclusions.	Casserole with inner cut rim; ear-shaped handle, curved body, convex base. White painted decoration on the handles.	Umayyad-Abbasid? (7th-early 9th cent. ?)
6 (Fig.28,4)	Red fabric, many medium lime inclusions; scattered tiny quartz inclusions.	Lid with cut rim; hemispherical body, cylindrical handle. White painted decoration on the body. The lid matches perfectly with the casserole.	Umayyad-Abbasid? (7th-early 9th cent.?)
7 (Fig.28,5)	Light-grey/brownish fabric, handmade, common medium lime inclusions; many medium voids.	Pithos, round inner-folded rim; globular body; flat base; finger print decoration on the short neck. Multiple handles. Medium size.	Umayyad-Abbasid (mid8th-9th cent.)

Trench 8

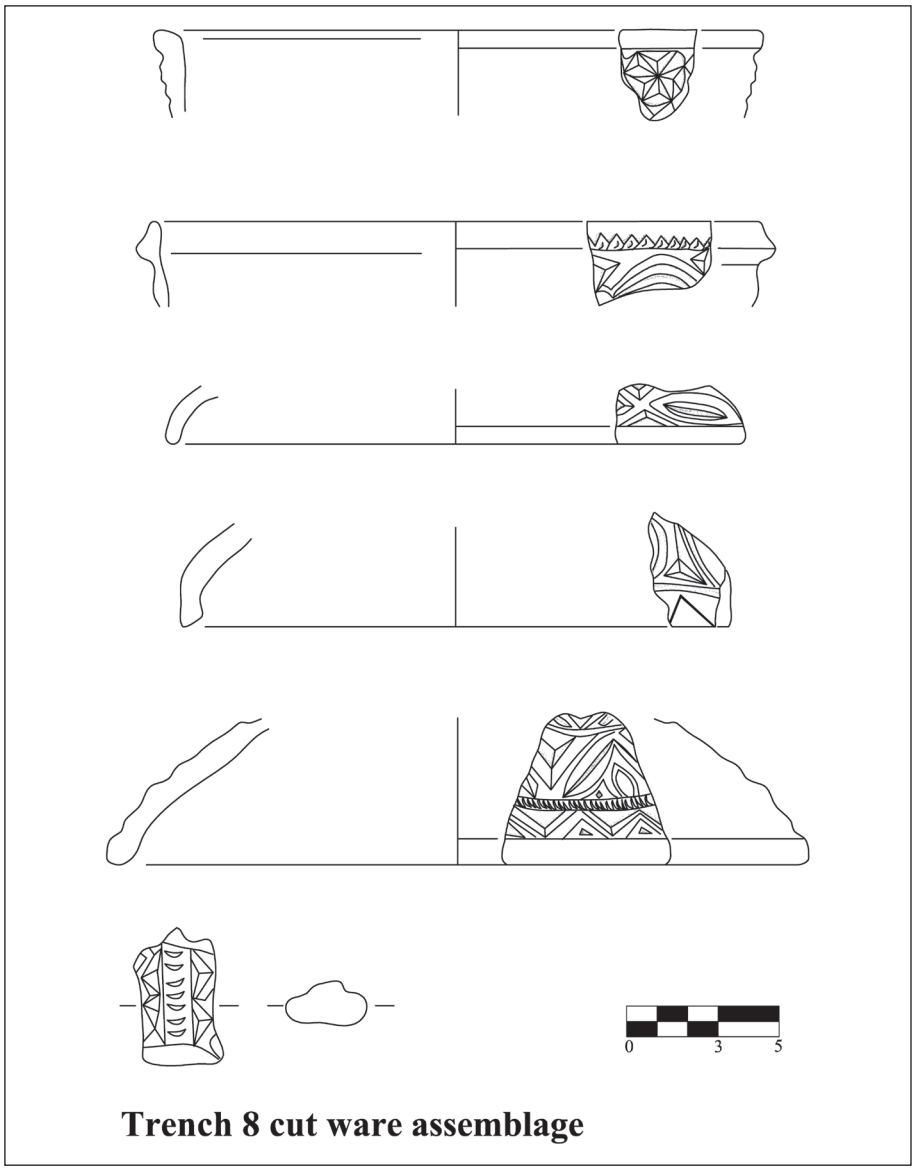
The excavation of Trench 8 revealed a considerable amount of pottery. Due to time constraints only three *loci* were processed, but combined, they contained twice the amount of the entire assemblage from any other trench (11,584 sherds; 376 diagnostic). The composition of the assemblage suggests that the area was an enormous pottery dump in the Abbasid period. From this assemblage it is worth highlighting the (at least) 15 different shapes of cut ware vessels (lids, bowls and pans) in both red and grey fabric (**Fig. 29**). It is also important to bring attention to a high percentage of kiln waste vessels (119 different shaped sherds), which may suggest the presence of nearby ceramic production. Further work needs to be undertaken in the next season in order to complete the pottery processing and analysis of the material from Trench 8.

Archaeobotanical Analysis

Archaeobotanical analysis has the potential to inform upon a range of research questions including diet, agriculture and trade. Very limited archaeobotanical analysis has taken place within previous excavations at Jarash (French unpublished on results from the Islamic Jarash Project), hence a programme of archaeobotanical analysis was instigated in the 2017 season of the LAJP. Archaeobotanical analysis at Roman, Late Antique and Islamic sites in the Middle East is generally rare (Lev-Tov 2003; Neef 1997). However, a recent archaeobotanical study at Petra and environs has indicated the potential for such research in this region (Bouchaud *et al.* 2017; Ramsay and Smith 2013). Archaeobotanical data can contribute to debates on the increase in agriculture in the Late Antique period (Ramsay and Smith 2013), and the intensification of agriculture and introduction of exotic crops in the Islamic period (Watson 1983).

Methodology

Soil samples were taken (0.5-19L) from a range of *loci* excavated in 2017. The sealed destruction deposit in Trench 9 was a focus



29. Cut ware vessels from Trench 8, locus 2 © LAJP.

of intensive sampling. Soil samples were processed by bucket flotation, using 0.25mm flot mesh and a 1mm residue sieve. Flots were assessed in the field using a low power binocular microscope (×40) and residues were sorted by eye. Preliminary identifications have been made utilizing the reference collection at the School of Archaeology, University of Oxford. Sub-samples were taken with a riffle box and then multiplied up, as presented in **Table 4**.

Results

A total of 38 samples were processed during the 2017 season, along with hand collected material from 7 *loci*. Charred plant remains were recorded in numerous samples. Traces of mineralized material was present in Trench 6 *locus* 10 –an ash deposit within Room A that also contained fish bones and an oil lamp. Given the calcareous geology at Jarash, there is strong potential for further mineralized material to be recovered. A range of charred cereals, pulses, fruits and weed seeds were identified, at generally low densities (1-5 items/L), which is reflective of other sites in the region, such as the area around Petra (Ramsay and Smith 2013). The structure in Trench 9 produced exceptional charred storage deposits of cereals, pulses and fruits. Initial assessment results are here summarized by period.

Trench 5

Seventeen samples were assessed from Trench 5. Taxa included barley (*Hordeum* sp.)

(*locus* 43), olive stones (*Olea europaea*) (*loci* 32, 42, 43, 45, 55, 56), grape (*Vitis vinifera*) (*locus* 38), fig (*Ficus carica*) (*loci* 51, 60), pulses (*loci* 38, 43, 47, 51) and weed seeds including *Silene* sp. (*loci* 32, 51). No cereal chaff was present in this or any other square.

Trench 6

Three samples were assessed from Trench 6. Olive stones were present in *locus* 8 and 10. Numerous fish bones and traces of mineralised insect eggs were present in *locus* 10, indicating a midden/faecal deposit.

Trench 7

One sample was assessed from Trench 7, which contained no charred plant remains.

Trench 8

Seven samples were assessed from Trench 8. Olive stones were present in *loci* 4, 7, 8, 15. Also present in *locus* 15 were barley grains, fig, and pulse seeds.

Trench 9

Given the presence of abundant charred plant remains in *locus* 10, *locus* 12 and 14 were split into *ca.* 50cm square areas for spatial sampling. One deposit of 100s of charred barley grains was present in *locus* 14, Area 1. Initial observations showed the grains to be hulled, and weed seeds were present. *Locus* 14, Area 2 produced a mixture of 100s of barley and wheat grains (*Triticum* sp.). *Locus* 10 produced numerous (100+) cultivated pulses, probably lentils (*cf. Lens*). Two intact dates (*Phoenix dactylifera*) were recovered from *locus* 14. This material will be the focus of detailed laboratory study and radiocarbon dating.

Results by Period

Samples from *loci* which have been assigned a preliminary chronological phase are summarized in **Table 3**. Cereal grains are present in all period –include *Hordeum vulgare* (hulled barley), *Triticum* sp., including *Triticum cf. dicoccum* (emmer) and free-threshing (*T. aestivum*/*durum*). No cereal chaff was recorded in any periods indicating that crop-processing was not taking place in this area of Jarash. *Olea europaea* (olive) was present in the Hellenistic, Early Roman, Late Antique and Late Antique/Early Islamic I periods. *Ficus carica* (fig) was present in the Early Roman, Late Antique, and Late Antique/Early Islamic I period. *Vitis vinfiera* (grape) was present in Hellenistic II. A range of pulses are recorded in all periods–usually *Vicia ervilia*, and a substantial deposit of lentils in Trench 9.

Preliminary analysis of samples from Trench 9 (**Table 4**) has shown that there are two major deposits, one containing an abundance of lentils, alongside small quantities of *Triticum* sp. grains. In Trench 9, Area 3, cereals are the main crop, mainly barley grains and wheats, with small quantities of bitter vetch. Many of the cereals are badly preserved, having been charred at high temperatures. The stored crops of lentil and barley were both clean, with very small quantities of cereal chaff and a few weed seeds (*Malva* sp., *Rumex* sp.). Two intact charred dates were also preserved.

Discussion

This preliminary study has indicated the successful retrieval of charred plant remains from Jarash. The identification of a range of cereals, fruits and pulses indicates the continuation of crop repertoire from the Roman to Islamic period, as highlighted elsewhere in the region (Farahani 2018). Fig and grape have so far not been recorded in the Abbasid period. No Islamic exotic imports have yet been recorded, and few weed seeds are present with which to evaluate the Islamic agriculture revolution (Watson 1983). The insights from the structure in Trench 9 indicate the storage of cereals and pulses within the structure. Along with wheat, barley, and dates, a store of lentils was recorded. Excavation of the rest of this structure will shed light on the range of food stored within a domestic structure in the Abbasid period.

The crop spectrum recorded at Jarash is comparable to that recorded elsewhere in Jordan. At Al Lajjūn on the Limes, barley, pea, lentil, grape and olive were recorded in the Roman period (Crawford 1987). In southern Jordan at Bīr Madhkūr in the desert hinterland of Petra a similar range of crops was recorded in Late Antiquity, including fig, olive, grape, millet, barley, free-threshing-wheat (Ramsay and Smith 2013). From Petra itself, free-threshing

Table 3: Assessment results from the LAJP 2017. Only includes samples with charred plant remains present. + = 1-5 items, ++ = 6-10 items, +++ = >10 items.

Sample	Trench	*Locus*	Period	Cereal Grain	Cereal Chaff	Olive	Fig	Grape	Pulse	Weed
29	5	38	Hellenistic II	+		++		+	++	
31	5	55	Hellenistic II	++		++				
32	5	56	Hellenistic II			+				
-	5	11	Early Roman			+				
49	5	16	Early Roman	+						
-	5	18	Early Roman	+		++	+		+	
30	5	42	Early Roman			++				
8	8	15	Early Roman?	+		++	+		+	
22	5	32	Late Antique			+				+
28	5	60	Late Antique	+		+	+			
17	5	47	Late Antique/ Early Islamic I	+					+	+
16	5	49	Late Antique/ Early Islamic I			+				
18	5	51	Late Antique/ Early Islamic I	+			+		+	+
11	5	43	Early Islamic II	+		+			+	++
2	5	22	Early Islamic II						+	
-	5	27	Early Islamic II						+	
6	8	4	Abbasid	+						+
-	8	4	Abbasid			+				
+	9	10	Abbasid	+++	+				+	
33	9	12.3	Abbasid	+++						
41	9	12.2	Abbasid	+						
20	9	14.1	Abbasid	+					+	
19	9	14.2	Abbasid	+++						
23	9	14.3	Abbasid	+++					++	
21	9	14.4	Abbasid	++						
3	6	6	Post-Abbasid?							+
7	6	8	Post-Abbasid?			+				
4	6	10	Post-Abbasid?			+			+	+
-	5	17	Medieval			++				

wheat, barley, lentil, pea, fig, olive, grape and date were the main taxa recorded from the 2nd century BC to the 5th century AD (Bouchaud *et al.* 2017). A recent detailed study from DHībān, to the east of the Dead Sea has also shown a continuity in crops from the Iron Age to the Middle Islamic period, with the main crops being free-threshing wheat, emmer, barley, lentil, grape and bitter vetch (Farahani 2018).

Other Islamic period archaeobotanical studies are rare. Limited data from Umayyad period Ṯabqat Faḥl (Pella), to the north-west of Jarash in the Jordan Valley indicated the presence of 2-row and 6-row barley and pistachio (Willcox 1992). At Tall Ḥisbān, samples from the Iron Age to the Islamic period showed the continued cultivation of wheat, barley, lentil, fig, grape, olive and bitter vetch in all periods (Gilliand 1986). Given the small dataset currently available from Jarash, the picture of continuation in the main crops through time holds.

Given the presence of albeit generally low densities of charred plant remains, further sampling with increased sample size has the potential to inform upon key aims of the LAJP, and enable wider comparisons with other urban sites in the region.

Copper Coin Conservation in Jarash

Conserving coins, as opposed to other types

Table 4: Quantified data from Trench 9. Samples only analysed to 1mm.

	Sample	**20**	**21**	**23**	**41**	**19**	**26**	**14**
	Context	9.14	9.14	9.14	9.12	9.14	9.14	9.10
	Area	Area 1	Area 4	Area 3	Area 2	Area 2		
	Fraction	1 mm	1mm	1mm	1mm	1mm		1mm
	Volume/L	3.5	5.5	5.5	5	3	Hand-picked	10
Triticum sp. (grain)	Wheat			196	4	115		49
cf. Triticum sp. (grain)	Wheat	1	6	5				
Hordeum sp. (grain)	Barley			79		30		24
cf. Hordeum sp. (grain)	Barley	2	2					
Cereal indet. (grain)	cereal			300	2	66		64
Cereal indet. (culm node)	cereal							8
Lens culinaris	Lentil							899
Phoenix dactylifera	Date						2	
Malva sp.		1	3	4	1			
Rumex sp.				4				
Vicia ervilia	Bitter vetch	3						
cf. Vicia ervilia	Bitter vetch			8				
cf. Juncus clusters			6	8				
Large Poaceae indet.				12				
Seed indet.				4				24
Pulse indet.				4				

of archaeological objects, present a challenge due to the dual character of coins: coins are considered documents as well as objects with a materiality to be studied. The choice of conservation procedure depends on an array of factors: priorities set by the archaeologists, the objects' state of preservation, human resources (training and experience of the conservator), accessible technical facilities and interwoven into this: funding and time[2].

Priorities and Time: Cursory Cleaning and Selection for Conservation

The initial wish expressed by the director was, unsurprisingly, to have *all* coins conserved. As time is always scarce during a work campaign the following strategy was developed to optimize the outcome of the conservation effort: all coins were initially cleaned cursorily to establish whether further cleaning would provide readable surfaces. Based on this initial cleaning, the coins were then divided into two groups: a) the "promising" coins and/or coins from particularly significant contexts and b) the "not promising" coins.

During two weeks of conservation, 51 coins retrieved by the LAJP from 2015-2017 (of a total of 83), were lightly cleaned to evaluate their potential. Of 40 promising and/or high priority context coins, 33 coins had optimal cleaning done. 7 promising coins will be cleaned during next season and the remaining 11 coins were either too worn, fragmented or corroded to carry any legend.

State of Preservation: The Basics of Copper Corrosion and Where to Find the Surface

All coins retrieved by LAJP in 2015-2017 were struck of copper (or copper alloys). They are treated as copper coins even though they might contain small amounts of zinc, lead and tin. In Jarash, the corrosion products range from a thin and even patina to thick, bulky and porous layers of corrosion disguising and sometimes destroying the legend of the coins. The corrosion crust may –even on an individual coin– vary in thickness and state of preservation. This phenomenon, described

2. The author is greatful to Jettie van Lanschot, M. Sc. in Conservation, Ass. Professor Emerita, School of Conservation, Copenhagen for supplying relevant literature and sparring.

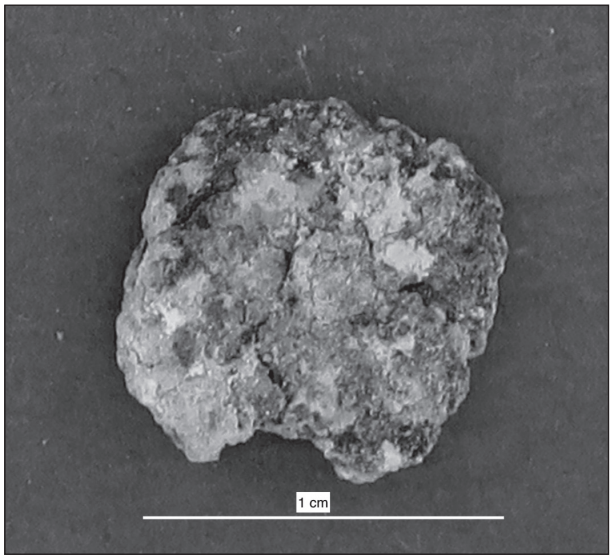
as pitting corrosion, results from the uneven distribution of highly aggressive components in the ambient soil, such as chlorides, which may derive from the dense human activity in Jarash.

Corrosion is an electrochemical process degrading metals and attacking at the surface of metallic objects. The metallic copper meets water and air (oxygen) and oxidizes. In this process it also reacts with –and incorporates– elements from its immediate surroundings *e.g.* salts and sand particles. The border of this degradation process is moving inwards from the surface of the coin towards the core of the object. Corrosion also spreads along cracks and micro fissures inside the object. When the metal reacts chemically with its surroundings it forms new combinations, which are bigger and more porous than the uncorroded metal (**Fig. 30**).

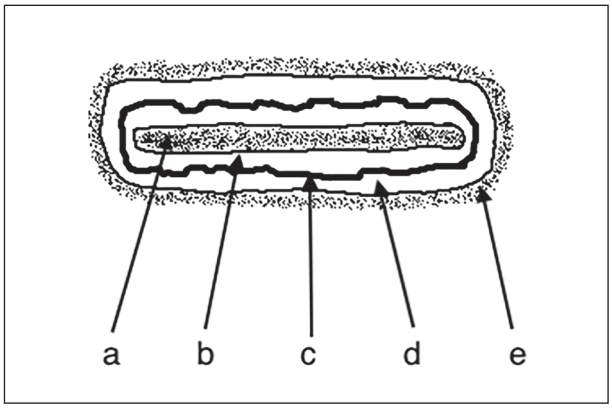
On copper alloys, as found in the Jarash coins, the corrosion layer close to the metallic surface consists of a dark brown to orange, compact cuprite, copper(I) oxide, Cu_2O. In the outer bulky, porous, green layers, the corrosion products *e.g.* copper carbonate hydroxide, malachite, $Cu_2CO_3(OH)_2$, tend to embed elements from the ambient soil, very often lime, sand and organic particles (Selwyn 2004: 64-65).

In the frequent presence of *salts* (chlorides) a bright, greyish, greasy copper(I) chloride, nantokite, CuCl, is formed directly at the metallic surface of the coins. When CuCl meets water (or a relative humidity higher than 40%) it oxidizes into the powdery, light green (par) atacamite, $Cu_2Cl(OH)_3$, known as "bronze disease" (**Fig. 31**) (de Ryck 2007: 32; Selwyn 2004: 66-68; Thickett 2016: 183).

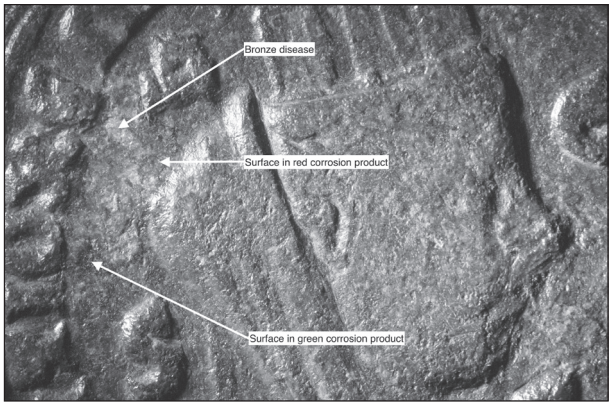
The supposed surface of the coins is therefore a corrosion feature to be found within the corrosion layers. Optimal cleaning aim to find precisely *the* spot in the corrosion layers which best resembles the original surface *i.e.* which reveals the best impression of the supposed original surface of the coin when it was in use. Sometimes the best impression is to be found in the copper oxide, sometimes in the copper carbonates, sometimes it is corroded away (**Fig. 32**) (Bassett and Chase 1994: 71). The volume change involved when copper turns into copper(I) oxide is moderate. Therefore, the corroded features stay relatively unchanged when kept in this orange-brown corrosion product (Gettens 1964: 6).



30. Bulky corrosion and corrosion in cracks. LAJP Trench 2, Locus 14, Field Object 7.



31. Corrosion layers: a) sound metal, b) cuprite, nantokite, c) best impression of original surface, d) malachite, cuprite, (par)atacamite, e) soil minerals, accretions, replaced organic material etc. © Strehle.



32. Original surface kept in specs and in different corrosion levels. LAJP Trench 8, Locus 6, Field Object 5. © LAJP_ Strehle.

Experience: Cleaning Methods and Their Effects

Thirty-one conservation campaigns since 1988 in the Middle East have given this conservator the chance to revise my earlier work. I have encountered no re-corrosion on the coins previously treated despite storage conditions that in many cases have been far from ideal.

My experience is backed by two further studies: a bibliographical survey of conservation methods applied since the time of the mandate period (1920-1946) in the Middle East (Strehle 2001: 131-135), while visits to all the Syrian museum store-rooms in 2000-2001 and to the Bahrain National Museum in 2002 and 2018 have given me the opportunity to inspect the long term effect of conservation methods. The coins kept in these museums are either untreated or have been stripped from corrosion products by the use of chemical methods such as electrochemical treatment in NaOH with zinc granulate (Damascus, Hama, Homs, Al-Maara, Aleppo and Palmyra), citric acid in the form of lemons (Palmyra) or variations of electrolysis (IFAPO Damascus and Damascus National Museum). For post cleaning, if any, the conservators have applied different varieties of paraffin or Paraloid™ as a surface treatment.

The antiquarians and conservators that I interviewed as a part of my visits have the unanimous experience that none of these treatments produce stable and secured objects. They have noted (with regret) that chemical treatment removes the surface of the copper alloys. Therefore, some museums have abandoned chemical treatments of any kind (Hadad *et al.* 2007: 164; Strehle 2001: 133) and recently, stabilization procedures have been used in the region (Hadad *et al.* 2007: 163).

These personal experiences are strongly backed by the conservation literature from the 1920s onwards. David A. Scott, a leading authority on metallurgy and metal conservation, states: "Because of the difficulties in controlling reactions during chemical treatment, which may compromise the shape of an object –including details of design, tool marks, or surface finishes retained in the corrosion– mechanical cleaning remains the preferred option…" (Scott 2002: 358).

Chemical cleaning methods do, however, have some use on museum objects with only a superficial patina on top of a sound metallic core (Hadad *et al.* 2007: 163), but it is never advisable to apply onto the corroded archaeological finds retrieved from the soil. The chemical methods have until recent years been used *on coin hoards*, where it has proven otherwise difficult to separate the individual coins imbedded in corrosion products (Selwyn 2006: 317) or, when separating the coins is thought to be too "time and labour-consuming…" (Viljus 2013: 33-39).

Research by David Thickett and Celestine Enderly at The British Museum, Department of Conservation, has verified a series of drawbacks to using chemicals for removing corrosion products: *e.g.* metal is lost to the cleaning solutions (Thicket and Enderly 1997: 185). After treatment, an increase in porosity of the metallic microstructure is observed. This presents a danger for future corrosion. The researchers also noticed, that the copper alloy loses its alloyed metals such as lead (Thickett and Enderly 1997: 187). These changes are not visible to the naked eye but are detectable with high-resolution methods such as scanning electron microscopy with energy dispersive x-ray analysis (SEM-EDX) and x-ray fluorescence spectroscopy (XRF) (Thickett and Enderly 1997: 184). Thereby, the chemical changes lead to a false picture of the composition of the copper alloys.

An alternative to chemical cleaning techniques is electro-chemical (*galvanic*) cleaning. Electro-chemical methods can involve alkaline solutions - such as NaOH - as electrolyte and a less noble metal –such as aluminium or zinc– which serves as an anode (Selwyn 2006: 318). Electro-chemical methods with sacrificial anode material have been used at museums since 1887 and were abandoned by professionals on finds retrieved in excavations since the 1970s, when more informed methods evolved (Appelgren 1896: 33-35; Scott 2002: 353-358, 368). The electro-chemical methods suffer from the same drawbacks as the chemical methods (Scott 2002: 354). Additionally, aluminium –or zinc– (according to the anode used) will precipitate at the surface of the coins (Thickett and Enderly, 1997: 187). Copper

alloys treated in the past with sodium-based solutions now present new corrosion problems, because of reactions involving the copper alloy and the residual sodium ions (Selwyn 2006: 317). Therefore, chemical –as well as electro-chemical methods– are shown to be destructive and will hamper future archaeometric studies such as investigations into alloy composition.

When dealing with hoards or coins in large quantities, excavators and numismatists with a focus on coins as documents, can be tempted to save time and turn to these destructive methods for their immediate effect on the better-preserved coins (Schultze 2018: 195-196). Chemicals cannot distinguish corrosion above the original surface from corrosion under this level. For that reason alone, no "quick fix" chemical cleaning is advisable. Only a cleaning method of a *mechanical* nature can reveal the shape and surface, which best represents the original appearance of the object without destroying the material information embedded in the coins (Bassett and Chase 1994: 64; Scott 2002: 358; Selwyn 2006: 317).

Experience: Stabilization Methods

Cleaning alone is seldom valid as the sole treatment: Coins found in soil tend, if left untreated, to suffer from bronze disease *i.e.* to re-corrode after excavation and cleaning (Selwyn 2004: 66). Therefore, it is neither sufficient, nor ethically acceptable, to stop the conservation treatment as soon as the coins are deciphered. The conservation method must address the survival of the alloy as such. Accordingly, a stabilization regime must be set up for the long-term safe keeping of the coins. This includes *chemical* as well as *physical* stability.

Since 1967 it has been possible to enhance the *chemical stability* of copper alloys by applying the corrosion inhibitor benzotriazole, BTA (Rahmouni 2009: 5215; Scott 2002: 376-377). The inhibitor neutralizes the otherwise aggressive chlorides still sitting in the corrosion crust on a coin, which has been cleaned to the best impression of the original surface. Using a 3% (weight/volume) solution BTA in ethanol is still considered the most effective inhibitor (Scott 2002: 380). Methods of application vary: from brushing at room temperature to immersion in vacuum (Hadad 2007: 163-164; Scott 2002: 379; Watkinson 2010: 3332-3334).

For *physical* strengthening and protection against oxygen- and humidity-induced corrosion, a 5-15% (weight/volume) solution Paraloid B72™ (Acryloid B72™ in the U.S.) in organic solvents is standard procedure. The coating further acts as a barrier against the poisonous BTA (Scott 2002: 380; Watkinson 2010: 3328). In the recent years, as formal training of conservators has spread, these procedures have come into use in the Middle East (Argyroupoulos 2007: 3-5; Hadad 2007: 163-164).

Methodology: How to Find the Surface and How to Preserve the Coin

To meet the dual goal of finding the best impression of the original surface and preserve the coin, I followed a three-step conservation regime at this LAJP campaign as well as in my previous involvement with University of Copenhagen's Islamic Jarash Project (IJP):

(1) mechanical cleaning, (2) stabilization of the chemical integrity of the coin in order to stop further corrosion and (3) securing the physical cohesion of the coin.

Mechanical Cleaning

A binocular magnification of 10×-40× *i.e.* using a stereo microscope and fibre lights (**Fig. 33**) is crucial to guide the mechanical removal of corrosion products (Scott 2002: 358-359). Cursory, exploratory, cleaning (see above) is done with slightly curved scalpels set in a flat angel against the coin. Working for 10 minutes on each coin is often enough to establish whether any detectable features are hidden in the corrosion and for a rough dating to Roman, Byzantine, Umayyad pre-reform or Umayyad post-reform (**Fig. 34**).

The next stage; removal of corrosion products to produce the best impression of the original surface is very time consuming and in Scott's wording: "The real problems begin when attempting to expose the object´s original surface, which may be preserved in a cuprite layer below outer, sometimes swollen, covering layers of basic copper carbonates and basic chlorides. These layers are often quite hard,

and the cuprite layer itself may be either very compact or sugary, which cannot be gauged without prior exploratory cleaning" (Scott 2002: 359). This stage of the cleaning is performed in steeper angles with pointed scalpels which are purpose-shaped by the aid of grinding paper (**Fig. 35**). Also brushes with a varying degree of stiffness and a small camera air blower (puffer) are needed to remove the loosened corrosion crust. If the surface is well defined, an ultrasonic dental chisel (still guided by stereo microscope) can be helpful. A finishing touch to enhance the aesthetic appearance of the cleaned surfaces is achieved by gentle use of a rotating stainless-steel brush.

33. Mechanical cleaning under stereo microscope. © IJP_ Tjelldén.

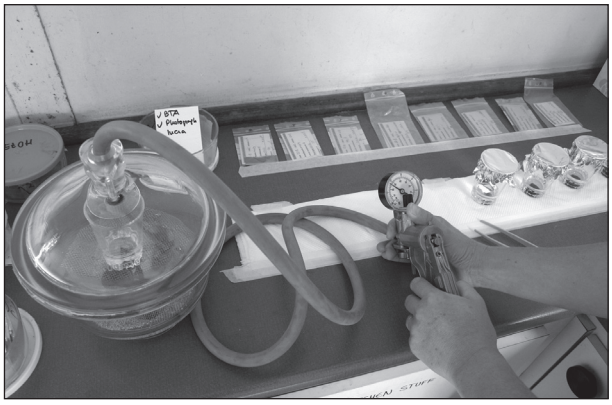
34. Cursory cleaning of coin from Trench 1, Locus 12, Field Object 9 before and after. © LAJP_Strehle.

Chemical and Physical Stabilization

Inhibiting the coins from further corrosion is achieved under vacuum, established with a hand driven pump, which can reach 65mm mercury (Hg) (**Fig. 36**). The immersion runs for a minimum of 24 hours, and is repeated if the coin, after checking in a humidity chamber, shows signs of instability or bronze disease. The coins sit in individual, labelled containers but are treated in batches (**Fig. 37**).

The final, protective treatment is applied by immersing the coins in a 15% weight/volume solution Paraloid B72™ in propanone:ethanol 3:2. This step also involves vacuum to penetrate

35. Mechanical cleaning to the best impression of the original surface. © IJP_Tjelldén.



36. Chemical and physical stabilization is performed under vacuum. © IJP_Brahe.

37. Logistics while stabilizing coins. © IJP_Tjelldén.

the micro cracks and porosities of the corrosion crust (**Fig. 36**).

Finally, the coins are stored in acid free envelopes set with tags in a polyethylene bag and handed over to the Jordanian authorities. In the housing belonging to the Jordanian Department of Antiquity at Jarash, a mobile laboratory can be set up for each season and the inventory packed up and stored between working campaigns.

Results and Future Possibilities

At this field laboratory, it is possible to conserve the coins following best practice and revealing their features without compromising the integrity and future research potential of the coins. Analysis of copper alloys, which have not been subject to chemical treatment, has thus allowed composition-based categorization according to date and function (Arafat *et al.* 2013: 264-269). Technology, provenance and trade are further areas of future research (Watkinson 2010: 3310).

The long-term effect of the conservation procedure has been monitored for three decades and proven effective. Given the possibility of treating the coins at one of the permanent conservation laboratories, the same techniques for cleaning and stabilizing would be applied.

The initial sorting of coins into promising and not-promising may be eased considerably by using digitally enhanced x-ray procedures (Walmsley 2003: 124-125). It is also tempting to experiment with stereo X-ray recordings, thus producing a double picture which separates the two sides of the same coin.

The Roman and Late Roman Coins

A total of 83 objects identified as coins were found during the 2015 and 2017 seasons (although this identification is not certain in the cases of poorly preserved objects). These were all coins of copper alloy; no higher value coins were found. Of these, 51 were selected to undergo conservation procedure. As a result of the cleaning process, detailed above by Helle Strehle, it was possible to identify a small number of the coins, which are of Roman, Late Roman, Byzantine and Islamic issue. The Roman and Late Roman coins are presented here; the Byzantine and Islamic coins will be presented separately. The coins represent single losses; no hoards were found.

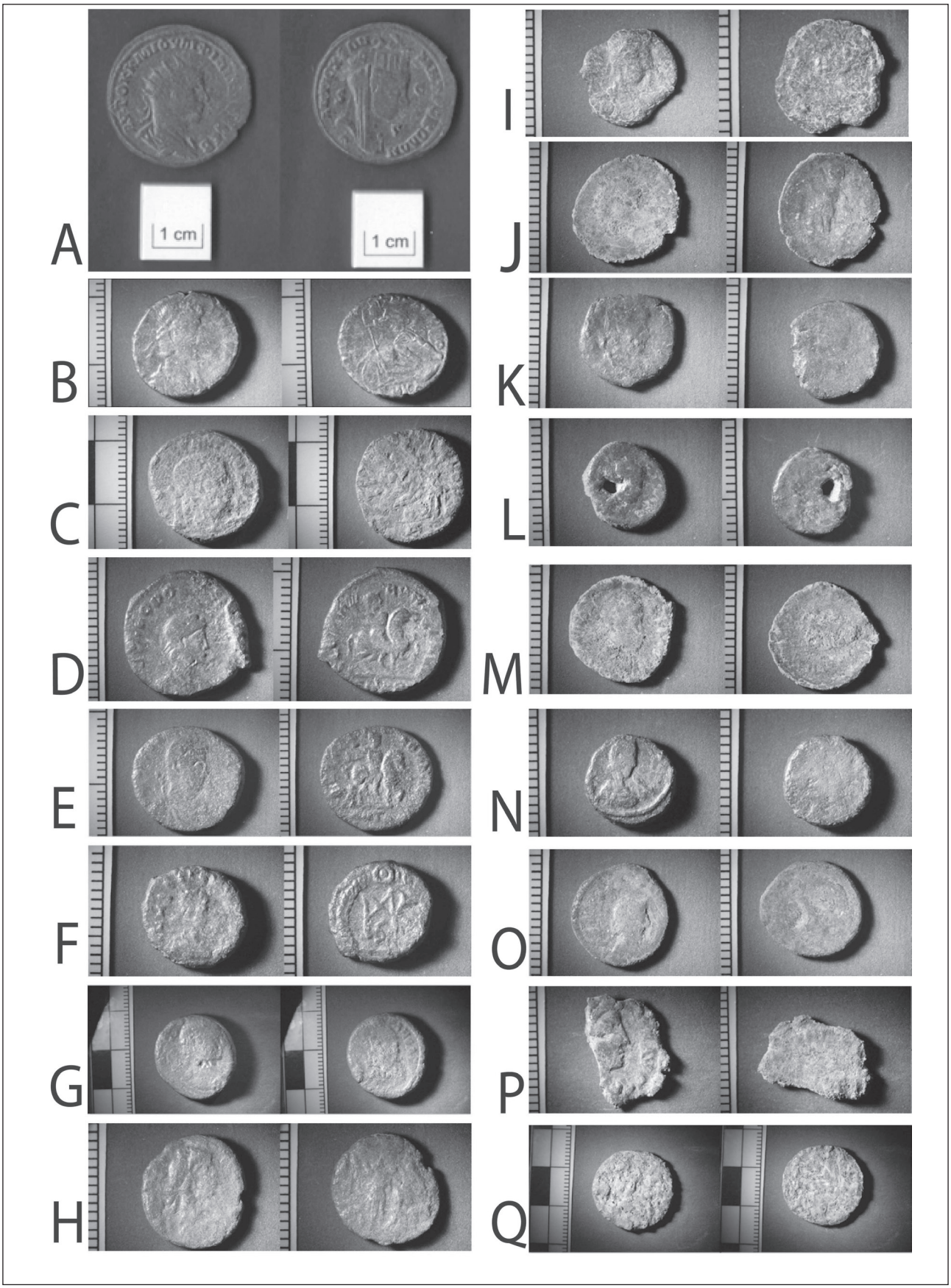
The coin catalogue is organized according to the following order:

- Field season, Trench, *Locus*, and Field Object Number.
- Denomination, ruler, mint.
- Condition.
- Description of obverse, followed by inscription.
- Description of reverse, followed by inscription.
- Diam. (in mm), weight (in grams).
- Series date.
- References (abbreviations are listed in the first section of the bibliography).

LAJP 2017 Trench 8 - *Locus* 6 - Field Object No. 5 (**Fig. 38, A**)
AE Philip I, Antioch-on-the-Orontes
Surface corrosion, worn.
Obv: radiate bust facing r. AVTOK K M IOVΛI ΦIΛIΠΠOC CEB
Rev: veiled bust with mural crown facing r. ANTIOXEΩN METPO KOLΩN; ram jumping right above, star below. In field, Δ-E S-C
Diam: 29mm, wt: 10.42g.
Series date: 244-249 AD
Ref: BMC 529-30

LAJP 2015 Trench 1 - *Locus* 12 - Field Object No. 9 (**Fig. 38, B**)
AE Constantius II, Cyzicus
Surface corrosion, very worn
Obv: Diademed draped and cuirassed bust facing r. [DN CONSTAN] TIVS [PF AVG]
Rev: Helmeted soldier facing left spearing fallen horseman to lower left. [FEL TEMP] REP[ARATI]O In Ex: SMKA
Diam: 17mm; wt: 3.03g
Series date: 351-354 AD
Refs: RIC VIII Cyzicus 92

LAJP 2017 Trench 8 - *Locus* 7 - Field Object No. 6 (**Fig. 38, C**)
AE Constantius Gallus?
Surface corrosion, extremely worn.
Obv: Bare-headed draped bust facing r. [DN FL CONST]ANT[IVS NOB CAES]. Reading uncertain.



38. Overview of Roman and Late Roman coins © LAJP.

Rev: [FEL TEMP REPARAT]IO. Falling horseman type(?)
Diam: 17-18mm, wt 3.18g
Ref: *E.g.*, RIC VII Cyzicus 94
Series date: 351-354 AD

LAJP 2015 Trench 4 - *Locus* 1 - Field Object No. 1 (**Fig. 38, D**)
AE Theodosius I, Cyzicus
Surface corrosion, very worn
Obv: Diademed, draped and cuirassed bust facing r. [DN] THEODO [SIVS PF AVG]
Rev: Mounted figure facing right raising right hand. GLO[RI]A - ROMA[N]ORVM
In ex. SMKS
Diam: 21mm; wt 2.19g
Refs: RIC IX 29
Series date: 393-395 AD

LAJP 2015 Trench 4 - *Locus* 10 - Field Object No. 42 (**Fig. 38, E**)
AE Theodosius I(?), Antioch
Surface corrosion, very worn
Obv: Diademed, draped and cuirassed bust facing r. Inscription illegible.
Mounted figure facing right, raising right hand. G[LORIA] ROMANO[RVM]
In ex. ANT[A]
Diam: 14-15mm; wt: 1.86g
Series date: 392-395 AD
Refs: RIC IX 69.

LAJP 2017 Trench 4 - *Locus* 11 - Field Object No. 15 (**Fig. 38, F**)
AE Marcian
Surface corrosion, very worn
Obv: Diademed, draped, cuirassed bust facing r. Inscription visible but not legible (DN MARCIANVS PF AVG)
Rev: Monogram (RIC 1b or 2) within wreath with S below.
Diam: 11mm; wt: 1.43g
Refs: RIC X Marcian 546
Series date: 450-457 AD

Below are coins that could not be specifically attributed but based on their few distinguishing characteristics appear to belong to the Roman/ Late Roman period. A further 23 objects identified as coins and treated by H. Strehle lacked any distinguishable surface features and were in too poor condition to merit inclusion here.

LAJP 2017 Trench 8 - *Locus* 8 - Field Object No. 8 (**Fig. 38, G)**
AE Greek Imperial
Very corroded, surface extremely worn
Obv: bust facing r.
Rev: bust facing r. Inscription in Greek letters] ANEAC[(?)
Diam: 21-22mm; wt: 10.42g

LAJP 2015 Trench 1 - *Locus* 4 - Field Object No. 6 (**Fig. 38, H**)
AE Roman/Late Roman
Very corroded, extremely worn
Obv: Laureate or diademed bust, draped, facing r.
Rev: Standing figure (possibly flanked by two other figures)
Diam: 11-12mm; wt: 0.83g

LAJP 2015 Trench 1 - *Locus* 11 - Field Object No. 8 (**Fig. 38, I**)
AE Roman/Late Roman
Very corroded, extremely worn
Obv: Laureate bust, facing r.
Rev: No discernible features
Diam: 10-11mm; wt: 0.41g

LAJP 2015 Trench 4 - *Locus* 11 - Field Object No. 18 (**Fig. 38, J**)
AE Roman/Late Roman
Very corroded, extremely worn
Obv: Bust facing r. [---]NIANVS P[F AVG]
Rev: Standing figure
Diam: 12-14mm; wt: 0.81g

LAJP 2015 Trench 4 - *Locus* 10 - Field Object No. 12 (**Fig. 38, K**)
AE Roman/Late Roman
Very corroded, extremely worn
Obv: Diademed bust, facing r.
Rev: No discernible features
Diam: 11-12mm; wt: 0.88g

LAJP 2015 Trench 4 - *Locus* 10 - Field Object No. 22 (**Fig. 38, L**)
AE Roman/Late Roman
Very corroded, extremely worn.
Perforated by a hole close to one edge, possibly

used as as pendant or decoration?
Obv: Bust facing r.?
Rev: No discernible features
Diam: 10-11mm; wt: 1.04g

LAJP 2015 Trench 4 - *Locus* 11 - Field Object No. 17 (**Fig. 38, M**)
AE Roman/Late Roman
Very corroded, extremely worn
Obv: Laureate or diademed bust, facing r.
Rev: No discernible features
Diam: 13-14mm; wt: 0.54g

LAJP 2015 Trench 4 - *Locus* 14 - Field Object No. 33 (**Fig. 38, N**)
AE Roman/Late Roman
Very corroded, extremely worn
Obv: Bust facing r.
Rev: No discernible features
Diam: 10-11mm; wt: 1.02g

LAJP 2015 Trench 4 - *Locus* 15 - Field Object No. 29 (**Fig. 38, O**)
AE Roman/Late Roman
Very corroded, extremely worn
Obv: bust facing r.?
Rev: No discernible features
Diam: 11-12mm; wt: 0.89g

LAJP 2017 Trench 7 - *Locus* 22 - Field Object No. 8 (**Fig. 38, P**)
AE Late Roman (Constans or Constanstius II or later)
Surface corrosion, worn, clipped in half
Obv: Diademed bust facing r.]PF AVG[
Rev: No distinguishable features
Max length: 14 mm (pre-cleaning); wt: 0.69g

LAJP 2017 Trench 8 - *Locus* 7 - Field Object No. 7 (**Fig. 38, Q**)
AE
Very corroded, no surface features distinguishable
Diam: 21mm; wt: 3.20g

Concluding Remarks

The results from the 2017 season of the LAJP has changed how we perceive the habitation of Jarash's southwest district. For the first time, it has been possible to document that this part of the city was in use during the Hellenistic period whereas previous studies saw mainly the Forum, the Temple of Zeus and Camp Hill as the areas of early occupation (Kraeling 1938). Although the nature of the Hellenistic period settlement in southwest Jarash requires further examination, the human remains found in Trench 5 reveals that a necropolis was found in this area prior to its reorganization in the Roman period. The ceramic evidence suggest that the water feature may already have been in use in pre-Roman times, but this remains to be examined further once the excavation of Trench 5 has been completed. Like the rock-cut dwellings uncovered in Trench 3 and 4 in 2015, the reservoir saw a prolonged use starting with extensive quarrying followed by a reorganisation for water storage. When the reservoir went out of use, the rock-cut basin was modified perhaps for dwelling purposes, as exemplified in the discovery of a beam slot and a rope hole (see also results from Trench 3 and 4 in Blanke 2018a; Blanke *et al.* 2021).

At the other end of the chronological spectrum, the discovery of an Abbasid period occupation on the southwest hilltop has vastly expanded our understanding of the size and nature of the occupation of Jarash in the 8th and 9th centuries AD. Prior to LAJP's work in 2015, the excavations of a congregational mosque in the city centre and the residential and administrative buildings in its vicinity –including the later phases of the so-called Umayyad house– have been our only evidence for an Abbasid-period occupation of the city (see, for example, Blanke *et al.* 2011; Gawlikowski 1986; Rattenborg and Blanke 2017; Walmsley 2018). The excavations of LAJP's Trench 1, 2, 6, 7, 8 and 9 in 2015 and 2017 has revealed that not only the city's centre, but perhaps the entire southwest district (and beyond) were rebuilt after the earthquake in 749 AD. The quality of building material used (*e.g.* recycled ashlar masonry, marble slabs and moulded plaster decoration) and the assemblage of finds (*e.g.* high-quality ceramic table wares) suggest a well-off population with the ability and means to construct good quality houses designed for long-term occupation. The ceramic wasters retrieved from the excavation of Trench 8 suggest that also ceramic manufacture took place nearby and continued into the Abbasid

period.

The excavation of the burned room in Trench 9 offers unique insights into diets in the 8th and 9th centuries AD as well as excellent material for radiocarbon dating (currently in progress), which will allow us to refine our understanding of the area's chronology.

Importantly, the 2017 season brought only sparse new knowledge on the area's Late Antique history. Evidence from Trench 5, 6 and perhaps also 7 suggests a major clearing event either towards the end of the Umayyad period or after the earthquake in 749 AD, which allowed for structures and areas to be repurposed for new usage. If this interpretation is correct, we should expect to find a major dumping ground of residual material in the vicinity of the southwest hilltop.

The next season of LAJP will further our excavation of the structure examined in Trench 9 in order to study the organisation of a household as well as daily life in a residential area in the Islamic period. The excavation of Trench 5 will also resume in order to reach the bottom of the reservoir and hopefully establish more firmly its date of construction and disuse as well as resolve the question of whether it was built as a reservoir to collect water brought into the city or was the expansion of a karst system as suggested by the steps and natural cave.

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PRELIMINARY REPORT ON THE TEMPLE OF THE WINGED LIONS CULTURAL RESOURCE MANAGEMENT INITIATIVE (2014-2019)

Glenn J. Corbett and John D.M. Green

Introduction

The Temple of the Winged Lions (TWL) is a Nabataean temple complex dated to the 1st to the 4th centuries AD in the heart of the ancient city of Petra. Built on a promontory that rises above the north bank of the Wādī Mūsā (**Fig. 1**), the temple overlooks the colonnaded street and several important religious and public buildings. The temple and several areas abutting it were the focus of a long-term excavation project directed by Philip C. Hammond (1924-2008) between 1974 and 2005 as part of the American Expedition to Petra (AEP) (Hammond 1996). The temple building has an entrance flanked by columns and an inner cultic chamber (*cella*) with a raised podium. While most columns had Corinthian-style capitals, those surrounding the main podium had "winged lion" capitals, which give the monument its name. The walls and columns of the temple's inner sanctum were brightly decorated with floral and figurative designs, and recesses and niches surrounded the podium. Thought to have been built by the Nabataeans in the early 1st century AD and continuing in use through the Roman annexation of 106 AD, the temple is surrounded by structures on its west and north sides, including rooms, corridors, and spaces that Hammond interpreted as workshops. In addition, farther to the north is a courtyard structure with benches known, as the north court (**Fig. 2,** northern part of plan). The earthquake of 363 AD appears to mark the final date of the temple's use.

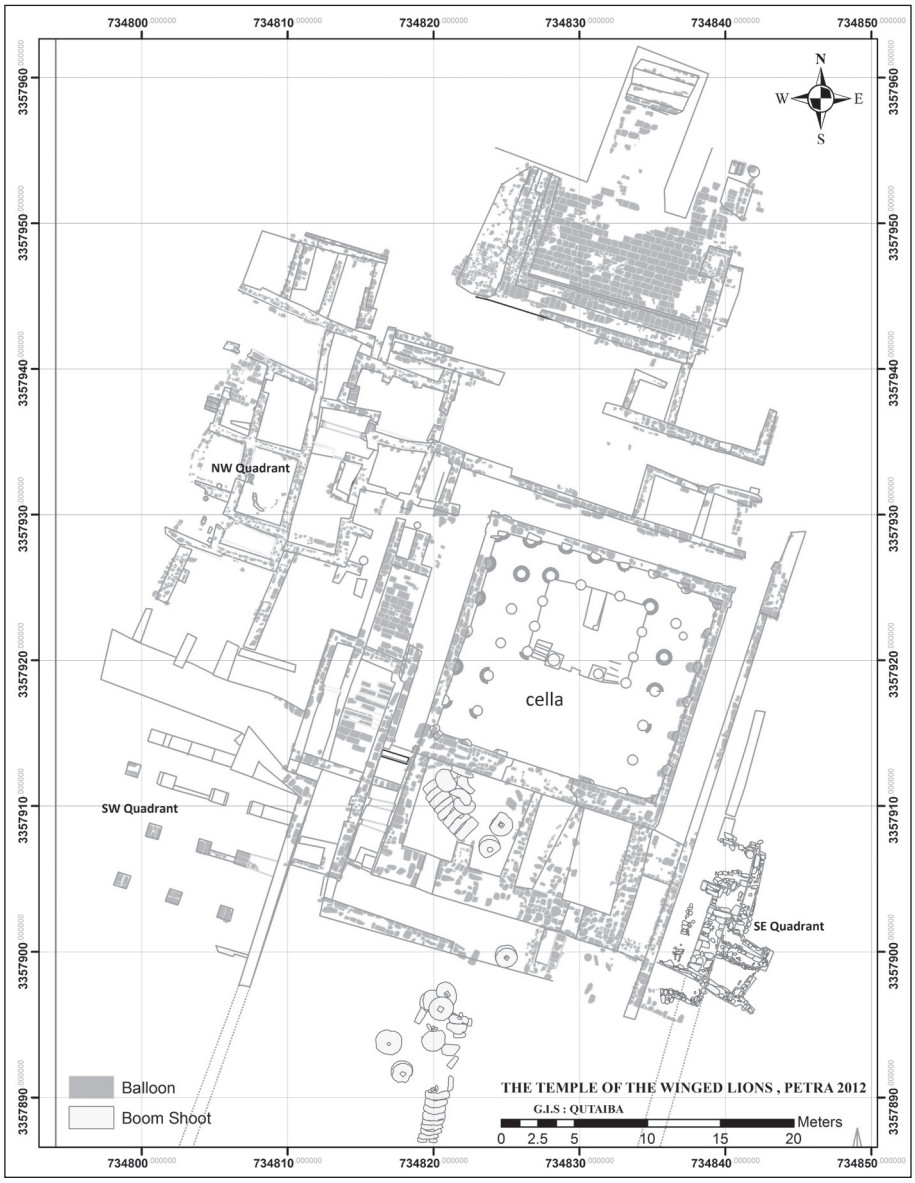
The Temple of the Winged Lions Cultural Resource Management (TWLCRM) Initiative was launched in 2009 as a cooperative project undertaken by the American Center of Oriental Research (ACOR), the Department of Antiquities of Jordan (DoA), and the Petra Archaeological Park (PAP), which is within the Petra Development and Tourism Region Authority (PDTRA). The following preliminary report presents the main activities of the TWLCRM Initiative between 2014 and 2019 (Tuttle 2013a; Corbett and Ronza 2014, 2015; Corbett 2016; Corbett and Green 2017; Tuttle, Corbett, and Ronza 2017; Green 2018, 2019a)[1].

Initiated by Christopher Tuttle of ACOR, the TWLCRM Initiative was developed with the intent of accomplishing multiple goals: (1) to stabilize, conserve, and protect the monumental temple and its precinct; (2) to rehabilitate the surrounding landscape that was adversely affected by the original excavation project; (3) to develop and implement a comprehensive presentation strategy for the temple and its environs; (4) to (re-)publish data derived from both the original excavation and the new project; (5) to help develop guidelines and manuals for different aspects of cultural resource management (CRM) work in the Petra Archaeological Park; and (6) to help build local capacity for undertaking CRM efforts as a means of increasing the likelihood that current and future work will become sustainable.

Work at the TWL was initially expected to finish in 2014−2015, yet with the identification of further emergency conservation and site presentation needs, and the availability of further funding, continued work was possible until

1. See also the winter issue of each ACOR Newsletter 2009-2019: www.acorjordan.org.

1. View of the Temple of the Winged Lions in spring 2017, following installation of the pathway and glass sign, and with the architecture in the southwest quadrant wrapped in geotextile (photo: Qais Tweissi).



2. Plan of the Temple of the Winged Lions in 2012 (surveyed by Qutaiba Dasouqi).

2018. This included completion of conservation and backfilling programs, installation of interpretative signage and pathways, and creation of a hands-on educational program. The project saw changes in management, staffing, and funding support over the past five years. In addition, there has been a focus on the preparation of archival and research materials for the TWL Publication Project, conducted largely at ACOR.

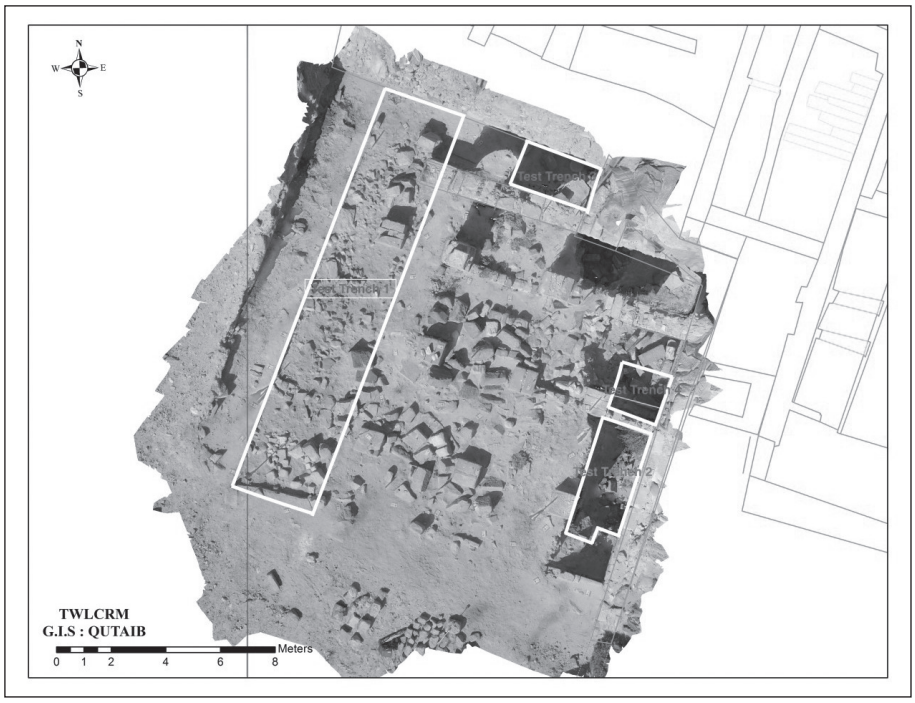
Covering the reporting period, the project directors from ACOR were Christopher Tuttle (2009 to June 2014), Glenn Corbett (June 2014 to October 2017), and Jack Green (from October 2017 onward). Elena Ronza served as a co-director until March 2017. Monther Jamhawi, former director general of the Department of Antiquities, was an associate director of the project (2014 and 2018). TWLCRM team members Eman Abdessalam and Ahmad Mowasa were employed as USAID Sustainable Cultural Heritage Through Engagement of Local Communities Project (SCHEP) site stewards and played a vital role in project delivery between 2015 and 2018. Lead conservators were Christina Danielli (2013−2014) and Franco Sciorilli (2016−2018). Giuseppe Delmonaco, engineering geologist of Institute for Environmental Protection and Research, Geological Survey of Italy (ISPRA), was a project consultant between 2014 and 2018. Allison Mickel, a doctoral candidate at Stanford University and Fulbright scholar based in Jordan in 2014-2015 (now assistant professor at Lehigh University), was the team's anthropologist from 2015 to 2018. Marco Dehner, a doctoral candidate of Humboldt University, helped document the site's *lapidarium* from 2017. Archaeologist Tali Erickson-Gini served as the project's ceramicist and archival consultant through 2015, and PAP staff members Qais Tweissi, Wajd Nawafleh, and Halemah Nawafleh, all former TWLCRM team members, provided regular support to the project throughout. The TWLCRM Initiative acknowledges contributions by Sela for Vocational Training and Protection of Cultural Heritage between November 2015 and July 2017. Sela, a non-profit organization based in Umm Sayhūn, helped develop and implement a community-based training program in site conservation and preservation at the Temple of the Winged Lions. Qutaiba Dasouqi was the surveyor for the project until 2018; his efforts resulted in the creation of new plans and contour maps. Lastly, the TWLCRM Initiative thanks the many local community team members, interns, and trainees who worked hard on this project over several years.

The site-based results of the TWLCRM Initiative presented in this report are spread across two major funded programs: firstly, funding from the US Ambassadors Fund for Cultural Preservation (AFCP) aimed towards conservation and site preservation needs (finalized in early 2017), and, from 2015 to 2018, a phase supported by USAID SCHEP that incorporated conservation training and culminated in the completion of emergency conservation of the *cella* and the southwest quadrant, as well as preparation of pathways and signage. Now that this important site is conserved, as well as safe and accessible for visitors, this brief preliminary report outlines the project's achievements and efforts over the past five years. The authors are grateful for all the support provided by donations, sponsorship, and grant funding, as well as in kind support from the Department of Antiquities and the PDTRA (see Acknowledgments).

Southwest Quadrant Excavation

Overseen by TWLCRM co-director M. Elena Ronza in collaboration with Department of Antiquities representatives Ahmad Lash and Asem Asfour, four test trenches were opened in the southwest quadrant over a six-week period during October and November 2014 (**Fig. 3**). Six students from Al Hussein Bin Talal University also took part in this excavation season. Some further small excavation and cleaning in this area took place between mid-November and mid-December 2015.

Test trench 1 (16×3m) ran parallel to the southwest quadrant's western section, corresponding with AEP subareas V.9 and V.6. In test trench 1, many large architectural fragments and building stones appeared below the present surface. Fragmentary pieces of painted plaster were found among the masonry. Based on the jumbled architectural remains and the dating of the recovered pottery, it is thought that the



3. Orthorectified boom photograph of the southwest quadrant, showing locations of excavation trenches. Note the orange lines showing the location of the west wall adjacent to trenches 2 and 4 (image: Qutaiba Dasouqi).

southwest quadrant was used as a dump when the destroyed temple above was being cleared of debris following the earthquake of 363 AD.

The ceramics from these four trenches were assessed by ceramicist Tali Erickson-Gini, who found a range of vessel and lamp types dated between the 1st century BC and the 4th century AD, generally corresponding with those found in Hammond's AEP excavations. One Islamic-era glazed pottery sherd was found during cleaning.

The ashy traces of a small fire pit with remains of animal bones and eggshell were found amid the debris of trench 1. This is interpreted as the remains of a small campfire made by workers who were salvaging building materials. Given the heavy accumulation of debris, the trench was closed in order to focus on other trenches in the southwest quadrant.

Test trenches 2 and 4 (5×2m and 2×2m, respectively) were opened in the eastern part of the quadrant, directly abutting the west wall, which bounds the temple's west stairway. These areas had already been partially excavated by Hammond (AEP subareas III.4 and III.7) and by 2014 contained silt and modern debris. Test trench 3 (2.5×1.5m) was opened on the north side of the quadrant (AEP subarea III.7). Trenches 1, 3, and 4 were only partially excavated, all revealing similar architectural debris and concentrations of painted plaster.

Only trench 2 was excavated down to natural deposits, and revealed a fuller picture of the sequence, including through its west section. Beneath the layer of heavy architectural debris encountered below the surface was a layer that had a more limited concentration of architectural debris and mostly painted plaster fragments encountered between 879.25m and 878.95m asl, mirroring the situation in trenches 1, 3, and 4. Beneath this level was a 1.2m thick general accumulation deposit containing sparse painted plaster fragments. After removing contaminated layers post-dating the AEP excavations, the excavators encountered a partially preserved coarse pavement made from irregularly shaped dry-laid stones at 877.75m asl. This coarse paving was in two layers (smaller stones overlaying larger ones) and had a compact bedding layer underneath (**Fig. 4**). Only the bedding layer, consisting of compact soil and beaten earth with small stone inclusions, was found to extend underneath the west wall (**Fig. 5**). There are indications of an ashlar block beneath the lowermost stone of the pier in the east section, which suggests that the foundations of the piers extend below the paving. A 1.0×1.0m trench within trench 2 below the bedding layer reached natural or water-laid soil. It is not clear either if the paving

over the bedding layer was truncated by the west wall and is therefore part of an earlier structure predating the temple or if the paving was simply part of the sequence of construction over the bedding layer. It appears that the lowermost course of the west wall was constructed without foundations, directly on top of the bedding layer. The foundations of the piers in the southwest quadrant were not reached. Future probes may be required to clarify the sequence, including the potential identification of phases pre-dating the temple's construction.

Geophysical Survey

In 2014, a study of the underlying geology of the Temple of the Winged Lions was undertaken by Giuseppe Delmonaco and Luca Puzzilli of ISPRA in order to assess the stability of the site and its architectural features, including the potential impact of seismic activity in past and present eras. First employed was geoelectrical resistivity tomography, which involves deploying a series of current-injecting electrodes into the ground to measure the electrical resistance of buried features relative to the surrounding geology. Secondly, active seismic tests were conducted; in these, small seismic events were simulated, sending shockwaves directly into the earth's surface. Measuring the relative velocity of the seismic waves allows information about the depth and makeup of subsurface features to be obtained, leading to a subsurface geophysical model of the site. The sandstone bedrock underlying the temple complex was found to be much farther underground than expected –approximately 30-35m below the archaeological site (862-857m asl). A minor fault line was also detected below the east side of the temple, which is furthermore the location of some of the more unstable columns, which required strengthening. The construction of the temple over a depression between two seismic faults makes the site particularly vulnerable to earthquakes. In addition, subsurface voids below the temple may explain why the exposed architectural remains are so susceptible to accumulation of moisture and are particularly prone to salt efflorescence. A topographic monitoring system was implemented from September 2014 to November 2015 in

4. The partially preserved coarse paving in trench 2 and the pavement bedding layer beneath it. West wall in foreground on right side (photo: TWLCRM Initiative, ACOR).

5. Facing east towards the west wall in the southwest quadrant built directly on the pavement bedding layer. Note that sign refers to 'East wall,' relative to trench 2's orientation (photo: TWLCRM Initiative, ACOR).

cooperation with Qutaiba Dasouqi to control further deformation of the inclined columns located in the western corridor of the temple. The results provided minor movements due to expansion/contraction of iron-rich minerals that characterize the Petra sandstone. Such deformation has been correlated with daily temperature fluctuations in Petra recorded for the same period. A further site visit by Delmonaco and Francesco Traversa of ISPRA in 2016 allowed for additional measurements and continued assessment of the site's stability. These findings have informed the direction of conservation efforts at the site: buttressing and backfilling vulnerable areas and cautioning against attempts to reconstruct walls or columns beyond their preserved heights (Corbett and

Ronza 2014; Delmonaco *et al.* 2019).

Vocational Training and Site Stewards

A key success of the TWLCRM Initiative has been derived from its focus on equal opportunities, gender-blind hiring, and vocational training aimed at providing new employment for local community members in the Petra region, in addition to sharing skills, knowledge, and experience between specialists and non-specialists. Mentorship has played an important role in the sharing of skills and best practices, as well as the development of leadership experience, project management, and stewardship skills during the course of the project. All of these skills are transferable and therefore sustainable in terms of future employment and related opportunities in archaeology and heritage preservation for local communities (see Corbett and Ronza, forthcoming; Green and Sciorilli forthcoming).

Community-based archaeology and cultural heritage preservation became an important aspect of research in its own right through project anthropologist Allison Mickel, supported by translator and interview assistant Eman Abdessalam. In 2015, Mickel documented local community team member perceptions of archaeology and heritage preservation, while experimenting with innovative recording methods aimed at capturing local knowledge and understanding.

In 2015, the non-profit organization Sela was established, receiving support through USAID SCHEP to develop a vocational training program at the Temple of the Winged Lions with a focus on long-term preservation needs in the southwest quadrant. To serve as local ambassadors for the site and the project, two site stewards were identified: Eman Abdessalam and Ahmad Mowasa, both veterans of the TWLCRM local team. The key role of site stewards was to represent the site during visits by dignitaries, schoolchildren, and tourists, while improving their own understanding of site management and preservation.

In 2016, with technical oversight by project co-director M. Elena Ronza, lead conservator Franco Sciorilli, and engineering geologist Giuseppe Delmonaco, the Sela team provided nearly 70 members of Petra's host communities with hands-on experience in essential documentation, conservation, and backfilling techniques. Workshops and training sessions carried out within a trial period enabled the selection of team members to work at the site.

The involvement of Sela ended in July 2017. TWLCRM team members, led by the SCHEP site stewards, continued to complete major conservation and site enhancements up until April 2018. An event to celebrate the completion of the work at the Temple of the Winged Lions and to award certificates of participation took place at the end of April 2018, attended by members of the TWLCRM Initiative team, the Department of Antiquities, PDTRA, USAID SCHEP and other ACOR staff, and project specialists. This was also an opportunity to gather and share in the achievements of the project, to reflect on the work conducted to date through presentations and consultation meetings, and also to identify challenges and priority areas for the future.

TWLCRM has provided the potential for new or enhanced employment opportunities for many of those who received such training. Several team members have since gained employment in cultural resource management roles within Petra and elsewhere in Jordan. Several former TWLCRM Initiative team members have gone on to be employed with the PDTRA. Sela, the local company that emerged as a result of the TWLCRM Initiative, continues to play an active role in a range of cultural heritage projects in Jordan.

In addition to practical on-the-job conservation training, the continued documentation of the site's condition, the recording of interventions, drafting of site management guidelines (with a view toward creating future manuals), and continued monitoring have been important parts of the project. Training of team members has included the analysis of the condition of archaeological areas, documentation of architecture, monitoring of vegetation, drainage, pathways, barriers and signage, and the continued assessment of the impact of salts, which are among the activities that need to continue as part of general site management procedures by the PDTRA. As the TWLCRM Initiative shifted to more targeted, smaller-scale projects in fall 2018, there were opportunities for

on-the-job training for existing and new PD-TRA staff and local trainees, enabling former TWLCRM team members to transfer skills to their colleagues (Green 2018). By the end of the site-based operations at the close of 2018, over 300 local community members had been trained in tangible vocational skills related to heritage preservation, including documentation, conservation, excavation, and landscape rehabilitation. It is hoped that the Temple of the Winged Lions can continue to be a venue for future hands-on training activities and that this example of a community-based approach can serve as a model for other projects in Jordan and beyond.

Conservation

Conservation needs at the TWL focused on critical needs in the temple's *cella* and the southwest quadrant, as well as backfilling at a number of locations around the site. The conservation season in spring 2014 helped resolve challenges faced within the temple's main cultic podium and the east wall of the *cella*. A team of seven conservation technicians, led by lead conservator Christina Danielli, cleaned encrusted salts from the sidewalls of the podium and the *cella*'s east wall. Where necessary, the team used a water-based stone consolidant, Syton X-30, to prevent further deterioration. The relatively poor condition of the podium sidewalls and the east wall required repairs using a reversible lime-based hydraulic mortar, which was tinted in a way to identify the intervention but minimize its visual impact. The *cella* podium surface, once covered with decorative *opus sectile*, was by this time a mass of eroding bedding mortar. The team carried out general surface cleaning and made mortar repairs to the platform's fragile edges. In 2015, under the guidance of junior conservation technician Ahmad Mowasa, several trainees removed further destructive salts and modern cement mortars from the sandstone walls of the temple and the southwest quadrant.

In 2016, efforts were continued by lead conservator Franco Sciorilli and senior assistants Baha' Jankhot, Khaled Wahkyan, and Marwan Jamaliah, who continued to clean the building's sandstones of embedded salts and applied layers of a reversible lime mortar between the ashlar blocks that make up the temple's walls, filling deep cavities and voids (**Fig. 6**). In addition, significant cleaning and backfilling efforts were completed for the open trenches immediately in front of the *cella* (the pronaos and spaces below), providing a stable base for the creation of future pathways that would allow safe access for visitors. By November 2016, almost all of the building's front-facing architecture, including the monumental walls of the temple's entrance and forecourt, had been conserved. This new mortar was applied so that it channels rainwater gently away from the structure. In addition, vegetation was removed and, in some cases, missing or damaged stones were replaced to improve stability and cohesion.

The prevalence of salts, three leaning columns, and exposure of the podium to the elements still required emergency conservation in the *cella*, carried out from fall 2017 to early 2018. These interventions were led by Franco Sciorilli, assisted by Baha' Jankhot, Hamza Wakhyan, and Khaled Wakhyan. Solutions included the provision of a mortar capping and a magnesium panel for the podium of the temple (**Fig. 7**), which replaced a temporary wooden cover added in the 2016-2017 season. The mortar capping includes a breathable geotextile layer over a layer of bedding mortar to help prevent the buildup of moisture from the podium. A gradient of 2 degrees allows water to flow off the podium. Further backfilling of the *cella* floor with a layer of geotextile, also at a slight gradient, has helped to improve drainage of rainwater away from the site and to prevent moisture buildup in the *cella*. In the temple's west side, two leaning columns were braced

6. Conservation training in action. Mortaring of the east wall of the cella in 2016 (photo: USAID SCHEP, ACOR).

7. Before and after the application of a protective mortar capping on the cella podium in 2017 (photos: Franco Sciorilli).

with wooden supports; a third was partially restored with an intact column drum from the *lapidarium*. As a result of these actions, the *cella* is now safe and accessible. The impact of salts on the ashlars appears to have been reduced due to these actions, although the situation within the temple *cella* continues to be monitored.

In the southwest quadrant, conservation actions began by backfilling the previously excavated areas in 2016. Following the completion of documentation, cleaning, and mortaring, all exposed architecture was wrapped with geotextile and subsequently backfilled with alternating layers of soil and rubble. A number of the already documented ashlar blocks originating from the temple and collected during Hammond's excavations were reburied in these trenches. The backfilling of the southwest quadrant continued in 2017 and was completed in the same year. The process of backfilling was informed by the geological study of the Temple of the Winged Lions (see above), leading to the use of sandbags at the juncture between the trench and the rubble slope in a stepped arrangement (2.0×2.0m along its 10.5m east-west extent) in order to provide greater stability and prevent collapse of the rubble slope. This was followed by the addition of compacted layers of fill to form a downward gradient from the northern edge of the quadrant, providing further stability for the rubble slope and assisting the flow of rainwater. In addition, backfill was added above the slope to prevent rainwater accumulation and seepage behind it. Backfilling was also carried out in the southeast quadrant in order to improve drainage.

Although much of soil and rubble for the project's backfilling efforts was previously generated through the clearing and sifting of the AEP's spoil heaps (**Fig. 8**), due to time limitations, much of the backfilling material (approximately 147 cubic meters) used in the southwest quadrant and other areas was brought onto the site from a source in Mā'an outside the Petra Archaeological Park. The fill, a fine loamy sand, was selected due to its compaction properties and lack of permeability. It is noted to have been a more yellowish color than the surrounding soil matrix. A chute was used to deliver the backfill material down the slope to the southwest quadrant below. While the arches and piers within the southwest quadrant are largely buried to protect them from collapse or damage, it was decided to leave their tops slightly above ground to allow continued

8. Landscape team members Agelah Jmeidi and Bassam Alfaqeer sifting dumped soil for backfilling in the southeast quadrant, August 5, 2017 (photo: Halemah Alnawafleh).

awareness of their presence.

In fall 2018, further consolidation was carried out on the rubble slope, which had been initially consolidated in 2017, and lime-based mortar was applied to the west wall and the upper part of a short diagonal wall between the rubble slope and the west wall. Sciorilli, Khaled Wekhyan and Marwan Al Jamaliyyah added further drainage channels to the rubble slope and, along its base, a slab-covered east-west drainage channel (**Fig. 9**) leading to a larger north-south channel was cut into the backfilled slope, which helped to improve the overall drainage in this area. Documentation, cleaning, and mortaring was assisted during this season by PDTRA staff members who served as on-the-job trainees.

Documentation

In addition to the documentation carried out during the southwest quadrant excavations, architectural and conservation documentation continued to play an essential part of the TWLCRM Initiative, particularly for the creation of elevation drawings of standing walls previously excavated by the AEP. There was also a need to carefully document the condition of the exposed sandstone walls prior to conservation interventions and backfilling.

In 2014, documentation specialist Eman Abdessalam produced elevation drawings to document walls and sections within the expansive southwest and northwest quadrants, and in 2015 she mentored team members in architectural documentation and recording techniques. As the conservation and preservation work increased in 2016, so did the documentation. Eman Abdessalam and draftsperson Halemah Nawafleh made "state of facts" drawings to record and detail the condition of walls and features. Hand drawings were made of all implemented conservation work that altered the appearance of the walls. Previously undocumented or partially documented areas (such as the walls of the temple's forecourt) became a priority as the conservation team progressed in their work. Architectural documentation continued in subsequent seasons, including the north corridor wall carried out by PDTRA staff member and former TWL team member Halemah Nawafleh, who shared skills with other on-the-job trainees in fall 2018. This leaning wall, currently supported by sandbags on its south side, was in need of assessment in anticipation of future conservation work.

The TWLCRM Initiative continued to make use of digital tools in surveying and the creation of three-dimensional models. Surveys with a total station and photo-boom documentation were conducted by project surveyor Qutaiba Dasouqi in 2012, 2016, and 2018. These have all contributed to the overall mapping of the site and surrounding landscape. In 2016, former TWLCRM draftsperson and then PDTRA employee Ahmad Hasanat finalized a 3-D AutoCAD model of what the temple and its surrounding landscape might look like after the completion of backfilling operations. TWLCRM draftsperson (subsequently PDTRA employee) Qais Tweissi also created 3-D visual renderings of the temple based on reconstruction drawings by Chrysanthos Kanellopoulos and others, which now support visitor interpretation (see "Landscape, Pathways, and Signage," below).

A commitment to combining documentation, training, and research continued through efforts to fully assess and reorganize the multiple lapidaria spread across the site. The main *lapidarium* forms a square arrangement of several hundred diagnostic architectural fragments from the temple and has developed since the time of Hammond's excavations. Following Tweissi's work in 2014 to document a large number of individual architectural fragments within the *lapidarium*, Marco Dehner, a PhD candidate of Humboldt University, Berlin, continued efforts to more fully document this

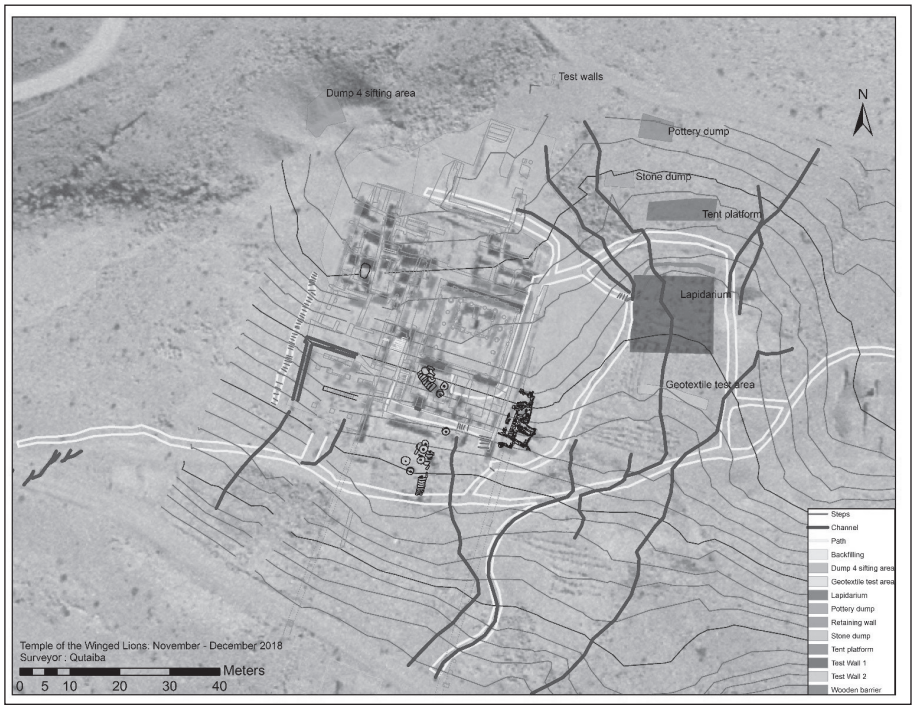
9. Southwest quadrant, showing covered drainage channel completed in December 2018 and areas of conserved walls, facing east (photo: Jack Green).

10. Photogrammetry model of the main lapidarium at the Temple of the Winged Lions (image: Marco Dehner, using photo-documentation carried out in October 2017).

area in 2017 as part of his doctoral research. It has since become apparent that the AEP had documented and published the architectural fragments from the TWL only selectively and that further documentation and publication is needed. Documentation assistant Halemah Nawafeh continued to measure and photograph the fragments. Dehner undertook an extensive rapid photo-documentation of the *lapidarium*, which resulted in a photogrammetric model that will serve as a useful tool for documentation and preparation for future conservation and reorganization (**Fig. 10**).

Mapping of drainage channels was conducted by Dasouqi as part of the fall 2018 survey to document all recent conservation interventions (**Fig. 11**). In collaboration with Franco Sciorilli and Giuseppe Delmonaco, the drainage study reveals the impact of natural channels on the hillside affecting the site. Among other areas of study, the *lapidarium* is shown to be particularly vulnerable to issues of drainage and is being considered for a longer-term project focused on training, documentation, conservation, and interpretation.

The documentation of artifacts continued to be an important aspect of the TWLCRM Initiative, with a focus on objects retrieved during sifting of the AEP spoil heaps, material encountered during the southwest quadrant excavations, and AEP objects in museum storage facilities. In 2014, documentation specialist Eman Abdessalam took final photographs of all recorded and publishable



11. Composite contour map of the TWL, showing locations of features and interventions carried out as part of the TWLCRM Initiative, including paths, steps, backfilled areas (pink), and the presence of drainage channels (blue). Note the perpendicular drainage channels in the southwest quadrant (surveyed by Qutaiba Dasouqi, December 2018).

pottery and artifacts recovered from the spoil heaps. On-site work continued throughout 2015 and 2016 with a focus on clearing and sifting dump 4. A few examples of unstratified objects encountered through sifting included a ceramic cup fragment depicting a Nabataean horned capital and a delicately carved face that likely once adorned the temple's interior (Corbett and Ronza 2015: 3), a miniature silver spoon (Corbett 2016: 3), lamps, and coins (**Fig. 12**). Abdessalam and TWLCRM intern Wiebke Lepke began re-photographing and re-registering objects recovered during the original AEP excavations housed in museum storerooms in Petra. Coins and other artifacts continued to be found during sifting operations, including during the education program. Artifacts and architectural fragments were brought back to ACOR in ʿAmmān for further cleaning and documentation, contributing to the work of the TWL Publication Project (see below). This resulted in the discovery of a new stucco face that can be added to the range of those that the AEP retrieved from the temple (**Fig. 13**). There is a future plan to rebury much of the non-diagnostic material back at the TWL once it has been fully documented and assessed.

Landscape, Pathways and Signage

Making the TWL site safe and accessible for visitors was a major aim of the TWLCRM Initiative. Through efforts carried out by the TWLCRM Initiative team between 2015 and 2018, several pathways were created to improve access to the site (see **Figs. 1** and **11**). In addition, there was continued assessment of the landscape. In summer 2015, Connor Smith of Andrews University continued the landscape vegetation field survey begun by Erin Addison in 2012. Smith was able to identify 26 plant species, a reduction from the 72 species identified during the spring and fall 2012 surveys (Corbett and Ronza 2015: 3).

A key aspect of the creation of new pathways and improvement of the landscape has been the repurposing of previously excavated materials from the site, including sifted soils coming largely from dump 4 on the northwest side of the temple complex, as well as stone ashlars that cannot be used for future reconstruction taken from the lapidaria to line the paths. It is noted that the large volume of the spoil heaps around the site, combined with the necessary labor required to sift this material to make it available for conservation purposes, has meant that only a portion of the spoil heaps was drawn upon in the project period. Due to the continued value of the AEP spoil heaps, and the fact that they still contain many artifacts, it is advised that they be conserved for future educational and preservation projects.

Two types of pathways were created. Firstly, a pathway was built around the east wall and in front of the temple's *cella*; this consisted of successive layers of sandbags filled with clean sifted soil from the AEP spoil heaps, which were then covered with a layer of large limestone chips, followed by a layer of geotextile and a layer of clean earth fill. Over this was deposited

12. Copper-alloy coin (obverse and reverse) found during cleaning of the southwest quadrant, May 2014 (image: TWLCRM Initiative, ACOR).

13. Stucco head depicting either Ariadne or a maenad (identified by R. Wenning). Found in dump 2 in 2012, documented at ACOR in 2019. H. 5.3cm (photo: J. Green/ TWLCRM Initiative, ACOR).

a layer of reddish-brown coarse sand to match the color of the site. The pathway first completed in 2016 was widened in early 2018 to allow space for more visitors.

The second type of simple ashlar-lined compacted-earth pathways, graded in some instances, were installed around the site between 2015 and 2018 by the TWLCRM team. Unfortunately, severe rains in spring 2018 led to channeling and erosion within some completed sections of the pathways, which the PDTRA quickly repaired. A drainage study of the site in fall 2018 suggested a need for additional drainage channels and modification to steeper pathway sections. Visitors surveyed in fall 2019 did not report significant problems with the pathways and generally found the site to be accessible. The condition of the paths remains under review. In addition to pathways, fixed posts and portable post-and-rope barriers were added at key points to prevent visitors from climbing over vulnerable or hazardous parts of the site.

Signage was an important outcome of the project (Green 2019a). An augmented reality (AR) glass sign at TWL, inspired by an example at the Heidentor at Roman Carnuntum in Austria, was developed by M. Elena Ronza, Qais Tweissi, and Jehad Haron and produced by the Modern Advertising Center signage company in ʻAmmān. The sign was installed in 2017 as a follow-up to a 2013 pilot project to partially restore the temple with faux column capitals (Tuttle 2013b). The glass sign presents a visualization of the inner sanctum of the TWL along with imagery of a winged-lion column capital (**Fig. 14**). This provides visitors with a way to interpret the architectural space as an interplay between past and present, allowing them to see what is preserved and what was once present.

In spring 2018, a series of new signs was installed to mark the end of our main program of site improvements. This included a second glass sign down on the colonnaded street, some distance from the site at a lower level, allowing visitors to see the two-story temple dramatically emerging from the hillside and thus further building awareness of the TWL among those passing through the colonnaded street of Petra. The first glass sign in the *cella* sadly suffered damage, but it was subsequently replaced thanks to AFCP support. The second glass sign in the street was also damaged in November 2019. The glass signs can be viewed as a pilot project, and future applications will depend on the durability of such signage.

For the standard site signage, the chosen design consists of a painted steel base with a single leg and frame that supports a lightweight label holder. The graphic panel (*ca.* 70×40cm) takes the form of a reverse-printed sticker on a clear acrylic cover mounted onto the frame at each corner. This simple design allows for inexpensive reprints in the future, which will perhaps be necessary every few years due to sun exposure. The six bilingual graphic panels present introductory information on points around the site, including the fallen columns, the southwest quadrant, the northern complex, and the architectural gallery (*lapidarium*). A three-dimensional test replica of a winged-lion fragment was created to be installed in the

14. The augmented-reality glass sign installed at the entrance of the cella in 2017, designed to show the upper story of the temple (photo: Qais Tweissi).

lapidarium but was not of suitable quality for installation. In addition, supporting images were added to most signs to help visitors visualize the site. The fallen-columns panel allows visitors to relate the line of huge sandstone column drums on the ground in front of them with a reconstruction drawing showing the façade of the temple as it would have appeared in antiquity. In the southwest quadrant, a panel is positioned to allow visualization of the supporting arches in this partially backfilled area, as well as to indicate the role that local community members played in preserving the site. The southwest quadrant was cordoned off to discourage visitors from climbing over conserved areas. In addition, simple wayfinding and warning signs have been created, encouraging visitors to stay on paths and not to climb on the remains, particularly on the conserved temple podium.

A visitor survey and tracking project took place in October 2019 at the Temple of the Winged Lions in partnership with the PDTRA and the Petra College of Tourism and Archaeology at Al-Hussein Bin Talal University (HBTU) and with support from the DoA (Green 2019b). Four students and two PDTRA staff members conducted interviews and tracked visitors over a two-week period. Dr. Mukhles Al-Ababnah of HBTU conducted an analysis of the survey of visitors and tour guides. This will be used to help improve the visitor experience by documenting perceptions and use of the site following recent interventions. We are grateful for the support of Dr. Zeyad as-Salameen of Petra College and Ibrahim Farajat of the PDTRA.

Educational Programs and Outreach

A number of educational visits were hosted at the Temple of the Winged Lions. For example, in 2015, students from the American Community School in ʻAmmān visited the project in Petra and took part in a range of hands-on archaeological and conservation activities (Corbett and Ronza 2015: 2). Lessons learned during such visits helped to develop and design a hands-on experiential learning program at the Temple of the Winged Lions. The educational awareness program developed as "Experience Petra" was subsequently renamed "Experience Archaeology." TWLCRM team members played a vital role in sharing the message of site conservation and preservation through such activities. The program was supported by USAID SCHEP, the PDTRA, and Jordan's Ministry of Education. Site stewards Eman Abdessalam and Ahmed Mowasa hosted nearly 300 Jordanian schoolchildren in fall 2017 (**Fig. 15**). Boys and girls from eight different schools came from throughout Jordan, including Ayla, Bayt Rās, Busayrah, Ghawr As Sāfī, Mādabā, Bīr Madhkūr, Wādī Mūsā, Umm Al Jimāl, and Wādī Ramm. They made the trip to TWL to learn about the temple and to participate in hands-on activities, including sifting for archaeological objects, making architectural drawings, undertaking architectural conservation, and learning about pottery. These students, aged 10−17, left with new appreciation of the temple and the preservation of archaeological sites in Jordan encouraging them to become future stewards of their cultural heritage. The pilot program was broadened to include groups of international tourists visiting Petra, demonstrating that this can be a viable future program for engaging visitors, generating revenue, and employing local communities.

In addition, public outreach efforts were

15. Umm Al Jimāl girls' school visit to the TWL October 4, 2017 (photo: Ahmad Mowasa/ TWLCRM Initiative, ACOR).

undertaken in 2019 to help raise greater awareness of the achievements of the TWLCRM Initiative. A well-attended Temple of the Winged Lions Study Day at Petra College in Wādī Mūsā took place in July 2019. Hosted at Petra College, Al Hussein Bin Talal University in Wādī Mūsā, the event was co-chaired by Jack Green of ACOR and Ibrahim Farajat of the PDTRA. Barbara Porter of ACOR, Ali Al-Khayyat of the DoA, and Zeyad as-Salameen of Petra College gave introductory remarks. Jack Green, Franco Sciorilli, Marco Dehner, Hussein Khirfan and Raneen Naimi, Pauline Piraud-Fournet and Safa' Joudeh, and Halemah Nawafleh and Taher Falahat gave presentations. Presentations were also given for tour guides in Wādī Mūsā and for the Jordan Tour Guides Association in ʻAmmān.

Publication Preparations

With the completion of the American Expedition to Petra's fieldwork in 2005, and with only preliminary reports and two of Philip C. Hammond's final volumes published at the time of his death in 2008, significant elements from the Temple of the Winged Lions remain inaccessible to researchers. Following the physical transfer of the Philip C. Hammond/ AEP Archive to ACOR in ʻAmmān in 2009 by his widow, Lin Hammond, considerable efforts have been undertaken to digitize and organize the archive, as well as to process artifacts and site documentation from the TWLCRM Initiative to prepare a final publication. These include digitization efforts made between 2012 and 2015 by Christopher Tuttle and Tali Erickson-Gini, who carried out a study of the AEP's area I excavations of Nabataean dwellings immediately adjacent to the Temple of the Winged Lions (Erikson-Gini and Tuttle 2017).

Preparations toward the final publication of the Temple of the Winged Lions are supported in part by ACOR's Publication Fund, leading to the contributions of TWL Publication Fellow Pauline Piraud-Fournet (2018-2019). Piraud-Fournet has prepared a full bibliographical survey of the Temple of the Winged Lions and a thorough reassessment of the AEP excavations and its history of excavations, based on publications, unpublished reports, and archival materials (Green 2019c).

TWL Publication Project intern Safa' Joudeh (2018−2019), assisted by ACOR intern Libby Trowbridge (Joudeh and Trowbridge 2019), as well as Nora Al-Omari, who joined in December 2019, have helped to document hundreds of fragmentary objects and materials sifted from spoil heaps between 2012 to 2018 and to digitize and organize the physical objects and archives. In summer 2019, ACOR intern Tamara Dissi documented conserved AEP and TWLCRM metal objects. By the end of 2019, 65 crates of sifted and excavated material had been processed (an estimated 50 percent of the total materials). An ongoing assessment of artifacts and a study of the temple's architecture are helping to develop a fuller understanding of religious and daily life activities, alongside the history of excavations and conservation of the site. The TWL Publication Project has also benefitted from the addition of scanned images from the Kenneth W. Russell Collection as part of the ACOR Photo Archive project and the donation of images by former AEP team member Benjamin Unger. Future priorities include the preparation of an object database based on the AEP registers and individual chapters from specialist contributors.

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A STATISTICAL LOOK AT THE ANNUAL OF THE DEPARTMENT OF ANTIQUITIES OF JORDAN (ADAJ)

Osama Lutfi Eid

Introduction

The Annual of the Department of Antiquities in Jordan (ADAJ) has been a platform for those working in the field of archaeological studies for more than seventy years. Today, by issuing its sixty-first volume, it continues the traditions of the Department of Antiquities, which was also born a century ago to be the guardian and patron of archaeological and historical sites, to record the long and important history of this prosperous country: the Hashemite Kingdom of Jordan.

In this short article and others to come, we take a statistical look at this annual and its sister publications issued by the Department of Antiquities during years past.

The Beginning with Archaeology

Archaeology, in its current form, is a (relatively) modern science that did not exist before the eighteenth century. It began with varying steps as a branch of antiquarianism concerned with precious ancient objects and trading in them, or as a practical complement to theology, history and natural science. Owing to this most of the first workers in this field were divided between the antiquarians, and the Christian clergy specialized in the biblical studies, especially in the historical events contained in the books of the Old Testament.

Accordingly, research missions came to the countries of the *Arab Mashreq*, individually and in groups. One of the most prominent of these missions was that of the Palestine Exploration Fund.

British as Pioneers in Archaeology

The roots of the British National mapping agency go back to the rebellion of Charles Edward Stewart in Scotland in 1745 AD and his claim to the British throne. The army then needed accurate maps of the Scottish Highlands that would help in military planning and to know the routes that the soldiers may take, and accordingly the British government at that time requested the Ministry of Defense (or what was then called **the Board of Ordnance**) conduct comprehensive surveys in the country since the army suffered from a lack of detailed maps (British Ordnance Survey 2022: The official website).

Between 1864 and 1865 the Council conducted the first scientific, documentary survey outside the borders of the United Kingdom, in the city of Jerusalem, Palestine, under the supervision of Charles William Wilson of the British Royal Engineers Corps.

This survey was called **the Ordnance Survey of Jerusalem**. Its main purpose was to improve the city's water supply lines (Gibson 2011), and the costs of this survey, estimated at more than £500 (about £63,000 today) (Palestine Exploration Fund 2022: the official website\history), was funded by the English philanthropist Angela Burdett-Cotes (**Fig. 1**).

After the end of this survey, a number of scholars and clerics interested in exploring the biblical antiquities in the Holy Land gathered and decided, on June 22, 1865, to establish a fund with initial funding of £300 (Schwartz 2003: 226) aimed at "**research according to an**

accurate and close method in the antiquities of the Holy Land, its topography, geology, natural geography, and customs of its inhabitants." and their traditions, in order to clarify the Torah" (PEQ 1870: First Pages; Abu Taleb 1978: 19).

These included Charles Wilson (1836–1905) who led the Ordnance Survey in Jerusalem (**Fig. 2**), George Grove (1820–1900), and Arthur Penrhyn Stanley (1815–1881) Dean of Westminster Abbey. The fund was under the presidency of the Archbishop of York until 1891, then under the presidency of the Archbishop of Canterbury, under the direct auspices of the Queen of Britain (PEQ 1870: First Pages; Abu Taleb 1978: 19). In 1869, the Fund issued a scientific bulletin under the name of (the Palestine Exploration Fund–Quarterly Statement), or what later became known as (PEQ), which it is still issued today (**Fig. 3**).

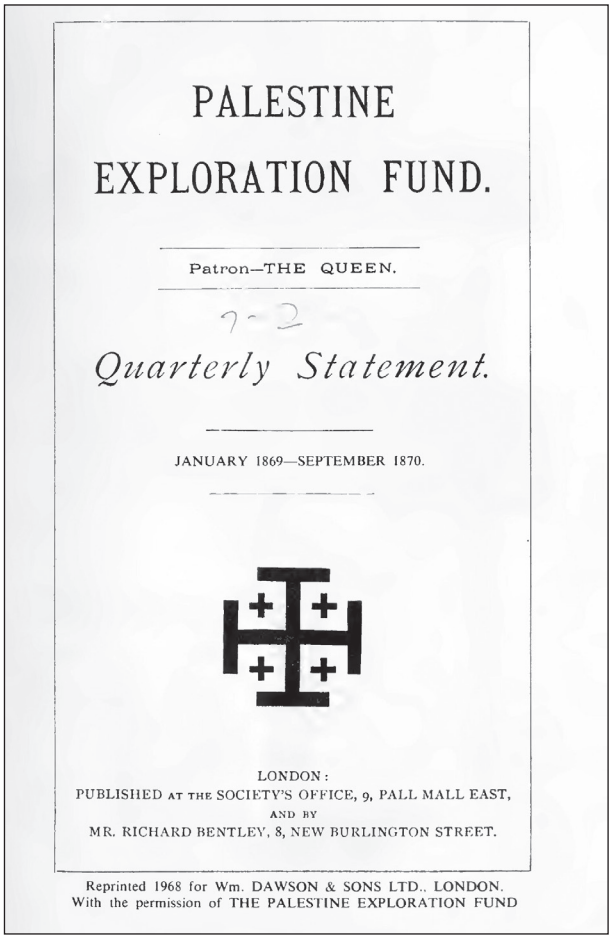
Many of the men who contributed to the exploration of the Holy Land emerged from the work of the fund and their archaeological work in the *Arab Mashreq*.

On 23rd of October 1917 the British Army occupied, then a resolution issued to organize and protect antiquities of the *Arab Mashreq* by the (Occupied Enemy Territory Administration) directly. in 1920 it was transferred to a civilian administration, and an antiquity law was issued considering the Treaty of Sèvres, which was signed by the Entente Powers and the Ottoman State in Sèvres one of Paris City suburbs, which ceded the Ottoman territory in the *Arab Mashreq* to Britain and France officially.

Considering that the Palestine Department of Antiquities was established to be affiliated to the British Mandate government in Palestine, as a scientific academic governmental institution that undertakes sober research in the country's antiquities and history, Mr. John Garstang (1876-1956) designated to be the first director.

1. The English philanthropist Angela Burdett-Cotes.

2. Charles Wilson (1836–1905) who led the Ordnance Survey in Jerusalem, between 1864 and 1865.


PALESTINE

EXPLORATION FUND.

Patron—THE QUEEN.

7-2

Quarterly Statement.

JANUARY 1869—SEPTEMBER 1870.

LONDON:
PUBLISHED AT THE SOCIETY'S OFFICE, 9, PALL MALL EAST,
AND BY
MR. RICHARD BENTLEY, 8, NEW BURLINGTON STREET.

Reprinted 1968 for Wm. DAWSON & SONS LTD., LONDON.
With the permission of THE PALESTINE EXPLORATION FUND

3. Cover of the PEQ Bulletin issued in 1870, reprinted in 1968 with permission from the Palestine Exploration Fund, the phrase "Patron - The Queen" appears on it.

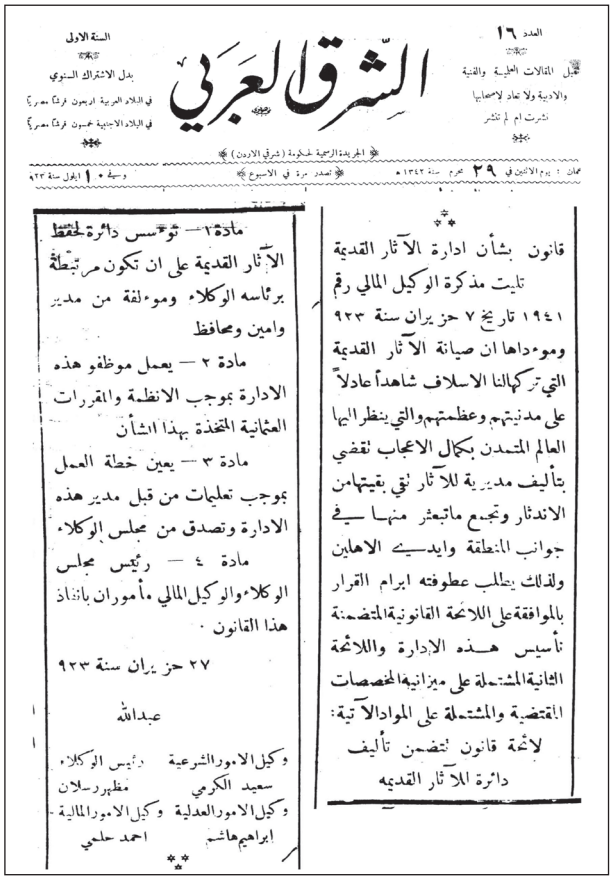
On 27th of June 1923, A high Emiri edict was issued to establish a department organizing and protecting antiquites in the Emirate of Transjordan (**Fig. 4**), a number of men of the Jordanian nascent state headed it, the first was Mr. Rida Tawfiq (1869-1949) (The Official Site of the Jordanian e-Government: Department of Antiquities).

In 1934, the Palestine Department of Antiquities issued a quarterly scientific bulletin of the results of archaeological work in the country under the name (**Quarterly of the Department of Antiquities of Palestine-QDAP**), which continued to be issued until Palestine witnessed the events of the Second World War and the establishment of a Jewish state which necessitated this bulletin to be cessated. That led to the thirty fourth volume and last issue to be issued in 1950.

After the declaration of the unity of the two banks of Jordan River in 24th of April 1950, the Jordanian Department of Antiquities became responsible for the antiquities in Transjordan and the West Bank. In 1951, Mr. Gerald Lancaster Harding (**Fig. 5**) who led the department between 1938 and 1956, issued **the first volume of the Annual of the Department of Antiquities of Jordan**, as heir to the Quarterly of the Department of Antiquities of Palestine (**Fig. 6**).

First Volumes

Mr. Harding edited the first three issues of the ADAJ, which was printed at William Clowes Ltd. in London, measuring 21×28cm. Most of its articles were in English; as the first issue (1951) contained ten articles, nine in English and one in French, Mr. Harding wrote four of them while Sir Alec Kirkbride, Mr. Dimitri Barmaki, Mr. R.P.R. De Vaux and Mr. R.D. Barnett wrote one article for each, and Mr. Auni Dajani wrote two. the articles was in English and French only, with different subjects like Amman Citadel By Mr. Harding, Kufic Texts by Mr. Barmaki, Une



السنة الاولى
بدل الاشتراك السنوي
في البلاد العربية اربعون قرشاً مصرياً
في البلاد الاجنبية خمسون قرشاً مصرياً

الشرق العربي

العدد ١٦
تقبل المقالات العلمية والفنية والادبية ولا تعاد لاصحابها نشرت ام لم تنشر

الجريدة الرسمية لحكومة (شرقي الاردن)

صدر : يوم الاثنين في ٢٩ محرم سنة ١٣٤٢ هـ — تصدر مرة في الاسبوع — وسعرها ١٠ قروش سنة ٩٢٣

قانون بشأن ادارة الآثار القديمة

تليت مذكرة الوكيل المالي رقم ١٩٤١ تاريخ ٧ حزيران سنة ٩٢٣ وموداها ان صيانة الآثار القديمة التي تركها لنا الاسلاف شاهداً عادلاً على مدنيتهم وعظمتهم والتي ينظر اليها العالم المتمدن بكمال الاعجاب تقضي بتأليف مديرية للآثار تقي بقيتها من الاندثار وتجمع ماتبعثر منها في جوانب المنطقة وايدي الاهلين ولذلك يطلب عطوفته ابرام القرار بالموافقة على اللائحة القانونية المتضمنة تأسيس هذه الادارة واللائحة الثانية المشتملة على ميزانية المخصصات المقتضية والمشتملة على المواد الآتية:

لائحة قانون تتضمن تأليف دائرة الآثار القديمة

مادة ١ — تؤسس دائرة لحفظ الآثار القديمة على ان تكون مرتبطة برئاسة الوكلاء وموءلفة من مدير وامين ومحافظ

مادة ٢ — يعمل موظفو هذه الادارة بموجب الانظمة والمقررات العثمانية المتخذة بهذا الشأن

مادة ٣ — يعين خطة العمل بموجب تعليمات من قبل مدير هذه الادارة وتصدق من مجلس الوكلاء

مادة ٤ — رئيس مجلس الوكلاء والوكيل المالي مأموران بانفاذ هذا القانون .

٢٧ حزيران سنة ٩٢٣

عبدالله

وكيل الامور الشرعية رئيس الوكلاء
سعيد الكرمي مظهر رسلان
وكيل الامور العدلية وكيل الامور المالية
ابراهيم هاشم احمد حلمي

4. Edict of His Highness the Emir to establish the Department of Ancient Antiquities, published in Al-Sharq Al-Arabi newspaper (The Official Gazette), Issue Number 16, Monday 29th of Muharram 1342H (10th of September 1923).

5. Mr. G.L. Harding giving hand to Mr. James Leslie Starkey, director of Tall Ad Duwayr (Lachish) excavation near Al Khalil (Hebron) which held between 1932 and 1938.

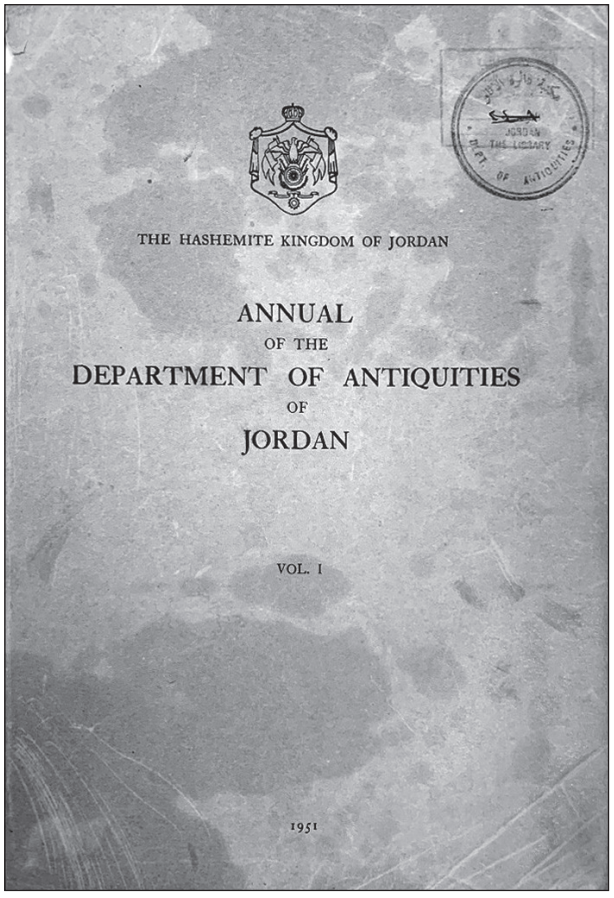
Nouvelle Inscription Au Dieu Arabique by Mr. De Vaux, Four Sculptures from Amman by Mr. Barnett, and A Hoard of Byzantine Gold Coins from Awarta, Nablus by Mr. Dajani.

Mr. Dajani wrote his second article to summarize archaelogical activites in Palestine and Jordan in the years 1949 and 1950, he wrote about excavations and discoveries in Bethany (near Jerusalem), Jericho, Tell El-Far'ah, As Samu in Hebron District, Wadi al Badhan in Nablus District, al-Bireh (near Ramalla), al-Jib and Sebastiya, and others.

The second volume (1953) and the third volume (1956) had six English articles in each. The first volume was in 52 pages for text and 15 pages for illustrations, the second was in 96 pages for text and 12 pages for illustrations while the third volume was in 88 pages for text and 8 pages for illustrations, all illustration plates printed as separate leaves after the text *folios* on one face of the sheet only.

The Beginning of the Arabic ADAJ

His Majesty King Hussein issued his order on first of March, 1956; to Arabize leaders throughout the country. Accordingly, all the foreigners who held high positions left the Kingdom, including Mr. Harding, so ADAJ stopped issuing for four full years until Mr. Awni Dajani and Mr. Mahmoud al-Abedi as members of the cadres of the Department of Antiquities revived it. They issued in 1960 two combined volumes; the fourth and fifth, which carried the first Arabic article along with nine English articles.



6. First ADAJ edition cover (1951).

Mr. Mohammad al-Amin Mohammad Khader ash-Shanqeeti the minister of Education wrote the preface of this volume in 18th of Sha'ban (8) 1379H (15th of March 1960).

This issue had one extended Arabic article summarized the archaeological activities in Jordan and Palestine during the past ten years (1949-1959). Mr. Mahmoud Abedi wrote about Jericho, Shechem (Nablus), Petra, Duthan, Fahil, Amman Airport (Mārkā), Amman Citadel, Al Fār'ah (between Nablus and Baysan), Al Fashkhah (near Dead Sea from Jericho side), Al Quwaylibah (Abila) and Al Azraq, also he touched the excavations in 'Ammān, Suwaylih, Sāfut, Umm Ad Danānīr, Jarash and Dayr Al Layyat.

This issue included 204 pages; 156 pages for English articles, 32 for Arabic, and 16 for illustrated plates, in addition to two other plates measuring 26×68cm and 21.5×46cm respectively. This issue printed at the Roman Orthodox Monastery Press in Jerusalem (**Fig 7**).

In 1962 the Sixth and Seventh volumes issued in one book with 216 pages; 32 of them was for illustrated plates, this issue had thirteen English articles and two Arabic.

Few persons who were editing parts of ADAJ became later general directors of the Department of Antiquities of Jordan such as Mr. Awni ad-Dajani who was director between 1959 and 1968, Mr. Safwan at-Tal between 1991 and 1994, and Mr. Adnan al-Hadidi between 1977 and 1988. All of them achieved the PhD degree while they were part of the Department cadres.

Mr. Mahmoud Al-Abedi was one of the special ADAJ editors; he supervised the first Arabic issues (from the 4th edition to the 9th between 1960 and 1964).

Dr. Fawzi Zayadin (**Fig. 8**) was semi-permanent editor of the ADAJ for more than

thirty years; from the 16th edition (1971) to the 38th edition (1994) continuously, also he participated in the 45th and 46th editions (2001, 2002) editing.

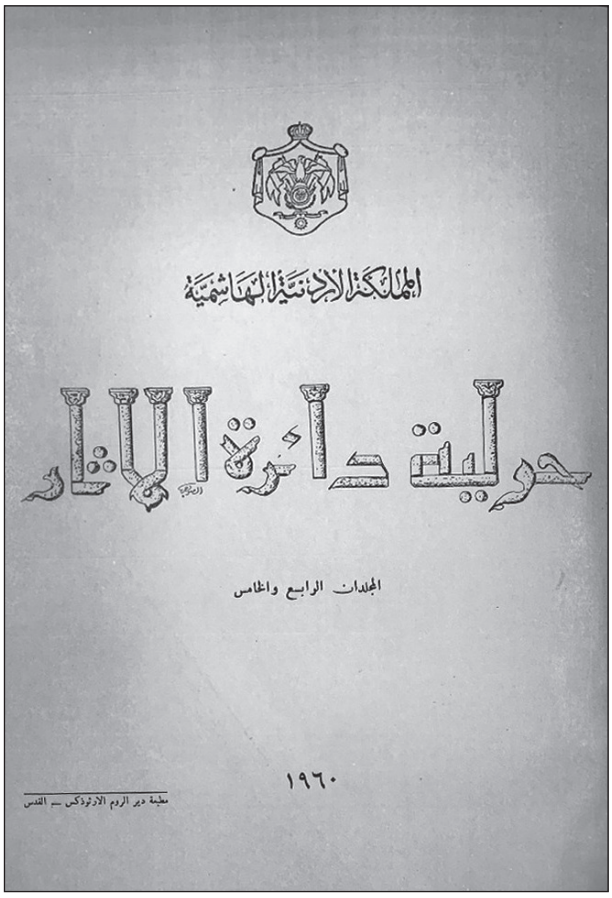
ADAJ editors through years were the following ladies and gentlemen:

Farah S. Maayah, Rafik W. ad-Dajani, Anwar Akroush, Faiza Abd al-Nabi, Dr. Fawaz A. Touqan, Laila Touqan, Rose Habaiba, Youssef J. Al-Alami, Yaqoub Owais, Dr. Muawiya Ibrahim, Hanan Al-Kurdi, Lina Al-Saadi, Khawla Q. Hanania, Zain Shurdum, Badiah Abd al-Hadi, Hanan Azar, Sherry Linzen, Dr. Khairiya Amr, Dr. Ghazi Bisha, Ina Kyhrberg, Dr. Fawaz Al-Khraisha, Mai Al-Shaer, Hanadi Al-Taher, Juliet Jabji, Hanan Abu Ali, Dr. Rafi Harahsheh, Samia Khoury, Safinaz Kabaja, Samantha Dennis, Qamar Fakhoury, Sahar Al-Nsour, Kate Washington, Alexander Wass, Fares Al-Hmoud, Asim Asfour, Dr. Monther Jamhawi, Arwa Masada, Osama Eid (author of this article), Hala Al-Syouf, Dr. Ali Al-Hajj, Dr. Ismail Melhem, Maryam Ibrahim, Ann Beubji, Professor Dr. Fadi Balawi, Muhammad Nasser, Nazih Nasser, Adam Rassell and Dr. Abdallah Al-Lababdeh.

For decades, ADAJ published articles by the most prominent Arab and foreign archaeologists who worked in the Hashemite Kingdom of Jordan. It is for them as a constant book in which they record the events of their days, discoveries and achievements, to the students it is the best aid that guides them to what scholars have documented about the antiquities of this prosperous country. To the archaeological sites, it is the best reference to preserve what it was and to manage what it has to be, ADAJ is full of drawings, pictures and maps that a researcher or an interest in field of archeology cannot avoid. Perhaps what distinguishes it, whether among Arab or foreign students, is that the participants of the archaeological projects themselves write its articles, so it is a continuous live documentation of the excavation stages of these projects, surveys, discoveries and achievements.

By the end of 2022 ADAJ has 60 Volumes in 24955 pages in 1597 articles in English (1329), Arabic (223), French (43) and German (2) languages.

Following statistically table contains ADAJ full editions details:



7. First Arabic ADAJ edition cover (1960).

8. Dr. Fawzi Zayadin was semi-permanent editor of the ADAJ.

Volume	Issue Year	English	Arabic	French	German	Articles Count	English Pages	Arabic Pages	Plate Pages	Total Pages	Design Center	Printing Press
1	1951	9	–	1	–	10	52	–	15	67	–	–
2	1953	6	–	–	–	6	96		12	108	–	William Cluase and Sons Ltd.
3	1956	6	–	–	–	6	88		8	96	–	William Cluase and Sons Ltd.
4 + 5	1960	9	1	–	–	10	156	32	16	204	–	Greek Latin Press
6 + 7	1962	13	2	–	–	15	160	24	32	216	–	National Press and Bookstore
8 + 9	1964	13	1	–	–	14	102	40	50	192	–	Islamic Orphan House Industrial Press
10	1965	2	–	1	–	3	50	2	22	74	–	Islamic Orphan House Industrial Press
11	1966	8	2	–	–	10	108	24	40	172	–	National Press and Bookstore
12 + 13	1967-1968	11	2	–	–	13	84	14	58	156	–	Cooperative Press Workers Society
14	1969	5	7	–	–	12	36	68	58	162	–	Cooperative Press Workers Society
15	1970	10	6	–	–	16	42	68	40	150	–	–
16	1971	12	1	3	1	17	124	8	68	200	–	–
17	1972	14	5	–	–	19	110	58	86	254	–	–
18	1973	19	1	1	–	21	88	6	66	160	–	Cooperative Press Workers Society
19	1974	12	2	–	–	14	172	20	96	288	–	Cooperative Press Workers Society
20	1975	12	4	–	–	16	142	32	76	250	–	Cooperative Press Workers Society
21	1976	17	1	–	–	18	152	10	70	232	–	Jordanian Press Establishment / Al Rai
22	1977–1978	10	3	2	–	15	184	30	104	318	–	Jordanian Press Establishment / Al Rai
23	1979	15	4	2	–	21	200	32	96	328	–	Arab Company For Press and Publishing / News
24	1980	20	–	2	–	22	214		148	362	–	Jordanian Press Establishment / Al Rai

Press Location	Chief Editor	Editorial Board	Subscription Fee	Notes
–	L. Harding	–	–	
London	L. Harding	–	–	
London	L. Harding	–	–	
Jerusalem	–	Awni Dajany, Mahmoud ‘Abidi	–	with 68×26, 46×21.5cm Plates
Amman	–	Awni Dajany, Mahmoud ‘Abidi	–	with 60×25.5cm map
Jerusalem	–	Mahmoud ‘Abidi	–	Volumes 4-9 Has No Editorial Board Names
Jerusalem	Farah S. Maia‘ah	–	–	
Amman	Rafiq W. Dajani	–	–	
Amman	Safwan K. Tell	–	–	
Amman	Safwan K. Tell	Anwar ‘Akroush, Fa’izah Abd Al Nabi	–	
–	Dr. Fawaz A. Touqan	Layla Touqan, Fa’izah Abd Al Nabi	1 JD	First Volume with Two Columns Design / First Subscription Fees Note
–	Dr. Fawaz A. Touqan	Rose Habaybah, Dr. Fawzi Zayadine	1 JD	
–	Yousuf J. ‘Alami	–	1 JD	
Amman	Yacub Oweis	Dr. Fawzi Zayadine, Lina Sa‘di, Rose Habaybah	2 JD	
Amman	Yacub Oweis	Yousuf ‘Alami, Dr. Moawiyah Ibrahim, Dr. Fawzi Zayadine, Hanan Kurdi, Lina Sa‘di, Rose Habaybah	2 JD	
Amman	Yacub Oweis	Yousuf ‘Alami, Dr. Moawiyah Ibrahim, Dr. Fawzi Zayadine, Hanan Kurdi, Lina Sa‘di, Rose Habaybah	2 JD	
Amman	Dr. Adnan Hadidi	Dr. Fawzi Zayadine, Rose Habaybah, Khawlah Qsous	3 JD	King Hussein Silver Jubilee
Amman	Dr. Adnan Hadidi	Dr. Moawiyah Ibrahim, Zain Shurdum, Khawlah Qsous, Dr. Fawzi Zayadine	3 JD	
Amman	Dr. Adnan Hadidi	Dr. Fawzi Zayadine, Badi‘ah AbdulHadi, Zain Shurdum, Khawlah Q. Hanaynah	5 JD	with 70×27cm map
Amman	Dr. Adnan Hadidi	–	5 JD	In memoriam of L. Harding

Volume	Issue Year	English	Arabic	French	German	Articles Count	English Pages	Arabic Pages	Plate Pages	Total Pages	Design Center	Printing Press
25	1981	23	3	1	–	27	360	36	110	506	–	Middle East Company for Press
26	1982	29	6	4	–	39	420	26	160	606	–	Jordanian Press Establishment / Al Rai
27	1983	42	1	–	1	44	657	7	148	812	–	Jordanian Press Establishment / Al Rai
28	1984	30	5	1	–	36	424	30	116	570	–	–
29	1985	25	6	–	–	31	297	46	117	460	–	–
30	1986	32	5	2	–	39	429	34	133	596	–	–
31	1987	32	2	1	–	35	544	16	96	656	–	–
32	1988	21	–	1	–	22	352	2	54	408	–	–
33	1989	23	2	2	–	27	363	24	61	448	–	–
34	1990	17	2	1	–	20	388	28	–	416	–	–
35	1991	20	4	–	–	24	414	52	–	466	–	–
36	1992	16	4	5	–	25	356	68	–	424	–	–
37	1993	31	5	1	–	37	554	70	–	624	–	–
38	1994	31	6	–	–	37	511	65	–	576	–	–
39	1995	33	5	3	–	41	562	40	–	602	International House of Publishing and Media Services (Info-Media)	Commercial Press of Ad Dustour
40	1996	32	2	–	–	34	494	14	–	508	Orjowan Pre-Press Services	Commercial Press of Ad Dustour

Press Location	Chief Editor	Editorial Board	Subscrip-tion Fee	Notes
Amman	Dr. Adnan Hadidi	Dr. Fawzi Zayadine, Zain Bouran, Khawlah Q. Hanaynah	5 JD	
Amman	Dr. Adnan Hadidi	Dr. Fawzi Zayadine, Muna Zaghloul	5 JD	Two volumes; one for articles, the other for plates
Amman	Dr. Adnan Hadidi	Dr. Fawzi Zayadine, Hanan Kurdi, Hanan ʻAzar, Cherie Lenzen	5 JD / 20 US $	Two volumes; one for articles, the other for plates
–	Dr. Adnan Hadidi	Dr. Fawzi Zayadine, Hanan Kurdi, Hanan ʻAzar, Cherie Lenzen	5 JD / 20 US $	
–	Dr. Adnan Hadidi	Dr. Fawzi Zayadine, Muna Zaghloul, Hanan ʻAzar	5 JD / 20 US $	
–	Dr. Adnan Hadidi	Dr. Fawzi Zayadine, Muna Zaghloul, Dr. Khairieh ʻAmr	5 JD / 20 US $	First contribution notes (in English only)
–	Dr. Adnan Hadidi	Dr. Fawzi Zayadine, Muna Zaghloul, Dr. Khairieh ʻAmr	5 JD / 20 US $	Tenth anniversary of Dr. Adnan Hadidi as DAJ general manager / First translitration (Romanization) system
–	Dr. Adnan Hadidi	Dr. Fawzi Zayadine, Muna Zaghloul, Dr. Khairieh ʻAmr	5 JD / 20 US $	
–	Dr. Ghazi Bisheh	Dr. Fawzi Zayadine, Muna Zaghloul, Dr. Khairieh ʻAmr	5 JD / 20 US $	By generous donation from Sameer Shamma
–	Dr. Ghazi Bisheh	Dr. Fawzi Zayadine, Muna Zaghloul, Dr. Khairieh ʻAmr	5 JD / 20 US $	First issue without plate pages
–	Dr. Safwan Tell, Dr. Ghazi Bisheh, Dr. Fawzi Zayadine, Dr. Khairieh ʻAmr, Muna Zaghlul	Dr. Khairieh ʻAmr, Muna Zaghloul	5 JD / 20 US $	
–	Dr. Safwan Tell, Dr. Ghazi Bisheh, Dr. Fawzi Zayadine, Dr. Khairieh ʻAmr, Muna Zaghlul	Dr. Khairieh ʻAmr, Muna Zaghloul	7 JD / 25 US $	
–	Dr. Safwan Tell, Dr. Ghazi Bisheh, Dr. Fawzi Zayadine, Dr. Khairieh ʻAmr Muna Zaghlul	Dr. Khairieh ʻAmr, Muna Zaghloul	7 JD / 25 US $	
–	Dr. Safwan Tell, Dr. Ghazi Bisheh, Dr. Fawzi Zayadine, Dr. Khairieh ʻAmr Muna Zaghlul	Dr. Khairieh ʻAmr, Muna Zaghloul	10 JD / 40 US $	
Amman	Dr. Ghazi Bisheh	Muna Zaghloul, Ina Kehrberg	15 JD / 50 US $	
Amman	Dr. Ghazi Bisheh	Muna Zaghloul, Ina Kehrberg	15 JD / 50 US $	

Volume	Issue Year	English	Arabic	French	German	Articles Count	English Pages	Arabic Pages	Plate Pages	Total Pages	Design Center	Printing Press
41	1997	33	4	2	–	39	476	44	–	520	Jordanian Press Establishment / Al Rai	Jordanian Press Establishment / Al Rai
42	1998	41	7	1	–	49	642	54	–	696	Jordanian Press Establishment / Al Rai	Jordanian Press Establishment / Al Rai
43	1999	31	1	2	–	34	558	26	–	584	Jordanian Press Establishment / Al Rai	Jordanian Press Establishment / Al Rai
44	2000	31	3	1	–	35	592	24	–	616	Jordanian Press Establishment / Al Rai	Jordanian Press Establishment / Al Rai
45	2001	32	8	1	–	41	492	80	–	572	Jordanian Press Establishment / Al Rai	Jordanian Press Establishment / Al Rai
46	2002	40	16	2	–	58	639	177	–	816	Al Wesam For Press Services	Al Qayrawan Press
47	2003	30	11	–	–	41	492	104	–	596	Jordanian Press Establishment / Al Rai	Jordanian Press Establishment / Al Rai
48	2004	28	10	–	–	38	372	76	–	448	Jordanian Press Establishment / Al Rai	Jordanian Press Establishment / Al Rai
49	2005	39	8	–	–	47	558	82	–	640	Jordanian Press Establishment / Al Rai	Jordanian Press Establishment / Al Rai
50	2006	24	5	–	–	29	384	60	–	444	Jordanian Press Establishment / Al Rai	Jordanian Press Establishment / Al Rai

Press Location	Chief Editor	Editorial Board	Subscription Fee	Notes
Amman	Dr. Ghazi Bisheh	Muna Zaghloul, Ina Kehrberg	15 JD / 50 US $	
Amman	Dr. Ghazi Bisheh	Muna Zaghloul, Ina Kehrberg	15 JD / 50 US $	
Amman	Dr. Fawwaz Al-Khraysheh	Muna Zaghloul, May Shaer	15 JD / 50 US $	
Amman	Dr. Fawwaz Al-Khraysheh	Muna Zaghloul, May Shaer	15 JD / 50 US $	In memoriam of James Sawer and Mujahed Muheisen
Amman	Dr. Fawwaz Al-Khraysheh	Dr. Fawzi Zayadine, Dr. Khairieh ʻAmr, Hanadi Taher, Juliette Jabaji, Hanan Abu Ali	15 JD / 50 US $	First list of abbreviations / First note that articles must be in English and Arabic only
Amman	Dr. Fawwaz Al-Khraysheh, Dr. Khairieh ʻAmr, Dr. Fawzi Zayadine, Dr. Rafe Harahsheh	Dr. Khairieh ʻAmr, Hanadi Taher, Samia Khouri, Soufinaz Kabajah	15 JD / 50 US $	In memoriam of Jumaʻah Kurayyem / First deposit number (2003)
Amman	Dr. Fawwaz Al-Khraysheh	Hanadi Taher, Samia Khouri, May Shaer, Samantha Dennis, Dr. Rafe Harahsheh	15 JD / 50 US $	Deposit number (2004)
Amman	Dr. Fawwaz Al-Khraysheh	Dr. Rafe Harahsheh, Hanadi Taher, Samia Khouri, Qamar Fakhoury, Samantha Dennis	15 JD / 50 US $	In memoriam of Hamad Qatameen and Tayseer ʻAtiyyat
Amman	Dr. Fawwaz Al-Khraysheh	Dr. Rafe Harahsheh, Hanadi Taher, Samia Khouri, Qamar Fakhoury, Samantha Dennis	15 JD / 50 US $	
Amman	Dr. Fawwaz Al-Khraysheh	Dr. Rafe Harahsheh, Qamar Fakhoury, Sahar Nsour, Hanadi Taher, Samia Khouri, Kate Washington	15 JD / 50 US $	

Volume	Issue Year	English	Arabic	French	German	Articles Count	English Pages	Arabic Pages	Plate Pages	Total Pages	Design Center	Printing Press
51	2007	28	6	–	–	34	486	54	–	540	Jordanian Press Establishment / Al Rai	Jordanian Press Establishment / Al Rai
52	2008	31	3	–	–	34	480	80	–	560	Jordanian Press Establishment / Al Rai	Jordanian Press Establishment / Al Rai
53	2009	31	3	–	–	34	478	42	–	520	–	–
54	2010	36	11	–	–	47	516	60	–	576	–	–
55	2011	36	4	–	–	40	624	56	–	680	–	–
56	2012	32	3	–	–	35	506	50	–	556	–	–
57	2013	33	3	–	–	36	558	26	–	584	Military Press	Military Press
58	2017	38	6	–	–	44	696	112	–	808	Al Bandar Press	Al Bandar Press
59	2018	36	5	–	–	41	662	74	–	736	Al Safeer Press	Al Safeer Press
60	2021	39	6	–	–	45	742	54	–	796	Al Fanar Press	Al Fanar Press
61	2022–2023	32	7	–	–	39	452	84	–	536	Printers Press	Printers Press

Press Location	Chief Editor	Editorial Board	Subscription Fee	Notes
Amman	Dr. Fawwaz Al-Khraysheh	Dr. Rafe Harahsheh, Qamar Fakhoury, Sahar Nsour, Hanadi Taher, Samia Khouri, Kate Washington	15 JD / 50 US $	
Amman	Dr. Fawwaz Al-Khraysheh	Dr. Rafe Harahsheh, Sahar Nsour, Hanadi Taher, Samia Khouri, Kate Washington	15 JD / 50 US $	In memoriam of Nabeel Al Qadi, Mohammad Hatamlah, Mahmoud Al Najjar, Nasri Atallah, Michelle Baccirillo, Philipe Hammond, Manfred Lender and Johny Demolemester
–	Dr. Fawwaz Al-Khraysheh	Dr. Rafe Harahsheh, Sahar Nsour, Hanadi Taher, Samia Khouri, Alexandar Wasse	20 JD / 65 US $	
–	General Manager	Hanadi Taher, Samia Khouri, Alexandar Wasse	20 JD / 60 US $	Gifted to the soul of the late Dr. Fawwaz Khrishah
–	Fares Al Humoud	Qamar Fakhoury, Sahar Nsour, Hanadi Taher, Samia Khouri, ‘Asem ‘Asfour, Alexandar Wasse	20 JD / 60 US $	Arabic section pages started from left
–	Dr. Munther Jamhawi	Qamar Fakhoury, Hanadi Taher, Samia Khouri, ‘Asem ‘Asfour, Alexandar Wasse	20 JD / 30 US $	In memoriam of Abd Al Kareem Gharaybah, John Basel Hennisy and Klause Smith
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Amman	Prof. Fadi Bala‘awi	Mohammad Naser, Hala Al-Syoof, Mariam Ibrahim, Osama L. Eid, Dr. Ali Al Hajj, Dr. Alexandar Wasse, Nazeeh Naser	20 JD / 30 US $	In memoriam of Judith McKenzie Bert de Vries Samar Habahbeh
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THE KARAK 'NEOLITHIC' SURVEY: PILOT SEASON, OCTOBER 2021

Pascal Flohr, Bill Finlayson, Zeidan Kafafi, Elizabeth Gibbon, Laith Alshboul, Lily Graham-Stewart and Mohammad K. Tarawneh

Introduction

The Late Neolithic is a key period in the history of Jordan, during which farming became consolidated as the main mode of subsistence. Small communities of people conducted mixed farming and it appears pastoral groups, whether or not part of the farming communities to the west, were present in the steppe and desert areas (Kafafi 1993; Gibbs and Banning 2013; Rollefson *et al.* 2014).While research in these more arid zones has increased, especially over the last decade (*e.g.* Rowan *et al.* 2017), the period remains relatively underrepresented in particular in the agricultural zone (with the notable exception of the work in the *wadis* Ziqlāb and Qus̲aybah (Banning *et al.* 2015), despite its importance as the time when the 4000-year-long processes of transition from hunting and gathering coalesced into a farming lifestyle that formed the basis of the later complexity on which our current world is founded.

Profound climatic changes occurred during the period although it is unclear what the local impact on environments in Jordan was. The so-called 8.2ka event is the most significant cold event during the Holocene as recorded in Greenland ice cores, and has been attested throughout the northern hemisphere (Alley and Agustsdottir 2005; Rohling and Pälike 2005). Conditions appear to have become more arid in the Eastern Mediterranean area (evidence summarized in Flohr *et al.* 2016) and it is possible the climate started to become more arid from around 6600BC onwards (Rohling and Pälike 2005). However, this is superimposed on a generally wetter Early Holocene and more research is needed to establish what exactly climate and environment were like in Late Neolithic Jordan. Nonetheless, it makes the period very interesting for the study of the effects of climate change on early farming societies, as has been done, for example, in Northern Mesopotamia (Nieuwenhuyse *et al.* 2016). We know there were no large-scale collapse or large-scale population movements (Flohr *et al.* 2016), but we do not really know how (and if) people in the Southern Levant adapted to changing conditions.

Our project, "Climate, environment, and early farming societies: Late Neolithic settlement patterns on the Karak Plateau, Jordan", aims to study the resilience to climate change of early farming communities in Jordan. It will achieve this by studying Late Neolithic settlement patterns and chronology through ground survey in combination with experimentation in the use of remote sensing and predictive modelling to aid in the discovery of these sites. Late Neolithic sites are under-represented in the record not just because of a research bias (for example not collecting or studying chipped stone during surveys), but also because of other factors, including: a lack of training of survey crews in prehistory; the poor preservation of Neolithic pottery; the scarcity of diagnostic tools; the sites often being small; and site location being especially prone to have been covered by colluvium or later occupation (Banning 2015). While deflated sites on hilltops and in steppe and desert areas may be found during intensive survey, in wetter areas many parts of the Neolithic landscape will have been destroyed

by erosion (*wadi* downcutting) or covered by colluvium (Banning 2015). An approach that uses an iterative Bayesian allocation approach to target areas with a higher probability of containing preserved prehistoric remains has been successful in northern Jordan (Hitchings *et al.* 2016). We aim to use the same approach, although the pilot season presented here was used mainly to gather more data to assign such probabilities within the study region.

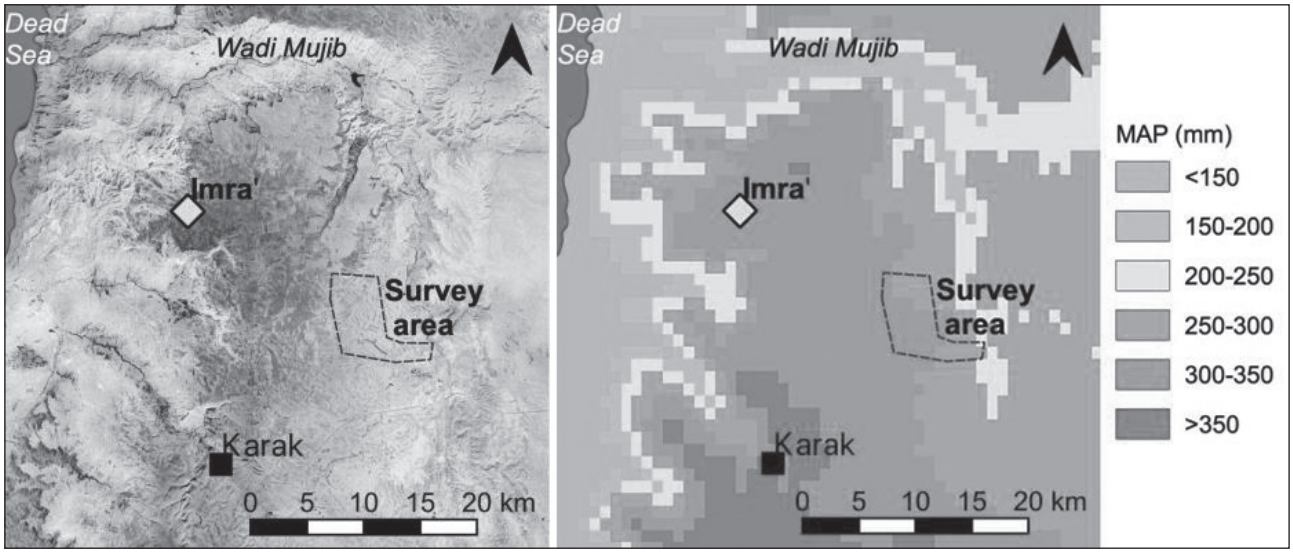
The Study Region

Our study region is the Karak Plateau, as this encompasses a range of environments and climatic zones. Moreover, large parts are under threat because of intensive farming in the west and mining in the east. Our aim is to compare parts of the plateau with different environmental characteristics, but the 2021 season focused on a *ca.* 7×8km L-shaped area (*ca.* 38km^2) stretching from the agricultural into the steppe zone (**Fig. 1**). The mean annual precipitation ranges from *ca.* 250mm in the southeast, *ca.* 290mm in the northeast, to *ca.* 315mm in the west (based on Worldclim 2.0, Fick and Hijmans 2017), so the study area sits on the current edge of the rain-fed farming limit. The area runs from the villages As Samākiyyah, Ḥumūd, and Al Judayyidah on the west to the known Late Neolithic site of LAS 188 on the Wādī Abū Ash SHa'r on the southeast, being L-shaped to exclude a fenced area and keep the size of the area more manageable. In addition, the single site of Imra' in the northwest of the plateau, about 14km northwest of As Samākiyyah, was included, since likely Late Neolithic chipped stone had been observed here in 2019 in a bulldozer/*wadi*/road cut (Flohr and Finlayson 2020), which we wished to study before the area was filled, destroyed, or covered.

The Karak Plateau has been the subject of previous surveys. Our study region was covered partly by the 1979 season of the Archaeological Survey of the Karak Plateau (ASKP) (Miller 1991) and partly by the 1980s Limes Arabicus Survey (LAS) (Parker 2006), with the two overlapping in the middle part of the survey area. However, the ASKP specifically targeted later periods, did not collect chipped stone, and was not intensive. The LAS did document many prehistoric sites, but the project director expected many others to remain unrecorded (S. Thomas Parker pers. comm. 2019), while we also wished to gather more information especially on LAS 188, described as a "village site" with 40 Late Neolithic lithics (Clark *et al.* 2006: 73). Musil and Glueck also visited the area (cited in Miller 1991).

Methods

It is important to note that while the focus was on the Late Neolithic and on areas where remains from this period may be more likely to be found, once we were at a location we collected material irrespective of period. In addition to the difficulty of ascertaining the



1. The survey area and the site of Imra' on the Karak Plateau, with a) modern satellite imagery (Google Earth) showing relief and differences in land use, and b) gridded mean annual precipitation derived from Worldclim 2 (Fick and Hijmans 2017).

date of the material in the field, we consider it important to document all archaeology.

As this season was the pilot season, aimed to gather information for more systematic survey using predictive modelling and Bayesian allocation as described above, different parts of the study area were assigned approximately equal time and areas both likely and unlikely to contain preserved prehistoric archaeology were visited so that these assumptions could be checked. Using a combination of remote sensing (mainly satellite imagery freely available through Google Earth Pro), and information from existing studies regarding Late Neolithic and other prehistoric sites (see Flohr 2022 for a compilation of most of the previously documented, published Late Neolithic sites in Jordan). No model was set up, but areas with likely and less likely to contain preserved and visible prehistoric remains were defined based on: 1) accessibility and modern disturbances as visible on the imagery (*i.e.* the exclusion of the large fenced area from the survey); 2) surfaces/terraces potentially intact since the Neolithic (*i.e.* not eroded or covered); also taking into account 3) slope and aspect (Banning *et al.* 2013). We also tentatively identified areas with more or less likely locations of Late Neolithic settlement/habitation sites, *i.e.* locales where people lived and not, for example, 'special' burial locations, knapping, or hunting sites. We based this on a general presence of drinking water, but especially of perennial water sources like springs, and the presence of naturally wetter areas, which would have been important for these early farming communities. Except for the presence of *wadis* and known spring locations, we based this on several proxies: 1) the presence of (seasonal) vegetation; 2) current (Bedouin) occupation; and 3) the presence of (pre-mid-20th century) occupation, as such 'old' villages are often associated with springs. Moreover, we identified areas of *wadi* confluences, as these can be also naturally

2. The main study area and the extra study site of Imra' (inset) with the 2021 survey units and the type of investigation. In grey are the estimated areas of the archaeological 'sites' as based on previous information, remote sensing, and the new information from our survey.

wetter and have been shown to be favoured locations for Late Neolithic sites (Banning *et al.* 2013; Flohr and Finlayson 2020). These areas were then visited during the survey, as well as 'control areas' assumed to be less likely to contain prehistoric remains. All wider areas identified prior to the survey were visited, but priorities changed based on the information gained during the season.

Once at the location of a survey unit, we used three different methods, depending on the site(/non-site) type and balancing the available time (**Fig. 2; Table 1**):

1. Transects: Systematically walked transects, walked in rows at set distances (these distances varied). The total area and transect area were recorded by GPS, and the number of walkers, and sometimes the time were also noted down (in future we will ensure to always record time, see Banning *et al.* 2011).
2. Collection: when the main current question was either the presence or absence of archaeology and/or certain periods, or when the place was not suitable for transects (*i.e.* within and directly around a feature like a cairn or structure) timed collection was performed. By documenting the number of people and the collection duration time we are able to relatively compare different collection areas (keeping in mind the relation between search time and artefact detection is exponential, Banning *et al.* 2011), but direct comparisons with transects or a measure of artefact density are not possible.
3. Check: In areas were no or very little material was present, nothing was collected, or only in smaller parts, while the larger areas were simply 'checked'. The walking over these areas was also done in lines of people, but generally speedier than with transects (since no material was picked up) and with larger distances between individuals.

Each of the visited survey units was described for each archaeology and survey parameters (like visibility) using standardized forms, photographed, and its location and extent measured with a Garmin 64st GPS. Surface archaeological material was collected in the transect and collection units, and all picked up chipped stone was retained (non-worked stone was however removed, directly or later). When possible, pottery was sorted in the field as to only retain diagnostic items. Nonetheless many non-diagnostic items made it into the collection due to time limits and/or non-specialists collecting the material in some of the units. Other material was not generally collected, with the exception of ancient glass (1 piece in one unit) and a few accidentally collected ground stone objects.

The surveyed pottery sherds were washed, sorted, and studied. Diagnostic sherds were assigned to period based on a typological parallel study with others found at well-stratified excavated archaeological deposits at major sites. A detailed study of the surveyed pottery sherds will be published later in another communication.

The chipped stone was washed and then sorted into basic debitage categories, with pieces of interest (retouched and potentially used pieces, cores, core rejuvenation pieces, and any other pieces with specific technological information) put aside. A second pass was made through the pieces kept aside to describe these and pull out a sub-sample for illustration. A more detailed paper containing the full chipped stone results will be published elsewhere.

Results and (Preliminary) Interpretation

In total 82 survey units were visited and documented: 23 transects (survey unit KNS002 contains two transects), 42 collection units, 15 check units, plus 6 spot find units (**Table 1**). Roughly 2% of the total area was covered by our 2021 season survey units, and within each survey unit coverage was also never 100% (for the transects, estimated coverage varied between *ca.* 24 and 86%). We focused specifically on the two most contrasting areas, the somewhat wetter, more agricultural north and the drier southeast of the survey area. We also extensively visited areas in the middle of the survey area, but as expected there were very few (visible) remains. Chipped stone was abundant especially in the southeast but also in some locales in the north of the survey area. Palaeolithic chipped stone appeared present in many of the units, but the Neolithic and later prehistory were also represented. Pottery, in contrast to the chipped stone, was almost

Table 1: KNS 2021 survey units with site or area names; the type of survey (way of collecting material); site type (where 'background' scatters are also off-site, but off-site areas contain even less to no material); number of collected chipped stone pieces and where known periods indicated by diagnostic material; numbers of pottery sherds collected/kept with the preliminary period indication as designation during the field season. Indeterminate period chipped stone and sherds are not indicated; all units with chipped stone or pottery contained indeterminate pieces.

KNS unit	Site name / indication / area	Survey type	Site type	Chipped stone	Ceramics (prel.)		
				n	periods	n	periods
001	WAS Neo site; LAS 188	Coll.	Settlement / habitation site? Structures	484	LN; MP	1	1 ?Byz
002	WAS Neo site	Trans.		351	LN	0	
003	WAS Neo site	Coll.		222	LN	0	
004	WAS Neo site	Coll.		37	LN	1	
005		Trans.	Background	146		3	3 ?Iron
006		Coll.	Cairn	3	1 MP; Pal; ?late preh.	0	
007	WAS Neo site	Coll.	Structure(s), cairn	84	LN; ?Pal	0	
008		Trans.	Background	145	?late preh.	0	
009		Coll.	Knapping site	128	1 ?EP	13	2 Byz; 1 ?Rom; 1 ?Byz
010		Check	Off-site	NC		0	
011	WAS Pal. scatter(s)	Trans.	Scatter	263	Pal; ?late preh.	3	
012	WAS Pal. scatter(s)	Trans.	Scatter	419	Pal; MP; 2 LN	0	
013		Check	Off-site	0		0	
014		Check	Off-site	0		0	
015		Check	Background	NC		0	
016	Al Makhārīm	Coll.	Site halo?	288	1 LN	14	1 Byz; 1 Rom
017	Al Makhārīm area	Coll.	Off-site	69	1 LN	0	
018	Al Makhārīm	Coll.	Settl./hab. site	73	mixed	49	1 Iron; 1 Rom
019	Al Makhārīm	Trans.	Site halo	158		10	1 Nab; 2 Rom
020	Al Makhārīm	Coll.	Features	67		0	
021	Al Makhārīm	Coll.	Features	82		NC	
022	Al Makhārīm	Coll.	Background	85	2 MP	1	
023	Al Makhārīm area	Check	Off-site	0		0	
024	Al Makhārīm	SF	Not in situ	2	2 MP	0	
025	WG general	SF	Background	5	Pal	2	1 Ayy/Mam
026	WG site	SF	Terrace system, 1+ structure(s)	0		1	1 LBA
027	WG site	Coll.		0		20	5 LB/Early Iron
028	WG site	Coll.		5	1 MP	9	1 LBA
029	WG site	Coll.		3		24	1 ?LBA; 7 Ayy/ Mam; 1 Iron
030	WG site	Trans.		1		37	9 LB/Early Iron; 8 Ayy/Mam; 1 Iron II; 1 Abb
031	WG cistern	SF	Cistern	0		1	?Iron
032	Humūd site 1	Coll.	Slopewash / erosion of settlement / habitation site	81	Mixed; MP; 1 ?EP	97	1 EBA; 1 LBA; 15 Iron I; 3 Early Iron II; 2 Iron IIC; 15 Ayy/Mam; 3 Ab; Rom/Hell

033	Ḥumūd site 1	Coll.		43		29	1 Ayy/Mam; 1 ?Um; 2 LBA; 15 Iron I/II
034	Ḥumūd site 3	Trans.	Terraces, enclosure, cairn(s), scatter	175	?late preh.	14	1 Iron
035	Wādī Ḥumūd	Trans.	Background	20		1	
036	Wādī Ḥumūd cistern/cairn	Coll.	Feature	77	1 ?MP	4	3 LBA/Early Iron
037	Wādī Ḥumūd	Trans.	Off-site	47	Mixed; MP	3	1 Iron
038	Wādī Ḥumūd	Trans.	Off-site	18	mixed	NC	
039	Wādī Ḥumūd	Coll.	Off-site	9		0	
040	Wādī Ḥumūd	Check	Off-site	0 / NC	n/a	0	
041	Ḥumūd site 1	Coll.	Slopewash / erosion of settlement / habitation site	44	Pal	43	9 Ayy/Mam/ LBA; 12 Iron I; Hell/Rom/Byz
042	Ḥumūd site 1	Coll.		92	MP; mixed	12	5 LB/Early Iron
043	Ḥumūd site 1	Coll.		95	?LN/Chalc	3	1 Early Iron
044	Wādī Ḥumūd	Trans.	Background?	19		1	
045	Wādī Ḥumūd	Check	Off-site	0		0	
046	Ḥumūd site 2	Coll.	Neolithic scatter; possible structures	168	LN	2	
047	Ḥumūd site 2	Coll.		143	PPNB; LN	0	
048	Ḥumūd site 2	Trans.		145	LN	6	1 Iron
049	Ḥumūd site 2	Coll.		93	LN	0	
050	Ḥumūd site 2	Trans.		416	LN	0	
051	Imra’	Coll.	Settlement / habitation site	233	1 LN/EChalc	94	1 ?LN/Chalc; 4 EBA; 23 Iron I; 14 Iron II; 1 Um
052	Imra’	Coll.		16		21	1 LBA/Ayy/Mam; 4 Iron I; 9 Iron II
053	Imra’	Trans.	Site halo	141		23	13 Iron I; 3 Iron II; 2 Rom; 1 Byz
054	Imra’	Trans.	Site halo	93	1 ?LN	23	13 Iron I; 5 Iron II; 1 Rom
055	Imra’	Coll.	Site halo	45			IA; Classical
056		Check	Off-site	0		0	
057		Trans.	Off-site	2	1 ?LN	0	
058		SF	SF	2	2 ?Pal	0	
059		Trans.	Off-site	4		0	
060		Coll.	Cairn	9		0	Classic; IA/EIsl
061		Check	Background – off-site	10	1 ?LN	0	Classical
062		Coll.	Cairn	2	?late preh.	15	1 Rom
063		Coll.	Background	46	Not Pal	2	
064		Coll.	Cairns (?)	88	1 ?LN/Chalc	15	1 Iron; ?Classical
065		Trans.	Background	70	Pal; MP; late preh.	7	
066		Check	Cairn	NC		0	
067		Check	Dam	0		0	
068		Check	Background – off-site	NC		0	?Iron (NC)
069	Ḥumūd site 4	Coll.	Terrace system, cairns, scatter	147	1 ?LN	15	1 Byz; 3 Rom; 1 Hell

070	Humūd site 4	Coll.		105	1 MP; 1? PPNB	18	5 Neo/Chalc/EBA; 1 Rom; 1 Byz
071	Humūd site 4	Coll.		54		18	1 Byz
072	As Samākiyyah	Coll.	Settl. / hab. Site	25	3 ?LN/Chalc	33	16 Ayy/Mam; 7 Iron; 4 Rom
073	As Samākiyyah area (off-site)	Check	Off-site	15		9	1 Rom
074	Humūd site 2	Coll.	Neo scatter	20	PPNB; LN	25	1 Rom
075		Coll.	Background	4	1 ?late preh.; ?Chalc	6	2 Byz
076		Check	Pal. scatter	NC	Pal (?MP)	0	
077		Coll.	Background	6	Pal; 2MP	26	2 Ayy/Mam; 7 Iron; 4 Rom
078		Trans.	Off-site	27	Mixed; MP	0	
079		Check	Off-site	NC		0	
080	ASKP site 111	Coll.	Structures	83		20	9 Rom; 5 Byz
081	Al Judayyidah area	Check +Trans.	Off-site	27	MP	0	
082	ASKP site 111	Trans.	Site halo?	NC		0	

WAS = Wādī Abū Ash SHa'r;
WG=Wādī Al GHuwayr;
Coll.=Collection;
Trans.=Transect;
SF=spot find(s);
Settl. / hab. = Settlement / habitation;
NC = not collected;
Pal=Palaeolithic;
MP=Middle Palaeolithic;
EP=Epipalaeolithic;
Neo=Neolithic;
PPNB=Pre-Pottery Neolithic B;
LN=Late Neolithic;
Chalc=Chalcolithic;
EChalc=Early Chalcolithic;
EBA=Early Bronze Age;
LBA=Late Bronze Age;
Hell=Hellenistic;
Rom=Roman;
Byz=Byzantine;
Um=Umayyad;
Ayy=Ayyubid;
Mam=Mamluk;
late preh.=late(r) prehistoric.

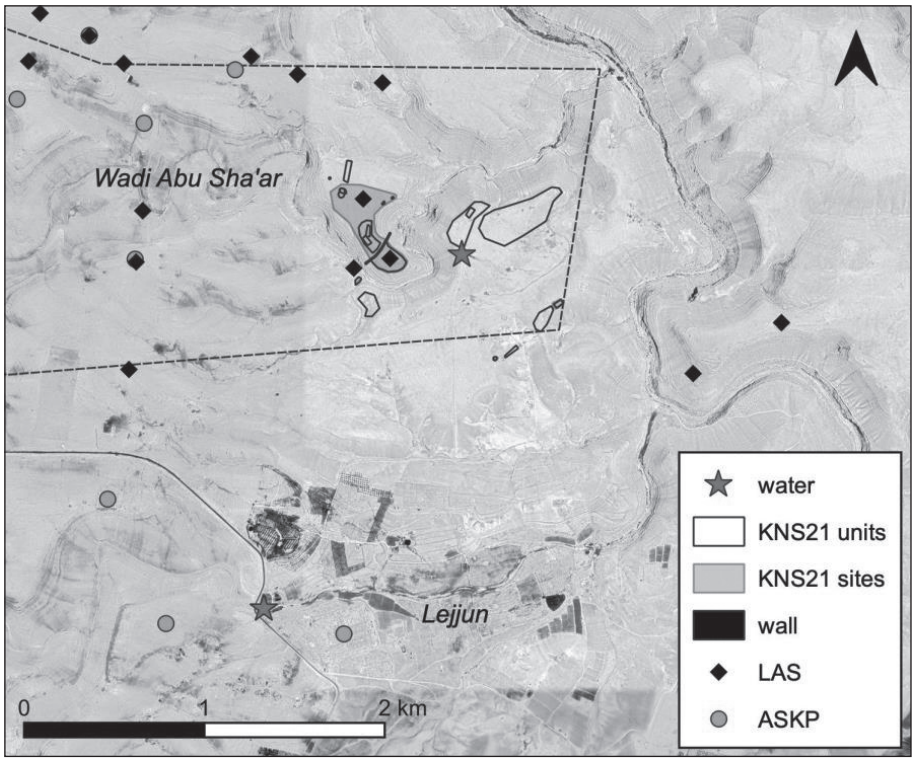
absent in the southeast and more abundant in the north. No intact pots were encountered, and Late Neolithic sherds were very rare, if they were found. The most important pottery assemblage to document for the first time in the Karak Plateau was a handful of Midianite pottery sherds that were collected from the site KNS072 (As Samākiyyah) (**Fig. 15**; see below).The findings are described into more detail for each of the wider survey areas and by 'site' within each of these.

Southeast of the Study Area: Wādī Abū Ash SHa'r

The reason for including this area were two-fold. Firstly, a Late Neolithic site had been reported by Parker (2006, Limes Arabicus Survey site 188), and this seemed to be confirmed by visits here by some of us in 2018 and 2019, during which we also noticed a prehistoric presence in the wider area (Flohr and Finlayson 2020, 2021). We therefore wished to study the Late Neolithic site more closely and explore the area around it to investigate whether more Late Neolithic material was present. Furthermore, the steppe environment contrasts with the agricultural zone further in the north of our survey area.

The Wādī Abū Ash SHa'r Area

The area currently receives on average around 250mm of annual precipitation, and while conditions were probably wetter during certain periods in the past, such as the Neolithic, other water sources would have likely been important. The Wādī Abū Ash SHa'r, at this point, is presently deeply incised and at least seasonally dry, but it is interesting that there is a pumping station on the south bank. It is not clear if this uses an existing, but now otherwise dry, spring, but if not, it seems likely that the water table is relatively shallow here. A spring or perhaps multiple springs are (or used to be) also present in the Al Lajjūn area less than 2km to the south. The Wādī Abū Ash SHa'r south bank is currently home to several Bedouin families, although it is not clear if this is only because of the presence of the pumping station or goes back further in time. Our area of focus sees several minor *wadis* coming together into



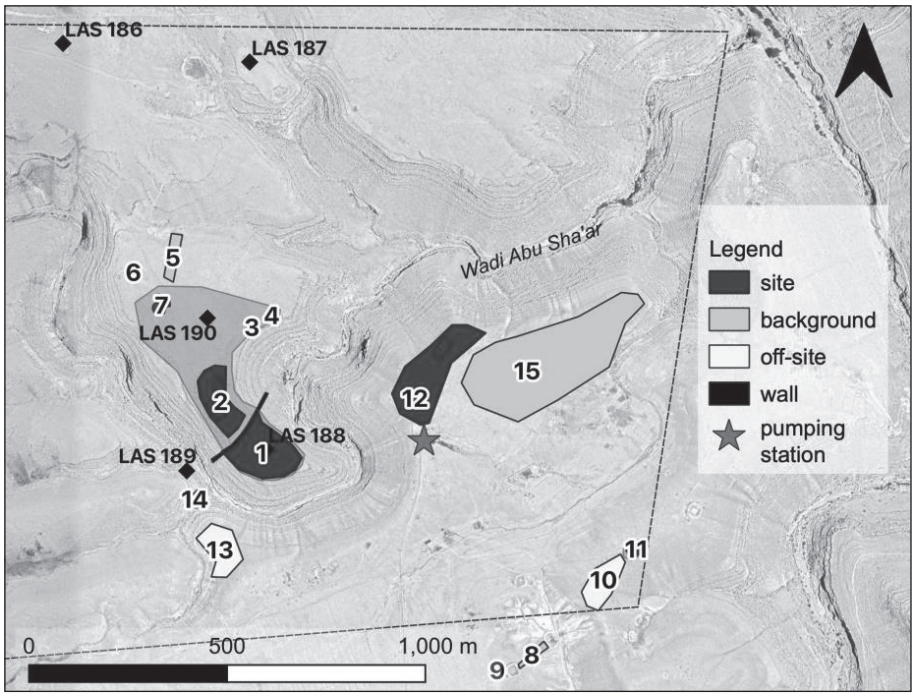
3. The southeastern part of the study area in its context. Shown are the 2021 survey units (see Fig. 4 for a close-up), previously recorded archaeological remains by the LAS (black lozenges) and ASKP (circles), and known or suspected water sources (star). Background Google Earth.

the Wādī Abū Ash SHa'r, and not far east from our 2021 survey units, this *wadi* runs into one of the major, now deeply incised *wadis* of the region, the Wādī Ad Dab'ah, one of the main tributaries of the Wādī Al Mūjib.

Wādī Abū Ash SHa'r North Bank

Here, our main focus was on the area of LAS Sites 188 and 190 (Clark *et al.* 2006), located on a sort of peninsula in a sharp bend of the Wādī Abū Ash SHa'r (**Fig. 4**). At least nowadays there is a rather steep slope towards the *wadi* bed, although the people living locally are able to cross the *wadi* easily. Using a combination of collection units and transects we documented features and collected material, which was almost all chipped stone, as units KNS001-007 (see **Table 1**). The far southern end of this peninsula is 'closed off' by a man-made, now collapsed wall, which appears to have been substantial (**Fig. 5**). To the south of, and enclosed by, this wall lies LAS 188, our unit KNS001, for which the LAS team reported "many circular structures" (Clark *et al.* 2006: 73). These are currently not very clear in this area; possibly they have become more disturbed since the 1980s. However, north of the wall, in our unit KNS002, mostly subcircular structures and curvilinear wall lines are clearly present, made of limestone and basalt stones. These include a *ca.* 8.5×9.4m subcircular double ring. As also reported by Clarke (2006) for LAS 188, at both KNS001 and 002 the deposits appear shallow, with the limestone bedrock visible in many places. As the chipped stone scatter was not particularly dense even for this apparently deflated surface, it is not clear how intensive occupation would have been; however, it is perhaps possible that artefacts have been washed downslope and carried away by the *wadi*.

Further northeast, along the edge of the escarpment, are further structural remains (units KNS003 and KNS004). KNS003 contains a small group of 2-3 subcircular adjoining stone structures, with a later cist inserted into them (**Fig. 6**). KNS007 is formed by a stone sub-circle of *ca.* 36×20m with a low 8×8m cairn and further internal features within, including the remains of a smaller stone circle. Units KNS003, 004, and 007, and perhaps also 002, might be part of LAS Site 190 (Clark *et al.* 2006: 74). Further north the already not very dense scatter becomes even less dense, and it appears unit KNS005 (a transect) and KNS006 (a 1.5×1.5×1.5m well-built cairn) are 'off-site' with just a background scatter of material present. In KNS005 deposits are deeper, so the



4. Southeastern part of the survey area, the eastern Wādī Abū Ash SHa'r area, with units KNS001-015 and estimated locations of Limes Arabicus Survey (LAS) sites. Within units KNS002 and KNS012, the outlines of the survey transects are indicated. The dashed line indicates the outline of the study area (KNS008 and KNS009 fall outside the study area but were included as the area is heavily disturbed and at risk of being destroyed).

context might not be deflated, and the material might be simply less visible.

Except for a couple of small sherds, all collected material from units KNS001, 002, 003, 004, and 007 consists of chipped stone. Although the overall assemblage here indicates a Late Neolithic presence, the sample varies over the site. The largest quantity of material, collected from the peninsula enclosed by the wall (KNS001) is the most diverse and includes at least one clearly Palaeolithic tool, a Mousterian point. There are heavily rolled and battered pieces, including one rolled bifacial fragment from KNS007, that also likely indicates a Palaeolithic presence. There are marked differences between KNS001 and 002 (both transects) on the one hand, and KNS003, 004 and 007 on the other. The first three are predominately flake-based assemblages, with KNS001 having the highest representation of blades at only 12%. In contrast, KNS003, 004 and 007 all have significant blade proportions around or over 20%. This difference is matched in the proportions of concave truncation burins, one of the most clearly diagnostic Late Neolithic tools present. KNS004 has the most in absolute

5. The wall between KNS001 and KNS002, looking SW over its length (top) and SE to its northern face (bottom).

6. One of the structures at KNS003.

numbers (20), 19% of the retouched tool count, while they represent 62% in 004 and 42% in 007. In KNS001 and 002 concave truncation burins are presentat consistently less than 4%.

The diversity of material in KNS001 may indicate a habitation site, although the diversity might also be a product of a palimpsest of material. In addition, the large effort and time spent by the team at this part of the site (see **Table 1**) and the therefore larger assemblage collected might have biased the sample. In any case, KNS003, 004 and 007 appear far more specialised in nature. A Late Neolithic date with some Palaeolithic presence is in line with the interpretation by the LAS project (Clark *et al.* 2006: 73, based on analyses by G. Rollefson), during which 40 Late Neolithic and eight Palaeolithic lithics were identified at LAS188. On the other hand, they identified mostly Chalcolithic/Early Bronze Age material at LAS190 (Clark *et al.* 2006: 74).

Wādī Abū Ash SHa'r South Bank

This area is currently busy with Bedouin camps and includes opportunistic fields. It is not clear if these are still in active use, as we only visited the area outside of the growing season in October (we have not yet asked the people living there). As mentioned, these fields and even the presence of people living here might be a consequence of the pumping station. We surveyed, more and less intensively (see **Table 1**), several areas here, units KNS008-015. No architectural remains were observed, but a background scatter was present almost everywhere, except for in units KNS013 and 014 and apparently also the minor *wadi* leading to these. The density varied - our mapping of this, however, is not in detail as our main aim was to establish a presence/absence of Neolithic material. Nonetheless it is clear that in units KNS009, 011, and 012 the chipped stone density is higher, while in KNS015 it was much more of a background scatter, and in KNS010 even lighter again. KNS008 might be slope wash from KNS009/the modern reservoir and contains a large, apparently worked stone. KNS014 is a rock shelter apparently used as animal shelter, probably one of the rock shelters described as LAS 189 (Clark *et al.* 2006). Clark (2006: 73) mentions Chalolithic/EBA and Early Roman/Nabataean material, but we did not see artefacts; they would in any case likely be covered by the dung layers.

There is a clear Palaeolithic element in the studied chipped stone. KNS011 includes Levallois cores, flakes with truncated facetted butts, hard hammer thick blades, and convergent retouched points, all of which suggest a Palaeolithic date for this unit, although angled scrapers may indicate a later prehistoric element. KNS012 contains Levallois points, Mousterian points, large blades with isolated platforms, plus some rolling, all indicating that this was also part of a Palaeolithic site. Flakes removed after rolling and patination suggest the area was subsequently used as a resource for later flint knapping, and the presence of two concave truncation burins and several angled scrapers suggests a Late Neolithic date for this activity. This is perhaps not surprising given its location just across the *wadi* from KNS001-007. There are platform renewal and scraper resharpening flakes not seen elsewhere in the survey area. KNS009 attracted our attention in the field as it was a fairly well-defined scatter. Numerous primary elements, simple cores on pebble fragments, and bashed pebbles, suggest this was a primary knapping site. No pieces are specifically chronologically diagnostic, the sole dihedral burin might suggest an Epipalaeolithic date. Later material was also around, with 13 pottery sherds, and preliminary analysis indicates a Byzantine date for at least two of these. While KNS008 material could theoretically have eroded out of KNS009, this is not borne out by the chipped stone, which is poor in retouched pieces and is not diagnostic to period, although one angled scraper and an absence of anything else diagnostic suggests later prehistory. Except for KNS009, little is known about the type of activity at these locations, but all of the units with higher densities of chipped stone have excellent views of the *wadi* and/or general landscape (**Fig. 7**), although we (in our team) are not aware how the landscape has evolved since Palaeolithic times.

Southwest of the Study Area

Hardly any of our attention was focused on this area during this season, because the

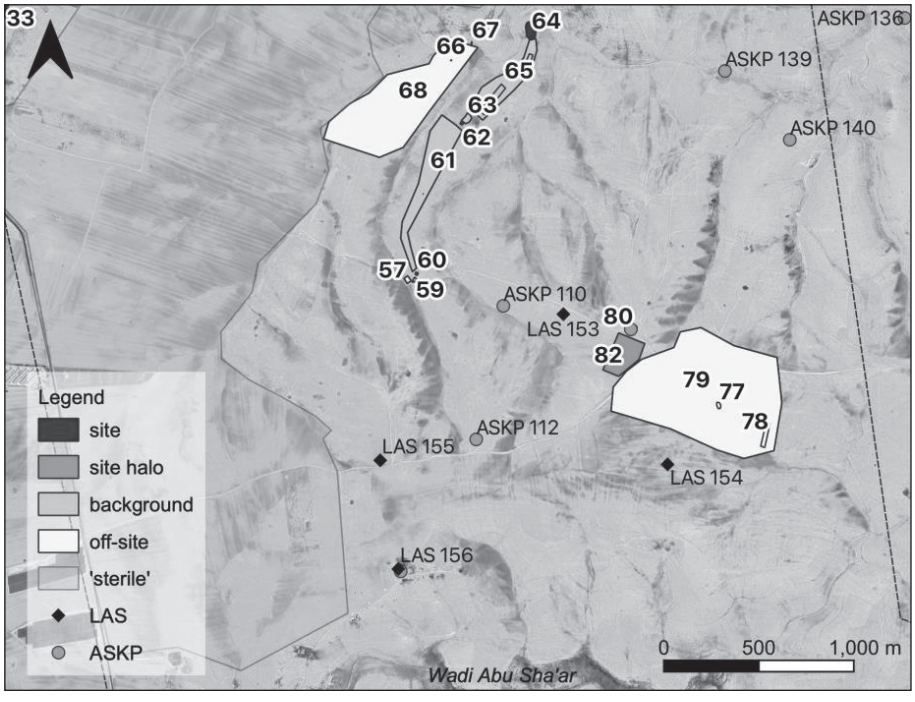
7. View from KNS009 towards to north. The pumping station and, across the wadi, site KNS001-007 beyond are visible; to the right (east) of the pumping station are units KNS012 and KNS015.

old village of Al Judayyidah (/Judaiyida) had already been studied by both the ASKP (ASKP 119) and the LAS surveys (LAS Site 158), and partly also because of a lack of time. The LAS studied a road-cut on the east side and found sherds dating back mostly to Classical periods, but also to the Iron Age, Mamluk, Ottoman, and modern periods (Clark *et al.* 2006: 70-71). Our survey and transect on the north slope of the modern village yielded an extremely low density of artefacts, including one discoidal core and one Levallois point. Because of the disturbances present in the area it is not clear if these are *in situ*, and they are more generally in line with the general background scatter of Palaeolithic remains in our study area.

Middle of the Study area Area

Based on the criteria described above (*e.g.* the presence of drinking water and naturally irrigated areas), we did not expect to find much evidence, at least of settlement/habitation sites, in this part of the survey area, and our pilot investigations show that this is correct. There are large areas of rolling hills with shallow *wadis* that yielded no (visible) material to an extremely low-density background scatter of mixed/undiagnostic material (mostly chipped stone) (*e.g.* KNS068, 077-079). These are interspersed with structures like (burial) cairns, sometimes already recorded by Miller and/or Parker (**Fig. 8**).

The western/north-western part of this middle area is agricultural land and heavily ploughed with very few stones visible, suggesting it has been intensively prepared for agriculture (**Fig. 8**). It appears devoid of artefacts: in some places it is almost'sterile'. We were not able to confirm this, but it appears possible a layer of fine sediment was put on the natural surface to increase the cultivatable soil depth, perhaps derived from places like a sediment quarry we observed just north of KNS075. In this case the absence of artifacts would be caused by a visibility issue. Nonetheless the artefact scarcity was repeated in the area to the southeast of this, where shallow *wadis* are present with 'ridges' in between. These are also ploughed and used



8. Middle of the study area with the KNS survey units numbered and in shades of red to white, the seemingly 'sterile' area (see text), and the estimated locations of known Limes Arabicus Survey (LAS) and Archaeological Survey of the Karak Plateau (ASKP) sites. The boundaries of the study area are indicated by the dashed lines.

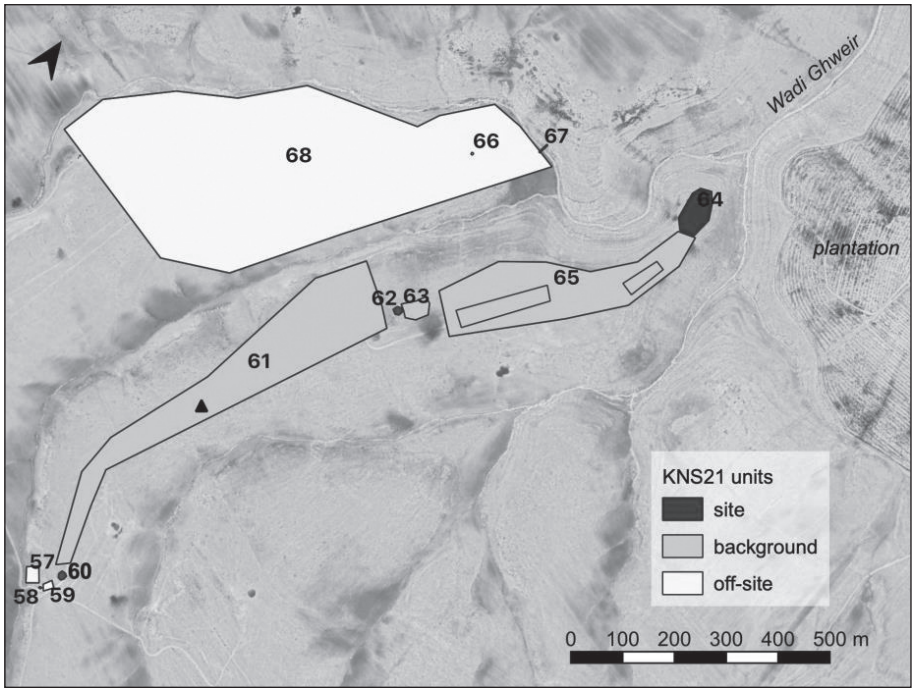
for opportunistic agriculture, but as visible on the satellite image (**Fig. 8**) the surface appears to be different and perhaps agriculture is less intensive here. There are generally very few artefacts, at least on the surface. During this pilot season we investigated these areas mainly by walking over large areas in lines, spaced far apart, documenting features and doing occasional more intensive transects.

For the most north-western ridge, very little material was observed in general (KNS068), both on top of the ridge and towards the *wadi* beds (**Fig. 9**). Most material appeared present in the northeast of the context, perhaps somehow related to the cairn there (KNS066). A dam of unknown date was also recorded (KNS067).

The next ridge in the south-westerly direction also yielded very few artefacts in its ploughed fields (KNS057, KNS058, KNS061) (**Fig. 9**). Two single cairns are present (KNS060, KNS062). At the end of the ridge, overlooking a junction of *wadis*, is a group of apparent cairns, KNS064. It consists of one large cairn/ cairn agglomerate at its highest point with several smaller cairns nearby. In between these cairns are ploughed areas and there is evidence of clearance by bulldozing. It does not appear that these cairns are merely clearance piles, but this cannot be excluded. The chipped stone found in this area was not very informative, with no diagnostic pieces, and may just represent a background scatter more preserved, or bulldozed into, the stone pile parts. A small bladelet core might indicate an early Neolithic or Chalcolithic date. Of the pottery sherds, preliminary analysis indicates that one is Iron Age, one of possibly Classical date.

A third investigated area again only yielded an at most extremely low-density background scatter (KNS077-079), with the chipped stone indicative of mixed periods including the Palaeolithic (2× Levallois core, 1× Levallois flake, from a bulldozed hole). In terms of visibility and obtrusiveness, it is interesting that, as in many areas in our survey area, much less material was spotted in ploughed field areas, with almost all of it present on harder, deflated to bedrock surfaces.

A few mostly single structures / cairns nearby in similar areas were documented by the ASKP and LAS projects, generally on or close to tops of hills and rises, but none of these are indicative of settlement or habitation sites, insofar as this can be determined based on ground survey. On what appears to be the highest point around a complex structure is present, KNS080 (see **Fig. 8**), already documented as ASKP site 111 (Miller 1991: 67). It consists of two adjoining sub-circular structures and one separate sub-circular structure of which only a semi-circle remains with the inside ploughed. Additional straight wall lines are also visible.



9. The northern part of the mid area with the KNS survey units. Note change of north direction. The triangle indicates the location of a converse truncation burin. 60, 62, and 66 are single cairns; 64 is a group of (possible cairns); 67 is a dam. No LAS or ASKP sites are located within the map frame. Background Google Earth.

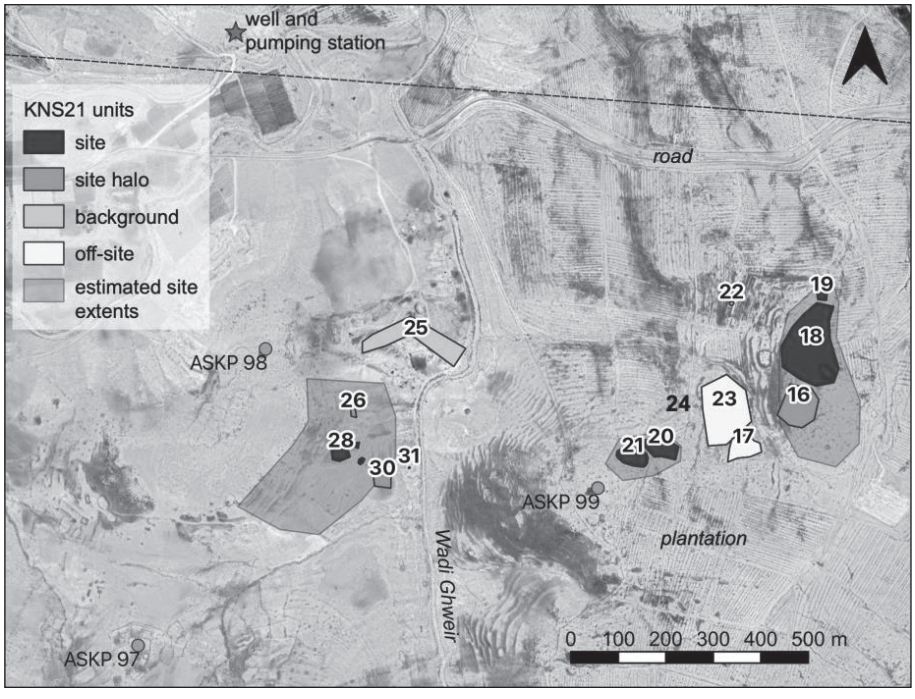
These might be part of the 8×8m structure described by Miller (1991), which we, however, did not observe as such, and which we may have simply missed or the wall lines may have been ploughed out or damaged by the tracks in the intervening forty years. Miller found Nabataean, Early Roman and Late Byzantine sherds (Miller 1991: 67); our preliminary analysis confirms these dates with 9 Roman and 5 Byzantine sherds. We also collected 50 pieces of chipped stone and were interested to see if there was therefore also a prehistoric component to the site, but unfortunately none of the pieces was diagnostic. KNS082 contains a scatter which is probably related to KNS080, but due to time limits we did not collect material here.

Northeast of the Study Area

The Plantation / KHirbat Al Makhārīm / Wādī Al GHuwayr east Side

We explored several areas inside the modern plantation in the north-eastern part of our study area (**Fig. 10**). This area overlooks the Wādī Al Qunayṭirah (or *Qneitrah*) or Wādī Al GHuwayr (according to Miller, *Qneitrah* is the name for the general area rather than the specific *wadi*) to the west and is currently heavily terraced on the slopes and cultivated for trees. There are several areas, however, which remain 'intact', presumably because many stones are present. When Miller surveyed here in 1979 the area was not yet agricultural. He reported stone heaps with occasional wall lines, with a pronounced *rujm* at the south end of the site, which he called KHirbat Al Makhārīm after Musil (Miller 1991: 63, site 99). It appears he did not visit the area where our units KNS016, 018, and 019 are, as clear structures are present here, but our areas KNS020 and KNS021 likely belong to Miller's ASKP site 099. We found that these latter two areas contain stone cairns and circular features, with a very low density of chipped stone. One feature of particular interest is a stone arc revetted into the slope. We did not find pottery in these specific areas. In a gully downslope two bifaces were found, which corresponds to Miller's observation of Lower or early Middle Palaeolithic handaxes (Miller 1991: 63).

Units KNS017 and 023 yielded very little material and appear to be 'off-site' with stone piles interpreted (by us) as clearance cairns. East/northeast of this, though, an area with clear larger and smaller circular structures as well as cairns is present(KNS016, 018, 019). A standing stone is located on -roughly- the highest point. Several structures composed of a circular structure with a 'flimsier' larger circular structure attached were observed, one of which was recorded as KNS018 (**Fig. 11**). Next to the 'house' a grinding stone platform with a circular



10. Northeast of the study area with the 2021 survey units, their interpretation, and estimated site extents in grey. ASKP site 99 is Al Makhārīm (Miller 1991). KNS24 is the find spot (in a gully) of two bifaces. A well and pumping station is mentioned by Miller and the location was derived from Google Earth imagery, but not yet checked on the ground.

depression, plus grinder, was present. There is also a possible cistern nearby. It seems this is a 'later' (non-prehistoric) village extending over the knoll, likely in a location with an earlier presence, if not occupation.

The chipped stone from the wider 'Al Makhārīm' area (including all of the units KNS016-24) was very heavily flake based (all units <10% blades, and one unit, KNS020, < 3%). The material from KNS016, 018, and 019, around the structures, was notably very fresh, suggesting it may be eroding from *in situ* contexts. KNS016 and 017 each included one concave truncation burin, suggesting a Late Neolithic component, but there were few diagnostic elements present, with most of the units dominated by miscellaneous retouched pieces, fragments, and used pieces, which generally made up more than 60% of the assemblages and in unit KNS018 was at 79%. KNS022 showed a Palaeolithic presence, with one Levallois core and a Levallois flake with a truncated facetted butt. 024 was the find spot for two bifaces, one ovate and one lanceolate with a missing tip. The ovate biface was particularly well made.

Pottery was found in units KNS016, 018, and 019 only. Preliminary analysis indicates an Iron Age to Byzantine date, but numbers for each are low. This corresponds to Miller's ceramics, which date to Classical periods (Nabataean to Byzantine), which seem to have come from parts of the site more to the southwest (Miller 1991: 63).

In sum, it appears that Al Makhārīm is an area extending over the larger east slopes of the Wādī Al GHuwayr and includes multi-period activity, including the Palaeolithic and Classical periods with most likely occupation in between, but it is hard to pin down a more specific period for the latter. This is a promising area which merits further research.

Wādī Al GHuwayr (West Side)

Due to modern occupation, the part just south of the road, a tentatively 'high probability area', could not be explored. Further south, downhill from ASKP site 98, an Iron Age *rujm* (Miller 1991: 63), a terrace system and at least one structure were found (KNS026, 027, 028, 029, 030) **(Fig. 12**). KNS027 is a generally rectangular structure (12.85×6.40m; inner part 8×6.40m), with either two rooms or an inner and outer area, and a possibly later circular feature on top (*ca.* 4m diameter). Another possible rectangular building is present upslope, but this may be part of the terrace wall system. Almost no lithics were found. Pottery was much more abundant and during preliminary analysis was assigned to the Late Bronze Age (n=2), LBA/ Early Iron Age (14), general Iron Age (1), Iron II (1), and the later Abbasid (1) and Ayyubid/ Mamluk (15) periods. The structure KNS027 only yielded LB/Early Iron pottery, and it is tempting, but completely preliminary, to assign the structure to the LBA/Early Iron Age, and the terrace system to the later periods.

The site might be associated with ASKP site 098 uphill, which yielded a rectangular building and Iron Age, Nabataean and Late Islamic sherds (Miller 1991). The Ayyubid/Mamluk component (possibly the field system?) might be connected to the village site of KHirbat Muhaysin about 600m to the southwest, which

11. KNS018 circular structure with its 'courtyard' just visible to the left. Looking west with the modern villages of Humūd and As Samākiyyah visible in the background.

12. The terraced structure within the terrace system on the west bank of the Wādī Al GHuwayr, Al Qunaytirah (KNS027).

yielded multi-period evidence from Middle Bronze Age, Nabataean, Byzantine, Umayyad, Late Islamic, and Late Ottoman periods, also including five Ayyubid/Mamluk sherds (Miller 1991: 62).

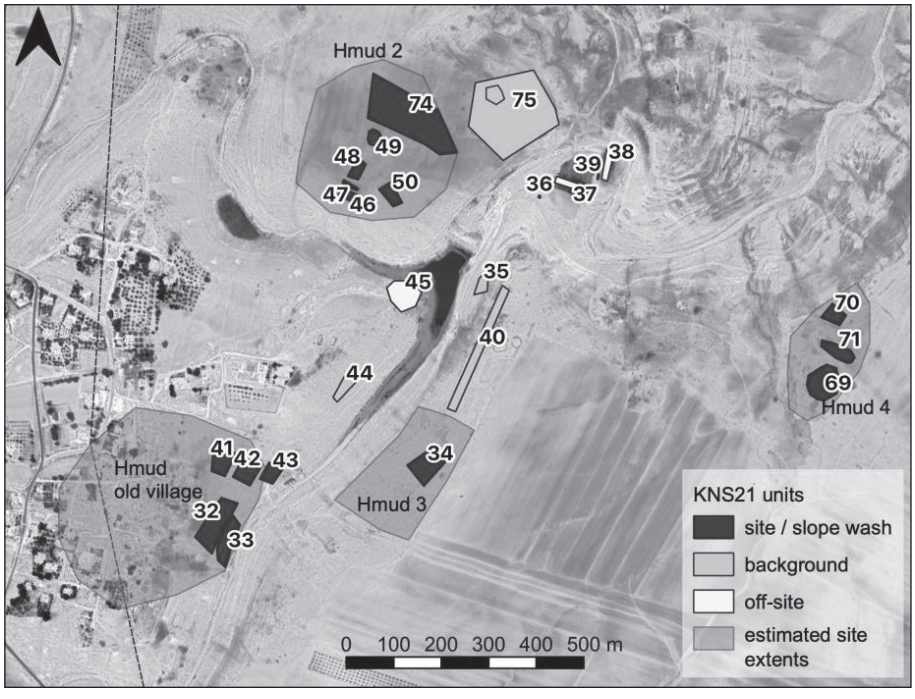
Humūd

Around 2km WSW of the LBA/IA and Ayyubid/Mamluk site in the Wādī Al GHuwayr lies one of the three villages of the study area, Humūd, on one of the more prominent *wadis*. We term this *wadi* here the Wādī Humūd, but we are not sure of its actual name. The area is very rich archaeologically and certainly merits more research. In our 2021 season we investigated only the part from the western edge of the survey area, where the modern as well as old village of Humūd is located, to about 1.5km upstream as the crow flies (or 2km following the *wadi* course) (**Fig. 13**). We had high expectations of the area, considering the presence, attested by Miller, of the old village, going back to at least Classical times, the presence of a *wadi* confluence with meandering bend with modern fields, and the visibility of many remains as well as modern Bedouin camps in the area, together indicating a water source and conditions suitable for at least opportunistic agriculture (**Fig. 13**; but note the small lake on the imagery is created by a modern dam).

Humūd Village

This site, ASKP site 100 and MEGA-Jordan 11051 is an old *(i.e.* Late Ottoman-20th century) village on top of earlier remains. When visited by Glueck (1934, in Miller 1991: 63) it was a "small inhabited site", while by the time of Miller's survey it has been "largely deserted" (Miller 1991: 63). There is now a new village built adjacent to the old village, while the old, ruined structures themselves are also occupied. While probably located on a natural hill or knoll, with the *wadi* on its southeast side, this also appears to be a *tell*. Miller found sherds dating from Nabataean to modern times. To investigate if there was an earlier element too, we collected material on the uninhabited southeast slopes between the old village and the *wadi*, where material is washing down as well as potentially eroding out (KNS032, 033, 041, 042, 043).

The majority of the collected material is pottery, but chipped stone was recovered too. While the pottery needs to be studied into more depth, the preliminary analysis is already very interesting, as clear pre-Nabataean sherds were found, dating to the Early Bronze Age (n=1), Late Bronze Age (3), LBA/early Iron (5), Iron I (16), Iron I/II (15), Iron II (4), as well as the Classical and Ayyubid/Mamluk periods mentioned by Miller. It is therefore clear that occupation goes much further back than originally thought.



13. Humūd and surrounding area. The dashed line indicates the edge of the survey project area. The estimated site extents include non-surveyed areas.

However, the expected Neolithic site does not appear to be clearly present (or the material is simply not present on the slope, which might well be the case). The chipped stone from the survey units at Humūd is highly variable. KNS041 appears to contain a significant Palaeolithic element, visible in facetted flake platforms, hard hammer thick cortical flakes, and some heavy bifacial fragments, with some significant rounding on the material. KNS042 is similar, including Levallois flakes with facetted butts and much evidence for rolling of the material, with some pieces retouched after rolling. KNS032 is again similar, and includes a Levallois flake core, but in addition has one microlith present, suggesting an Epipalaeolithic presence. KNS033 had no specifically diagnostic material. KNS043 has no obvious Palaeolithic material and very little evidence for rolling of the material. The angled and corner scrapers present are probably Late Neolithic or Chalcolithic.

Humūd 2 / Tall Ar Ramādī

Two knolls to the north from Humūd Old Village, we found a clearly Neolithic site (KNS046-50, KNS074) (**Fig. 13-14**). This was not reported by Miller, and also does not appear in MEGA-Jordan. There were relatively few pottery sherds, with the two diagnostic ones dating to later periods, but a (medium dense) scatter of chipped stone which stood out for its 'nice' tools. The chipped stone is in general Late Neolithic in character, although the single Amuq point from KNS047 indicates a PPNB presence. This is confirmed by the presence of a bidirectional blade core fragment from KNS074. Unusually for the wider project survey area, there is little evidence for any Palaeolithic presence. The material is not technologically uniform, visible in the variable proportion of blades, 14% and 13% in units KNS046 and KNS050, respectively, and over 20% in all other units, running as high as 38% in KNS047 (44% in KNS074, but within a very small, biased collection). These very high blade proportions may be a further indication of an earlier Neolithic presence.

14. Part of the Humūd 4 area with a few of the terrace walls, looking across the wadi, with Humūd 2 to the left (the grey hill) and As Samākiyyah in the distance.

It is not clear how deep the deposits go. The scatter washes off into the *wadi* on the south side and runs out where the fields start on the northeast side. It is not clear if any material might be present under the fields. On the knoll, which commands good views to all sides and especially over the *wadi*, some large, possibly natural basalt blocks were found, which appear to be bulldozed off the top. There are possible stone structures and/or mounds on the top of the hill, which are incorporated into the soil matrix and therefore do not appear to be the result of field clearance.

Wadi Banks

On the lower terraces closer to the *wadi* very little material was found, and what was found were mixed, generally undiagnostic material, as ever including some Palaeolithic material (units KNS037-39, 045). Future geological analysis and/or test pits will hopefully indicate whether the surfaces have been eroded or covered by colluvium or neither. A looted cairn or cistern (KNS036) yielded more material, essentially serving as test pit of sorts, but unfortunately the general picture was the same.

South Side of the *Wadi*

Humūd 3

Almost opposite Humūd old village, on top of the now steep east *wadi* bank on the sloping upper terrace, there are elements of terracing, cairns, and a structure, apparently an enclosure of some sort which appears to be mostly buried under modern slope wash. There is a medium-density scatter. Within a wider area that we call Humūd 3, we walked transect KNS034. In this unit, 175 pieces of chipped stone were collected, including, however, very few formal tools. Four of these are angled scrapers and

there is a concave truncation, possibly a blank for a concave truncation burin, suggesting a late prehistoric date. North of this area the scatter becomes sparser.

Humūd 4

Further north along the *wadi*'s east bank, beyond the bend, on a sort of premonitory on the sloping edge before the slope becomes steeper, lies an area with many basalt boulders and cobbles, including cairns, field boundaries, terrace wall features, enclosures (**Figs. 13, 14**). The area is disturbed by ploughing. Three areas were chosen for collection; it seems that the area continues further north (although on satellite imagery it appears to change). The area is of interest because it was the only area in our pilot season where potentially Neolithic pottery was found, possibly preserved by their location near structural remains (/or recently ploughed up?). It concerns 5 Neolithic/Chalcolithic/ Early Bronze Age sherds, which are most likely Neolithic or Early Chalcolithic. In addition, 7 Iron Age, 1 Hellenistic, 5 Roman, 2 Byzantine, and 16 Ayyubid/Mamluk sherds were collected (as well as undiagnostic ones). There is little chronologically diagnostic chipped stone material, although the concave truncation burin and denticulate from KNS069 may suggest a Late Neolithic date. KNS070, although a very small collection, includes one Palaeolithic Levallois core, but a poor example made on poor quality flint, and one upsilon blade, typical of PPNB naviform technology. In sum, the area seems to be a multi-period area used at least at some point for field systems and perhaps also for keeping animals, and perhaps prior to that for (burial?) cairns.

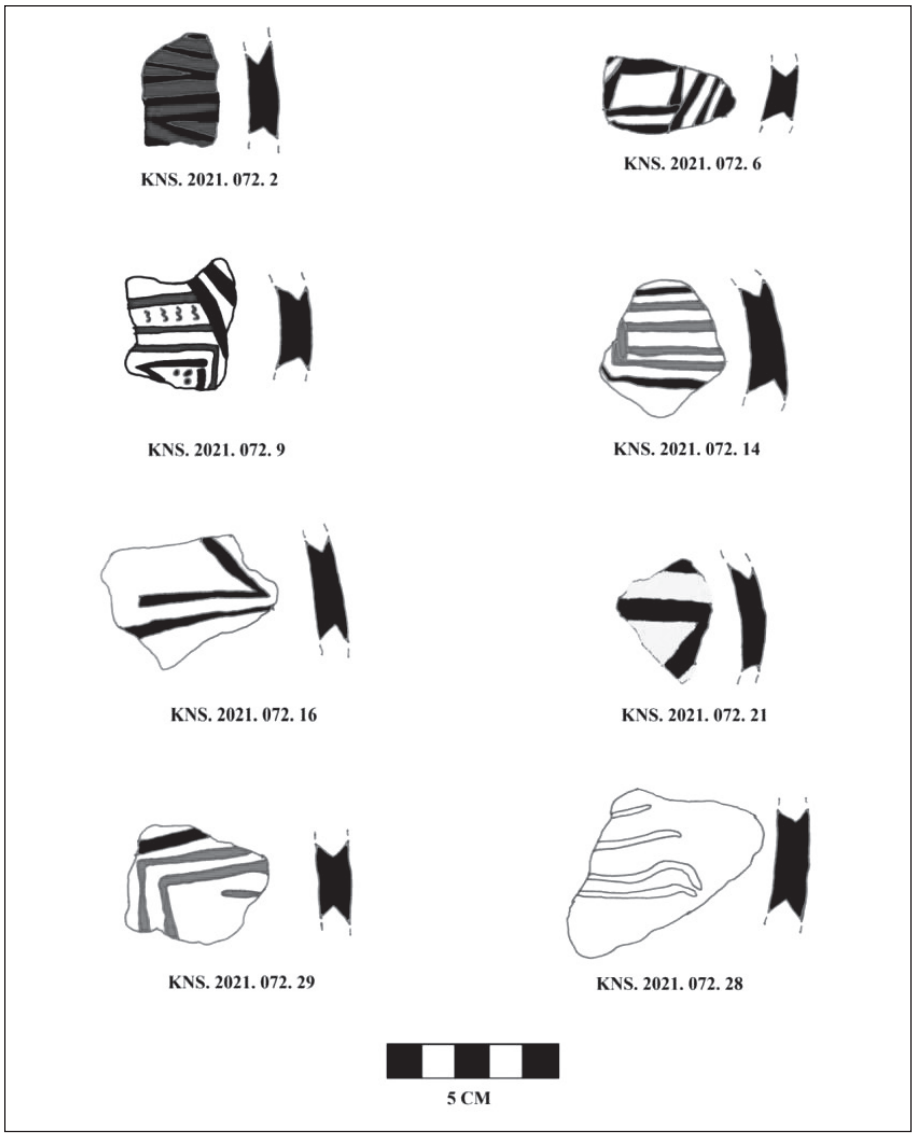
As Samākiyyah

The northwest end of the survey area is this modern village, which lies directly west of the old village. This old village is ASKP site 94. Apparently it was unoccupied around 1900 AD and resettled by the 1930s (Miller 1991 after Musil and Glueck). Miller's sherds indicate the earlier village dated from the Iron Age to Late Islamic periods (Miller 1991: 62). Our aim was to find out if there is also an earlier component, but with the non-built slopes occupied by Bedouin winter camps and no clear exposed section, this was not possible, and it might require a test trench. The few recovered chipped stone pieces included a small single platform bladelet core and three angled scrapers, possibly Late Neolithic or Chalcolithic. However, given the general background scatter numbers that are present throughout the region, a prehistoric component of As Samākiyyah is not demonstrated by this. Pottery was abundant, and is in line with Miller's findings, with Iron Age, Roman, and Ayyubid/Mamluk sherds present. Moreover, it contains the most exciting pottery finds of the season: for the first time on the Karak Plateau a handful of Midianite pottery sherds were collected (**Fig. 15**). These are different in type of the painted decorations and ware than those encountered at KHirbat An Nuḥās, Wādī Faynān dated to the Iron Age (Smith and Levy 2008), but parallel to the so-called *Hijazi* Midianite Pottery of the Late Bronze Age tradition (Marta Luciani personal communication 2022).

Imra' / Amra' / Mra' = MEGA-Jordan 10212

Outside the study area, one single site was included because we observed Late Neolithic material in a *wadi*/bulldozer cut in 2019 (Flohr and Finlayson 2020). This site is ASKP site 15, at which Miller found sherds dating from the EBII-III onwards (Miller 1991: 33). The site lies at the head of the Wādī Imra' (and presumably contains, or contained, a spring) (**Fig. 16**). We re-investigated and collected material from the south-eastern edges of the site (KNS051 and 052), where the site is cut by the *wadi*, bulldozing and the road. In contrast to our 2019 impression, relatively few chipped stone was present and it mainly came from an animal burrow in KNS051. This might indicate the earlier layers at the site are present below the current surface, but if these are substantial layers indicating a village, or rather occasional use would need to be confirmed by excavation.

Most of the chipped stone is poorly chronologically diagnostic. The principle exception is a Nizzanim point derived from this animal burrow, which is probably Late Neolithic, possibly early Chalcolithic (see image in Flohr and Finlayson 2020). An intensive pick up from the surface of the bulldozer cut (KNS51) failed to find any other artefacts as



15. Pottery sherds collected from the surface of As Samākiyyah, containing several sherds of the Hijazi Midianite type. Drawings by Laith Alshboul.

diagnostic, although nothing was found that would contradict this date either. Collecting from the adjacent section (KNS52) and KNS55 produced only a low number of flints, but this material is eroding from above the layer of the bulldozer cut. Nearby plots KNS53 and KNS54, across the *wadi*, also produced only low-density scatters. One fragment found in KNS54 may be from a concave truncation burin, also suggesting a Late Neolithic date. The assortment of thick scrapers generally supports such a date.

Abundant pottery was found, with, interestingly, one potential Late Neolithic / Chalcolithic piece from the same unit as the Late Neolithic chipped stone. Otherwise the pottery is as expected dating to the EBA and further mainly to the Iron Age (see **Table 1**).

Concluding Remarks

Finding the Late Neolithic

The Karak Neolithic Survey 2021 pilot season was successful in identifying areas with greater and lower archaeological probabilities, information which will feed into a Bayesian allocation model. It is important to note that we focused on areas where Neolithic (or, in general, prehistoric) remains are likely to be found. This is intended to help to address existing biases against such sites (Banning *et al.* 2013). However, the overall picture of the archaeological landscape through time will remain biased, as sites in areas that have been eroded or buried since the Neolithic, as well as areas where visibility is low for other reasons (*e.g.* our 'sterile' agricultural area), will not likely be located, and the Neolithic will therefore

16. The modern and old villages of Imra' with the KNS units surveyed in 2021.

remain underrepresented. Nonetheless, finding some Neolithic sites is better than none.

We have already documented in this first exploratory season a 'new' Neolithic site in the Wādī Humūd and have moved back the date of occupation at several other sites (notably at Imra'), simply by intensive walking survey, collecting, and studying chipped stone. It is also worth noting that simply repeating visits and collection, in this case four decades after the last survey, has yielded new results, like the much older date we have tentatively established for Humūd based on the pottery.

The presence of a prehistoric pottery specialist further ensured that we did find the few possibly Neolithic pottery pieces, emphasizing the importance of specialists and training of the team (Banning 2015). This holds, by the way, also for other periods: if we had had a focus solely on the Neolithic, the Midianite sherds would perhaps not even have been picked up in the field. Considering the unconscious biases that exist, our team was, although small, nicely balanced between chipped stone and pottery specialists, and amongst these between different periods. We are confident this will have gone some way to mitigate against biased collection, but one of the many reasons for adopting the reiterative survey method of Banning and team is exactly because such biases always exist.

17. Palaeolithic finds.

In terms of site location, one of the main criteria is, of course, the presence of water, and then ideally a permanent source. Indeed, most (non-specialist, or habitation) sites identified in the survey area by us and previously by Miller and Parker are present along *wadis* with at least seasonal streams. In contrast, features like (burial) cairns are, again unsurprisingly, located in more visible places along ridges, indicating that for these visibility was more important than water. Our survey results so far confirm the idea (Banning *et al.* 2013) that for Late Neolithic sites the presence of springs and naturally wetter areas like *wadi* junctions are important. However, it is still too early to be sure how representative our Neolithic sites are as, with exception of Imra', the sites were found on deflated surfaces with limited contextual information. The absence of evidence for

structures at most of our Neolithic sites means it is not yet clear whether these are habitation locales.

Our hypothesis that many Late Neolithic sites are present under later occupation, essentially forming the start of a new settlement system that would persist throughout the millennia after, appears to be supported by the Late Neolithic / Early Chalcolithic arrowhead and pottery sherd at Imra'. However, further work would be needed to identify the nature of the occupation there, given the limited evidence. Elsewhere, we did not find clear evidence of Neolithic occupation at the other multi-period sites, although the dating of the occupation at Ḥumūd is now pushed back, perhaps by millennia, and the wider area has a clear Neolithic presence. Examining the origins of the later settlement pattern hypothesis continues to be a useful line of enquiry though, to be explored further perhaps by test-pitting. In the rare cases that very low levels at large tell sites in Jordan have been reached, a Late Neolithic presence has been attested, as at Pella (Bourke *et al.* 1998, 2003) and Abū Sunaysilah (Lehmann *et al.* 1991; Kerner 2016).

Beyond the Neolithic: The Survey Area Through Time

While not our primary focus, interesting results were identified other than for the Neolithic. The Palaeolithic, for example, was present in almost every chipped stone assemblage (**Fig. 17**). While an extremely long period, this is nonetheless interesting, especially since there are clearly locales where there is more than just a 'background' palimpsest scatter. An example is the Wādī Abū Ash SHa'r south bank with units KNS011 and KNS012, but also for example the Al Makhārīm area. A frequent presence of Palaeolithic chipped stone was also found by the Limes Arabicus Survey, but appearing less omnipresent, at 28.7% of their sites (Clark *et al.* 2006: 35). Our research interests and expertise does not lie within this period, but we would be very keen to hear of other researchers that would like to be involved.

Of interest, but almost entirely absent, are the subsequent Epipalaeolithic and PPNA periods. They may be absent in part because of the small size of tools for the (later) Epipalaeolithic, or because we were not targeting site locations for both, but also perhaps because of other visibility and obtrusiveness issues. Our results echo other surveys (with the exception of those in areas with better visibility).The Limes Arabicus Survey, for example, found Epipalaeolithic chipped stone in only 8% of their assemblages (Clark *et al.* 2006: 35). However, while they only found 8% of Neolithic sites too, we identified a much larger Neolithic presence. This of course was the focus of our work.

A near absence of the Chalcolithic and a low presence of the Early Bronze Age in our survey assemblages is striking (at least in terms of specifically diagnostic Chalcolithic or Chalcolithic/EBA tools and pottery), since this period was well-represented in the Limes Arabicus Survey, where 51.6% of their sites yielded Chalcolithic/Early Bronze Age material, although it was not possible to refine this chronology (Clark *et al.* 2006: 36). Miller (1991) also only found few specifically Chalcolithic sherds, but plenty of Early Bronze Age ones. This discrepancy with our survey, at least so far, may be a matter of definition (*i.e.* our 'later prehistoric' term), or perhaps of focus of area. Many of the LAS sites dating to this period, for example, were stone rings, often present on ridges, and also often found east of our area, within the drier zone (Clark *et al.* 2006: 37). This absence will be monitored closely in coming seasons.

We found no diagnostic Middle Bronze Age sherds, but the Late Bronze Age, Late Bronze Age/Early Iron Age and the Iron Age are present especially in the north of the area. As usual the Classical periods are also well represented, for example at Al Makhārīm. Iron Age sherds were also found by the LAS at, for example, Al Judayyidah. An absence of these periods in our survey in the southeast may simply be caused by the near absence of pottery in our prehistorically-focused survey units there. The find of likely Hijazi Midianite pottery at As Samākiyyah is especially interesting, as this pushes the boundary of its material spread much further north than previously thought. The presence of limited Middle Bronze Age material, but more from the Late Bronze Age, and a substantial Iron Age and Classical presence is in agreement with the LAS findings

(Clark *et al.* 2006: 38).

The apparently abundant 13th-15/17th century presence in the north of our survey area, both at the village sites of Ḥumūd and As Samākiyyah (and with limited evidence at Al Judayyidah), but also in the landscape, is also interesting. Terraces are notoriously difficult to date and were likely used over multiple periods, but the consistent finds of Ayyubid/Mamluk sherds here in the *wadis* Ḥumūd and Al GHuwayr are interesting. This is probably for a large part a function of the high diagnostic value of "Ayyubid/Mamluk" type sherds (handmade decorated wares), which are commonly recognized in surveys. It is likely that this therefore does not reflect an actual large increase in population, but rather an increased visibility, in combination with the relative invisibility of preceding periods (Johns 1994; Walmsley 2008). Nonetheless, it has also been argued that this was a relatively calm period, an age of reconstruction after the Crusader period (Walmsley 2008), and our results tie in with a pattern of many small, rural village sites. It is also interesting to note that Brown (1992, cited in Walmsley 2008 and Johns 1994) argued, based on the ceramics from Miller's survey, that there was a shift from the arable plains in the centre of the Karak Plateau to the area further south and south-west, *i.e.* potentially including our survey area, at some point during this period. The 'new' area would have been less suitable to rain-fed agriculture, and more to intensive, spring-centred agriculture focused on irrigated fields and orchards. It appears that, now or in future, our survey could contribute to answering such questions; certainly, the building of terraces would argue for more intensive agriculture, perhaps tree-based, but at the same time the terraces on these steep slopes appear rain-fed rather than irrigated. In this respect it is also interesting that the LAS project, focused on drier areas generally, identified Ayyubid/Mamluk and/or Late Islamic sherds at only 8.8% of their sites (Clark *et al.* 2006: 51).

We aim to continue the survey on the Karak Plateau, eventually also using test pits or small-scale excavation to get to know more about the nature of the Late Neolithic sites. First, though, our objective is to set up a Bayesian allocation model and apply this in our survey area, in combination with standardizing artefact collection further following recommendations by Banning *et al.* (2011) in terms of recordings parameters like the participants' walking speed, the search time also for transects, etc, in order to get a better sense of artefact density.

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

Sumio Fujii, Takuro Adachi and Kazuyoshi Nagaya

Introduction

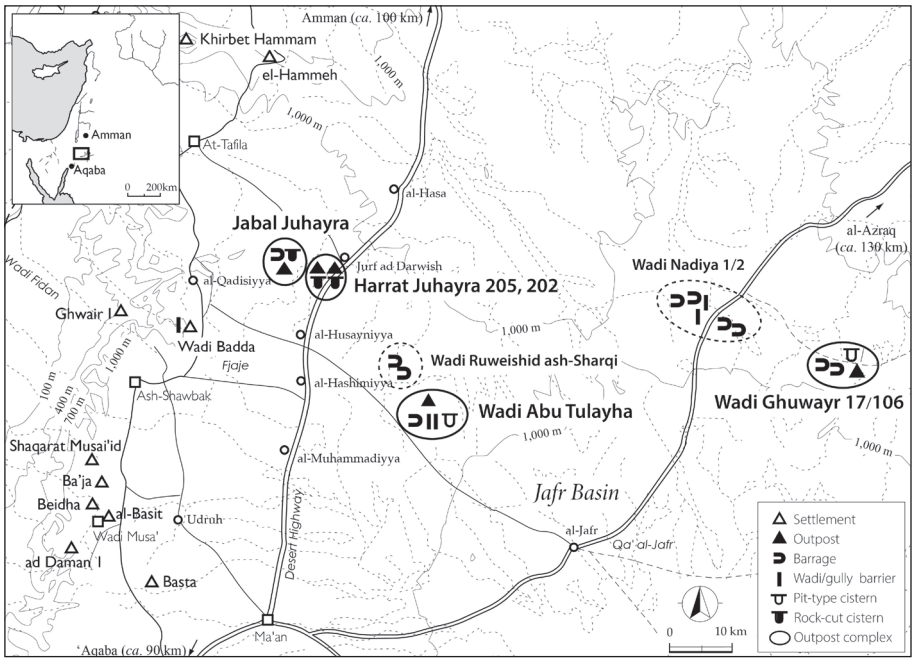
Our long-term research project (*JBPP*: the Jafr Basin Prehistoric Project) started in 1997 with a view to tracing the process of pastoral nomadization in the arid periphery of the southern Levant. Since then, we have investigated more than a dozen archaeological sites varying in date and character.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

The project has entered Phase 5 since March 2014. The primary goal of the current phase is to increase the precision of the Al Jafr chronology and, by so doing, provide further insights into our main research issue. We selected several sites toward this goal. The four Chalcolithic burial fields, Harrat Juhayra 1-4, are the third target following the Early Bronze Age burial fields of Tor Ghuwayr 1-3 excavated in 2014 (Fujii, Adachi, Yamafuji *et al.* 2014) and the stratified Pre-Pottery Neolithic B (hereafter PPNB) rockshelter settlement of Jabal Juhayra successively excavated from 2014 till 2016 (Fujii 2015, 2017; Fujii, Adachi and Nagaya 2018, 2021). The sites were first located during our preliminary survey in 2003 and registered in more detail in the second and third surveys resumed in 2015. The excavations at the extensive burial fields started in June 2016, immediately following the final operations at Jabal Juhayra, and are still in progress. This report briefly summarizes the research outcomes from two small Neolithic settlements nested in the Chalcolithic burial field of Harrat Juhayra 2.

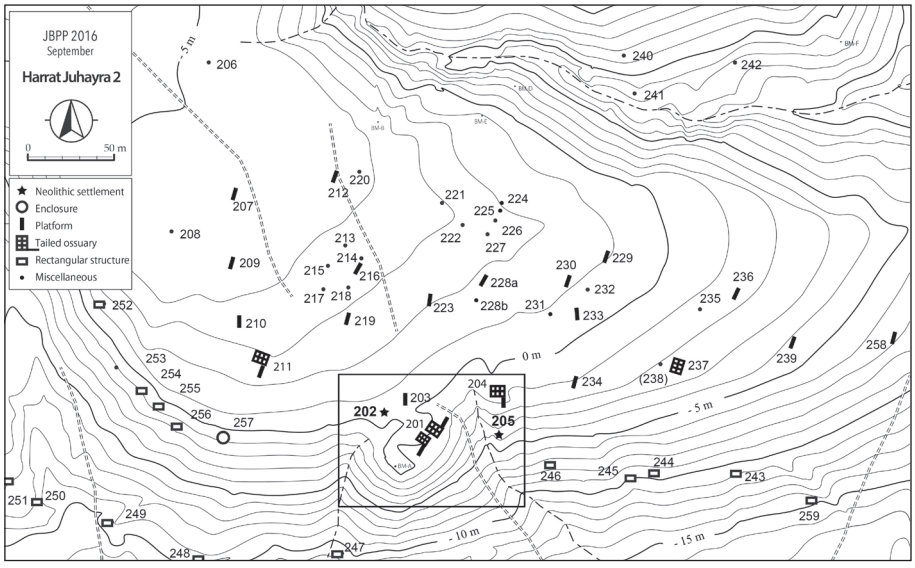
The Sites and Site-Setting

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

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



1. Harrat Juhayrah 205 and 202: site location.

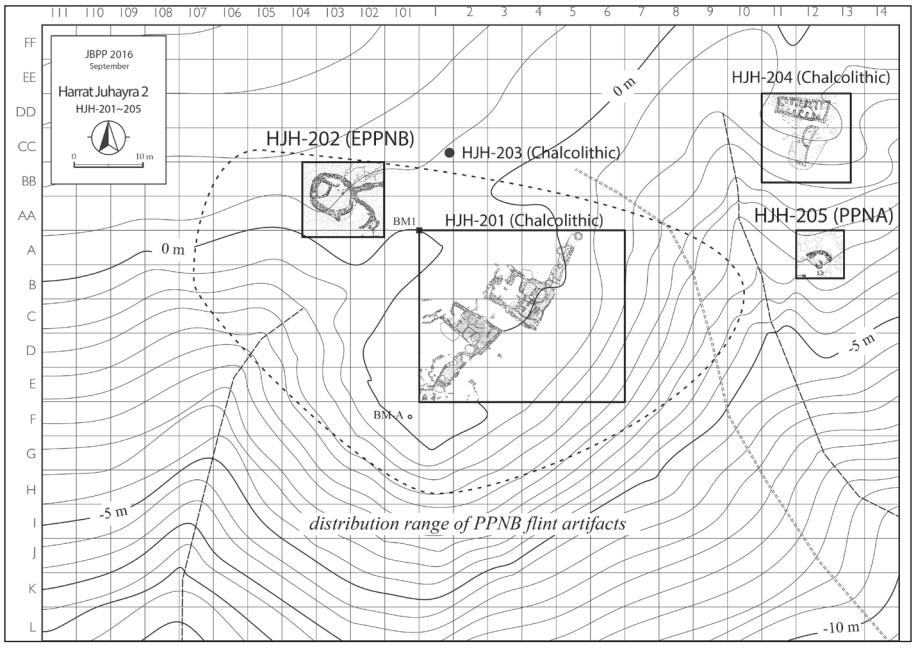


2. Harrat Juhayrah 2: feature distribution map (as of September 2016).

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

The Excavations

The excavations took place using an arbitrary benchmark (N: 30.38.51.24; E: 035.49.09.17; Elevation: *ca.* 1087m) set up a flat terrain between the two sites. Though varying to some extent depending on *loci*, the general site stratigraphy can be summarized as follows: Layer 1 (or the surface layer covered with basalt cobbles and pebbles) is *ca.* 5-10cm thick and consists of light buff, relatively loose, silty sand deposits; Layer 2 (*ca.* 10-20cm thick) contains light brown, relatively compact silty sand deposits including numerous basalt cobbles and pebbles; Layer 3 (*ca.* 10-50cm thick) is composed of light to grayish brown, somewhat loose deposits including fine-grained basalt pebbles; and Layer 4 (*ca.* 5-20cm thick) represents very compact, blackish weathered soil of the underlying basalt bedrock layer (Layer 5). The two sites were equally based on Layer 4 or 5 and buried with the Layers 3-1 deposits. Incidentally, excavated soil was not sieved due to time constraints, but several dozen litters of floor deposits and hearth contents are kept aside in our local storage for future archaeo-botanical analysis.



3. Harrat Juhayrah 201-205: contour map.

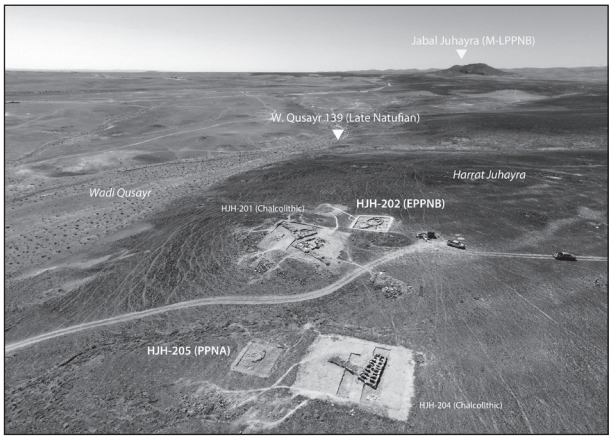
Harrat Juhayrah 205: PPNA Encampment

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

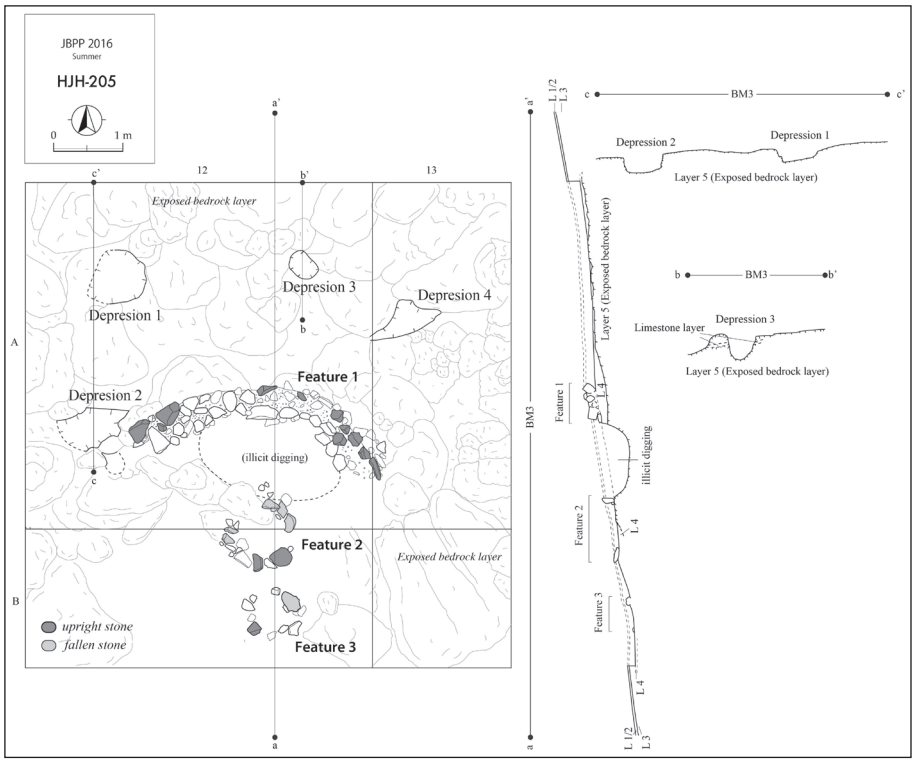
Structural Remains

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

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



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



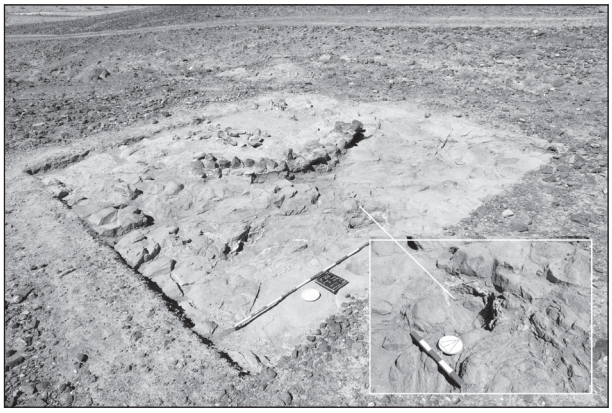
5. Harrat Juhayrah 205: plan and section/elevations.

Small Finds

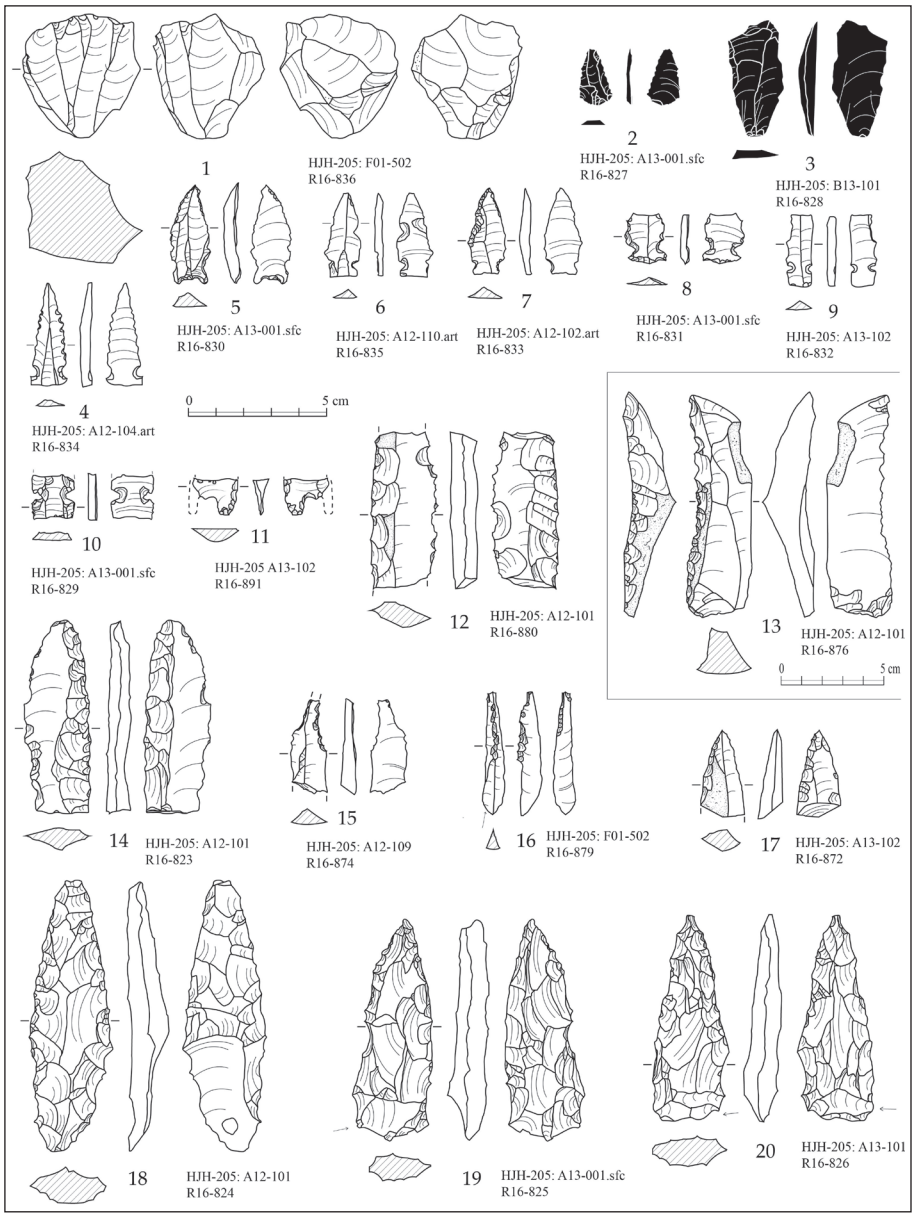
The complex yielded some seven thousands chipped flint artifacts and several grinding tools made of basalt. No other categories of artifacts were included. The scarcity of artifact variety, coupled with the small site size, is suggestive of the involvement of a small-scale, high-mobility population group.

The chipped flint assemblage occurred mostly around the semi-anthropogenic pools. The concentration of flint artifacts around a water-catchment facility has been confirmed at HJH-202 mentioned below as well, suggesting that Neolithic flint-knappers in the Al Jafr basin preferred a waterside as their workshop. The raw material of the assemblage fell into the following two groups: grayish, slightly lustrous, irregular flint nodules associated with whitish patina, and brown, somewhat mat flint slabs with buff cortex. Both types of flints were used roughly in an equal ratio. Core class products were dominated by single-platform, pyramidal blade/bladelet cores (**Fig. 8: 1**), followed by change-of-orientation flake cores and bidirectional blade-bladelet cores. No naviform cores were attested. Meanwhile, debitage class products included two obsidian flakes (**Fig. 8: 2-3**), which proved to have derived from the Gölludağ East source in eastern Anatolia (Campbell *et al.* 2017). Tool

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



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



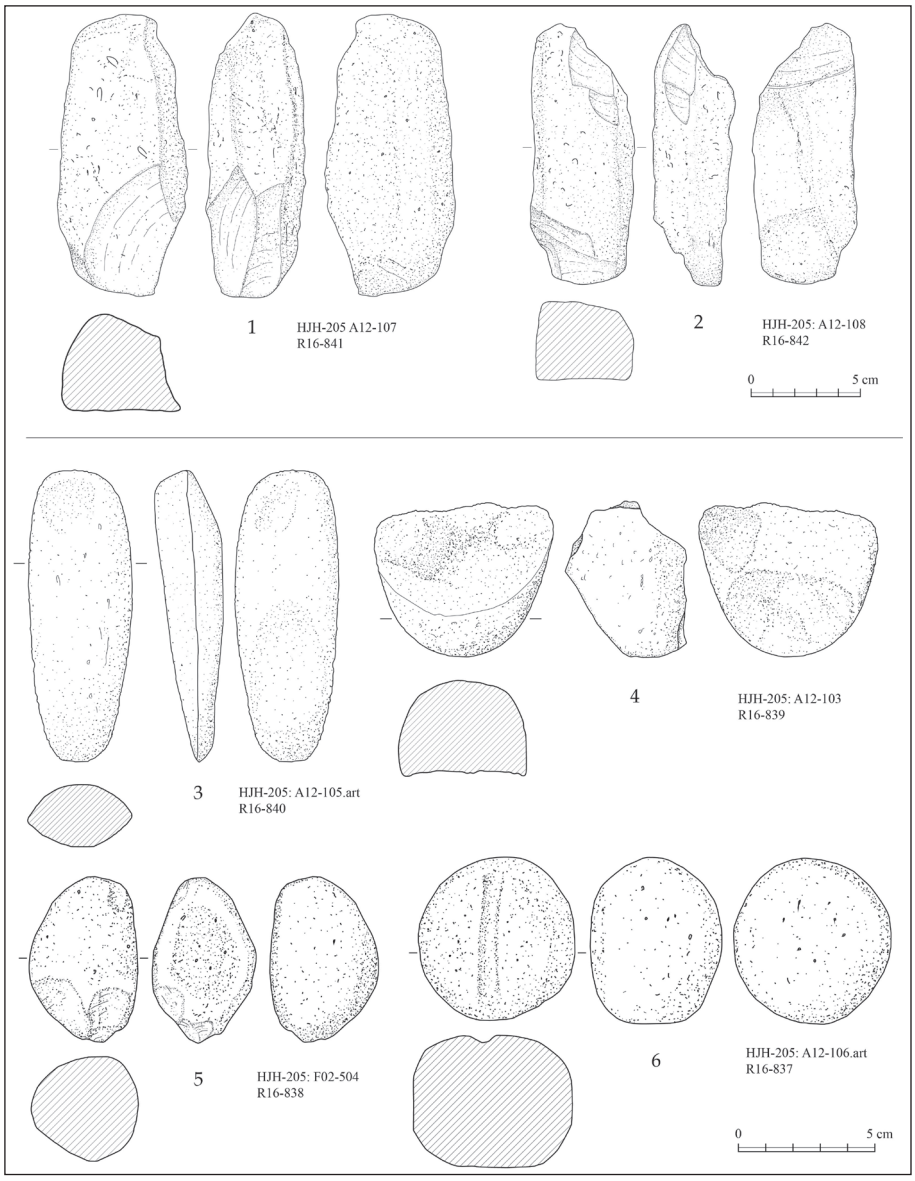
8. Harrat Juhayrah 205: chipped stone artifacts.

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

The groundstone assemblage, on the other hand, consisted only of several grinding tools made of basalt (**Fig. 9: 3-5**) and a grooved whetstone or shaft-straightener made again of basalt (**Fig. 9: 6**). Though small in number, their occurrence corroborates that domestic activities other than flint production took place at the site. Thus, the site can probably be defined as a temporary encampment doubling as a flint workshop.

Harrat Juhayrah 202: Early PPNB Settlement

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

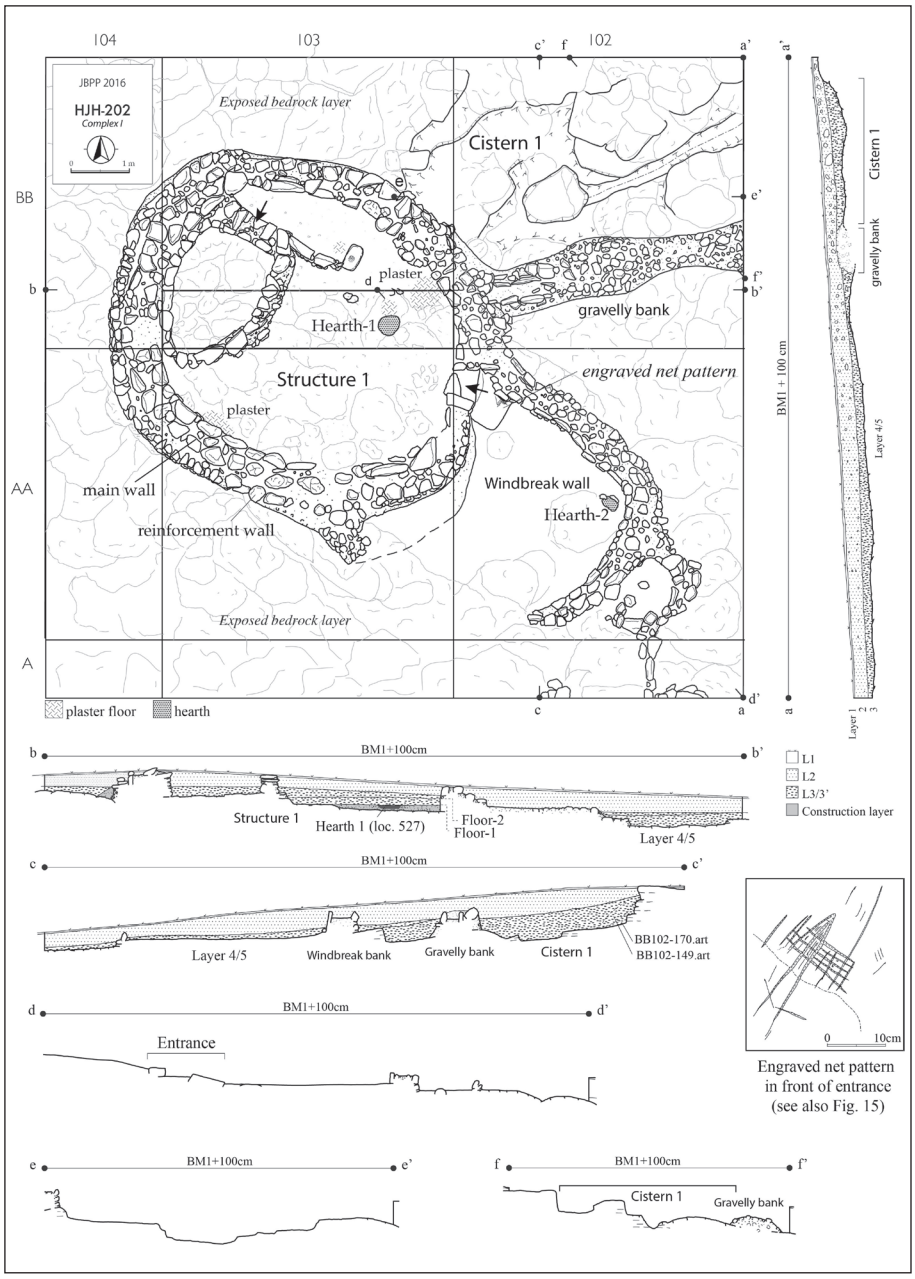


9. Harrat Juhayrah 205: heavy-duty digging tools (above) and ground-stone artifacts (below).

Structural Remains

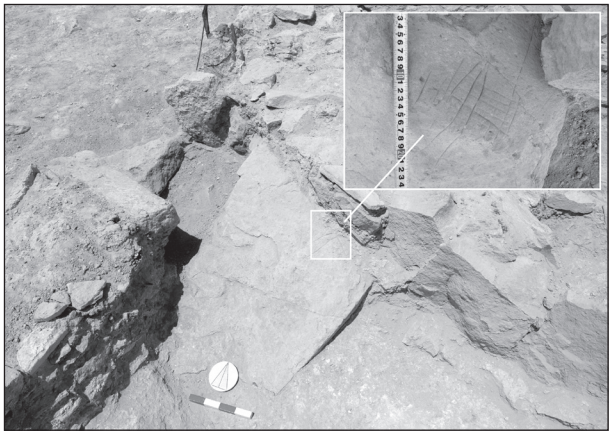
The excavation revealed a small-scale structural complex (Complex I) consisting of a masonry dwelling (Structure 1) and a rock-cut, open-air cistern (Cistern 1) (**Fig. 10**). The former had a slightly oval plan, measuring *ca.* 6-7.8m in outer diameter, *ca.* 0.6-1.1m in wall width, and up to *ca.* 0.5m in preserved wall height. In terms of stratigraphy, it was constructed on an exposed basalt bedrock layer (Layer 5) or its weathered soil layer (Layers 4), partly sandwiching a 5-20cm thick gravelly foundation bank (Layer 3/4) in between. As with the neighboring PPNA encampment of HJH-205, the thick masonry wall was constructed by a double-face, rubble core technique using clay mortar and reinforced by a low facing wall attached to its southern, lower-in-elevation side (**Fig. 11**). Undressed basalt cobbles *ca.* 20-50cm long were used as main construction materials, most of which were put in an upright position or a stretcher bond.

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



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

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

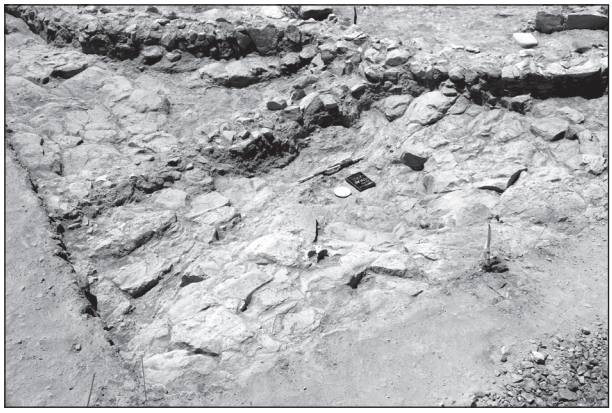


12. Harrat Juhayrah 202: close-up view of the entrance (looking N).

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

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

These two distinct components were combined to form a small-scale structural complex, which can probably be taken as a prototype of the outpost/barrage/cistern complex common to the Middle to Late PPNB Al Jafr Basin (Fujii 2010a, 2010b). In fact, a dozen radiocarbon dates of charcoal remains recovered from Hearth 1 and its surrounding *loci* converge on a short time range around 9000 cal BC, corroborating that the complex dates back to the beginning of the Early PPNB (see **Fig. 20**). The distribution range of surface finds suggests that the site extended southeastward to form a small settlement *ca.* 0.5 ha in total area (see **Fig. 3**). Subsequent excavations are expected to shed light on the overall picture of the Early PPNB settlement first identified in southern Jordan.



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

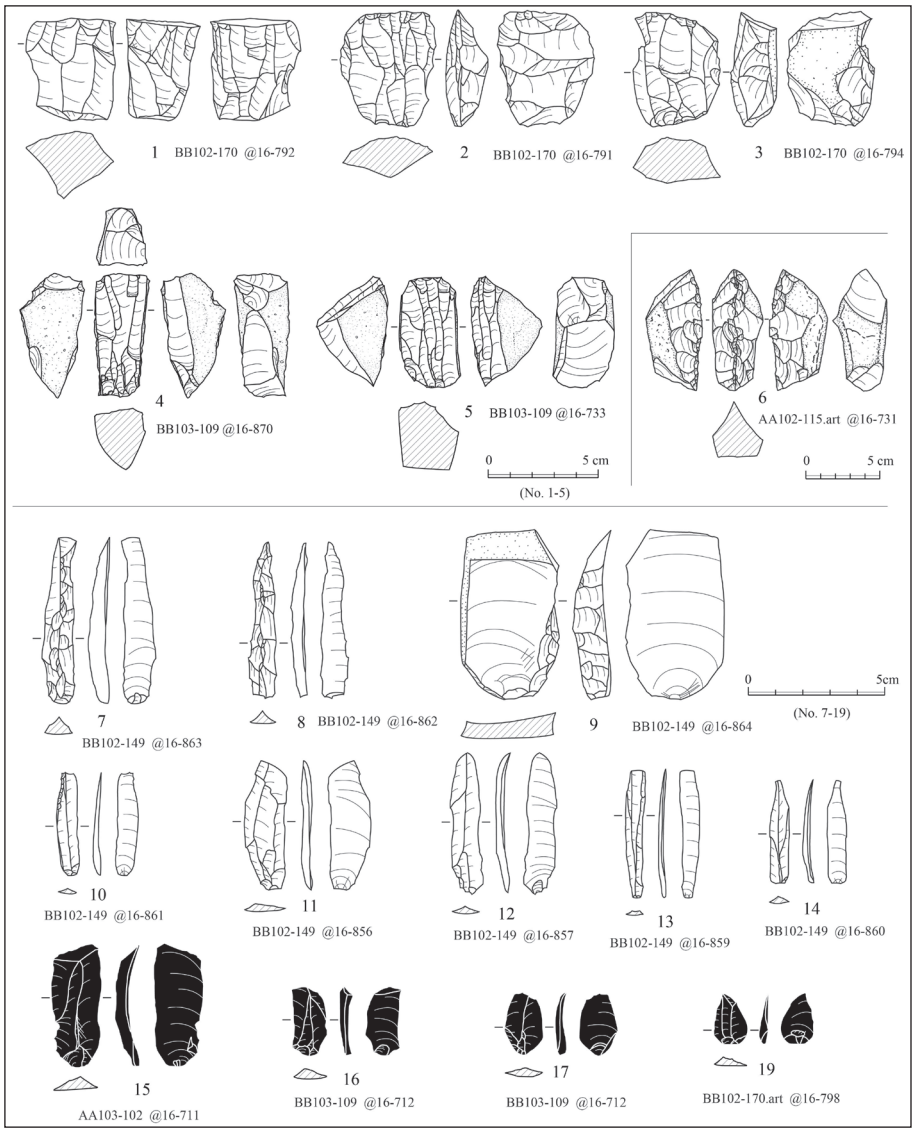
Small Finds

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

Chipped Stone Artifacts

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

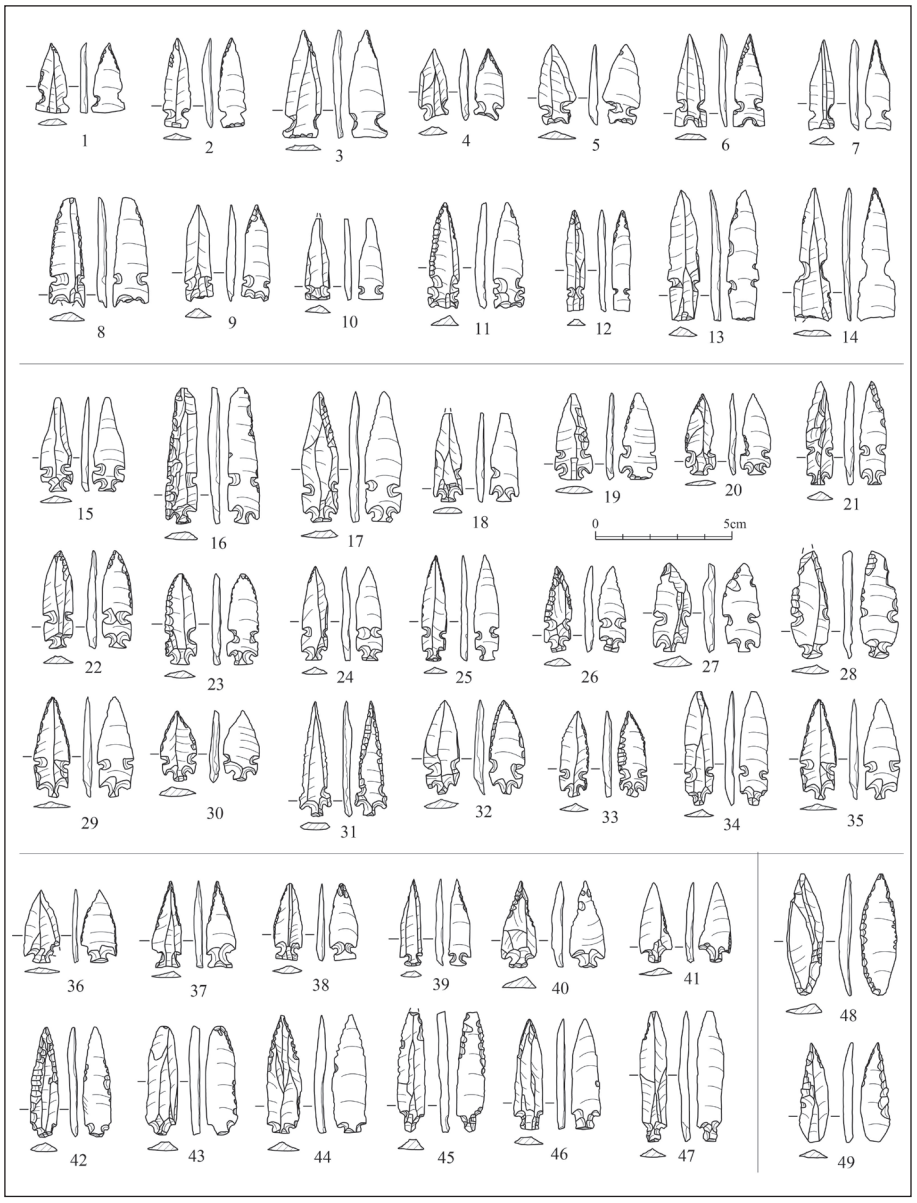
Core class products were dominated by single-platform blade/bladelet cores (**Fig. 14: 1**), followed by opposed-platform blade/bladelet cores (**Fig. 14: 2-3**) and change-of-orientation flake cores. In addition, unlike the assemblage from HJH-205, several naviform cores and pre-cores were also attested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



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

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

As with HJH-205, the tool class products centered on projectile points (**Figs. 15-16**), transverse-blow axes/adzes (**Fig. 17: 1-6**), and their roughouts (**Fig. 17: 7-12**). The points accounted for more than 60 percent of the retouched tools, highlighting the importance of hunting activities at the Early PPNB settlement prior to the introduction of domestic sheep and goats. In terms of typology, they fell into the el-Khiam point (see **Fig. 15: 1-14**), the Helwan point (see **Fig. 15: 15-35**), the small tanged point (see **Fig. 15: 36-47**), and other miscellaneous types including foliate points (see **Fig. 15: 48-49**). The Helwan type was predominant (52.3%) in the point assemblage, followed by the al-Khiam type (19.9%) and the small tongued points (18.3%). Their attribute analysis suggests that there is some correlation between the naviform cores and the small tongued points (Fujii, Adachi and Nagaya 2018). Meanwhile, the frequency of tranchet axes/adzes, together with the survival of the el-Khiam points, indicates that the assemblage partly stayed within the framework of the PPNA lithic tradition. The tool kit also included trapezoidal serrated blades (**Fig. 18: 1-3**), bifacially retouched large knives (**Fig. 18: 4-9**), drills (**Fig. 18: 10**), burins (**Fig. 18: 11**), truncated blades (**Fig. 18: 12**), and end- and side-scrapers (**Fig. 18: 13**).



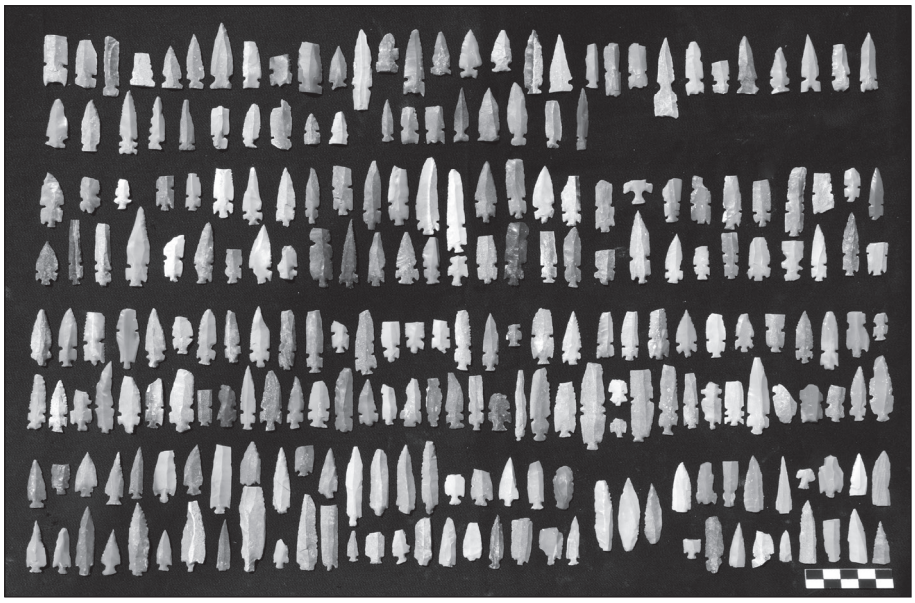
15. Harrat Juhayrah 202: chipped flint artifacts from Complex I (points).

Groundstone Artifacts

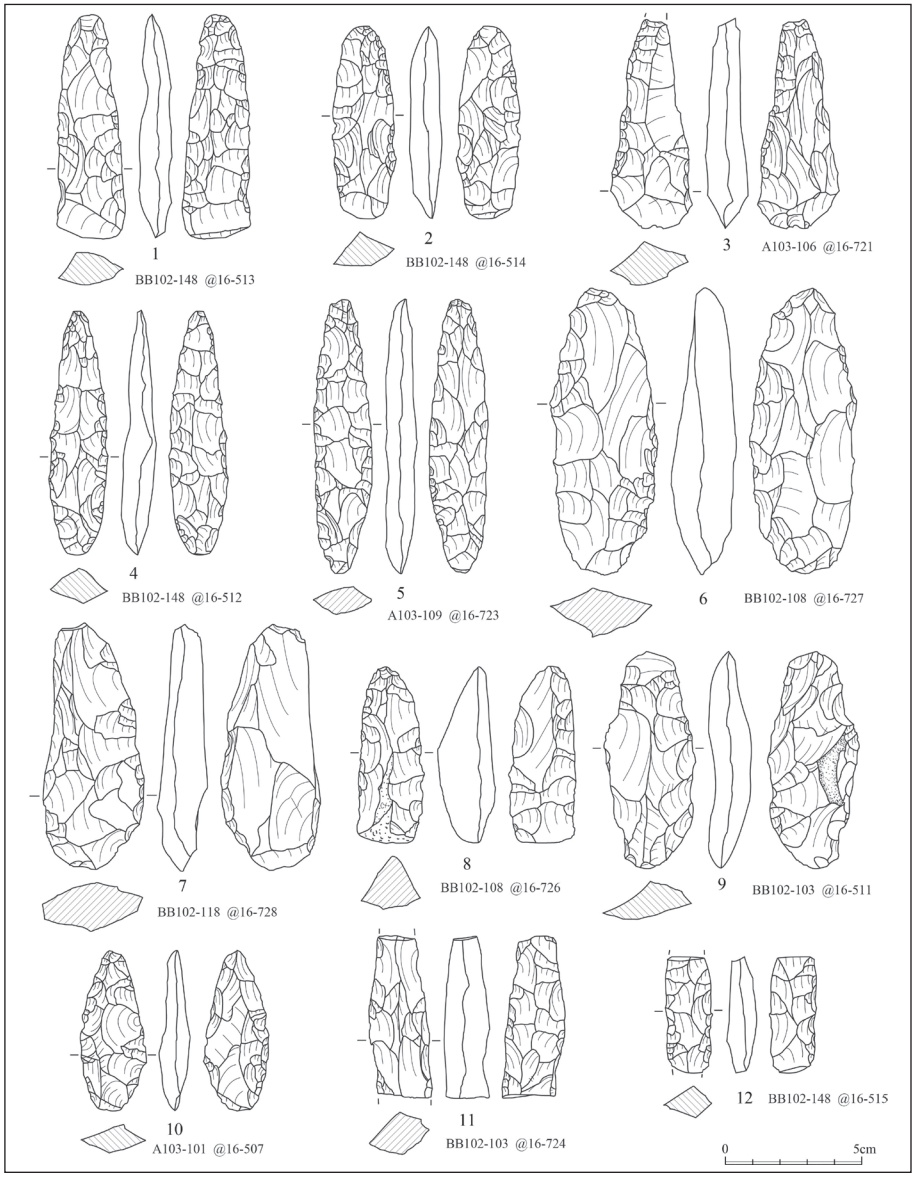
The groundstone assemblage included several basalt products with remarkable edge damage (**Fig. 19: 1-4**). Though different in raw material, they bear a strong resemblance to diagonally truncated limestone bars common to Middle to Late PPNB outposts in the basin (*e.g.* Fujii 2009: fig. 19, no. 1-3), suggesting their use as heavy-duty digging tools for leveling the construction ground of the oval structure and/or modifying the semi-anthropogenic cistern. The assemblage also included several pounding/grinding pebbles made of basalt (**Fig. 19: 5-6**) and two cup-hole mortars were also made of basalt (**Fig. 19: 7-8**). The former were relatively small in size, measuring *ca.* 5-10cm long and *ca.* 4-6cm thick. A stamp-like implement made of unidentified green stone also probably falls into the same class (**Fig. 19: 9**), although the existence of a shallow depression in the center of the working surface is potentially suggestive of its use as a capstone of a bow drill. Meanwhile, the mortars had a shallow cuphole *ca.* 8-13cm in diameter and *ca.* 1-4cm in depth roughly in the center of their flat working surface. They were probably used in combination with the small pestles to pound something, but it is still unknown whether cereal seeds were included in it.

Other Stone Products

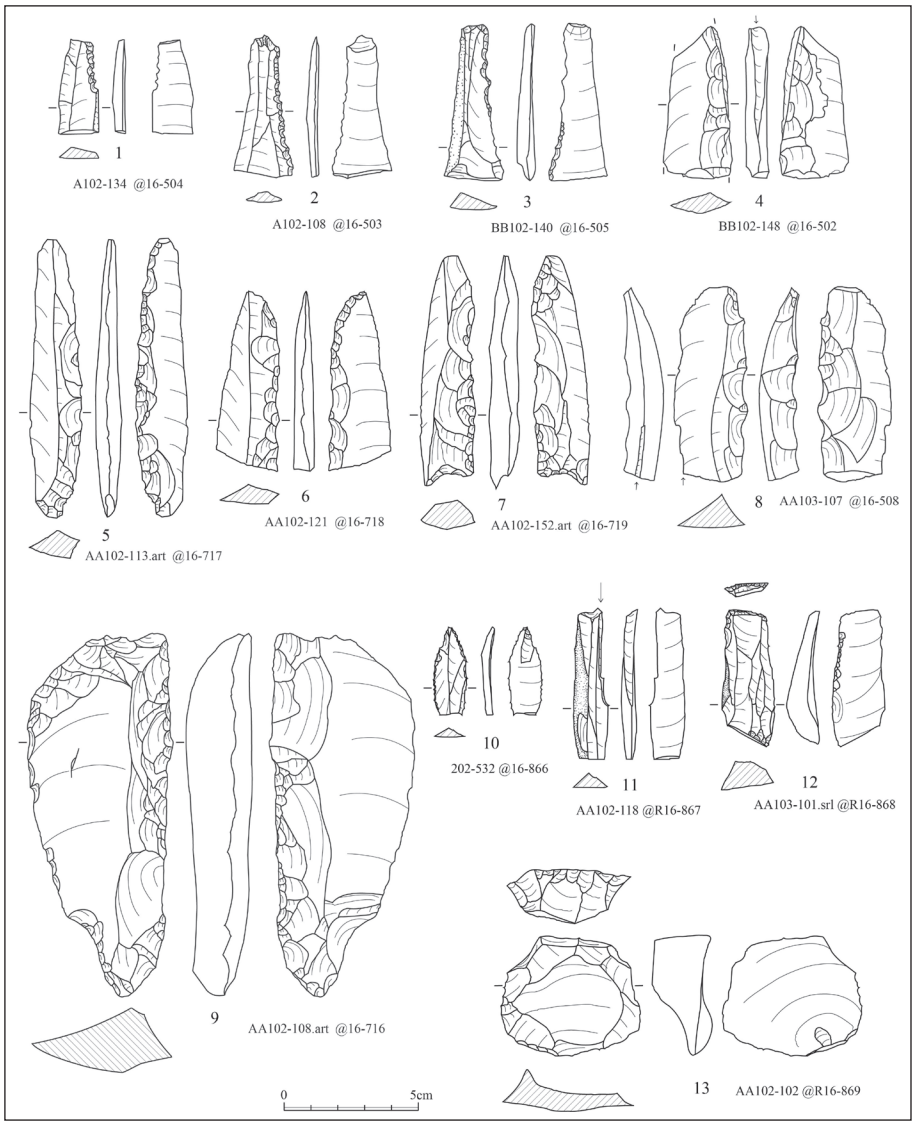
Other small finds were limited to a shaft-straightener made of limestone (**Fig. 19: 11**) and a small spatula made probably of mudstone



16. Harrat Juhayrah 202: points from Complex I.



17. Harrat Juhayrah 202: chipped flint artifacts from Complex I (bi-facials).



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

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

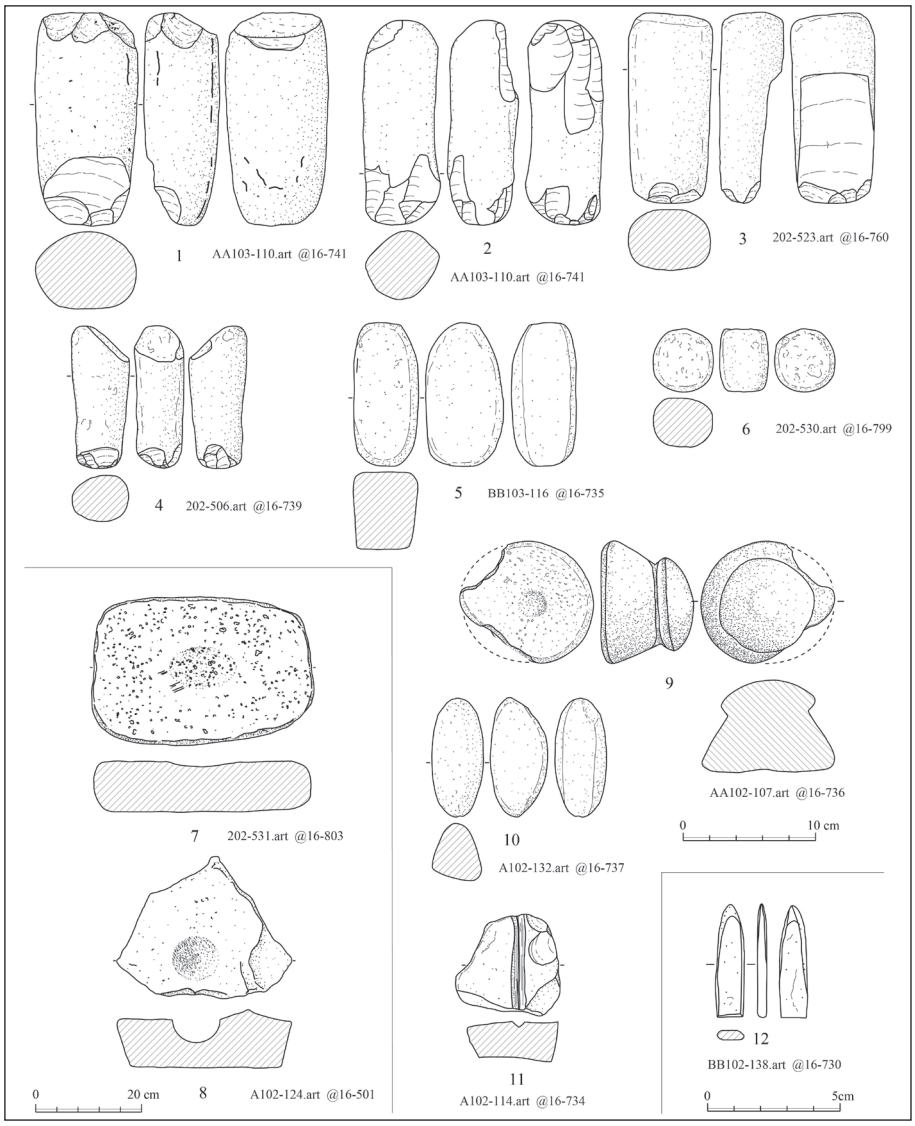
Discussion

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

Harrat Juhayrah 205: PPNA Encampment

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

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



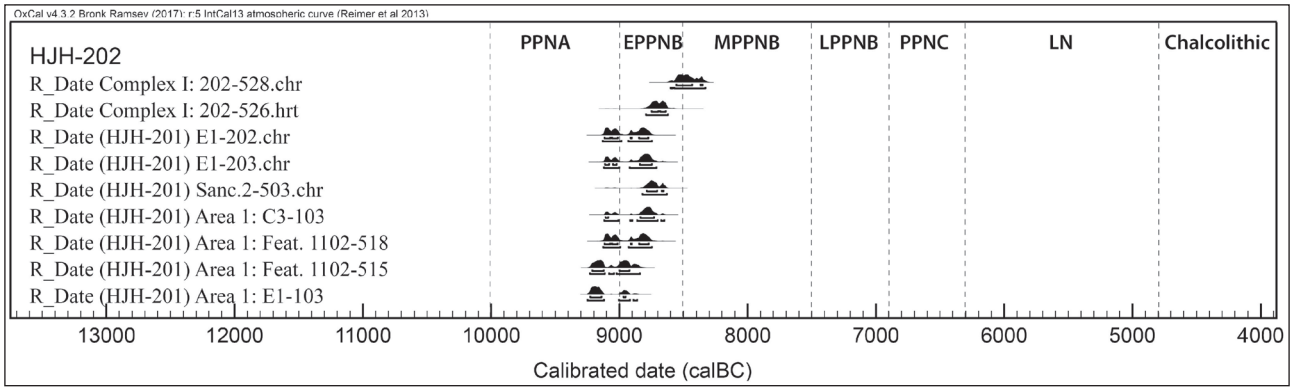
19. Harrat Juhayrah 202: ground-stone artifacts from Complex I.

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

Harrat Juhayrah 202: Early PPNB Settlement

HJH-202 is an Early PPNB site located again for the first time in the basin, and coupled with neighboring HJH-205, fills up a chronological gap at the initial stage of the Al Jafr Neolithic (see **Fig. 21**). Both the radiocarbon dates and the unique flint assemblage marked by the predominance of the Helwan type points also support the chronological perspective (**Fig. 20**). The finding of the Early PPNB settlement in the Al Jafr Basin, together with other related investigations (*e.g.* Burian *et al.* 1976; Garrard *et al.* 1994; Gopher 1997; Khalaily *et al.* 2007; Rokitta-Kurmnov 2016; Rollefson 1996; Stefanisko and Purschwitz 2016; Vardi *et al.* 2016), corroborates anew the presence of the Early PPNB phase in the southern Levant that has long been discussed (*e.g.* Cauvin 1994; Edwards *et al.* 2004; Edwards and Sayej 2014; Kuijt and Goring-Morris 2002). Of significance is the supposed combination of the naviform cores and the small tongued points made on bi-directional, multi-ridged blades/bladelets, which probably represents the initial form of the PPNB flint industry in the southern Jordan (Fujii, Adachi and Nagaya 2018).

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



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

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

WAT: Wadi Abu Tulayha

------ : Jafr PPNB outpost complex.

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

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

Concluding Remarks

The excavations at Harrat Juhayrah 205 and 202 have provided specific insights into the initial phase of the Al Jafr Neolithic thus far poorly understood due to the lack of basic information. Of significance is that the two key sites have filled up a millennium gap between the Late Natufian settlement of Wādī Qusayr 139 and the Middle to Late PPNB outpost complexes at Wādī Abu Tulayha and Jabal Juhayra and, by so doing, enabled us to start the discussion on the Badia Neolithization with its earliest stages. Furthermore, the finding of the PPNA and Early PPNB rock-cut cisterns has shed new light on the water-use history in the basin. However, despite this early data from HJH-202, it is important to note that the excavation at HJH-202 have just begun, and we would like to continue our efforts toward a better understanding of the overall picture of this key site.

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HARRAT JUHAYRAH 2: EXCAVATIONS OF CHALCOLITHIC TAILED OSSUARIES IN THE AL JAFR BASIN, SOUTHERN JORDAN

Sumio Fujii, Takuro Adachi, Kazuhiro Sakaue, Kazuyoshi Nagaya and Takashi Gakuhari

Introduction

Harrat Juhayrah is a collective term of large and small basalt foothills around Jabal Juhayra, an isolated volcanic hill behind Jurf Ad Darāwīsh. As mentioned elsewhere in this volume (Fujii, Adachi, Nagaya 2023), our reconnaissance survey in 2003 located a few dozen stone-built features in the southeastern part of the largest foothill that stretches toward the Desert Highway (Fujii 2005a). The second and third surveys resumed in 2015 enlarged the target to the whole range of the foothill and confirmed another three concentration areas of such features. We designated them Harrat Juharya 1-4, or HJH 1-4 for short, respectively, and registered the exposed features one-by-one as HJH-123 (*i.e.* Feature/Locality 23 in HJH-1), for example. The first two excavation seasons taken place in June and September 2016 focused on HJH-2 and examined four Chalcolithic tailed ossuaries (*i.e.* ossuaries with a tail-like, elongated feature) and two small Neolithic settlements nested in the site. Since the latter are dealt with elsewhere in this volume, this report summarizes the results of the excavations at the unique burial facilities first identified in southern Jordan.

The Site

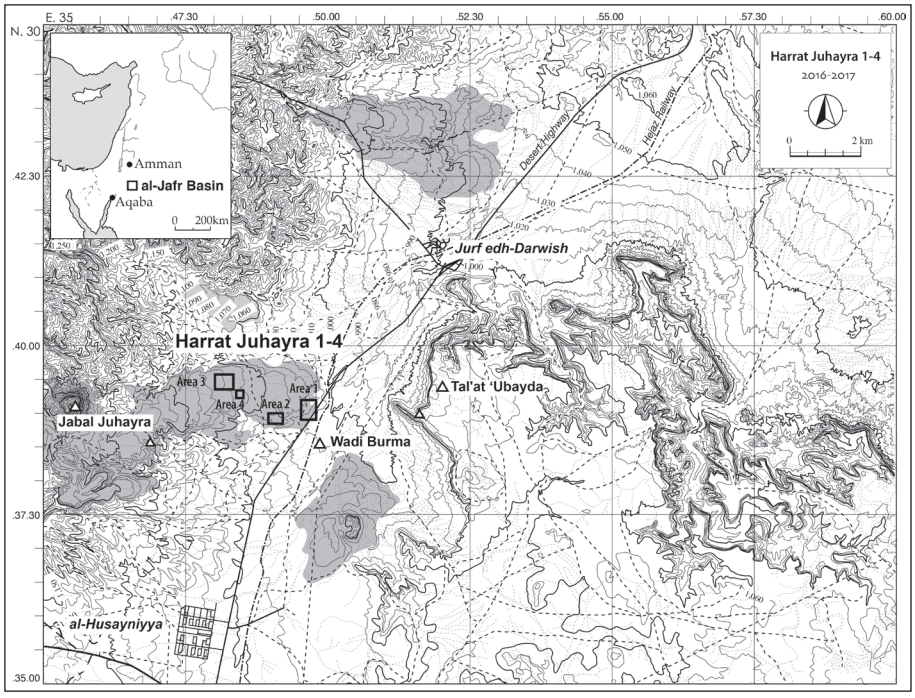
Harrat Juhayrah 2, or HJH-2, was the first to be located among the four Chalcolithic burial fields. In terms of topography, it extends over the southeastern part of the basalt foothill, overlooking the drainage basin of Wādī Qusayr and beyond (**Fig. 1**). This site is *ca.* 12 ha in total area and divided broadly into the following two zones: a Chalcolithic settlement extending along the southern slope and an extensive burial field on the hilltop (**Figs. 2**, **3**). The settlement contains more than a dozen rectangular structures, which are scheduled to be excavated in the next field season. Meanwhile, the burial field contains some sixty stone-built features, five of which are registered as tailed ossuaries. They are aligned along the southern edge of the foothill, being sandwiched between the settlement in the south and the other types of burial fields dotted to the north. We excavated four of them, leaving the remaining one (HJH-237) for future re-investigation.

Tailed Ossuary of HJH-201/1

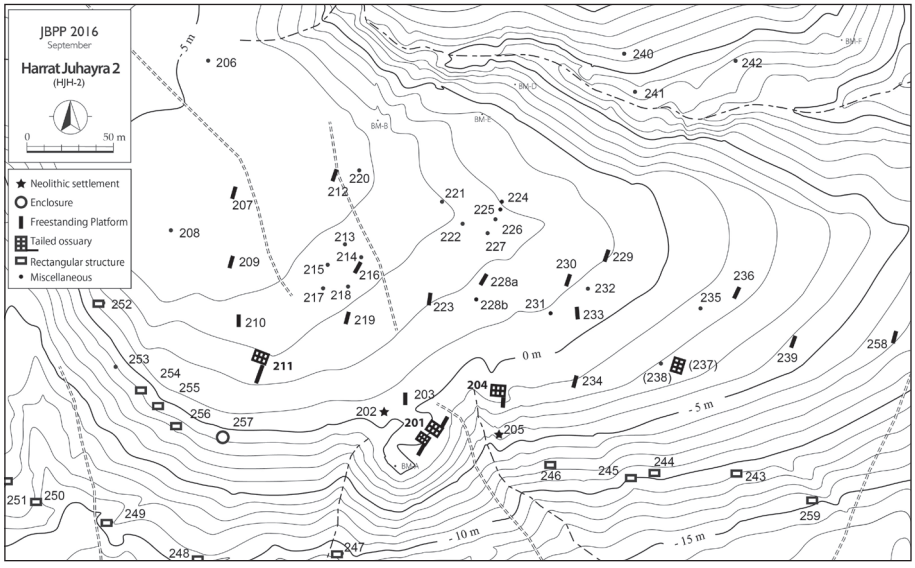
HJH-201 (*i.e.* Feature / Locality 01 in Harrat Juhayrah 2) occupies the center of a tongue-shaped small terrace that protrudes southward from the foothill, containing a pair of structural complexes arranged symmetrically (**Figs. 4**, **5**). HJH-201/1 is its southwestern counterpart.

Structural Remains

The excavation revealed a structural complex that consisted of a trapezoidal masonry structure and an elongated, tail-like feature (see **Fig. 6**). Both components were connected at a right angle with a 1m gap being between and formed, as a whole, an L-shaped complex *ca.* 12m wide and *ca.* 8m deep. In terms of stratigraphy, it was based on the upper surface of Layer 3 and covered with the deposits of Layers 1-2c, sandwiching a low cobble mound *ca.* 0.5m thick in between. Nevertheless, the overlying



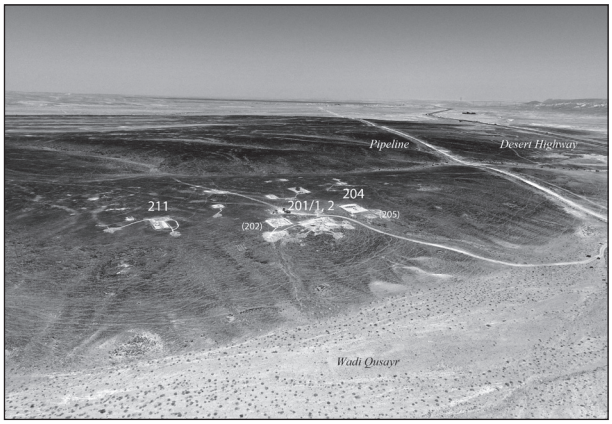
1. Harrat Juhayrah 1-4: site location.



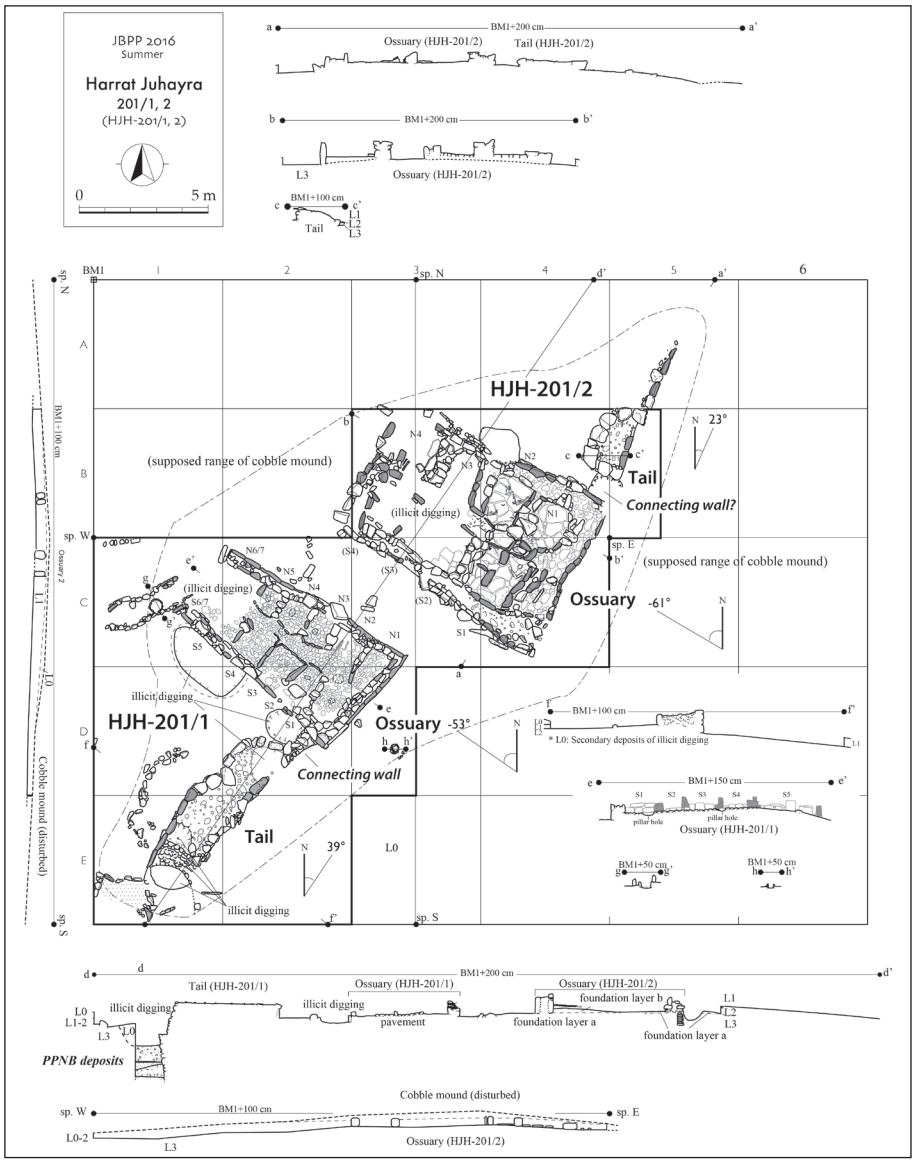
2. Harrat Juhayrah 2: feature distribution map.

layers including the cobble mound were badly disturbed by illicit digging, and the underlying complex was partly exposed when we started the excavation.

The trapezoidal structure, the main body of the complex, measured *ca.* 3-4.2m by *ca.* 8m in external size, and its main axis had an azimuth of *ca.* -53 degrees against the magnetic north. The foundation course of the masonry walls was constructed with two-rowed upright basalt boulders, on which up to a few courses smaller stones arranged in a stretcher bond were barely preserved. No clay mortar was confirmed. The masonry walls had a height of



3. Harrat Juhayrah 2: general view of the tailed ossuaries (as of Sep. 2016, looking NE).



4. HJH-201: plan and sections/elevations of the twin complex.

up to *ca.* 0.5-0.7m including the upper courses, but they appear to have been almost this height from the beginning. This is first because the whole complex was covered with the cobble mound of the same height, and second because fallen stones around the walls were not very frequent. Both facts suggest that the trapezoidal structure was constructed as a low-walled,

5. HJH-201: aerial view of the twin complex (looking SE).

6. HJH-201/1: general view (looking W).

unroofed one from the beginning. Meanwhile, the floor was carefully paved with basalt slabs *ca.* 10-20cm long, although it's northwestern part was scraped off by illicit digging.

Seeing that no clear evidence was confirmed in the other three sides, the entrance to this structure is thought to have been incorporated into the disturbed northwestern wall. The internal space was divided into three vertically long zones along the main axis of the structure, and a dozen square to rectangular compartments (S1~S6/7 and N1~N6/7) were arranged on both sides of a narrow corridor *ca.* 0.5-0.7m wide that stretched southeastwards from the supposed entrance. Each compartment was *ca.* 1-1.5m wide and deep, being fringed with upright basalt slabs *ca.* 10-30cm high. Some of them were associated with a standing stone *ca.* 30-50cm high and/or covered with capstones more than 1m long (**Figs. 7**, **8**). In addition, a pair of stone alignments *ca.* 3.5m long obliquely stretched from the northwestern corner of the structure, but it is thought to belong to the underlying Neolithic layer. The same is probably true of a small stone circle found in Square D3.

Meanwhile, the tail-like feature (hereafter *tail* for short) measured at least 8m long and up to *ca.* 2m wide, stretching at a right angle from the southwestern corner of the trapezoidal structure. However, its distal end was cut off by a looters' pit that penetrated into the Neolithic layer (Layer 3). This elongated feature consisted of a straight front wall and two interlocked curvilinear rear walls, and the dead space between the two was filled up with basalt rubble and silty sand.

Of significance is the existence of a small gap with the main body of the complex, which was bridged by rather an *ad hoc* masonry wall *ca.* 0.8m long (**Fig. 9**). This unique connection method is common to the other three complexes referred to below, indicating that it was the standard of this type of burial facilities. In addition, a few intermittent wall alignments were exposed around the tail, but they are thought to represent a part of a PPNB settlement that extends southward from the adjacent site of HJH-202 (Fujii, Adachi, Nagaya op. cit).

Small Finds

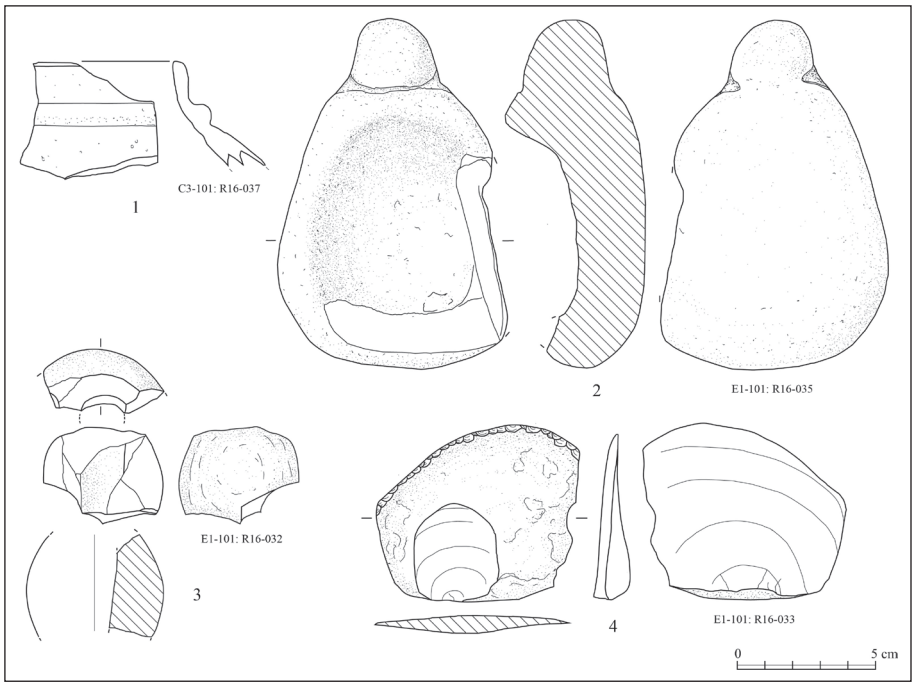
The trapezoidal structure yielded a certain amount of human skeletal remains. Although mostly fragmented, some of them were found *in situ* on the floors of the compartments and the corridor. This means that the multi-compartment structure was used as a communal ossuary.

The small finds from the ossuary included a coarse ware sherd with a horizontal band along its neck (**Fig. 10:1**), a spoon-shaped miniature vessel made of basalt (**Fig. 10:2**), a limestone macehead *ca.* 5cm in diameter (**Fig. 10:3**), and

7. HJH-201/1: reconstruction of a standing stone in Compartment S2 (looking SW).

8. HJH-201/1: reconstruction of a capstone in Compartment N4 (looking N).

9. HJH-201/1: connecting wall (looking NWN).



10. HJH-201/1: small finds.

a few small tabular scrapers (**Fig. 10:4**). Although rarely found *in situ*, these artifacts are considered as grave goods offered to the interments. In terms of typology, the spoon shaped miniature vessel resembles clay-made crucibles found at Hujayrat Al GHuzlān (Pfeiffer 2009: figs. 2, 4) and Wādī Fīdān 4 (Hauptmann 2000: fig. 92), corroborating a chronological synchronism with these Chalcolithic sites in southern Jordan. As described below, the scarcity of grave goods is common to the other tailed ossuaries and can be taken as the standard of the Chalcolithic burial practice in the Al Jafr Basin.

Tailed Ossuary of HJH-201/2

HJH-201/2, or Complex 2 at HJH-201, forms the northeastern half of the twin complex. The excavation revealed a structural complex similar to, but slightly larger than, HJH-201/1 mentioned above.

Structural Remains

Again, the combination of a trapezoidal ossuary and an elongated tail was attested (**Fig. 11**). As with the case of HJH-201/1, both components were connected at a right angle to form an L-shaped complex *ca.* 13m wide and *ca.* 9m in deep. This complex was also based on the upper surface of Layer 3 and, though badly disturbed, covered with a low cobble mound *ca.* 0.5m high and the Layers 2-1 deposits.

The ossuary was larger in scale than the southwestern counterpart, measuring *ca.* 5.6-6.7m wide, *ca.* 9m deep and up to *ca.* 0.6m in preserved wall height. The masonry walls were constructed by a dry-walling, rubble-core masonry technique using two-rowed upright basalt boulders. The entrance was probably located again in the middle of the disturbed northwestern wall. A total of eight square to rectangular compartments (S1~S4 and N1~N4) were arranged on both sides of a narrow corridor stretching in the NW-SE direction from the supposed entrance. The floor was paved with large basalt slabs, but its northern half was badly damaged by illicit digging. In view of the small height of the cobble mound, it is conceivable that this ossuary was also a low-walled, unroofed structure from the beginning.

The tail measured *ca.* 6m long and up to *ca.* 1.8m wide, stretching northeastward from the northern edge of the lower base of the trapezoidal ossuary. This tail was also composed of a straight front wall constructed with upright basalt boulders and a curvilinear rear wall built by a stretcher bond masonry technique, and the semi-circular space sandwiched between the two walls was filled with basalt rubble and silty sand. Here again, a small gap *ca.* 1.5m long intervened between the two adjacent features, but their joining method was unknown due to the existence of a looters' pit.

Small Finds

Although mostly fragmented, the ossuary yielded a substantial volume of human skeletal remains. They covered the corridor as well as the compartments, suggesting that this communal burial facility was used for a relatively long time.

The interments were accompanied with a small number of grave goods. What most attracted our attention was a rectangular palette put on a dead body in Compartment S-1 (**Figs. 12**, **14:1**). This sandstone product, measuring *ca.* 19cm long, *ca.* 15cm wide, and *ca.* 2cm thick, still retained traces of red pigment, probably of scoria/basalt origin, along the edges of the working surface. It was probably used in combination with a small sandstone slab from a disturbed fill layer of the same compartment (**Fig. 14:2**). Though different in both raw material and function, this palette has much in common with clay molds from Hujayrat Al Ghuzlān, a Chalcolithic settlement in the Al 'Aqabah area (Pfeiffer op. cit: figs. 2, 4).

Compartment S1 contained a pierced shell fragment and a lozenge-shaped shell pendant as well (**Fig. 14:4**, **7**). The other grave goods included a shell bracelet from Compartment N2 (**Figs. 13**, **14:5**), a basalt pestle from Compartment S2 (**Fig. 14:3**), a stone bead and a shell from the middle of the corridor (**Fig. 14:6**, **8**), and several small tabular scrapers found in various archaeological contexts (**Fig. 14:9**). As noted above, the scarcity of grave goods appears to be the norm of the tailed ossuary.

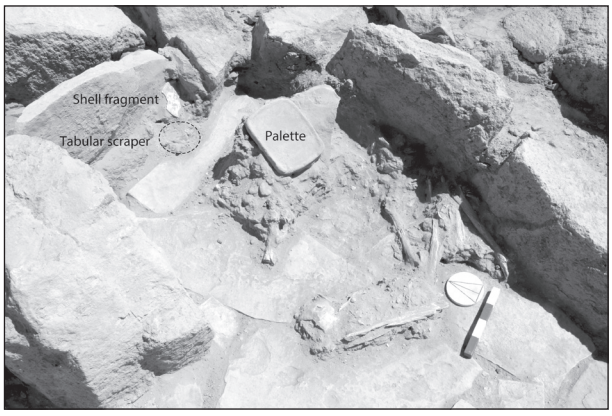
Tailed Ossuary of HJH-204

HJH-204 is located *ca.* 30m NE of HJH-201, occupying the head of a gentle slope at the southern edge of the basalt foothill. Unlike the others, this structural complex was found almost intact underneath an undisturbed cobble mound *ca.* 1m high.

Structural Remains

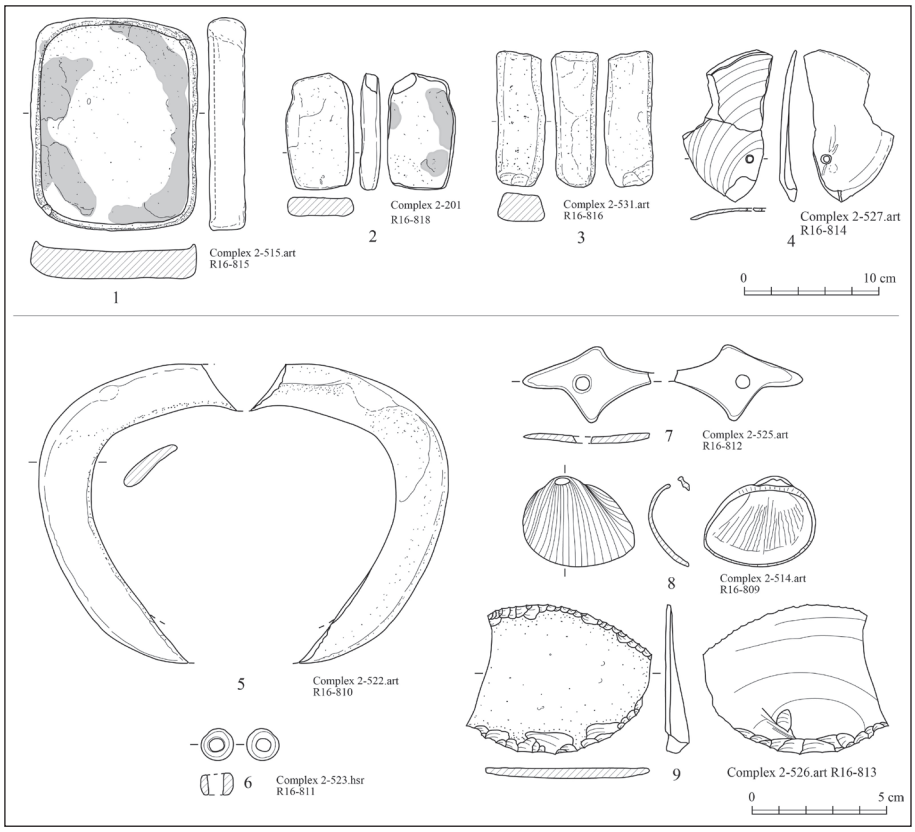
This L-shaped composite structure was also based on the upper surface of Layer 3, consisting again of a trapezoidal masonry ossuary and an inverted p-shaped tail (**Figs. 15**, **18** and **19**). The ossuary was much more slender in general plan than the twin complex at HJH-201, measuring *ca.* 2.5-3.4m wide, *ca.* 7.4m deep, and up to *ca.* 0.8m in preserve wall height. A narrow, sealed entrance was incorporated into the middle of the eastern, gable-side wall, from which a corridor *ca.* 0.5-0.7m wide stretched westward following the major axis of the structure. A total of seventeen compartments (N1~N9 and S1~S8) were arranged roughly symmetrically on both sides of the corridor, but no floor pavement was added in this case. As mentioned above, this ossuary was found nearly intact underneath the undisturbed cobble

11. HJH-201/2: general view (looking S).



12. HJH-201/2: interment in Compartment S1 (looking WNW).

13. HJH-201/2: interment in Compartment N2 (looking SE).



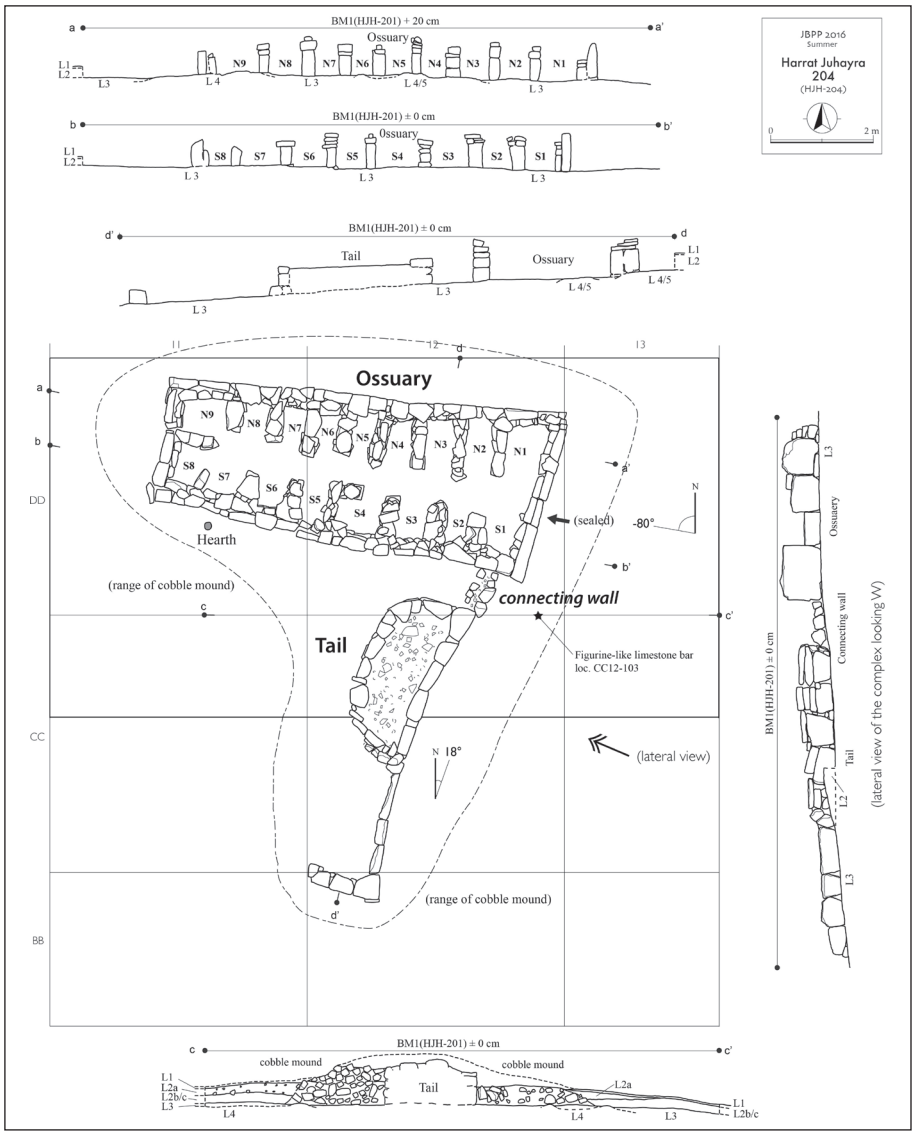
14. HJH-201/2: small finds.

mound (**Figs. 16-17**). Such an ideal state of preservation has enabled us to revalidate our interpretation that the excavated tailed ossuaries were less than 1m in original wall height and not equipped with a solid roof from the beginning. It should be added, however, that most compartments were covered with slab-capped earth fill (**Fig. 20**). This means that even though the ossuary itself was unroofed, individual interments were protected in such a simple manner until they were eventually covered with the cobble mound.

Meanwhile, the tail measured *ca.* 6.7m long and hooked at the distal end. Again, it stretched from one end of the lower base of the trapezoidal ossuary, sandwiching a 1m long simple wall segment in between (**Fig. 21**). The semi-circular space between the straight front wall using upright stones and the semi-circular rear wall built by a stretcher-bond masonry technique was filled up with basalt rubble and, together with the adjacent ossuary, entirely covered with the L-shaped cobble mound.

Small Finds

A preliminary anthropological analysis suggests that the minimum population of buried dead bodies is nineteen, and that they include five infants and/or juveniles, two young male adults, one young female adult, two mature male adults, two mature female adults, and one aged (Sakaue *et al.* 2017). Thus, the ossuary was probably used as a/an (extended) family tomb. With the only exception of the rear right one (*i.e.* N9), all the compartments included interment, but the number of buried bodies varied depending on *loci* from one to five or six (**Fig. 22**). Most of them were disarticulated, suggesting that secondary interment was the norm in the Chalcolithic burial fields. Of interest is the occurrence of several metatarsals with clear evidence of kneeling facet, which probably means that the relevant dead bodies were engaged in flour milling during their lifetime (*e.g.* Molleson 1989). Highly suggestive in this regard is the existence of a supposedly contemporary settlement on the southern slope of the foothill, where several surface finds analogous with the grave goods from the tailed ossuaries have been collected. This fact suggests that both structural entities were combined to form a unified cultural entity. In addition, a few skulls with traces of intentional piercing were also attested. Anthropological analysis now in progress is expected to

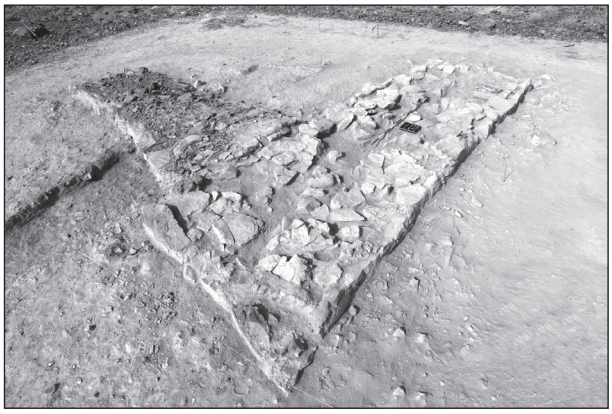


15. HJH-204: plan, section/elevations, and lateral view.

shed light on the overall picture of the interment at this ossuary (Sakaue *et al.* forthcoming).

Grave goods were unexpectedly scarce considering the number of interments, being limited to a shell bracelet from Compartment S5 (**Fig. 23:1**) and a basalt pestle from Compartment S1 (**Fig. 23:2**). The scarcity of grave goods is not attributable to later looting

16. HJH-204: cobble mound after surface cleaning (looking NW).



17. HJH-204: ossuary and tail after removing the cobble mound (looking SW).

18. HJH-204: general view of the L-shaped complex (looking NW).

19. HJH-204: general view of the L-shaped complex (looking SE).

20. HJH-204: Compartment S2 ~ S3 during excavation (looking S).

in this case, because this ossuary was sealed underneath the undisturbed cobble mound. In addition, although outside the ossuary, a limestone bar and a limestone quern were found *in situ* on the then ground surface beside the tail. The former took on a somewhat flattened, cylindrical form *ca.* 30cm high and *ca.* 15cm wide, being associated with a pair of headband-like bas-reliefs and a small, nose-like

21. HJH-204: connecting wall (looking W).

protrusion at its middle portion (**Fig. 23:3**). This unique artifact bears some resemblance to a basalt torso found at Qulban Beni-Murra (Gebel 2016: fig. 21), a Chalcolithic burial field near the border of Saudi Arabia, and requires further scrutiny.

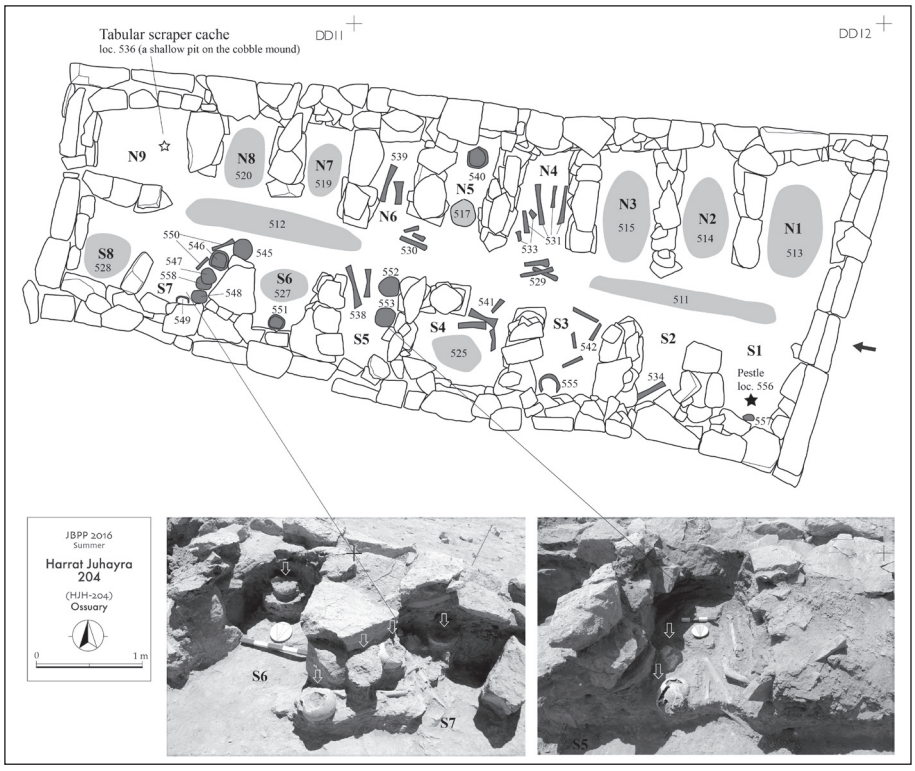
In addition, although not directly related to the tailed ossuary, a total of six tabular scrapers were collectively found on the cobble mound (**Fig. 24**). In view of their archaeological context, they can probably be regarded as a later addition. In fact, they substantially differ in both dimensions and morphology from the small, horizontally long products from HJH-201/1 and -201/2 (see **Figs. 10:4**, **14:9**), suggesting that a certain degree of chronological gap intervened between the two. This cache-like concentration, together with similar finds on the southern slope of the foothill (Fujii 2011), probably belong to the Early Bronze Age when the drainage basin of Wādī Qusayr served as a major transportation route of large tabular scrapers mass-produced in the Al Jafr Basin.

Tailed Ossuary of HJH-211

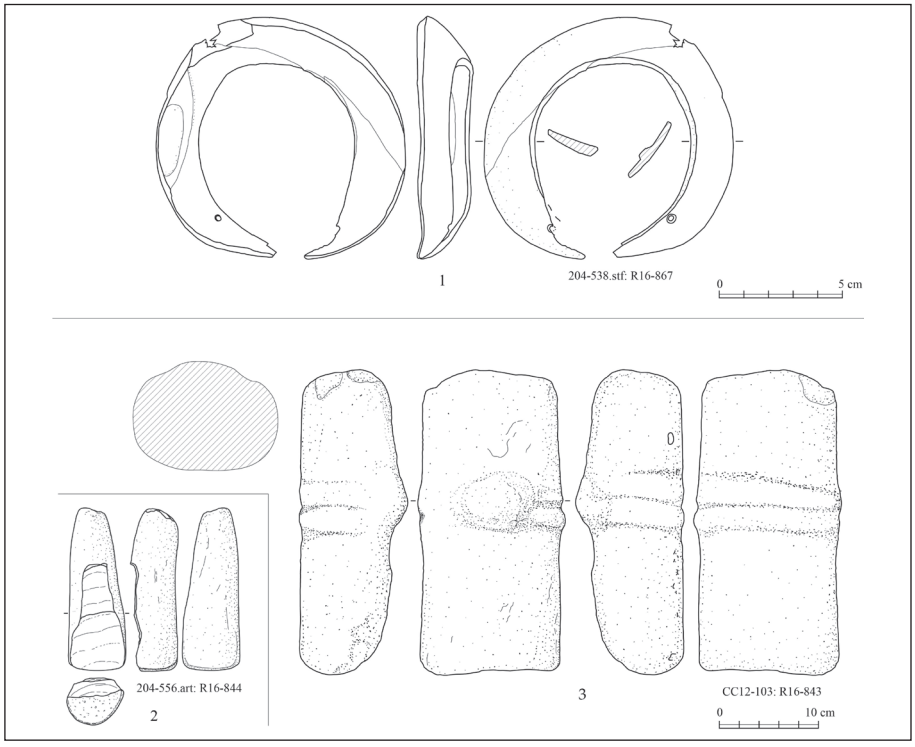
The fourth example of the tailed ossuary was located *ca.* 100m west of the twin complex at HJH-201, occupying a relatively flat terrain near the southern edge of the basalt foothill. A vertically enlarged, L-shaped complex was found underneath a badly disturbed cobble mound (**Fig. 25**).

Structural Remains

The ossuary of this complex was much smaller in scale than the others (*ca.* 2.6-3.4m wide, *ca.* 5.8m deep, and up to *ca.* 0. 5m in



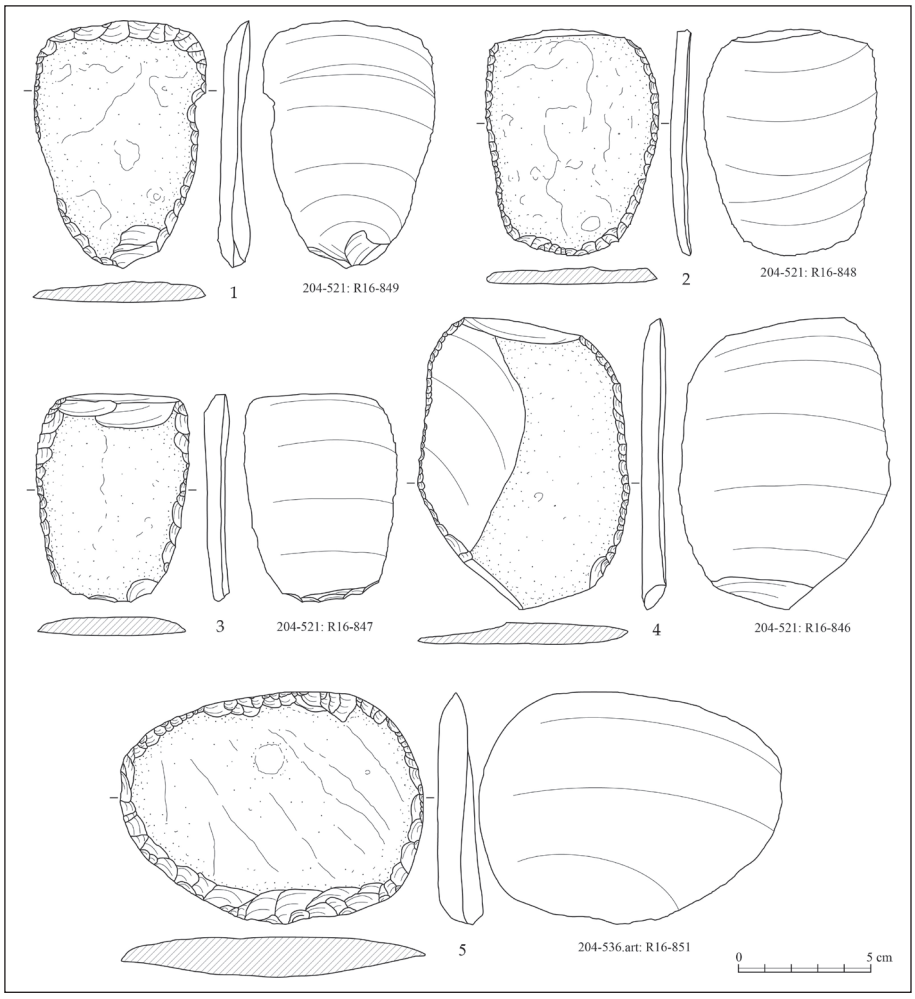
22. HJH-204: finding loci of major human bones in the ossuary.



23. HJH-204: small finds.

preserved wall height) and, at the same time, slightly rounded at the western edge. A narrow entrance *ca.* 0.5m wide was incorporated into the middle of the eastern wall, from which a corridor of the same width stretched in the WNW direction. As with HJH-204, the entrance was temporarily sealed with basalt cobbles, suggesting the intermittent use of the ossuary (Fujii 2016). A total of twelve compartments (S1~S6 and N1~N6) were arranged symmetrically on either side of the corridor, but no floor pavement was added.

The tail stretched in the SWS direction from the southeastern corner of the ossuary,



24. HJH-204: tabular scraper cache on the cobble mound.

sandwiching a 3m long simple stone alignment in between. This tail consisted of several large and small units to form a festoon-like composite feature *ca.* 13m in total length and up to *ca.* 3.5m wide. Again, the front wall was carefully constructed with upright basalt boulders, whereas the rear walls were built less elaborately by a stretcher bond masonry technique using smaller stones.

Small Finds

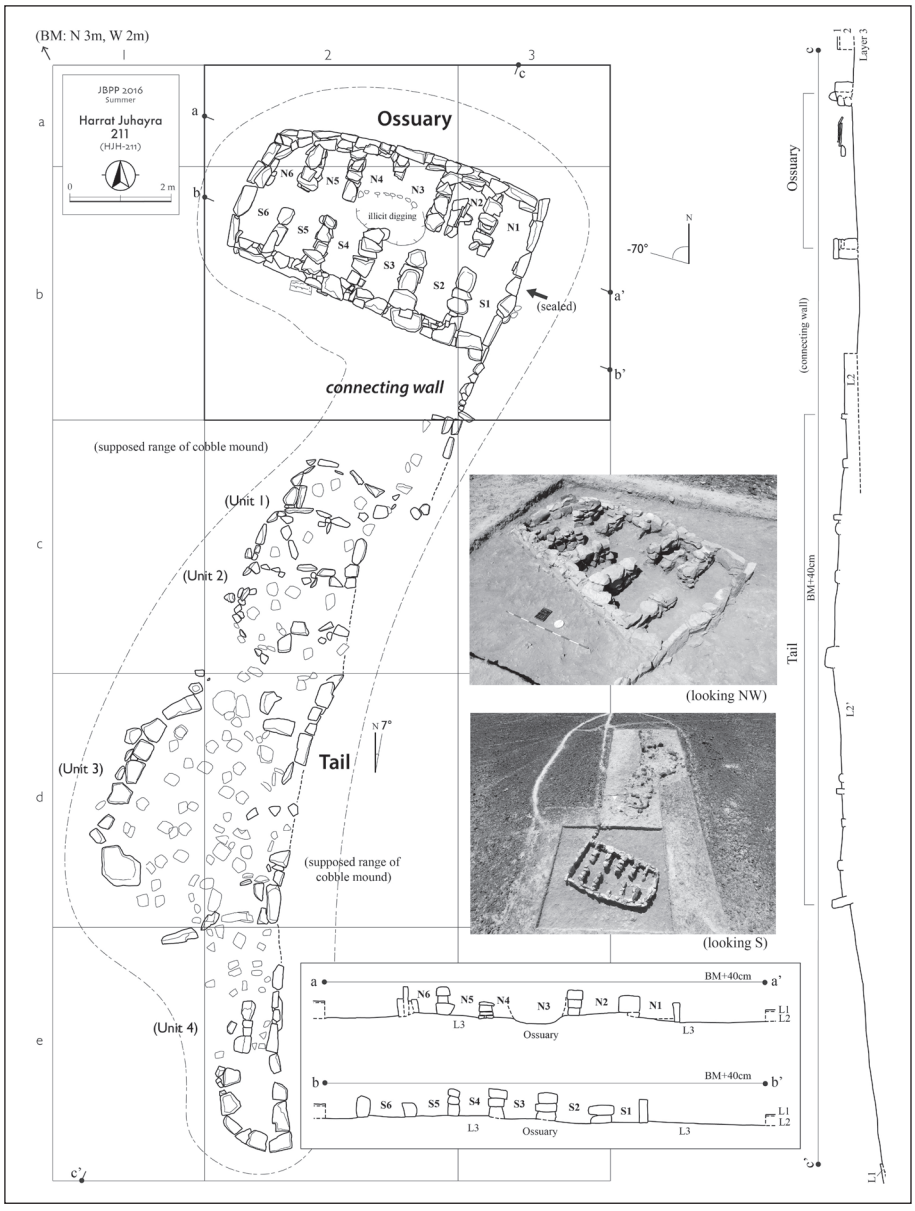
This ossuary was essentially empty, and a limited amount of fragmented human skeletal remains were recovered from Compartment N2 only. No grave goods accompanied them. The downsizing and hollowing-out of the ossuary is inextricably linked to the development and semi-independence of the tail, a sign of the typological transition toward freestanding tails dotted behind the tailed ossuaries.

Discussion

The tailed ossuary is a unique funeral facility first identified in the Al Jafr Basin and expected to shed new light on the post-Neolithic burial practice in southern Jordan thus far poorly understood due to the deficiency of basic information. The following discussion reviews the series of research outcomes according to several major aspects and offers a few tentative perspectives for future study.

Date

Five of six radiocarbon dates converge on a relatively limited time range around 6300-6000 cal BP, suggesting a Middle Chalcolithic date for the four excavated tailed ossuaries (**Table 1**). The occurrence of the small, horizontally long tabular scrapers without careful platform preparation (also called *fan scarpers*) coincides with this dating. In addition, the existence of the PPNB settlement under the twin complex of HJH-201, on one hand, and the finding of



25. HJH-211: plan and section/elevations.

the cache-like concentration of supposedly EBA tabular scrapers on the cobble mound of HJH-204, on the other hand, serve to narrow down the date from the viewpoint of stratigraphy. It is certain that the tailed ossuaries date back to the Middle Chalcolithic.

Location

The five tailed ossuaries (including the unexcavated example at HJH-237) are aligned along the southern edge of the foothill at the largest interval of *ca.* 100m, commanding their supposed parent settlement stretching again east and west along its southern slope. In this sense, it can be said that they occupy the best location as communal ossuaries.

The question is the mutual relationship to the other types of burial features dotted behind the tailed ossuaries, but nothing specific can be said before excavation. It is highly possible, however, that at least freestanding tails, the major components of the hilltop features, developed from the tailed ossuaries. Among others, HJH-211 shows symptoms of both the hollowing-out of an ossuary and the separation of a tail and, in this sense, potentially bridges the typological gap between the two types of burial features. It is our present interpretation that the tailed ossuaries first occupied the best location as burial facilities, followed by the freestanding tails in terms of both date and location.

Table 1. Radiocarbon dates from the four excavated tailed ossuaries (as of Sep. 2016).

Feature	Locus	Material	IAAA-	(yrBP)	**calBP (2δ)**
201/1	507.art	shell	160885	5816±30	**6296-6171** (95.4%)
201/1	C4-202.chr	chacoal	160888	4433±27	5069-4952 (62.1%)
201/1	E1-505.chr	〃	160314	5353±29	**6163-6100 (31.2%)**
201/2	507.art	Shell	160885	5340±30	**6271-6206** (95.4%)
204	DD11-104.chr	Charcoal	160891	5176±29	**5990-5903** (95.4%)
211	518.chr	〃	160892	5240±30	**6022-5919** (83.2%)

Function and Specific Usage

In view of the co-occurrence of human skeletal remains and grave goods, it is evident that the multi-compartment masonry structures were used as ossuaries. Meanwhile, the tail is devoid of interment and, therefore, can be regarded as an attachment feature with some symbolic meaning. Thus, as a whole, the tailed ossuary is defined as a communal burial facility associated with a symbolic feature. Seeing that surface finds from the adjacent settlement have much in common with the grave goods from the tailed ossuaries, both of these were, most likely, combined to form a unified settlement.

The well-preserved example at HJH-204 offers a glimpse into the specific use of the tailed ossuary. Available evidence suggests that: 1) the opening and temporary sealing of the entrance was repeated after every interment; 2) up to five or six dead bodies were buried in a compartment; 3) grave goods were rarely offered to them; and 4) every interment was tentatively protected with slab-capped earth fill and eventually covered with a low, L-shaped cobble mound. It is also noteworthy that the interment often overflows into the corridor beyond the compartments. This fact, coupled with the remarkable difference in the number of dead bodies in a compartment, seems to indicate that the use of the ossuary were flexible and had no strict rules. The fact that every dead body was treated equally probably suggests that no full-scale hierarchization progressed in the middle Chalcolithic society in the Al Jafr Basin.

Techno-Typology

In terms of construction technology, the tailed ossuary is characterized by the low-walled, unroofed structure. In addition, the dry-walling, rubble core masonry technique making great use of upright basalt boulders and the eventual covering by a cobble mound are also hallmarks of these structrures. In terms of typology, it is defined as an L-shaped composite structure that connects a trapezoidal ossuary and an (often inverted) p-shaped tail at a right angle. It is also noteworthy that both components are not directly connected but always bridged by a 1-3m long, rather *ad hoc* wall segment or stone alignment. This inexplicable connection method reminds us of the unique formation process of linear open sanctuaries in the Neolithic Al Jafr Basin (*e.g.* Fujii 2000, 2002, 2005b, 2013; Fujii, Adachi *et al.* 2013; Fujii, Yamafuji *et al.* 2012), but its real implication is as yet unknown.

The ossuary incorporates up to seventeen compartments, which are arranged roughly symmetrically on both sides of a narrow corridor stretching along the major axis of the trapezoidal structure. Understandably, the entrance was set up in a gable side, in the middle of the upper or lower base of the trapezoidal structure, but its orientation varies from the northwest (HJH-201/1 and 201/2) to the east (HJH-204) or the southeast (HJH-211), depending on the orientation of the ossuary itself and, more importantly, into which of the two opposed gable sides it is incorporated.

Meanwhile, the tail is composed of a straight front wall (carefully built with a single row and course of upright basalt boulders) and up to several semi-circular rear walls (less carefully constructed by a stretcher bond masonry technique using smaller stones). Thus, as a whole, it has an inverted p-shaped plan (in the case of the single unit type) or a chain-like plan

(in the case of the multi-unit type). In terms of orientation, it always stretches at a right angle from one edge of the upper or lower base of the trapezoidal ossuary and, therefore, faces to the east or to the southeast. Basalt rubble and silty sands are compacted into the semi-circular empty space between the two walls, but neither human bones nor burial gifts are included there.

Both components are eventually covered with a L-shaped cobble mound less than 1m high. The reason why the mound required only such a small height is that its target structural complex itself was equally low in wall height.

Origin and Intra-Site Typological Sequence

Nothing is known of the origin of the tailed ossuary. The series of unique traits-the low-walled, unroofed structure, the trapezoidal plan, the unique indoor space division, the combination with a long tail, and the eventual covering with a cobble mound-provides a key to approaching the issue, but no comparative examples have been attested in surrounding areas, to say nothing of the Al Jafr Basin. This gives us an impression that the tailed ossuary suddenly appeared without any clear cultural context, but this is probably not the case. An available hint, if any, is the grave goods. As noted above, the spoon-shaped miniature vessels and the rectangular palette have parallel examples at the contemporary sites in the Al ‘Aqabah and Wādī Faynān areas. Although no copper products are included in the grave goods from the tailed ossuaries, this fact is suggestive of some cultural contact with the contemporary copper mining and/or producing centers in southern Jordan. The origin of the tailed ossuary could be pursued in this context.

Meanwhile, the intra-site typological sequence of the tailed ossuary can be discussed in some detail on the basis of the research outcomes. Noteworthy is the difference in internal composition among the four excavated tailed ossuaries. HJH-204 at the eastern edge combines the large, standardized ossuary with practical interment and the single-unit tail. In contrast, HJH-211 at the western end combines the small, less standardized, essentially empty ossuary and the long, multi-unit tail. HJH-201/1 and -201/2 in the center exhibit a literally intermediate form between the two terminal complexes.

A few different interpretations are possible for the differences. One is the eastward development, but it is difficult to imagine that the tailed ossuary started with the small, essentially empty example and suddenly interrupted with the fully developed one. Thus the opposite sequence, namely, the deterioration from the full-fledged example with practical interment to the small, substantially empty one, seems more likely. However, the series of readiocarbon dates do not always descend in this order. Taking this into consideration, it is also highly possible that the tailed ossuary began with the central twin complex occupying the most ideal location as communal burial facilities and, then, developed or deteriorated to both directions.

No clear-cut conclusion seems to be reached at the present stage, but what is important here is that HJH-211 falls into one of the latest examples in terms of both radiocarbon date and supposed typological sequence. Given this, it would follow that the burial custom at the four excavated tailed ossuaries underwent the following two symmetric changes: the downsizing and hollowing-out of the ossuary, and the development and semi-dependence of the tail. The former change highlights the deterioration of practical interment, whereas the latter means the increase in relative importance of the symbolic attachment feature. Now that the necessity of the ossuary as a receptacle of dead bodies decreased, it is a natural consequence that the tail grew increasingly important. This assumption would offer a rational explanation for the enlargement of the gap between the two components and its consequent semi-independence of the tail. As suggested above, the appearance of freestanding tails behind the tailed ossuaries could be understood as an extension of such general trends.

Concluding Remarks

The finding of the tailed ossuaries has shed new light on the Chalcolithic burial practice in the Al Jafr Basin. They are probably combined with the adjacent settlement and, therefore, potentially contribute to a comprehensive understanding of the Al Jafr Chalcolithic. However, many issues-including the comparative study of the grave goods, the anthropological analysis of the human skeletal

remains, and the integrative study on the origin of the tailed ossuary-remain to be done. We would like to pursue these key issues in future study.

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JARASH:
INVESTIGATION IN THE VAULTS OF THE PODIUM OF THE TEMPLE OF ARTEMIS (NOVEMBER-DECEMBER 2018)

Ziad Ghnimat, Roberto Parapetti, Daniela Baldoni and Massimo Brizzi

Introduction

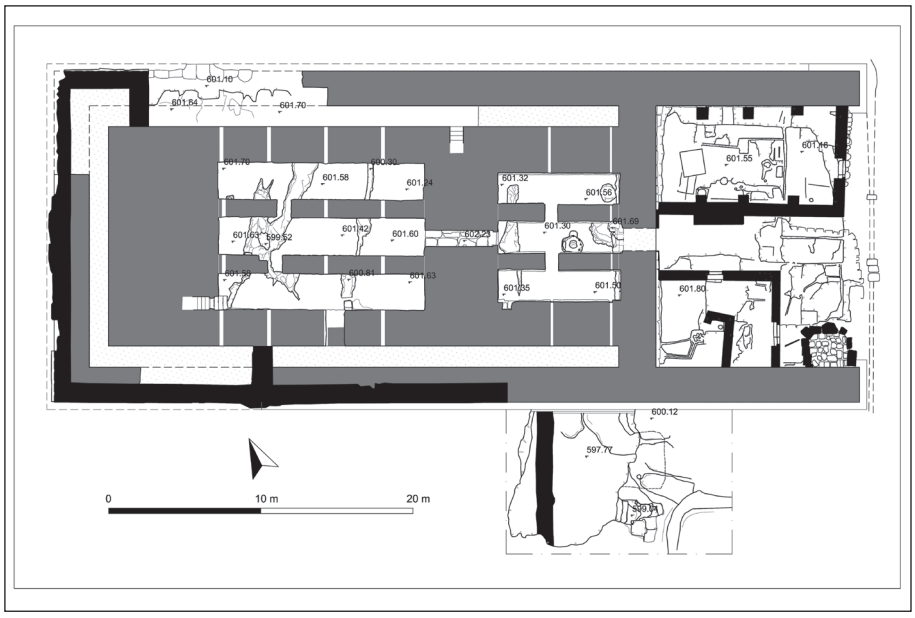
The 'Conservation of the 2nd-Century Temple of Artemis at Jarash' is a collaborative project between the Department of Antiquities of Jordan and Monumenta Orientalia (Rome), co-directed by Ziad Ghnimat and Roberto Parapetti, with the aim to halt or mitigate the major conservation problems of the temple; raise awareness of the site; and improve site access for tourists and local citizens. The project began in October 2018 and, after suspension due to the Covid-19 pandemic, ended in March 2022.

Since many of the more serious conditions in the structures of the podium were already identified, it was decided to proceed with the cleaning and systematic investigation of the stratifications that survived above the bedrock so as to be able to evaluate more clearly the condition of the foundations of the walls in relation to the bedrock on which they were built.

The excavation lasted one month from November 19th to December 20th 2018 and employed six workers of the Department who were directed by Massimo Brizzi. Antonio Abate was responsible for the documentation. The results of this investigation fill a long-lasting knowledge gap as the podium vaults, thanks to an ancient breach in the southern foundation, have always been accessible even after the monument and the city were abandoned, but were never investigated scientifically and documented, affecting the complete understanding of the monument.

The Podium of the Temple

The podium and the foundations of the temple were built simultaneously following groundwork on the surface of the bedrock, sometimes with low foundation trenches or by a simple leveling (**Fig. 1**). The podium is a U-shaped structure open on the eastern side. It is 53.90m long, including the wings of the stairway, and 22.70m wide. The foundations of the walls of the *cella* and the colonnade of the pronaos form a rectangle inside the podium measuring 36 by 14.40m. A 1.40m wide corridor is left between the two, closed at both eastern ends. The western side of the foundation of the *cella* is made of a huge platform 7.25m thick, while the foundation of the eastern corner staircase is 4.90m thick, crossed by a narrow corridor built in the structure that links two rectangular areas: the eastern portion under the pronaos is 8 by 8.45m wide; the western portion under the *cella* is 13.60 by 9.70m wide. The masonry of both the podium and the foundations is comprised of the same pink limestone commonly called *malakiu*, whose quarries are located about 4.5km north of the city. Both were likely worked by the same stonecutters, even if the podium is obviously better finished than the foundations. To support the floors of the *cella* and of the pronaos, two systems of three parallel vaults each were built in white limestone voussoirs. The vaults are supported by two parallel walls also of white limestone ashlars and by the foundations of the *cella* within which are designed the imposts for the southern and northern vaults. The only access to these vaults was a staircase built in the western platform



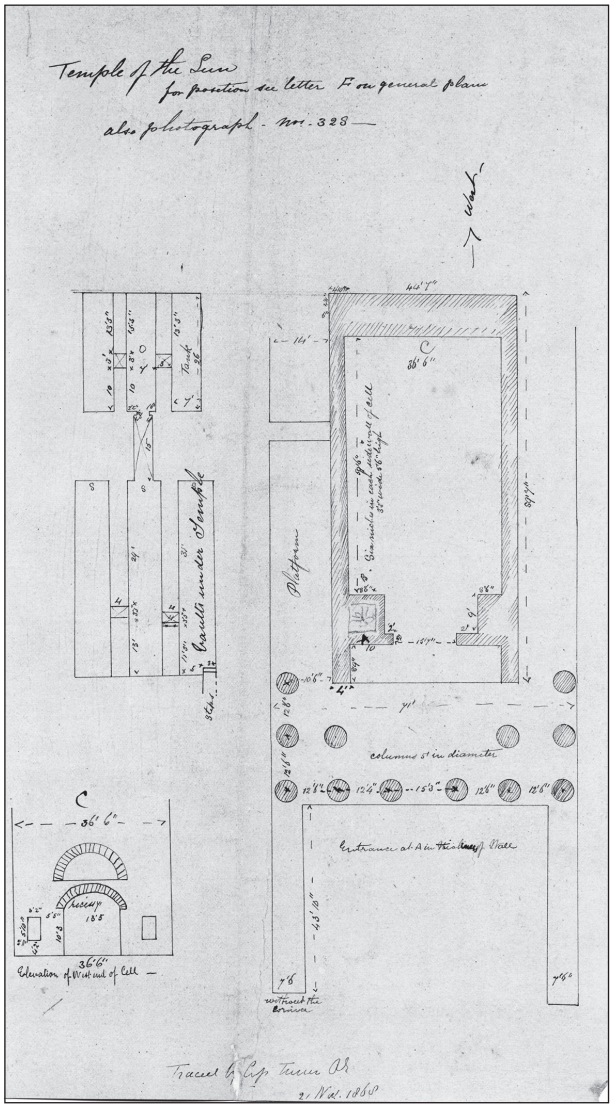
1. Plan of the temple sectioned at 602.50m asl with the heights of the bedrock (survey and editing: M. Brizzi).

that connects the south-western corner of the *cella* with the southern vault. The vaults under the pronaos, on the other hand, can only be reached through the corridor mentioned above, passing through the eastern foundation of the *cella* from the central vault. After the mid-6th century, two other entrances were opened in the eastern front of the temple towards the central vault under the pronaos and along the southern side into the southern vault under the *cella*. This last breach was the access to the rooms of the podium for all subsequent centuries, even when the *cella*, the pronaos, and the pteromata had become unusable (**Fig. 2**). When Clarence Fisher and Chester McCown were planning their investigation of the temple in 1930, they could access all of the vaults from the breach and found "a considerable damage has been done to the walls by the scraping in the effort to obtain saltpetre" (Fisher 1938: 135) generated by the dampness and, we add, the presence of nitrogenous waste due to the prolonged stay of animals in these rooms. In the vaults, there is no record of any investigation carried out by the American team in the 1930s. The complete clearance of the monument as initially planned was not achievable. The pronaos and the southern and northern sides of the temple were cleared of debris, but the collapsed blocks in the *cella* and along the western side of the temple were left *in situ* for many years. It is likely that, like four small trial trenches identified in the *cella* and in the pteroma of the temple, some targeted trenches were also made in the podium in order to assess the surviving evidence in this area. The systematic excavation of the *cella* of the temple was carried out by the Italian mission in 1994 and 1995, together with the excavation of the western and south-western pteroma. The excavation settled that the planned raising of the western part of the *cella* was modified, leaving the extradoses of the three vaults exposed and extremely fragile, so much so that once the excavation was completed, it was necessary to repair parts of the crown. For safety reasons the two entrances to the podium rooms were blocked with temporary barriers, which were soon tampered with. This meant that in the following years access to the vaults was not controlled, which led to the consequent accumulation of rubbish and other waste. In addition to dirt, more serious damage was perpetrated during these intrusions, as the archaeological investigation has subsequently shown; the most striking damage was the visible deterioration of the wall structures. When the poor condition of the door jamb between the southern and central vaults was recorded, it was immediately clear that the assessment of the podium structures could not be carried out before a general clean-up and the excavation of deposits above the bedrock.

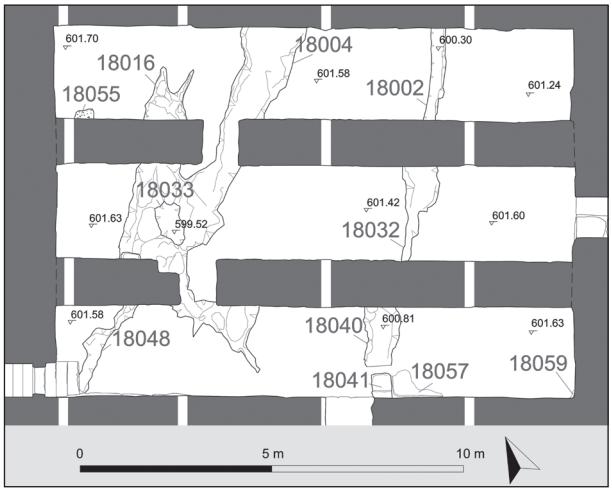
The Excavation

The area of the six investigated vaults is 146 square meters. The level of the bedrock in the

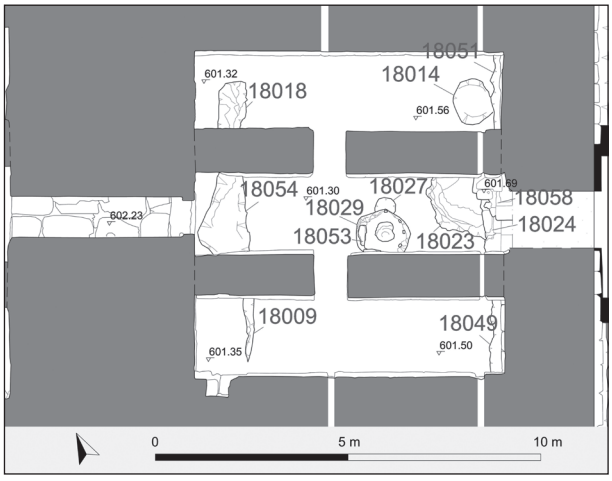
vaults ranges from 601.30 to 601.70m high asl; its surface is irregular, made of higher spots and depressions; the limestone is striped by natural fissures, oriented mainly north-east to south-west and filled with very compact natural deposits of sandy clay and gravel (**Fig. 3**). First of all, there is an extreme rarefaction of the anthropogenic traces in the bedrock when compared with the situation outside the temple recorded between the *alae* of the staircase by the American expedition in the 1930s and that of the Italians in the 1980s. They are concentrated in the eastern part of the vaults under the pronaos, while in the rest of the rooms only minor alterations of the rock have been recorded. In the 26m between the eastern limit of the vaults under the pronaos and the western limit of the vaults under the *cella*, three main natural fissures in the bedrock have been documented, whose irregular edges have been altered partially by both ancient and modern excavations (**Fig. 4** and **Fig. 5**). In the eastern vaults, the crack 18018-18054-18009 crosses the three small rooms without extending further either north or south. The fissure 18002-18032-18040 in the eastern half of the vaults under the *cella* is longer and widens in its southern part. The western half of the vaults under the *cella* is



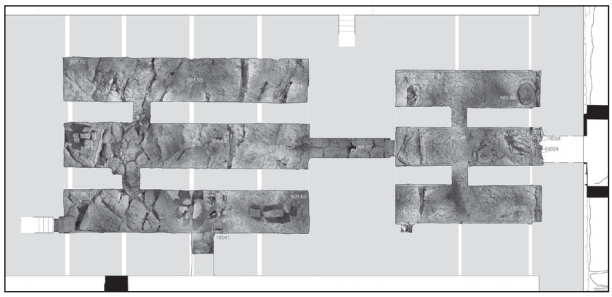
2. Sketch with measurements of the temple of Artemis at Jarash drawn by Charles Warren in 1868, likely after a visit to Jarash in 1867. Note the details in the plan of the podium vaults, then fully accessible. Warren noted the presence of a cistern, our US18041-18057-18059, but probably due to faulty memory he recorded a tank in the southern vault under the pronaos instead of the eastern end of the southern vault under the cella (Courtesy of the Palestine Exploration Fund).



3. Plan of the vaults in the podium of the temple and orthophoto of the bedrock after the investigation elaborated from the photogrammetric survey of the temple (survey and editing: M. Brizzi).



4. Plan of the vaults in the podium under the pronaos with the indication of the most significant contexts (survey and editing: M. Brizzi).



5. Plan of the vaults in the podium under the cella with the indication of the most significant contexts (orthophoto: A. Abate; editing: M. Brizzi).

occupied instead by the complex and articulated fissure 18004-18016-18048, subject of devastating interference by looters but already partially emptied in ancient times for uncertain purposes. Apart from some fills of cuts in the bedrock, the remnants of earthy stratigraphy not disturbed by modern excavations are almost nil. We therefore report the sequence that was possible to record during this investigation.

Evidence Predating Construction of the Temple

Understanding of activities preceding construction of the temple are limited to admittedly poor evidence in the central room under the pronaos. Here, the surface of the bedrock was uniformly lowered after construction of the temple, with the intent to create more clearance between the bedrock and the ceiling above, further aiding those walking on this surface. Despite this reduction, a deep cut in the rock was recorded in the north-eastern corner of the room. Only its western half has been exposed, since the cut continues under the foundation of the eastern columns of the temple and the threshold of a door built in a breach made during the Byzantine-period reuse. The upper filling of the cut (US18025) was disturbed by modern intrusions and contained pottery from a wide chronological range. The lowest deposit (US18026), sealed by fragments of over-fired tiles, was undisturbed. Here two fragments of Eastern Sigillata B bowls and one of African Red-Slip Ware, whose shapes unfortunately are unrecognizable, were found together with some sherds of ribbed and plain walls of cooking pots. The assemblage can be dated between the 1st and 2nd centuries AD. It is therefore a context that can be correlated with evidence of residential use of the area shortly before the construction of the temple already documented in the 1982 excavation between the *alae* of the temple (Bitti 1986). Although missing the upper layers, this cut was intentionally filled with materials that reveal a desire to offer solid support to what was about to be placed on top. Since there is no trace of the cut east of the temple foundation, it is likely that it does not extend far beyond the excavation limit of our investigation. The limit was imposed by the presence of the Byzantine structure that is off the western face of the foundation, so that it is impossible to know how the temple builders dealt with this depression: that is, if the rock was still reached with the lower courses or if the cut did not interfere with the masonry of the foundation. As for the function of this pit, the irregularity of its walls and the absence of any coating do not allow for a valid interpretation beyond the generic use of storage.

Other evidence from prior to construction of the temple, due to its relationship with the walls of the vaults, can be identified in the quadrangular regularization (US18018) of a natural fissure in the western half of the north vault under the pronaos. It was emptied and partially altered by modern excavations.

In the same room but at the eastern end, a circular shallow pit has been found (US18014). The pit is 1.2 by 0.95m wide and 0.35m deep and is cut by the foundation trench of the temple, showing its anteriority to the building despite the undisturbed sandy silty layers filling the pit (US18015 and US18020) that contain scarce pottery belonging to the Umayyad period. If related to the evidence of the cistern found outside in 1982 and the mentioned cut in the contiguous room, the shape and dimensions of this pit suggest that it could have been the slot for the setting of a large jar.

Finally, a smaller circular pit 0.45m wide was found in the middle of the central vault under the pronaos (US18027); it is also cut by another pit which, as we will see, has been connected to the life of the temple, placing this small cut in an earlier phase. The sandy fill didn't preserve any material. It could be the surviving bottom of a deeper pit reduced by the lowering of the walking level after the building of the vaults. Alternatively, this last evidence and the quadrangular cut adjusting a natural

fissure may refer to a clamping system of lifting machines during the construction of the temple, although these isolated traces are not exactly legible in a recognizable pattern.

Evidence of the Construction and Life of the Temple

As observed in various investigations carried out outside the temple building, the construction of the podium and foundations of the *cella* is always preceded by the regularization of the bedrock for the direct setting of the lower ashlars on the rock, without renouncing to adapt the footing to different levels by cutting the bare minimum from the natural rock. This strategy is the reason why real foundation trenches were recorded exclusively along the eastern sides of the two northern and southern rooms of the vaults under the pronaos.

In the northern vault, the bedrock was leveled roughly to the average height of 601.4m, sloping gently west. The linear cut (US18051) along the eastern foundation of the columns is about 20cm wide. This cut hosts at least one course of the ashlars of the foundation and it is an exception in the building procedures of the temple, where most of the foundations are set on leveled bedrock without a deep cut like this one. Such a concern is certainly attributable to the solidity of the rock that in this area was not considered reliable. The cut is filled with limestone flakes and sand, likely the debris of the chiseling of the ashlars, which has been left *in situ*.

In the southern vault the surface of the bedrock was also leveled roughly between 601.35 and 601.5m asl The cut along the foundation of the columns (US18049, equivalent to US18051) is 22cm wide and has been partially investigated. The filling consists of sand and limestone flakes (US18050), with no other artifacts recorded in this context. The edge of the cut is irregular. Covered by this filling, about 20cm below the surface of the bedrock, the offset of the lower course of the foundation fills up the whole width of the cut (**Fig. 6** and **Fig. 7**).

Following the foundations of the *cella* along the whole exposed perimeter in the podium vaults, there is a simple leveling of the bedrock surface on which the ashlars of the masonry are settled. This is also the case in the large platforms of the thalamos and the eastern staircase towers, without the deep surface cut of the rock as in the foundation of the eastern columns. The construction of the walls supporting the vaults

6. Southern vault under the pronaos. Detail of the foundation trench US18049 from north after the investigation of the fill, still visible in the section under the southern wall of the vault, covering the offset foundation of the eastern columns of the pronaos (photo: M. Brizzi).

7. Southern vault under the pronaos. View of the foundation trench US18049 from top where three ashlars of the offset footing are discernible after the excavation of the fill (photo: M. Brizzi).

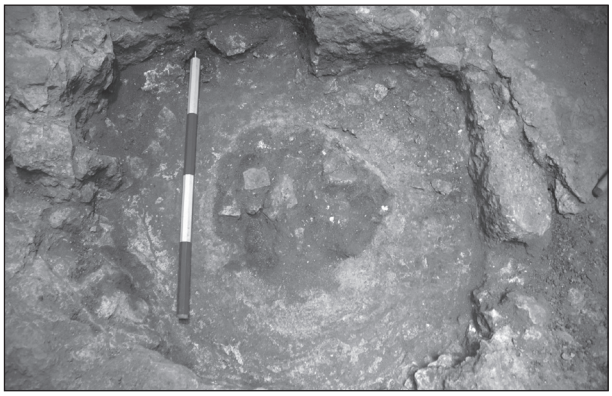
is made instead without the same precautions of careful leveling. Even allowing for an alteration of the walking levels following the profanation of the temple, the footing of these walls appears to have been adapted to the unevenness of the rock through improvised expedients such as filling gaps with small blocks.

The summary leveling of the bedrock in the podium vaults can probably be explained by the planned flooring of all the rooms with a thick, beaten-earth floor that would have regularized the walking surfaces. This floor, and all those that followed over the centuries these rooms were occupied, have been lost due to looting activities. Only a small fragment is preserved in the south-western corner of the northern vault under the *cella*. It is a small patch of a beaten floor of clay and gravel (US18055), 15cm thick, pressed directly over the bedrock. Whether it belongs to the original floor of the temple vaults or to a later phase is impossible to say due to the absence of any diagnostic material, but this fragment gives an impression of how the walking surface must have appeared in ancient times on these premises.

Beyond this uncertain evidence, in the central vault under the pronaos, a context was found most likely referable to the phase of use of the building as a temple; that is, between the 2nd and 4th centuries AD. It is a circular cut (US18029) along the southern side of the room, about 25cm deep, with a diameter of 1.15m. The bottom is flat, with a deeper central circular pit, 0.40m wide (**Fig. 8**). The south-western sector of the cut is adjusted with two blocks bound with clayish mortar (US18053); a probable third block is missing from the southern wall of the room, while four quadrangular lodges, 10 by 5cm each, are carved along the lower eastern edge of the cut. The filling of this cut (US18030) was undisturbed. A few fragments of cooking pottery were mixed with five fragments of polychrome marble slabs, one moulded, and five fragments of alabaster. This pit cuts the earlier mentioned smaller pit (US18027). The shape of the bottom suggests the presence of a big vessel set in the central pit and surrounded by a structure half built in masonry and half realized by fixing timber laths in the rock. The sequence shows that this feature was set when the wall of the vault was already standing. Since it is hard to imagine this structure built a few meters west of the entrance opened at the eastern end of the room after the profanation and occupying the middle of the only passage from the area, it is likely that it belongs to the phase of the temple when the three rooms under the pronaos were the most recessed rooms of the building basement. Furthermore, the fragments of marble and alabaster found in the filling, *i.e.* when this feature was dismantled, can be related to the rare contexts of the excavation of the *cella* referable to the years immediately after the systematic spoliation of the marble revetments of the *cella*. In particular, context 95174 which, in addition to many fragments of polychrome marble, contained fragments of a Nabatean alabaster capital that likely was an internal decor of the *cella* (Parapetti 1998; Brizzi 2018).

Evidence of Ancient Reuse after the Profanation of the Temple

The transformation of the temple after the interdiction of the cult of the goddess took place in successive stages, identified by the stratigraphic excavation carried out in the *cella* in 1994 and 1995. The first of these stages was the transformation of the great hall of the *cella* into a secular building, still covered by its roof although completely stripped of all marble revetments including the floor. Of this phase only a few fragments of polychrome mosaic survive, part of the new floor of the *cella* that was transformed into a reception hall for local authorities linked to the urban or provincial administration. Access to this hall had to take place through the same stairway to the temple,



8. Central vault under the pronaos. The cut US18029 during the investigation. The undisturbed context US18030 is still in situ filling the central pit. On the right, two blocks of structure US18053 (photo: M. Brizzi).

as evidenced by inscriptions (acclamations?) within crowns painted on the front columns of the portico and referable to this phase (Welles 1938, n. 337). The detail is evidence for the chronological framework of an important transformation in the vaults of the podium, *i.e.* the opening of a new access point at the center of the eastern wall of the central vault under the pronaos, which obviously implies the removal of the stairway in front of the temple. The latter was carried out at a further stage, when the roof of the *cella* collapsed, around the mid-6th century, determining another transformation in the use of the building and of the whole area. We can therefore state that in the rooms of the podium no evidence referable to the first transformation of the building has been identified so far, while with the transformation realized after the mid-6th century and the conversion of the entire upper terrace of the sanctuary into a vast production estate, important modifications are also recorded in the vaults of the podium.

The first is the mentioned opening of a new access point that transformed the vaults of the podium from the basement of the temple to the ground level of a stronghold that was the epicenter of an articulated artisan district and hosted residential, storage, and processing facilities. A breach 1.55m wide was cut in the foundation of the columns, removing the ashlars of three courses exactly in correspondence with the central intercolumniation. It is possible to discern the elements of two successive sets of thresholds and jambs belonging to two distinct phases (US18024 and US18058), the latter reducing the width of the entrance to 1.20m (**Fig. 9**).

Important interventions in this phase of the building have also been recorded in the southern vault under the *cella*. Here, a north to south oriented wall (US18041), built with recycled ashlars and bound with poor lime mortar, closed the eastern end of the room, isolating a space 4.70 by 2.30m wide. East of the wall, the excavation revealed the presence of a 3-4cm thick waterproof coating rich in sandy aggregates (US18057) laid both over the leveled surface of the bedrock and seamlessly over the southern and eastern walls up to a recorded height of about 85cm from the bottom. In the south-eastern corner, settled in the coating mortar, four limestone *tesserae*, about 1.5cm wide, are the only remains of the original flooring. The creation of this cistern in the vault of the podium can be connected to the trace of a drainage running along the external southern wall of the *cella*. The drainage came out of the breach made in the southern wall of the *cella*, then transformed into an open area with small houses, where rainwater was collected and conveyed to this point of the building, flowing into the cistern through one of the slots (**Fig. 11**). The intentional closure of the lower part of this slot provides an indicator of the original depth of the cistern. In fact, the wall structure that delimits the western side of the cistern is almost entirely destroyed, but using the height of the slot infill as a possible maximum filling level, we obtain a capacity of over 18 cubic meters.

9. Central vault under the pronaos. The breach opened through foundations of the columns opening an access to the vaults from the area between the alae. In the foreground, the threshold US18058 overlaying the earlier doorstep US18024 (photo: M. Brizzi).

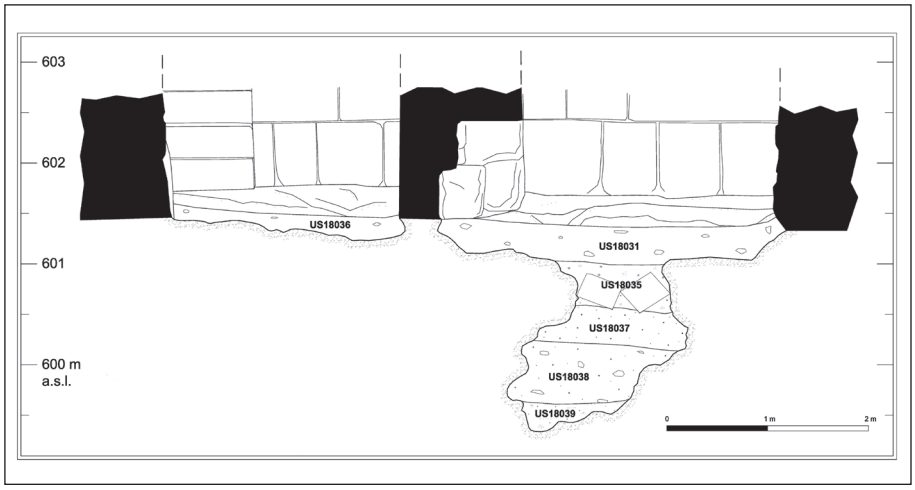
10. Southern vault under the cella. Detail of the SW corner of the Byzantine-Early Islamic pool in the eastern half of the vault with waterproof coating US18057 and structure US18041 (photo: M. Brizzi).

The second direct entrance from outside to the vaults, obtained by opening a breach in correspondence with a slot in the foundation of the southern wall of the *cella*, is more difficult to frame chronologically. It is immediately west of the cistern described above. The opening, 1.30m wide and just over 1.50m high, connects the southern vault under the *cella* with the corridor under the southern pteroma, which was already open and partially buried when the breach was cut. There is evidence of a swing door marking the threshold. This opening has remained a usable access point to the vaults up until today.

The deep and irregular cut (US18033) found in the western half of the central vault under the *cella* is more difficult to interpret (**Fig. 12** and **Fig 13**). It is located in the center of the long and branching fissure that crosses the three vaults in the western half, in the place where our attention had already been caught due to the dangerous condition of the door jamb. The excavation of this area revealed a deep recess in the bedrock, also identified, and partially emptied, by modern looters. Apart from the

11. Southern pteroma. The inlet to the cistern through the slot in the foundation of the south wall of the cella (photo: M. Brizzi).

12. Central vault under the cella. The cavity US18033 at the end of the investigation (photo: M. Brizzi).



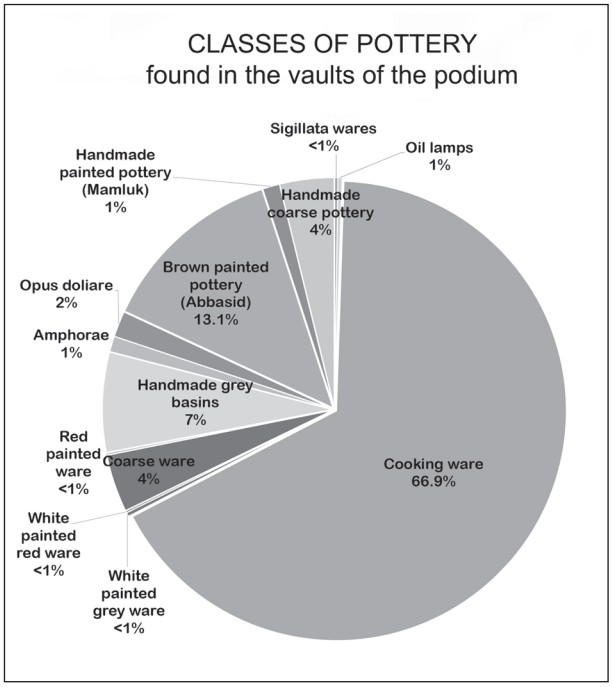
13. Central and southern vault under the cella. N-S cross-section through the cavity US18033 and recorded stratigraphy (survey and editing: M. Brizzi).

14. Central vault under the cella, cavity US1803. Bronze specillum from US18039 (photo: D. Baldoni).

damage caused by these recent excavations, the walls of the cavity show no signs of artificial cutting, indicating that we are probably dealing with a natural grotto used and filled in ancient times and then partially disturbed by looters. Under a layer of silty sand (US18031), extended to the whole western part of the room, the investigation recognized four different contexts filling progressively the cavity. The upper one (US18035) is a dump of two small limestone ashlars and sand with modern intrusions; it covers two thick sandy layers (US18037 and US18038) with few pottery, cobbles and gravel. At the bottom of the grotto, a more clayish layer (US 18039) shows a flat and horizontal surface and covers the irregular bottom of the cavity. Each of the lower three layers contained mixed pottery with a wide chronological range, from Roman to Mamluk periods, including Umayyad amphorae. At the surface of the lowest, an interesting artifact was found: an intact bronze *specillum* (**Fig 14**). It has a small spoon-shaped spatula on the top and a pointed circular-sectioned stem, flattened in the upper part where an arch and a double volute are incised. Only the upper of these layers fits with the characteristics of a dump following a looting, while the lower ones are undisturbed stratifications. It is therefore likely that the recent looting was limited to the upper part of the hole. Whether this cavity was opened during the reuse of the temple and closed after the Mamluk period, as indicated by the most recent pottery found in the filling, or if the activity was in turn the disturbance and reopening of an older context, is very difficult to determine. The presence of a bronze *specillum*, itself difficult to date precisely, opens legitimately the suspicion that the grotto had been used previously for religious reasons related to the temple or even for an earlier cremation burial, and then reopened, closed after the Mamluk period, and disturbed by the recent intrusion.

It has been mentioned repeatedly how most of the earthy deposits above the bedrock have been turned over by modern use of the rooms or by looting activities. The mapping shows crudely how the few undisturbed stratigraphies are the ones laying in the recesses of the rock, especially in the vaults under the pronaos. In many cases, a stubborn perseverance in excavating natural deposits inside the rock fissures has been recorded, even under the foundations of the walls, showing how those responsible for these ravages were inexperienced "treasure hunters," though no less dangerous to the state of the monument. Nevertheless, all the disturbed deposits were systematically excavated and recorded, and in the examination of the assemblages it was possible to recognize roughly what was originally documented in the vaults of the podium (**Fig. 15**).

The majority of recovered materials is related to the Late Byzantine and Early Islamic phases that are the periods in which the temple building



15. Investigation in the podium of the temple of Artemis. Distribution of the different pottery classes recorded out of the total fragments recovered in all the contexts excavated (chart by D. Baldoni).

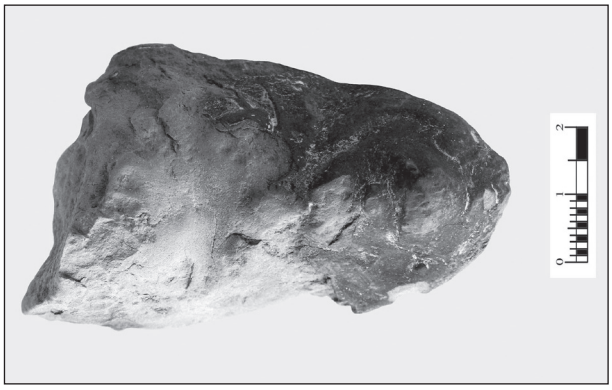
was transformed entirely. Along with fragments of cooking and coarse ware (together more than 70% of the total pottery) they also include quite a number of sherds of large handmade basins in a grey fabric (7%), attested in different varieties and dimensions and usually decorated with combed, wavy lines.

As expected, the presence of Eastern and African Sigillata Wares is limited to five fragments. Among the most ancient materials it is worth mentioning a terracotta figurine, likely an oil lamp handle, in the shape of a Satyr's head with a snub nose, long beard, and hair depicted by small engraved notches (**Fig. 16**). The surface, largely blackened, shows evident traces of use.

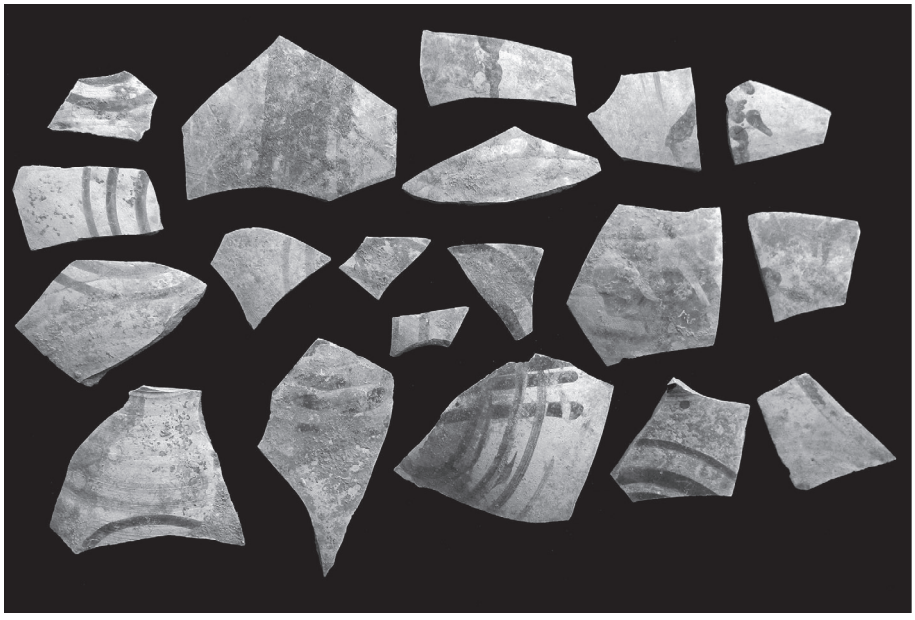
Particularly abundant and spread all over the vaults of the podium (more than 13% of the recovered pottery), with a higher concentration in the central and southern rooms under the *cella* (US 18036, US 18037, US 18038), is a type of pottery produced at the northern kilns of Gerasa from the early second half of the 8th century (**Fig. 17** and **Fig. 18**). All the collected fragments belong to jars, juglets, and spouted jugs with a cream or white-slipped surface and a purplish-brown painted decoration consisting of loops, spirals, wavy lines, arched patterns, and crisscrossed lines. This ware, widespread in northern and central Jordan, shares many features with the Abbasid pottery, which shows evident elements of continuity with the previous tradition, as pointed out by examples from Pella dated to the late-8th and early-9th centuries (Walmsley 1995: 661). Due to the high level of fragmentation of the diagnostic specimens and the difficulty in attributing them to known shapes, it is hard to establish whether they belong to the earliest production of this type of pottery or to a later one.

Final Remarks

The excavation in the vaults of the podium confirmed that the area, even if reduced to that underneath the pronaos, was likely used for dwellings earlier than the construction of the temple, as already recorded in the area between the *alae* of the stairway during the investigations carried out in the 1980s. Of all the area of the vaults under the *cella*, only the cavity in the central room may have been used before the construction of the temple for a cremation burial,



16. Northern vault under the cella. Probable oil lamp handle in the shape of a Satyr's head from US18034 (photo: D. Baldoni).



17. Investigation in the podium of the temple of Artemis. Fragments of Early Islamic pottery with cream or white-slipped surface and a purplish-brown painted decoration (photo: D. Baldoni).

18. Investigation in the podium of the temple of Artemis. Fragments of Early Islamic pottery with cream or white-slipped surface and a purplish-brown painted decoration (photo: D. Baldoni).

but this is an inference based on ambiguous and partly disturbed evidence. The rock surface was leveled only at the foundations of the walls of the *cella*; the inner area was left with its natural irregularities probably with the awareness that it would be covered by a beaten earth floor such as the fragment found in the northern vault.

After the mid-6th century AD, the use of these rooms was totally altered with the opening of new entrances and the construction of a cistern in the southern vault. Its connection with the rooms that were built at the same time in the above open *cella* was made more clear by the opening of the north-western vault to install a trap door with a manhole cover.

Although very few undisturbed contexts with significant assemblages have been preserved, the widespread presence of classes of pottery belonging to the second half of the 8th century reflects what is documented also in the *cella*: despite the interruption of craft activities in the upper terrace after the earthquake of 749 AD, the use of the houses and the other facilities built in the temple does not cease until the dawn of the 9th century, after which we witness the progressive abandonment of the building. After the earthquake that made the *cella* and the surrounding spaces unfit for any use between the 11th and 12th centuries, the vaults of the podium continued to offer shelter to the few inhabitants of the area or to occasional squatters up until the modern age.

With its uninterrupted frequentation, the vaults of the podium could have offered a unique stratification but which, unfortunately, has only minimally survived. This investigation has highlighted dramatically the extent of the threat of clandestine excavations to Jordan's archaeological heritage, which in recent decades did not spare even a monument in the center of a protected archaeological area. As evidenced by their targets, those responsible for the unauthorized excavations in the vaults are foolish treasure hunters and certainly not professional looters; however, as we have unfortunately witnessed, the former is no less dangerous than the latter. Increasing surveillance is certainly not enough; to counter this danger, the main strategy is a constant and lasting educational commitment by the Department of Antiquities, by the organizations and professionals working in cultural heritage, and by all Jordanian and foreign archaeological missions, focused first in schools but also extended to citizens of any age.

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PRELIMINARY REPORT ON 2019 SEASON OF EXCAVATIONS AT KHIRBAT AS SAFRĀ

Paul Gregor, Paul Ray and Jacob Moody

Introduction

Andrews University conducted its second season of archaeological excavations at KHirbat As Safrā between June 2 and July 12, 2019. The excavations were directed by Paul Gregor and Paul Ray of the Institute of Archaeology at Andrews University, with Ray and archaeology doctoral candidate Jacob Moody as Field Supervisors. About twenty faculty, students and volunteers were joined by eight Jordanian workers during the excavations this season[1].

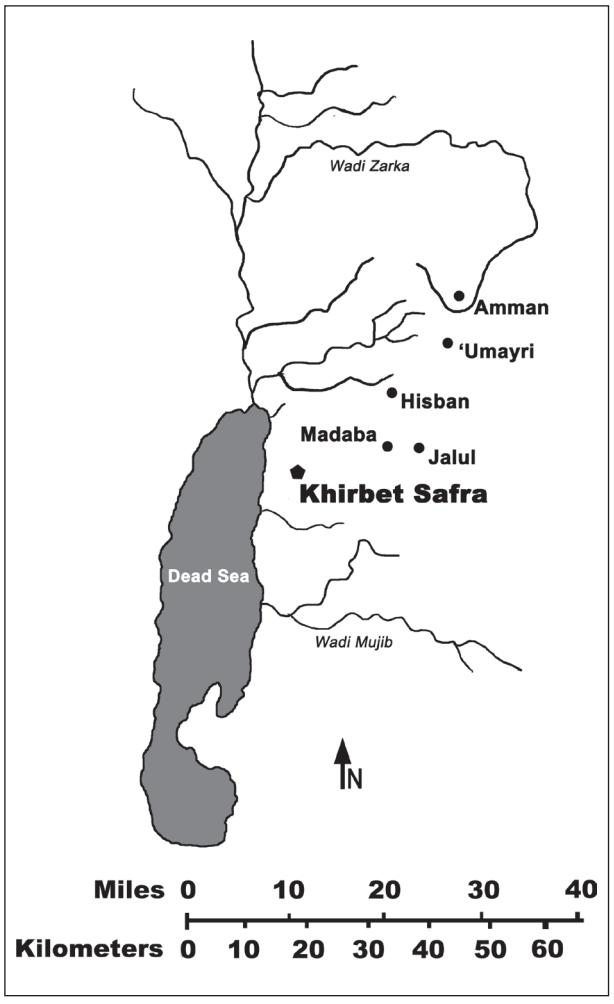
The site of Tall Jalūl, near Mādabā, has been undergoing an on-going series of excavations by Andrews University since 1992, as part of the Madaba Plains Project, with Phase I, of the excavations at the site, ending in 2012. During the publications hiatus, prior to a renewal of future large-scale excavations (Phase II), and in accord with the regional scope of the project, the team has more recently begun work at of the site of KHirbat As Safrā, beginning with a surface survey in the summer of 2017, and physical excavations at the site, first in 2018, with a second season of excavations in 2019. For background information on Tall Jalūl, the Jalūl Islamic Village, and the history of the excavations at the site (Gane *et al.* 2010; Gregor 2009; Gregor and Gregor 2009, 2010; Gregor *et al.* 2011, 2012, 2017; 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). For a report on the KHirbat As Safrā Survey, in 2017, and a history of earlier research in the immediate region, see Gregor 2021. For a preliminary report on the first season of excavation at KHirbat As Safrā, in 2018 (Gregor *et al.* 2021).

Results of the 2019 Season at KHirbat As Safrā

KHirbat As Safrā is an approximately 2.6 acre, triangular-shaped site, located southwest of Mādabā, overlooking the Dead Sea (**Fig. 1**), with a casemate wall system surrounding the perimeter. Excavations this season took place in two (Fields B and D) of the four fields opened in 2018. Each excavation square, as in the previous season, was opened, using GPS on the

1 We wish to thank HE Yazid Hashem Mohammed Elayan, acting Director General, and his staff at the Department of Antiquities of Jordan for their support of the project during this season. Also we would like to express our appreciation to Basem Al-Mahamid, Director of Madaba Antiquities Directorate, of the Department of Antiquities of Jordan. In addition, we would also like to thank Barbara Porter and Jack Green of the America Center of Oriental research (ACOR) for their usual assistance. Finally, we appreciate the help of Nisrin Khaled Fugh'a, and Amal Rawahna of the Department of Antiquities of Jordan, who served as our department representatives in 2019 season.

Staff for the 2019 season included director Paul Z. Gregor and co-director Paul Ray. Paul Ray also served as object registrar, with the help of Jeffrey Hudon, Elizabeth Emswiler and Hala Ajilat. Jeffrey Hudon and Hala Ajilat served as pottery registrars, and Jacob Moody and Paul Ray oversaw GPS readings on the site. Robert Bates, Jacob Moody and Talmadge Gerald served as technical advisors, dealing with the electronic database and iPad issues. The Square supervisors for Field B were Elizabeth Emswiler, Eva Glazer, and Christie Goulart Chadwick and for Field D were Talmadge Gerald, Aleksandra Jovanovic, and L. Scott Baker. Volunteers included Wol Bol Wol, Shingu Ju, Andreas Luntungan, David Glazer, Einra Baker, Guilherme Caldeira, Ademar Camara, Daniel Palacios-Worley, Parker Muhleneck, and Shinasue Takuma.



1. Regional Map.

basis of a grid of 6.0×6.0m squares laid over a topographic map created by the Department of Antiquities surveyors during the survey season, in 2017 (**Fig. 2**).

The Fortifications

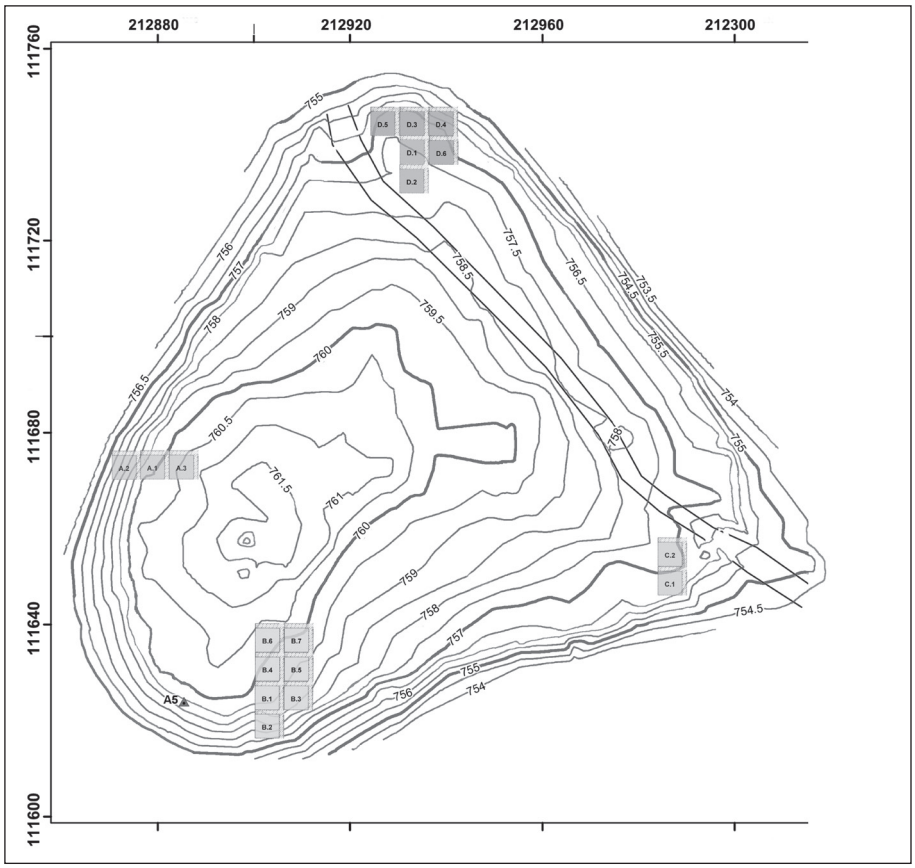
The casemate wall system has now been exposed in all four excavation fields (A, B, C, and D) on the site (**Fig 3**). The walls are freestanding, built directly upon bedrock, which is uneven, with various-shaped crevices. These crevices were filled with a densely-packed, sterile, red-bricky-like material, lacking material culture. On top of bedrock, a *ca*. 1.30-1.40m thick, one-two row outer wall, a *ca*. 0.70-0.80m thick, one-row inner wall, and *ca*. 0.40-0.60cm thick, single-row cross walls were constructed, with large field stones and chink stones, creating broad rooms *ca*. 5.0-6.5m long×2.0-2.25m wide. In three fields (B, C, and D), entryways have been found in the inner wall, connecting rooms on either side. In each field, the initial construction of the casemate wall system has been dated to the early Iron Age I.

Field B

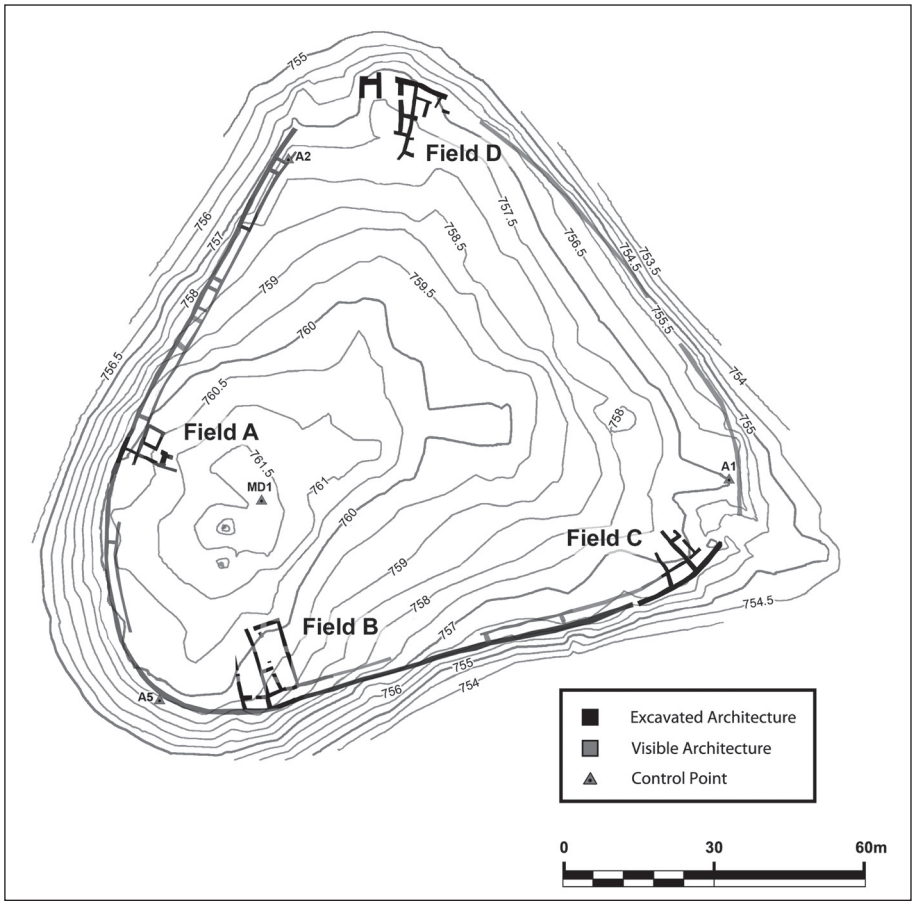
Field B, on the southwestern edge of the site (**Figs. 4 and 5**), was supervised by Paul Ray. The main goal for this season was the lateral exposure of the field to the north of the casemate rooms, excavated in 2018, in order to see what might be learned about domestic and cultural activities on this part of the site. Here, four new squares (B4-7) were opened this season, with another (Square B3), partly excavated in 2018, being completed at this time. Bedrock was reached in parts of four of the five squares, with Square B7 being worked for only a few days. The result was the unearthing of parts of two buildings, consisting of long room-structures, sharing one wall, and connected with the broad-room casemates, previously excavated.

Building 1, the westernmost structure, was traced to the northwest from the broad room casemate structure in Square B1, throughout Square B4, and much of Square 6. Its eastern wall (B3.6, 14=B4.3=B.6.5), which is shared with Building 2, is completely extant, but most of the western wall is located in an area that, is as yet, unexcavated. This wall was traced for a short distance (B1.11, 13=B4.17, 2), before it disappeared in the west balk of Square B4, just beyond a postern or side entrance (B4:18), to the west. The entrance (B6.20) to the building is on the north side of the building, with what appears to be the bedrock footing (B6.17) to a ghost wall, on its western end, again disappearing in the balk.

The outline of Building 2 is clearer than its western neighbor, and was traced throughout parts of five squares (B3-7) excavated this season. With the exception of a few short sections, still within unexcavated balks, its walls are completely exposed. The western wall (B3.6, 14=B4.3=B.6.5), which is shared with Building 1, and its parallel to the east (B5.9=B7.2), were traced slightly over 12 meters to the northwest from the broad room casemate structure in Square B3, to the south. The visible, but so-far unexcavated, entrance (B6.18) to the building is in the northwest corner of the north wall. The building is subdivided on its southwestern side

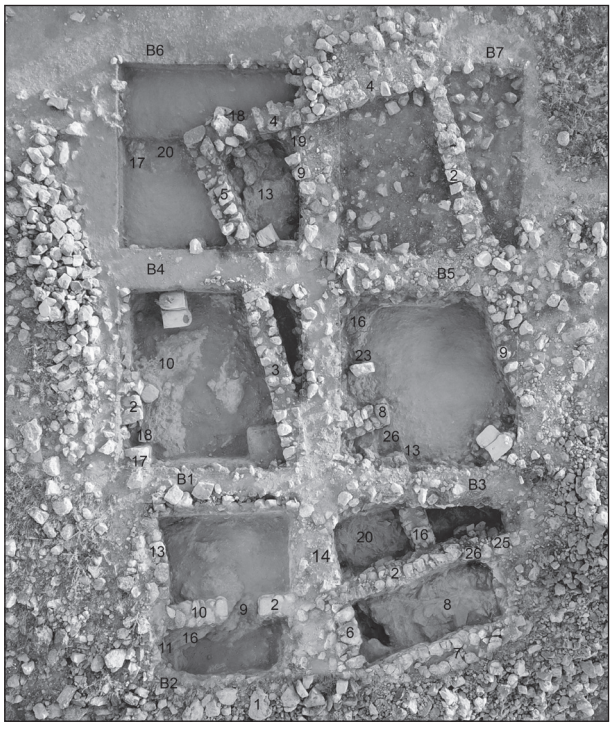


2. Topographic Map of KHirbat As Safrā with Excavation Fields.



3. The Casemate Fortification System at KHirbat As Safrā, with excavated architecture.

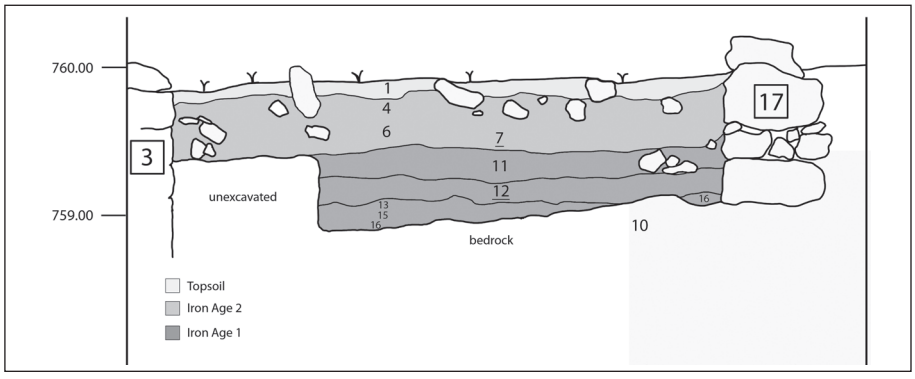
4. Field B.



5. Field B, with locus designations.

by a small room (B3.2, 14, 16 =B5.13, 8), with its entrance (B5.26) on the east from the main room. Further to the north, located on top of a shelve of bedrock (B5.16), was a beaten-earth floor (B5.14=15), partially paved with cobble stones. The building is further subdivided by a pillar (B5.23), and a short section of wall (B6.9), with another entrance (B6.19) into the main room, at the north wall of the building.

Use layers, in the form of beaten-earth surfaces, were discovered in both buildings. The first occupational layer (Building 1, B4.16, 19, 21 and B6:12; Building 2, B3.23, B5.25) was located just above the red-bricky fill material placed in the undulations of bedrock. Throughout Iron Age I, two or three additional beaten-earth surfaces (Building 1, B1:5=B4.12 (lower) and B6.10 (upper); Building 2, B3.21 (lower); B3.18=B5.21 (middle); and B5.19=20 [upper]) were laid. The middle of these two occupational layers, in Building 2, was apparently destroyed by a conflagration (ash layer B5.22), as evidenced on the eastern side of Building 2, in Square B5, but which is unattested in Building I. It would appear to have been the same fire that destroyed buildings in other areas (Fields A, C-D) of the settlement. Within this destruction layer, parts of a collar-rim pithos were found. On the western side of Square B5, above the cobble stone pavement (B5.12) in the small room in the southwest corner, was another beaten earth surface (B3.17=B5.11). Later, perhaps during early Iron Age II, still another beaten-earth surface (B1.6=B4.7, *cf*. **Fig. 6**) was laid above a fill layer in Building 1 (B1.7=B4.11). It appears that at least two of these surfaces, in Building I, were connected with stone thresholds, placed in the doorway of the postern entrance, presumably to keep everything level on both



6. Field B4 South Balk.

sides of the wall. A destruction, probably by an earthquake, sometime during the early Iron Age II, as noted lasted season, left considerable ruins, with stones penetrating two of the earlier floor levels.

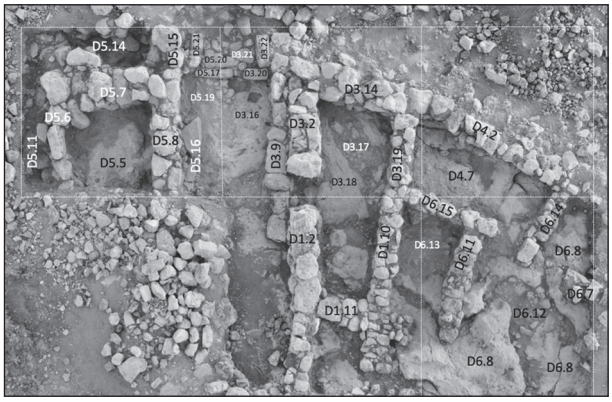
Preliminarily, it would seem that Building 1 represents a two-room house (one long room and one broad room), while Building 2 is a three-room house (one broad room and two long rooms). As noted last season, the structures in Field B seem to have been abandoned following an earthquake, although squatter activities may have occurred, as suggested by the presence of some late Iron Age II ceramics. Later, during the Byzantine period, there also seems to have been a light, perhaps squatter occupation here, as four isolated vessels were found in pits, in Square B3, in 2018. Post-abandonment earth-matrix material has accumulated ever since.

Field D

Field D (**Figs. 7 and 8**), supervised by Jacob Moody, is located on the northernmost edge of the site. Four new squares (D3-6) were opened and completely excavated in 2019. Their locations were chosen with the intent to help better understand the architecture in Field D and to provide a chance to excavate between the casemate walls, the tops of which, were already visible on surface. The portions of Squares D3 and D4 that were located outside the outer wall were left unexcavated. In general, the earth matrix in Field D is very shallow, with bedrock, in some cases, only 10cm below the surface, so these squares were quickly excavated down to bedrock, after which the balks were removed to provide a clearer picture of the obstructed architectural details, yielding the discovery of at least one casemate room and part of the gate complex to the site.

One complete casemate room was uncovered this season, covering portions of Squares 3, 4, and 6, with the outer wall represented by D3.14=D4.2=D5.7), the inner wall (D6.7, 15), and cross walls (D3.19 and D6.14). The southwest corner of another casemate room (D6.7, 14) may have also been uncovered in Square D6. Another small room, outlined by walls D1:10 and D6.11 and 15, was also uncovered in the western portion of Square D6. Some occupational surfaces were found

7. Field D.



8. Field D, with locus designations.

in Squares D3, D5, and D6. These surfaces (D3.11, D5.4, and D6. 13), were just above the bedrock, and in some places level with small exposed portions of the bedrock. They were made of flat, hard-packed earth, with some had flat-lying pottery on top of them. All this pottery dates to Iron Age I.

Part of the city gate complex, with its accompanying installations, and the various walls which make up its different rooms, was found this season. The gate is located within parts of Squares D3 and D5, with the westernmost part of Square D3 representing half of the gate, while the easternmost part of Square D5 made up the other half. There is a clear 2.5m break in the outer city wall (D3.14 and D5.7), and within this gap is its threshold (D3.20=D5.17). Outside of this threshold, to the north, are paving stones (D3.21 and D5.20) that have been worn smooth, from use. Bordering these pavement stones, both to the east and west, are two long, rectangular stones (D3.22 and D5.21) that run perpendicular to the threshold. Their exact purpose is unclear,

though they seem to have narrowed the gate entrance, and were perhaps used as supports for something above them. Further research on possible parallels is needed. Entering the city, just south of the threshold, a surface (D5.19) was found, with cobbles and earth used to level the ground with the sloping bedrock (D3.16). The roadway inside the gate is lined by two large walls (D1.2, D3.2 and D5.8=15), with benches (D3.9 and D5.16) installed up against them. Two long rooms, paralleling the gate entrance street, on the east and west, help to make up the gate complex. The eastern room, exhibiting a doorway into the room, from the street, has been fully excavated. The portion of the western long room, excavated so far, in Square D5, seems to match its eastern counterpart. A similar doorway into this room is suspected, but excavation to the south is needed to confirm this supposition.

Following the destruction of the casemate wall and gate, there seems to have been a period of abandonment, represented by a layer consisting of mostly post-depositional Iron Age II ceramics. In addition, a few Byzantine-period sherds were found, just below the current topsoil.

Preliminary Conclusions

Based on results from the first two seasons of excavation, the first settlement at KHirbat As Safrā was established during early Iron Age I, possibly as early as the 13th century BC Later in Iron Age I the settlement was destroyed by fire, represented by thick ash layers in every field. After that time, KHirbat As Safrā remained occupied until sometime, early in Iron Age II, when the entire site was destroyed for a second time, most likely by an earthquake. Some late Iron Age II sherds suggest a possible squatter occupation, following the earthquake, after which there was a hiatus in settlement until the Byzantine period, at which time a significant structure was built in Field A. Some pitting activities in Field B, and surface sherds throughout each of the excavation fields, also indicate occupation at this time.

Typical Iron Age I ceramics from Phase 3 include collar-rim pithoi (**Fig. 9**), biconical jars, cooking pots (**Fig. 10**) and Manasseh bowls.

As in the first season, the excavations in 2019 yielded mostly small finds connected with agricultural and domestic functions. Of the 205 objects discovered this season, most (112) were related to agricultural activities. In addition, 28 textile objects were also uncovered, with seventeen items of jewelry (mostly beads), ten recreational (gaming pieces and buzz toys) artifacts, with only one (a sling stone) related to warfare. In addition, two possible mercantile weights, and half of a cylinder seal were found. Based on the ceramics and objects, found so far, from both seasons of excavation, it appears likely that the site of KHirbat As Safrā represents a typical domestic settlement, with an emphasis on agriculture and herding activities.

Logistics

The excavations at KHirbat As Safrā continues to use an electronic format for data collection. Work on the *locus* sheets from the Madaba Plains Project Field Manual by Robert Bates has continued to evolve, each season becoming more user-friendly and intuitive, where possible. The system uses File Maker Pro software, and runs on the File Maker Go App, on iPads, operated by the supervisors in each field and square. The data are backed up wirelessly via air drop from the iPads to a

9. Collar-rim Pithos from Field B.

10. Cooking Pot from Field D.

The preliminary phasing of the site appears to be as follows:

Phase	Period	Field
Occupational Phase 1	Byzantine Period	A structure, B pits, C sherds, D sherds
Occupational Phase 2	Early Iron Age II	A, B, C, reused buildings, D sherds
Occupational Phase 3	Iron Age I	A, B, C, D fortification and buildings

lap top computer at the end of each day. Daily progress shots, photos of pottery readings and artifacts are taken with the iPad camera and embedded into the *locus* sheets as well as being stored on the device. GPS is used for geospatial information. Top plans are produced on graph paper and are then scanned to the iPad. The early-morning field shots and end-of-the-season photography is taken by a digital camera from a wonder pole (a telescoping device with a camera mount on top), integrated with an iPad as an optical piece, with the numerous images combined together to create final 3D images of each square, using Photo Scan Pro software by Jacob Moody and Talmage Gerald.

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PRELIMINARY REPORT ON 2021 SEASON OF EXCAVATIONS AT KHIRBAT AS SAFRĀ

Paul Gregor, Paul Ray, Robert Bates, Trisha Broy and Talmadge Gerald

Introduction

Andrews University conducted its third season of archaeological excavations at KHirbat As Safrā between May 30, and July 9, 2021. The excavations were directed by Paul Gregor and Paul Ray of the Institute of Archaeology at Andrews University, with Ray, Robert Bates and archaeology doctoral candidates Trisha Broy, and Talmadge Gerald as Field Supervisors. About fifteen faculty, students and volunteers were joined by eight Jordanian workers during the excavations this season[1].

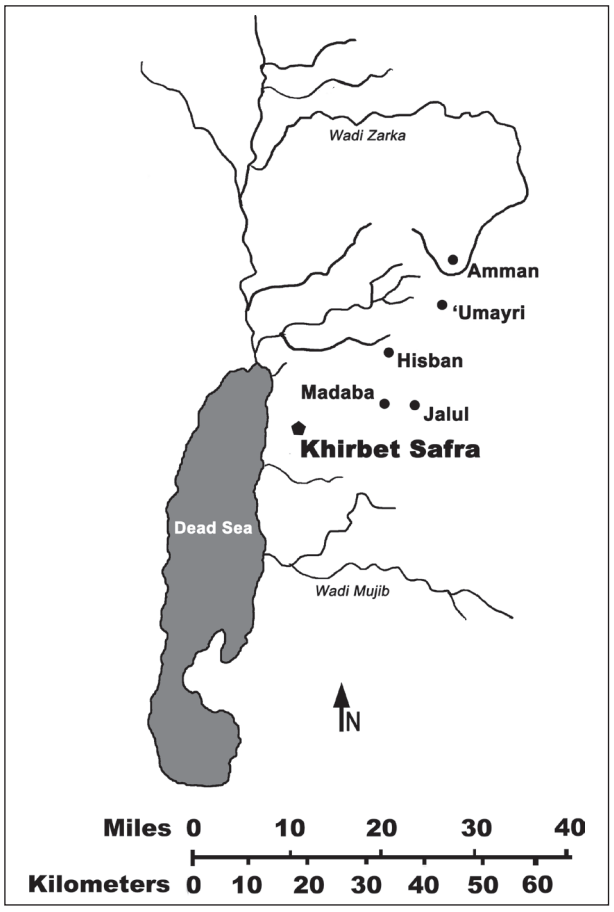
The site of Tall Jalūl, near Mādabā, has been undergoing a series of excavations by Andrews University since 1992, as part of the Madaba Plains Project, with Phase I, of the excavations at the site, ending in 2012. During the publications hiatus, prior to a renewal of future large-scale excavations (Phase II), and in accord with the regional scope of the project, the team has more recently begun work at of the site of KHirbat As Safrā, beginning with a surface survey in the summer of 2017, and physical excavations at the site, in 2018, and 2019, followed by a third season of excavations in 2021. For background information on Tall Jalūl, the Jalūl Islamic Village, and the history of the excavations at the site (Gane *et al.* 2010; Gregor 2009; Gregor and Gregor 2009, 2010; Gregor *et al.* 2011, 2012, 2017; Herr *et al.* 1994, 1996, 1997; Younker *et al.* 1993, 1996, 1997, 2007 and 2009; Younker, Gane and Shqour 2007; Younker and Merling 2000; Younker and Shqour 2008). For a report on the KHirbat As Safrā Survey in 2017, and a history of earlier research in the immediate region, see Gregor 2021. For a preliminary report on the first season of excavations at KHirbat As Safrā, in 2018, see Gregor *et al.* 2021; and on the second season of excavation in 2019, see Gregor, Ray and Moody this volume.

Results of the 2021 Season at KHirbat As Safrā

KHirbat As Safrā is an approximately 2.6-acre site, located southwest of Mādabā, overlooking the Dead Sea (**Fig. 1**), with a casemate wall system around the perimeter. Excavations this season took place in four

1. We wish to thank HE Ahmad Juma'a Alshami, acting Director General, and his staff at the Department of Antiquities of Jordan for their support of the project during this season. Also, we would like to express our appreciation to the Director of Madaba Antiquities Directorate, of the Department of Antiquities of Jordan. In addition, we would also like to thank Pearce Paul Creasman and Helen Malko of the America Center of Oriental research (*ACOR*) for their usual assistance. Finally, we appreciate the help of Abdullah al Bawareed and Khaloud Aqrabwei of the Department of Antiquities of Jordan, who served as our department representatives in 2021 season.

Staff for the 2021 season included director Paul Z. Gregor, and co-director Paul Ray. Paul Ray also served as object registrar, with the help of Jeffrey and Nathanael Hudon. Jeffrey Hudon and Trisha Broy served as pottery registrars, and Robert Bates and Paul Ray oversaw GPS readings on the site. Robert Bates and Talmadge Gerald served as technical advisors, dealing with the electronic database and iPad issues. The Square supervisors for Field B were Elizabeth Emswiler, and Eva Glazer; for Field C were Sion Sung and Sungjin Kim; for Field D Jeffery Hudon, and for Field E Christopher Jenkins. Volunteers included Nathanael Hudon, Venancio Morales, Manoba Manuvel, Shingu Ju, Vieda Van Wyk, Sophia Weiss, Walther Davila, David Ruiz, Fredy Supo, and David Glazer.



1. Regional Map.

(Fields B, C, D and E). Each excavation square, as in the earlier seasons, was opened, using GPS based on a grid of 6.0×6.0m squares laid over a topographic map created by the Department of Antiquities surveyors during the survey season, in 2017 (**Fig. 2**).

Fortification System

Parts of the casemate wall system, which dates to the early Iron Age I, have been exposed in four of the excavation fields (A, B, C, and D) on the site. The casemate wall is divided into broad room compartments, which are integrated into rectangular-shaped houses, built up against it (**Fig. 3**). The walls of these buildings are freestanding, built directly upon bedrock, which is uneven, with various-shaped crevices. A level surface for building the walls and laying the earliest floors was created by filling in these crevices with a densely packed, sterile, brick-like material[2].

2. For a more in-depth description of the casemate walls, see Gregor *et al.* 2021, and Gregor, Ray and Moody in this volume.

Field B

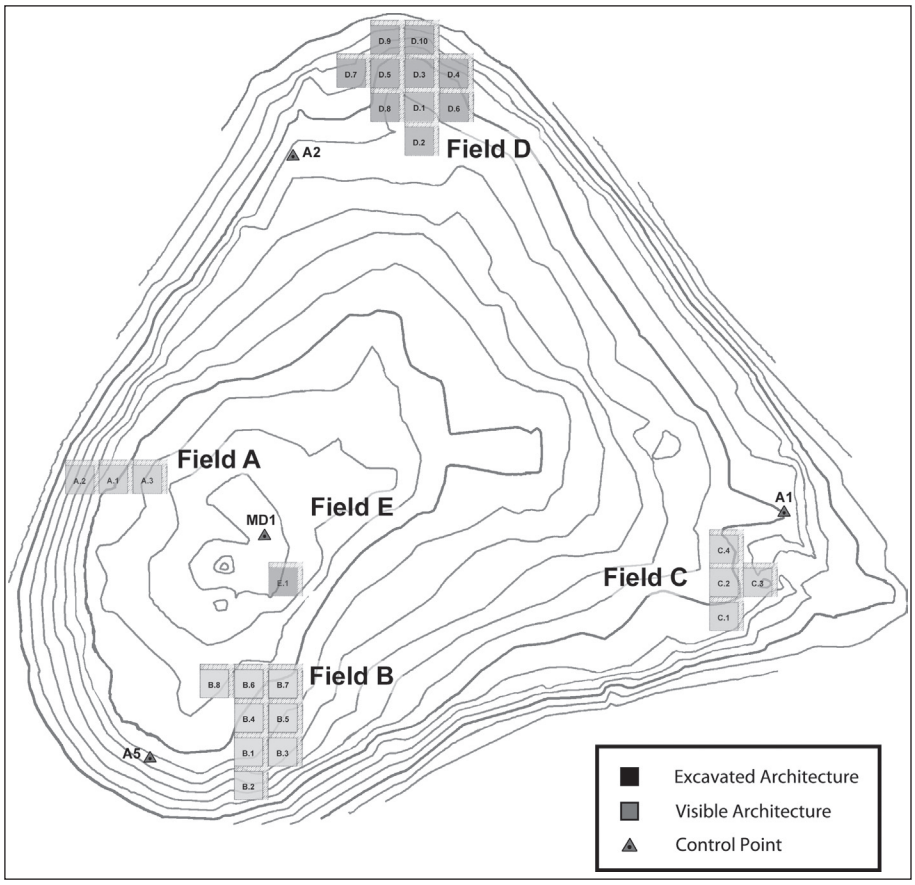
Field B, on the southwest side of the site (**Fig. 4**), was supervised by Paul Ray. One new square (B8) was opened this season, and another (B7), partly excavated in 2019, was completed. In addition, some balks were removed; one each in Squares 5 and 6, and two in Square 4. Bedrock was reached in part of the new square.

Excavation in Field B was begun in 2018, focusing on two rooms of the fortification system in Squares 1 and 3. In 2019, operations in the field concentrated on tracing parts of two buildings, consisting of long room-structures connected to the broad-room casemates previously excavated. In this current season, the removal of some balks exposed additional architecture in Building 2, and the excavation of part of a third building, to the west of Building 1, was begun.

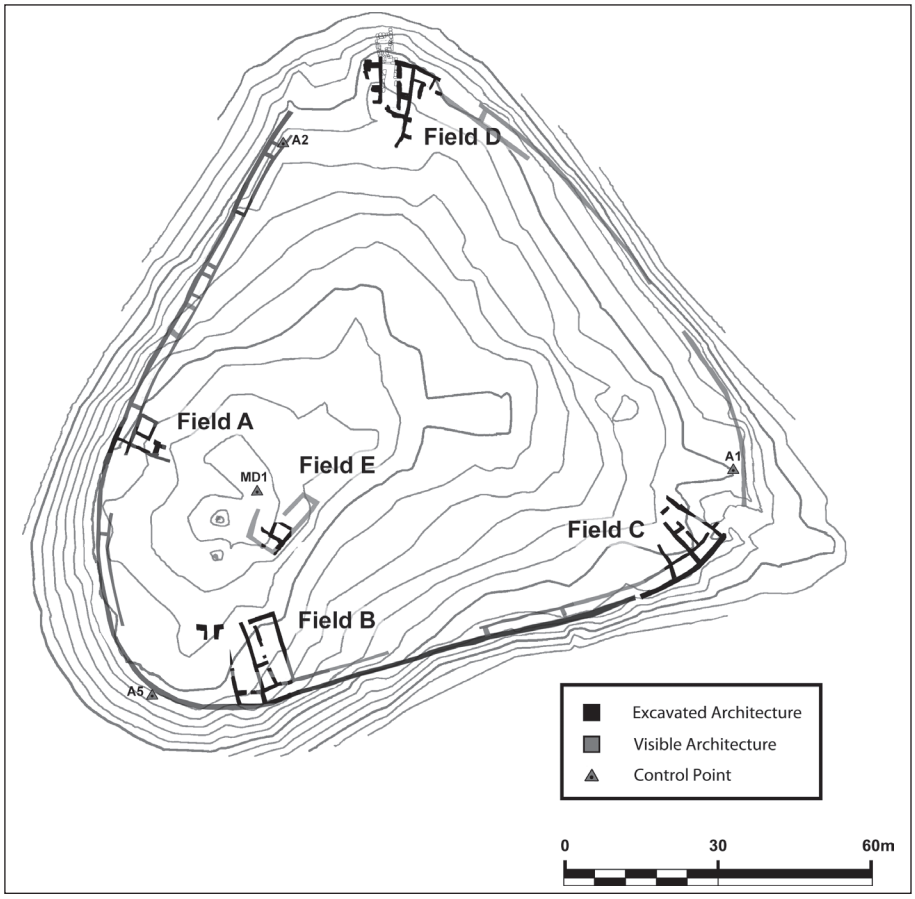
In 2019, Building 1, which continued north from the broad room casemate structure in Square B1, was traced partially throughout Squares B4 and 6, with the main entrance (B6:20) located on the north side of the building. While the western wall of the building (B1:11=13=B4:2 and 17), with its postern entrance (B4:18), possibly to a narrow alleyway, has only been traced for slightly over half of its distance, the entire eastern wall (B3:6=14=B4:3=6:5) has been completely excavated.

Some beaten-earth surfaces were discovered in this building. The earliest occupation layer (B4:16, 19, 21, 26=B6:12), dating to Early Iron Age I, was located just above the red-bricky material placed in the undulations of bedrock. During Late Iron Age I, beaten-earth surface (B1:5=B4.12=B6.10) was laid. Later, perhaps very early in Iron Age II, still another beaten-earth surface (B1:6=B4.7) was laid. Building 1, as a whole, is uneven, being constructed over three bedrock terraces. The removal of the north balk of Square B4, this season, helped to clarify both the nature of northernmost of these terraces, as well as Surface B4:7, a few centemeters above it.

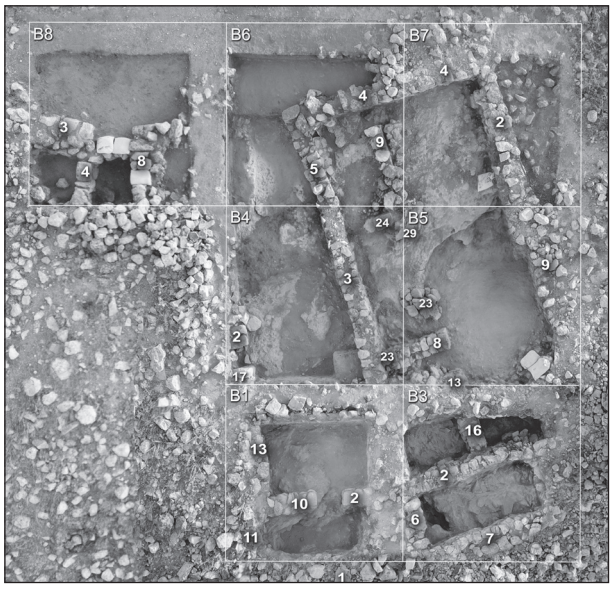
The outline of Building 2 is clearer than its western neighbor. Sharing the eastern wall (B3:6=14=B4:3=B6:5) with Building 1, it continued north from the broad room casemate structure in Square B3. It was traced throughout parts of the five squares (B3-7),



2. Topographic Map of KHirbat As Safrā with Excavation Fields.



3. Topographic Map of KHirbat As Safrā, with excavated and visible architecture.



4. Field B.

excavated during the 2019 and 2021 seasons. The main entrance (B6:18), to this structure (left unexcavated for structural reasons), is also on the north side. The building is subdivided on its southwest side by a small room, with an entrance (B5:26) on the east. Further to the north, located on a bedrock shelf, the building is further subdivided by a pillar (B5:23), and then another long, narrow room, consisting of walls (B5:29=B6:9 and B4:24), with entrances on the south (B4:25), and east (B6:19), into the middle and main rooms. The eastern wall (B5:9=B7:2) of the building, has been excavated for much of its length, the remainder of which can be partially traced on the surface.

Beaten earth surfaces were also found in this building. The earliest floor (B5.25; B5:12; B4:26=B5:27=B4:27=B5:28; B5:19=32 was located just above the red-bricky material, immediately above bedrock. Possible evidence of a fire (B7.10) was found in Square B7. If so, it might be connected with the same conflagration which destroyed the first occupation in some of the other areas (Fields A, C-D) on the settlement. During Late Iron Age I, an additional beaten-earth surface (B5:11; B5:14=15=17) was laid.

Part of a third building, west of Building 1, was excavated this season. The outline of this structure, based on what has been excavated so far, includes Wall B8:8 on the east. However, until the west balk of Square B6 is removed, it is not possible to know for sure if it is the eastern wall of the building. The top course of the presumed western wall can be traced just above the current surface, outside of the square, and awaits future excavation. The entrance (B8:10), as in Buildings 1 and 2, is on the northern side. Building 3 is subdivided by a Wall B8:4, made of a single row of stones. A sliver lunate earring (Object S0106) was found in the room created by this subdivision. The building, as excavated so far, would appear to be laid out on a slightly oblique angle, due it would seem, to the truncation, at this point, of the triangular-shaped topography of the site, hence, the need to deviate from the general pattern of Buildings 1 and 2. As in the other buildings, there is a beaten-earth surface (B8:13), just above bedrock (B8:15), with red bricky material (B8:14) filling in the bedrock cavities. This building, like the others, was ultimately destroyed in the Early Iron Age II earthquake, with considerable rock tumble (B8:7, 11) from the walls, in evidence.

Field C

Field C, on the eastern edge of the site (**Fig. 5**), was supervised by Trisha Broy. Here, two new squares (C3 and C4) were opened this season. Bedrock was reached in both squares. In addition, the east balk of Square C2, excavated in 2018, was removed.

In 2018, excavation in Field C focused on two buildings incorporated into the fortification system. The outer wall of the casemate system was built directly on bedrock, which had been leveled by the original builders, with a red-bricky material. In Field C, this wall (C1:4=C3:4) is a two-row wall with five surviving courses. The inner wall (C1:3=C3:2) is a single row wall, also built directly on prepared bedrock. Single-row walls (C1:12, 20 and C3:8) divide the space between the inner and outer fortification walls into broad rooms that are connected by doorways into the long rooms that extend into the building.

This season, operations in Field C concentrated on exposing parts of both the long and broad rooms of Building 2, as well as their relationship to the adjacent structures. The outer casemate wall (C3:4), within this building, is *ca*. 5.5m long and runs northeast/southwest. Connecting with it, on the north-east and running toward the north-west is the

eastern wall (C3:8=C4:4) of the building, with an excavated length, so far, of approximately 10.7m. Perpendicular to this wall, on its northwest side, is a 1.15m doorway, which, together with Wall C4:5, may possibly form part of the north perimeter of Building 2. The west wall (C2:3), which is just under 10m in length, is shared with Building 1.

Building 2 is subdivided, into several rooms, one of which was further subdivided in a second phase. In the southeast portion of the building, the interior casemate wall (C3:2) creates the rear, or broad room of the building, which is generally rectangular in shape, although the walls are slightly concave to accommodate the curving edge of the site. There is an 80cm doorway on the north-west end of the room, leading into a long room, that was likely an unroofed courtyard. A *tabun* and cooking area, found along the southwestern wall of this area, supports this hypothesis.

Three walls (C2:3, C2:8, C3:2), and two fieldstone pillars (C2:26) delineate another room from the surrounding areas of the building. This room was excavated during the 2018 season. Those excavations revealed a room flanked on the north-east by a wall (C2:8) and two pillars (C2:26). During the second occupational phase, this room was sub-divided by Wall C2:10, and the space between the two pillars was blocked to form another wall (C2:27).

Two use layers were discovered, one dating to Iron Age 1, the later one to early Iron Age II. The first occupation layer consists of a leveling fill, laid on bedrock, to create an even surface. This floor (C2:34, C3:10, C3:25, and C4:10) is consistently covered with a thick ash layer (C2:33, C3:9, C3:16, C3:23) that is sealed under the second floor (C2:32, C3:5, C3:15, C3:20). The ash layer is rich with food preparation tools. A barrel bead, two stone game pieces, and a stone signet ring were also found here. Portions of the second occupational surface (C4:7) may have been paved. Above this surface, wall tumble indicates a destruction of the building by an earthquake.

To the northeast of Building 2 are a few surviving walls forming the south-western line of a "Building 3." Most of this building was destroyed during the creation of the modern road, leading across the site. The surviving architecture is comprised of three walls and the edge of a door frame. On the south-eastern side of Building 3, a small portion of the outer casemate wall is still present. This wall remnant connects at the angle of the southern (C3:4) and eastern walls (C3:8=C4:4). A surviving segment of the inner casemate wall (C3:22) is also present. These walls form a portion of a room designated Room A. This room was heavily disturbed by bulldozer activity. Consequently, none of the occupational phases, known from Buildings 1 and 2, were detected. To the northwest of this room, both of these occupational phases, were evident. The first occupational phase again utilized the bedrock (C3:24, C4:12), above which, the ash layer is present, but to a lesser degree than seen in Building 2. The second occupation level (C4:8, C3:20) was at least partially paved, as indicated by six pavers, inside the remaining portion of the doorway. The second occupation was heavily disturbed in Building 3, prohibiting any solid conclusions about its nature.

Field D

Field D is located on the northernmost edge of site (**Fig. 6**) and was supervised this season

5. Field C.

by Talmadge Gerald. In the 2019 season, part of a gateway complex was found, attached to casemate rooms in Squares D3-D6. In 2021, four new squares (D7-D10) were opened and completely excavated.

The gate, located in Squares D3 and D5, is represented by a 2.5m gap in the outer city wall (D3:14 and D5:7), with an accompanying threshold (D3:20=D5:17). Immediately outside of the threshold, there are paving stones (D3:21 and D5:20) that have been worn smooth from use, bordered by two long, rectangular stones (D3:22 and D5:21), set on end, that run perpendicular to the threshold, apparently narrowing the entrance to the gate. The sloping bedrock and cobbled roadway inside the gate (D3:16=D5:19) is lined by two thick walls (D1:2, D3:2 and D5:8=15=D8:4), with benches (D3:9 and D5:16) against them. The goals for this season were to better understand the gate complex in relationship with the outside approach, the casemate defenses, and the adjacent town planning.

Squares D9 and D10 were located outside of the Gate Structure and outer casemate wall in Squares 3 and 5, in order to investigate potential architectural remnants on bedrock, that might be connected with a hypothesized "outer gatehouse." To the northeast of the "outer gate-chamber" in Square D10, is a relatively smooth area of bedrock (D10:2), possibly indicating entry from the northeast, into the site, over a line of flat-lying smooth pavement stones (D10:3), tentatively interpreted as a "threshold." In Square D9, two, two-row, one-course walls (D9:3 and D9:4) meet at an angle, connecting, it would seem, with the "threshold" in Square D10.

6. Field D.

Square D8 was opened to expose the southern part of a room of the western gate chamber. Excavation here provided, for the most part, a mirror image of the eastern gate chamber, with Wall D8:4 being a continuation of Wall D5:8=15, and bench (D8:8) a continuation of the same feature (D5:16) in Square D5. In 2019, it was hypothesized that there was a "doorway," in Square D5, mirroring the one on the east side of the gate structure, which was filled in a later phase. However, the western chamber wall (D5:8=15=D8:4) lacked clear evidence such a doorway. While this hypothesis is still possible, it is not conclusive.

Square D7 was opened to investigate possible architecture further to the west. However, most of this square did not survive the construction of the modern access road. While the remainder of the square was excavated down to bedrock, no occupational surfaces were found. Otherwise, it contained a shallow soil matrix (D7:1), yielding only a small amount of pottery.

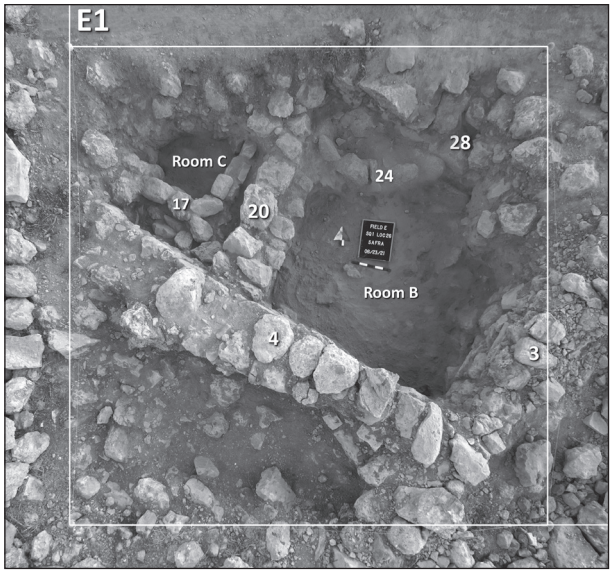
In general, the earth matrix in Field D is extremely shallow, with bedrock emerging, in most cases, within 10cm below the current ground surface. Two bedrock surfaces (D8:7 and D10:2) were discovered in squares D8 and D10. These surfaces had filled and leveled cavities, consisting of hard-packed bricky material and small pebbles, some with flat-lying pottery dating to the Iron Age I. The balks between squares were removed to expose a fully excavated gate complex. A cave located outside of, and approximately 17m east of the gate complex, possibly represents a large cistern for community water collection.

Field E

This season a new excavation area (Field E) was opened, supervised by Robert Bates. This location was chosen because it is near the highest point of the site (see **Fig. 2**), where several walls can be seen above the surface, one extending approximately 30 meters in a northeasterly direction (see **Fig. 3**). Such places

are often reserved for important buildings and elite living quarters.

Excavations here (**Fig. 7**), revealed three architectural phases, all dating to Iron Age I. The earliest phase contained a long room (Room A), with walls made of two rows of partially faced, hard limestone boulders, between 0.30-0.45×0.20×0.30m in size, built on a bedrock and clay foundation. There are nine extant courses in the south wall (E1:4), six in the east wall (E1:3), and five courses in the north wall (E1:28). Hard packed clay and small cobblestones sealed against the walls, filling in the cavities of the bedrock to create much of the earliest floor (E1:27, 29, 30, 31). Additional occupational fill was used to level the remaining floor in the southeast corner (E1:31). A semi-oblong installation (E1:17), possibly a bin, made of small boulders 0.15-0.20×0.10-0.20m in size, was found at the northwest end of the room. In addition, a plastered installation (E1:25), approximately 0.40×0.60m in size, with a 0.20×0.20m ash-filled pit, was located against the north wall. Several artifacts were found on the floor, including three pounders, a bronze ring (Object S0107, **Fig. 8**), and a bronze mace/scepter (Object S0109, **Fig. 9**). A wooden, possibly cedar, spatula with two letters on its reverse side (Object S0108, **Fig. 10**) was found near the plastered installation (E1:25). A bronze spear point with a bent tip (Object S0094, **Fig. 11**), was found on the north side of the bin (E1:17).

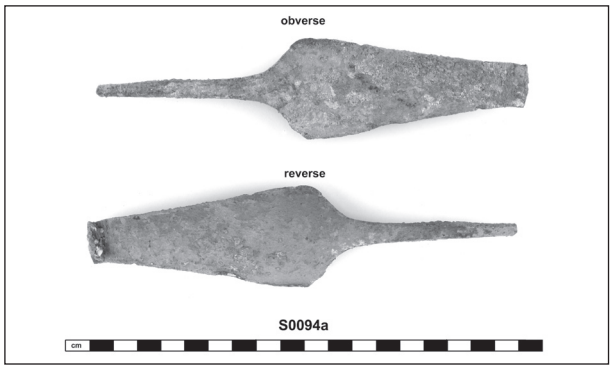


7. Field E.

8. Bronze Ring (Object No. S0107).

9. Mace/Scepter (Object No. S0109).

10. Spatula (Object No. S0108).



11. Spear Head (Object No. S0094).

This room was subdivided by a wall (E1:20) during a second phase, following a wall collapse (E1:26). Room B, on the east side, incorporating Walls 3, 4, 20 and 28, is approximately 2.0×2.2m in size. Two superimposed floors (E1:21, E1:22), with flat-lying body sherds, were laid, covering the plastered installation (E1:25), on top of which, a semi-oblong shaped installation (E1:24), made of small boulders, approximately 0.40×0.85m in size, was added in the corner of the room, against Walls 20 and 28. The excavated portion of Room C, outlined by Walls 4, 20 and 28, on the west side of Wall E1:20, is *ca.* 1.85m wide.

In the last phase, a doorway, with a 0.30×0.60m threshold and a possible stoop, was built on top of the dividing wall (E1:20), with the floors E1:11 and 12, on both sides, raised to the height of the doorway, partly covering the earlier "bin." These rooms were later abandoned following a wall collapse, leaving behind large boulders in the abandonment debris (E1:8, 12-15, 18-19).

Preliminary Conclusions

Based on results from the first three seasons of excavation, the first settlement at KHirbat As̲ S̲afrā was established during early Iron Age I, possibly as early as the late 13th century BC, or the early twelfth century BC, at the latest, as it occurred at a time when there was still Egyptian influence in the region (see below)[3]. This settlement was at least partially destroyed by fire, later in Iron Age I, represented by thick ash layers throughout much of the site, as revealed in Fields A, C and D. Following this event, KHirbat As̲ S̲afrā was quickly reoccupied, and remained so until sometime, early in Iron Age II, when the entire site was destroyed for a second time, most likely by an earthquake[4]. Some post-destruction late Iron Age II sherds suggest a possible squatter occupation, following the earthquake, after which there was a hiatus in settlement until the Byzantine period, at which time a large structure was built in Field A. Some pitting activities in Field B, and surface sherds throughout each of the excavation fields also indicate occupation at that time.

As in the first two seasons, the excavations in 2021 yielded mostly small finds connected with agricultural and domestic functions. Of the 155 objects discovered this season, most (114) were related to agricultural activities. In addition, 12 textile objects were also uncovered, with nine items of jewelry; mostly beads, one of which is in the form of a scarab (Object S0093), three recreational (gaming piece) artifacts, a cosmetic spatula, with only two (a sling stone and a spear head) related to warfare[5]. In addition, two possible dome-shaped mercantile weights, and a ring, with an Egyptian-style seal, were found. Based on the ceramics and objects, found so far, it appears as though the site of KHirbat As̲ S̲afrā represents a domestic settlement, with an emphasis on agriculture. Notwithstanding, at least four of the artifacts, found this season, had Egyptian motifs[6], one of which is a seal[7], possibly indicating that it played a more significant role in the site hierarchy of the region.

Flotation

While material culture is always important for understanding the lives of ancient people, the focused activities performed in specific

3. The Egyptians maintained a presence in the southern Levant throughout Iron Age IA, a phase generally dated from Tausert (*ca.* 1195-1183BC), or year eight of Ramses III, at the latest, up to the reign of Ramses VI (*ca.* 1141-1133BC), *cf*. Mazar 1985: 100, 103, Table 1, 107.

4. It is possible that the site was abandoned some time before the earthquake destroyed the settlement.

5. The bronze mace head (Object S0109) might be considered an object of warfare. However, it is highly decorated and may just as well have had a ceremonial use. It is possible that this artifact functioned as a scepter.

6. A lotus seed vessel pendant (Object S0006) made out of Carnelian (McGovern Type IV.F.5.b), found in the 2018 Season, is yet another Egyptian-style Object found at KHirbat As̲ S̲afrā.

7. The seal (Object S0085) is being studied separately by Trisha Broy, who will present the results in a separate venue.

The preliminary phasing of KHirbat As Safrā appears to be as follows:

Phase	Period	Field
Occupational Phase 1	Byzantine Period	A structure, B pits, C sherds, D sherds
Occupational Phase 2	Early Iron Age II	A, B, C, reused buildings, D sherds
Occupational Phase 3	Iron Age I	A, B, C, D, E, fortifications, and buildings

places within houses can provide an additional window into aspects of their behavior. Hence, in addition to the more traditional macro-level archaeological excavation methods used at the site, soil samples were collected from carefully selected stratigraphic contexts throughout the presumed domestic areas, in three of the excavation fields (B, C, and E) on the site. It is believed that these samples, when run through floatation tanks, under controlled conditions, should provide archaeobotanical evidence for which laboratory analysis will likely yield added insight into the micro-level activities of the daily life of the ancient people at the site. All these samples, collected throughout the season, were run through a flotation tank, and then sent to the laboratory of Annette Hansen in the Netherlands, for botanical analysis and species identification. Due to the pandemic, Annette was unable to be physically present on site, but provided logistical support via email. Financial support for this part of the project was provided by a Faculty Research Grant from Andrews University.

Logistics

Work on the digital form of the *locus* sheets from the Madaba Plains Project Field Manual has continued to evolve, with several new features added by Robert Bates this season. The system uses FileMaker Pro software, and runs on the FileMaker Go App, on iPads. The data are backed up to a lap top computer at the end of each day. GPS is used for geospatial information. Progress shots and end-of-the-season photography are taken by a digital camera from a wonder pole (a telescoping device with a camera mount on top), integrated with an iPad as an optical piece. The numerous images are combined to create final 3D images of each square, using Photo Scan Pro software by Robert Bates, with the help, this season, of Talmadge Gerald.

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THE 2019 AUSTRIAN AL JUMAYL PROJECT: PRELIMINARY REPORT

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Introduction to the Site (BH)

The archaeological campaign in Al Jumayl was conducted between 5th August and the 1st of September 2019, by the team of the University of Vienna. It was directed by Basema Hamarneh, with the active participation of 9 students. the DoA representative for the project was Mohammad Saqr, 6 local workers were employed in different phases of the excavation.

Al Jumayl (JADIS 2309007; MEGA Jordan 2728)[1], lies 35km to the south west of Mādabā on the road to DHībān, and about 3,5km to the West of the UNESCO World Heritage site of Umm Ar Rasās[2]. In the Byzantine period it was part of Provincia Arabia, falling under the ecclesiastical jurisdiction of the Bishop of Mādabā (Piccirillo 2005: 378-382).

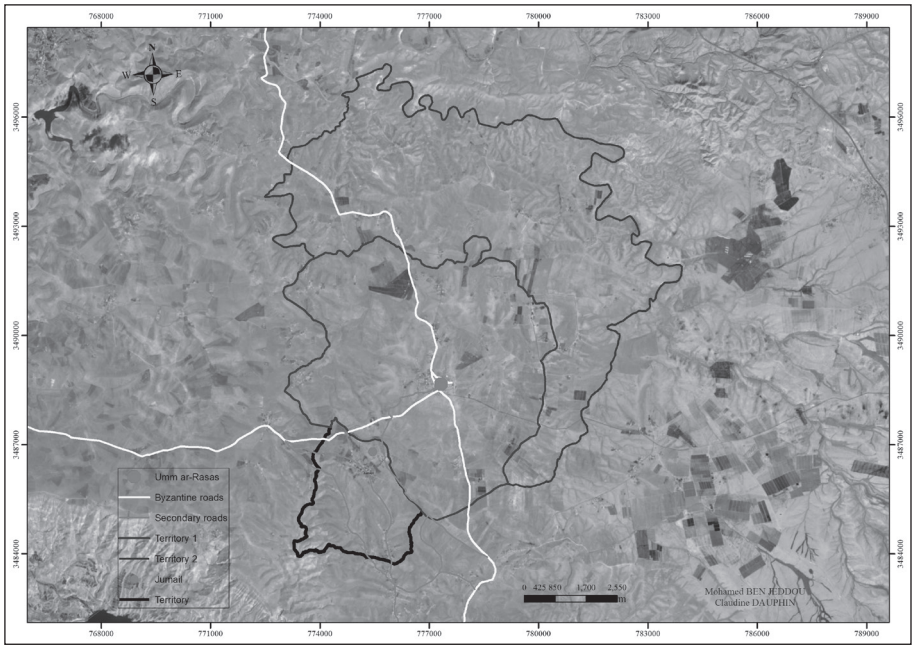
Despite the considerable extension of the archaeological remains (150×200m), Al Jumayl has received only limited attention by scholars, mostly passing by on their way to al-Lahūn or to Umm Ar Rasās. Among the earliest notes of western travelers on Al Jumayl, are the brief mentions of (Tristram 1874: 165; Vailhé 1896: 232; Brünnow and von Domaszewski 1904: 72; Musil 1907/08: 110, 246). In 1933, Nelson Glueck gave a short description of the ruins and reported a large number of Iron Age (including decorated Moabite), Nabataean, Roman and Byzantine sherds. He also pointed out that the area had a great agricultural potential in ancient times, having fenced fields extending towards Umm Ar Rasās (Glueck 1934: 36-37). In 1936 Savignac, identified a Chapel in the western side of the village (Savignac 1936: 242). An important contribution to the knowledge of the area was given by the excavations of Umm Ar Rasās by Piccirillo (Piccirillo and Alliata 1994). Additional information, with a reconsideration of Glueck's early notes, was provided by a survey of Chang-Ho and 'Attiyat in 1996 (Chang-Ho and 'Attiyat 1997: 118-119) but no excavations have been attempted to date.

Scholarly opinion suggests identifying Al Jumayl with Beth Gamul mentioned in the Bible (according to Jeremiah 48: 23). The Old Testament narrative associates the Town, to other ten in the Moabite Plateau[3]. Although the name of the site in the Byzantine epoch is still unknown, it cannot be ruled out that the village may have maintained its ancient name modified to suite modern Arabic phonetic[4].

The rapid agricultural and urban development of the area surrounding Umm Ar Rasās, deemed it necessary to launch an intensive field investigation project at Al Jumayl, in order to document as much as possible of the elements related to the built environment, its surrounding landscape, and investigate how a peripherical rural settlement functioned in late antiquity.

Preliminary reconstruction of the main features was made by combining data from 1953 aerial photographs taken by

1. The main coordinates are: 3589980E / 3148364N; UTM Zone 36; UTME 7748 and UTMN 34879.
2. https://whc.unesco.org/en/list/1093/.
3. The plateau is about 910m above the level of the Mediterranean, or 1,300m above the Dead Sea level, rising gradually from north to south. Al Jumayl lies near DHībān, Aro'er, Lahun and Mefa'at, all important Iron Age Towns (Benedettucci 2017: 9-17).
4. This is the case for example of biblical Heshbon- Byzantine Esbous - modern Hisbān; Medaba - Byzantine and modern Mādabā; and Dhibon - modern DHībān which was the main city of the Moabite kingdom.



1. The area of Al Jumayl and of Umm Ar Rasās according to a preliminary reconstruction from aerial photographs (by C. Dauphin and M. Ben Jeddou © IKA).

Huntingdon Aerofilms, with satellite imagery; these were compared to the Jordanian Air Force photographic coverage of the Umm Ar Rasās-Al Jumayl area in 1970. The images were corrected for terrain and optical distortion, followed by the composition of an accurate "orthophotographic" mosaic, produced using computer software[5]. The recorded elements enabled to create data sets for more specific archaeological interpretations and provided the necessary elements to define the investigation field of research.

This resulted in the identification of a vast area of a fringed landscape that covers around 1ha, and actually stretches from Umm Ar Rasās to Al Jumayl (**Fig. 1**), connected or shared by the two settlements. The densely exploited anthropogenic environment, argues strongly for the existence of a centrally managed system (tentatively State - Church institution-private landowners). A possible involvement of different types of landownership reflects the primary role played by the agriculture in local and regional economy (micro and macro circuits) and will be addressed in further detail in our project.

The Excavation (BH and ML)

The purpose of the first campaign was to study the topographic setting of the habitat, its infrastructures and acquire information on the stratigraphic development of selected areas of the site. This approach will allow to program further research, specifically on the function of the rural settlement, its main features and its productive landscape in late antiquity. The in-depth investigation focused on two areas the first to the South-West of the hill edge (main *tall*), and the second on the summit of the *tall* itself (**Fig. 2**).

Complex 1

Section I

The first excavation trench is situated to the west side of the central hill (*tall*), it stands roughly at the centre of the densely build-up area of the village. It develops to the South of a large house consisting of a courtyard surrounded by, at least three rooms, of which only the north-eastern side was excavated. The whole complex was covered by a consistent structural collapse, that included wall stones, roof slabs, a broken architrave decorated with a cross and smaller stones.

The sector, measurs 6.70×5.30m, stands on the southern side of a large wall running east-west, traceable on the surface, which stops immediately at the foot of the *tall*. On the south side, it was delimited by a parallel irregular wall made of stones of different forms probably coming from other buildings. A third wall running north-south formed its western

5. The preliminary study of the aerial photographs was made by Cl. Dauphin and M. Ben Jeddou.

2. Aerial photo of Al Jumayl with the excavated areas (APAAME-20081005-DLK-0036. Photographer: D.L. Kennedy, courtesy of APAAME)

limit, allowing to identify the sector as a proper rectangular room (**Fig. 3**).

The walls 1a and 2 consisted of well-dressed stones, organized in regular rows. While fairly different are the building technique of wall n. 9, and the one row division wall in the middle of Section I (lowest *strata* US5), both have been randomly assembled with spolia (coming mostly from other buildings). The lack of a structural scheme in wall n. 9, is seen in the re-employment of various building material, as for example a threshold stone, as well as the lack of a foundation trench suggest that it was added in a later period (see below for the wall analysis).

The excavation of Section I included the removal of the collapsed stones pertaining to the upper layers of wall and possibly of the roof, mixed with modern material. Very few pottery sherds dated to the Mamluk and Byzantine periods mixed with plastic bags and greyish loose soil were the major characteristic of this large and uniform deposit (of US 0-1-2). In correspondence to the wall running north-south some remains of human bones were found. The loose soil and the thick deposit of collapsed stones showed no specific material but rather modern waste.

Under the structural collapse greyish dark soil mixed with limited charcoal and traces of two fireplaces (US 3 and US 4) yielded, among other pottery finds, an Ayyubid glazed sherds that can be dated to the 12th-13th century (see pottery section). The remnant part showed mainly Mamluk pottery (16 sherds) none of them diagnostic. Other sherds dated to the Byzantine period (4, with one diagnostic) and Umayyad (2 not diagnostic) were also among the finds.

The room was divided into two sectors by a narrow line of stones of one row, supposedly added to separate the area of the fire places from a second part of the same space probably used for other purposes, as traces of ashes in the north-eastern, and eastern limits of the trench were found. The following *stratum* US 05 is the floor of the room, it was made of hard white/greyish plaster with few stones that remained in the bottom of the floor. The plaster was spread at the same level of the foundation trench of the Byzantine North wall (wall n. 2). The plastering was possibly added to achieve a smooth surface, which was not possible owing the irregular

3. Excavated section I (© IKA).

surface of the bedrock seen in the south corner.

The pottery consisted of Mamluk sherds (9, 2 diagnostic), Byzantine (16, 1 diagnostic) and Umayyad (12, none of which was diagnostic). The removal of small parts of the plaster showed hard reddish/brown soil with traces of ashes in the north-eastern, and eastern limits of the trench, which forms the floor level with parts of the bed rock visible near the southern wall.

Interpretation

The excavated sector bears witness to the requalification process of an open space. The area that was chosen to build the room, is set on the external side of a house, and was probably part of an internal courtyard, or simply a passage within settlement during the Byzantine and in the early Islamic periods. However, when the area was reoccupied in the Ayyubid/Mamluk period, as suggested by the pottery assemblages collected in the lower *strata*, it was transformed to a room closing part of the court/passage. This is confirmed by the pressed soil of the ground level in proximity of the wall in which the Byzantine sherds were found. The latter were very small (mostly smaller than 2cm). The perpendicular walls of the room were built against the existing Byzantine wall to the north, which consists of at least five rows of well-dressed stones running east-west, while the parallel south wall (wall n. 1a) and the connecting wall to the west (wall n. 9) have a less accurate fabric made of reused stones of different shapes and forms, incorporating a significant number of *spolia*. The eastern part was not excavated due to the vicinity of the *tall*, and the large collapsed stones that once formed the outer walls of the fortification built on it. Thus, it is hypothetically suggested that an entrance may have been practiced from that side. The room was used as living space during the Mamluk period as results from the pottery deposits, the two fire places and the plastered floor. Its functions were probably related to other buildings on the site that still require identification.

Building on the *Tall*

Section II and III

The second trench was opened on the summit of the *tall*, which forms the highest point of village. The area presents a complex stratigraphy of buildings, as a large rectangular fortification oriented north-south, which measures around 8.5×8.5m, of which two thick walls to the north and to the south can be seen. This in turn, was built over an earlier round structure, possibly around 9m in diameter (**Fig. 4**). The excavation focused on understanding the construction phases of the structure on the summit, and its relation to the excavated area in Complex 1. Directly on the top of the *tall* the remains of a mosaic pavement made of white *tesserae* with some small red stones forming a simple geometric motive were found, conserved only under a secondary wall running north-south. (**Fig. 5**).

4. Top view of the area of the tall (© IKA).

The excavation was enlarged to include an area delimited by two walls, one large to the south and a smaller one to the north. The limit in the west was a fallen arch found *in situ*. The first stratigraphic unit consisted of structural collapse (bigger stones located closer to the walls while the rubble in the middle of the section mainly consisted of smaller elements). It showed ashlar stones mixed with greyish-brown loose soil, with orange soil along the walls. The collapse contained few oil-shale fragments that probably formed part of some sort of decorative elements, yet all the examples found were too small to detect any possible function. The removal of the collapse showed a *stratum* (US-02) containing mainly mosaic *tesserae* (of different shapes, sizes and colours as grey, red, white, blue, green, yellow), and parts of mosaic bed, within a dry-granulose soil and pottery fragments (mostly Byzantine, few diagnostic).

US-02 included also at the same level US-03 consisting of brownish-yellow soil with small traces of greyish-black ash. US-04, is a smaller structural collapse limited to the central part of the room, and US-05, showed a fireplace partly covered by US-04. The last *stratum* showed a compact plastered floor, possibly the remains of the mosaic bed. It contained a large number of Byzantine pottery sherds (20, 3 diagnostic), Umayyad (10), Mamluk (7) and one diagnostic Nabataean sherd. The *stratum* was detected in correspondence to the collapse of the arch that formed the limit of the excavated area to the west.

A second trench (Section III) (**Fig. 6**) was opened between the two northern walls, the large Byzantine one and a smaller one, probably Mamluk. The area was of 1.23×1.56m. The section reflected a similar stratigraphic sequence as in Section II, yet in the last *stratum*, which was US-05, the Byzantine wall was constructed over an oblique older wall (US-06) that may have functioned either as a foundation for the Byzantine wall or as part of another earlier building on the summit of the *tall* that has not been detected yet. Pottery in correspondence to the foundation pit was found; mainly Byzantine pottery (11, 2 diagnostic) and one Nabataean diagnostic sherd.

Interpretation

The limited extension of the excavated area does not allow a thorough identification of the purposes and extension of the building on the summit of the *tall*. It may have formed a functional space in the Byzantine period considering the limited remains of the mosaic floor and the Byzantine pottery found there. However, the space was probably reused or adapted for other purposes in the Mamluk period. The privileged position on the summit may have played an important role in this requalification.

Coins and Metal Objects (ML)

Six coins were found during the excavations in Section I, II and III; five heavily eroded and damaged, and thus difficult to classify, while one bronze coin showed a better state of preservation. The coin, J19-5/I, with traces of damage and erosion on its edges and both sides,

5. Excavated section II and III (© IKA).

6. Section III, US 05 (© IKA).

especially on the obverse. However, allowing to see profile, head, neck and shoulders in the center of the coin. Neither attributes, nor structural dividing lines can be seen (**Fig. 7**).

The reverse shows the letter "M" at the center with star on the left. This number sign dated back to a monetary reform in 498, under Anastasius I, symbolizes 40 nummi equal to 1 Follis (Hahn 1973: 23). The *officina* mark "CON," reading "Constantinople," refers to the place of minting (Hahn 1973: 16). The bad conservation does not allow to determine a minting date, however the monetary reform of Anastasius I, considered as *terminus post quem*. A second term can be considered the monetary reform of Justinian I in 537 AD (*Novella* 47), the embossing on the revers was changed from 538/539 onwards, adding instead "ANNO" next to the number sign downwards on the left side, together with the year of reign on the right side (Hahn 1973: 58; Grierson 1999: 18-19). Thus the coin can be dated tentatively between 498 and 537 AD (corresponding to the regnal years of Anastasius I, Justin and Justinian I).

Further metal finds in the three Sections are limited to several heavily eroded lumps of copper and bronze, in different sizes; a bronze nail, a modern ring and two circular metal objects - one possibly a very small ring.

Architectural Decorations (ML)

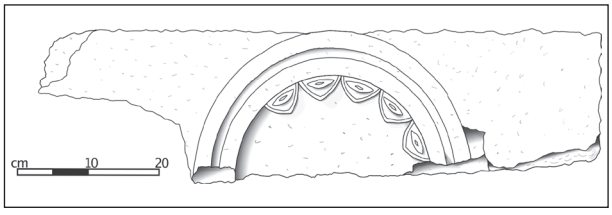
Two architectural objects were discovered during the campaign of 2019. The first was found during the survey of the site, the second in the excavation.

The first is a block of local stone measures about 60×22cm and was reused in the entrance area of Complex 1. (**Fig. 8**) The surface of the block shows traces of tool marks on all sides, except the fractured edge. The breaking line in the lower part is irregular and does not show any signs of artificial influence. While the upper part and the right side seem to be (mostly) intact. The form of the stone and the lack of specific carving of the back side suggests it was used in architecture.

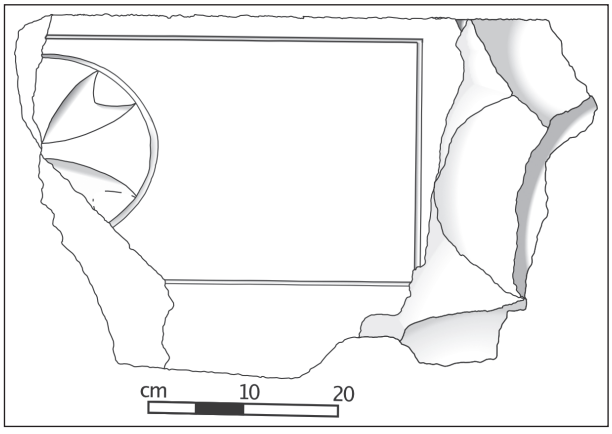
The front side shows a semicircular arch divided in three sections. The two outer convex stripes are highlighted by an inner concave one, lining the internal semicircle there are five triangular elements, each decorated with a dotted elongated oval shaped motive. The area within the semicircular structure is deepened forming a niche. Niches are very prominent decorative features throughout time and regions, examples can be found inside and outside of buildings in Jarash, and in the churches of the *Aedicula* and *St*. Paul in Umm Ar Rasās (Michel 2001: 383, 397, fig. 375). In particular several are used in the side isles of churches, probably as permanent storage shelves of small objects.

The second architectural element was found during excavation of Complex 1-Section I (**Fig. 9**). It is made from local stone and measures about 45×30cm. The piece has a smooth top edge and is broken on all other sides due to possible reuse in the wall masonry. The backside shows traces of tools and is roughly worked, while the front is flat with some incised decorations. Three concave outlines, forming part of a rectangle can be seen close to the upper, right and lower edge.

7. Coin, J19-5/I, dated between 489 and 537. (© IKA).



8. Niche stone J19-stone-C1 (© IKA).



9. Architrave stone J19-stone-SI (© IKA).

On the left side another element is partly preserved within these outlines. The element consists of an incised concave circle and a partly preserved cross with rounded lines. Formerly this piece might have belonged to an architrave, very common in local context on entrances, several examples were found *in situ* especially at Umm Ar Raṣāṣ.

Architecture and Building Structures (EG, FE)

The site shows a great variety of well-preserved structures that allow a good overview of various building techniques as in other sites in Jordan with still standing all stone buildings (Gilento 2015; Anastasio *et al.* 2016; Marino and Coli 2020). However, most of the buildings around the *tall* are covered by the collapses, building sections closer to modern settlement areas in the north and southwest are reused for agricultural purposes (*e.g.* as goat sheds or pastoral fields). In the following description focus will be laid on masonry found in the three trenches (Section I-III) as preliminary determination of building phases was possible through the archaeological excavation only. All trenches showed stone-walled buildings, that were not excavated in their entity during the campaign. For all building structures on the *tall* and the adjoined quarters, ashlar stones were used and set together in dry masonry technique (Marino and Coil 2008: 74-76). No binding mortar between individual blocks was identified. So far, only local building material was used for the masonry; probably coming from a stone quarry located north to Cistern 6 (Arce 2007: 503; Parenti 2012: 194). On top of the *tall* a large building complex was identified. Due to debris covering large parts of the structures the exact dimensions of the walls could not be recorded properly.

Masonry in Section I

The western trench concentrated on a trapezoidal room of a larger building complex. The eastern line of the trench did not run along the eastern wall but formed a cross-section of the whole room (see **Fig. 3**). The height of the excavated walls reaches the maximum height of 2 meters. The three walls (the north wall, the east wall and the south wall) of the uncovered part were not plastered and roughly set against each other. The north and south walls show the best state of preservation. The stones used for the wall have irregular cut surfaces, with the result of having a rectangular shape, but not being smoothed. The walls show two outer faces and an inner core consisting of cobble stones.

The northern wall, which delimits Section I, consists of roughly hewn limestone blocks, which form a stable structure. Only the lowest course shows a regularity in the structure. The large ashlars were laid on bed-rock. Since the surface of the rock was not sufficiently smooth, small depths were filled with fine lime chipping. Only in the filled pits could a binder of air lime be found. The cuboid blocks of the lowest row were laid at regular intervals to each other. The head joints were filled with the same fine lime chipping and fixed with a measure of lime binder. The width of all four almost completely preserved courses is irregular. However, the north wall - in comparison to the south and west wall - can be considered the most valuable in terms of quality (**Fig. 10**).

A later wall was built in on the western side of the trench. This wall did not differ much in shape from the northern wall, also constructed using large limestone blocks; between the bigger blocks measuring approximately 0.8×05×0.5m, smaller irregularly sized stones were placed to support the whole construction (Parenti 2012: 193). The original entrance to the room was not identified. An opening about 1m wide in the middle of the western wall indicates that

10. Section I, US 06 - wall 2 and 9. (© IKA).

the entrance was once located exactly at this place. Across the entire section, there was an artificial demarcation obtained by a one level wall in the west-east direction, probably used for functional reasons as remains of a fireplace was identified in the northern area.

The southern wall of Section I consists of the same rock material as the northern wall. The limestone blocks were probably used from the nearby quarries for most of the building complexes-an efficient method often found in the region (Arce 2007: 503). The lower part of the wall consists of much smaller, roughly hewn stones, which have an approximate size of 20×20×20cm. The surface of the limestone blocks appears flat, but on closer examination it becomes clear that the corners of the limestone blocks are slightly irregular. The distribution of the stones is not subject to a fixed scheme. The connecting points are much closer than in the case of the northern wall, probably for this reason we find less filling material in the form of lime splinters within the joints. Remarkable is the fact that for the upper rows-at the height of about one meter-larger stone blocks were used. These rows are made of dry masonry.

Masonry in Section II and III

Various wall units were documented, one separated the trench into roughly two parts and suggest at least three occupation phases for the building on top of the *tall*. The structures differ in building technique as well as in the material used, and thickness of the walls. On top of the *tall* Section II and III were delimited on three sides (north, east and south) by masonry structures and on one side (west) by collapse of the building. (**See Fig. 5**)

The first phase is visible on the northern side of the trench in Section III, where at a depth of about 0.8m the so far oldest wall segment (US-06) was unearthed. It was found under the north eastern corner of the apparently more recent and has a different orientation. Roughly worked stones were used for this structure and set together in a dry masonry manner. (**See Fig. 6**)

The second phase is marked by the big rectangular building with thicker outer walls visible on the southern and north-eastern parts of the hilltop. Their inner surfaces form the southern boundary for Section II and the northern end for Section III. Due to the heavy collapse of the structures the exact dimensions of the walls were only partly documented. The thicker walls on the southern and northern side were built with roughly worked ashlar blocks fit into the wall as dry masonry. The constructions show irregular blocks of different size, fit together irregularly in two adjoining rows and smaller stones in between functioning as wedges. While the upper layer of the wall consisted of larger building blocks the lower part was constructed with smaller cobble stones embedded into earth. This foundation was recognizable beneath the thicker wall south of Section II as well as the one north to Section III (**See Fig. 6**). The structures from this phase are dated to the Byzantine period as large quantities of pottery in combination with the remains of a mosaic floor (US-02) allowed this conclusion.

A third phase is attested by a thin wall inside of the building running north-south, which divided the interior space into a larger and a smaller part. In the eastern part of Section II, remains of floor paving decorated with mosaics was found preserved under this single row wall constructed with regular ashlar blocks. Unfortunately, the mosaic floor was badly preserved, and the blocks of this later construction were set directly on the mosaic without any foundation trench.

A second wall, presumably belonging to the same phase, separates Section II and III and meets the other wall in a right angle (**Fig. 11**).

The Pottery

All pottery assemblages collected in the excavation areas were recorded according to the stratigraphic *loci*, the diagnostic fragments (rim, handle, and base) were selected and classified according to shape, fabric, firing technique and decoration. The vessel functions were considered as an important criterion to establish typologies in circulation in the area. The main identified vessels in the excavation included table ware divided in open forms (such as plates, bowl, dishes, cups) and closed forms (as amphorae, jugs and juglets); cooking ware (as casseroles and cooking pots), and coarse ware as basins. The chronological span was determined by parallels with documented

forms in published excavations especially from undisturbed stratigraphic contexts.

Surface Strata (TL and AH)

Surface finds in correspondence of the first excavated area included Nabataean, Late Roman, Byzantine, Umayyad and Mamluk pottery. Eighteen diagnostic sherds were selected, six of them Byzantine, seven Umayyad and five Mamluk.

*Nabataean and Late Roman (***Fig. 12***)*

The plates n. J19-00/0-18 and J19-00/0-19 exhibit an orange and red clay colour respectively, they represent a local imitation of oriental Sigillata A with good parallels found in the excavation of the Bajali complex in Mādabā (Acconci and Gabrieli 1994: 442, fig. 26. 5; Id. fig. 428.39). The fine plate J19-00/0-20 has a beige slip on its exterior surface, is light reddish on the interior and has grey, white and black inclusions and could be dated to the second half of the 2nd century (Acconci and Gabrieli 1994: 494-495, fig. 52.4). Two sherds J19-00/UK-1a and J19-00/UK-1b are parts of a plate with a thickened and slightly out-turned lip. The vessel is shaped following a convex line and the walls are very fine. The plate displays a uniformly red color on both the interior and exterior and black hand painting on the interior of a fringed palm-leaf. The vessel is typical of Nabataean fine ware which has good parallels in the area of Jordan and in the Negev (Schmid 1995: 646, fig. 10), and also at ‘En Tamar in Palestine (Erickson-Gini 2016: 59, fig. 10; 11).

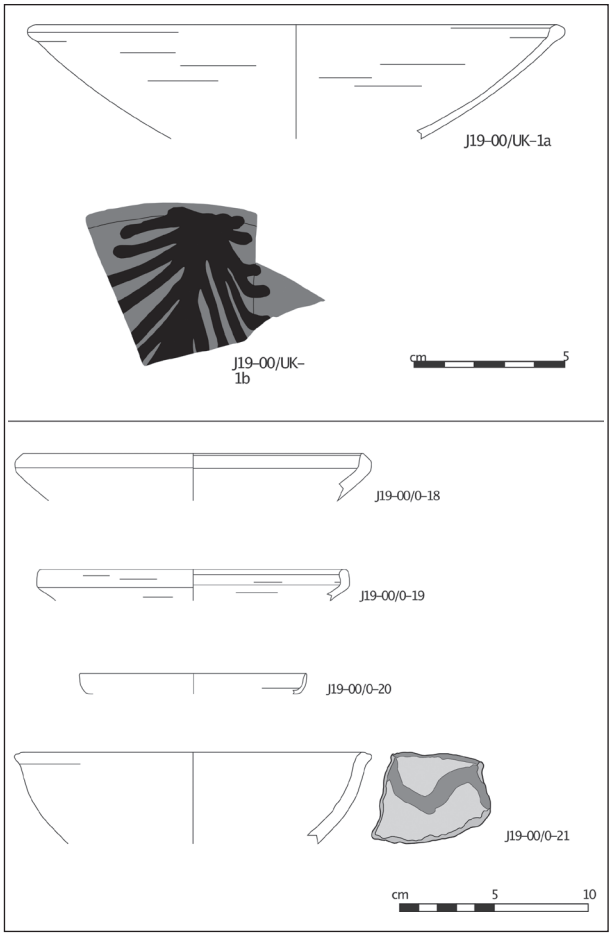
*Byzantine Pottery (***Fig. 13***)*

The ring-base of a juglet J19-00/0-16 shows a light orange (interior and exterior colour), and an orange fabric. The basin J19-00/0-22 displays an incised wavy decoration on beige slip exterior as well as a fingerprint. The interior surface is reddish-brown and the fabric contains white and dark inclusions. Parallels may be found in Umm Ar Rasās (See Alliata 1991: 394, fig. 16.1).

The cooking pot n. J19-00/0-14 with an out-curved neck is a bifacial reddish sherd with a dark red fabric containing small black inclusions, it may represent a transitional form between the Byzantine and Umayyad periods common ware (Gerber 2016: 162, fig. 32.372).

Concluding the Byzantine surface finds, the body-fragment of an oil lamp J19-00/0-15 displays decoration of the type decorated with a palmette motive in relief, the typology is also referred to as candlestick lamp (Magness 1993: 173-174; Pappalardo 2007: 563-566), a black slip on its outer surface and an otherwise reddish colour on the interior and in the fabric.

11. Section II, US 02 - north wall/separation to section III. (© IKA).



12. Pottery, surface Strata - US 00 (© IKA).

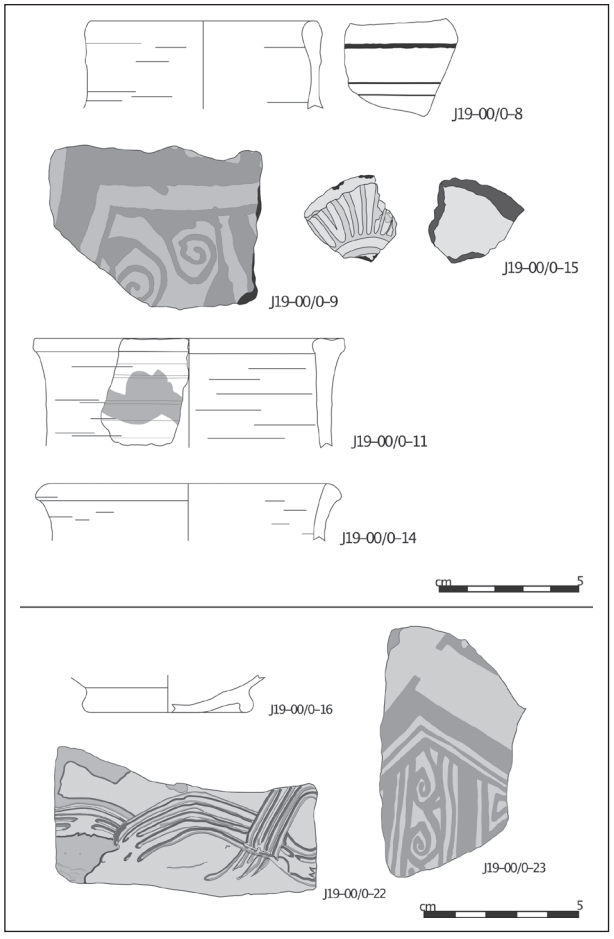
Umayyad Pottery (See **Figs. 12-14***)*

The Umayyad pieces consist of predominantly closed forms, *i.e.* jugs or small *amphorae* as J19-00/0-1, J19-00/0-5, J19-00/0-7, J19-00/0-8, J19-00/0-11, and one cup/bowl J19-00/0-21. The amphora J19-00/0-1 is of light orange colour and features painted decoration on its exterior. The amphora J19-00/0-5 has a beige slip with a light brownish hand painted decoration showing concentric circles, with dark reddish-brown fabric and interior (Sanmorì and Pappalardo 1997: 420, n. 2). The amphora fragment n. J19-00/0-7 shows a dark orange hand painted decoration on an orange-red coloured surface (Alliata 1992: 245, fig. 12, 1). N. J19-00/0-8 is a rim of an amphora with a light brown slip, a light grey interior and a grey fabric (Alliata 1991: 407, fig. 23, 2). A common typology in the area is the amphora rim n. J19-00/0-11, it exhibits a grey ground colour with a painted decoration in red, a beige interior and a brownish fabric (Acconci and Gabrieli 1994: 481, fig. 64.9). The hemispherical cup/bowl J19-00/0-21 has a brownish-orange exterior with continuous dark-reddish wavy painting along the rim and on the beige coloured interior. The fabric is dotted with dark grey and white inclusions (Alliata 1992: 246, fig. 12.18).

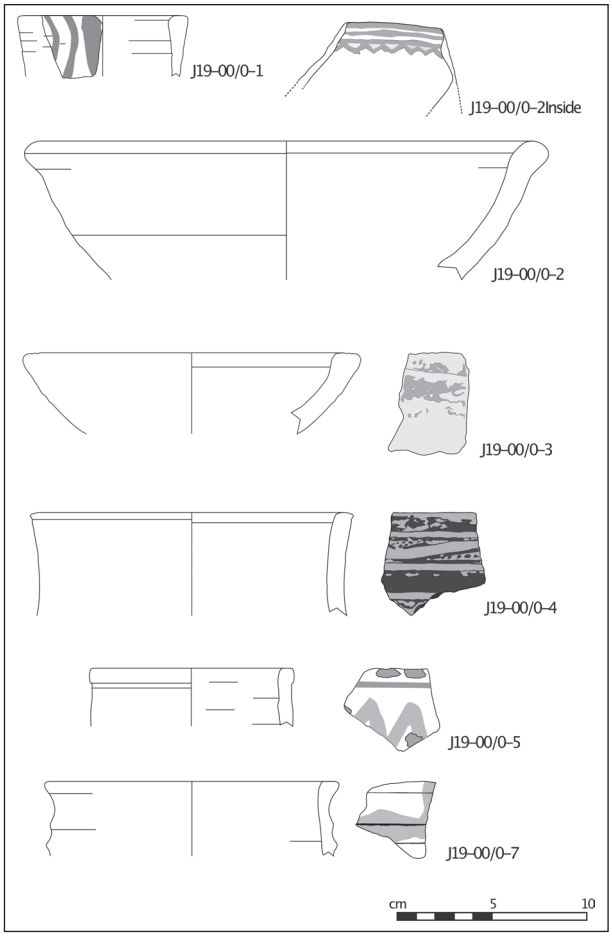
*Mamluk Pottery (***Figs. 13, 14***)*

The Mamluk pottery comprises of two open forms J19-00/0-2, J19-00/0-3, one closed form J19-00/0-4 and two body sherds J19-00/0-9, J19-00/0-23, they find parallels in the pottery discovered at Nitil (Hamarneh 2006: 449, fig. 22. 1). The bowl J19-00/0-2 shows a beige exterior with slightly visible traces of brownish hand painting, while the inside is orange-red with reddish-brown hand painting along the outside and inside surface of the rim. The bowl J19-00/0-3 is depicted with dark brownish geometric pattern applied with free brush strokes on both the exterior and the interior. The fabric contains dark inclusions and air pockets.

The jug/small amphora J19-00/0-4 is decorated with black hand painting on either



13. pottery, surface Strata - US 00 (© IKA).



14. Pottery, surface Strata - US 00 (© IKA).

Table 1: Distribution of the *Sherds* in Complex I - Section I.

Trench I	Nabataean	Byzantine	Umayyad	Ayyubid	Mamluk
US 00	-	178	68	-	58
US 01	-	12	11	-	13
US 02	-	3	1	-	-
US 03	-	18	4	1	22
US 04	-	16	12	-	9

side. The two body sherds J19-00/0-9 and J19-00/0-23 are painted with decorative ornaments in black. Parallels can be found in handmade decorated vessels typical for Ayyubid-Mamluk period pottery (Petersen 2017: 69, Fig. 4).

The Pottery of Complex 1 - Section 1 (CH and DS)

The excavation yielded pottery (**Table 1**), *tesserae*, small metal objects, glass beads and few glass fragments none of which diagnostic. The diagnostic sherds are presented in stratigraphic and chronological order.

Byzantine Pottery

US 0 (**Fig. 15**)

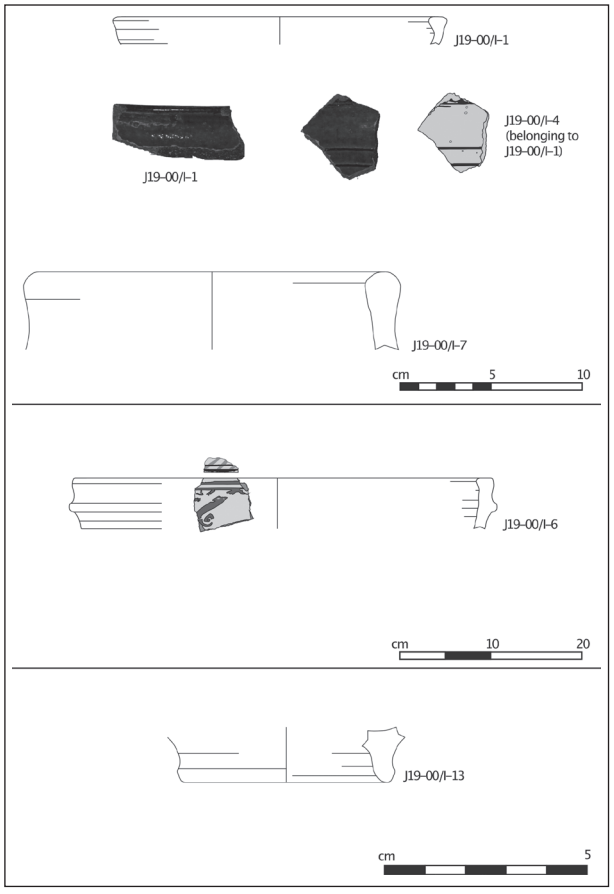
Amphora/jug J19-00/I-13 has a circular base with red and grey fabric. A similar form was attested at Nitil (Hamarneh 2006: 425 Fig. 1.11).

US 1 (**Fig. 16**)

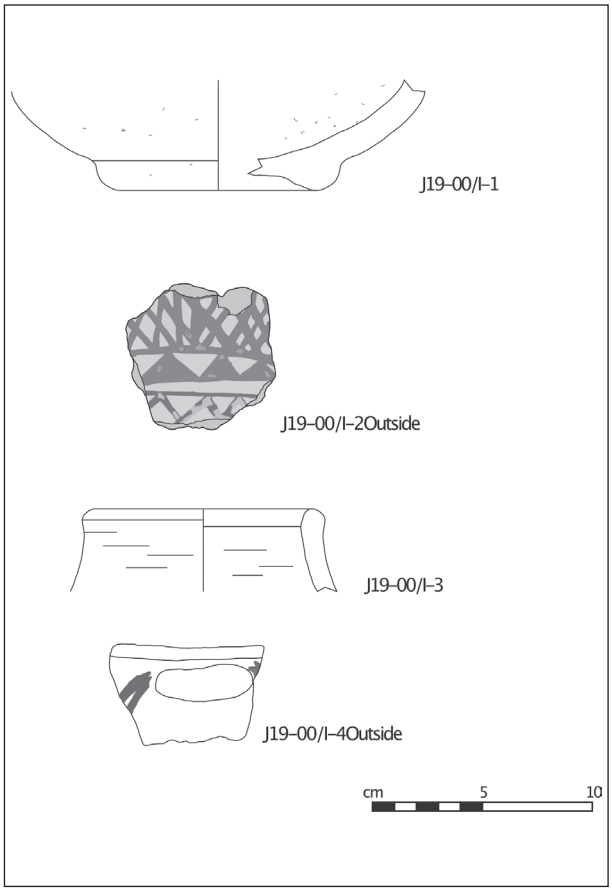
The jug n. J19-01/I-3, has a thickened lip and profile, uniformly reddish (color and fabric), well fired, the rim inflection is inverted, the fabric attests to a good firing process (Alliata 1991: 405, fig. 22.6).

US 3 (**Fig. 17**)

Two bag-amphoras J19-03/I-7 and J19-03/I-8**,** show ribbed external profile. J19-03/I-7 features a grey slip on the outside and has a light orange tone on the inside. The fabric is grey and features dark inclusions. J19-03/I-8 also has a grey slip on the outside and a brownish orange



15. Pottery, Section I - US 00 (© IKA).



16. Pottery, Section I - US 01 (© IKA).

one on the inside, the fabric has white inclusions with air bubbles (Alliata 1991: 388, fig. 12.1).

J19-03/I-5 is a cooking pot, dark grey on the outside and greyish brown on the inside. The lip profile is slightly angled, and the rim profile is thickened. It is similar to a sherd found in Complex II, J19-01/II-8. There are also similarities to a fragment found in Jarash with a grey core and a diagonal tool-made pattern on the outside. It was dated to the Byzantine or early Umayyad period (Lichtenberger *et al.* 2018: 93, fig. 81).

The Casserole n. J19-03/I-2, has a slightly out-curved neck, slightly thickened rim with rounded lip, ribbing on the shoulder and internal ribbing. Its cream-colored slip and the darkish pink fabric. The typology is well attested in several sites in Jordan as in Mādabā (Acconci and Gabrieli 1994: 460, fig. 31.46); in Barsinia (El-Khouri 2014: 316, fig. 3); in Abu Matar in the Negev (Holmqvist 2019: 170 fig. AM015-017), as well as in Jabal Hārūn near Petra (Holmqvist 2019: 52, fig. 5.13. JH023).

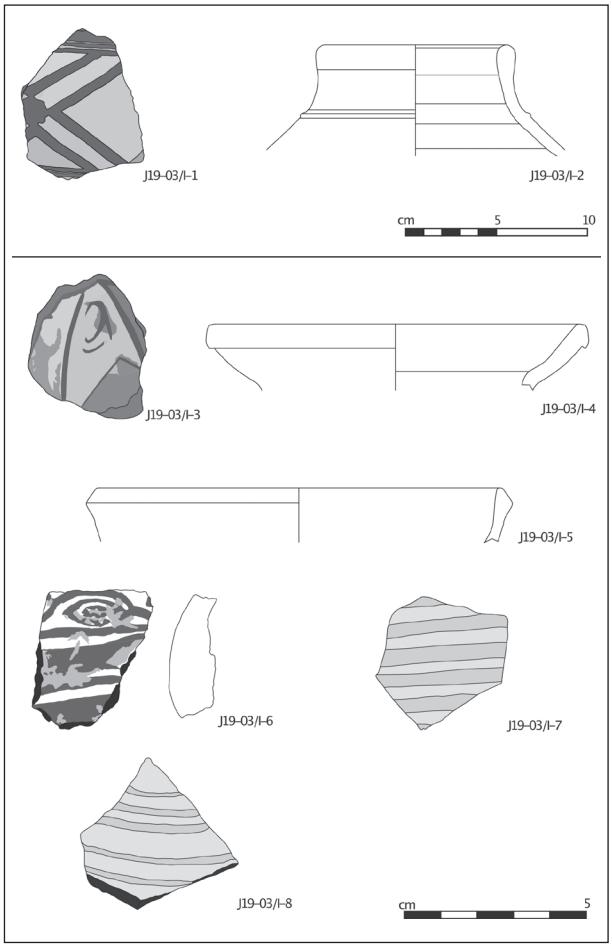
The plate no. J19-03/I-4 is bright orange on the inside and brownish orange on the outside. The lip is thickened, and the rim is straight and has an inverted offset. There are parallels to pottery found at Bayt Rās (Mlynarczyk 2018: 186, fig. 6).

US 4 (**Fig. 18**)

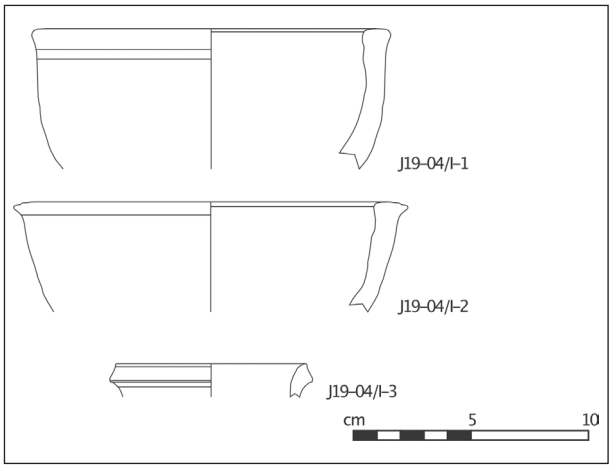
The jug J19-04/I-3 can be attributed to the Byzantine period as it features a typical dark reddish color and dark grey fabric. It has a slightly out-curved lip. This sherd has some parallels to one found at Nitil (Hamarneh 2006: 425, fig. 1.8).

Ayyubid and Mamluk Pottery

The pottery finds consist of a large amount of open vessel forms, such as bowls, plates, or cooking pots; they range from simple coarse ware to geometrically painted and glazed tableware. The closed-form vessels are mostly simple storage jars, with a wide range of manufacturing and decoration styles that are well attested in the area of Transjordan (Brown 1992: 170-171; Peterson 2017: 68), mostly hand-made vessels, as opposed to the mostly wheel-thrown pottery from the Byzantine and Umayyad periods (Hendrix *et al.* 1996: 289-290; Brown 1992: 174). This change of manufacturing mode can be dated to the eleventh century, when potters in the area of current Jordan gradually favored hand-making pottery to the kick wheel (Brown 1992: 175). The quality of these vessels, especially regarding the poor preparation and firing of the clay (often only sun-dried), indicates that they were intended for personal use rather than for



17. Pottery, Section I - US 03 (© IKA).



18. Pottery, Section I - US 04 (© IKA).

trade. They were either slipped and/or painted vessels or plain and unpainted. The painted decoration consisted mostly of simple lines and dashes of red slip which was developed into a more complex geometric style in the twelfth century (Milwright 2010: 155). These manufacturing and decoration styles rapidly spread through the Levant and became rather localized (Milwright 2010: 156; Gabrieli *et al.* 2014: 194).

US0 (See **Fig. 15**)

An example for a wheel-thrown vessel with geometric painting is a bowl or basin J19-00/I-6 with a large diameter of 44.5cm. This vessel form has parallels in Nitil, it shows a cream-colored slip and dark green hand painting in a swirl-like pattern (Hamarneh 2006: 451, fig. 25.6-8). This is also known on large bowls in Tabaqat Fahl (Walmsley 2008: 33, fig. 12.16-18) and Tall Hisbān (Walker 2017: 516, fig. 33, plate 5.t). One of the few closed-form Mamluk vessels is a storage jar J19-00/I-7 with a thickened lip and slightly in-curved neck. It features a beige slip and orange hand painting. Parallels in the vessel form come from KHirbat Arindela in southern Jordan (Walmsley and Grey 2001: 160-161, fig. 12.1, 3) as well as Yoqne'am in Palestine (Ben-Tor and Portugali 1996: 148, fig. XIII.113).

US 1 (See **Fig. 16**)

Among the handmade vessels from Al Jumayl is the base (J19-01/I-1) of a plain hand-made bowl with a concave profile and thick walls. It shows a beige slip on the exterior and a reddish-brown clay color on the interior. The clay which was tempered with organic matter showing a dark grey fabric. The shape of the body can be assumed to be globular, as suggested by parallels in Tabaqat Fahl (McPhillips and Walmsley 2007: 140 Fig. 11.2).

J19-01/I-2 shows the body of a handmade vessel. Notable is the dark orange hand-painted geometrical pattern of irregular thin lines and triangles which is well attested in ash Shawbak (Brown 1988: 236 fig. 11.1, 4, 7; Walmsley 2008: 30) and Nitil (Hamarneh 2006: 427 fig. 2.9).

A Mamluk-dated fragment (J19-01/I-4) showing dark red hand painting can be compared to similar vessels from ash Shawbak in southern Jordan (Brown 1988: 236 Fig. 11.1, 4, 7).

US3 (See **Fig. 17**)

A body fragment from another hand-made vessel J19-03/I-1 has a dark cream slip with a reddish-brown painted geometrical pattern which is similar to vessels from Nitil (Hamarneh 2006: 427 fig. 2.10) and Yoqne'am (Avissar and Stern 2005: 114, fig. 47.9). Parallels also come from Baniyas and Bet She'an (Avissar and Stern 2005: 114, fig. 47; 116 II.4.4.1 no. 4, 5). J19-03/I-6 features a cream-colored slip and reddish-brown painting of irregular lines and swirl-like shapes. This kind of decoration can be found in numerous examples from Jarash (Lichtenberger *et al.* 2018: 77-78, fig. 26); Tall Hisbān (Walker *et al.* 2017: 517, fig. 35. 6.y-z.), Tabaqat Fahl (Walmsley 2008: 33, fig. 12.16-17) and Yoqne'am (Ben-Tor and Portugali 1996: 170, fig. XIII.154.2, 6).

US 4 (**Fig. 18**)

Two handmade vessels discovered in US04, are in many ways similar to each other. The first J19-04/I-1, is a biconical bowl, with thickened lip and a slightly out-curving inflection. The exterior of the bowl displays a light brown clay, a beige slip, and reddish-brown hand painting on the exterior. Similarly, shaped bowls which can be dated to the Late Ayyubid and Mamluk periods are known in Jarash (Lichtenberger *et. al*. 2018: 77-78, fig. 24) as well as in Nitil (Hamarneh 2006: 447, fig. 18.2). The second, slightly larger biconical bowl J19-04/I-2 with angular out-curving lip, has parallels in the bowls from Nitil (Hamarneh 2006: 451, fig. 25.6). It features a light brown slip inside and out and a reddish-brown hand painting on the exterior.

Glazed Pottery

Also typical for the Ayyubid and Mamluk periods and documented at the site of Al Jumayl is pottery with either monochrome or polychrome glazing; green or yellow glaze is known as the most common color (Brown 1992: 221). The sherd J19-03/I-3, found in Complex I, shows white slip and yellow, brown and green glazing in a geometric pattern (See **Fig. 17**). It can be dated to the Late Ayyubid or early Mamluk period (12th-13th century).

Six fragments of the same bowl four rims: J19-00/I-1, J19-00/I-2, J19-00/I-3, J19-00/I-3a

and two body sherds J19-00/I-4, J19-00/I-5 were found in the same context. The rims show a thickened and slightly squared in-curving lip profile. One of the body fragments J19-00/I-4 (See **Fig. 15**) features two parallel incisions that decorated the inner part of the bowl. The fabric has a dark grey color with white inclusions. On the interior there are traces of white slip underneath dark green glazing.

Similar green-glazed wheel-thrown vessels were found in Pella -Tabaqat Fahl (Walmsley 2008: 34, fig. 13.6-7), Yoqne'am, Ramla and Jerusalem (Ben-Tor *et al.* 1996: 102 fig. XIII.39; Avissar and Stern 2005: 15, fig. 5.7-10), as well as in KHirbat Din'Ila (Stern 2014: 85, fig. 7.8) and possibly in Ghawr As Sāfī. Based on these comparisons, this bowl can be dated to the second half of the fourteenth or the early fifteenth century (Walmsley 2008: 32; Peterson 2017: 70).

The Pottery of the *Tall* Building - Section II and III (AH, TL)

The Area that encompasses trenches II and III lies on the summit of the *tall*, topped by a sequence of structures dated to various periods. The excavated area is situated in the eastern limit of a rectangular building. The area showed some remains of mosaic floor of roughly half a square meter, which was comprised of mostly white mosaic *tesserae*, while red ones formed a geometric pattern. The orientation of the pattern suggested, that it would have continued to some extent westwards. Plenty of mosaic *tesserae* of various colours were found within the adjacent trenches II and III, remains of a destroyed floor could be seen to the west, within a pit made by illegal digging. The excavated area was split into the trenches II and III, because of a thin separating wall that has been built in at a later stage of the building's occupation-time.

*Glazed Pottery (***Fig. 19***)*

The sherd J19-00/0-32 was found on the surface of the *tall*, exhibits a turquoise blue glaze on the interior and on exterior and was identified as belonging to an early Islamic vessel, which might have been an open form, a plate or bowl, possibly table ware. The Typology of glaze may point to an import from the Islamic provinces of Iraq. A jug with similar glaze was found at the excavation of Umm al-Walīd, with a possible date the 8th-9th century (Bujard and Joguin 1994: 142, fig. 29-30). Two fragments of the same typology were signalled among the finds of the Peacocks chapel at Umm Ar Rasās (Pappalardo 2002: 409).

Section II

The southern trench II, which also showed some remains of fire places, might have been in use for a longer time, which is suggested by the broad range of pottery originating from different periods.

In addition to the surface finds (US 00) six *strata* (US 01-06) could be identified. They showed a mix of Nabataean, roman, byzantine, as well as Umayyad and mamluk sherds. The heterogeneous character of trench II is represented in chart II below.

The total amount of 362 sherds were collected, with 28 diagnostic sherds. The majority is byzantine ranging between the 6th to the 8th-9th century (**Table 2**).

Nabataean Pottery

US 2 **(Fig. 20)**

Two diagnostic sherds belonging to open forms, probably bowls. J19-02/II-11 features a thin rim with white slip at the top of the exterior while the lower area is reddish-brown. The interior has a uniform dark reddish-brown slip and the fabric is orange (Acconci and Gabriele 1994: 442, fig. 26.5). J19-02/II-13 shows orange-brownish painting on the rim of the otherwise brown exterior. Its fabric is brown as well and it has a light brown interior (Acconci and Gabrieli 1994: 427, fig. 18.48, 446, 28.31).

Late Roman Pottery

US 2 (**Fig. 20**)

The bowl J19-02/II-14 has a sharply

19. Glazed blue Pottery, J19-00/0-32 (© IKA).

Table 2: Distribution of the sherds in Section II.

Trench II	Nabataean	Roman	Byzantine	Umayyad	Mamluk
US 00	-	-	129	16	1
US 01	-	-	26	2	-
US 02	2	1	71	16	13
US 03	-	-	7	5	7
US 04	-	-	20	3	-
US 05	-	-	-	-	9
US 06	1	-	20	10	7

out-curved neck, orange colour, which has a light reddish slip on the exterior, while the interior and the core of the fabric tend to be greyish, two similar but not identical bowls were found in the excavations of Mt Nebo (Bagatti 1985: 268, fig. 13.13 and 269, fig. 14.1).

Much similar form is the shallow bowl n. J19-02/II-12 with a slightly outstretched lip, it shows a light brown slip on the exterior that is slightly chipped of at the rim. The interior is covered with a dark brown slip, while the fabric is orange with white and black inclusions. The colour, form and fabric of the bowl find good parallel in the fragment coming from the north wing in the monastery of Mt Nebo (Bagatti 1985: 266, fig. 11.9).

Byzantine Pottery

US 0 (**Fig. 21**)

Among the thirteen diagnostic sherds selected is a small omphalos base J19-00/II-6 probably of a jug (Alliata 1991: 387, fig. 11.11; Acconci and Gabrieli 1994: 501, fig. 56.52/56.53). The sherd shows a well fired reddish fabric. Its exterior is reddish brown.

US 1 (**Fig. 22**)

The lower part of the body of small amphora J19-01/II-1 is red on the exterior with a light brown slip and a dark-grey fabric (Alliata 1991: 394, fig. 16.8). The amphora with B-carinated, grooved external profile J19-01/II-5 shows completely orange fabric with black and grey inclusions (Acconci and Gabrieli 1994: 502, Tav. 57.2).

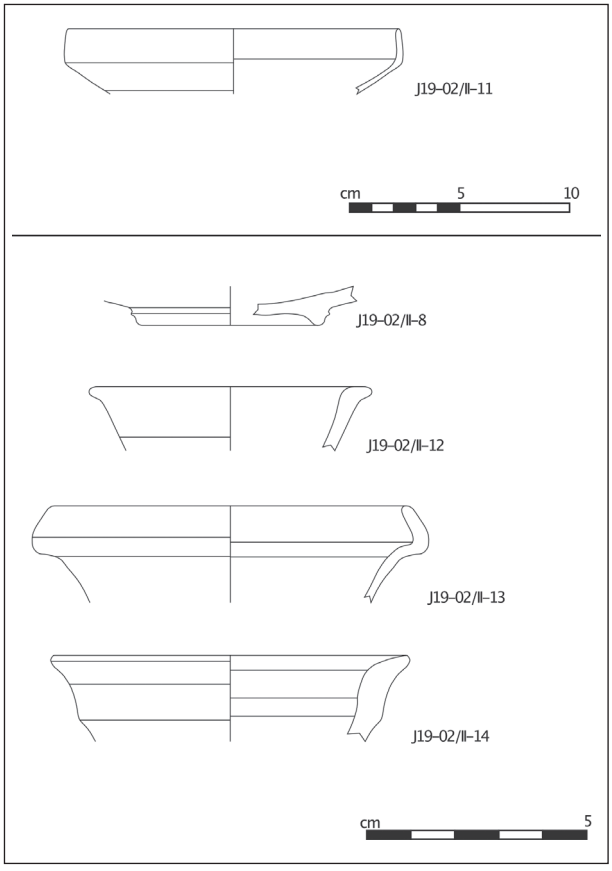
The small bowl J19-01/II-2 shows a rounded slightly curved lip, with reddish-brown surface, and a very fine-grained fabric (Acconci and Gabrieli 1994: 437, fig. 23.60). The bowl/plate J19-01/II-6 shows a brown surface and a dotted fabric with white and grey inclusions (Acconci and Gabrieli 1994: 439, fig. 24.3). The plate J19-01/II-8 has a grey exterior and interior colour, as well as white and grey inclusions in its fabric, (Pappalardo 2002: 412, fig. 18.8).

J19-01/II-9 is a plate characterized by a thick, flattened rim, a brownish internal and external surface and white inclusions within its fabric (Pappalardo 2003: 314, fig. 22.4; Acconci and Gabrieli 1994: 486, fig. 48.12).

US 2 (see **Figs. 20, 23**)

The jug J19-02/II-6a, has a convex rim with a reddish colour and a porous fabric with dark inclusions.

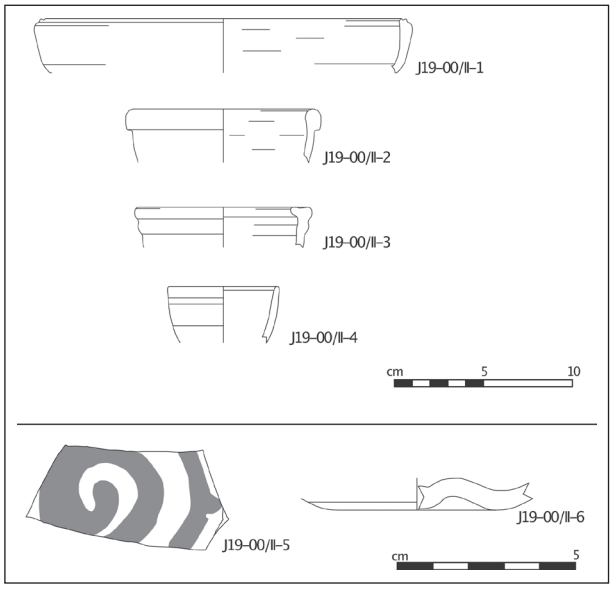
Plate fragment J19-02/II-3 has a reddish coloured exterior and interior surface, while its



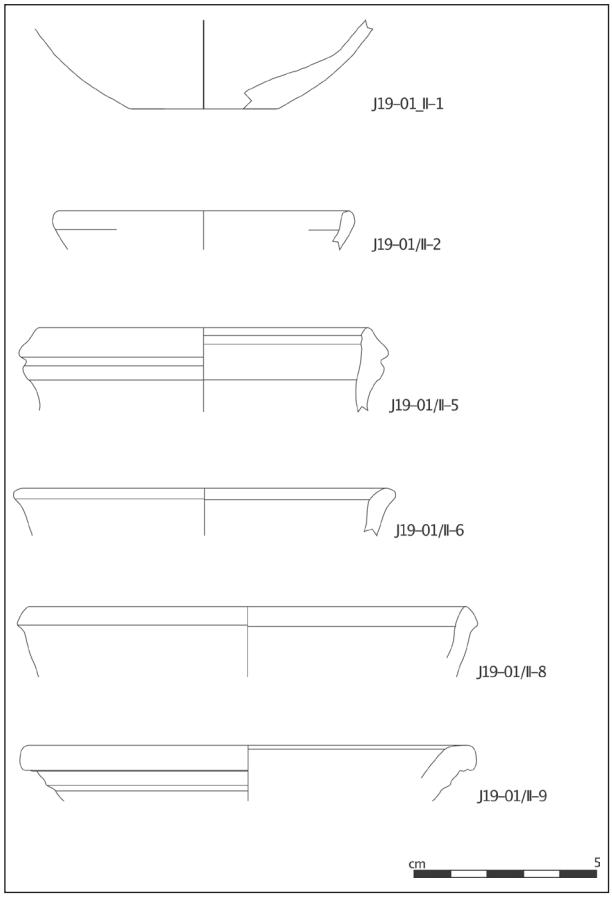
20. Pottery, Section II - US 02/1 (© IKA).

fabric is of good quality and exhibits some black inclusions (Kenkel and Hoss 2020: 126, pl. 1.5, fig. ETS 11.3); much similar is the base J19-02/II-8 with brick-red inside and outside surface colour, its fabric displays white and black inclusions within a generally fine fabric (Kenkel and Hoss 2020: 124, pl. 1.4, fig. ETS 4). The base fragment J19-02/II-4 has a more rounded shape, a beige exterior and interior colour and a medium quality fabric with black inclusions.

Bowl n. J19-02/II-1 with a thickened out-curved rim displays a reddish coloured outside surface with black inclusions, a beige-orange interior surface with air bubbles, and a pink fine fabric with few inclusions (Acconci and Gabrieli 1994: 459, fig. 31.38).



21. Pottery, Section II - US 00 (© IKA).



22. Pottery, Section II - US 01 (© IKA).

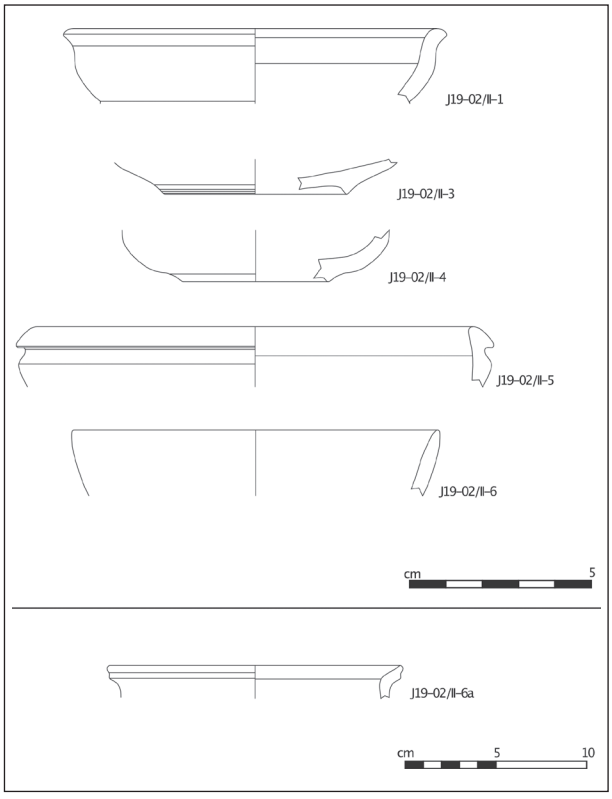
Umayyad Pottery

US 0 (See **Fig. 21**)

The jug/amphora fragment N. J19-00/II-5 has an external decoration of concentric circles in red added by free-brush strokes on a beige slip. The interior features a beige-pink slip. This typology is very well attested in the abandonment layers of the churches of Umm Ar Rasās (Alliata 1991: 392, fig. 15.1; Sanmorì and Pappalardo 1997: 423, fig. 15.1).

US 2 (**Fig. 23**)

The rim of J19-02/II-5, possibly a bowl with carinated shoulder, slightly out curved neck with thickened rim; it shows external ribbing, it is covered by a dark slip and has a beige fabric with dark inclusions. Similar form was found in



23. Pottery, Section II - US 02/2 (© IKA).

the North wing of Mt Nebo monastery (Bagatti 1985: 267, fig. 12.15).

US 3 (**Fig. 24**)

J19-03/II-1 is a rim showing remains of some black traces which could be remnants of painting (Pappalardo 2003: 316, fig. 27.5). J19-03/II-2 is an amphora body sherd decorated with red circles in free brush strokes on white ground with one being very minor. The interior and fabric are both of orange-pink colour (Alliata 1991: 392, fig. 15.1; Sanmorì and Pappalardo 1997: 423, fig. 15.1).

*Late Umayyad - Early Abbasid Pottery***.**

US 0 (See **FIG. 21**)

The cup J19-00/II-4 shows a smooth surface with a greyish-beige slip on the exterior, and a grey slip on the interior. The fabric is again made up of very fine material devoid of inclusions and with a reddish-grey hue (Alliata 1991: 384, fig. 10.33).

US 2 (See **FIG. 23**)

Bowl N. J19-02/II-6 exhibits a slightly pointed-rim profile with a thinned lip and was identified as late Umayyad-early Abbasid. Compatible typological parallel comes from the excavation of the courtyard of the Church of St. Paul at Umm Ar Rasās, and may point to a local production (Pappalardo 2002: 417, fig. 23.11). The inside colour appears in a darkish pink, while on the outside a light brown slip is visible. The good quality fabric presents itself with white inclusions possibly common to the byzantine local production.

Section III

The smaller northern trench III is directly adjacent to the southern trench II. As already stated, these trenches are only separated by a thin built-in wall, which would not have been part of the building's original layout. It should also be mentioned, that after the last layer was excavated, some part of a non-parallel wall could be seen running underneath the so called "*Tall*-Building"

The stratigraphic situation within trench III, shows different occupational phases compared to trench II, as may be shown best by (**Table 3**), with only 7 diagnostic sherds.

*Nabataean Pottery (***FIG. 25***)*

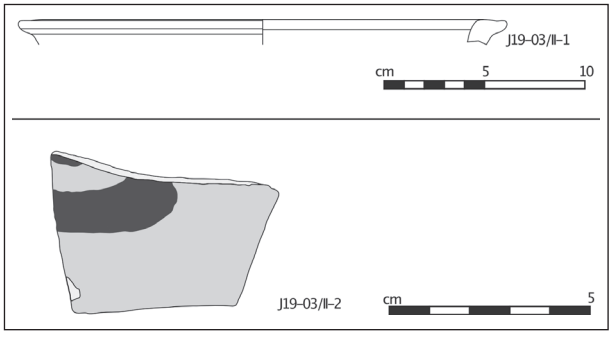
Two fragments of Nabataean fine ware were found. Plate 19-04/III-1 has a diameter of 12cm, a rounded lip, a reddish exterior and interior colour and is hand-painted on the rim and on the inside surface. The sherds fabric is beige-reddish and indicates high quality. The second J19-04/III-2, is a plate of 24cm diameter with a thinned lip. The outside and inside surface colour is reddish, whilst the good quality fabric has a dark grey colour.

Byzantine Pottery

US 1 (**Fig. 26**)

The jug/amphora J19-01/III- shows an out-curving rim, it displays a grey slip, while the inside is reddish-orange and the fabric greyish-beige.

The second example for an amphora/storage jar J19-01/III-2 (**Fig. 26**), has a rounded lip, an externally thickened and cup shaped rim profile. A black slip adorns the vessels outer surface, while the inner surface is brown and the fabric red (Pappalardo 2003: 320, fig. 26.4). Fragment n. J19-01/III-3 is a plate/bowl with cream slip and fine reddish fabric (Alliata 1991: 384, fig. 10.32).



24. Pottery, Section II - US 03 (© IKA).

Table 3: Distribution of the sherds in Section III.

Trench III	Nabataean	Roman	Byzantine	Umayyad	Mamluk
US 01	-	-	21	9	3
US 02	-	-	6	4	-
US 03	-	-	20	4	13
US 04	2	-	15	6	8

US 2 (**Fig. 27**)

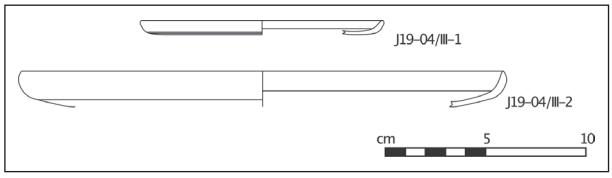
Fragment n. J19-02/III-1, another fragment of an amphora with carinated shoulder, slightly out curved neck with thickened rim and external ribbing, showing a cream slip and reddish fabric (Sanmorì and Pappalardo 1997: 421, fig. 14.1).

The bowl n. J19-02/III-2 shows an out curved rim, the reddish interior, and badly conserved slip (burned surface), may point to a local imitation of African red slip ware (Hayes form 93B) similar bowls/plates were found in Mādabā (Acconci and Gabrielli 1994: 504, fig. 58.40-42; Pappalardo 2002: 412, fig. 19.25).

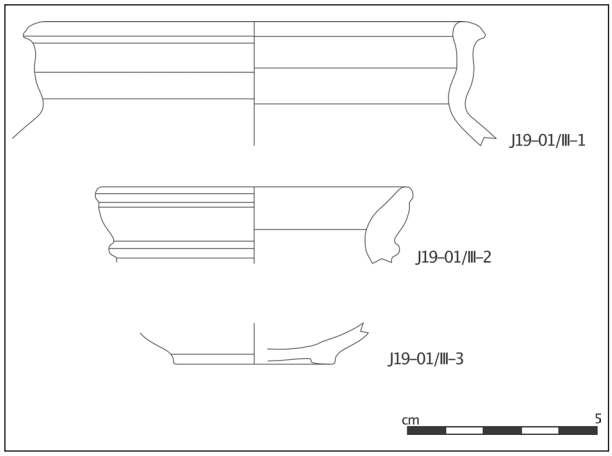
Cisterns of Al Jumayl (TZ, FM, EG)

General Assessment

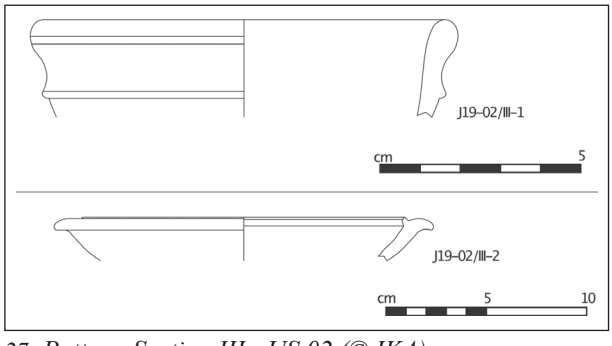
Al Jumayl is located on a rocky ridge in a region with a semiarid climate. The continental climate is characterized by dry summers, and little but heavy rainfalls in winter (Abujaber 1995: 737; Tsuk 1997: 132). Similarly, to Umm Ar Raṣāṣ (Kastron Mefa'a), the seasonal rainfall was not sufficient to provide water for the needs of the local population. Therefore, a rainwater harvesting system was implemented as part of a network that was used to store and supply water during dry periods, which is a highly important part of archaeological evidence in the region (Keilholz 2014: 27). The water management system of Al Jumayl consists of various cisterns, which are thus a critical piece of infrastructure to control seasonal variation in temperature and rainfall[6].



25. Pottery, Section III - US 04 (© IKA).



26. Pottery, Section III - US 01 (© IKA).



27. Pottery, Section III - US 02 (© IKA).

However, as in Kastron Mefaa, the settlement of Al Jumayl did not have any-as of yet-identifiable springs; as a result, reliable rainwater storage systems were vital in supporting the health and economy of the community (Kraushaar *et al.* 2015: 369). Evidence for highly regulated water control in Nabatean and Roman-Byzantine Jordan, at sites such as Petra, Umm Al Jimāl, Yasīlah and Umm Qays, shows complex systems and "less wasteful" than later ones (Shqiarat 2008: 39). Water cisterns in the region were often carved directly into the bedrock, as the local rock is of soft limestone, and has many natural cavities that could be enlarged, or adapted, according to requirements (MacDonald *et al.* 1988: 238; Shqiarat 2008: 36). However, the main type of cisterns represented are the so-called rock-cut cisterns, which started to appear in the Nabatean period, and were used in major settlements at points where great amounts of rain water could be "naturally and artificially collected" (Evenari *et al.* 1971: 14-17, 159; Shqiarat *et al.* 2010: 210). Their walls needed to be plastered to avoid water dispersal. As the cisterns were utility structures, they were used over long time periods; this required renewal and repairs of the coating mortar (Lichtenberger *et al.* 2015: 116). The sealing mortar layer was accurately made, while later repair work was often not carried out as carefully (Brinker *et al.* 2007: 110). Due to the fact that they were periodically re-plastered, particularly during the Byzantine

6. Throughout the region, water management was of great importance, and even literary sources testify to its necessity. In the so-called *Petra Papyri*, a corpus of Ancient Greek papyrus documents from the 6th century AD, several of these discuss water management systems and regulations to draw water (Evenari *et al.* 1956: 45).

period, the cisterns often display variations of colour and material (Shqiarat *et al.* 2010: 220), especially different types of lining, either with lime, mortar or cement, which often overlie each other (Shqiarat 2008: 31). Old lining was not necessarily removed before a new layer was smeared on; however, its different materials and their chronology need to be analyzed in future campaigns. The majority of cisterns were covered in order to keep surface evaporation at bay, to prevent algae from growing, and avoiding animals falling into the water (Tsuk 1997: 132; Brinker 2007: 101). In order to retain fresh water, its circulation was regulated by blocking the openings with capstones. While covered cisterns were preferred water storages, open cisterns might have been used as "central collections point[s]," depending on their predominant location in or near settlements (Shqiarat 2008: 39). However, these open cisterns were more likely used for animal herds due to water contamination and pollution (Abu Jaber 1995: 743). It cannot be excluded, considering the vast agricultural land present, that water was also stored or collected through check dams in proximity of the *wadis* and small allotments for agricultural purposes[7], as the main source of supplementary irrigation for trees during the summer seasons (Tsuk 1997: 131; Shqiarat 2008: 23, 39).

Cisterns at Al Jumayl: Distribution and Form

During the first excavation in Al Jumayl (2019), a total of eleven cisterns were documented[8]. The majority were located several meters from the densely built-up center, in the lowest part of the settlement; this allowed the cisterns to collect most of the water using natural slope. Four of them can be found in the north-western part of the settlement, as well as three in the south and south-east. In addition, four cisterns can be identified in the vicinity of the central structures of the settlement. As a result, of covering almost the entire area of the habitat.

The subterranean structures can generally be characterized by similar shapes; most display walled cistern necks constructed into the soil, and the final socket stone (*puteal*) can still be seen (Keilholz 2014: 29). Many of the cisterns show a round opening, of which only funnel-shaped holes are visible. Some of the cisterns exhibit an (almost) quadratic opening, which is framed by stones[9]. The openings varied between 20 and 170cm width, each lead to a shaft and a wide, sometimes pear-shaped, cavity. The shaft can be either round, or chimney-shaped and rounded at the bottom. These shapes of rock-cut cisterns are similar to the ones identified in Udhruh near Petra: bottle-shaped, rectangular, circular and irregular (Shqiarat *et al.* 2010: 211). A comparison to the cisterns in the Decapolis city of Gadara made apparent that a vertical shaft is hewn into rock - an indicator for the bottle-shaped type of cistern which connects the opening and the cave (Shqiarat *et al.* 2010: 211). The interior had to be plastered with hydraulic mortar (Keilholz 2014: 29). The narrow tube-shaped entrances are mostly clad with light-brown or light-grey mortar, probably due to the concentration of charcoals[10]. In our specific case different types of mortar used to seal the inner rock surfaces need to be investigated with radiocarbon analysis of mortar samples, as well as the shapes and sizes of the cisterns, and will hopefully give valuable insights into their phases of use and abandonment. Whereas, various mortar types could point to different periods of use and possible repairs (Lichtenberger *et al.* 2015: 116).

Looking at the individual cisterns, their interior is broad and round, and as in Cistern 9 (C9) furnished with a stone-pillar plastered with mortar (**Fig. 28**). As in the case of the cistern at Udruh site no. 099 with a waterproof layer of mortar (Shqiarat *et al.* 2010: 216-217, fig. 6), it supports the construction of a horizontally

7. Aerial photographs allowed to identify a *wadi* terracing system. It allowed to collect runoff water for agricultural purposes. This system will be properly addressed in the next campaigns. For similar systems see (Evenari *et al.* 1958: 231-268).

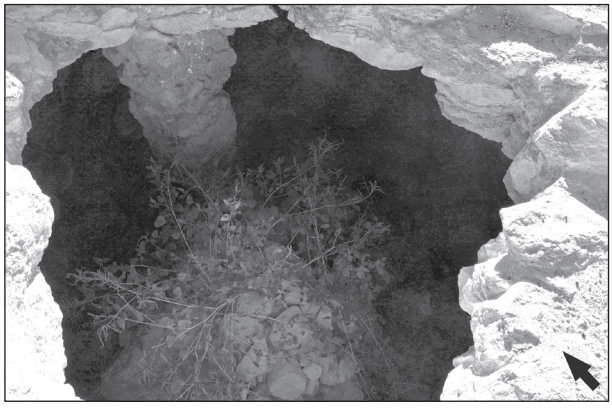
8. A higher number is expected, as there was often one cistern per household in Byzantine times (Tsuk 1997: 131). Such distribution of cisterns is much common to the area as evinced from the Moabite Stele of Mesha (around 853 BC) that mentions: "make yourselves each one a cistern in your house" (Ullendorff 1958: 197).

9. In the course of the settlement history, the surface terrain increased, and cistern necks were likely extended with stones, only proving their long usage (Keilholz 2008: 207-208).

10. Mortar with charcoal particles can frequently be seen, and lime mortar was often used for lining (Keilholz 2008: 207).

rock hewn type (Shqiarat *et al.* 2010: 211). The weak natural roof required the construction of a support pillar; these types are referred to as a so-called *qa'* or ditch, in which water contamination is highly probable (Abu Jaber 1995: 743). Moreover, the reuse of cisterns for housing or production is well-documented in the region (Abu jaber 1995: 743; Lichtenberger *et al.* 2015: 124).

Today, most of the cisterns of the site are in disuse, most are filled in with stones and modern waste. Few still store water up to 70cm (*e.g.* C1). The cisterns have an average depth of up to 4.7m, when measured from the opening to the deepest point. Some openings are blocked by a stone, either put there on purpose, or collapsed onto the opening. Some capstones are still preserved *in situ* (potentially C4, **Fig. 29)**. This would point to a more recent use of the cistern's interior, which required the roof to be covered.



28. C9, cistern with roof supported by pillar (© IKA).

29. C4, cistern with rectangular opening and capstone in situ (© IKA).

Individual Cisterns

One water reservoir is found at Al Jumayl, located in the south-east, which was probably a disused stone quarry. Its potential use as a quarry during earlier times and to be discussed in more detail after future investigations. However, it is also similar to the case of Gerasa/Jarash, where quarries were transformed into cisterns in order to construct churches at a later time of the settlement's expansion (Hamarneh *et al.* 2013: 60). Quarries and cisterns are also located near the stylite tower at Umm Ar Ra̲sā̲s̲, which are carved into the bedrock; moreover, the tower was constructed out of the stones extracted from the quarry later reused as a cistern (Piccirillo and Marino 1991; Al-Taher *et al.* 2016: 20-21).

Cistern C1 is located in the south of the excavation area, outside of the settlement. Its shape is reminiscent of the square settling basin with similar measurements at Udhru̲h (at site no. 104) built of flint blocks (Shqiarat *et al.* 2010: 217, fig. 7). The cistern is partially filled with water, as a tree is growing out of the opening, with fallen stones visible from above[11]. Cistern C2 is located in the north-east part of the excavation area and is only a few meters away from the *tall*. The cistern is set within the densely built habitat and is surrounded by structures to the north and west. Cisterns C3 and C4 are located in the northern area, only a few meters apart. The two utility structures are also set in a built-up area, which presumably comprised of several residential buildings. To the south of both cisterns stands a large building, which was partially uncovered during the campaign (Complex 1). Cistern C7, identified in the center of the settlement, is located in the eastern part of the excavation area, flanked by long, regular walls. Most utility harvesting structures were hewn in the south-eastern area, on a lower level and flat ground, as cisterns C1 and C5; C6 is located south-east of them and lies in the southern part of the settlement. A last group of four cisterns are located to the north-west, a part of the settlement mainly

11. Open cisterns are often filled with deposited materials, as they may have been used as a waste disposal site later on (Keilholz 2008: 208).

consisting of rocky ground. Similar to C3 and C4, cisterns C10 and C11 are located at a small distance from each other. A few meters further east, a large area with black soil may suggest the use of water for agricultural purposes. This may suggest that C10 and C11 were not used for domestic purposes, but rather for the irrigation of a limited area that necessitated additional watering during high temperatures and drought, as in other cases highlighted in Southern Jordan (Shqiarat 2008: 39). The development of this area still requires further assessment.

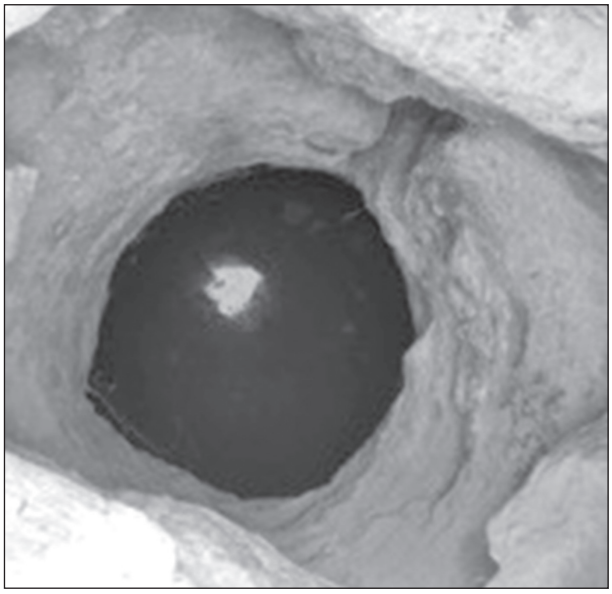
Some of the cisterns (C5, C6, C8, C11) display potentially modern material around their opening, as in the case of C11 where a big patch of mortar or cement is visible. The cisterns are mostly lined with hard white plaster, which is comparable to those in other areas, such as The High Place of Sacrifice at the top of the Al KHubthah mountain in Petra (Al-Bashaireh 2013: 333). In the case of C2, C3, C7 and C9, water channels are cut into the bedrock in the walls of the tube. These water inlets both supplied the cisterns with rainwater and also connected them to the water management system. They are mostly only detectable as small regular openings. At C3 and C7 (**Fig. 30**), channels plastered with mortar and with a width of *ca.* 20cm leading into the tube can well be seen slightly beneath the surface. These incised channels likely facilitated the filling of the cisterns with rainwater. Runnels are also present, which caught the water and led to a draining hole, also well documented in other sites (Oleson *et al.* 1986: 56).

Some of these cisterns are probably still in use by local farmers today (Shqiarat *et al.* 2010: 222). Many residential and potentially agricultural buildings or farmsteads have associated cisterns (Shqiarat *et al.* 2010: 214), which may be detectable in the settlement of al- Jumayl as well. For future campaigns, it cannot be ignored that the cisterns are rather small in size but numerous in quantity and at least two or even more seem to be interconnected in a network of cisterns. The different shape and usage of the rock-cut cistern types located within the densely built-up habitat, and potential agricultural areas farther away needs to be investigated in detail as they provide valuable insights to settlement patterns, and economic conditions.

Conclusions (BH)

The origins of anthropogenic settlement at Al Jumayl should be associated with particularly suitable environmental conditions. The area had experienced relative prosperity during the Iron age, Nabataean-Late-Roman periods connected to an intensive long-distance commercial traffic, linked to the general urbanisation of towns and strongholds in the Moabite plateau. The town witnessed a substantial expansion in the Byzantine period as marked by well-developed patterns, with dense inner spatial organisation around the main hill (*tall*). The extensive area of fenced fields following *wadi* beds around the site, reflects the unparalleled expansion into marginal lands, and the intensive agricultural exploitation of the landscape. The vicinity to Umm Ar Rasās is extremely interesting, studying closely related sites/satellite in the area have not been attempted so far and will allow a systematic mapping of the anthropogenic landscape of the region to unravel patterns in their use and reuse over time.

The archaeological research at Al Jumayl, is paying specific attention to the aspects of economic and social life below the elite level, which in many research projects remains underestimated. The pottery chronologies, essential for studying sites of this period, especially to determine the phases of use, development and abandonment show an extremely long-time span. Although the analysis



30. C7, cistern with regular round opening and plastered water channel (© IKA).

of the data collected during the first field season is still in progress, the preliminary results have shown so far, a remarkable continuity of the use of the central areas from Late Roman to the Mamluk period. Though the function of the village during the later Islamic period is still uncertain, it cannot be excluded that it served as an observation spot on the ancient road passing towards Wādī Al Mūjib, we are confident that future research will allow to deepen our knowledge on the changing human landscapes in the area.

Acknowledgments

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RECYCLING THE VALLEY: PRELIMINARY REPORT OF THE 2016 AND 2018 EXCAVATIONS AT TALL DĀMIYAH

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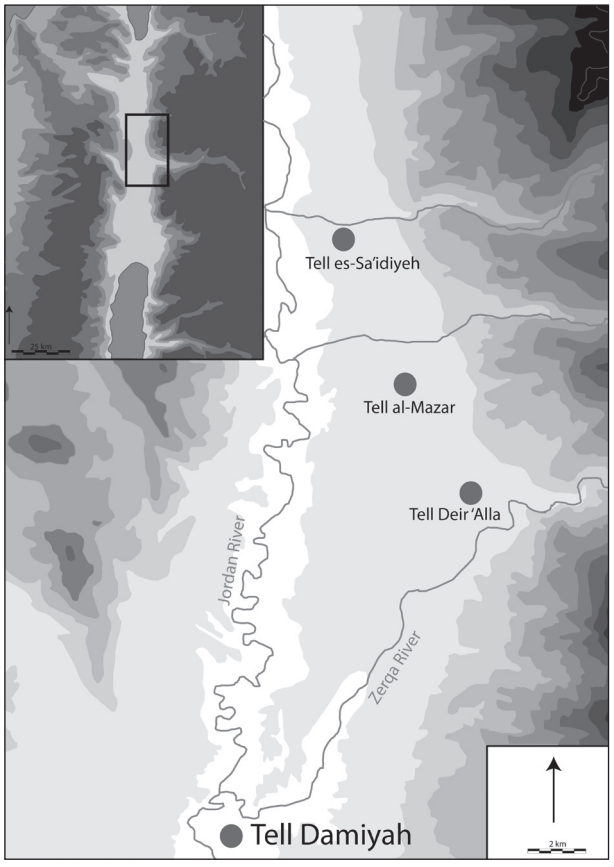
Introduction

Tall Dāmiyah is one of the few settlement mounds located on the east bank of the Zūr, just south of the confluence of the Az Zarqā' and the Jordan River (**Fig. 1**). It is, as the famous archaeologist William Foxwell Albright correctly describes, "a small but well-formed" archaeological site (**Fig. 2**; Albright 1926: 47). Its summit covers an area of less than one hectare, which is indeed small compared to many other sites in the area, like Tall Dayr 'Allā or Tall As Sa'īdiyyah. Human occupation started in the second Millennium BC on a natural rise, parts of which are still visible on the west side. Surface material and excavation results suggest that Tall Dāmiyah was occupied throughout the Iron Age, at least until the end of the 7th century BC, after which the mound was visited only occasionally (Petit 2009b; Petit 2013; Petit 2014; Petit and Kafafi 2016; Kafafi and Petit 2016, 2018; Petit and Kafafi 2018). Tall Dāmiyah's location is of strategic importance, for it guards one of the few fords of the Jordan River. Looking north from the summit one can see the impressive mound of Tall As Sa'īdiyyah in the distance.

Small archaeological rescue operations at Tall Dāmiyah started in 2004, after a bull-dozer had cut the southern slope, resulting in increased surface run-off and erosion. This project was carried out by Omar al-Ghul from Yarmouk University and Lucas Petit, at that



1. Map of the Central Jordan Valley and the location of Tall Dāmiyah.

2. Tall Dāmiyah in 2018, seen from the south (photograph by Yousef Al-Zu'bi).

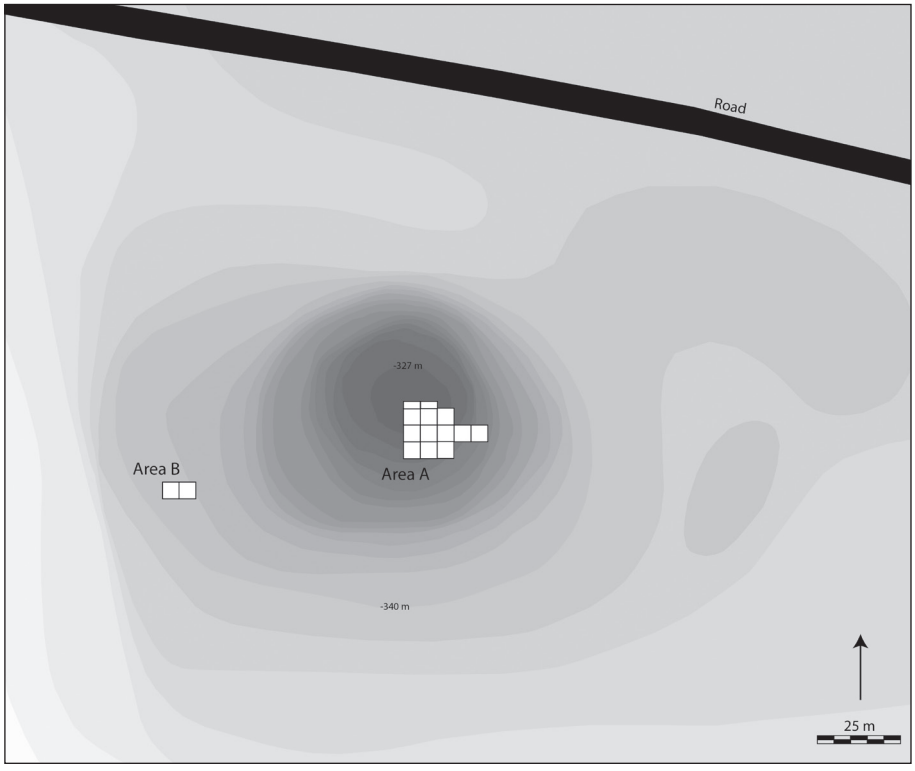
time staff member of Leiden University (Kaptijn *et al.* 2005). It was decided together with the Department of Antiquities of Jordan to continue in 2005 to get a better idea of the site's occupation history (Petit *et al.* 2006). Discoveries from these seasons, such as a bulla inscribed with cuneiform and the remains of large anthropomorphic statues, suggested that Tall Dāmiyah was important during the Iron Age.

Recycling the Valley

In 2012 the Dutch National Museum of Antiquities decided to renew the excavations at Tall Dāmiyah within the project *Recycling the Valley*. This project was initiated to study the intriguing short-term settlement cycles in the Central Jordan Valley during the first Millennium BC (Petit 2013; Kafafi and Petit 2018: 317-318). In this period the inhabitants of the region were avowedly involved in a continuing process of migration and return migration to search for the most favourable areas, while maintaining a sedentary way of life. This project intends to systematically investigate the role of the Central Jordan Valley during the Iron Age and Persian Period. Information from previously excavated sites in the Valley, such as Tall Dayr 'Allā and Tall Al Himmah, will be compared with new results from the Valley and the eastern plateau. In 2014 Yarmouk University became an equal partner in the project, represented by Zeidan Kafafi.

As mentioned in previous publications, Tall Dāmiyah was continuously occupied from approximately the 15th until the late 7th century BC (Petit 2009b; Petit and Kafafi 2015, 2018; Kafafi and Petit 2016, 2018). This is in sharp contrast to the aforementioned short-term settlement cycles at other nearby sites, like Tall As Sa'īdiyyah, Tall Al Mazār, and Tall Dayr 'Allā (Van der Kooij 2001; Petit 2009b). This non-continuous occupation pattern has been attributed to catastrophic events and climate changes disrupting, among other things, the fragile irrigation system that was needed for agriculture (Kaptijn 2009; Petit 2009b). Tall Dāmiyah had apparently a different way of overcoming these challenges, or for some reason proved to be resilient.

In 2014 and 2015, the team discovered remains of a sanctuary that was completely burnt down around 700 BC, on the summit of the *tall*. Its inventory was encountered *in situ,* which is a rare find in the Southern Levant. It was concluded that Tall Dāmiyah functioned as a waypoint with a sanctuary for traders and travellers even at times when the rest of the valley was abandoned (Petit and Kafafi 2016).



3. Site plan with location of Area A (summit) and Area B (western foot).

The 2016 Excavation Season

The 2016 excavation season ran from the 25th of September until the 20th of October. The team worked mainly on the summit, although some additional work was carried out on the ridge at the western foot of the *tall* (**Fig. 3**). The main aim during this season was to complete the investigations of the sanctuary, and to start uncovering the preceding occupation remains, dated provisionally to the 8th century BC. Extra attention was paid to Persian-Hellenistic silos and the two later graveyards in order to understand the post-Iron Age occupation at Tall Dāmiyah (see for more information on the site's stratification, Petit and Kafafi 2016: 19; 2018; Kafafi and Petit 2018).

In area B one square from previous seasons was re-opened, in order to further explore the puzzling nature of the occupation at the western foot of the site (Petit and Kafafi 2018: 332-344). Other sites in the Central Jordan Valley show settlement areas and cemeteries on so-called "lower *talls*" such as Tall Al Mazār and Tall As Sa'īdiyyah. In order to decipher the settlement size of Tall Dāmiyah during the Iron Age, it was necessary to understand this lower area and to see if this part of the site was inhabited during the first millennium BC. After two seasons, it seems clear that this western lower ridge was never intensively occupied. The team discovered alternating layers of burnt material on top of natural sand deposits. A calibrated radiocarbon date (1385-1235 BC)[1] ruled out the possibility that these layers were the result of the medieval sugar industry, as was proposed before (Petit and Kafafi 2018: 333-334). Furthermore, based on Late Bronze pottery, we suggest that this area was not a living quarter, but used for an unknown industry during the Late Bronze Age. Clear Iron Age occupation could not be detected in anyof the excavated squares. Only after the Iron Age, pits and graves were dug into the foot of *tall*, cutting through these burnt layers.

In area A, on the summit, more than 40 Byzantine and Ottoman period graves were studied, as well as numerous Persian-Hellenistic pits. The Ottoman graves wrought havoc on an earlier Byzantine graveyard, making dating of individual graves challenging. Most clearly Ottoman period burials were often constructed with wooden beams, of which fragments were encountered which often contained iron or bronze pins. The Byzantine burials, on the other hand, often contained beads and occasionally yielded a glass vessel. Furthermore, the latter graves themselves were not cut as deep as the Ottoman ones. Extensive research on both graveyards will be carried out in the near future.

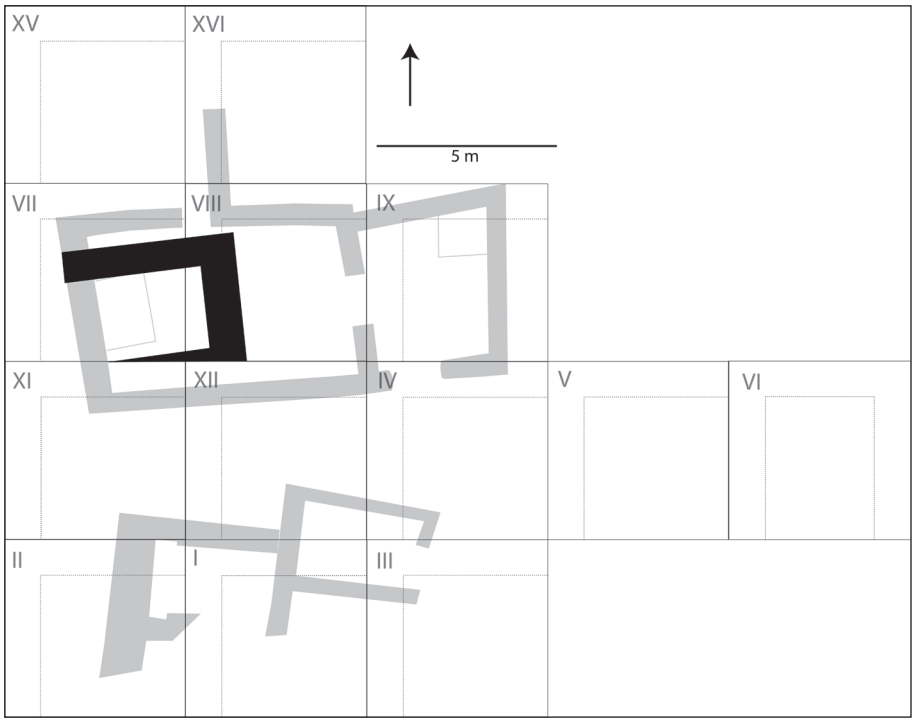
The pits, all dated to the Persian-Hellenistic periods, were filled intentionally with organic material and debris from the settlement mound[2]. It has been proposed in the past that these were silos in which animal fodder was stored for dry seasons (Petit 2014). In such pits in square VII and VIII, the team additionally discovered many loom-weights. Such loom-weights are also encountered at other sites in the Central Jordan Valley (*cf.* Boertien 2013). Textile production seems to have been an important industry between the 5th and 3rd century BC, even though the region had no permanent settlements during this period.

Square XI was opened to provide a connection between the sanctuary and the building to its south. Other than several graves, a walking surface was found, belonging to the sanctuary phase. This surface was encountered somewhat higher in elevation than that in the sanctuary building (**Fig. 4**). Most of square XI probably comprised a street, similar to squares XII and IV, and sedimentation over time caused the difference in elevation between the interior and exterior surfaces. The street sloped down towards the east, and it is postulated that there was a path all the way down along the steep eastern slope. A rare find from the street levels in square XI was a worked bone handle, burnt by the conflagration around 700 BC (**Fig. 5**).

In the southernmost square, square I, the uppermost layers can be dated to the 9th/8th century BC. The aforementioned bulldozer had not only removed most of the buildings south of the sanctuary, but also the 8th century BC–remains immediate below. The 9th/8th century BC–layers in square I consist of a bread oven in a courtyard, surrounded by two buildings (**Fig. 6**). The pottery from this phase

1. GrA 68284 – Age BP 3045, Error +/–35 (calibrated 1 sigma: 1385-1235 BC).

2. GrA 68283 – Age BP 2225, Error +/–30 (calibrated 1 sigma: 365-350, 300-210 BC).



4. Plan of the sanctuary (grey) and the older building (black).

differs from the sanctuary phase, which is particularly visible by an increase in the amount of red-slipped sherds.

The 2018 Excavation Season

After a break in 2017, the excavation resumed in October and November 2018. Work was carried out in six squares, all located on the summit of Tall Dāmiyah (see **Fig. 3**). The aim was to get more information about 8th century BC phases, located directly below the sanctuary. Additionally, the area north of the sanctuary was investigated.

At the beginning of the season the remaining features from the sanctuary were investigated. Among these were two platforms, both constructed from sun-dried mudbricks and covered with lime plaster. In previous seasons figurines, animal skulls, one fragmented head of an anthropomorphic statue and a pottery stand were encountered immediately next to these podia. Likely most of them had fallen off the platforms during the final conflagration (Petit and Kafafi 2016, 2018). After removing the western platform, in square VII, the team surprisingly discovered the skeletal remains of a snake directly underneath it (**Fig. 7**). This context is now being investigated, to see if this animal was placed here intentionally, or if it was intrusive. Radiocarbon dating of its bones could provide further insight into this matter. While seemingly quite a unique situation, depictions of snakes have been found frequently near

5. Fragment of a bone handle.

6. Mudbrick walls, a bread oven and the remains of a ceramic bowl found in square I.

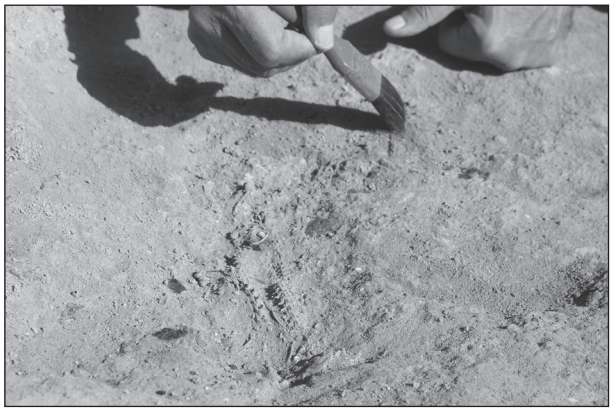
platforms in Iron Age temples and sanctuaries, also in the Jordan Valley (*e.g.* Rowe 1940: pl. 14:1.3 and pl. 16:1-3).

Trenches XV and XVI were opened directly north of the sanctuary, to check the northern wall and adjacent areas. In former articles the sanctuary was considered a freestanding building with an entrance in the south wall (*e.g.* Petit and Kafafi 2016). However, since the northern enclosure was partly hidden in the baulks of squares VII, VIII and IX, it remained a hypothesis that needed further investigation. An additional argument to assume adjacent rooms to the north, was the excellent preservation of the northern wall of the sanctuary (at least 1.5m) compared to the *ca.* 20cm height of the southern one. If the sanctuary was free-standing, walls would have been preserved more or less equally. The results from the two new trenches confirmed the idea that the sanctuary was part of a larger complex. In square XVI we discovered a second room probably used for storage (**Fig. 8**). A horse figurine on the floor was the same as those found in the sanctuary, but unfortunately Persian and Hellenistic pit makers had damaged a large part of the floor.

After the 2018 season, we are confident that the sanctuary was part of a larger complex. The complex could be entered via a small opening in the northern wall of the sanctuary (see **Fig. 4**). It is at this stage unclear if the whole complex was roofed, or if there was an inner courtyard surrounded by more rooms. The limited amount of roof material in square XV suggests the latter.

In squares VII, VIII, IX and XII, occupation remains from the 9th and early 8th century BC were excavated. The main feature of this phase, discovered in square VII, is a rectangular building constructed with sun-dried mudbricks. It was oriented slightly offset from the east-west axis with a large entrance towards the north (see **Fig. 4**). The western part of the room, presumably half of the building, remains unexcavated. Due to the thickness of the walls (1.12m), the character of this structure is more massive than the later sanctuary with 0.63m thick walls. The team recovered the remains of an outsized ceramic vessel on its floor (**Fig. 9**). Unfortunately, most of the sherds were

8. Yousef al-Zu'bi making photographs of a floor context.



7. The remains of a snake below the western podium.

9. Fragments of a large krater on the floor.

removed by yet another Persian-Hellenistic period circular pit. The sherd fragments belong to a large krater with an out-curving rim, a ridge with fingerprints on the neck, and a spherical body. The red painted decoration on this vessel is organized in at least two superimposed registers (**Fig. 10**). The lower register repeats a series of irregular stepped triangles, whereas the upper one shows animal and plant motifs resembling the well-known tree of life, often interpreted as symbolizing fertility (*cf.* Giovino 2007). A good parallel of this depiction was found on a large pithos from Kuntillet ʻAjrud, in the Sinai peninsula, where it was considered to have been used in cultic activities (Dever 1984: fig. 7). Considering that both this building and the krater were found directly underneath the later sanctuary is a reasonable argument to assume continuous cultic activities at Tall Dāmiyah during the Iron Age. However, to date no other objects related to cultic practice were found in the occupation layers of this phase.

In squares VIII, IX, and XII the team reached courtyard layers below the aforementioned massive building, in which some bread ovens were found. Hardly any construction material was encountered in these layers, leading us to assume that if there were buildings in use during this phase, they would have been located elsewhere on the summit.

Discussion and Future Challenges

Tall Dāmiyah is considered to be an important waypoint with a sanctuary during much of the Iron Age. This small site, consisting of the sanctuary on the summit flanked by only a few other buildings, attracted people from all over the Southern Levant and beyond. Among the finds that attest to these far-reaching contacts are Cypro-Phoenician pottery and Assyrian Palace Ware, but also Mesopotamian seals and Egyptian scarabs.

Furthermore, Tall Dāmiyah consists of multiple occupation phases that follow each other relatively quickly, without long abatements. Fires, earthquakes, and short periods of erosion can be identified, but these did not seem to stop people from using the site as a place for cultic practice. In contrast to sites with a long, but interspersed occupation histories, Tall Dāmiyah is excellent for identifying small- and large-scale changes, especially in material culture. With detailed stratigraphic analyses and techniques such as XRF analysis, the team hopes to identify these changes and similarities in occupation, material culture, and long-distance trade during the Iron Age. The *Recycling the Valley* project intends to utilize the unique archaeological context of Tall Dāmiyah to refine the occupation history and material culture chronology of the Jordan Valley and beyond during especially the Iron Age.

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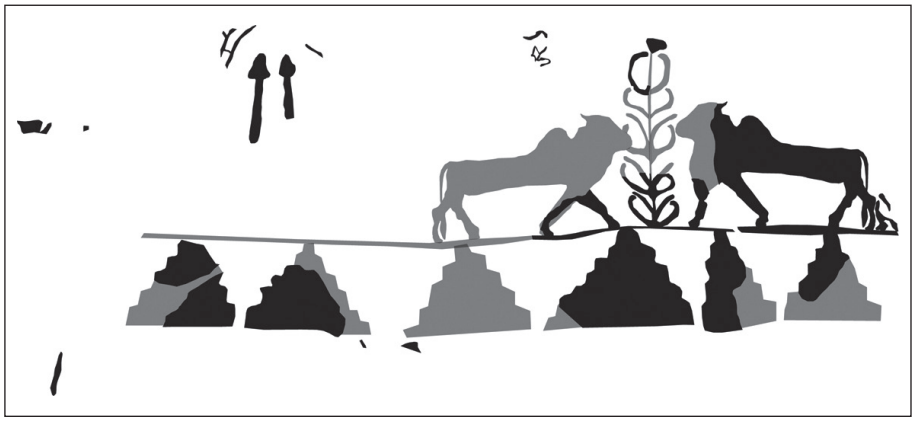

10. A sketch of the drawing on the krater (dark grey is present, light grey is reconstruction)

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THE BONES FROM TWO CAVE TOMBS IN ‘ABDŪN, ‘AMMĀN AND THE AL YĀSAMĪN HYPOGEUM

A.J. Nabulsi and Ahmad Al-Shami

Introduction

A rescue excavation was carried out in late July 2013 by the Amman office of the Department of Antiquities (DoA) in a Roman cave tomb. It was discovered on a hillside during clearance works for a private construction in ‘Abdūn Ash SHamālī area, SW ‘Ammān (35°89′4′′ long./31°94′3′′ lat.), along Prince Ali Street that connects ‘Abdūn Corridor with Prince Hashim Street (**Fig. 1**). The southern (entrance) front of the tomb was destroyed by the heavy machines revealing multiple burial niches (*loculi*) around a central rectangular hall, originally about 3×3m. Around the central hall, burial niches were hewn ±210cm deep in the limestone, each about 80cm wide and 100cm height with an arched ceiling *archosolium*. The maximal height of the tomb was well beyond 200cm. Each *loculus* contained multiple interments.

While processing the human bones from this tomb, now to be referred to as Abdn2013-H1, the DoA had started from August to the end of November 2015 a sequence of rescue excavations in a multitude of tombs in an adjacent private land, *ca.* 7 dunums, along the same road. Here again, the tombs were discovered by heavy construction machines cutting and levelling the limestone hillside. A total of 11 hypogea and 11 single chamber cave tombs were discovered and rescue excavated. A number of other smaller cave tombs found down the hillside were disturbed and garbage filled, hence not included in the inventory and documentation. The single chamber tombs were hewn some meters below the hypogea, down the slope. Many of these were damaged by the construction machinery. All cave tombs were affected by humidity, as indicated by the greenish coloration on their walls, caused by repetitive inundations and porous limestone. Many tombs were disturbed, either recently or in earlier times. Further archaeological details on these tombs are to be published in a separate report. All 22 tombs contained the remains of multiple burials. The retrieved material was large enough to fill a 4×5m storage room with rows of bone-filled cartons.

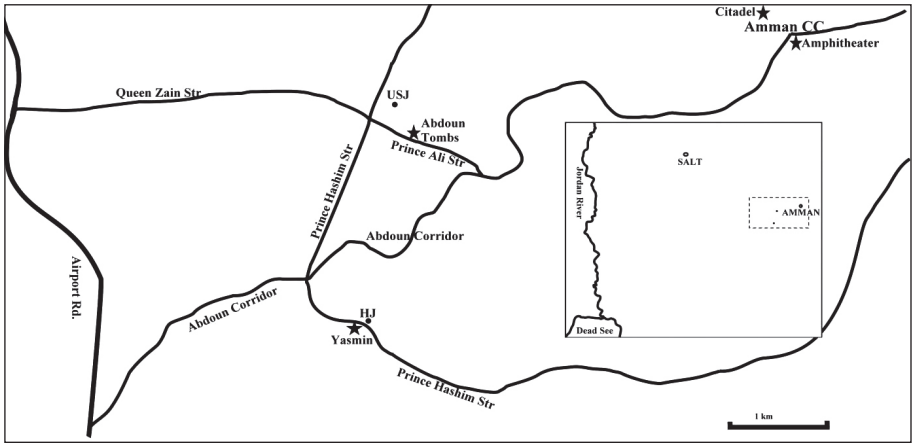
There is hardly any ADAJ volume without a report or more on rescue excavation(s) of Roman cave tombs somewhere in Jordan. These reveal a wide range of architectural variability from single chamber to very complex and sometimes elaborate hypogea with multiple burial rooms, niches, and burials (*e.g.* Vibert-Guigue and Barbet 1982; Sulaiman 1984: 18; Taani 1995). Most of these reports provided an inventory of deposited objects and rarely inform on the burials inside, if present. This report outlines the main results of the osteological analyses that were carried out on the human skeletal material from Abdn2013-H1 of the 2013 season, as a prelude to the analyses on the much larger material from the 22 tombs excavated in 2015 in the same area. Because of its significance, the subject of Roman cremation burials is considered, in the light of immediate observations on the material of the 2015 ‘Abdūn tombs, mainly of Abdn2015-H10 cave tomb. The report also includes the results of the limited osteological analyses on the scanty remains from the neighbouring Al Yāsamīn hypogeum that was also excavated by the Amman Office of the DoA in April 2013.

The Skeletal Material of Abdn2013-H1 Hypogeum

Mixed human remains were collected from each burial niche, but none from *Loculus* 7 and 12. The material was mostly fragmented, particularly of the upper body parts. Only few cranial fragments and lower jaw bones were available. Between the bones there were Roman pottery and glass, intact and damaged, as well as other objects. These included iron nails (4-6cm long) with traces of wood on their surfaces, thus similar to previous observations (*e.g.* Bisheh 1972; Sulaiman 1984: 20). This allows suggesting that the (first) deceased were carried into or laid on the floor of the *loculi* using a nail-fixed wooden structure (coffin or stretcher). Few fragments of red, black, and white painted plaster were also found, raising the possibility of at least partly plastered tomb walls, as was reported in other hypogea (*e.g.* Abbadi 1973; Vibert-Guigue and Barbet 1982; Abu Shmeis 2003: 88). The cranial material (skulls) was lost after the discovery and before excavating the cave tomb on the following day!

There were 2-4 burials in each *loculus*. This facilitated the allocation of skeletal parts to specific individuals, but not always. The 10 *loculi* of Abdn2013-H1 were thus estimated to contain at least 32 interments, including 24 adults (10 females and 10 males) and 8 children, one younger and another older than 6-10 years of age. No infant material was found. Sixteen of the adults were estimated to have an age at death above 40 years. Most of these were senile as indicated by healed sockets of earlier lost teeth on multiple mandibular bones. Further 5 adults deceased between the age of 18 to 40 years and the remaining 3 were undeterminable (sex determination and age estimation according to Sjøvold 1988 and Szilvássy 1988).

Despite fragmentations, there were some intact, hence measureable, long and compact bones. A selection of the osteometric measurements (according to Bräuer 1988), on different bones from different individuals are listed in **Table 1**. The estimated stature varied between 155-180cm for males and 150-165cm for females. The data is too small and certainly unfit for comparisons. Yet, it still reflects strong sexual dimorphism. All maximal female values were below the lowest male values, with the exception of a few measurements. These in turn reflect a tendency towards skeletal robustness in both sexes that was not often documented in the few published data from Jordan. The cranial material is scanty and the only interesting anatomic (epigenetic) variant found was a probable case of metopic suture. Though the numbers are small, the incidence of post-cranial epigenetic variants (**Fig. 2**) is best demonstrated in the light of comparative data from the Roman Masarat cave tombs in Az Zarqā' area (Nabulsi *et al.* 2021). The skeletal material from Abdn2013-H1 revealed nearly similar frequencies for the presence of transverse foramen on the cervical vertebrae (5 of 11) and septal aperture of the humerus (3 of 21). The values were lower for Stieda's process of the talus (5 of 15) and mild spina bifida of the sacrum (3 of 9). The incidence of patellar variants (10 in 22) is noticeably high. One patella revealed an unusual shape of its articulation facets (**Fig. 2c**), which could also be pathologic. Vascular grooves were observed on the lateral side of 6 tibiae of 4 different individuals. Furthermore, mild

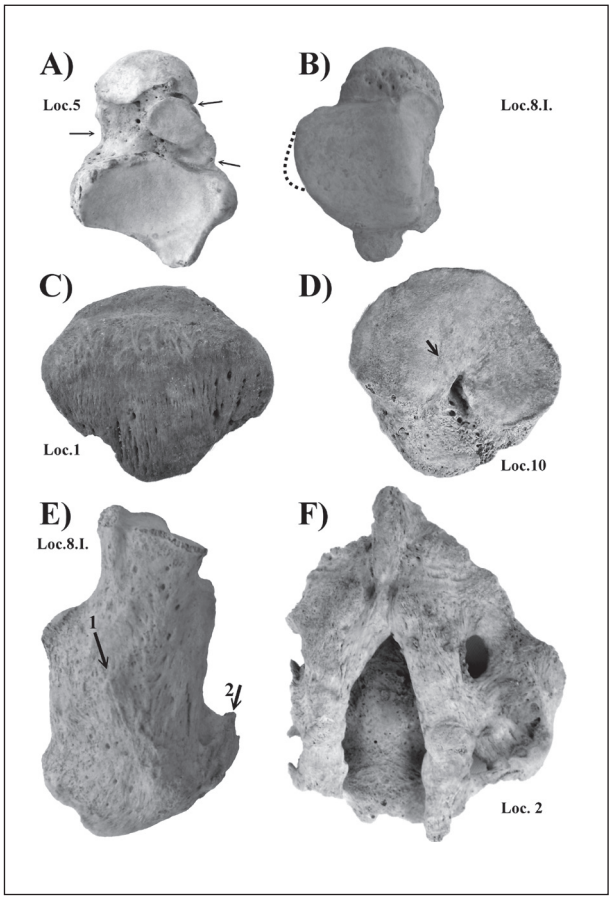


1. The locations of the excavated cave tombs presented in this report and neighbouring Hujayrah (HJ) and Umm As Summāq Al Janūbī (USJ) tombs (stars). All were excavated by teams from the DoA-Amman office (all graphics and drawings were provided by the first author).

peroneal process (**Fig. 2e**) was manifested on 7 of 14 *calcanei* of 10 individuals, bilateral in three. The observations made might further confirm higher frequencies of patellar variants, Stieda's process, peroneal process, and mild spina bifida among different local populations or communities on the Eastern Heights during the Roman era. In addition, one right talus from *Loculus* 5 revealed horizontally bi-forked *sulcus tali* on its inferior side separating both anterior median *calcaneus* articulation facets from the "reduced" head. Another left talus from *Loculus* 8 revealed reduced lateral process (**Fig. 2a, b**).

As a result of pre- and post-mortem tooth loss, only 88 molars, 36 premolars, 18 canines, and 18 incisors were available. Two erupting permanent molars of children from *Loculus* 1 and 11 revealed unusual rough, or granulated, crown surfaces that might have resulted from a pathologic condition (**Fig. 3a**). Most available teeth revealed strong wear and some had calculus. Caries were observed on 22 molars and 6 premolars. Enamel hypoplasia was documented on one incisor and a child's canine, which also had a small caries lesion on its tip. Two maxillary fragments and seven nearly intact mandibular bones revealed dental abscesses and atrophic teeth sockets (**Fig. 3b**). These were probably age related and possibly indicative of dental hygiene deficiencies.

The observed degenerative alterations (DA) were mostly medium to strong and consistent with the estimated age of above 40 years for most of the adult burials from this burial cave. Old age might also be associated with numerous vertebral degenerative changes, cases of osteochondroses dissecans (joint fragmentation and collapse, **Fig. 4d**), and entheseal changes (ossifications at muscle attachments) on bones of both extremities. These pathologic conditions were frequent on the available metatarsal and phalanges of the feet, as well as on parts of the elbow and knee joints (**Figs. 2e**, **4**). Enthesopathies developed ventrally on most available patellae and dorsally on some calcanae (Achilles tendon attachment). The strong fragmented remains of Individual III (above 55 years old male) of *Loculus* 5 included both femoral distal ends. The epiphyses revealed strong eburnation in the form of broad axial scratches on their ventral side, particularly on the better preserved left one (**Fig. 4a**). These features indicated bilateral patellar dislocation (luxation) caused by an abnormal friction of an up and down sliding patella. This pathologic

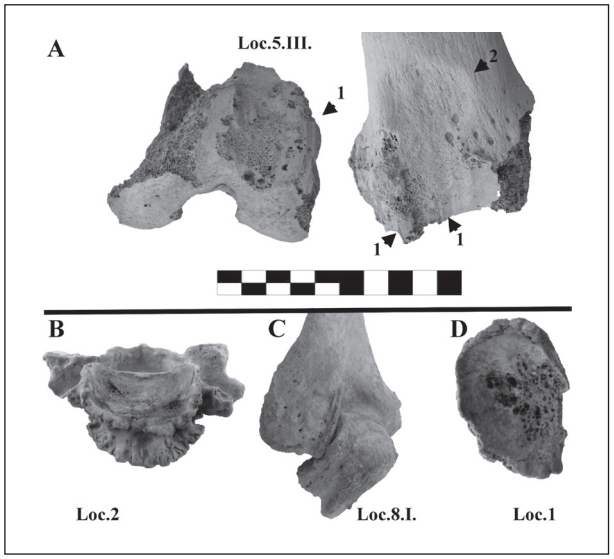


2. Examples of relevant epigenetic variants observed in the Abdn2013-H1 skeletal remains: a) Right talus with bi-forked sulcus tali; b) Left talus with reduced lateral process (dotted line); c-d) right patellar variants; e) right calcaneus with mild peroneal process (1) and enthesopathy (2) on the tuber calcanei; f) mild spina bifida on a distal sacrum fragment.

3. Selected dental pathological features observed in Abdn2013-H1 burials: a) the unusual surface of erupting child 1st molar (M1), ca. 10mm, could be a case of "Mulberry" molar (see text); b) One of six mandibular bones with mostly atrophied teeth sockets and caries on M2.

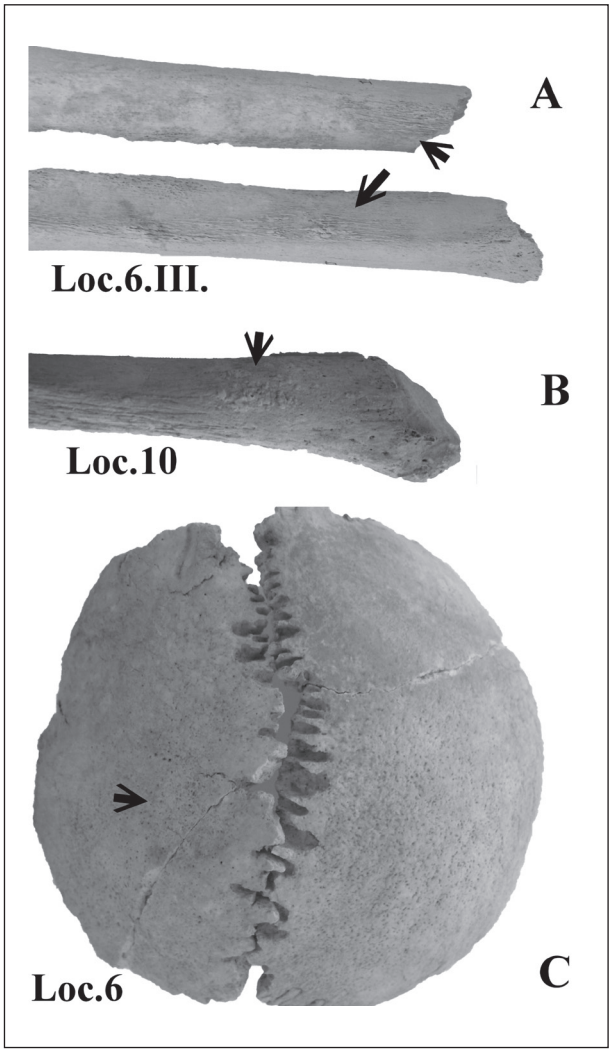
condition is usually related to physical strain on the knee joints, aggravated by a deviant patellar form (height) and/or abnormalities of the femur condyles (*e.g.* Dejour *et al.* 1994; Stefanik *et al.* 2010; Frings *et al.* 2020). The depression (about 22×25mm and 3mm deep) just above the left epiphyses, with small inflammatory lesions, probably indicate a case of "patella alta" that is associated with the dislocation (Biedert *et al.* 2017). In general, all the above detailed DA might be indicative of prolonged physical stress during lifetime in most of the adult material and could be occupation related.

Lesions related to inflammatory responses to chronic infections, (periostitis) developed on 5 tibiae, bilaterally twice, and on two fibulae from *Loculus* 5, 6 and 9. All lesions were localized distally on the shaft (**Fig. 5**) thus suggesting the possibility of a treponemeal infection. Furthermore, the two "deformed" molars from *Loculus* 1 and 11 (**Fig. 3a**) could be cases of "mulberry molars," suggestively caused by congenital syphilis (*e. g.* Grupe *et al.* 2015: 305, Abb. 8.30; Luc *et al.* 2015: fig.3). Infection might have caused the formation of lamellar bones on the surfaces of the 1-5 years old child remains.

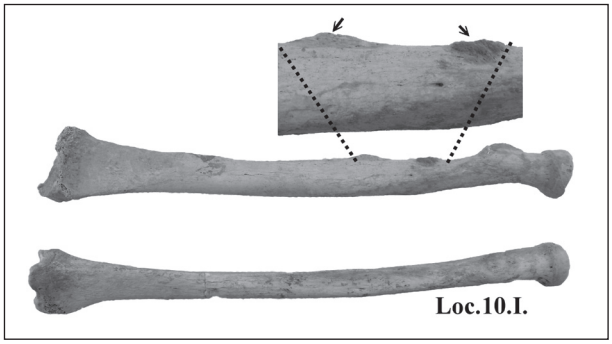


4. Some significant degenerative alterations documented from Abdn2013-H1 burials: a) patellar dislocation with strong eburnation on one femur (1). The depression just above the femoral epiphyses could indicate patella alta case with inflammatory reactions (2); b) a cervical vertebra with strong osteophytes (bone out growths); c) beginning fusion of the elbow joint as a result of degenerative alteration; d) a proximal articulation surface of a metatarsal with osteochondroses dissecans.

The strong porosity on the outer surfaces of both parietals from a burial in *Loculus* 6 might be caused by infection of the overlying skin or anaemia associated with the observed thickening of the skull bones (**Fig. 5c**). Further, but



5. Some observed inflammatory lesions (periostitis) from Abdn2013-H1 bones: a) on the distal shaft part of both tibiae and (b) a fibula; c) strong porosity on both parietal bones. The arrow indicates the location of a light traumatic injury.

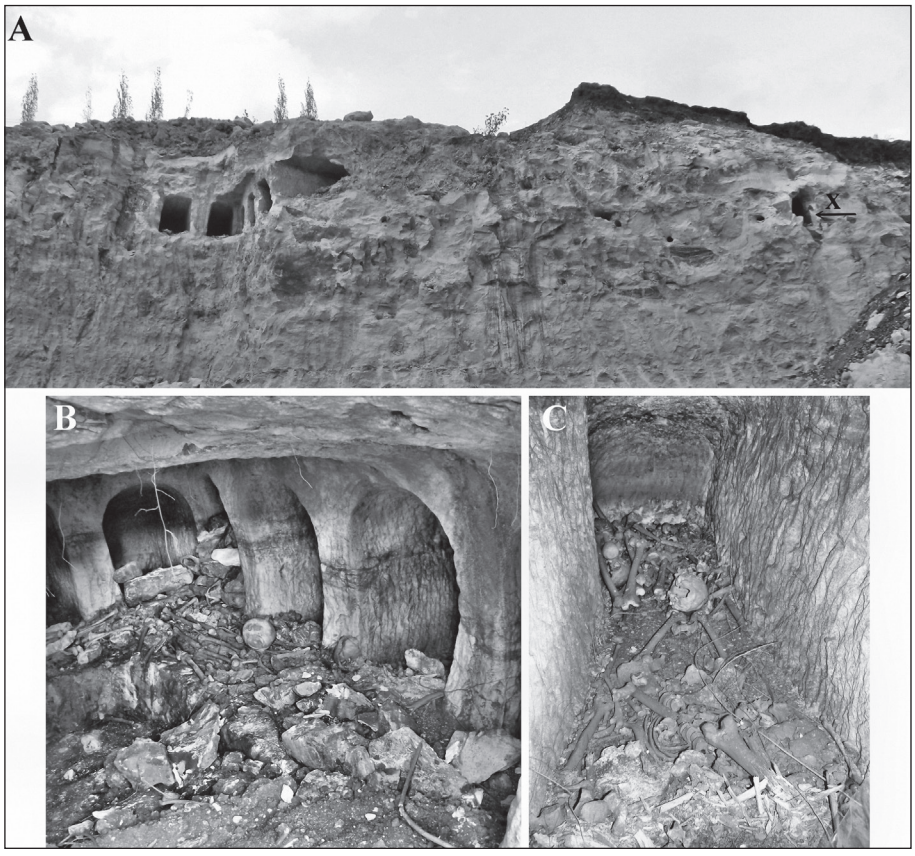


6. Benign tumours on the right radius of Individual I. from Loculus 10.

milder porosity was observed on the outer surface of the frontal and parietal fragments from different skulls. Other documented pathological features included two small traumatic injuries on the frontal bones of different male skulls and an unhealed broken 5th phalange, as well as a haematoma (swelling) on one tibia. Three benign tumours (osteochondroma) were identified, two on the shafts of a left radius from *Loculus* 10, and one on a left fibula from *Loculus* 8 (**Fig. 6**).

Hypogeum Abdn2015-H10 and Roman Cremation Burials

This hypogeum was excavated in early November 2015 (**Fig. 7a**). All indications suggested dating it to the Roman period. The nearly 65 by 95cm entrance on the southern side lead through an 85cm broad step to an almost rectangular hall, 345cm N-S and 305cm E-W, with a triclinium-like bench of 65-75cm breadth. The central hall in the middle (*ca.* 2×2m) was almost filled by pebbles and earth from the deteriorated walls or sifted through the closed entrance. The tomb's flat ceiling was estimated to be about 175cm above the bench's level. Many rough stones were scattered all over the tomb's floor. Some were still *in situ*, lined in rows at the foot of the *loculi*, apparently remnants of stone built walls closing the burial niches as observed in some other Roman cave tombs (*e.g.* Bisheh 1973: 65; Khadija 1974: 157; Haroon 2004: 37). Four arched *loculi* were hewn on each side of the U-shaped bench. Two more *loculi* flanked the entrance (**Figs. 7**, **8**). The dimensions of the *loculi* varied between 195-225cm in length, 60-70cm breadth, and 100-110cm height. Each of the 14 *loculi* contained the skeletal remains of multiple individuals, 4-7 burials each or even more. The deceased were buried in a stretched position with the heads inwards and away from the hall, but few were obviously buried in the opposite direction. Further burials were laid on the bench, sometimes on top each other and obviously after all niches were "closed" (**Fig. 7b**, **c**). The total number of interments in Abdn2015-H10 was most likely well above 100, mostly adults. Glass and pottery vessels of different size as well as other diverse objects were deposited with the buried. The tomb was not disturbed and the damage inside must have

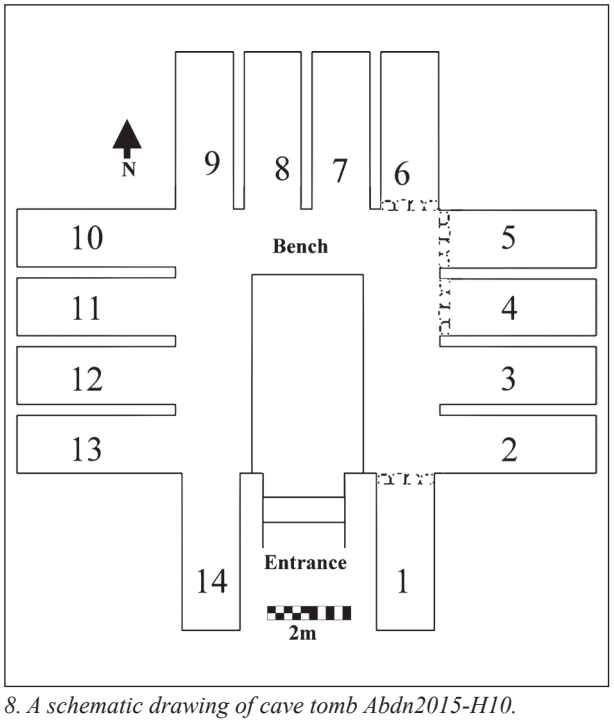


7. Abdn2015-H10 hypogeum: a) Location (X) near another one exposed by construction works on their southern (entrance) side. b) Disturbances inside and the damage caused by the collapsed walls, humidity, and root intrusions. c) The deceased were interred in a stretched position at either end of the loculus (in situ ribs).

resulted from natural causes, such as rain, earthquakes and even root-intrusions (**Fig. 7b**). Most of the damage to the burials was probably caused by fallen stones that walled the burial niches' entrances.

The tomb was clean excavated within a few days to prevent further material loss and damage, particularly by the "curious some." The human remains from each *loculus* were assembled separately, which implied prolonging the later sorting and analyses processes. The relative good condition and quantity of the skeletal remains from this and the other excavated 'Abdūn cave tombs provide an opportunity for a sizable sample. Though the majority of the obtained cranial material is fragmentary, a number of intact skulls are available.

For the meantime, a significant observation was made during the still unaccomplished process of cleaning and sorting of the human bones from the 2015 excavations. Many bone fragments revealed typical signs of exposure to high temperatures (above 700C°) in the form of coloration (from black to white), shape deformation, coiling, longitudinal, horizontal, and elliptical fissuring (**Fig. 9b**). These were obtained from *Loculus* 1 to 6 and the bench of Abdn2015-H10, as well as from at least two other hypogea. The observations present clear evidence that cremation burials were part of the burial practices of the local population in this area during the Roman era before the 3rd century AD, when the practice disappeared in Rome. Though none of the material was found urned, the diverse damaged pottery cooking pots found in the burial niches suggest that some might have served as urns (**Fig. 7a**). This is supported by the fact that many burnt bone fragments were muddy thus indicating that they were loosely collected from the floors of the burial niches. It cannot be excluded that further cremation burials could be discovered once the sorting phase for the remaining 40% of the material is completed. It might be worth mentioning that a few burnt and small bone fragments were also found among the material retrieved from Abdn2013-H1, but these are insufficient indicators of cremation.



8. A schematic drawing of cave tomb Abdn2015-H10.

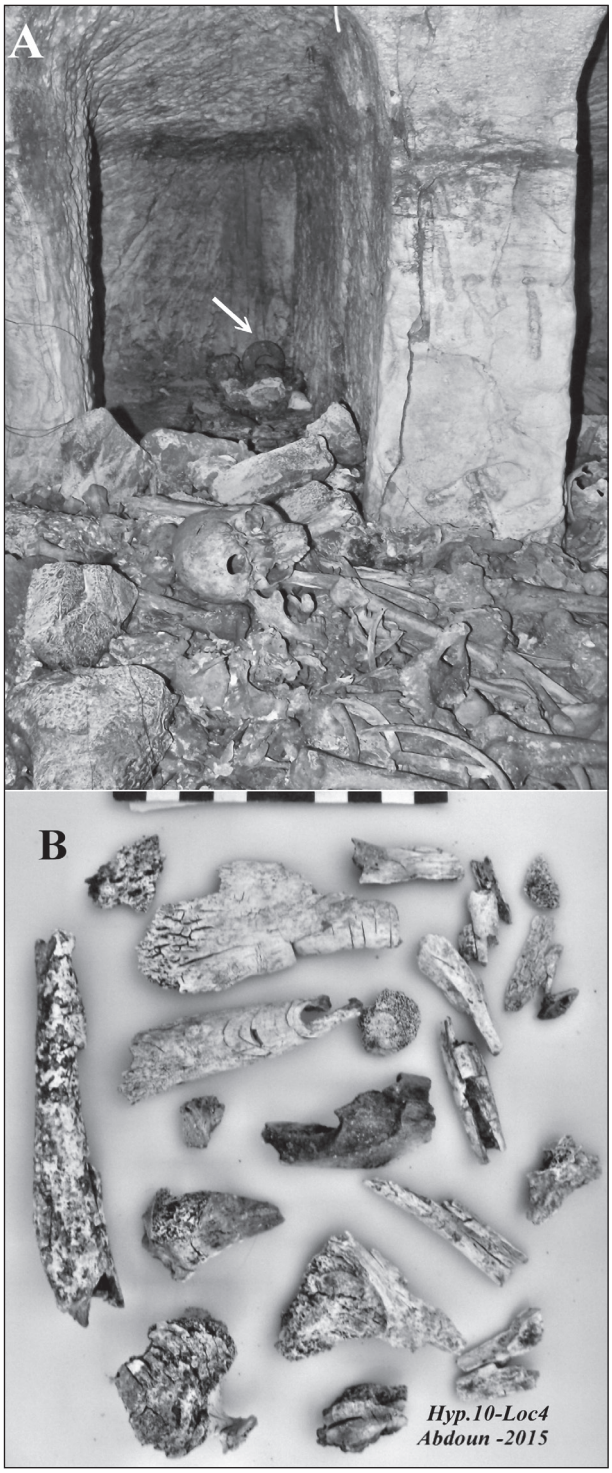
In Jordan, Roman cremation (urn) burials were reported from nearby Umm Al Hanafiyyah (Ma'ayeh 1960), Hisbān (Mitchel 1994; Waterhouse 1998), Tall Al 'Umayrī (Boling 1989), Queen Alia Airport (Ibrahim and Gordon 1987), Yasīlat Irbid (Al Muheissen and Tarrier 1996), Umm As Summāq Al Janūbī and Hūjayrah (Abu-Shmeis and Nabulsi 2009), and most recently from Al Masarrāt - Az Zarqā' (Nabulsi *et al.*, 2021). Beside further 3-4 possible cases from Hisbān (Waterhouse 1998), a clay urn displayed in Jarash Museum and a leaden urn from a Roman cave tomb in Jarash (Naghawi 1989) went unnoticed. Even if only the confirmed cases are considered and reducing the numbers of cremations from all 'Abdūn tombs to a single case, this would provide a total of 12 confirmed Roman cremation burials from eight different sites in six different regions within Jordan. Therefore, the practice of cremation during the Roman era in Jordan was relatively frequent (>1%) and not "rare" as previously argued, (*e.g.* Ibrahim and Gordon 1987; Al Muheissen and Tarrier 1996). The practice was a costly undertaking that consumed sizable resources, both natural and financial (Toynbee 1971: 48-51; Barber 1990: 380). Their numbers, distribution, and previous observations in Jordan (Abu-Shmeis and Nabulsi 2009) suggest that ustrinum cremation was practiced more among prosperous and romanized male individuals of the local agricultural communities, possibly, since the first centuries BC/AD.

Al Yāsamīn Hypogeum

Earlier, in April 2013, a Roman cave tomb was discovered while digging the foundation for a new building at the Policewomen command centre in Al Yāsamīn suburb of 'Ammān, *ca.* 2.5km further south of the excavated 'Abdūn tombs (see **Fig. 1**). The discovery was made when a bulldozer cut right in the middle of the tomb, demolishing nearly half of it and leaving 5 strongly disturbed *loculi* and two (empty/ied) burial benches. The ceiling of this tomb appeared to be vault-shaped (**Fig. 10a**). Human bones retrieved from the 5 *loculi* were in a very bad condition, not least as a result of the latest intervention. Except for no. 1, all other 4 niches contained single burials. The material was strongly fragmented and missing many parts, particularly the cranial bones and teeth, and showed strong deterioration (**Fig. 10b**). Therefore, their analyses were significantly limited. The available human bones were those of five adults, 2 males and three females, and a child. The two males were estimated to have died well beyond the age of 40 years. Both male individuals revealed strong DA on the available vertebrae and major joint parts (shoulder, elbow, hip and knee), with some strongly developed enthesopathies. Fibular fragments of one male revealed some lesions that possibly resulted from an inflammatory reaction. While the age of one adult female was not possible to estimate, fragments of another elderly woman (>40y) suggest osteoporosis. The third female died young, 25-35 years. Though scanty, all female material revealed less DA than the males. Dentition and post-cranial bones suggested a 5-7 year old, probably, girl, who died as a result of a chronic infection. The available 6 deciduous and 6 erupting permanent teeth were normal. From all available human remains of this tomb, no septal aperture on 6 humeri, no Stieda's process on 4 tali, and only a mild spina bifida on the sacrum of the senile female was observed. The few possible metric variables obtained are irrelevant.

Conclusion

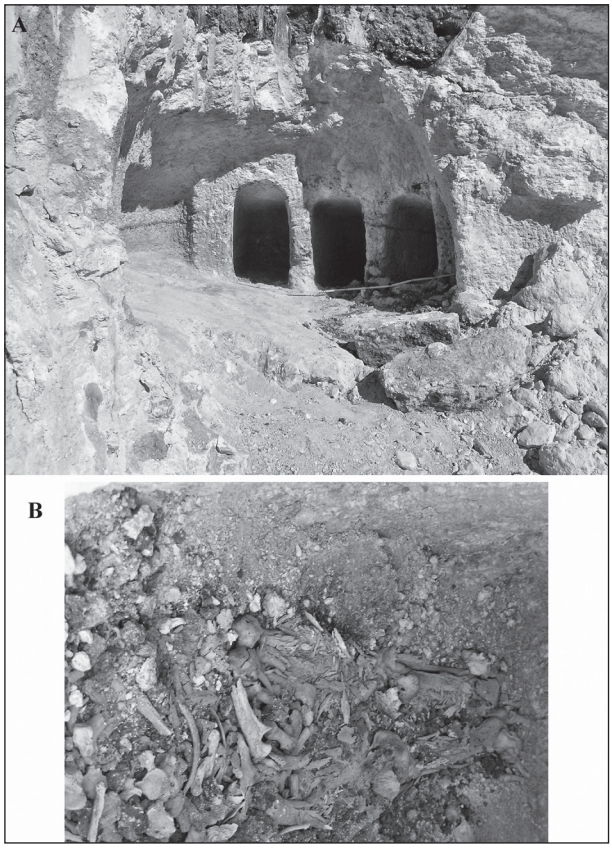
The examined human bones from Abdn2013-H1 cave tomb tend to reveal robustness and reflected a strong sexual dimorphism. They also indicate high frequencies for some epigenetic (anatomic) variants that might be of comparative value, but these are insufficient indicators of relatedness between the buried. The material also provides some interesting examples of infectious diseases as well as indicating signs



9. Evidence of cremation burials from Abdn2015-H10: a) the arrow shows the position of a displaced pottery vessel surrounded by a shallow (protective!) stone wall. b) Cremated human bones with typical heat induced deformation.

of physical stress by most adults, males in particular. Yet, the available material did not allow reflecting on its population. The size of the human skeletal remains obtained from the 2015 excavated cave tombs in ʻAbdūn might shed some light on the biological structure, *i.e.* demography, biological variability between and within the tombs, and health conditions of the population(s) they represent

The numerous number and concentration of the excavated cave tombs excavated by the DoA in 2013 and 2015 suggest the presence of a Roman cemetery or necropolis in ʻAbdūn Ash Shamālī area. Furthermore, Umm As Summāq Al Janūbī cave tomb is some 100 meters distant from this site, while Al Yāsamīn Hypogeum is on the opposite side of the street separating it from the hill that contained the Hujayrah tomb (Abu-Shmeis and Nabulsi 2009), where also numerous damaged, empty, and non-excavated Roman tombs were found. The concentrations of cave tombs suggest a concentration of a local population in this area, some 10km to the SW of ʻAmmān centre, and probably not related to the Decapolis city of Philadelphia. This area is known for centuries, or even millennia, to be agricultural before the recent urban expansion (*e.g.* Elayan 1999; Zabin and Taher 2004), as also indicated by the adjacent and earlier excavated "Byzantine" olive press (see **Fig. 1**). The impending osteological analyses of the 2015 season might infer on the biology of these people, but cannot explain who were and where did these people live. The relative high incidence of cremation burials in Abdn2015-H10 is a further evidence of its practice among the "privileged" of the local agricultural communities during the Roman era up to the late 2nd century AD.



10. The remains of Al Yāsamīn cave tomb (a). Notice the bulldozer marks at the top. The burials, mostly single, were in a very poor condition (b).

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Table 1: Selected post-cranial measurements of the left side on bones from Abdn2013-H1. n: number of bones; R: measurement on the right side bone; Ø: diameter. (Measurements and numbers are according to Bräuer 1988).

	Female			Male		
	n	min	max	n	min	max
(1) Humerus max. length	2	254	270 R	2	280	282
(5) Humerus max midshaft Ø	2	21	19 R	2	21	23
(10) Humeral head Ø	2	37	36 R	2	39	40
(1) Radius max. length	2	192	194 R	5	199 R	242
(4-1) Radius midshaft Ø	2	16	17 R	5	19 R	21
(1) Femur max. length	5	365	409	2	402	454
(6) Femoral sagittal shaft Ø	5	26	22	2	27	31
(13) Femoral upper epiphyses	5	82		2	87	85
(18) Femoral head Ø	5	39	41	2	40	43
(21) Femur bicondyler breadth	5	69	67	2	71	67
(1) Tibia max. length	3	307 R	335	3	346	394
(8) Tibia sagittal midshaft Ø	3	26 R	27	3	28	38
Calcaneus length	6	64	85	3	70	91
Calcaneus height	6	36	39	3	39	43
Talus length	4	41	50	7	52	57
Talus breadth	4	31	41	7	41	47

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RECYCLING THE VALLEY
TALL DĀMIYAH EXCAVATIONS 2019

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Abstract

The ninth excavation season at Tall Dāmiyah took place from the 29th of September until the 31st of October, 2019. It was a joint project between the Dutch National Museum of Antiquities, represented by Lucas Petit, and the Yarmouk University, represented by Zeidan Kafafi. Work was carried out in 5 squares on the summit of the *tall*. The main goal was to study the late 8th and 7th century BC levels and to relate the findings to other Iron Age sites in the vicinity. During the 2019 season adjacent rooms of the sanctuary were excavated resulting in the discovery of the main storage area of the complex. The team encountered numerous restorable vessels that were used to store mainly organic material such as barley and wheat. In the most northern squares late Iron Age layers were investigated, suggesting that after the destructive conflagration in the early 7th century BC, people remained at the site. During the 2019 season also some Persian-Hellenistic silos and Byzantine and Ottoman period graves were investigated.

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. Unknown in Near Eastern archaeology and even beyond, this form of sedentary occupation system forces scientists to widen their geographical scope in order to understand

1. Tall Dāmiyah in 2018, seen from the south (photograph by Yousef Al-Zu'bi).

2. The Zūr, close to Tall Dāmiyah.

how those people have interacted with the surrounding areas. Inhabitants of the Central Jordan Valley during Iron Age II and the Persian Period were avowedly involved in a continuing process of migration and return migration to search for the most favorite areas but with 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, archaeologist can only guess where the migrating people went to in times of difficulties.

The project Recycling the Valley intends to systematically investigate the role of the Central Jordan for the region during Iron Age II and the Persian Period. It continues at the point where other projects stopped: 1) the study in detail of the role of the site of Tall Dāmiyah in the valley that seems as one of the only site have been occupied almost without occupation breaks, 2) the investigation of settlements on the eastern plateau to see how their occupation system relates to the habitation of the Central Jordan Valley during the first millennium BC, and 3) the bounding of previous studies into one coherent picture. On one hand this project will come up with intriguing new information about first millennium BC sites, with evidence of destructive earthquakes, far distance trade and creative solutions against severe climatologic conditions, and on the other hand it will place investigated ancient settlements into the broader first millennium BC society. Recycling the Valley is a stimulating story about people with emotions, creativeness and a long term vision of how to survive in a fertile but unpredictable environment. The project will re-define terms like sedentary and migration archaeologically and as a consequence will make people aware of pre- and historical solutions to recycle lands.

Tall Dāmiyah

The archaeological site of Tall Dāmiyah is situated in the Zūr, directly south of the confluence of the Az Zarqā' and the Jordan River (Lat. 32.1040000915527, Lon. 35.5466003417969). The site is surrounded from three sides by Katar-hills (the Rās Zaqqūm, the Sha'sha'ah and the Dāmiyah Katar) and is 500m east of the Jordan River. Across this river, at the western side, situates the Jiftik and the Marj An Na'jah belonging to the Nablus district in Palestine. Tall Dāmiyah is considered the most southern settlement with Iron Age occupation in the Jordan Valley, beside *talls* situated in oases (*e.g.* Jericho, Tall Nimrīn and Tall Al Hammām). The site covers an area of approximately 3 hectares at the bottom and has relatively steep slopes all around, rising approximately 17m above the recent ground surface. It consists of two parts, the upper *tall* and a lower terrace that occupies the western and southern sides. Especially the

3. Tall Dāmiyah (MEGA number: 2750, DAAHL Site number: 353200251).

upper *tall* has a strategic position and today commands the Prince Muhammad Bridge over the Jordan River. In addition, it dominates the N-S road through the Jordan Valley and the E-W road connecting ancient Ammon with the Wādī Al Fāri'ah. The area in which the site is situated is very fertile and today well irrigated.

Tall Dāmiyah is one of the few sites with a continuing occupation during the Iron Ages (Petit *et al.* 2006; Petit 2008; Petit 2009: 103-149). This fact is remarkable when recounting the parallel discontinuity of the 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 by Dr. Lucas Petit and Dr. Omar al-Ghul (Yarmouk University) have resulted in intriguing information about late Iron Age occupation and Neo-Assyrian presence along the river Jordan (Kaptijn *et al.* 2005; Petit *et al.* 2006; Petit 2009b) and about the Byzantine Period (Petit 2015). In 2012 it was decided to start an in-depth study of the site of Tall Dāmiyah in order to understanding the role of the Middle Jordan Valley. Under the auspices of the National Museum of Antiquities in the Netherlands and a little later the Yarmouk University, an international team of archaeologists and specialists opened squares on the summit. Preliminary results of the 2012 up to the 2018 seasons are, or will be, published in the Annual of the Department of Antiquities (Petit 2015; Petit *et al.* in press; Kafafi and Petit 2018; Petit and Kafafi 2018) and are published in Near Eastern Archaeology (Petit and Kafafi 2016) and AJA online (Kafafi and Petit 2016).

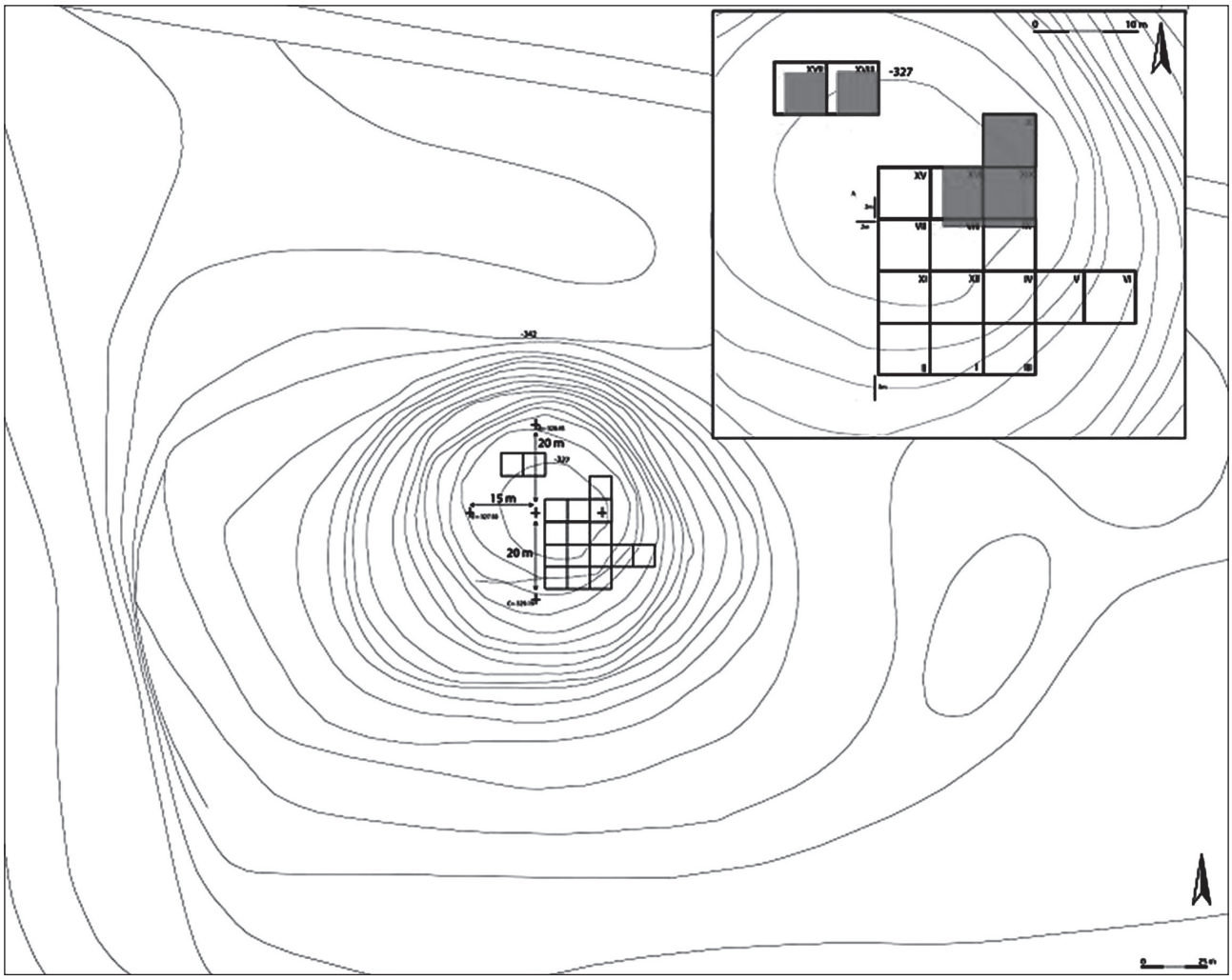
Excavation work in 2019 was resumed at the site of Tall Dāmiyah as a joint Jordanian-Dutch project under the directorship of Zeidan Kafafi of the Yarmouk University and Lucas Petit of the Dutch National Museum of Antiquities. With the cooperation of the Department of Antiquities of Jordan represented by Rami Fraihat the team worked between the 29th of September until the 31st of October 2019. The aim of this season was to get a more substantial view of late Iron Age levels, especially the occupation relating to the sanctuary found in previous seasons. In order to investigate adjacent rooms, we opened 4 new squares on the summit (X, XVII, XVIII and XIX) and continued in one older square (XVI). Tall Dāmiyah is one of the few sites in the Southern Levant with Neo-Assyrian objects, including cuneiform writings. Furthermore, the spectacular discovery of a Byzantine cemetery on top of Tall Dāmiyah is valuable to understand the late-Antiquity in the Jordan Valley. Erosion processes on the southern summit created by a bulldozer's cut make archaeological research urgent and one looting pit was identified on the southwestern slope (see Site Evaluation and Challenges).

Team of 2019

Zeidan Kafafi (co-director), Lucas Petit (co-director), Rami Fraihat (DoA representative), Yousef al-Zu'bi (photographer), Muwaffaq Bataineh (area supervisor, surveyor and draughtsman), Jeroen Rensen (square supervisor), Luc Amkreutz (square supervisor), Diederik Halbertsma (square supervisor), Sanaa Azaizeh (square supervisor), Laith Alshboul (square supervisor), Raghad Khalayleh (square supervisor), Amarah Abu Zaitoun (square supervisor), Erwin Kanters (3D specialist), Martijn Kanters (3D specialist), Anna Hofmann (archaezoologist), and Mariette Grimbergen (housekeeper).

Previous Studies and Reports

Victor Guérin was the first who recognized the importance of Tall Dāmiyah (Guérin 1869: 238-240), although others like 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: 325-326; Lynch 1855: 249-250; Van de Velde 1854: 321). John William McGarvey, who visited the site in 1879, mentioned the ruins of a building on its top and near the eastern end (1881: 350). He also was one of the first scholars who equate Tall Dāmiyah with Adam(ah), a city mentioned several times in the Old Testament (*e.g.* Joshua 3:16, Kings I 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 main periods: LB II, Iron I, Iron II, Persian, Early Roman, Byzantine and Islamic.



4. Site plan with location of squares in red (based on drawing by M. Bataineh).

Archaeological excavations were undertaken by Petit in 2004 and 2005 (Kaptijn *et al.* 2005; Petit *et al.* 2006; Petit 2009b). During these first two season the main objectives was to rescue and document the uncovered archaeological remains in the bulldozer cut (Squares I-III). Archaeological research was continued from 2012 onwards.

Methodology

Fieldwork

The excavation methods equal the methods executed and worked out by the joint Dayr ʻAllā project. Small excavation units (max. 5×5m) with baulks in between will guarantee a good stratigraphic overview of the site. Information will be saved by top plan- and section-drawings as well as digital photographs. Most drawings were made with a scale of 1:20, except for the human remains, which were drawn at 1:10. In 2012 and 2013 it was agreed upon to rebury all human remains at Tall Dāmiyah (Byzantine and Ottoman Period cemetery) after a short study at the excavation house. All special finds were measured in (x, y and z). Archaeobotanic, Archaeozoological and soil samples were taken from "clean" contexts. A database, exclusively designed for the Tall Dāmiyah excavation, was facilitating all team members in the excavation house. Data, including photographs and drawings, of past-excavations are stored and available in the excavation house.

Material Culture

Portable finds were taken to the excavation house, washed (if the condition allowed it), drawn and photographed. They were numbered, packed and stored in boxes. Broken pottery was mended if possible.

5. One of the oldest Photograph of Tall Dāmiyah (©American Colony, ca. 1920-1933).

Results (Stratigraphy and Finds)

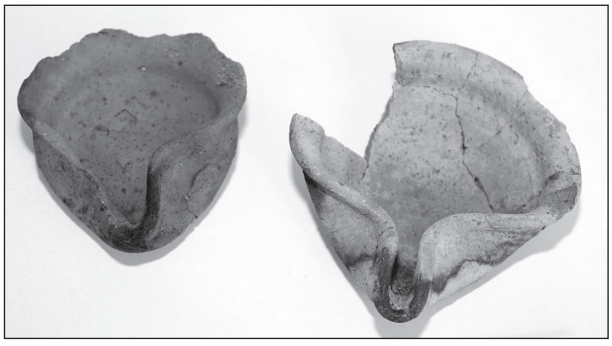
Excavations

Excavation operations in 2019 were carried out in area A on the summit of the *tall* in five squares, the aim of which was to gather more information of the Late Iron Age (8th-6th centuries BC), the Persian/Hellenistic Period (5th-3rd centuries BC) and the two graveyards dated to the Byzantine and Ottoman periods. The results will be compared with material culture from other contemporaneous sites located in the Jordan Valley.

Preliminary Results

The latest dated remains in area A discovered during previous seasons were numerous graves from the Ottoman and Byzantine periods. In 2019 a number of new graves were excavated, especially due to the opening of two new squares in the north (XVII and XVIII), and square XVI also revealed several new graves. Those graves as well as several large Persian and Hellenistic storage pits filled with animal fodder, did cut the uppermost Iron Age layers. During the previous seasons, the remains of a large rectangular public building from those late Iron Age layers, measuring approximately 14×5m, were revealed. It was burnt down completely, probably at the beginning of the 7th century BC. The interior walls were plastered with a lime-plaster, as was a platform constructed against the most western wall. Several pottery stands and figurines, both of horses and females, were discovered in and outside this room and cultic activities can be assumed. Especially the excellent condition of those figurines and the remains of two anthropomorphic statues are unique objects

6. Excavation work in 2019 (photo Yousef al-Zu'bi).

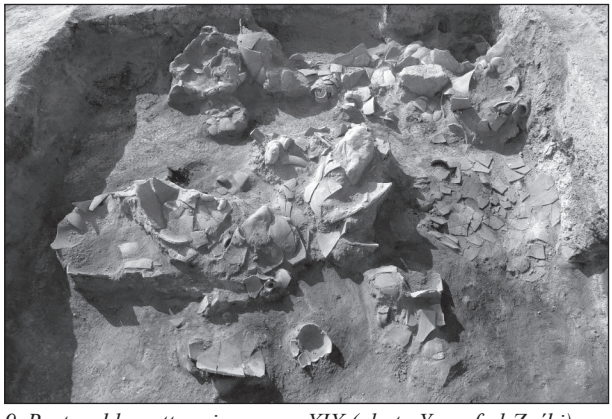


7. Two lamps (photo Yousef al-Zu'bi).

that have only a few parallels. Moreover, a clay bulla with cuneiform signs (found in 2004), Assyrian Palace Ware, and a few Egyptian objects and Cypro-Phoenician and Ammonite pottery sherds indicate relationships with the Jordanian Highland, Lebanon, Mesopotamia and Egypt. After revealing evidence that this building was part of a larger complex, the main goal of the 2019 season was to uncover adjacent rooms north of the cultic room.

In Square XVI we continued the work In a small trench where in 2018 we reached the floor of a room of which the dimensions and function remained obscure. In 2019 we reached the floor in the rest of the square. It turned out to be a large room, around 6×5.5m large with a walking surface sloping towards the south. On top of the floor that was unfortunately severely damaged by Persian-Hellenistic pits and graves, we uncovered some restorable vessels. A funnel, a few bowls, a lamp, a holemouth jar and a bottle, the last completely filled with burned wheat, were encountered along the walls of the room.

8. Figurine found in square XVI (photo Yousef al-Zu'bi).



9. Restorable pottery in square XIX (photo Yousef al-Zu'bi).

The center of the room seems to have been empty of finds. At least one mudbrick feature in the center appears to be a column-base for roof support. Burned roof debris was found on the floor, assuming this room to be roofed. Against the southern wall some plastered clay installations were discovered. It might have been used as storage facilities, although no evidence was found to state that function. All the material culture can be safely dated to the late 8th or early 7th century BC. A special find was a fragment of a female figurine (**Fig. 8**), that was found in between some pottery sherds, stones and two pendants.

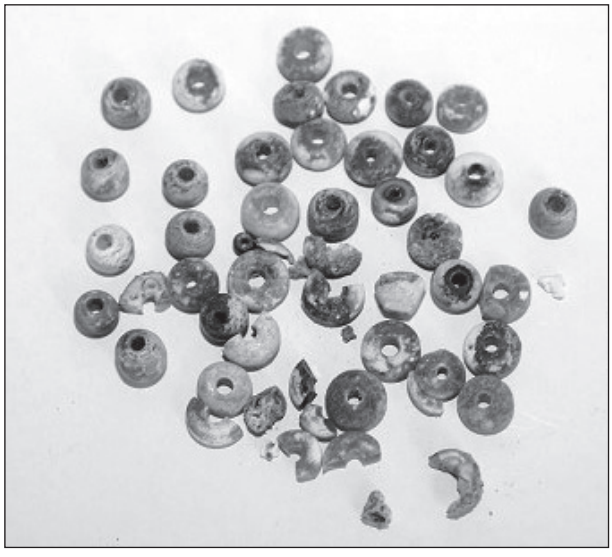
In Squares XIX and X two rooms were uncovered that had a direct connection to the room found in square XVI. These two rooms were very similar in size (2.60×2.60m) and their mudbrick walls were clay-plastered. A few graves had cut through the Iron Age II mudbrick tumble, but most of the content of these rooms were undisturbed. Most remarkable was the discovery of a large quantity of restorable storage jars and pots, most of them filled with burnt organic material, preliminary identified as barley and wheat. Also two cooking pots, a funnel and bowls were found in this room. Two jars were found inside the wall and roof debris, suggesting that these were originally standing on the roof. The two rooms that can be stratigraphically associated with the cultic building encountered in previous seasons, were used as storage rooms. In square X, that was excavated only a short period, the corner of the complex was found. It seems that the storage rooms and the large room in square XVI were the most northern units of the complex, at least in this part of the summit.

On the northern summit we opened two new squares, named XVII and XVIII. Last year after heavy rain, we identified a few burned mudbrick walls on the surface. The two new squares were started to understand and investigate these remains, especially in order to see the maximum size of the complex with the sanctuary. Since the identified walls were already on the northern slope and we did not want to break the surface cover of the *tall* (avoiding extra erosion in the future) we opened the square on the inside of the walls. During the first three weeks, we had to deal with the Ottoman and Byzan-

tine graveyard that covered most of the summit. Those graves were almost all oriented east-west with the head facing south. There are a few exceptions. Beads, bracelets and rings were uncovered in the graves. The last two weeks we reached Iron Age layers, however,due to the disturbances of the graves it was hard to present a coherent picture. It seems, stated by material culture, the orientation of the walls and the absence of red burned mudbrick debris, those layers belong to the late 7th and 6th century BC. The pottery is all late Iron Age, but without the Assyrian Palace ware or red slip. Preliminary, we suggest that the intended goal of the season, the late 8th and early 7th century BC layers, were not reached in these squares.

Discussion

The excavation results of 2019 at Tall Dāmiyah have resulted in a better picture of the occupation during the late 8th and 7th century BC. Although heavily disturbed by Persian and Hellenistic pits as well as later burials, it became clear that the sanctuary was part of a large complex, including well equipped storage facilities. There is a clear relation with the Neo-Assyrian empire as well with Ammon. But what the exact role of Tall Dāmiyah in this period is needs further research. Very preliminary, the authors suggest that this building was a kind of caravanserai with a central and important sanctuary. Travelers and traders could stay at Tall Dāmiyah and use the sanctuary for offerings. Finds, such as figurines, statues and altars in this and previous seasons, suggest that the site had played an important cultic role for locals as well as foreigners. But in contemporary layers, cooking pots, loom weights, weaving utensils and grinding stones were found, implying that Tall Dāmiyah was around 700 BC much more than just a sanctuary or a trading post. Some people were living on the site, hunting, farming, producing textiles and possible trading.



10. Beads from the graveyard (photo Yousef al-Zu´bi).

Site Evaluation

General Condition

The condition of Tall Dāmiyah is relatively good, especially if compared to the other settlement mounds in the Jordan Valley. This is mainly ascribed to its position within military area, prohibiting people from entering without a permit. The main destruction to the site was carried out by the military itself. Beside some trenches made during the war in 1967, a bulldozer had cut a deep trench in the southern summit in 2003. This trench, almost three meters wide caused massive erosion on its site, especially before we could partly stabilise the profiles. The trench was cut from the bottom of the *tall* to the top. A military watchtower on the summit of the site was taken away in 2008 or 2009. Some concrete blocks are still remaining. In 2019, a small looting hole was identified on the southwestern slope and later filled.

Conservation Works and Maintenance

After the 2004 and 2005 excavation season we stabilized the section of the bulldozer and our excavation trenches with plastic, stones and sediments. 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 the years after. In 2019 we filled the squares to protect the sections and archaeological features.

Challenges

Ownership

The site is owned by three brothers of the Ramadneh family of the Abbad Tribe. Contact with the owners is excellent and they are very interested in the work. They visit the excavation regularly. An undated written permit, signed by the owners, is in the possession of the Department of Antiquities.

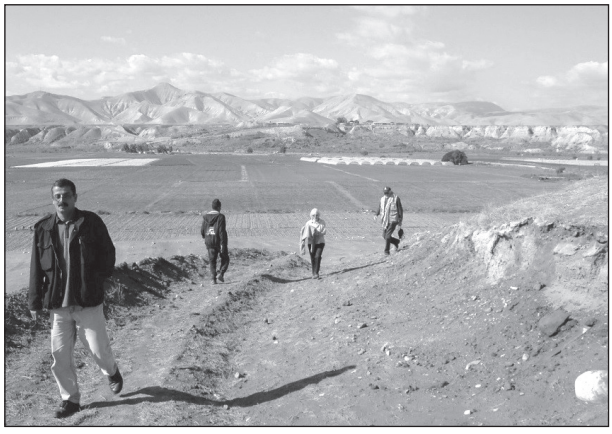
Looting and Destruction

There is virtually no looting at the site, although a small looting hole was identified in 2019. Fields are ploughed around the site. Especially the slightly elevated area southwest of the site might contain archaeological remains and might thus be damaged by agricultural activities. A military bulldozer has created a trench in the southern summit.

Recommendations and Conclusions

At present the excavators cannot come to final conclusions about the function of the site. Nevertheless, the results of the present archaeological excavations indicate that the site played a major role in the area especially during the Iron Age periods. Several objects proved both close and distant relationships with surrounding regions. In many ways, the site of Tall Dāmiyah is different from the other *talls* in the area. Its position along the Jordan River close to one of the few fords, makes it a very likely place for travellers in the past to visit and camp. The excavators are intending to publish the results in a monograph in the years to come. In this publication all data will be finalized from the earliest excavated levels up to the recent use of the site and its environment.

11. Erwin and Martijn Kanters scanning the pottery on the floor in one of the storage rooms (photo Yousef al-Zu'bi).



12. Bulldozer trench in 2004.

Acknowledgements

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PRELIMINARY REPORT OF THE EIGHTH SPANISH-ITALIAN ARCHAEOLOGICAL EXPEDITION TO JABAL AL MUṬAWWAQ, MIDDLE WĀDĪ AZ ZARQĀ', SEPTEMBER 2019

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Introduction

Jabal Al Muṭawwaq is an Early Bronze Age I site located along the Middle Wādī Az Zarqā', 7 km south-east of Jarash, characterized by a walled village of 18 ha and a large megalithic necropolis extended over the entire mountain with hundreds of dolmens still preserved[1]. Since 2012 it is the subject of a joint Spanish-Italian expedition directed by Juan Ramón Muñiz Álvarez (Pontificia Facultad San Esteban, Salamanca) and Andrea Polcaro (Università degli Studi di Perugia)[2]. In prior seasons of excavation several areas of investigation have been opened: Area A (Polcaro *et al.* 2016; Muniz *et al.* 2017), in the south eastern corner of the EB I village close to the settlement wall, Area B (Alvarez *et al.* 2013; Polcaro *et al.* 2014; Muniz *et al.* 2016), in the eastern cluster of the megalithic necropolis on the southern slope of the mountain, Area C (Muniz and Polcaro 2017; Polcaro and Muniz 2018; Polcaro and Muniz *in press* a), in the eastern margin of the Central Sector around the structure called the "Great Enclosure," Area D (Casado *et al.* 2019, figs. 9-10), in the northern part of the Central Sector of the village, and Area E in the north-eastern corner of the village.

In September 2019, archaeological excavations were conducted in three areas of the site: Area C East and Area D, already investigated in the past seasons, and Area EE, a new area opened along the southern slope of the mountain, close to the stone settlement wall and the southern door of the EB I settlement, opened centered on Dolmen 11, clearly visible from the surface and partially looted with the removal of half of its huge capstone (**Fig. 1**). Moreover, a comprehensive study of the pottery and the flints discovered during the excavations has been completed.

Area EE

The discovery of Cave C. 1012, close to Dolmen 535, at the end of the 2018 season of excavations[3], left open interesting questions about the relationship between dolmens and underground caves, at least along the southern slope of the mountain, where the large megalithic structures, built close to the external facade of the settlement wall, seem to directly face the rock cliff. There are in fact several dolmens built in this topographical location, no more than two or three meters from the southern cliff.

In order to understand better the connection between this group of dolmens and in order to have more data about their chronology, a

1. The site was first investigated by a Spanish expedition leaded by Juan Antonio Fernandez-Tresguerres Velasco since 1990 till 2011 (Muniz *et al.* 2013; Fernandez-Tresguerres 2005). One of the most important discoveries of the past Spanish expedition was the "Temple of the Serpents"; a sacred area located in the Central Sector of the EB I settlement (Fernandez-Tresguerres 2008).

2. Università degli Studi di Perugia, Pontificia Facultad de San Esteban de Salamanca and Università di Roma "Sapienza".

3. The shaft leading in Cave C. 1012, artificially excavated in the limestone bedrock of the mountain, was discovered just in front of the entrance of Dolmen 535, the findings inside the hypogeum proved the contemporary use of the dolmens and of the cave, used for secondary burials. Just miniaturist vessels were discovered as funerary gifts inside the bone piles in the chamber of the cave (see Polcaro and Muniz in press b).

new area was opened around Dolmen 11, as usual with a large open area trench (Trench 1), including also other features visible on the surface, such as a standing stone (S. 1200, in a shape of a single megalith of 1.62m height; 1m large and 0.80m wide at the base), very well preserved, that appeared from the beginning connected to the megalithic structure (**Fig. 2**).

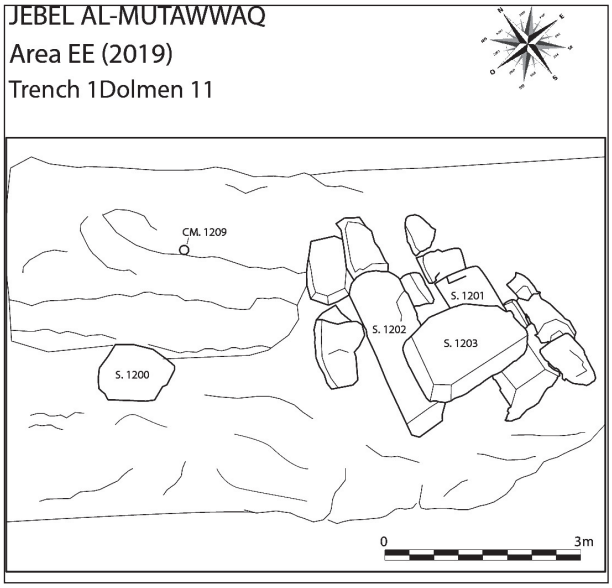
Despite of the fact that the dolmen appears looted from its front entrance, it seemed well preserved in its other parts, particularly on the back, with the back slab still in place (S. 1204). The area is located close to the southern gate of the settlement (around 29m), and from a large water cistern, already noticed by Hanbury-Tenison in his first survey of the site (Hanbury-Tenison 1989: 138, 149, fig. 4).

During the season, another trench was opened south of the first one (Trench 2). The purpose of this second operation was the investigation of an underground chamber, noticed in connection with Dolmen 11, and clearly artificially excavated in the soft limestone rock of the lower slope of the mountain, Cave C. 1210 (**Fig. 3**). After this season of excavation, it seems clear that the limestone rock of Jabal Al Muṭawwaq has a geological conformation characterized by the presence of alternating hard and soft *strata*, allowing some parts to be very easily excavated by hand. During the main phase of use of the settlement (Early Bronze Age IA) this has encouraged the excavation of underground chambers, which were apparently used both as storage and production spaces, and perhaps in a later phase of the settlement life, as burial hypogeum and ossuaries connected to the dolmens.

Stratigraphy of Trench 1

Trench 1 (6.5×14m), had in its Western part a stratigraphy composed by several accumulation layers (SU 500, 516, 518), covering directly the bedrock that was clearly leveled and used as a floor during the main phase of use of the standing stone and the dolmen. The bedrock was clearly cut in three steps, the upper one shaped with a rock cut bench (L. 1211), with a cup mark excavated in the bedrock in the middle of it, just in front of the standing stone. The cup mark (CM. 1209) had an irregular shape, with its northern side more polished and sloped, compared to the southern part of it, cut vertically and without traces of use; this shape, together with the findings, suggests perhaps it's function as a mortar (**Fig. 4**). The standing

1. General view of Area EE and Area C from the Southern door of Jabal Al Muṭawwaq, looking South.



2. General view of Area EE with Dolmen 11 and the Standing Stone S. 1200.

3. 3D reconstruction of Area EE, Trench 2, with the entrance of Cave C. 1210, looking North.

stone (S. 1200) lies on the lower third step of the bedrock, partially leveled with a layer of small stones and compact earth before its rising (SU 522).

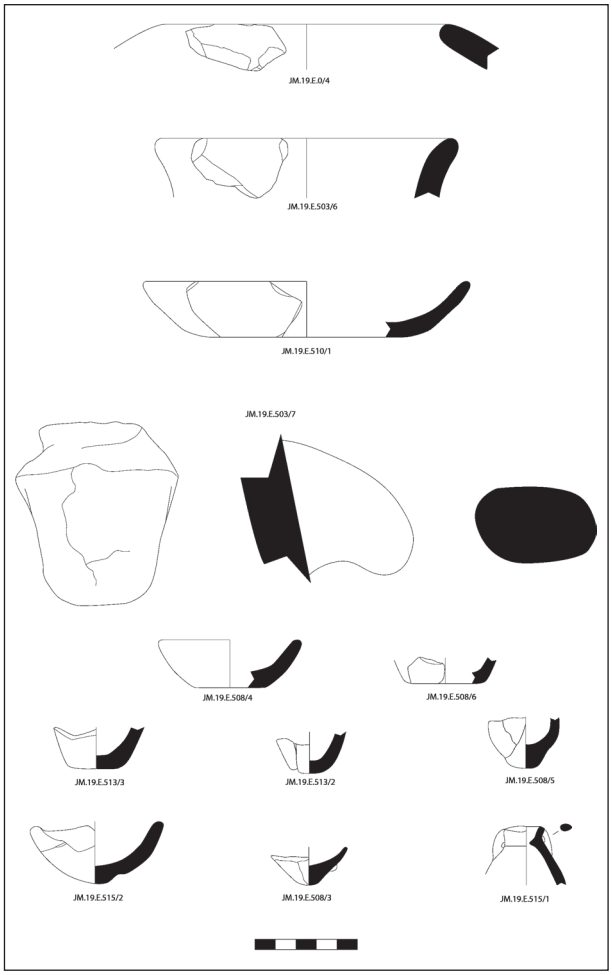
In the Eastern part of the trench, the dismantling of the frontal sealing of the dolmen with half of its huge capstone overturn by modern robbers (SU 504) has been recognized. Under this layer, another one (SU 512), relative to the collapse of the platform wall surrounding the dolmen, covered a beaten-earth floor (L. 1208) with a preparation layer of small stones and pebbles. More than a second phase of use, this floor seems related to the original ground level in front of the dolmen. In fact, part of its preparation layer (SU 515) was found under the megalithic side slabs of its chamber. On the Western side of the dolmen platform a more consistent and hard preparation layer (SU 520), composed by clay and limestone fragments, has also been identified.

Findings and Chronology of Trench 1

The pottery sherds recovered in the layers lying directly on the beaten-earth floor and on the bedrock, both in front of the dolmen as well as in front of the standing stone are comparable with the Early Bronze IA pottery usually found in the main phase of the Jabal Al Muṭawwaq settlement. In particular, the diagnostic sherds identified include plain ledge handles and impressed rope decorations, both present mainly on large storage jars (**Fig. 5**). Very interesting is the discovery of four almost entire miniature bowls and a miniature jar with loop handles in SU 515 comparable with the miniature pottery already discovered in 2018 season inside the Cave C.1012 in front of Dolmen 535 (**Fig. 5**)[4].

Other findings in the Western part of Trench 1, connected clearly with the bench, the cup mark and the standing stone are at least five grinding stones with several hand stones and pestles, discovered lying directly on the bedrock (**Fig. 6**). Moreover, a well preserved Cananean blade was recovered above the rock cut bench (**Fig. 7**). This could suggest, as do the cup mark shaped as a mortar, the use of the rock cut bench and the bedrock in front of the standing stone and beside Dolmen 11 as a productive area, perhaps for meals linked to funerals or funerary

4. Bench L. 1211 and cup mark CM. 1209 in Area EE.



5. Pottery discovered in Trench 1 of Area EE, Early Bronze Age I.

4. Nos. JM.19.E.508, JM.19.E.513, JM.E.19.515. The miniature bowls and anphoriskoi discovered in Cave 1012 in 2018 and in Trench 2 of Area EE this season are comparable with miniature vessels usually discovered in tombs of the end of the EB I (Early Bronze Age IB) or early EB II (see examples from Arad: Amiran 1978, pl. 10:2; from ʻAyy: Callaway 1964, pl. XVI: 673; from Jericho: Nigro 2010: pl. LXXIV: 1-5). However, the examples from Jabal Al Muṭawwaq are different in the position of the loop handles, located not on the shoulders, but on the neck of the small jars.

rites[5]. Also Very interesting is the presence of five spindle whorls of different materials and weight, some completely preserved, all recovered in connection with the rock cut bench and the bedrock in front of the standing stone (**Fig. 8**).

Stratigraphy of Trench 2

Trench 2 (7× 5m), was opened in front of Cave C. 1210. The cave appears already opened by illegal excavations and was thus visible from outside. It was clear from the beginning of the operation of this trench that Cave C. 1210 has probably more than one underground chamber.

In front of the cave four layers have been excavated. The first one (SU517) is the result of the dump made by modern robbers. The second one (SU 519) consists of an accumulation layer with some animal bones inside, that was also identified inside the cave. Under it, outside the cave, layers SU 525, close to the entrance, and SU 524, southeast of the first one, covered directly the bedrock.

It was, as usual, used as floor but apparently not leveled as much as in Trench 1, due to the geological conformation of the rock (**Fig. 9**).

Inside Cave C. 1210 the SU 523 and 526 have been excavated under SU 519. These ones were preserved layers not reached by the robbers, directly lying on the bedrock, with archaeological materials preserved inside. Here also some scattered bones have been discovered. Unfortunately the bones are too fragmentary to recognize it as human or animal, but further analysis will be conducted to understand their nature.

The excavation of cave C. 1210 was not finished and two sections were left un-excavated on the Western and Eastern sides of the frontal underground chamber. However, the bottom of the cave has been reached. The maximum height of the excavated chamber is 1.4m.

Findings and Chronology of Trench 2

Outside and inside the Cave C.1210 four large tabular scrapers have been discovered in layers SU 524 and 526 (**Fig. 10**). The typology of the scrapers is the same of the ones already recovered in several areas of the site, both in private (double apsidal dwellings) and public contexts (such as in Building 131)[6]. Also notable is the presence of several pottery sherds of large dimension recovered inside the cave. These are mostly storage jars with ledge handles and rope impressed decoration, with some kitchen ware sherds and fragmentary small bowls (**Fig. 11**). All the pottery sherds and the flints are dated to the main phase of use of the settlement, the Early Bronze Age I.

An unexpected find inside SU 526, inside Cave C. 1210, is a small clay figurine, representing an animal, with the tail and two horns broken (**Fig. 12**). Due to the large body, the shape seems to be related to a bull or sheep. However, the legs are not visible, as such as the snout, even not sketched, appearing completely flat. Due to the rare presence of animal clay figurines discovered in the Early Bronze Age I Jordan, it was not possible to find direct comparisons[7]. Also noticeable is the presence of two parallel small holes passing from the face of the animal through the back.

General Achievements

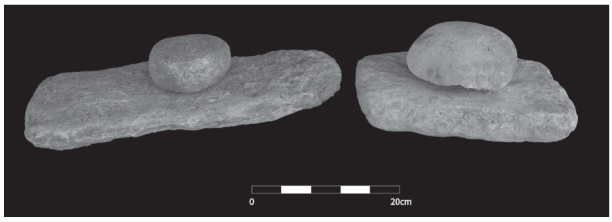
The excavations of Area EE allows for a more comprehensive understanding of the megalithic necropolis of Jabal Al Muṭawwaq and its relationship with the Early Bronze

5. Earth samples have been recovered inside the cup mark and from the sealed layers identified on the rock cut bench; they are currently under analysis in order to understand the nature of the food production in the area close to the dolmen. In any case, the presence of grinding stones of different materials, basalt and limestone, the cup mark and other rock cut installation on the bench could be related to grinding activities, both for barely or other kind of products like olives, and perhaps pressing activities for the production of oils.

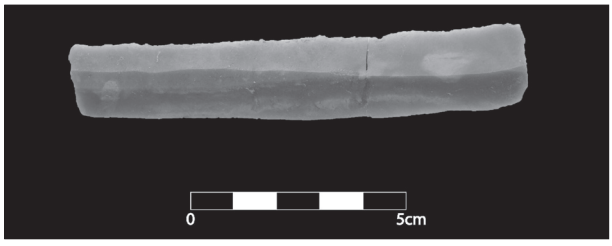
6. For the scraper found in Building 131 see: Polcaro - Muniz in press a: fig. 15a; See also the scraper recovered in Dolmen 317 of Area B: Polcaro *et al.* 2014, fig. 14; several similar scrapers were also been discovered in the Temple of the Serpents: see Fernandez-Tresguerres 2008: fig. 15.

7. Very few clay figurines are known from EB I contexts, although some examples, mostly related to human shapes, come from the Bāb Adh DHirā‘ shaft tombs (see Hauser 2013). Later figurines of the EB II-III seems more realistic in shape, especially for equids that are the prevailing type of clay figurine in that period: see the examples from Megiddo (Finkelstein, Ussishkin and Cline 2013, fig. 20.2) and Jericho (Kenyon1960, fig. 40:1).A best comparison, in particular for the flat shape of the snout, is from the Late Chalcolithic Period (see Tadmor 1990, fig. 7), when however also the more classical equids figure with clearly marked snout are attested (see Abu Hamid: Dollfus - Kafafi 1993, fig. 4); in general, it seems that in Chalcolithic period clay figurines of bulls present more flat snout compared to equids (see also Levy 2006: fig. 15.25).

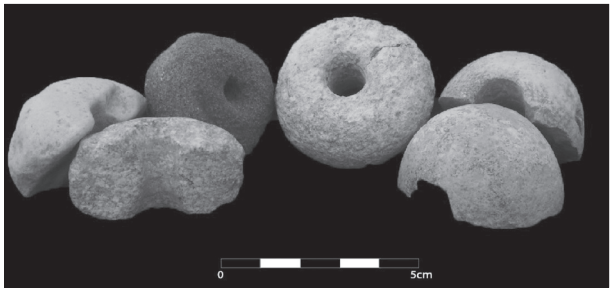
Age I settlement on the southern slope of the mountain. Dolmen 11 is very similar in architecture to Dolmen 535, already excavated in season 2018. The technique of construction foresee a huge platform built with regular large rectangular stone blocks (**Fig. 13**); the chamber of the dolmen has a floor obtained with two flat slabs lying on the preparation layer SU 515, for a total length of about 3m, a width of 0.60m and an height of 1.40m. On the lateral slabs a carved groove is evident, suggesting that the megalithic chamber was divided in two spaces with a



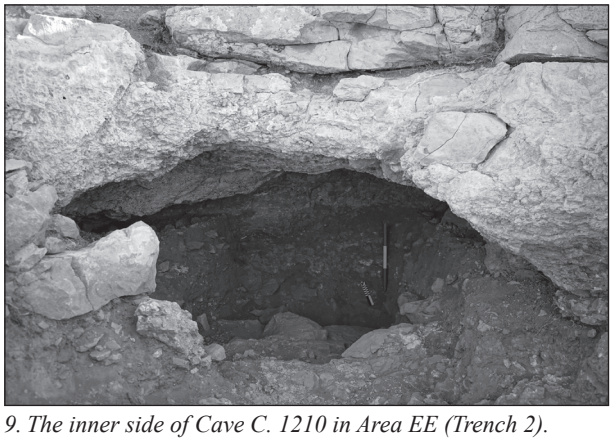
6. Grinding stones and pestles discovered in Area EE (Trench 1).



7. Flint blade discovered in Area EE (Trench 1).

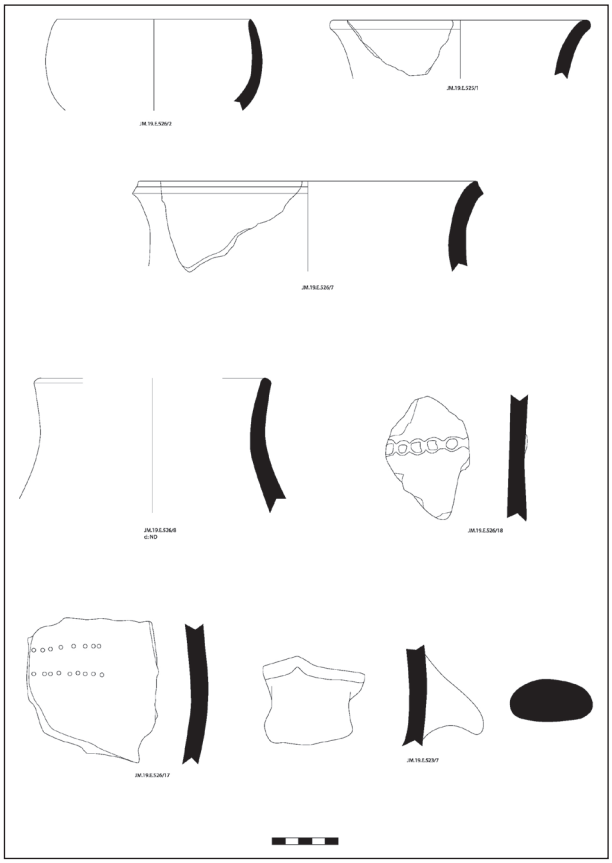


8. Spindle whorls discovered in Area EE (Trench 1).



9. The inner side of Cave C. 1210 in Area EE (Trench 2).

10. Tabular scraper discovered in Area EE (Trench 2).



11. Pottery discovered in Trench 2 of Area EE, Early Bronze Age I.

12. Small animal clay figurine discover in Cave C. 1210, Area EE.

middle floor of perishable material like wood. The dimension and the method of construction of the dolmen, together with the absence of a stepped *dromos* entrance (like in the dolmens excavated in Area B), make it comparable with Dolmen 535, excavated in seasons 2016-2018, very similar also for the topographical position and located just 100m from Dolmen 11.

Concerning Cave C.1210, it seems larger than expected, in particular compared to Cave C. 1012 excavated in the 2018 season in front of Dolmen 535, and possible other two lateral chambers will be investigated in the following season of excavation.

From this first season of excavation in Area EE, some general conclusions can be advanced: the cave C. 1210, artificially excavated during the Early Bronze Age I had a first phase of use that, looking to the findings now recovered, seems to be used as a storage and production place, located outside the settlement wall. Only the presence of the rare animal clay figurine could suggest some sort of ritual purpose of the cave during this phase. Considering the comparison with Cave C.1012, it must also be considered that the robbery of Cave 1210 in modern time could have affected the upper layers of the cave, related to a second phase of use, possible connected with funerary purpose. In fact, Cave C.1210 seems to have a direct topographical connection with Dolmen 11, located just behind it, in a similar way to Cave C. 1012, already proved to have been used in a second phase as a funerary chamber for secondary burials, directly located in front of Dolmen 535. Moreover, also Cave C. 1012 had a first phase of use with storage and production function (See Polcaro and Muniz in press b).

Area C East

Area C East is centered on a large semicircular structure of around 60m of diameter called the Great Enclosure and investigated since 2014 for four seasons of excavations[8]. During 2019 season two trenches (1 and 2) were opened in connection to two trenches excavated in 2018 season. The first one (Trench 1) was opened in relationship to the main door of the Great Enclosure (D. 1110), already partially excavated on its front side and discovered blocked with a front wall and a sealing of large megalithic stone inside. The trench was enlarged on the back of the door, inside the Enclosure, where a huge amount of stones have been noticed on the surface. In this area the excavations allowed the discovery of a huge perfectly circular stone structure, called Structure C1, of around 8m of diameter with a small oval space in the center[9], that had included and blocked the door of the enclosure in a second phase of use of the area, when its door was no longer used as passage (**Fig. 14**).

Trench 2 was opened behind the standing stone, located in the center of the enclosure and already excavated in 2018 season in a small sounding. The trench includes the inner face of W. 102, representing the main surrounding wall of the Great Enclosure (W. 102). Here a narrow rock cut space used as a storage place with jars *in situ* has been discovered, together with a small semicircular room connected to the main wall (**Fig. 15**).

Stratigraphy of Trench 1

Trench 1 (10×7m), was opened including the door D. 1110 and wall W. 102; after the removal of the top soil, several layers of stone rubble (SU 727, SU 728 and SU 729) have been excavated, and soon the Structure C1 (7.82×8.18m) started to appear.

The structure was built with circular concentric walls, at least three of them clearly identified. The space in between these walls was then filled with stones of irregular shape of large and middle dimensions. The external retaining wall of Structure C1 (W. 190) was built with more regular squared stones compared to the inner ones. During the excavation of Structure C1 it appears that the door of the Great Enclosure was included inside it and then blocked with two large megalithic stones (W. 1112) (**Fig. 16**). The circular concentric walls of Structure C1 reached in the center of an open oval space (1.5×0.9m), delimited by wall W.

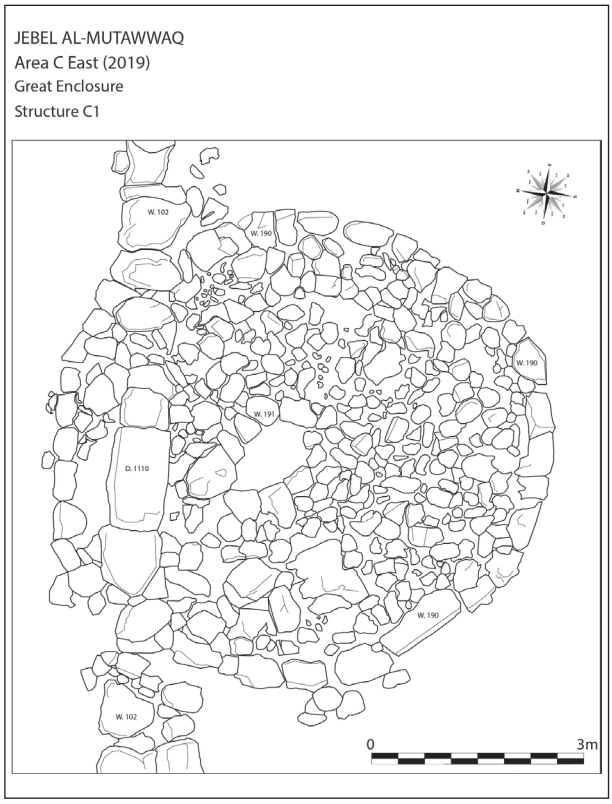
8. Excavations of the Great Enclosure have been since now concentrated on the perimetrical stone wall W. 102, on its western and northern sides (see Polcaro and Muniz 2017, fig. 7).

9. This circular structure was already visible on the surface and interpreted in the past as a later tumulus (see Fernandez-Tresguerres 2001: 177 and Polcaro and Muniz 2017: fig. 8).

191, that must be reached during its use from the top of the structure. The excavations proved also that the wall W. 1108, already recognized during the 2018 season and considered a blocking wall of door D. 1110, has to be connected with Structure C1, representing its western side wall.

The cleaning of the collapsed stone of the structure also permits the identification of the first use of the door and its clear connection with the wall W. 102, relative to the first phase of use of the Great Enclosure (**Fig. 17**).

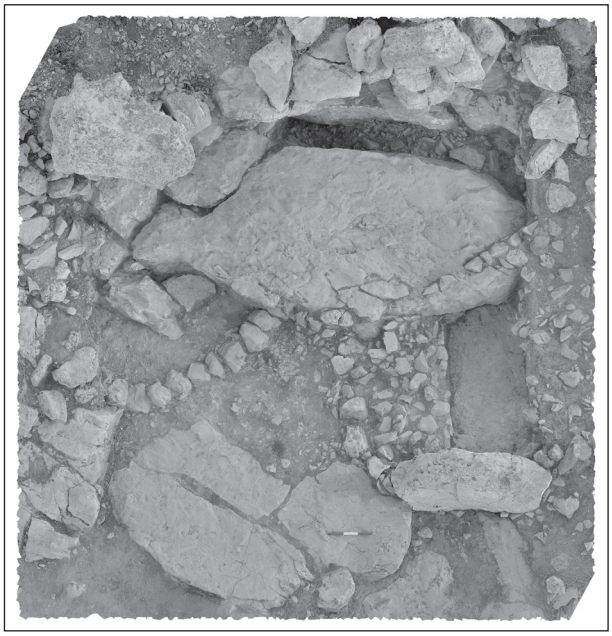
13. Western side of the platform around the dolmen excavated in Area EE.



14. General plan of Structure C1, discovered inside the Great Enclosure in Area C (Trench 1).

The blocking wall (W. 1112) on the interior of the door structure was then removed to investigate the relationship between the door structure and the circular structure (SU 736). Excavation was also carried out inside the door structure itself, where the soil filling the space between the exterior blocking wall (W. 1108) and the interior blocking wall (W. 1112) was investigated. Here SU 733, a dark soil with tumbled stones (interpreted as interior fill of circular structure) was identified. Below this layer, SU 734 was encountered, which is a layer of small pebble and rubble, running below the tumbled blocking inside the door structure and interpreted as a preparation layer for the construction of Structure C1.

Moreover, excavation inside Structure C1 focused on examining smaller areas to answer



15. Photogrammetry of Trench 2 of Area C at the end of 2019 season of excavations.

16. The blocking wall of Door D. 1110 in Area C (Trench 1).

particular questions about the function of this structure. To examine the possible use of the structure as a tumulus, excavation was carried out inside W. 191 where two layers were identified and excavated. The objective was to examine the contents of the supposed oval space delimited by W. 191. Wall W. 191 is placed roughly at the center of the large circular structure and consists of two courses of medium to large roughly worked limestone boulders laid down as a low oval wall structure. The first layer excavated inside the oval space was SU 737, which was relatively clean of finds and did not reveal any obvious evidence of burials. Before meeting bedrock at the bottom of the W. 191, SU 738 was encountered, which was a layer of compact soil with many small pebble and rubble stones, thought to be the same soil layer encountered inside the port/gate structure, *i.e.* SU 734.

Excavation was also carried on outside Structure C1, inside the Great Enclosure, permitting the identification of the external floor, consisting in the bedrock, in some points leveled with a layer of small stones and compact earth cover by a beaten earth floor (L. 197). Finally, a small rectangular sounding performed inside Structure C1, on its southern side, proved that the structures was built directly on the bedrock and leveled in the same way with a layer of compact earth and small stones (**Fig. 18**).

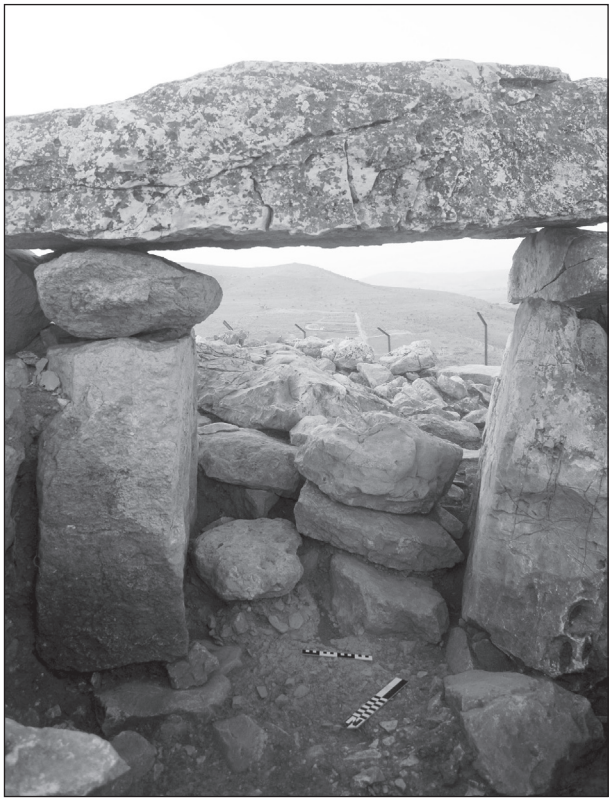
Findings and Chronology of Trench 1

Very few finds were recovered during the excavation of the circular structure in Trench 1. However, several diagnostic sherds identified inside the covering layers and in the foundation of the structure clearly date it to the Early Bronze Age I, the same period of the Great Enclosure and of the first use of door D. 1110, as it's main entrance. Together with the pottery sherds, from the inner side of the structure and from the outside, two fragmentary basalt vessels with knobs have also been recovered (**Fig. 19**).

Stratigraphy of Trench 2

The first aim of the excavation in this trench (6.5× 5m) was to examine the relationship between the standing stone located in the central northern part of the Great Enclosure and its surrounding wall W. 102. Several large stones from the collapse of W. 102 along with accumulated soil was firstly removed in the area together with accumulated soil layers located against wall W. 102 (SU 739 and SU 742).

Under these layers, the bedrock was reached and a narrow "channel" (L. 196) was encountered in front of the wall W. 102. It was found that W. 102 stood on bedrock and in some places was preserved to a maximum height of five courses of large boulders standing above 2m. The "channel" had been deliberately cut into the bedrock and was covered with a layer of compact sandy soil (SU 740). The excavation of SU 740 revealed the top of a



17. The outer side of Door D. 1110 in Area C (Trench 1).

18. The foundation of wall W. 190 in Area C (Trench 1).

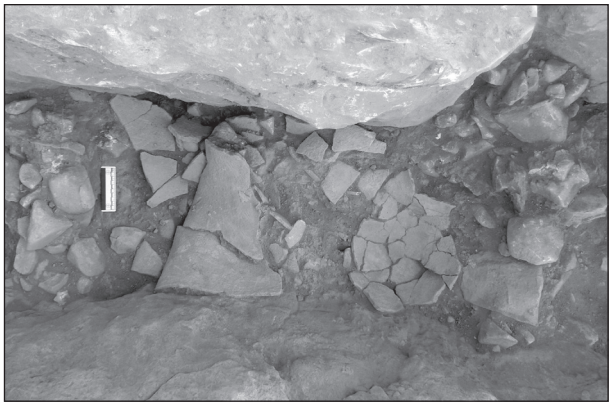
fragmented vessel, a base and part of the walls of a large storage jar (**Fig. 20**), set into a stone installation (I. 193). The feature was found in the central part of SU 740. The vessel contained animal bones, which appear to be sheep/goat, but further analysis will be performed on it. The vessel was removed and revealed a high concentration of sherds underneath it. After careful excavation, it was concluded that there was an additional stone installation below the upper one, which was associated with large fragments of a vessel where the rim, parts of the walls and two different types of handles could be reconstructed (**Fig. 21**). A base in the same storage ware was also found, which is thought to belong to the vessel. The installation therefore appears to have two phases with a larger stone installation below, with a broken vessel and additional fragments of other vessels (SU 745), and a somewhat smaller stone installation above with the remains of a partial vessel inside it (SU 744). SU 740 contained a good quantity of bones mixed in with the soil. During the excavation in this "channel" the soil in SU 740 slowly changed and started to include a compact packing of pebble and rubble stones (SU 752). When this SU was excavated a layer of compact red soil with pebble and rubble stones was encountered at a deeper level (SU 754), but this layer was left unexcavated as the "channel" at this point became very narrow. In connection with the channel a small patch of soil (SU 747) between bedrocks outcrops was examined, where a very small amount of pottery was found.

As the excavation had concentrated on the area near wall W. 102, the area behind the standing stone was not fully excavated, but left for possible excavation during the future 2020 season (SU 751). The area in front of the upper bedrock "terrace" was excavated and collapsed stones have been removed, until a possible surface was encountered (SU 749). SU 749 consisted of a badly preserved plaster or beaten earth surface located just above bedrock. While excavating SU 743 a stone wall (called W. 192) was identified among the tumble. The wall is made of a single course of stones running between the upper bedrock terrace and another bedrock outcrop. At the same level as the top of W. 192, SU 748 was found. The layer consisted of a concentration of ceramics, all seemingly lying on the same level. This might indicate a surface at the same level as the top of the small wall line.

Lastly, a small wall (W. 195) was identified on the top of the upper bedrock terrace, behind the standing stone. At places (on top of the bedrock) the wall is only preserved at a height of one course of stones, but when the Eastern part of SU 740 was excavated, it was discovered that the wall has additional courses preserved.

19. One of the fragmentary basalt vessel discovered in Area C (Trench 1).

20. Fragmentary jar discovered in situ in the channel L. 196 in Area C (Trench 1).



21. Pottery sherds pertaining to large storage vessels discovered in the channel L. 196 in Area C (Trench 1).

The bedrock slopes down in this section leaving up to three courses of the wall preserved. It was also found that the wall continues into the Eastern baulk, but the extent of the run of the wall could not be determined as this area outside is filled with accumulated soil and a good quantity of collapsed stones from W. 102.

Findings and Chronology of Trench 2

In Trench 2, inside L. 196, 9 handles and 13 decorated body sherds were recovered. All the fragmentary vessels date to Early Bronze Age I and are large storage jars with ledge handles, which strongly suggests the function of the narrow chanel excavated in the bedrock close to the main wall of the Great Enclosure as a storage area. Flint objects were extremely rare with only three flint tools being identified. This included two blades and a scraper.

General Achievements

Excavation in Area C East permited the identification of two different phase of use of the Great Enclosure, definitely identified in Trench 1 and possibly also in Trench 2.

Concerning Trench 1 it is clear that, sometime during the use of the Great Enclosure, the people of Jabal Al Muṯawwaq settlement decide to close its main entrance in order to build a large circular structure, Structure C1, whose function is still undetermined. However, several similar circular stone structures, usually interpreted as megalithic funerary monuments, like the "ring cairns" and the "tower tombs," are common in the steppe and desert area of Jordan, both in the Hauran and in the eastern and southern deserts[10]. The main problem is the date of these structures, usually related to late periods for the end of the Bronze Age till the 1st century BC; moreover, no human bones or pottery sherds dated to periods later than the EB I have been recovered in Structure C1 at Jabal Al Muṯawwaq.

Concerning Trench 2, the discovery of storage spaces, both cut into the bedrock or built with small circular rooms against the main wall of the Great Enclosure proves that one of its main original function was again to store products, possible to be used of community activities. Also in this case, further investigation of this area is needed to reach a final conclusion.

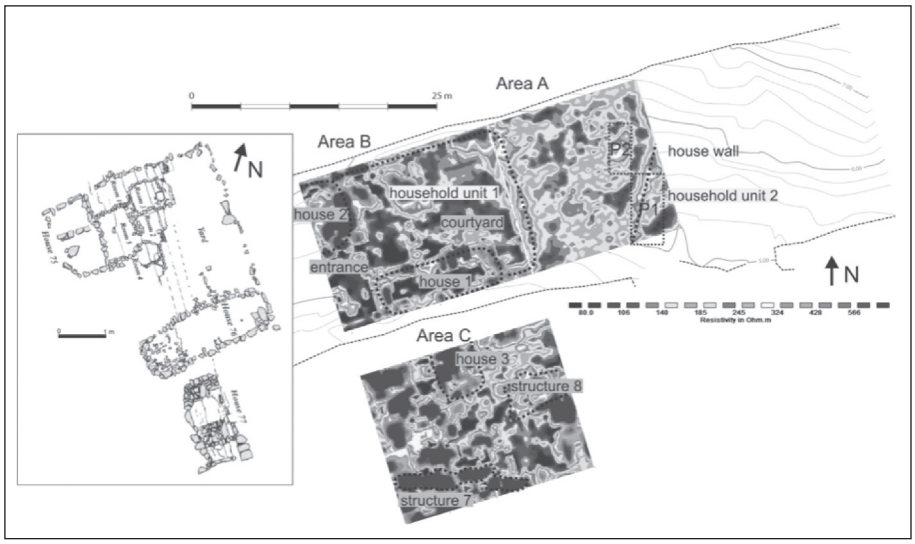
Area D

The archaeological intervention in Sector D was aimed at demonstrating the presence of dwellings in the northern area of the site. This intends to understand their relationship with the houses in the southern area and draw the proto-urban landscape of the village.

The background for this intervention was laid in the 2015 and 2016 campaigns when geophysical surveys were carried out in the area. These surveys offered hitherto unknown data on existing constructions under the current land level. The site's concealment has preserved these dwellings from destruction observed in other buildings in the southern area. This archaeological season has fulfilled the following research objectives:

Firstly, the reliability of the non-invasive geophysical method performed in past seasons by the Olomuc University team (Martín Monik and Zuzana Lendakowa) has been confirmed (**Fig. 22**). This application has allowed to us identify a number of constructions and their distribution over the northern area before fieldwork. In addition, this approach has improved the resolution of the archaeological surveys and facilitated the research design of the fieldwork. The results also provided us with approximated plans of the buildings allowing comparative analyses with similar constructions already excavated. Therefore, these geophysical surveys have improved our understanding on the planning model of the site. Secondly, an undisturbed construction preserving well-preserved stratigraphic layers with entire objects from its interior has been identified and partially excavated. This finding has allowed us to consider the state of the building at the time of its abandonment. This circumstance is extraordinary since most dwellings excavated so far located at ground level, were poorly preserved. Thirdly, the planning of the site at the northern area was examined, where, so far, the presence of more buildings has not been attested. The analysis of the archaeological materials in the future will

10. For the Hauran region see the examples from Jabal Qurma (Akkermans and Brüning 2017); for the diffusions of these kinds of megalithic circular structures see also Steimer-Herbert 2013, fig. II.15).



22. Two draws.. the Temple of the Serpentes on the left and the readings of the geophysical tests in Area D on the right.

allow us to build a chronological framework, and establish whether this area was occupied during the Early Bronze Age or during another period. The new houses from this area hitherto unknown, will be received a new total number from 400 in advance for the dwellings preserved inside the Jabal Al Muṯawwaq EB I village.

Fieldwork Method

The archaeological intervention developed during this campaign are novel because it helped to clarify the objectives and strategy and because it can change fieldwork approaches in the future. Currently, there is an unpleasant situation in which the owners ask for large amounts of money for digging in their land and nobody guarantees the preservation of the remains. Therefore, geophysical survey allows for investigating wide extensions of land mitigating harm through agriculture. In addition, this approach contributes to generating a preliminary record of the archaeological contexts located underneath. The topographic work allows comparing the final result of the excavation works with the interpretation made through the geophysical examination.

The archaeological surveys were conducted by identifying the deposits following the natural stratification sequence. Thus, the architectural features and the archaeological materials were properly contextualized and georeferenced using a total station until the archaeologically fertile *strata* were exhausted.

Several archaeological samples were collected from the occupational layers in order to carry out radiocarbon dating. In addition, sedimentary samples were collected from the edges of ceramic vessels to analyze the residues using bioarchaeological techniques.

General Achievement from House 400

The result of the archaeological excavation was the partial discovery of house No. 400. This is a 4 meter width construction defined by a wall of large stone blocks with an apsidal plan. The building has an entrance on its north side, which was also located. The gate was closed by a deposit of stones and soil, and a deposit of animal bone tools and bones was located close to the entrance (Stratigraphic Unit 125). This deposit comprises both finished tools and raw material selected for this purpose. The construction of the house was carried out on a leveling base formed by small slabs and soil (SU 124) on which the walls enclosing the building were built. This baseline level was the horizon on which the ground floor was installed (SU 117) and used during the time the house was open. On this part of the surface, there were 15 ceramic vessels and bowls. Furthermore, there were also numerous stone tools made in flint and basalt, some fragments of grinding stones and stone loom weights.

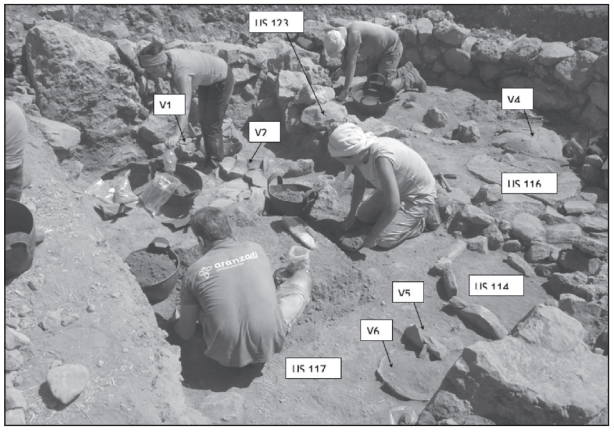
In the east apse area, several work and production spaces for the inhabitants of the house have been discovered (**Fig. 23**). Although we have found these remains, we decided to postpone the excavation until we carry out the complete excavation of the building. The aim is to establish if these areas were domestic or

specialized areas of production, such as those located in House 131 and House 77 at Jabal Mutawwaq.

The apse was compartmentalized by an internal stone wall (SU 123) that separated an inner space with evidence of having suffered intense heat (SU 121/122) such as an accumulation of cooked or burnt mud (SU 120). In another space we also identified where they accumulated a tiled surface (SU 113/116) and a container of stones located at a lower position (SU 114/115). Another space was also delimited by a circle of stones which has not been totally excavated. Inside this circle, some fragments of ceramic vessels have been found, so it could have been used as a venue for big ceramics (SU 119/118).

After the abandonment of the construction, a reuse of the structure (SU 110) was observed, comprising a stone circle of unknown functionality because absence of diagnostic sherds (SU 111/112). Probably, this circle was related to specific activities carried out at the time of the re-use, since they were done on the surface of the collapsed structure (SU 110). This reuse did not affect the archaeological record from the lower layers during the first use.

At the outer area of the construction, two layers of stones have been identified, one formed by large blocks holding the wall of the house (SU 109) and another upper level of smaller stones above forming a terrace that equaled the outer and inner surfaces of the house (SU 107). The latter sealed the massive collapse of the walls (SU 108) that was mostly contained inside the building perimeter occupying an inner ring of the building one meter wide.



23. General view of House 400 during excavations.

Stratigraphic Units from 101 to 106 comprise some disturbances after the abandonment of the site, with imprecise dating due to the massive presence of EBI ceramics spread across the entire surface (**Figs. 24-25**). This presence is

24. Bottle from House 400.

25. EB I large storage jar discovered in House 400.

similar to the one that exists today in many points of the site due to the massive ceramic presence of this chronology throughout the mountain.

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NEOLITHIC REMOVED SKULL: AN INTERPRETATIVE PERSPECTIVE

Aven Al Qatameen

Abstract

The removal of skulls is documented for the first time in the Levant during the Natufian period (9000 years BC), and spread to the end of the Pre-Pottery Neolithic B (PPNB) (8500-6000 BC). When this practice was discovered for the first time by Kathleen Kenyon, it was interpreted as a sign of ancestral worship. This study will analyze and discusses the characteristics of socio-cultural community in the southern Levant through the study of skulls found in the southern Levant; the collected data from literature review was made in order to clarify other interpretations for the removal of skulls from that era and this has led to another innovative explanation other than that of ancestral worship. The new interpretation is supported by direct and indirect physical and intangible evidence such as spatial distribution of collective skulls caches, linked with plaster statues, creation of memory, the social construction of identity and its relationship to the issue of abandonment that have occurred in some areas of southern Levant during the (PPNB) period, and why the skull was specifically removed. The evidence showed that the skulls do not all belong to elder males but also to male and females of different ages. This result is contrary to the idea that worship was only associated with older males and other interpretations related to social phenomenon.

Keywords

Neolithic, Removed Skull, Ancestral Worship, Identity, Burial Practices, socio-cultural community.

Introduction

The Neolithic period is considered to be the Agricultural Revolution due to several cultural, humanitarian and environmental variables. During this time, a new culture began with regular practice of cultivation and domesticating animals (livestock production) leading to the emergence of farming villages. With this new way of life and the increase in agricultural economy, man evolved from a hunter-gatherer into a farmer (Rollefson 1998; Kuijt and Goring-Morris 2002).

The study of a removed skull from this period will help us to further understand the transformation of attitudes and social practices of that time. Archaeological results will be used to establish cultural activities and convey the practices of rituals and the relationship between people and their environment. This research attempts to shed light on the comprehensive factors that endured several changes during the Neolithic period. Additionally, it will discuss the removed skull theory within the overall context of the Neolithic period.

Human dependency on environment and eco-system as whole originates from thinking. Therefore, each part results in the previous section and cannot be taken separately from the other. It constitutes a complementary cycle. Hence, this study analyzes and discusses the characteristics of socio-cultural community in the southern Levant through the study of skulls found in the southern Levant. The data collected from literature review was provided to clarify other interpretations of removed skulls from that era. This has led to another innovative

1. Plastered skulls sites during M/LPPN (1. Nahal Hemer, 2. 'Ayn Ghazāl, 3. Jericho, 4. Kfar Hahoresh, 5. Baisamon, 6. Tall Ramad, 7. Tall Aswad.)

explanation other than that of ancestral worship. The new interpretation is supported by direct and indirect physical and intangible evidence, such as spatial distribution of collective skull caches linked with plaster statues, creation of memory, the social construction of identity and its relationship to the issue of abandonment that occurred in some areas of southern Levant during the (PPNB) period, and why the skull was specifically removed.

Neolithic Burial Practices Processing

The Neolithic period witnessed a vast spread of symbols and ritualistic customs throughout the Levant. Emerging burial practices contained new habits such as, secondary burials, skull removal, decapitated, catches of skulls, trash burial, burials within or under floor of the houses and courtyard, ritualistic buildings, plastered human skulls are among the cultural intellectual output as it represents human thought. In our research, we studied this theory to identify the role the skull plays within the cultural contexts dominated in Neolithic period. We used the information available as a result of archaeological studies, resources, researches, and so on.

Skulls, stone statues and stone masks

Additional discoveries representing human remains have been found in a variety of contexts. A ritual is a symbolic or communication system that establishes the social behavior between the individual and the society. Social organizations are formed through symbols and rituals, which produce and reproduce links between humans and the supernatural entities (Verhoeven 2002b).

Ultimately, the nature of the life during the Neolithic period inspired expressive dying through establishing new means.

Skull Removal

What do we know about the practice of skull removal in Natufian period and where the team

finds sculls used for ancestral worship?

The removal of skulls is documented for the first time in the Levant during the Natufian period (9000 years BC), and spread to the end of the Pre-Pottery Neolithic B (PPNB) (8500-6000BC) in the Levant and (7000-6500BC) in Anatolia.(Belfer-Cohen 1991; Byrd 1989; Edwards 1989) Illustrates the most important locations that contain plastered skulls in the Levant during (PPNB). When this practice was discovered for the first time by Kathleen Kenyon, it was interpreted as a sign of ancestral worship (Kenyon 1955; Kuijt 1996).

Skull removal is practiced either by removing skulls[1] or skulls isolated from individual skeletons, or in group caches of removed skulls or groups of headless or decapitated skeletons. Skeletons without removed skull practices either have been treated as plain skulls or a complete skull, crania without a mandible. Approximately 73 modified skulls have been revealed from eight sites in the Near East between the years (1953-2004). Crania plastering was common in the PPNB period in the 3rd millennium BC (the first plastered skull was discovered in Jericho in 1953 by Kathleen Kenyon). The culmination of this practice of skull processing[2] embodies the life cycle of the Neolithic period (Garfinkel 2014). This practice was later revealed in additional sites dating back to the (PPNB) in the Levant such as: Tall Ramad (Contenson 1966; Lechevallier *et al.* 1978); Nahr Hammer (Bar-Yosef and Alon 1988); ʻAyn Ghazāl (Griffin, P. *et al.* 1998; Rollefson 1986, 2000); Kfar-Hahorsh (Goring-Morris 2000; Horwitz and Goring-Morris 2004). (6000-7200BC) (Bonogofsky 2006).

During PPNB (7000-8800BC) the treatment of human skulls took a more varied approach. The number of treated skulls increased within the region and were found within agricultural villages of all sizes from (0.5) to 14 hectares as in ʻAyn Ghazāl (Griffin *et al.* 1998). Several treatments and modifications were applied to the removed skulls to create realistic features and a sense of portrait of the living person. This was accomplished through plastering or painting, the use of clay, gypsum, or lime, on the crania or face without the mandible -mainly after the decomposition of the tissues or after the drying of the skull, (Kenyon 1957; Rollefson and Bienert 1994; Bonogofsly 2001).

Skull Removing Processes and Methods:

Following death, skulls and lower jaws were removed and in some cases covered with plaster. skulls are removed shortly after a death or after body decay (Garfinkel 1994) by one of two methods: either prior to decomposition, as was common in many LPPNB sites such as Jericho (Kenyon and Holland 1981); or after decomposition of the body, as in ʻAyn Ghazāl, Basta, Jericho, Nahal Hemer (Bienert 1991). Skull was discovered individually, buried isolated from other skulls, in double burials, or in caches of three or more. (Banning 1998; Rollefson *et al.* 1992; Hershkovitz and Galili 1990).

ʻAyn Ghazāl Diversification of Skulls Treatment

Skull Treatment is Varied in Several Ways as Follows

1. Partial Treatment: In general, the cranium was treated either in plaster or paint, without the lower Jāwā. However, in some cases skulls were found with its lower jaws in Tall Ramad and one skull from Jericho.
2. Plastered area: Focused on certain areas of the face and left other areas without forming or plastering, this is often called a mask. For example, in the ʻAyn Ghazāl, a young male cranial received special treatment with traces of a thin, black material which may have "Bitumen" (Rollefson 1986).
3. The eyes: In Yiftahal, the eyes were often formed in the eye socket with sea shells to represent the (iris). Some skulls replaced the eyes with shells, and, yet other skulls had left the eyes empty.
4. Teeth: In some cases, it is apparent the teeth have been removed intentionally.
5. Other facial features: Features such as the ear, mouth, nose, and eyes are identified, and the chin was also performed without the lower jaw.

1. That implies that skulls have been removed from the primary graves and then buried either individually or separated from the skeleton, and these skulls are present either in the form of groups or individually.
2. The followed methods in decorating and shaping skulls either by painting it, drawing on it, embodying facial features or plastering it.

6. Painting: In Kfar Hahorash and a Tall Aswad the plastered crania skull was painted red. However, in Nahal Hemer the skulls were painted in black or strips of black on the cranium of the upper skull.
7. Head covered: In the cave of Nahal Hemer skulls were discovered containing the distinguished characteristics of the PPNB period. The skull was covered from the back without the lower jaw with a retinal pattern or covered by asphalt and bitumen. Many textiles were found in the same cave. The fabric could have possibly served as a head cover, covering the top of the skull (Schick 1988; Bar-Yosef and Alon 1988; Arensburg and Hershkovitz 1989).

Skull Removal Theories

The importance of skull removal practices is evident in the frequency of untreated skulls in several regions. Additionally, it was the obvious choice for removal, remodeling, treatment, or presentation.

Initially, the concept of "skull worship" was first debated by Kathleen Kenyon when the skulls were discovered in Jericho in 1950 (Kenyon 1957). Since then, additional burials have been discovered with different stylistic approaches and Kenyon's interpretations were widely accepted by researchers such as, Amiranin 1962, H. de Contenson 1967, G. Rollefson 1986, Garfinkel 1994, and others. According to Rollefson (2004), the practice of skull removal is a cult ritual associated with leaders of a group or clan within residential settlements, likely related to ancestral worship.

However, this belief has been reversed by Bonogofsky (2004, 2001), who argued that skulls also belong to males and females, young and old alike. For example, in Jericho there are two main caches containing 50 percent of youth skulls, with one of the six groups containing three children, and one of the 10 groups containing cache for 10 children of different ages (Kurthand RohcrErtl 1981; Bonogofsky 2006 b).The skulls do not indicate specific treatment by sex or age. They receive similar patterns of treatment and do not indicate unequal or differential treatment between the sexes, there are groups of skulls related to adult females and males. For these reasons, the ancestral worship is not supported. The skulls belonging to youth did not live long enough to be called the predecessor. Additionally, some anthropologists and archaeologists suggest that skulls without teeth belong to men who served the role of leaders as they are older. Therefore, the teeth of certain skulls could have been deliberately removed in an attempt to make them appear older than they were (Bonogofsky 2004).

Another analysis by Bonogofsky of six skulls in Jericho showed the individuals were closely related and were buried simultaneously. It is possible to support that if they want to return the ancestor or glorify the adult, but this is contrary, because it is not logical to have multiple ancestors of the same family at a time.

Another explanation for plastered skulls is the communication between the past and the present, which began between 12,000-7000 years BC. In the Levant, between the Bedouin and the pattern of settled communities living in permanent villages. In the early Neolithic period, stratified societies differed in size from 0.5 to 14 hectares and social competition was common. In these cases, skulls would have to serve as a weapon against the emerging village (Garfinkel 1987; Garfinkel 2014).

According to Finlayson, the burial under the residential floors, the plastering of skulls, and the production of statues, is a social representation of the worship of ancestors based on kinship (Finlayson 2014). Another view by Keeley (1996) discusses a practice called violent head hunting in where skulls were chosen to exercise violence as a result of war at the time. Kenyon also believed that skulls belonged to enemies who kept them in memory (Kenyon 1965) of their defeat. However, this contrasted with skulls that were kept to honor people and keep them among the living. Further, Pearson's point of view was that the removal of skulls does not reflect aggression because there are children's skulls and children are not qualified to be represented as enemies.

According to (Kuijt *et al.* 2009)), the removal and plastering of skulls is a representation of a complex part of the social network nested at the Neolithic period to build memory for generations and build power within agricultural villages. In other words, the process of skull removal is a changing process that focuses on building social memory.

Plastering Skulls and Worship Ancestors. Who They Were and Why?

In Anthropology, the term "ancestors" is used to distinguish those who are mentioned by descendants to indicate specific religious practices as part of the term "worship of ancestors" (Bloch 1996). There is no specific answer, each community has its own criteria based on their own culture, yet, not all the dead who are mentioned are described as ancestors; hence not all of them are considered predecessors. Therefore, the criteria of ancestors differs from the ancestors of the myth-imagined in the memory or conceptual imagination of the community-from family ancestors or congregational groups, so they can not necessarily have similar characteristics like the ancestors of all societies (Whittle 2003; Thomas 1999).

Side position of skulls may indicate social standing. For instance, peripheral skulls can be found guarding the skull of an important individual (Milevski *et al.* 2008). Also of note, tooth avulsion during the Neolithic period was a sign of an elderly person or a symbol of the father or grandparent (Arensburg and Hershkovitz 1988). This is not required if the person with the removed skull is too old.

Statues, Figurines, Mask, and Skulls Relevance

Skull modifications can be made by applying plaster to reproduce the portrait shape of the skull. This style was similar to the statues in terms of style and size. Head area, eyes, eyebrow, forehead, nose, mouth, and chin were all covered in plaster and then re-buried. Masks dating back to the early eighth century BC have also been found, as at 'Ayn Ghazāl in an outer hole inside the soil (Schmandt-Besserat 1998).

For example, animal and human statues were also made to express the individual's activities. Statues expressed in these forms give an indication of the importance of the animal. Additionally, statues that emerged in the image of pregnant women. Birth and fertility often represent agriculture (Schmandt-Besserat 1998). Statues can also belong to identical archaeological contexts, where they are carefully placed in a pit that has been clearly designed for this purpose.

During the early Neolithic periods, statues were characterized by a natural style. In the later stages of the Neolithic period, female statues depicted the role of women arbitrarily in procreation and pregnancy by highlighting and emphasizing the most important female parts, including the female genetalia, which may represent the impact of the agricultural economy and their changing role of society. It signified the important role of women in the new agricultural system, with greater roles in the work distribution among the members of society as a whole. Accordingly, "Funeral are times when the positions of the living are renegotiated. People's roles change, and the funerary process is one step in the renegotiation of changing identities" (Thomas 1999).

So what differentiates skulls within these categories, and what indicates that the skulls are a kind of statue? It is a contradiction to say skulls are a part of ancestral worship and that statues are not, because the skulls (such as sculpture) and (statues) may represent symbols of natural sovereignty as cultural signals that overlap with the nature of an ideology and a culture within a society.

Discussion

What is the New Interpretation and How Does It Compare with the Previous Ideas on Skull Removal Expressed by Scholars?

Veneration of skulls took place at the community level, not merely within the level of individual household. It may have been occurred for generations, since the removed skulls represent a deceased person mentioned by his family and other members of the community. The skulls are preserved for the special and communal memory. To accumulate skulls over time for generations, consequently proves their social identity and territorial property. That comes across clearly through spatial distribution of skulls, where the distribution of skulls within one place and within the same area in circular, cluster or row-shaped in different context such as on the roof or surface of the houses during PPNA, or under the floors, courtyards or communal domestic houses during PPNB (Grafinkel 2014). In addition, skull caches and reshaping them are among the patterns that represent a complex net of interaction to create a memory for the generations (Kujit, 2008). Through general or local rituals, in addition to the organization of ritualistic practices, transferring the social memory contains constant elements of ideologies based

on performing these practices (Koutsadelis, 2007). Thus, these skulls may indicate the value of the owners of skulls in this period perhaps indicating that diversity is the concern for the individual and their appreciation within society, being an agricultural community.

Another view by Rollefson based on the various types of tombs dating to MPPNB ʻAyn Ghazāl including "trash burials" and tombs containing only skulls may suggestvariaiton is based on social groups within the community. Rollefson also argued that large groups of people came from other areas in Palestine and Jordan in this period; a social mixture created cultural variations through cultural objects, including tombs (Rollefson 2004).

In addition, there were tombs outside the settlements, such as Kafr Hahorsh, during the PPNB period in Palestine, which was called the Regional Funeral Center (Rollefson 2004). Similarly, Nahal Hemer, was used as a special place for burial or "storage" for human skulls, which were treated similar to sacred objects. During the PPNB architectural designs are "clearly distinct" compared to residential buildings. Two smaller types of architecture were found: small circular buildings called the "Shrine" within the residential areas, and larger rectangular structures indicating that they were used for rituals. The larger rectangular structures were found in ʻAyn Ghazāl (Rollefson 2001), Baiḍā (Kirkbride 1968), and in Tall As Sultan in Palestine (Kenyon 1981). These buildings are called "private buildings" as revealed in the classroom (Bienert *et al.*2004). This social stereotype within the community reflected a different variation on the location and distribution of graves and burial forms and burial practices as well.

But, how does one to reflect the elements of burial practices (removed skull specialty) on social relationships through theoretical frameworks?

First, we cannot consider the practice of skull removal without considering the elements of other burial customs, as all of the elements are integral to each other. The patterns of burial practices varied during Neolithic period among diverse contexts. The secondary and mass burial within a household was more common than the burial of a primary individual, especially during M/LPPNB. For example, mass burial has prevailed, which highlights its importance in this period and reflects the origin of the group. The economic pattern requires cohesion among individuals to help make an effort in agriculture, which requires time and distribution. This has affected social cohesion, which was assumed by the economic (agricultural) pattern. Thus, this pattern influenced the method of burial practices, which reflects the social pattern of the cultural component left behind. For example, the burial under the floors of houses can reflect the social cohesion between the family and the importance of family cohesion. In can be seen in the impact the individual leaves behind even after the death, as the family has placed importance of burying him near the home or within the home. It is also reflected in the existence of large houses with common walls between the rooms, where the skull of a deceased family member's was placed within the thresholds of doors. This reflects the sincerity, loyalty, respect and appreciation of the great family or one of its members.

According to (Bonogofsky 2004), who explained that people who suddenly died for obscure reasons had been moved out of settlements as disposal methods, such as being a stranger in society (within migratory movements that have been occurred during LPPNB), this explains the differences between removed skulls treatment.

In general, we cannot consider social differentiation in its crystallized form within the society. If we look at the practice of mass burial, which generally prevailed in the early PPN, we can see social cohesion in a large way with the existence of social differentiation. This does not mean there are no social paradoxes, but it began to make an appearance at the end of the PPN. This was accompanied by the decline of mass burial practice and increase in individual burial practice, in addition to the beginning of the presence of grave goods in the tombs. Hence these two practices: the mass and individually burials, indicate the beginning of the social differences in communities. The presence of individual burial reflects the economic value of the individual. The most important social difference that distinguishes the individual from others, in addition to the funerary, is the embodiment of economic value that has become widespread in the society based on economic factors. Is the high storage of food, the high population density and productivity

sign of social inequalities? These variables are associated with the social structures of unequal societies, production and storage work on the existence of inequality between society, which reflected the burial habits in the representation that explains the common of plastered skulls practice and other skulls without any kind of treatment.

Consequently, it is important to refer to the issue of abandonment of many sites in rural communities during the LPPNB period in the south and central Levant, which were abandoned between (8000-7750 BC) and the establishment of a new starting point of the Neolithic. With the passage of time, the increase of population within the site, and the migration they did not practice a special treatments of skulls. The significant increase within the LPPNB community reflects new processes, such as the creation of stressful social conditions, increased social congestion, and conflict between the lineage of individual ratios and rights and duties. Perhaps even the struggle to compete in the organization of rituals within PPNB communities as response to demographic dimensions played a factor (Kujit 2000).

Differences in skull treatments may have arisen depending on the nature of the mobile or permanent settlement, and as a result of the population turmoil at the end of the MPPNB in southern Levant. The population began to move from the western Jordan Valley to the eastern highlands, resulting in the development of sites in LPPNB, later known as "mega-sites" as a result of the continued abandonment of areas (Rollefson 1992). Due to some of the host sites being "mobilized," the incoming population had limited basic resources and compensation. According to the architectural changes, the population increased and reached thousands for the first time in prehistoric times, thus developing the knowledge of social identity (Rolleyson 2010). The above resulted in cultural changes and changes to ritual ideology, and therefore, new funerary behaviors emerged such as the plastered skulls.

The Ecology During PPN in Levant

The first change that influenced the culture was the environmental change of the ancient Middle East climate, which became warmer in the Holocene era, which included a drought during the PPNB period. Improvements were observed with the emergence of the socio-demographic changes that took place during the PPNB period. Changes occurred until the peak of development during LPPNB as the size and distribution of the settlements and population, architecture development, (mega-site) and the emergence of increased exploitation of natural resources (Rollefson, 2004).

After that, LPPNB or PPNC is considered to be the period in which the size of the sites declined. There was a gap in or problem with the indigenous population, as site abandonment and population dispersion attributed to over-exploitation during LPPNB (Kenyon 1987). It could have also been due to the environment or to the influence of previous generations as suggested by Kirkbride (1968).

Therefore, in the early PPN the evolution of home models and housing styles began. The settlement process began in a semi-permanent manner due to the pattern of fishing and agriculture. During the PPN, the settlement model evolved in response to environmental and ecological changes to fit the farming pattern, which required stability in the construction and sufficient storage space and capacity to accommodate the extended family style (Simmons *et al.* 2007).

A numbers of scholars have noted a relationship between the environment and culture (*e.g.* Kuijt 2000; Kuijt and Goring-Morris, 2002), so that each culture is conditioned by their subsistence regime, thus there are links between culture and nature where the difference of nature and its factors are likely to affect culture at different rate. One such change in the social component within the community that depended on the extended family in order to assist in division of works (agriculture) for its multiple tasks and the difficulty of having one or a few groups manage such a source, correspondingly, the agricultural villages were established and social cohesion has been imposed in general and family or kinship cohesion particularly. Therefore, the circumstances of the environment have a significant role in influencing the formation of culture. This requires that humans must be flexible in their culture so that they can connect with ecological niche (Megarry 1995), which is what represented in skull removal practicing (as a component of the whole culture).

Moreover, according to Qzaogun, it must consider the extent and spread of the geographical Neolithic areas, "shared knowledge" and publish "know how" and this idea can be derived from the obsidian trade that has been transferred and exchanged between sites that are far from their main source. This explains the diversity of the skull removal processes.

Conclusion

Within this historical context of organization and social cohesion, removed skulls have been seen as ritual behavior to express the social identity. As reported previously, we note that the aspect of intellectual development is the result of stability which allowed people to think about other issues than living and their subsistence, as a result of securing the basic life needs (food) and resources for livelihood.

From the above, the function of skulls at the beginning of stable life as a factor for the evolution of societies includes:

1. Establishing new villages through new settlers.
2. Finding private ownership.
3. Inheritance by the offspring.
4. The need for an indicator of private ownership and rights.
5. Special skulls that identified the earliest settlers.

The removal of skulls is a way of "blaming/revival" of the dead by removing their skulls.

The spatial distribution of different skulls and keeping the dead inside the house or within the scope of the living or the common areas of the community, aims to create a sense that the individual still exists and has an active role among members of his family or community. The embodiment of the skull within the living quarters, their lives and their homes is a kind of illumination of feelings about this dead individual who, in the view of his community did not die but has begun another kind of life in another world. This is logical in terms of materialism, where it can be explained that the face is the most prominent part of the body and the most important. It represents the person physically and gives purpose to the body that was used in this life. When reconstructed they provide an image of the absent person to act as a reminder, especially when done by physically reconstructing the facial features (plastered and modeled skulls) specifically to appear as they did in life.

Another issue is the variety of spatial distribution of the skulls. They were often placed in different areas as physical tangible evidence of their association with places of worship or with other places where skulls were positioned.

For the different treatment of removed skulls, some of them have been plastered or have had different treatments applied, while some are not believed to be allowed an identity, as they belonged to a "normal person."

The skulls are also reflected in the ritual belief system, which focused on the cohesion of society and the reaffirmation of domestic and societal beliefs. (See Goring-Morris 2000; Kuijt 1996, 2000). Attention was also drawn to how to perform rituals and religious rites (public) by forming "identity" through burial practices (*e.g*. Goring and Morris 2000; Kuijt 1996; Rollefson 2000).

The individualistic rituals are performed within the household and communal context, and are represented by human and animal statues, and it is possible that they are connected with vitality, fertility and "life force." The household rituals are indicated by representing them through the skull in addition to the animals' horns and skulls in the household area, and through figurines as well, and these rituals were concerned in the first place with death and also served as the rituals between reminiscence and memory; because the memory is another fundamental factor in the burial rituals and especially in the removal of the skull, not only to remember the deceased but also to play a fundamental role in transferring social memory. Consequently, stabilizing their identity through display of the skull illustrates the way the family's rituals connect the living with the dead.

The burial customs that play a fundamental role in society and in dealing with the emotional pain caused by death, and its effect on the human consciousness, allow the social structure of the identity and memory of the individual and their place in the community to be expressed, for that reason secondary ritualistic practices such as plastering, drawing on and painting human skulls serves as a form of commemoration of the memory and identity of the individual in society.

In other words, plastering skulls could be a ritualistic memorial ceremony for the dead. Retrieving their skulls and decorating them with plaster, which helps the household or the family to feel that the deceased is still among them, as if they are still alive, provides a means for the relatives to sense the deceased, and to have the deceased back with them.

Based on the above, the belief system during the Neolithic period was represented by focusing on remembrance of the individual and the property and rights of the family members. Many researchers related this to the fact that the Pre Pottery Neolithic B period was distinguished by creating extended families as a basis for domestic economy and societal interaction. Additionally, the family became more productive throughout the Late Pre Pottery Neolithic B (LPPNB) due to the increase in the family size (extended family), which illustrates the increase in specialization and investment in the household. Consequently, the stereotype and lifestyle of the family have been reflected through the burial method, to reflect its perspective toward the family member, which remains a memory by recreating his personality based on the family's point of view. This keeps a line of imaginary connection between the deceased and the family, to feel close to him, and that he is still with them, which is reflected in the bodily representation.

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FROM THE GROUND TO THE AIR TO THE COMPUTER: RE-CONCEPTUALIZING THE SITE PLAN FOR THE ARCHAEOLOGICAL SITE OF AL HUMAYMAH

M. Barbara Reeves and Craig A. Harvey

In 2022, Al Humaymah Excavation Project began creating a new site plan to contextualize better past archaeological work at Al Humaymah and to show the site's potential for future work. This preliminary report presents an introduction to the site and our methodology for creating the new site plan.

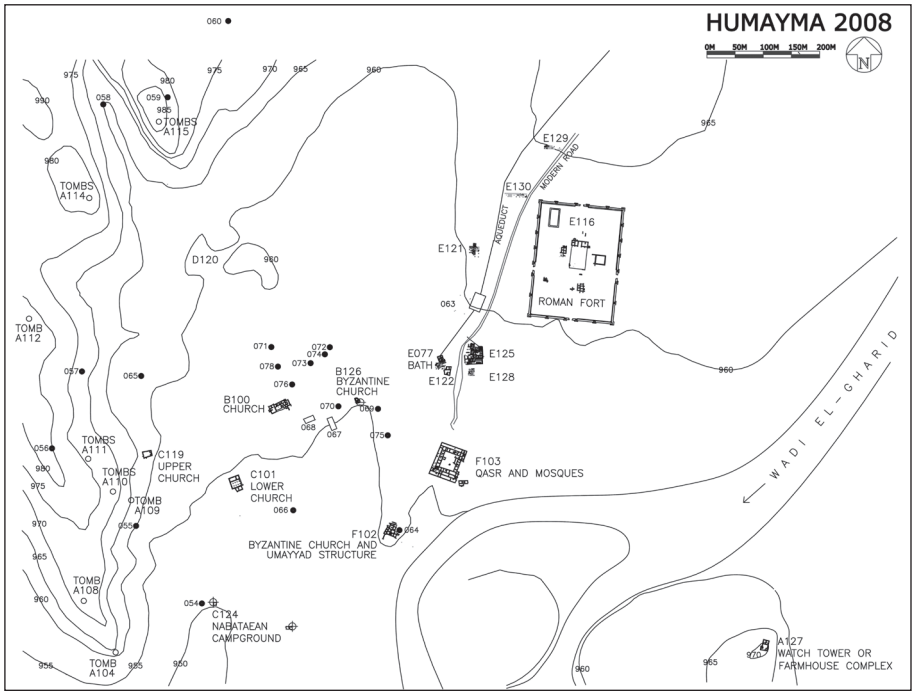
The archaeological site of Al Humaymah in southern Jordan contains important remains from the Nabataean, Roman, Byzantine, and early Islamic periods, as well as some evidence of later occupation up to the second half of the twentieth century (Oleson 2010: 50-62). According to a foundation myth preserved in Stephanus of Byzantium's *Ethnika* (Oleson 2010: 50-53), a Nabataean prince named Aretas, son of King Obodas, founded the town of Huwwārah here in the 1st BC under divine guidance. The Nabataean royal family would have been attracted by the site's excellent water catchment and its location on important trade routes, including those between Petra and their Red Sea ports of Ayla and Leuke Kome, as well as those heading further south to the lands of southern Arabia (through their border town at Hegra) (Oleson and Reeves: forthcoming). Huwwārah's strategic advantages of control over trade routes and an abundant water supply must likewise have motivated the decision of the Roman Emperor Trajan or his governor, Gaius Claudius Severus, to build a fort here soon after they converted the Nabataean Kingdom into the Roman Province of Arabia in the early 2nd century AD. The only forts currently known from that period are those at the large legionary headquarters at Bostra, the mid-sized fort at *Hauarra* (the Roman version of the site name), and the small fort at Hegra. Situated in a sparsely populated desert but connected to Bostra (six days distant) via the primary north-south artery of the *Via Nova Traiana*, the fort at Huwwārah probably served as a southern base from which soldiers could be redeployed, as necessary, to Petra, Ayla, Leuke Kome, and Hegra. In the provincial reorganizations of the late third/early fourth century, Huwwārah's fort received a much smaller garrison and lost its significance as a supply base as it was now one of many small military bases located about a day apart in this region. By the early fifth century, the fort had been abandoned, but the site continued to thrive as indicated by the construction of at least five churches (Oleson and Schick 2013) and the town's high assessment in the Bi'r As Sabi' (Beer Sheva) Edict (Oleson 2010: 55). In the mid-seventh century, after the region came under Islamic control, Al Humaymah (as the site was then called) was purchased by the Abbasid family, who plotted the overthrow of the Umayyad caliphate from their *qaṣr* and mosque, located on the southeastern side of the settlement (Oleson 2010: 60-62). The site's Roman bath was likely reused at this time, and other structures across Al Humaymah were reconfigured for new domestic occupation (Oleson 2010: 61; Reeves 2019: 121). Most of this occupation came to an end in the mid-eighth century after the Abbasid family left for Damascus and an earthquake damaged the site. Around this time, the aqueduct ceased functioning and the *Hajj* route shifted east so that Al Humaymah was no longer a stop. Over

the next 12 centuries, the site was never again a significant settlement, but there is some evidence of small-scale occupation in the Abbasid, Fatimid, Ayyubid, Mamluk, Ottoman, and modern (Hashemite) periods (Oleson 2010: 1, 61-62; Oleson and Schick 2013: 13-16, 96, 163, 535, 554; Reeves *et al.* 2017: 116). Occupation amongst the ruins ended in 1979 when the archaeological site was created (Graf 1983: 659).

Archaeological work has been carried out at the site since the late 1970s, first as preliminary surveys (Graf 1979; Eadie 1984), then by the Al Humaymah Hydraulic Project (1986-1989; Oleson 2010), and finally by the Al Humaymah Excavation Project (led J.P. Oleson in 1991-2005 and M.B. Reeves in 2008-2014; Oleson and Schick 2013; Oleson *et al.*: forthcoming; Oleson, Reeves and Foote 2015; Reeves *et al.* 2009, 2017, 2018). Six plans of the main site were produced by these projects: Graf 1983: 658, Map 3; Eadie 1984: 215, fig. 3; Oleson 1990: 287, fig. 2; Blétry-Sébé 1990: 315; Oleson *et al.* 1993: 463, fig. 2; Reeves *et al.* 2009: 230 (**Fig. 1**), as well as two plans including features in the site's hinterland: Oleson 2010: 28, fig. 2.7; Reeves *et al.* 2018: 142 (**Fig. 2**). In accordance with the goals of the projects, these site maps only included buildings and features surveyed or excavated. Thus, for example, **Fig. 1** shows hydraulic works, tombs, the Nabataean campground, the Roman fort, the Roman-early Islamic bath, Byzantine churches, and the Abbasid *qaṣr*, whereas **Fig. 2** shows quarries and graffiti sites. The only aforementioned map that does not place its emphasis on extensively studied or excavated buildings and features is the one produced by Blétry-Sébé (1990), which resulted from a preliminary ground survey of exposed wall lines across the site in 1989. Despite its inclusion of otherwise unillustrated buildings, this map was not incorporated into any subsequent site plan.

The differences in plans produced by the teams led by Oleson, Reeves, Eadie and Graf (who plotted what they had studied) versus Blétry-Sébé (who plotted wall lines visible during her ground survey) reflect scholarly decisions. The particular elements of the site included in **Fig. 1** versus **Fig. 2** likewise reflect decisions by investigators regarding what to emphasize.

A third approach was taken by Kennedy and Riley (1990: 147), whose map of Al Humaymah includes all the wall lines, field boundaries, and the mid-twentieth century construction discernible in a 1953 vertical photograph taken by the Hunting Air Survey. That 1953-based plan of the site succeeds in offering a better sense of the overall density of the ruins and patterns in their placement, but it lacks



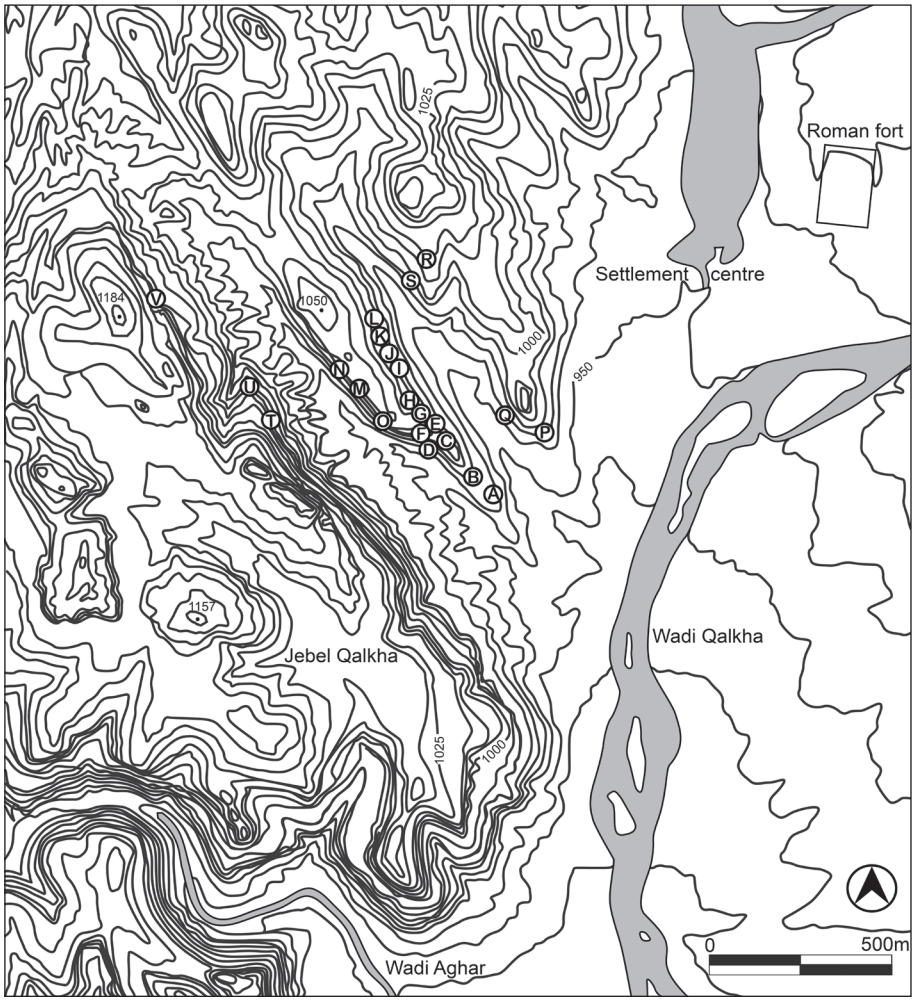
1. Main site plan with areas excavated and surveyed by the Al Humaymah Excavation Project up to 2008.

important details produced by the groundwork carried out since the late 1970s (including many entire structures).

The locations of those excavations and focused surveys have, however, been marked on more recent aerial photographs in the Al Humaymah Excavation Project's subsequent publications (**Figs. 3, 4**; Oleson 2010; Oleson and Schick 2013; Reeves forthcoming).

The goal of the present mapping project, begun in 2022, is to combine the strengths of the previous approaches in creating a new comprehensive site plan. This new plan will include all previously excavated and surveyed structures, significant modern landmarks (*e.g.* roads, the mid-twentieth century school, and the visitor's center), and other wall lines visible in satellite imagery and aerial photography. The satellite imagery to be used include the Esri World Imagery basemap as well as those from Google and Bing. Aerial photographs to be consulted include tethered balloon images created for the Al Humaymah Excavation Project by J. Wilson Myers and Eleanor Myers in 1992 (*e.g.* **Fig. 3**, Oleson *et al.* 1993: 488) as well as helicopter and plane images supplied by APAAME (The Aerial Photographic Archive for Archaeology in the Middle East) (**Fig. 4**) and Jane Taylor (*e.g.* Oleson *et al.* 2015: 1).

The new Al Humaymah site plan will be created using ArcGIS Pro and will combine all aforementioned sources into a geo-referenced map of the site. Using the Esri World Imagery basemap as a base layer, we will overlay shapefiles from the project's 2008 AutoCAD generated map of the excavated and surveyed structures. Initial work on this step has already revealed that, while the orientations of the structures in the AutoCAD drawings are fine, the relative placement of some of these structures is incorrect, a distortion previously suspected for several years. We will use the satellite imagery to correct the relative placement of the drawn structures and will then overlay and trace those



2. Topographic plan showing location of petroglyph and quarry sites surveyed by the Al Humaymah Excavation Project in 2014.

excavated since 2008. With the placement of excavated areas brought up to date, we plan to add visible wall lines of unexcavated structures, modern buildings, and roads to the plan using satellite imagery with the aid of aerial photographs. We will also extend the boundaries of the site plan, particularly to the west, in order to include additional surveyed sites. We will then add topographic contour lines from the 1957 Hashemite Kingdom of Jordan 1:25,000 topographic map, and more recent satellite imagery.

Harvey will take the lead in creating this updated and more complete plan, which promises not only to provide a more accurate reflection of the excavated and visible remains at Al Humaymah, but also to help contextualize structures in upcoming publications. It is also hoped that this new plan will aid future research at Al Humaymah by contributing to a better understanding of the site's organization, significance, and potential for future archaeological investigations.

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3. 1992 balloon photograph with locations marked for excavated churches (B100, B126, C101, C119, F102), Abbasid qasr (F103), and Nabataean campground (C124). (Courtesy of John Oleson.)

4. 2016 helicopter photograph facing east with labels added for buildings and features studied by the Al Humaymah Excavation Project. (APAAME_20160919_DLK-0097. Photographer: David Kennedy. Courtesy of APAAME. Labels added by M. B. Reeves.).

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PHASING THE EASTERN COMPLEX AT WĀDĪ RAMM

M. Barbara Reeves and Dennine Dudley

The Wadi Ramm Recovery Project[1] (henceforth WRRP) conducted two three-week field seasons in the summers of 1996 and 1997 at the Eastern Complex on the sandy hill / alluvial fan abutting the face of Jibāl Ramm, in the bay west of the modern village within Wādī Ramm. The Nabataeans referred to this area as Iram (Savignac and Horsfield 1935: 265-269); the Romans as Aramaua (Ptolemy *Geog* 6.7.27; Graf 1983: 655). The WRRP has previously published a preliminary report on the first season of work (Dudley and Reeves 1997), overviews of the complex (Dudley and Reeves 2007, 2013), and a report on the ceramic building materials (Reeves and Harvey 2016). The final publication is currently underway. The purpose of this paper is to share some interim thoughts about the Eastern Complex's phasing and character.

The Eastern Complex, along with the Nabataean Temple and Western Complex behind it, had been cleared out by the Department of Antiquities in the early 1960s but the records of that work have been lost, except for a few photographs in the Amman office (**Fig. 1**) and some objects deposited in the 'Aqaba Museum (*e.g.* inscriptions: Sartre 1993: 180-181, nos. 147, 148; *tubulus*: Reeves and Harvey 2016: 453). In 1995 Khairieh 'Amr of the Jordanian Department of Antiquities suggested that Dudley and Reeves, two graduate students involved in archaeological work at Al Humaymah, study the ruins of what seemed to be a Nabataean house and bathhouse on the eastern end of the Ramm hill (**Fig. 2**). Thus began the two seasons of the WRRP, with goals to document and analyze the extant ruins, excavate some probes to assist in phasing the complex, and clean up the site prior to planned consolidation by the Department of Antiquities.

1. The Wadi Ramm Recovery Project was licensed by the Department of Antiquities of the Hashemite Kingdom of Jordan and accredited by the American Schools of Oriental Research's Committee on Archaeological Policy. The first field season took place from 2 to 23 August 1996. The second season took place from 27 June to 18 July 18 1997. Project directors were Dennine Dudley and M. Barbara Reeves, both then of the University of Victoria. Luay Mhamadieh served as Department of Antiquities representative and draughtsman in both seasons. Vicky Karas served as excavator and assistant in 1997. Khairieh 'Amr analyzed the 1996 ceramics; Sarah Wenner analyzed the 1997 ceramics following preliminary examinations by John Oleson and Andi Shelton. Megan Perry provided an osteological report on the human skull. Luay Mhamadieh, Dennine Dudley, M. Barbara Reeves, Sean Fraser, and Michael Huston contributed to the creation of the top plan. This process was facilitated by a surveyed point map created by IFAPO prior to the 1996 season to locate the corners of exposed archaeological remains across Ramm's bay. The 1996 season of the project ran simultaneously with Laurent Tholbecq's investigation of Ramm's Nabataean temple and Western Complex allowing our teams to share resources (Tholbeq 1998). Funding for the WRRP was provided by the University of Victoria Alumni Association (1996, 1997), an American Schools of Oriental Research EBR CAP Grant (1997), the Joukowsky Family Foundation (1997), the Archaeological Society of British Columbia (1996), and the donations of many generous individuals. Barbara Reeves was awarded a Von Rudloff Travel Scholarship and a Graduate Student Travel Grant in 1996 from the University of Victoria and an ASOR Endowment for Biblical Research Travel Grant in 1997. Vicky Karas was awarded a Von Rudloff Travel Scholarship in 1997. We are grateful to Dr. Ghasi Bisheh and the Department of Antiquities for providing salaries for the workmen and supplying a truck for the transportation of finds at the end of the 1996 season. We are also grateful to Drs. Pierre and Patricia Bikai and all the staff at ACOR and also to Dr. John P. Oleson (University of Victoria) for their assistance and to Khairieh 'Amr for suggesting the study of this site.

Nature of the Eastern Complex

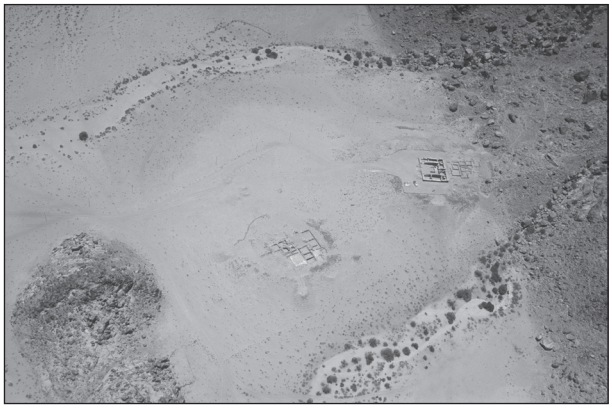
Although our pre-excavation expectations (based on earlier reports) were to find the ruins of a house and bathhouse, it quickly became apparent that all of the ruins at the eastern end of the hill formed part of a single large structure, which we rebranded as the Eastern Complex. It was further apparent that construction details including large quarried blocks, painted wall plaster, column drums, and an internal bathing suite were indicative of an elite structure. The building's placement at the front (*i.e.* eastern end) of the projecting hill is also consistent with Nabataean and contemporary elite structures situated on natural heights which allowed them to both overlook the surrounding landscape and to be seen as a dominating aspect of it (*e.g.* Petra: Kolb 2003; Schmid *et al.* 2012; Al Bayḏā: Bikai *et al.* 2007; Judaea: Gleason 2014: 82-83, 86).

As the primary goal of our limited project was to document the parts of the structure cleared out in the 1960s, the Complex's plan is still only partially known (**Fig. 3**). What is apparent is that the structure consists of more than 28 rooms grouped in four main suites around a central courtyard (Room G) with corridors and doors controlling access to different areas. Western Rooms A-E and Corridor Θ are hypothesized to have served a private, perhaps domestic, purpose, while northern Rooms H, I, and J with open and easy access into Room G, appear to have had a more public function. Eastern Rooms L, M, N, O, Q, R, W and X are identifiable as part of a bathing suite. Courtyard P is accessible from Room G but has no clear role. Southern Rooms F, K, U, V, and T also served an undetermined function. Given that the hill (currently) falls off to the north and east of the Complex, that the entrance to the bay from Wādī Ramm was to the southeast, and that the village was to the southwest, the entrance to the Complex was probably on its south side.

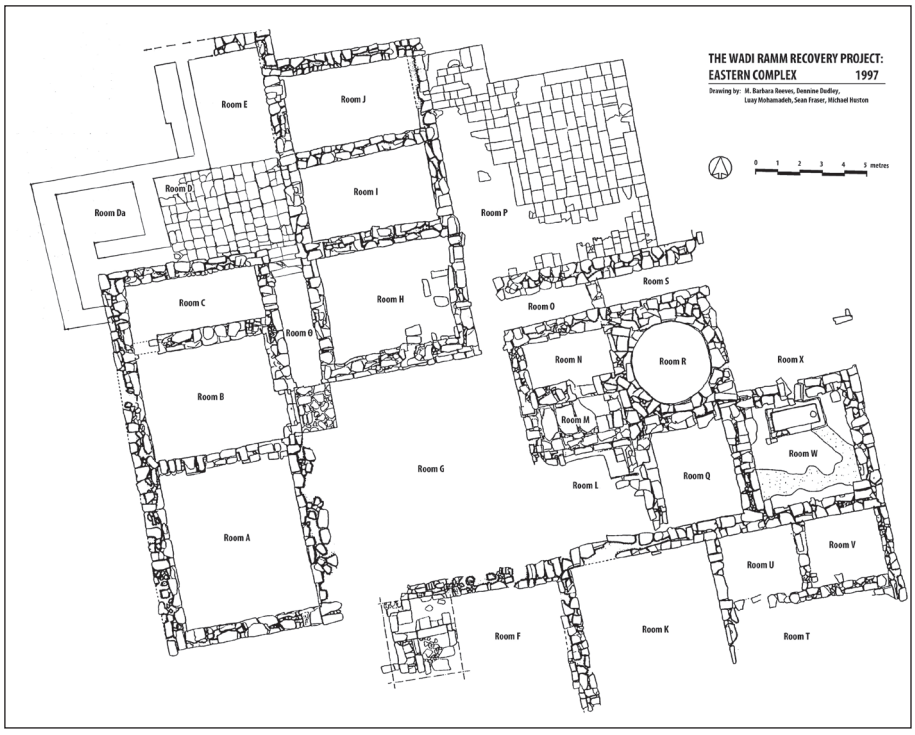
Fieldwork Overview

During the 1996 season most of the ruins exposed during the 1960s excavation were sufficiently cleared of debris (including 1995 earthquake collapse, **Fig. 4**) to allow most of the previously exposed walls and features to be drawn, described, and photographed. In some cases we removed soil to ascertain the nature of the flooring (*e.g.* in Rooms G and W); the fill was then replaced for protective purposes. In 1997 the cleared flagstones in the northern courtyards and Room M were deliberately left uncovered to assist in the upcoming consolidation. Probes were also undertaken to investigate the hypocaust in Room W, the floor in Room R, and the intersection of Courtyard G, Room B, and Corridor Θ. Also in 1997, additional probes were carried out beneath the floor of Room Q, across the east side of Rooms M and L, inside the north end of Corridor Θ, and in the deep fill south of Room G where the entrance to the building had been hypothesized. As most of these probed areas had not been cleared out in

1. 1960s clearance of Nabataean Temple and Western Complex (foreground) and Eastern Complex (left rear). (Courtesy of the Department of Antiquities of Jordan, A187).



2. Hill at base of Jebel Ramm with the Eastern Complex (center), Temple and Western Complex (right), and cemetery between. The bottom of the hill's north and south slopes are demarcated by run-off wadis. Photo from 1998, following the WRRP's second season and before consolidation of the Eastern Complex. (APAAME_19980520_RHB-0089. Photograph by Robert Bewley, courtesy of APAAME).



3. Plan of the Eastern Complex. (WRRP 1997).

the 1960s, a major goal was to obtain information that could help in phasing the complex. Finally, work was also carried out in 1997 to define more of the architecture in the northwest corner of the building (Rooms D and E).

Information for Phasing

Information pertinent to phasing the Eastern Complex comes from the physical remains of the structure, the objects found within, and the local and regional context. Analysis of the pottery sherds provided a very general sense of ancient human activity within the Complex. In both 1996 and 1997 sherds ranging in date from the first century AD to fifth century AD were found in rooms throughout the structure. In addition, some possible sixth and seventh century sherds were found in the fill over Courtyard P, a possible Iron Age sherd (a clear outlier) was found in the fill of Room E, and a late first century BC or early first century AD sherd was found in a probe beneath the hypocaust's plaster floor in Room W.

Based on the ceramics, it is likely that this elite structure was constructed in the Nabataean period and then utilized in some fashion during the Roman and Byzantine periods. A Nabataean period build is supported by the construction methods. The walls of the structure were constructed from large quarried ashlar blocks etched with the typical Nabataean diagonal dressing (**Fig. 5**). On some wall faces these blocks were tightly fit together; elsewhere chinking stones were used between the blocks. This combination of these two methods of facing within the same structure matches the construction style of first century AD Nabataean structures at Hawara (modern Al Humaymah), the largest settlement in the northern Hisma (Reeves *et al.* 2017: 108-111).

Another important element to dating the building's construction is the use of sandstone *pilae* to support the hanging plaster floor in Room W's hypocaust (**Fig. 6**). Sandstone does not withstand the heat of a furnace well and thus its use for *pilae* seems to have been restricted to

4. Room Q and corridor to Room R filled with tumbled blocks prior to the WRRP's 1996 cleaning. (WRRP).

5. Room R wall with quarried Nabataean dressed blocks and extant wall plaster. (WRRP).

6. Room W hypocaust with stone pilae, stone pilae-covering slabs, flue vent, and plaster layers of hanging floor. (WRRP).

early hypocausts (Nielsen 1990: I.14). Indeed, already by the late first century BC, the Roman architect Vitruvius included only the use of fired bricks when describing hypocaust construction (*De Arch* 5.10.2). The best regional parallels for sandstone *pilae* come from the baths in Judaea built by Herod the Great, many of which were built between 35 and 15 BC (Netzer 1999). The public bathhouse at Ramat Hanadiv near Caesarea also employed carved sandstone *pilae* and was also constructed in the late first century BC (Hirschfeld 1995: 39-42). Based on these parallels and the fact that Nabataean elites probably knew about these luxurious structures in the neighboring country, a date for the construction of Iram's bathing suite in or soon after the late first century BC is probable. In further support of this date, the stone *pilae* and *pilae*-covering slabs in the hypocaust do not conform to the specific measurements detailed by Vitruvius (*De Arch* 5.10.2), suggesting that this bathing suite may predate his handbook on architecture (or at least the introduction of his ideas to Nabataea).

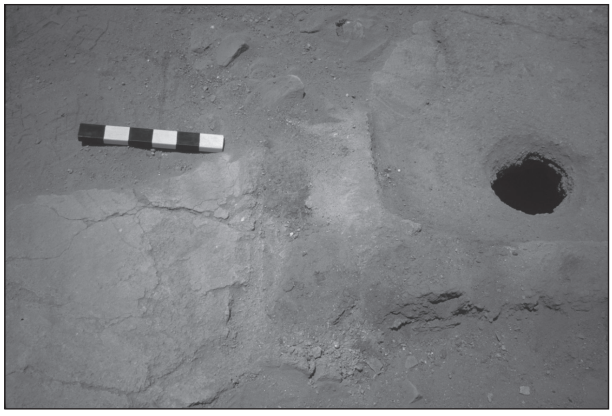
The standards recommended by Vitruvius can, however, be seen in the ceramic building materials (small rectangular bricks, circular *bessales*, *tubuli,* and pipes) found in the fill of Room W (the *calidarium*) and other rooms in the complex. Circular *bessales* and other bricks also remained *in situ* in the rim of the *calidarium*'s basin (**Fig. 7**) and in a posited repair to a wall in Room M. The dimensions of these ceramic building materials conform to fractions of the Roman foot (Reeves and Harvey 2016: 463, 467) demonstrating knowledge of Roman building standards at the workshops that produced them and shipped them to this site. The fact that good parallels for the fabric and dimensions of the small rectangular bricks and *tubuli* from this complex have been found in a first century AD Nabataean bath in Wādī Mūsā indicates that the ones at Wādī Ramm are likely of Nabataean date (Reeves and Harvey 2016: 463, 467, 470). The *tubuli* must have lined the walls of Room W, as it is the only room in the Eastern Complex found to have been heated by a hypocaust. Bricks were used in Room W's basin, and others were possibly used in the furnace (Room X?). The locations of these ceramic building materials could assist in phasing this complex, but whether some ceramic building materials were used together with the stone hypocaust elements in the original construction of the bathing suite, or whether some or all were added in a later renovation is currently unknown.

The previous evidence all supports the Eastern Complex's construction as a Nabataean elite structure in or by the first century AD. A late first century AD date would make it contemporary with the nearby Rabbel II monument at 'Ayn Ash SHallālah (Savignac 1933: 407-11; 1934: 581-582) and the posited expansion of Iram's temple (Tholbecq 1998: 245-247). A late first century BC to early first century AD date would make it contemporary with the first major phase of Iram's temple (Tholbecq 1998: 243-244, 246). Either of those periods, when there was major construction undertaken in Wādī Ramm, likely under the patronage of a Nabataean king, would be a logical time for a Nabataean elite to take up residence in a prominent location near both the Temple of Allat and the sanctuary at 'Ayn Ash Shallalih.

Probes Beneath Floors

In an attempt to narrow down the building's construction date, three probes were excavated beneath floors in the bathing suite. These probes explored beneath sections of extant floors in Rooms W and Q and beneath the robbed out floor in Room R.

Room W. Room W was the bath's *calidarium* (hot room). It is a square room with square projections in each corner for springing a dome, a large immersion basin on its north side, grooves for flue pipes in its south, east, and north walls, and a (later blocked) door to Room Q (**Fig. 8**). The walls are made of large quarried blocks with a mortared rubble fill; the rim of the basin is made of a combination of flat cobbles, circular *bessales*, and rectangular or square bricks laid in grey mortar with a facing of grey plaster covered in orange hydraulic plaster (**see Fig. 7**). The hole in the basin's east end, possibly for drainage, is 0.20m in diameter.



7. Southeast corner of the calidarium's basin showing circular bessales used in its rim, grey and orange plaster on the floor and the basin's interior, and the circular hole. (WRRP).

8. Room W (calidarium) facing north. Note remnants of the plaster floor and immersion basin, and the square projections in the corners of room. (WRRP).

In 1996 a 0.10m thick fill still remained over the surface of Room W, consisting of sandy light brown soil containing loose blocks and cobbles, fragments of orange and grey floor plaster, mortar, and white wall plaster, hundreds of fragments of *tubuli* and a few brick fragments, and some twentieth century items. Removal of this fill revealed remnants of a plaster floor. It was decided to sink a probe through the floor in the southeast corner of the room in order to document the construction of the floor and the hypocaust beneath, and to look for datable materials. This revealed that the *calidarium's* (hanging) plaster floor was 0.17m thick and had been laid in six layers. The top layer is orange hydraulic plaster. Beneath this are two layers of light grey plaster with carbon and lime inclusions, another layer of orange plaster with crushed pottery inclusions and thin layer of crushed pottery beneath, then another layer of grey plaster and finally a layer of sandy brown mortar or mud plaster. Below this was a 0.19m thick layer of irregular cobbles set in light grey mortar (**Fig. 9**). The two different surfaces of orange hydraulic plaster (which should be the upper surface of the floor) suggest an original construction phase and a subsequent renovation phase. Between the hanging plaster floor and the wall was a space of 0.10-0.12m, extending down to the *pilae*-covering slabs, to allow *tubuli* to be attached to the wall. Below the hanging floor, the *pilae*-covering slabs consisted of large flat irregularly-sized sandstone slabs *ca.* 0.14m thick. These stone slabs rested on sandstone hypocaust *pilae* (See **Fig. 6**) with capitals consisting of either a single rectangular block or a two-block stepped capital with Nabataean dressing. The *pilae* are at least 0.78m high but their bottoms and the subfloor beneath could not be reached from the top of the probe. Two layers of fill were discovered around the *pilae*. The top layer (0.79m thick) seems to consist of the same sandy light brown soil as found above the floor and in the space between the end of the hanging plaster floor and the wall. It contained broken *tubuli* fragments and a single small pottery sherd, dating to the late first century BC to early first century AD, which probably leaked beneath the floor with the soil, through the gap left by the broken *tubuli*. This early sherd is thus out of its original context and cannot be

used to date the operation of this hypocaust. Unfortunately, the ash layer below this soil fill, which accumulated during the hypocaust's operation, produced no finds.

Room Q. Room Q is a rectangular room linked by doors to Rooms R, W, and L. Given its placement in the bathing circuit between the *calidarium* (Room W) and the *frigidarium* (Room M) and the lack of furnace grooves in its walls, it was hypothesized that Room Q might have functioned as a semi-heated *tepidarium* or sweat room. To investigate whether or not it contained a hypocaust and to search for any evidence of the room's phasing, a 1.50m wide probe was begun along the room's southern wall in 1997 (**Fig. 10**). After digging through four layers of soil fill, a mortared cobble layer suggestive of a damaged floor surface was encountered. To investigate this surface and anything beneath, a 1.50×1.40m sub-probe was excavated in the southeast corner of the room (**Fig. 11**).

These probes revealed that the room had been constructed on top of sterile coarse orange sand (at least 0.18m thick). On top of this sand was a 0.40m thick mixture of sandy light brown soil full of pebbles and cobbles which seems to have formed a packing for two thick large sandstone slabs, resembling the slabs over the hypocaust in Room W **(Fig. 11)**. These slabs possibly formed part of a floor which was later robbed out. Two parallel blocks fell, or were set, 0.15m apart on top of these slabs. Between, around, and over these two parallel blocks was light brown soil containing fragments of orange hydraulic plaster with one smoothed face, the original context of which is unknown. Pottery sherds found in this soil do not date later than the first or early second century AD. Above this soil layer was a *ca.* 0.12m thick layer of irregularly shaped and tightly packed cobbles set in grey mortar with some flat cobbles on top. As the upper surface was very patchy, it is not clear whether this layer is indicative of a cobble floor or simply a mortared cobble foundation. None of the 10 diagnostic pottery sherds found in the mortared cobbles could be dated later than the early second century. The fill over this

9. Cobble layer beneath plaster layers in Room W's hanging floor. (WRRP).

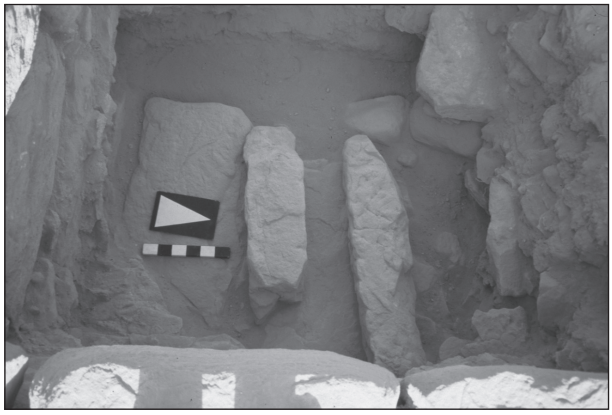
10. Probe along south wall of Room Q with cobble concentration and flat stones. (WRRP).

feature constituted four layers of soil (0.34m thick) containing displaced third to mid-fourth century AD pottery sherds and some bone fragments. There was also a high concentration of wall plaster, some of which was found in broken sheets suggesting it had fallen directly from the walls. This plaster had either white or grey faces and in some cases, there was white-faced layer from a renovation overlying an earlier grey-faced layer, hypothesized to be soot accumulation.

The stratigraphy from these probes suggests a sequence of construction, damage, and rebuilding. In the earliest phase, corresponding to the construction of the Eastern Complex's bathing suite, a floor of stone slabs set in a foundation of soil, cobbles, and pebbles was laid over sterile orange sand. First to early second century AD pottery sherds, orange hydraulic plaster fragments, and stone blocks subsequently were dumped or fell onto this floor and other floor blocks were removed. This damage might be associated with an earthquake or disruption around the time of the Roman annexation (*cf.* Parker 2009; Reeves *et al.* 2017: 108-111, 139). This damage was followed by a renovation in which a foundation level of cobbles (and early second century pottery sherds) set in grey mortar was laid over the previous debris. Based on the pottery sherds this renovation dates to a late Nabataean or Roman phase in the Eastern Complex's use. The floor over this cobble foundation was later robbed out. After that layers of soil, third to mid-fourth century AD pottery sherds, bone fragments, and fallen wall plaster filled the abandoned room, but it is impossible to know to what extent the fill present in 1997 accumulated before or after the 1960s clearance. These probes revealed that this bathing room had not contained a hypocaust. It is, however, possible that that this room could have functioned as a *tepidarium*, if the soot staining on early phase wall plaster was due to a brazier located inside the room.

Room R. Room R is a circular room situated in the bathing circuit between Rooms N (the *apodyterium*) and Q. Its internal walls are constructed from large tightly fitting blocks with a concave interior face and diagonal Nabataean dressing (see **Figs. 5 and 12**). The blocks were laid in level courses over a circular rim which extends 0.05m towards the center of the room. The rim-stones at the base of the wall also serve as part of the flooring in the corridors linking Rooms N and Q, indicating cohesiveness in plan and construction. This design feature and the presence of a disturbed convex-sided flagstone in the fill of Room R led us to hypothesize that this room once had a flagstone floor at the level of the rim. This theory was later confirmed by a local man who had worked on the 1960s clearance. In an informal interview in 1997, he noted that the flagstone floor had been extant at the time of the earlier excavation and that the 1960s team had lifted a flagstone. Subsequent looting presumably resulted in the removal of the remaining stones.

In order to determine what remained beneath the robbed-out flagstones, a small probe (1.20×0.75m) was excavated beside Room R's east wall and the corridor to Room Q (**Fig. 12**). This probe revealed a packing for the floor consisting of unworked cobbles and large stones in firm light brown soil. This foundation was



11. Room Q sub-probe with blocks on top of sandstone slabs. (WRRP).

12. Room R, corridor to Room Q, and location of probe beneath robbed out floor. (WRRP).

deepest next to the wall (*ca.* 0.66m thick) and sill (0.50 thick) and thinner towards the center of the room (0.28m thick) (**Fig. 13**). Fragments of wall plaster and mortar were found in the foundation's soil, along with a glass bead, and 23 pottery sherds, all non-diagnostic, but, given the robbed out floor above, it is likely that this foundation layer has been disturbed during the twentieth century. A probe beneath this foundation revealed that it rested on sterile orange-brown sand.

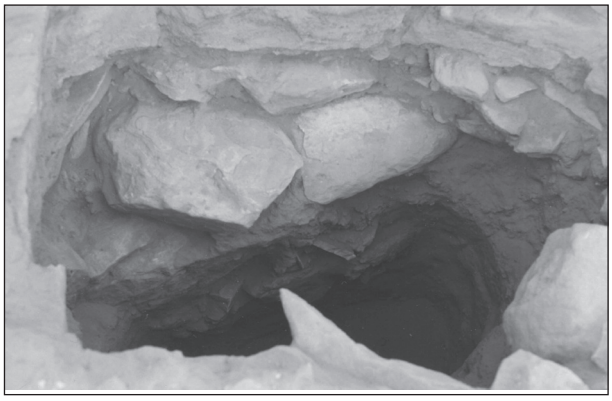
Probes in the Fill

All rooms in the complex were covered in fill when our examination began in 1996. In most cases this fill had accumulated since the 1960s clearance, although it is not known whether that clearance had always extended down to the ancient floor levels. Clearance may not have extended to the floor in Room W (the *calidarium*), for example, where hundreds of flue pipe fragments were found in the overlying fill. The fill over the *frigidarium*'s floor north of the basin (Room M) may also not have been fully cleared-as a local resident who participated in the 1960s work told us that the ash dug through then resembled the ash layer that we encountered. Yet, Room W's fill also produced modern glass and a World War 1 Belgian military button, which are a good reminder that the fill in cleared out rooms represent a context disturbed both by the clearance and more than thirty years of subsequent activity. Wall sections collapsed over fill, some from the November 1995 earthquake, were another record of recent disturbance (See **Fig. 4**); another was clandestine digging before, during, and between the WRRP's excavation seasons (**Fig. 14**). Thus, although all the fill throughout the complex contains objects related to this site's history, only the objects beneath intact floors, or in areas not cleared out in the 1960s, can provide secure evidence of the Complex's phases.

To investigate these contexts, a few probes were excavated in 1997 in areas that, based on their deep fill, did not appear to have been cleared out in the 1960s (the *frigidarium*'s basin; Room L; the north end of Corridor Θ; Area G01). Some of the phasing information obtained from these probes is discussed below. A caveat to interpreting all of this information is that even the areas not completely cleared out in the 1960s must have had surface tumble removed at that time (see **Fig. 1**) or before (*e.g.* Savignac and Horsfield 1935, 245). Thus, the material from roofs, ceilings, and the upper courses of walls was no longer available for study.

Rooms L and M

At the end of the 1996 season it had been hypothesized that Rooms L and M might form a single room comprising the bath's *frigidarium* (Dudley and Reeves 1997: 102-103). This theory was based on two factors. First, what appeared to be the edge of a large basin (*ca.* 2.55m long×1.90m wide) whose northern rim was uncovered in cleaning the southern edge of the 1960s clearance in Room M (**Fig. 15**). Second, a doorway between Rooms Q and L which, if M and L constituted the *frigidarium*, would confirm a ring-style organization for the bathing suite. The 1997 excavation over the floor north of the basin and probes along the east wall were unable to either prove or disprove the single



13. Room R probe bottom. (WRRP).

14. Room L vandalism: removal of floor stones and digging into the missing lower section of the wall between Rooms L and K. (WRRP).

room hypothesis. Thus, until further excavation is conducted in the deep fill over the southwest quadrant of this area, "Room M" will be used to denote the *frigidarium*'s floor and basin whereas "Room L" will be used for the area to their south.

Room M North of the Basin

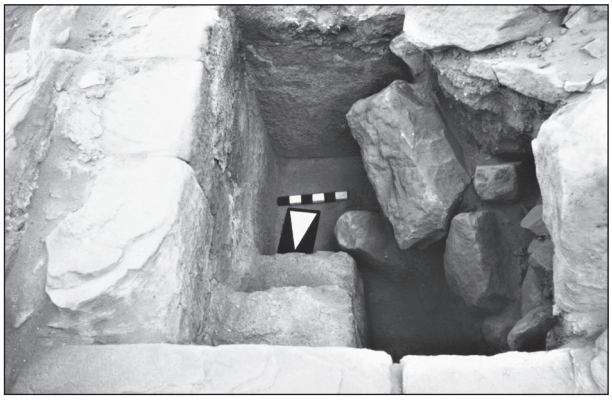
In 1997 the ashy fill remaining to the north of the basin was cleared, revealing a flagstone floor composed of large blocks and cobbles set in grey mortar, which was disturbed by a robber's pit. The clearance also revealed a bench (2.70m long × *ca.* 0.39m wide × 0.28m high) (**Fig. 16**). Traces of white wall plaster remained on the side of the bench, on the walls of the room, and inside the door to Room G. The walls and features in the room are made almost exclusively of mortared stone blocks, whereas occasional bricks are likely from repairs. Stones placed on top of the flagstone floor, especially two stones abutting the north wall, one of which is an inverted water channel block, may have served as platforms in a post-bathing phase of the room's use. The robber's pit also corresponds to a later use. If the remaining 0.17m thick layer of ashy soil filling the room (including a dense charcoal layer directly over the floor) is ancient, then the platforms and ash, in conjunction with finds of burnt and unburnt animal bone, *tabun* fragments, and a grinding stone, may indicate a later domestic phase. Other finds from the fill included second to early fourth century pottery sherds and a coin of the Roman Emperor Gallienus (r. 253-268 AD).

Room M Basin

In contrast to the shallow fill north of the *frigidarium*'s basin, the fill inside the feature was much thicker (0.90-1.00m), suggesting it had not been cleared out in the 1960s (see **Fig. 15**). To investigate the nature of the basin's construction and the fill within it, a probe was laid in 1997, spanning the basin from its northern to southern edges and extending 1.5m back from its eastern wall (**Fig. 17**). This probe revealed that the basin's walls are composed of large Nabataean-dressed blocks fit tightly together with small chinking stones between. Interior dimensions (not including plaster) are 1.24m wide × *ca.* 2.59m long × 0.94m deep. Entry was facilitated with two interior steps in its northeast corner (0.25-0.34m long×0.36-0.37m wide×0.25-0.30m high). The rim was 0.38m wide on the north/front, 0.36m wide on the east, and 0.17m wide on the south where it abutted a poorly preserved wall (possibly a partition wall) 0.63m wide. The basin's rim and its interior walls, floor, and two steps were coated in layers of grey and orange plaster. Two layers of plaster (orange on top of grey) are extant on the rim and three successive layers (grey, orange, grey) are also extant on the south and east interior

15. Room M after cleaning in 1996 revealed the edge of the frigidarium's basin. (WRRP).

16. Three areas excavated in Rooms M and L in 1997. (WRRP).



17. Probe inside the frigidarium's basin in Room M. (WRRP).

18. Objects found inside the frigidarium's basin. (WRRP).

walls. The application of grey plaster over the orange hydraulic (presumed) surface layer probably represents a renovation associated with a second bathing phase, post-dating the basin's original construction.

The top 0.30m of fill within the basin contained sandstone blocks, cobbles, wall plaster, bone fragments, and fourth century pottery sherds in soft light brown soil. The next 0.35m contained a layer of ash lenses and burnt cobbles overtop soft brown soil surrounded by cobbles and some large blocks with a black ash pocket in its center. This layer contained fragments of wall and basin plaster, glass vessel fragments, animal bones, third century AD pottery sherds, lumps of iron and copper alloy, two almost intact pottery vessels, hand-sized basalt disks, a hand-sized quartz ovoid with a flat end, and a copper alloy cosmetic stick (**Fig. 18**). The lowest layer (0.25m thick, extending from the top of the lowest step to the bottom of the basin) consisted of soft light brown soil with many cobbles and blocks. This layer contained fragments of wall and basin plaster, animal bone fragments, early to mid-second century AD pottery sherds, and human remains (a detached human skull resting vertically on the floor of the basin with some finger bones beside and friable long bones visible in the western baulk) (**Fig. 19**).

Based on a preliminary analysis of ceramic sherds in the layers of the basin's fill, we had previously postulated that the deceased was the victim of an early second century earthquake that marked the end of the bath's operation (Dudley and Reeves 2007: 407; *cf.* 2013: 301-302). The hypothesis needs to be revised now given that the pottery sherds in the lowest layer of fill could date into the mid-second century. It is still possible that the deceased was a victim of a later earthquake that brought down the walls in the basin and Room L (see below) and resulted in this person's head becoming detached. Given the third and fourth century pottery around the large blocks in the upper layer of fill, the 363 earthquake is a possibility. In that case the excellent level of preservation of the skull (but not the long bones) might be due to the arid conditions and surrounding tumble arresting its deterioration.

As **Fig. 17** illustrates, the surrounding rocks and soil would have provided enough protection to slow down decay, but not a shield that would completely eliminate deterioration from insects or rain. Although Wādī Ramm is in a very arid zone, there are at least five rainstorms a year

19. Skull in situ at the bottom of the frigidarium's basin. (WRRP).

(Oleson 2010: 33). The rainfall run-off from the adjacent Jibālwas mostly channeled beneath the northern and southern edges of the hill (see **Fig. 2**), but rain landing on the Eastern Complex would have sunk into its soil. In the case of the water-proof basin, this meant some water would have pooled around the human remains at its bottom. This was especially likely in the three decades between the clearance of the archaeological site and the body's discovery.

Given the excellent preservation of the skull, it is therefore possible that these remains represent either a burial pre-dating the creation of the archaeological site or the re-interment of excavated human remains. A cemetery predating the earliest archaeological work in Wādī Ramm was documented on Barrois' 1934 plan of the bay (Savignac 1934: pl. 35). Thus that cemetery is many decades older than both the clearance of the ruins in the 1960s and the establishment of the modern village in the 1970s (Chatelard 2003: 140). Although that cemetery's edge is currently more than 25m to the west of where this body was found (see **Fig. 2**), it is possible that these remains might be associated with it. Alternatively, the re-internment of excavated human remains is also possible. Reports indicate that archaeologists opened nearby tombs in the 1930s, 1950s, and 1960s (Glueck 1934: 54; Hayajneh 2006: 112; Perry and Jones 2006: 157, 166). If any of the human remains found in those ancient tombs were subsequently re-interred in Wādī Ramm, the unexcavated ruins next to the cemetery might have seemed a suitable location. Such a re-interment might explain why the skull was detached from its body. All of these theories will require further study.

Room L

In 1996 it was noted that Room L still contained deep fill - up to the exposed top of its east and south walls and completely covering its west and north walls and any features within the room. Like the Room M basin, most of Room G, and the areas south of Room G, this area does not appear to have been dug out in the 1960s. In 1997 a 1.5m wide probe was excavated along the east side of the room (**Fig. 20**). This revealed that Room L is 1.68m wide. Based on the common wall line shared by Rooms O, N, M, and K, it is probably 3.65m long. There is a doorway (later blocked) from Room Q at the southern end of its east wall, and a rough wall (perhaps not original) between it and the basin in Room M. The wall between it and Room K, which features a water channel running around its northwest corner (Dudley and Reeves 1997: 104-105), was disturbed at some point in the past and crudely repaired with stones re-laid along the wall line (See **Fig. 14**). As a result, the eastern stones in Room L's south wall that are visible on the surface are only two courses deep and resting on soil. A partially intact sandstone floor was encountered 1.20m below the top of the fill (**Fig. 20**). The floor is composed of rectangular sandstone slabs set in light grey mortar. It runs from the room's north wall to the (missing) south wall and extends 0.90m west from the base of the east wall. A 0.60m wide sub-probe in the soil alongside the extant western edge of the floor and extending 0.50m from the north wall found a concentration of cobbles, likely the foundation for the floor's now missing continuance.

Five *loci* were excavated in Room L, three over the floor level and two in the sub-probe west of the extant floor stones. The top two *loci* (1.04m thick) contained within their light brown soil a concentration of large Nabataean-dressed blocks (0.68-0.78m long×0.25-0.38m wide×0.20-0.33m thick) from the building's collapse (**Fig. 21**), a great deal of very hard sandy white mortar probably from a vault, some wall plaster, animal bone fragments, and a few mid-second to possibly third century AD pottery sherds. If these stones and mortar are *in situ* where they fell, their tumble supports the theory that they are contemporaneous with the death of the body in the adjacent *frigidarium* basin. The 0.16m thick soil *locus* over the floor contained many bone fragments, seven corroded iron fragments, a 0.018 thick flat-faced fragment of alabaster, two ceramic pipe fragments,

20. Room L probe showing floor stones and crude wall between Rooms L and M. (WRRP).

and first to second century pottery AD sherds. The top 0.12m thick *locus* next to the extant floor stones consisted of light brown soil with ash and dark soil lenses containing a few bone fragments and late first or early second century pottery AD sherds. The 0.08m thick *locus* below that contained no finds except for a significant concentration of cobbles in a hard-packed matrix suggestive of a floor foundation.

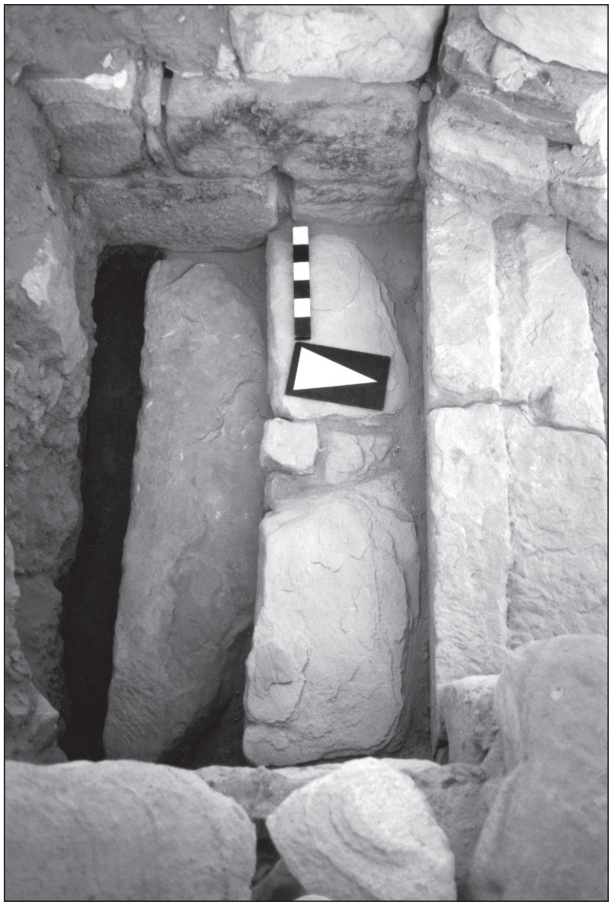
Room L's robbed out floor stones, missing and crudely re-laid south wall, crudely constructed north wall, blocked door to Room Q, and wall stones fallen on top a 0.16m level of soil fill are all records of the long and multi-phase history of both this room and the Eastern Complex as a whole. This history was further complicated when, at the end of the 1997 probes (and before the floor could be drawn), looters pulled up floor stones and bored into the south (missing) wall (see **Fig. 14**). It does not appear that these looters found anything archaeologically significant, as no deep holes were dug and no bones or pottery fragments were discarded, but this cannot be confirmed.

Corridor Θ

Corridor Θ provides access from the central courtyard (Room G) to the courtyard in Room D and the rest of the northwestern corner of the complex, as well as an entrance to Room C that bypasses Room B. As best we can determine, this corridor had not been cleared in the 1960s. In 1997 we probed the north end of the corridor, 0.40m down into the compact sand and large stone tumble. We were unable to extend this probe very far to the south, as the stability of the walls was in doubt, but we were able to reveal the entirety of a short flight of stairs which descended from the corridor's doorway to a floor of cobbles set in sand (**Fig. 22**). In the short distance between the bottom step and the baulk, we discovered an ash layer immediately over the floor. This contained fragments of bone and coarse-ware ceramics, some of which were burned. The only diagnostic pottery sherd found on the floor dated from the late first to early second century AD; ceramics higher in the fill dated from the fourth to early fifth century AD.

Area G01. At the end of the 1996 season

21. Collapsed stones at top of the probes in Room L and the Room M basin. Facing north. (WRRP).



22. Probe in north end of Corridor Θ with stairs to Room D. (WRRP).

the area south of Room H and west of Room K remained unexplored, except for the small probe in the shallower fill of its northwest corner. A better understanding of this area was one of our priorities, and in 1997 we traced a continuance of the northern wall line extending west of Room K into Room F. We also excavated a 3×3.5m probe through the fill which, based on its thickness of up to 1.34m, was not disturbed in the 1960s. This probe (**Figs. 23, 24**) revealed a further continuation of the north wall, a west wall with a doorway in the northwest corner of the probe, a staircase in the southeast, and a paved landing or corridor in the north which provided access to the western door, the southern staircase, and Room F to the east. The north western doorway leads to an unexcavated space between this probe and Room A, where the southern entrance to Room G is now thought to be located. The staircase, which rises to the south, provided access to some undetermined part of the complex. The probe also provided ample evidence of several later phases in the Eastern Complex's lifespan: through two large blocks inserted over the doorway's threshold, through the partially robbed out paved floor and staircase, through robbed out or tumbled blocks in the walls and doorway, through the mass of tumbled stones that filled the probe and Room F, and through ash pockets in the soil. Pottery found in the probe's fill dated from the late second century to the fourth century AD suggesting this area was abandoned in or after the fourth century.

Eastern Complex Phasing

Based on the results of our excavations and analyses presented above, the following tentative phasing is proposed for Iram's Eastern Complex.

Construction of an Elite Nabataean Structure.

The Eastern Complex's architecture and context, and the pottery found within it all support its construction partially (or entirely) on sterile sand in the Nabataean period (*cf.* temple: Tholbecq 1998: 243, fn. 8). Based on the pottery, a construction date in the first century AD seems most likely, with a date early in that century supported by the use of sandstone pilae and pilae-covering slabs in its hypocaust. This would make the construction of this elite structure contemporary with either the hypothesized building of Iram's Nabataean temple in the late first century BC to early first century AD or to its major renovation in the late first century AD (Tholbecq 1998: 246-247). The latter date would make it contemporary with the Rabbel II monument at 'Ayn Ash SHallālah (Savignac 1933: 408-11; 1934: 581-582).

The Eastern Complex's construction out of quarried ashlar blocks and the sophisticated engineering skills required to build its hypocaust and the aqueduct supplying it with water (Dudley and Reeves 1997: 105-106) also suggest that skilled construction workers were sent out on one or more occasions from Petra, perhaps under royal patronage (*cf*. Hawara's foundation and water supply: Oleson 2010: 50-53, 57). It is likely that these craftsmen worked on Iram's Eastern Complex, Temple of Allat, Rabbel II monument, and the hydraulic system, perhaps at the same time. Masons, sculptors, and plasterers who were likely involved in these construction projects carved remembrances in the Nabataean language at the 'Ayn Ash SHallālah sanctuary

23. Area G01 (facing east) with robbed out floor in landing, tumble-filled entrance to Room F, north and west walls, and robbed out staircase. (WRRP).

24. Area G01 (facing southwest) with robbed out floor in landing, blocked doorway to west (after its upper stone was removed), and robbed out staircase. (WRRP).

(Savignac 1933: 415-418, 421; 1934: 577-578). A Greek inscription for the remembrance of builders found in the 1960s temple clearance (Sartre 1993: 181, no. 148) could also date to a Nabataean construction or to a later renovation.

Renovation and Reuse of the Elite Structure in the Nabataean and Roman Period.

The best evidence for these renovations and the continued functioning of the bathing suite is the laying of a new surface layer of orange hydraulic plaster in the bath's *calidarium* (Room W) and a new layer of grey plaster over orange in the *frigidarium* basin (Room M). New layers of wall plaster (including a new white layer overtop grey-faced plaster in Room Q) are also probably remnants of these renovations.

Whether or not this renovation (or renovations) occurred in the Nabataean or Roman period, it is likely that the Eastern Complex was occupied after the Roman annexation of the Nabataean Kingdom in 106AD and into the third century as suggested by mid- to late second and third century AD pottery and a coin of the Emperor Gallienus found in the Complex. Roman activity (and the interest of Roman authorities) in the nearby temple is indicated by an altar with partially preserved Latin dedication from the first half of the third century AD set up by the provincial governor (Sartre 1993: 179-180, no. 146; Bauzou 1996: 32; Savignac and Horsfield 1935: 258-261; Tholbecq 1998: 246), a coin of Emperor Marcus Aurelius (Savignac and Horsfield 1935: 259-261) and a Nabataean graffito dated to the Roman province's 41st year (147AD; Savignac and Horsfield 1935: 265-268; Starcky 1964: col. 979-980). The later graffito was painted onto a wall in the temple. On the same wall was another painted graffito, in both Greek and Nabataean, which was set up by an architect (Sartre 1993: 176-178, no. 141). Based on its location, it is thought to date to the mid-second century AD. This architect, and the builders mentioned in the Greek inscription above, might have been involved in renovations. Across the bay at 'Ayn Ash SHallālah a Greek remembrance graffito was set up to the goddess by a δοφλικάρις (Roman *duplicarius*, *i.e.* a soldier on double pay) described as "the overseer of the work" (ό έπισταθις τού έργου) (Kennedy 2004: 204; Sartre 1993: 175-176, no. 139). It is likely that this *duplicarius* and other Roman soldiers were based at Iram (Roman Aramaua) to watch over the passing trade route, springs, and religious sites (Graf 1992: 260; Kennedy 2004: 204; Sartre 1993: 175).

As no Roman fort has ever been detected in or near Iram's bay, it is likely that Roman soldiers overseeing this site were based inside a pre-existing structure. It was common practice in the Near East for Roman soldiers to be garrisoned within existing settlements and to take over and repurpose earlier structures (Kennedy 2004: 28). From a Roman military perspective, the Eastern Complex would have been a strategic choice for a *duplicarius* and small detachment. The building's location at the eastern end of the hill provided an excellent vantage point from which to monitor access into this important bay with its springs, reservoir, village, temple, and open-air sanctuary. As an elite structure, the building also conveyed a sense of authority which was reinforced by its basic similarity to a *praetorium* (the elite house with central courtyard at the center of a Roman fort that was occupied by its commanding officer). The *praetorium* in the early second century AD fort at Al Humaymah (Nabataean Hawara, Roman Hauarra) is a similarly arranged elite structure (Oleson 2019: 397-399), a point that would not have been lost on soldiers who were probably detached from that fort, the largest in southern Arabia (Oleson and Reeves forthcoming). Finally, from a practical perspective, the Eastern Complex's ample size, numerous rooms, internal bathing suite, and piped water made it a great choice for a detachment. A parallel can be noted at Dura-Europos where a military unit took up residence in a large elite house with a similar arrangement of rooms including a central courtyard and internal bathing suite (James 2019, 103-109).

Crude Reuse and Collapse in the Structure.

This phase is found throughout the Complex and is associated with doors being blocked or their thresholds being built up and rooms being reused for non-elite activity. The installation of tabuns and other cooking debris in the former *frigidarium* provide an example. Pottery found throughout the complex dating to the fourth and fifth century (and in one place possibly the sixth and seventh centuries) can be associated with this broad phase. Within this long period of reuse, there is also evidence of considerable damage to the structure, as exemplified by the missing stairs and deep layer of tumble filling

the corridor in Area G01. Further evidence of this cruder reuse of the structures on the hill was found in the temple, where a brick wall associated with domestic reuse is posited to have collapsed in the fourth century (Kirkbride 1960b: 87, 92). As bricks were not used in earlier phases of the temple, it is very likely that these bricks were recycled from the Eastern Complex's bathing suite after it went out of use. Mid-fifth century surface sherds found at the Western Complex also point to later occupation on the hill (Tholbecq 1998: 247).

Twentieth Century Disturbance.

Prior to our study in 1996 and 1997, the Eastern Complex had been heavily disturbed. Already in the early twentieth century this disruption included the shifting of interesting blocks from the ruins to the cemetery between the temple and Eastern Complex, as noted by Savignac and Horsfield in the case of a Greek inscription (1935, 263, fig. 17) and by our own team in the 1990s, in the case of aqueduct and architectural blocks. It is also possible that a burial or re-internment was made into the Eastern Complex. Savignac and Horsfield also reported on the extensive quarrying of Ramm's ruins for the construction of the 1933 police post (1935, 245). Given the increased definition of the Eastern Complex's ruins between Savignac's 1932 and 1934 site plans (1932, fig. 1; 1934 Planche XXXV), it is likely that blocks used in the police post had been removed from the tumble overlying this site. In 1959 there was possibly a sounding into the Eastern Complex's ruins (Kirkbride 1960a, 230). Then in the early 1960s the ruins on the Ramm's hill were cleared and left open to enhance tourism. A visitor centre was also built below Ramm's hill and enclosed in a wall of ancient blocks that a local resident reported were taken from the Eastern Complex (Dudley and Reeves 2013, 310). The next thirty years saw erosion to the site as a result of tourist traffic, looting, and natural processes. The November 1995 earthquake, which occurred between our preliminary examination of the Eastern Complex and our first excavation season, was especially destructive for exposed walls. As previously mentioned, clandestine digging has also taken place. And of course, our own fieldwork as well as the subsequent consolidation of the exposed walls, have changed the nature of the Complex. But as indicated, there are areas apparently still untouched, and more information yet to be revealed.

Conclusion

A full discussion of all components of this Complex and the finds from the 1996 and 1997 fieldwork will be presented in our upcoming final report. In the meantime, it is hoped that these interim thoughts on the phasing can assist in contextualizing this elite complex within Ramm, the Nabataean Kingdom, and the Roman Empire.

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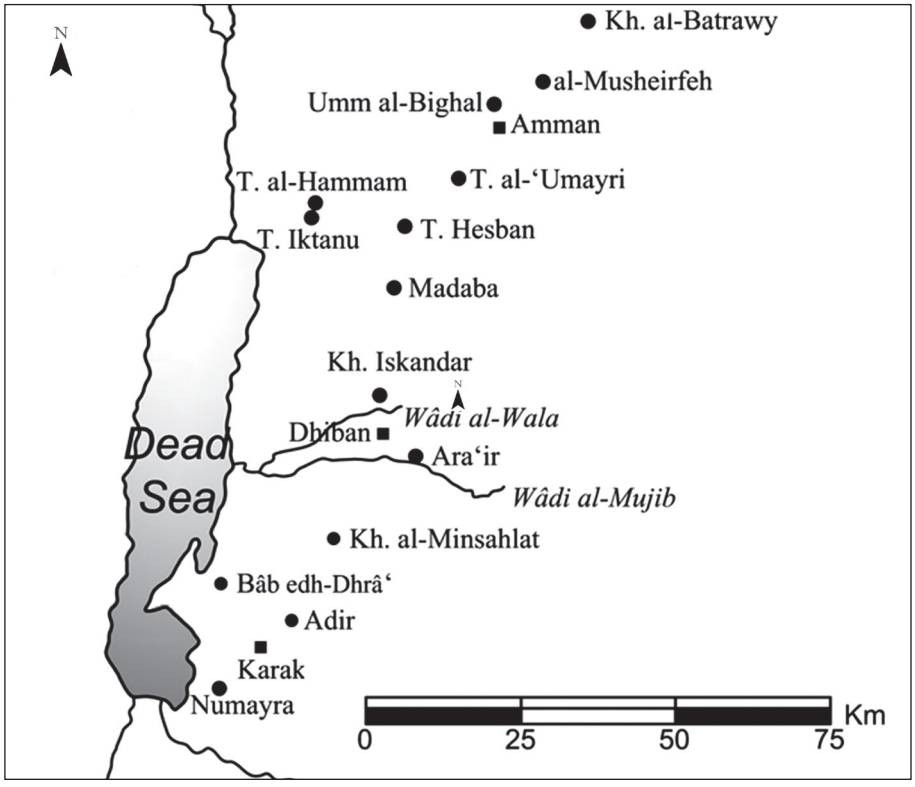
EXPEDITION TO KHIRBAT ISKANDAR AND ITS ENVIRONS: THE 2019 SEASON

Suzanne Richard, Jesse C. Long, Jr. and Marta D'Andrea

Introduction

This short preliminary report summarizes the four-week season of renewed work at the site of KHirbat Iskandar from June 9-July 10, 2019. The project operates under permit by the Department of Antiquities, for which we are extremely grateful.

The site of KHirbat Iskandar, located on the Wādī Al Wālah about 20-25km south of Mādabā and just north of DHībān **(Fig. 1),** is known as one of the major Early Bronze IV (EB IV) small towns/regional centers in the southern Levant in the second half of the third millennium BC. Recent excavations have illuminated a picture of an important EB III urban site as well. KHirbat Iskandar's importance lies in the fact that it is one of the few sites to have multi-phased *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 Wālah, 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,



1. Map showing the location of KHirbat Iskandar, north of DHībān.

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, *ca.* 2000/1950 BC.

This year represents the eleventh major excavation season at the site, the previous seasons being 1982, 1984, 1987, 1997, 2000, 2004, 2007, 2010, 2013 and 2016 (Richard *et al.* 2018 and bibliography cited there; D'Andrea *et al.* forthcoming). 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 II/III and EB IV, although earlier materials have been encountered on the *tall* and in the cemeteries (EB I).

This long-term project has in the past several seasons refocused its energies toward investigating the considerable EB III occupation on the mound in new areas away from the northwest fortifications, with the specific intent to closely examine the stratified profile at the EB III/IV transition. Given its multi-phased EB III and EB IV settlements on the mound, KHirbat Iskandar is one of the rare sites where such a research objective is possible. This new focus aligns well with the growing scholarly acceptance of higher dates for the Early Bronze Age of 3600-1950 BC (Regev *et al.* 2012; Höflmayer 2014, 2017), which has radically altered traditional scholarly views on both the EB III and EB IV. The latter (the so-called pastoral-nomadic period) is now almost 500 years long and one that correlates with the late Old Kingdom as well as the First Intermediate period in Egypt, thus now overlapping with state societies in both Syria (the Kingdom of Ebla) and Egypt (Richard 2020; Höflmayer 2014, 2017; D'Andrea 2019, 2020). Previously, the dates for the EB IV culture, *ca.* 2350-2000 BC, virtually equated with the decentralized Egyptian First Intermediate Period, thus bolstering a cultural synchronism with an EB IV pastoral nomadic intermediate period in the southern Levant, called by some scholars the Intermediate Bronze Age (IBA). The period was generally thought to have little connection with either the urban period before or after, and for surveys of the period, see Richard (1987, 2014), D'Andrea (2014), and Prag (2014). The new chronology, along with a growing data from new excavations, has engendered recent reevaluations of EB IV society (*e.g.,* Prag 2014; Richard 2014, 2020; D'Andrea 2014, 2020; Greenberg 2002, 2017; Falconer and Fall 2019). A new synthesis of the period, which gathers a plethora of evidence from the permanent settlement sites, posits the view that there was a high level of rural complexity in the EB IV period, as well as strong continuities with Early Bronze Age tradition (Richard 2020). The continuing work at KHirbat Iskandar is shedding new light on facets of the reoccupation of the mound in the aftermath of the destruction of the urban EB III settlement. Based on radiocarbon dating and survey of diagnostic ceramic types, this destruction appears to have occurred before the end of the period, so in EB IIIA. The 2019 season at KHirbat Iskandar has brought to light a stratigraphic profile having all the hallmarks of a new dataset that could very well proffer cogent new information on the events and activities of inhabitants in the immediate wake of the EB III destruction.

Objectives of the 2019 Season

The primary objective for the season was to excavate more of the EB III occupation on the mound and especially to investigate the EB III/IV transition, *ca.* 2500 BC. There exists no scholarly consensus on the cause for a shift in the complex socio-political and economic organization at the nexus of change from more urban to more rural frameworks. The question is twofold: What were the diverse causes throughout the southern Levant for the urban EB III system to become unsustainable, and, what followed thereafter (Cohen 2018; Richard 2020). In the case of KHirbat Iskandar, was there continuity between the two periods or was there a hiatus/abandonment before the EB IV settlement. We have always argued for continuity based on comparative cultural analysis, although the specifics attending the

actual transition have remained elusive. This summer's work has provided excellent and unforeseen stratified evidence regarding the particular transition at KHirbat Iskandar for that very critical nexus. This evidence may help to explain why *tall* sites in Transjordan with both EB III and EB IV *strata* are more abundant than elsewhere in the southern Levant. KHirbat Iskandar now has the stratified profile to support the view of strong continuity between the EB III urban and post-urban (rural) EB IV. To meet the objectives outlined above, the strategically focused areas of work in 2019 (as well as continuing goals) included (**Fig. 2**):

1) Excavation in Area C at the southeast corner, in particular Squares C6 and C8 at the eastern edge of the Gateway;
2) Excavation in Area B at the northwest corner, in particular the fortifications, both the recently discovered EB III defensive line and its relationship to the "Rubble Wall" previously discovered;
3) Excavation in Area B at the southwest corner, in particular Squares B21 and B21A, where once again more data were sought to reaffirm earlier evidence of rebuild and reuse of the EB III fortifications in EB IV, and to seek transitional EB III/IV remains at this edge of the site.
4) Research in Area B rechecking of all drawings and sections in view of publication work on the EB IV occupation in Area B (Vol. 2).
5) Consolidation in Area B and C of standing walls to continue.

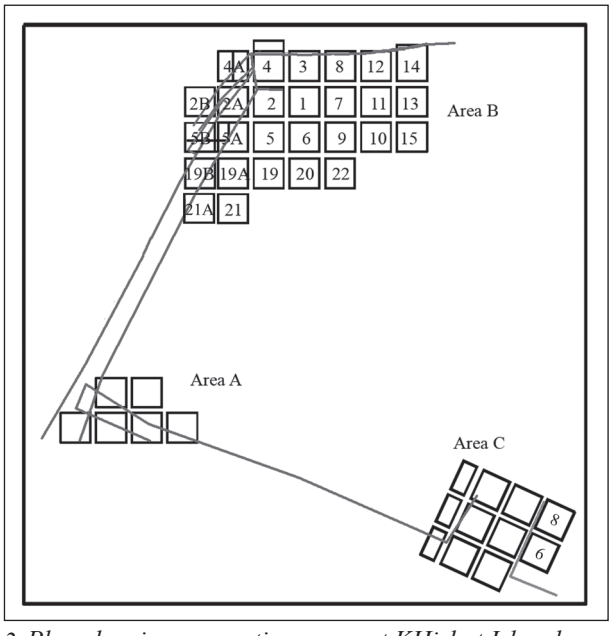
The 2019 Season

Area C: Squares C6/C8

Although the work in Area C (the Gateway) was completed in 2007, the architecture restored, and the final report published (Richard *et al.* 2010), the team revisited Area C in 2016 in order to reinvestigate especially the earliest, somewhat controversial EB IV phase. As presented in the final report and other publications (Richard *et al.* 2010, 2018) the three phases of EB IV occupation, including a gate in the uppermost level, revealed a remarkably well-preserved and fairly prosperous occupation including the earliest Phase 1 (Long 2010). This phase, although attested at other sites (Richard and Long 2010; Richard 2020; D'Andrea 2014, 2016, 2020), is still somewhat enigmatic. Its features at KHirbat Iskandar, with comparisons elsewhere, reflect strong EB III ceramic tradition; moreover, at KHirbat Iskandar in particular, the well-known EB IV "caliciform" characteristics had a virtual null value in the statistical ceramic study (Holdorf 2010; Richard 2010; D'Andrea 2012, 2016). The Phase 1 repertoire of types convinced the excavators to identify it as a transitional EB III/IV phase (Richard and Long 2010). The 2016 work also provided additional ceramics against which to test earlier hypotheses about the chrono-typological phasing put forth in Vol. 1 (Richard 2010; Holdorf 2010, 2021.; Long 2010). The 2016 work centered on Squares C8 and C6 (**Fig. 3**) in the eastern sector to lessen the impact on the preserved Gateway (for a full report see Richard *et al.* 2018; Long, D'Andrea, and Richard 2018). Although the plan was to investigate EB III levels, the meticulous work in these two squares rendered that goal impossible. Thus, we returned in 2019 to these Area C squares with the specific intent to reach pre-EB IV layers.

Square C6

Starting in Square C6, work began at the level of the mudbrick that had been exposed below the Phase 1 surface in 2016 but not excavated (**Fig. 4**). At the time, the assessment



2. Plan showing excavation areas at KHirbat Iskandar.

was that it signaled the mudbrick collapse of the EB III destruction, known so well at the northwest corner of the mound within the fortifications; further post-excavation study recognized mudbrick wall lines however. Excavation this season soon falsified the destruction level hypothesis and affirmed the second interpretation when articulated bricks began to emerge into a nicely defined mudbrick structure (W. C6047/53; **Fig. 5**). Indeed, the mudbrick feature proved to be the corner of a structure lying immediately below the EB IV Phase 1 surface. Within the structure, the team traced a metaled surface with pebbles and occupational debris (**Fig. 5**). The discovery that there was no break between the mudbrick wall and the smoothing over of the mudbrick as makeup for the Phase 1 floor was remarkable; notably, surface pottery associated with the mudbrick wall identified it as late EB III. The temporary phase assigned to this feature was EB III Sub-Phase 1a. The mudbrick wall ran north into the balk, suggesting a continuation into Square C8 and, indeed, excavation did find remnants of some mudbrick walls belonging to the same phase.

Below this mudbrick structure and slightly to the south although on a similar orientation (NE/SW), an earlier EB III stone wall (W. C6064) appeared (labeled EB III Sub-Phase 1b; **Fig. 6**). On its southern side, there was an associated surface on which a badly preserved tabun(s) sat amidst a great deal of charcoal and burning. Excavation retrieved the remains of a charred EB III cookpot within the tabun (**Fig. 7**). From the few vestiges of intact sections of the tabun's walls, it is possible that its configuration was similar to the EB III horseshoe oven found in Area B, Square B1. The latter comprised an articulated mudbrick platform and a semi-circular open oven area (**Fig. 8**). Clearance of the surface and carbonized debris of EB III Sub-Phase 1b brought to light yet another phase: a stone wall and door socket (W. C6085) with associated surface (**Fig. 9**). In this somewhat constricted area of excavation, there was not enough exposure to clarify whether or not this doorway had been reused with upper W. C6064; it was clear, however, that the lower wall ran under it and thus was labeled as new layer EB III Sub-Phase 1c. Tracing of the associated surface toward the southern end of the square scraped below into a layer of carbonized debris, not excavated. Presumably this emerging phase signals the destruction corresponding to the EB III destruction elsewhere on the mound and will be excavated next season.

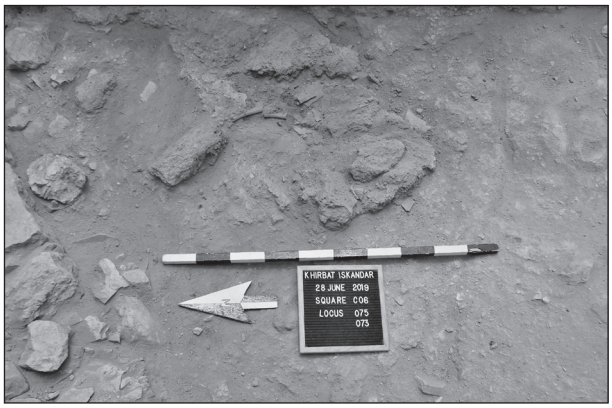
3. Plan of Area C, the EB IV gateway (Richard et al. 2010).

To summarize the 2019 discoveries in Square C06, and despite the somewhat restricted area of excavation, it nevertheless appears that three levels of EB IIIB occupation are extant at KHirbat Iskandar (and see further evidence in C8 below). It also appears that these three levels post-date the destruction of the site in EB IIIA. Moreover, the stratigraphic profile indicates continuous occupation without discernible break through the three EB III phases and into Phase 1 of the EB IV period. This quite unexpected discovery of stratigraphic evidence for an EB III reoccupation in the immediate aftermath of destruction offers a

4. Area C, Square C6: mudbrick underlying EB IV Phase 1 surface; Phases 1-3 walls at the right; looking north.

6. Area C, Square C6: EB III Subphase 1b stone wall with associated surface showing burning from tabun remains, looking north.

5. Area C, Square C6: EB III Subphase 1a mudbrick structure below Phase 1 EB IV wall and surface; looking north.



7. Area C, Square C6: close-up of EB III Subphase 1b surface showing blackened cookpot in tabun.

8. Area B, Square B1: horseshoe shaped mudbrick tabun with platform, EB III, pre-destruction Phase C2 in Area B, looking west.

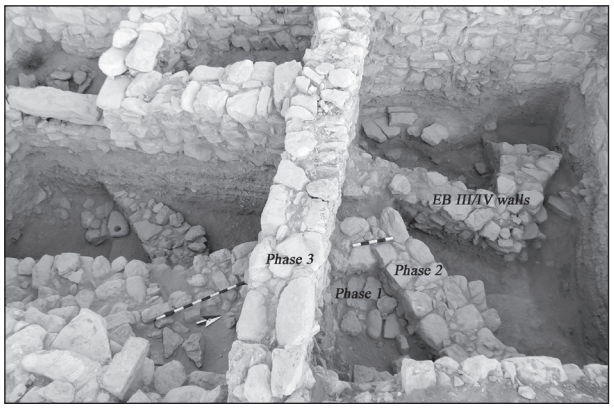
9. Area C, Square C6: EB III Subphase 1c stone wall and pivot stone with associated surface; looking north.

new and extraordinary lens through which to view what is clearly a more complex trajectory of deurbanization than previously realized. However, note that the *Stratum* 6/Period E settlement at KHirbat Al Karak (Beth Yerah) is described as a transitional phase from urban to post-urban, although apparently there is no evidence for EB IV (IBA) materials (Greenfield and Eisenberg 2006: 157; for other transitional references see below). Previously, the scholarly view held on the EB III/IV transition was that there was urban collapse and/or abandonment followed at some point by a reoccupation in EB IV. The new evidence at KHirbat Iskandar suggests a late EB III transition and recovery at the site that helps to explain the prosperous and seemingly well-established Phase 1 EB IV settlement and its very early EB IV repertoire that hearkens back strongly to EBA tradition. This new information offers insight into the regional development in central and southern Transjordan especially of EB III and IV occupation on mounded sites.

Square C8S-C8N

As mentioned above, the 2016 goal in Area C was to investigate Phase 1 and earlier occupation; in C8 this meant expanding the square to 5m. The expansion, however significant the new Phases 2-3 occupational remains (architecture and surfaces) that came to light, thwarted the goal to investigate earlier occupation in this square in 2016. There also was no time to concentrate on the series of wall lines exposed near the western balk in a probe in 2007 that had uncovered what appeared to be EB IV Phase 1 rebuilding of earlier EB III walls, as demonstrated by different construction techniques, as well as surface evidence (Long 2010: fig. 3.25, here see **Fig. 11**). Thus, in 2019 the objective was to investigate that area along the west balk as well as to excavate below the Phase 2 surfaces discovered in the square in 2016. Again, the overall goal was to glean new data about the EB III/IV transition. Given the natural division of Square C8 by an east-west wall (C8002/002a), in 2019 the decision was made to compartmentalize the work by describing the northern area as C8N and the southern as C8S. Most of the work accomplished was in C8S, which is discussed first.

In 2019, when work began to trace the lowest surface reached in the previous season, it became clear that this surface was in fact a Phase 1 (not an earlier Phase 2) surface. The first hint of this phasing was a line of stones emerging below the Phase 2 wall (W. C8066),



10. Area C, Square C8(S): below upper EB IV Phase 3 walls, there are Phases 1-2 structures superimposed at bottom; EB III-EB IV Phase 1 wall at back; looking west.

11. Area C, Square C8(S): interior of EB III-EB IV Phase 1 wall at the west balk, showing distinct construction techniques; fragment of EB IV Phase 2 wall on top; looking east.

the corner of which was discovered in 2016 to be the extension of a wall originating in Square C6 (W.C8061/66). Secondly, work clarifying the interior of the Phase 2 structure uncovered the continuation of the Phase 1 wall from C6, whose corner was the line of stones mentioned previously (W. C8080/91; **Fig**. **10**). Moreover, the newly identified Phase 1 surface, when traced westward to the multi-phased and multi-rebuilt stone wall near the west balk mentioned above, helped the team confirm the Phase 1 date of the upper wall, which proved to be a corner (W. C8018A/31; **Fig**. **10**). It is also clear now that the fragment atop the Phase 1 wall (at the south end) was indeed a Phase 2 wall (mostly removed during previous excavation) that can now be associated with Phase 2 surfaces discerned previously. The Phases 1-2 structures, one above the other in C6/C8 show a sequence of buildings in EB IV, both corners of which indicating two sequential rooms to the east, unexcavated. The series of surfaces and makeup within Square C8 was extraordinary, pointing to multiple occupational layers and build up in EB III and EB IV (Richard *et al.* 2018; D'Andrea *et al.* forthcoming).There was a layer of mudbrick encountered below the Phase 1 surface which was traced southward and in all likelihood will link up with the mudbrick level in C6 (as discussed above; EB III Sub-Phase 1a). A subsidiary balk was left intact at the southern balk as the only way in future to connect the stratigraphy of C8 with the three EB III layers found below Phase 1 in C6. This will be pursued in the next season. Toward the north balk, a large pit was discovered, and its outlines and depth determined. This pit unfortunately cut some of the surfaces delineated in the square, but only at the northern end.

It is the architectural features at the west end that finally became unraveled since first emerging in a deep probe in 2007. The judicious removal of rubble revealed toward the north end the corner of a structure that continued westward into the balk and southward into C6 under structures and a subsidiary balk still standing (**Fig**. **10**). Earlier stratigraphic observations (Long 2010) proved correct in that the bottom courses of this structure proved to be EB III, while the course with smaller stones above was an EB IV Phase 1 wall (**Fig**. **11**). Surfaces were found on the interior of the structure, along with what appeared to be a series of benches or paving stones stretching out of the west balk, but whether connected to the EB IV Phase 1 wall or to the EB III segment is not certain (**Fig**. **10**). This constricted area at the west rendered excavation difficult. Moreover, contiguous upper Phase 2-3 walls in the balks had to be reconsolidated, thus compromising the area somewhat with rubble and marring surface lines in the balks observed in 2007. Further study of the 2007 excavation will hopefully provide us with data needed to correlate the work of this season. Although the stratified profile needs to be pieced together in the different sectors of Square C8, nevertheless, it is clear that, as in Square C6, EB III occupation postdates the destruction. More research in future will clarify the connections between Squares C6 and C8.

C8N. This sector, north of W. C8002 (and west

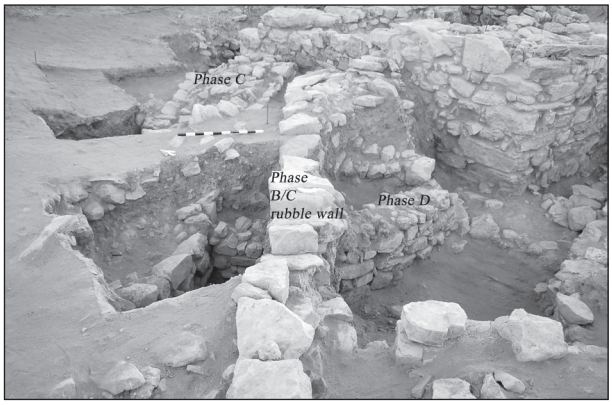
into Square C3), included the southern portion of a structure with doorway that extended much further into unexcavated areas to the north and east and, as such, represented a unit distinct from the southern sector of C8 (see **Fig. 3**). This building and surface were left at the Phase 3B level when work concluded in the field (and see Long 2010) and remained unexcavated in 2016. In 2019 work in the northern sector was limited to several weeks, but a Phase 3A surface was traced that could be correlated with C8S. Excavation below encountered a segment of a wall and a surface that also seemed to generally correlate with Phase 2 that had been excavated in 2016 to the south. At this point, however, the large pit found in C8S appeared and the work until the end of season was spent defining its outlines and depth. Very little new information arose from this particular area and much study of C8 (N/S) is necessary to be more definitive about the correlation between the two in the earlier phases.

Area B: B2A/B4A/B5A/B5B.

The 2016 work in Square B2A uncovered more of the new EB III fortification (W. 4A006) –discovered in 2010-2013 in Squares B4A/B2A (and see Richard *et al.* 2013, 2018)– including its definitive dimensions (1.75m in height, 2.0m in width) attesting to the remains of a substantial western defensive line matching in depth and wall construction the northern EB III Phase C outer wall. It abutted the northwest corner of the bastion/tower (**Fig. 12**). The 2019 project sought a broader exposure of the fortification southward as well as another check of the relationship between it and the parallel "rubble wall" fortification (W. B2053), discovered long ago (and identified at the time as Phase C EB III), that abutted the tower bastion at the southwest corner (**Fig. 12**).

The two parallel trace walls on the western perimeter, of different construction and foundation levels, represent two of the three major phases of fortifications at the site; the third is the mudbrick-and-stone "inner wall" on the northern perimeter. Prior to 2010, the defenses at the site seemed straightforward enough stratigraphically: the inner mudbrick and stone wall was constructed first (Phase D); following a destruction, the inner wall was encompassed within the Phase C stone outer defensive line. The "rubble wall" (overriding the Phase D mudbrick and stone circular features on the west) was the latest and the only candidate at the time for the Phase C EB III western trace wall, although the nature of its construction never seemed comparable to the northern line. The rebuilding, reinforcing, and strengthening of the site's defenses in Phase C, evident in the segments of defenses reaching 7.0m in width, now included a massive tower and platform (see tower in **Fig. 12**). The new fortification line (W. B4A006) introduces complexity into the above sequence that –along with new data pointing to a use and rebuild of the "rubble wall" in EB IV plus other cogent factors– requires continuing re-evaluation of the construction history of the fortifications at KHirbat Iskandar (most recently, Richard 2016)

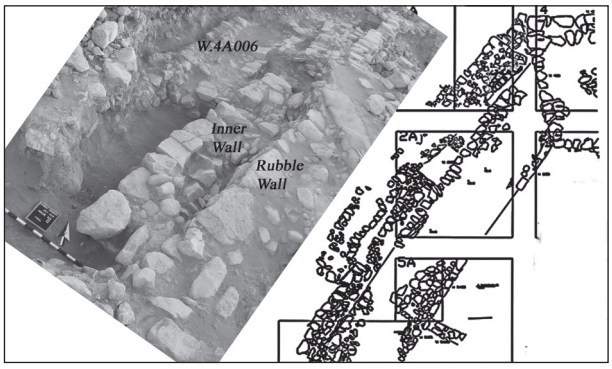
To that end, Square B2B was opened and B5B expanded into a full 5m square (see **Fig. 2**). In 2016, a segment of an unidentifiable fortification, whether extension of B4A006 or the "rubble wall" or overlap of the two, had come to light in Square B5B; the 2019 goal was to resolve this question. The 2019 excavations in Squares B2B/B5B, unfortunately, involved moving the dump on the western crest of the mound from years earlier. It was with great effort that the rubble was removed and the first stratified level uncovered: a level of mudbrick remains of a probable superstructure, since immediately below lay the continuation of W. B4A006. As shown in **Fig. 13**, excavation revealed that W.4A006 continued to run



12. Area B northwest corner fortifications: from left, Phase C (W.4A006) outer wall, remaining outer segment of Phase B/C "rubble wall," circular tower Phase D below "rubble wall." Tower/bastion at top; looking east.

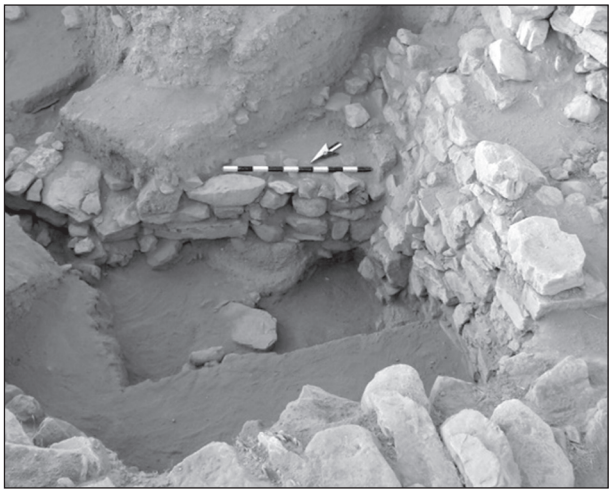
parallel to the "rubble wall," and that the B5B segment proved to be part of the latter, thus resolving the question posed earlier. However, excavation did find that the nature of the underlying wall, over which the "rubble wall" had been built, was much more massive than in the north. The additional 10.0m stretch of wall has the appearance of a somewhat segmented, multiple phased, and rebuilt fortification, the configuration of which was not immediately apparent in the field. Much more analysis and further exposure is surely a necessity in order to comprehend how these new segmented walls on the western perimeter fit in with the other fortification phases; nonetheless, some observations are in order. The new features, when set into a broader context, have brought into sharper focus an earlier hypothesis that a gate had existed in this area in Phase D (Richard *et al.* 2013).

The hypothesized gateway uncovered previously comprised a 2.0m wide opening with threshold and remains of a pavement juxtaposed by two curvilinear towers of stone and mudbrick (**Fig. 14**). A mound of mudbrick debris was associated with the southern tower (W. B2108 on the right and see **Fig. 15**), although articulated, in-situ layers of mud bricks were clearly discernible. Stratigraphically, W.B2108 proved to continue eastward under a Phase C structure, into which it may have been incorporated. Connected to this southern tower structure was Pier B2A007, a stone transverse wall or buttress that clearly was part of the Phase D defenses at one point (as **Fig. 15** shows). On analogy with reinforcements in the northern fortifications, this buttress appeared to represent a similar reinforcement in the Phase C reconstruction and expansion of the Phase D fortifications. However, in light of the new evidence from 2019, it is likely that the buttress was originally part of the Phase D defenses, but reused in the Phase C rebuilding. The northern tower (B2077) is less well-preserved. Our working hypothesis is that it was cut by construction of the Phase C tower bastion, cut by the outer wall (W4A006), and encompassed into the Phase C reconfiguration of the defenses (see **Fig. 12**). Excavation in Square B2a in 2016 uncovered possible remnants of the circular structure on the interior of W.4A006, but the badly preserved remains renders this conclusion problematic (**Fig. 16**). This northern tower lies under the "rubble wall" (and see **Fig. 12**). In any case, what became clear in 2019 is that the small gap or opening that the 2016 excavations discovered just south of the northern tower,



13. Area B photo and plan of the western perimeter exposure of fortifications. From left W.4A006 outer wall, inner wall with possible gate opening, and the "rubble wall"; looking north.

14. Area B, Phase D gateway between two juxtaposed mudbrick and stone curvilinear towers, threshold and pavement at top; looking east.



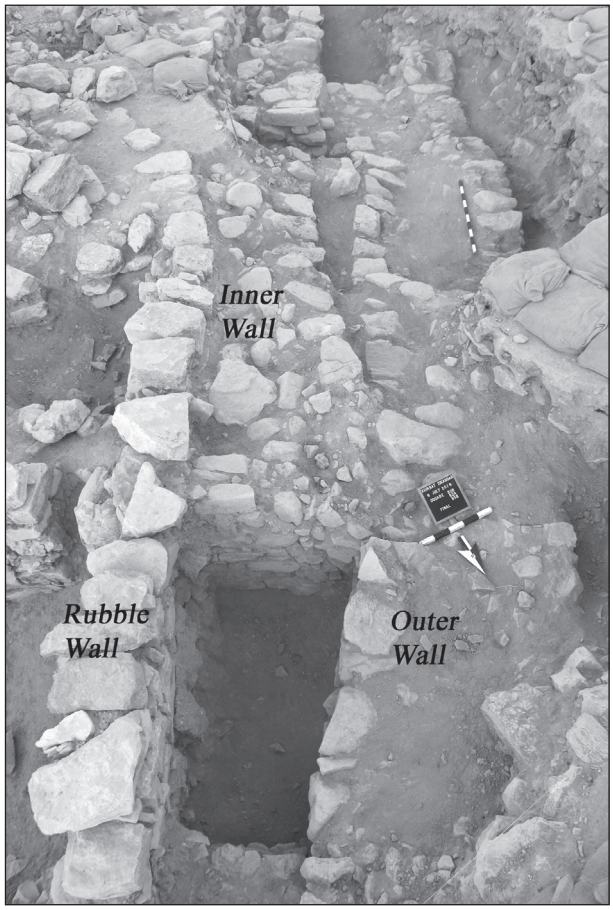
15. Area B, Phase D southern tower with mudbrick superstructure and Phase C/D pier/buttress; looking east.

16. Area B, poorly preserved wall, possible circular structure on interior of W.4A006; looking north/ northeast.

turned into a 2.0m wide gap bounded in the south by Pier B2A007, although somewhat obscured by the "rubble wall" (**Fig. 17**). This space matches precisely the width of the distance between the two towers (as mentioned above).

All of the above factors combined suggest a new iteration of the gate hypothesis is in order (and see **Fig. 13**). Given the newly discovered 2.0m gap, it is with more confidence that in Phase D there was an early gateway that led through a passage between two mudbrick and stone towers over a threshold and pavement into the town. The Phase D *stratum* is dated to late EB II or very early EB III, but pottery from surfaces within the gateway must be analyzed more closely to clarify the date. What seems evident now is that this gateway was later incorporated into the Phase C realignment of the fortifications, which effectively blocked it with the construction of outer fortification W.B4A006. As **Fig. 17** suggests, the newly recovered defenses on the west resemble the northern fortifications in that a Phase D inner wall with buttress is encompassed into an outer Phase C fortification. So, where was the Phase C gateway? Although the articulation of a gate is not immediately recognizable due to multiple phases and continued rebuilding on the west, there are some indications that an opening existed further south, but much more exposure is needed. The team did find several surfaces and pottery, all of which needs further analysis to incorporate into the overall phasing of the fortifications.

As a further observation of the 2019 exposure at the west, the stratigraphic phasing of the two western perimeter walls, as determined previously at the northwest corner, proved to be correct: the "rubble wall" was constructed last; it overrides the Phase D (rebuilt and consolidated with Phase C) architecture and, likewise, its foundation is at a level higher than the top of the outer EB III wall (W. 4A006). The two walls continue in parallel fashion without overlap as far as we have excavated. Complicating the sequence of construction somewhat (as alluded to earlier) are 1) the considerable evidence accumulating to suggest rebuilding and reuse of the "rubble wall" in EB IV, and 2) the new evidence for a post-EB III occupation at the site (see Area C discussion above). So, if the new outer wall (W4A006) is the western trace



17. Area B western perimeter exposure of fortifications. From left "rubble wall," Phase D gate opening and inner wall line, W.4A006 outer wall at right; looking south.

wall matching the Phase C northern outer fortifications, what is the "rubble wall" (in the past identified as Phase C)? The hypothesis that it may be a transitional EB III/IV wall takes on more credence given the above two factors. We await further evidence of this hypothesis before identifying a new stratigraphic phase and will continue to call the "rubble wall" an EB III/IV (Phase C/B) fortification.

Squares B21/B21A

The project's return to these two southwestern -most squares in Area B included several goals: recheck connections between EB IV and the "rubble wall," begin exploration of EB III levels in this sector, and, especially, seek stratified evidence of the EB III/IV transition (and see **Fig. 2**). In 2019 work renewed in B21 –where a cache of EB IV vessels had been recovered on a plaster floor in 2013– in a structure that included a bench room on the east (Richard *et al.* 2013). In 2019 work also renewed in square B21A by expanding it to a full 5.0m in order to comprehend the multiple-phase wall lines discovered in 2016, and to clarify what was thought to be a segment of the "rubble wall."

In Square B21 the strategy was to first bring the bench room surface into phase with the western sector and then concentrate on the latter to investigate earlier levels. To that end, excavation discovered, below the Phase B EB IV plaster surface, a very thick and hard layer of plaster at the north end, interpreted as makeup for the Phase B plaster surface and construction of buildings above. Although it may have been a feature (bin?), given the similar evidence for thick plaster/limestone in the consolidation of earlier layers and construction of the storeroom/ bench room in Squares B7-8 at the north, it likely represents a similar phenomenon. As we will see, a similar phenomenon came to light in B21A, likely an extension of the plaster *locus*. This conclusion seems warranted by excavation below which uncovered a phase of a badly preserved east-west stone wall partially covered and surrounded by limestone plaster, including a possible plaster surface. Unfortunately, there was a pit south of this structure, which effectively cut off connections with the southern sector. However, it seems clear that related contemporaneously to the wall in the north was the badly preserved east-west wall at the southern end, also covered partially with plaster and limestone. An out-of-place pillar base, partially covered with plaster, overlay the wall. The two weeks spent on Square B21 ended with more questions than answers, except to say that there was no sign of the EB III destruction layer and that the several phases excavated predate Phase B, although it is not certain if we have encountered the enigmatic EB IV Phase 1 or the EB III transitional materials as seen in Area C. Work in contiguous Square B21A to the west did shed some light on the Square B21 materials.

B21A. Work in this square proved to be far more successful in the objectives mentioned above: investigating the "rubble wall" and earlier, pre-EB IV levels; it was also possible to clarify the reuse of several Phase A-B walls rebuilt on earlier walls. Excavation revealed a series of superimposed architectural elements and surfaces but no destruction layer, suggesting we may have an occupational profile similar to that recovered in Area C. Expanding the square to a full 5.0m provided the broader exposure needed to affirm that the wall at the northwest corner was indeed the "rubble wall" (**Figs.18, 19**). Repeating a pattern noticed upslope, the Phase A EB IV wall ran up to it and a lower Phase B parallel wall, badly preserved, appeared to intersect with it, but one cannot be certain without dismantling the upper section of the "rubble wall." Associated with the Phase B wall was a badly preserved surface on which

18. Area B, Square B21A: "rubble wall" at bottom left, Phase A EB IV abutting wall; lower EB IV Phase B intersecting "rubble wall" and associated surface with remains of roof collapse; multiphased wall at top right; looking northeast.

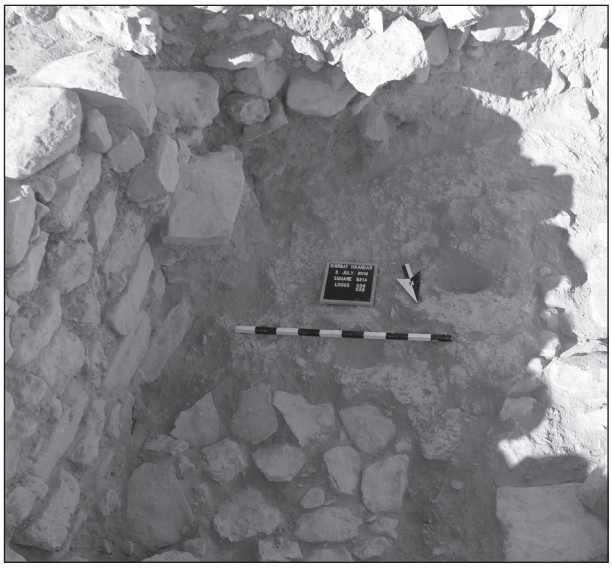
a great deal of rubble, presumably from the "rubble wall" had fallen (**Fig. 18**).

Dismantling the poorly preserved Phase B wall revealed a possible earlier use surface in an associated pavement that ran under it (**Fig. 19**). The stone pavement was found only in one area, but contiguous to it and apparently contemporaneous was a very thick plaster/mudbrick surface traced to the south and west balks (**Fig. 20**). The thickness and hardness of the plaster recalls the similar phenomenon encountered in B21 and is presumably contemporary. It is worth noting that wherever excavation has discovered EB IV Phase B remains, it has found a very thick plaster surface on top of smoothed over mudbrick, as a first use surface. Leaving the pavement in place, the team investigated the plaster/mudbrick layer to the south and west, where it soon became clear that this plaster/pavement surface was an occupation phase covering at the west an earlier and very substantial wall line (W. B21A043; **Fig. 21**). The latter consisted of massive flat stones, thought at first to be pavers but with more exposure turned out to be part of a structure of at least two courses and two rows. This stone feature at the west underlay both the Phase B wall and the "rubble wall." Unfortunately, the season ended before the significant stratigraphic profile in B21A could be further explored and analyzed. However, several observations are in order: Excavation reaffirmed the stratigraphic position of the "rubble wall": it is the latest fortification and built over earlier fortifications. The massive new trace wall uncovered in Square B21A appears similar in dimensions to the substantial wall underlying the "rubble wall" in Square B5A, as noted above. Although tentative, the newly uncovered phasing in B21A recalls the transitional levels encountered in Area C, including no trace of a destruction layer.

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 EB III and IV architectural units in Area B in future (as occurred in Area C). Although continued upkeep has occurred every season, the weather (in particular rain) has not been kind to past consolidated

19. Area B, Square B21A: view of "rubble wall" to west, EB IV Phases A-B walls in center; lower pavement emerging under Phase B wall; looking north.



20. Area B, Square B21A: view of pavement and contemporary thick plaster/mudbrick surface; looking south.

21. Area B, Square B21A: end of season photo of newly emerged massive stone wall at left under "rubble wall": pavement to right, and supervisor Tucker Deady; looking north.

walls. In 2019, for example, it was necessary once again to consolidate several walls in danger of collapse in Square C8S. Reconsolidation and shoring up of a number of walls in Area B was required to stem the tide of weather-related destruction of walls. Unfortunately, the team likewise encountered more indication of treasure hunting in the number of holes dug on the site since last season, one so deep as to indicate a mechanical or motorized type of equipment was used. The team reported the problem to the Madaba office of the Department of Antiquities and received prompt assistance from the regional director and staff.

Conclusion

While the findings of the 2019 season are preliminary and exposure limited, it is possible to conclude that occupation is extant on the mound following the EB III destruction and preceding the Phase 1 EB IV settlement. The clearest picture may be drawn from Area C, Square C6, where three architectural phases with late EB III pottery were discovered sandwiched between the Phase 1 EB IV settlement above and, apparently, a destruction level below (not excavated). No break in this sequence of stratified layers was distinguishable. Somewhat comparable phasing did come to light in Square C8(S), that is, a late EB III phase with mudbrick walls and surface, as well as the layer on which the mudbrick structures were built; but efforts continue to correlate the two squares. It is suggestive, however, that in C8(S) Phase 1 EB IV walls were built on top of EB III remains. Work in B21A brought to light evidence that may very well be contemporary with the transitional occupation in Area C, but without more exposure and research this inference is speculative at this point. Work reaffirmed the "rubble wall" as the last phase of continuous rebuilding of the fortifications in the Early Bronze Age. Again, the connections with Phase B walls suggest rebuild as well as reuse in EB IV; more importantly, there is growing evidence to suggest that the "rubble wall" may have served as a transitional fortification on the west during the recovery in late EB III, recently come to light in Area C primarily. The newly discovered transitional EB III/IV data at KHirbat Iskandar now allows for more comparative study with transitional remains at other sites, *e.g.,* Tall Al Hammām, which appears to be a continuously fortified site from EB III-IV-MBA (Collins, Kobs, and Luddeni 2015), KHirbat Al Karak (Beth Yerah), which evinces a post-urban phase (*Stratum* 6/Period E) that includes transitional ceramics in the EBA tradition and forms anticipating the EB IV (IBA), according to the excavators (Greenberg and Eisenberg 2006: 157), as well as sites exhibiting an early EB IV repertoire (and see D'Andrea 2014, 2016, 2019, 2020; Richard and Long 2010; Richard 2020)

The 2019 season also added new information about the fortifications near the northwest tower/bastion. Although the new stretch of trace walls on the west awaits further investigation, there is compelling new evidence to reinforce the hypothesis that a gateway stood at that point in Phase D. The 2.0m wide opening proved to match the width of the open area juxtaposed by two curvilinear mudbrick and stone towers, threshold and pavement, pointing to a gateway in Phase D. What became clear is that the continued reinforcement and strengthening of the defenses in Phase C (as seen on the north) incorporated this gateway and blocked it by construction of the outer wall (W. 4A006). Although the sequence of Phase D, Phase C, and the "rubble wall" is reaffirmed, there is growing evidence to suggest that the "rubble wall" (Phases B/C) served as the defensive line on the west for the transitional occupation on the mound in late EB III and again in EB IV.

Thus, while other scholars argue for a complete break between EB III and EB IV, it is now clear (what many of us have thought for years) that in certain areas of the southern Levant, EBA occupation continued after the devastation of destruction. In the particular case of KHirbat Iskandar, it now appears that there was no abandonment of the site. If this proves to be the case, then one can offer an explanation for the Transjordanian phenomenon that finds greater continuity between EB III and EB IV on tell sites than elsewhere in the southern Levant. The surprise finding of the 2019 season is that it was resilient EB III inhabitants at the site that strove to recover and rebuild following the destruction –the three post EB III destruction architectural phases attest to that– and that

their habitational efforts appear to have laid the foundation for the following EB IV period. This new evidence helps to explain why even the Phase 1 EB IV architectural remains at KHirbat Iskandar seem somewhat advanced, and also explains the early pottery discerned for Phase 1, with virtually no rilled wares typical of EB IV in a repertoire of EB III forms with red sip and burnish. The results from this summer's work are truly significant for offering a first glimpse at the efforts of the site's occupants to rebuild after the destruction. Work next season in Areas B and C will concentrate on testing the hypothesis that KHirbat Iskandar includes a transitional phase between the EB III destruction and the beginning of EB IV.

Acknowledgments

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BALU‘ REGIONAL ARCHAEOLOGICAL PROJECT: THE 2010, 2012, AND 2017 SEASONS AT KHIRBAT AL BĀLŪ‘

Monique D. Roddy, Walla Walla, Kent V. Bramlett, Friedbert Ninow, Matthew L. Vincent and Ian W.N. Jones

Introduction

The Balu‘ Regional Archaeological Project (BRAP) officially began in 2017 with excavations at KHirbat Al Bālū‘ under the current directors, Drs. Kent Bramlett, Monique Roddy, and Friedbert Ninow. GPS survey and test excavations in 2010 and 2012 established the extent and excellent preservation of the remains at the site and paved the way for the renewed excavations at Al Bālū‘ in 2017.

KHirbat Al Bālū‘ is located next to the Wādī Al Bālū‘, which is a tertiary tributary to the Wādī Al Mūjib (**Fig. 1**). In this location, Al Bālū‘ was able to control the major north-south road in pre-Classical periods and guard access from the north to the Al Karak Plateau. A Middle-Late Islamic settlement with a possible caravanserai attests to the continued importance of this site’s location on transport routes over the millennia. Previous work at Al Bālū‘ includes Friedbert Ninow’s 2008 excavations of a Nabatean structure (Ninow 2008) and Udo Worschech’s 1980s soundings of primarily Iron II remains (Worschech and Ninow 1992; Worschech 1989; Worschech *et al.* 1986).

The GPS surveys in 2010 and 2012 traced all visible architecture, water features, and looting damage to the site. Four probes were opened in 2012 to test the GPS results and correlate with previous excavations. The 2017 season expanded on one of these probes, in an Iron II domestic structure, and opened two new probes in alignment with specific goals regarding the dating and phasing of the monumental *qaṣr* structure and the fortification system. The surveys and excavations revealed the outlines of a fortification system enclosing upper and lower settlements, housing areas, and potential streets from the Iron II period. The numerous standing doorway lintels and deep preservation of the core of the settlement, especially the domestic structures of the upper settlement, suggest a well-preserved example of a major Iron II city. Distinct areas of occupation from the Roman and Middle-Late Islamic periods were also indicated by separate structure clusters and concentrations of sherds dating to these periods. The vast size of the site, nearly 25ha, promises potential for many seasons to come and with preservation and development could make Al Bālū‘ a distinctive educational opportunity in Jordan.

Research Plan

This report includes results from the 2010, 2012, and 2017 seasons at KHirbat Al Bālū‘. The 2017 season marked the start of a full-fledged, five-season research plan for the BRAP, from 2017 to 2025, excavating on alternate years. The research design of the BRAP includes the following goals:

1) Build a ceramic typology of the Al Bālū‘ region. While this includes all periods of occupation, the specific focus at the start of this project is to develop the Iron Age ceramic sequence for Moab from a major stratified site. The possible Bronze and Iron Age phases of the *qaṣr*, the three distinct phases of the Iron II domestic structure, and the casemate rooms of the Iron II fortification system provide stratified Iron Age ceramics alongside short-lived radiocarbon samples.

1. Aerial view of KHirbat Al Bālū‘. (Credit: APAAME).

2) Understand the political and economic history of a large site on a major route. The prominent location of Al Bālū‘ is the likely cause of its large size and success in multiple periods. Collecting and analyzing the historical, social, and economic evidence of this site will contribute to our understanding of one of the largest sites in Central Jordan and its role in regional politics and trade over time.
3) Establish the sequence and expanse of settlements at Al Bālū‘. Soundings have confirmed periods of occupation that include the Iron I and Iron II, Hellenistic, Early Roman, Nabataean, and Middle-Late Islamic periods. Survey pottery from the *wadi* below the site has also included pottery from other, earlier periods, not yet identified in stratified excavation. Continued sampling and exposure of multiple, stratified areas will confirm the extent and duration of the various settlements at Al Bālū‘. A probe excavated in 2012, for example, revealed the first known Hellenistic remains on site.
4) Survey and excavate test squares at regional survey sites from multiple periods. As the full name of the The Balu‘ Regional Archaeological Project indicates, this project is determined to include the larger region around Al Bālū‘ as part of its investigations. This will build a larger social and environmental picture of this region’s use and development. This will include regional surveys for ceramic density as an indicator of occupational intensity.

Careful excavation, historical research, and environmental investigation over the course of the five planned seasons will bring this ancient settlement to life by situating it firmly in its larger regional context in all major periods of occupation. This will build a picture of long-term subsistence and social and economic patterns on the northern Al Karak Plateau.

Season and Team Information

The 2010 season ran from 15 August to 7 September. The team consisted of 10 volunteers from Germany and the United States. The Department of Antiquities representative was Jihad Darweesh. Dr. Friedbert Ninow (Theologische Hochschule Friedensau) directed the project with Friedensau’s sponsorship. Matthew Vincent supervised the mapping.

The 2012 season ran from 12 August to 13 September. The team consisted of 11 volunteers from Germany, the United States, Jordan, Bosnia and Herzegovina, Spain, and France. The Department of Antiquities representative was Jamilah Shtawey. Dr. Friedbert Ninow (Theologische Hochschule Friedensau) directed the project with Friedensau’s sponsorship. Matthew Vincent supervised the mapping and Monique Roddy supervised the excavations.

The 2017 season ran from 6 to 25 August. The team consisted of 19 participants from the United States and Germany and 6 workers hired locally from the Azazmeh tribe, As Samākiyyah, and ‘Ammān. The Department of Antiquities representative was Arwa Massadeh. Dr. Kent Bramlett (La Sierra University), Dr. Monique

2. GPS survey outline overlaid on satellite map.

Roddy (La Sierra University/Walla Walla University) and Dr. Friedbert Ninow (La Sierra University) directed the project. La Sierra University and Theologische Hochschule Friedensau sponsored the project. Ian Jones managed the geospatial system.

2010 and 2012 Survey Results

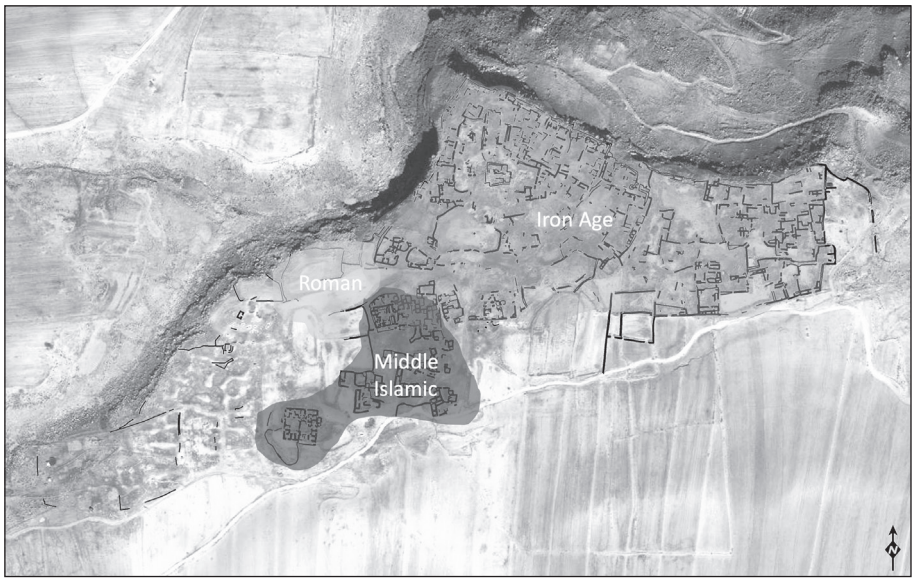
The 2010 and 2012 seasons at KHirbat Al Bālū‘ focused on building a geographical information system to help record details of the site and understand the layout of the visible ruins. Using a differential GPS system (Promark 3 RTK) with an accuracy of 2cm, the team established new benchmarks and control points for current and future use and mapped the exposed architecture.

The first priority in 2010 was to establish a benchmark and four control points. Using a post-processed, static survey, the benchmark and control points were created and then used during the rest of the season to tie the survey work into the UTM 36N projection. We used elevation data from Palestinian Grid topographic survey maps in order to keep elevation readings from previous seasons of work consistent with the work of this and future seasons. All data were collected in a geodatabase using ArcMap 10.0.

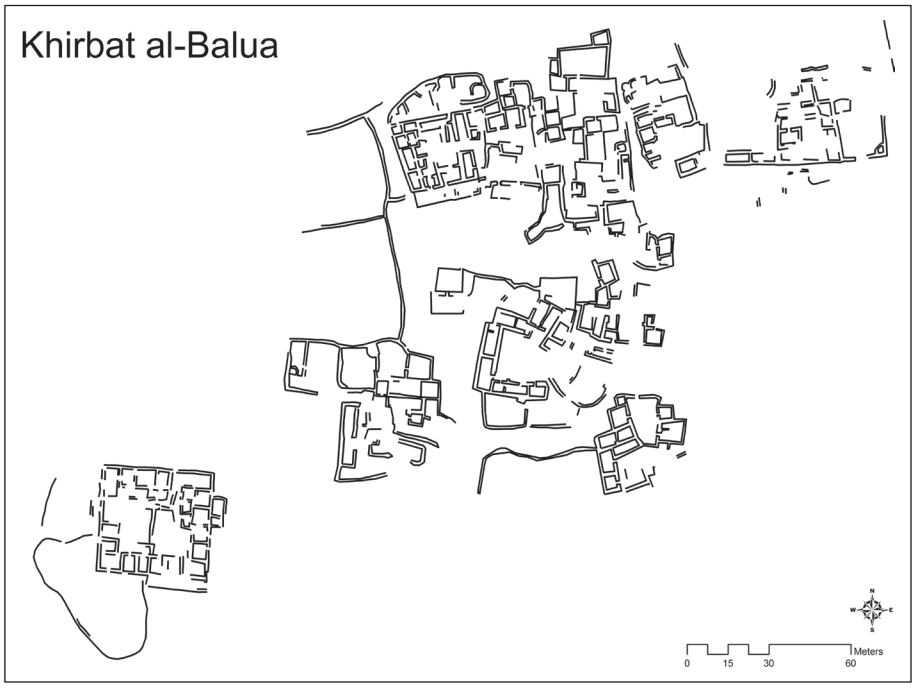
The team then mapped as much of the exposed architecture as possible, which was accomplished by recording most of the large buildings and perimeter walls in 2010 and then filling in the gaps in 2012. Udo Worschech produced a map of the site that showed the perimeter of the site especially in regard to the western and northern edge towards Wādī Al Bālū‘ (Worschech 1989: 112; 1990: 90). Only a few architectural features and remains were shown on the map, however, and the digital data of this map have since been lost. The 2010 initiative produced the outlines of a new map of the site that is more comprehensive in regard to the overall site and its various architectural features. The purpose was to show what is on the surface today and not to interpret construction or phasing. Once excavations are conducted in various areas, the recorded architecture can be dated, phased, and organized where it is related to stratigraphically secure architecture.

The 2012 season continued the mapping that had started in 2010, focusing on the architectural features within the perimeter wall of the main site, *i.e.*, the Iron Age settlement. In addition, four probes were opened to test the GPS survey results, correlate results with previous excavations, and to evaluate possible future areas for excavation. Two probes were opened at the eastern end of the site (lower settlement) and two others northeast of the central *qaṣr* (upper settlement, see image ref).

The new map that emerged from this work displays the potential of the site as well as the extent of KHirbat Al Bālū‘ (**Fig. 2**) The architectural map reveals a densely populated and densely built site. In the Iron Age, the period of the largest extent of the remains, it is clear that this site was not a small village (**Fig. 3**). It seems to have been a major center on the Al Karak Plateau. While the western part



3. GPS survey outline overlaid on satellite map with periods highlighted.



4. GPS survey outline of Islamic remains.

of the Iron Age occupation seems to include various smaller and larger living quarters, the eastern part seems to be more spacious and not so densely populated. Possible street lines could be seen in parts of the settlement. A heavy casemate wall, confirmed by earlier excavations as well as this season's mapping efforts, surrounded the Iron Age settlement. A second casemate wall separated the western/upper and eastern/lower parts of the site. The significance of this separation will await future excavations, but likely marks a new extension of the site in the latter part of the Iron Age.

The Middle-Late Islamic settlement is in the southwestern part of the site (**Fig. 4**). The settlers of this part of the site did not build on top of the former occupation but used new building space to the SW of the Iron Age ruins. It appears that a small settlement first started near the Iron Age demarcation and then extended further to the south with three main buildings. The various buildings, their size and architecture, points to the importance that this site gained during the Islamic era.

Analysis of satellite images also revealed structures at the western edge of the site which had not been recognized previously. A surface survey of this area revealed quite a number of

Roman pottery sherds. A few walls could be traced. The concentration of Roman sherds was located on the northeastern part of this section. If these new features are indeed part of the site, the overall site would cover an area of almost 20 hectares, instead of the currently estimated 16 ha.

The 2010 and 2012 surveys noted two additional features at Al Bālū‘ and in its immediate environment. In 2010 water features were recorded with a handheld device with ArcMap on it to record the location of the water features around the site. Water features included an estimated 55 cisterns. In 2012, evidence of looting was recorded, with a substantial increase between 2010 and 2012 in illegal excavation. The Nabatean cult place, excavated by Ninow in 2008, had been completely destroyed. Shallow metal-detection pits were found all over the site.

Data from the 2010 and 2012 Season Mapping Project:

Area covered by the entire site: *ca*. 16ha

Area covered by mainly Iron Age remains: *ca.* 11ha

Area covered by mainly Islamic remains: *ca*. 5ha

East-West extent: 1025m

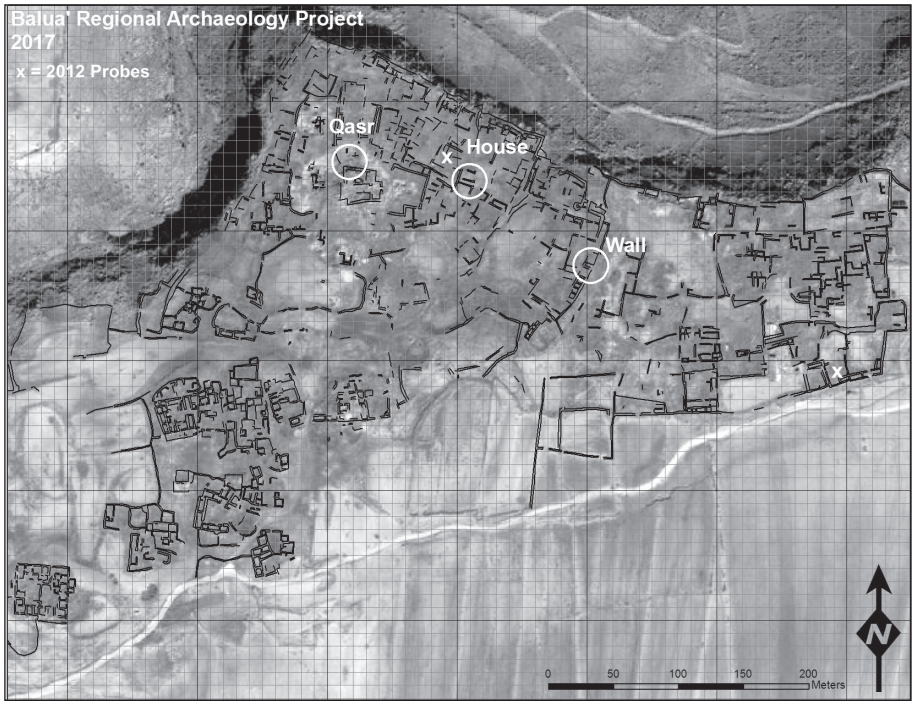
North-South extent: 400m

2012 Excavation Results

In 2012, as stated above, four probes were opened to test the GPS survey results, correlate results with previous excavations, and to evaluate possible future areas for excavation. A grid was generated to cover the extent of visible ruins at the site starting from the northwestern corner with 100m^2 areas subdivided into 10m^2 areas (**Fig. 5**). Two probes were opened at the eastern end of the site (lower settlement) and two others northeast of the central *qaṣr* (upper settlement, see image ref). Unfortunately, some of the excavated areas were vandalized overnight during the season, preventing further excavation. These incidents were traced by the local police department to tribal rivalries over the position of official guard of the site.

In the lower settlement, in the southeastern area of the architectural remains, two 2m by 2m probes were opened for excavation in adjacent buildings (**Fig. 5**). Both were finished after nine days of excavation. Each building consists of a rectangular N-S structure with a smaller southern room formed by a casemate wall and a larger, open northern room inside the settlement. While excavation of the small probes did not confirm a connection between the southern and northern rooms, it was assumed that they did so to form a single large building.

The first probe (Square 59.20) was placed in



5. GPS survey, excavation grid, and 2012 and 2017 excavations over satellite map.

the larger, northern room of one building, while the second probe (Square 60.11) was placed in a southern casemate room (**Fig. 6**). The goal was to determine the date and occupational phases of the layers associated with the casemate wall system. The results of the excavations showed a single period of occupation, with no sub-phases detected. Both probes located a hard, gravelly, semi-solid layer of basalt bedrock with limestone veins at 834.39 and 834.93m asl. The ancient occupants had laid beaten earth surfaces directly on the bedrock. The surfaces in both rooms were bare of cultural material, with the exception of a single flat-lying pottery sherd and possible jar stopper/spindle whorl blank embedded in the surface of the casemate room. Post-occupation, the upper structures of the walls collapsed into the rooms with windblown earth, sealed in later by earth layers hardened by seasonal rains. The post-occupational debris measured approximately 1m in depth. Domestic items (grinding stone and figurine fragments) were found in these debris layers. In both probes the distinction between the collapse levels and the post-occupational weathering levels was clear on the face of the wall stones, which were clean and unweathered in the collapse layers and heavily weathered above this level.

Two 2m by 3m probes were placed in the upper settlement, north of the *qaṣr*, with the goal of detecting the earliest periods of occupation at the site. Each was placed against standing walls, guided by the GPS survey results (see **Fig. 5**).

6. Lower settlement excavations in Square 60.11; the exterior fortification wall is to the south with a small, single row, single course dividing wall and earth surface at its base.

Square 24.50 was placed northeast of the *qaṣr* in an area where it was hoped there would be considerable stratigraphic depth preserved. Initial excavation included probable Hellenistic occupational phases associated with large walls, carefully prepared beaten earth and plaster surfaces, and domestic artifacts including an in-situ basalt mortar (**Fig. 7**). Unfortunately, the square was then vandalized, stones tipped over, and excavation halted for the season. The Hellenistic occupational phases in this square were the first noted at Al Bālū‘.

Square 25.62 was placed against a wall in what appeared, from the visible wall lines, to be a room in a large building. Excavation revealed a well-preserved Iron Age structure with walls standing to over 2m in height, preserved under at least a meter of destruction debris from a major fire, with tumbled stones, burnt mudbrick, and ashy earth. The part of the room in the probe turned out to be an entryway with a threshold and earthen and cobble stone floors, part of a

7. Upper settlement excavations in Square 24.50; earliest Hellenistic walls and surface reached before vandalism.

building with at least two phases of use dating to the Iron II period (**Fig. 8**). Material remains included domestic artifacts such as ground stones, pottery, figurine fragments, jewelry, and a spindle whorl. As this building will be further described below in the 2017 excavation results, we will not describe it further here.

The 2012 excavations, while preliminary, did contribute significantly to our understanding of occupation at Al Bālū‘. In particular, the deep destruction layer discovered in the upper settlement probe was not detected in the lower settlement probes. This highlights the rapid expansion, short occupation, and then peaceful abandonment of the lower settlement when compared to the fiery destruction of the upper settlement after at least two major phases of use. Future excavation will clarify the occupational history of the Iron II period at Al Bālū‘.

2017 Excavation Results

We returned to Al Bālū‘ for renewed excavations in 2017. Work focused on three areas, including the *qaṣr*, the Iron II domestic structure from 2012, and the fortification line dividing the upper and lower settlements in the Iron II period (see **Fig. 5**).

The Qaṣr

One goal of the 2017 season at Al Bālū‘ was to narrow the date of the large standing structure called the *Qaṣr Al Bālū‘*. Excavation against the northwestern external face of the structure would examine its founding level and the *strata* that related to its construction, use, and abandonment. Because of the collapse of the *qaṣr*'s upper structure it had previously not been feasible to excavate near the base. An estimated upper two meters of wall stones, many weighing an estimated several thousand pounds, had collapsed on a layer of sloped debris encircling the *qaṣr*. A front-end loader was arranged through the assistance and cooperation of the DoA representative, regional offices, and the *Qaṣr* municipal district. We mapped and numbered about 60 of the large blocks in the area we wished to work. Photogrammetry was conducted on the area in case of future reconstruction efforts, then the loader pulled back the fallen blocks from a 4m width along a western portion of the northern *qaṣr* wall.

A 3×3m probe in Square 24.42 was opened against the *qaṣr*'s north wall (**Fig. 9**). Sloped debris layers were excavated that contained mostly Iron II pottery, perhaps representing late collapse of original mud-brick superstructure. A cobble and packed-earth surface was reached at about level with the surrounding area (**Fig. 10**). A few Nabataean pottery sherds indicated an early first-century AD Nabataean reuse of the structure and surrounding area, including one inscribed with a possible measurement.

8. The Iron II domestic building with Phase II features and surface at the end of 2012.

9. Qaṣr Al Bālū‘.

10. The Nabataean cobble surface sealing against the Qaṣr.

Excavation below this level revealed two east-west walls and several layers of earth debris covering and running up to the *qasr* wall (**Fig. 11**). Diagnostic pottery indicated an Iron IIB date. Much bioturbation and disturbance was encountered along the *qasr* wall including a fox burrow, which made it difficult to ascertain the stratigraphic relationship of the Iron II layers with the *qasr* wall. Further excavation finally reached below the bioturbation and established that the earth layers sealed against the *qasr* wall and had not been cut by a foundation trench. Time limitations did not allow us to excavate to the bottom of the *qasr* wall, but the lowest layer excavated appeared to consist of destruction debris interspersed with charred wood and animal bone fragments (**Fig. 12**). This layer contained a quantity of pottery which dated earlier than any of the other layers encountered in the 2017 season. Late Bronze Age pottery dominated with some Iron I forms present. A careful study will be made to refine the ceramic readings from this layer. Tentatively, it appears this debris layer, if not of secondary deposition, could provide a *terminus ante quem* for the construction of the *qasr*, which would be early in the Iron Age sequence.

The Iron II Domestic Structure

Square 25.62 was reopened and expanded to further expose the domestic structure excavated in 2012. A major objective was to establish a date for the destruction of the building and to understand the phases of use represented by several surface layers encountered in 2012.

Phase I

The first phase of the structure was founded on bedrock (a basalt and limestone mix, as found in 2012 in the lower settlement probes). Two enormous boulders (over 1m high) were either placed in this area at this time or were already present and utilized as part of an east-west wall. A stone wall abutted these boulders from the north. Preparatory earth layers smoothed the surface of the bedrock and a cobblestone surface was laid against these two walls to the northeast (**Fig. 13**). The surface contained significant buildup, with a thick, hard-packed organic layer (which in 2012 contained a quantity of artifacts and pottery). While minimally exposed in 2017, Phase I represents a distinct period of use early in the Iron II period, as dated by the ceramics. The two Phase I walls were reused/rebuilt in the succeeding phase, though the plan appears to have changed significantly with the addition of more walls to the north and east. There was no clear destruction or abandonment level between the two phases.

Phase II

New walls were added to the east and north and the two existing walls rebuilt to

11. The Qasr and the Iron Age walls.

12. Iron Age earth layers sealing against the Qasr.

create an area with two rooms. The walls and surfaces of this phase were constructed on top of a thick plaster surface sealing in the Phase I remains (with the exception of the southern wall, which was built directly on top of the large basalt boulders) (**Fig. 14**). A foundation trench cut along the central wall indicates the Phase II occupants took some care in reutilizing the earlier architecture. The two rooms were partially exposed with additional rooms indicated by an unexcavated doorway to the southwest and a passage to the east. The preservation of these walls is remarkable, with the walls still standing nearly 3m high and a basalt door lintel still *in situ* over the southwestern doorway.

A series of surfaces in both rooms attest to several sub-phases of use over the course of the structure's occupation.

The latest use-surface included a number of domestic installations and artifacts, including two stone-lined bins or supports for pithoi in the western room and a flat basalt quern with later rebuild and reuse as a bin in the eastern room (**Fig. 15)**. The western room contained several pithoi crushed by the collapse of the dividing wall between these two rooms (**Fig. 16**).

The destruction that brought this structure to an end was likely caused by an earthquake and consequent conflagration. The central wall, oriented roughly north-south, had collapsed, producing a pile of wall stones and rubble mostly on the west side. But the courses near the base were shifted eastward. This is strong evidence of an earthquake emanating from the direction of the Great Rift Valley just to the west with the shockwave traveling eastward and shifting the base of the wall off its foundations to the east. However, the stationary inertial momentum of the upper wall would cause it to lag behind the motion of the lower portion and it collapsed backwards on the west side crushing at least five pithoi. Mudbrick debris, at least 1m deep and fiery red with destruction, sealed in the last phase of use (**Fig. 17**). Another half meter of windswept debris covered this destruction

13. The Iron II domestic structure Phase I with cobble stone surface.

14. The Iron II domestic structure with Phase II on left, Phase I on right image.

15. The Iron II domestic structure's Phase II bins, surface, and pithoi in western room.

layer. The ceramic forms from the final phase of the house date to the Late Iron II or even into the Persian period while retaining mostly Late Iron II characteristics. The ceramics, as well as the artifacts, from this structure are likely to contribute greatly to a better understanding of the Iron II occupation at Al Bālū‘.

The Wall

An area of excavation, part of Square 41.31, was chosen to overlie what appeared from the surface and GIS mapping to constitute a defensive wall that separated the upper settlement from the lower, eastern expansion. This wall probably served as the external wall prior to the late Iron Age expansion and thus might provide us with information that could establish a chronology of the upper settlement and a date for the lower extension. Excavation revealed three phases of fortification, all dating to the Iron Age II.

Phase I

A probe on the eastern external side of the wall extended more than 3m down to the wall's founding level on bedrock. The resulting view of the wall face indicated three phases of construction (**Fig. 18**). The latter two phases correspond to what we call here Phases II and III, while an earlier Phase I appeared on the exterior that has not been reached yet on the interior. The pottery from this lowest phase probably indicates a date early in the Iron II.

Phase II

Excavation of the 7m wide wall soon revealed that there are actually two large walls running parallel to each other, with a room in between. While the Phase III tower obstructs a clear view of this room at this time, the layout strongly suggests a casemate construction

(**Fig. 19**). The portion of the casemate room excavated produced 45 clay loom weights of varying sizes. The unfired loom weights were very crumbly but were photographed *in situ* and extracted as intact as possible for restoration (**Fig. 20**). A number of ground stone fragments also were excavated in these fill layers suggesting domestic or economic activity

16. The Iron II domestic structure's Phase II pithoi in balk with collapse stones above.

17. The Iron II domestic structure's Phase II destruction debris in eastern doorway.

18. The Iron II domestic structure's Eastern Wall with all three phases.

19. The Iron II fortification's casemate room.

in this room. A short wall extending east-west between the casemate walls, but with a door or passageway allowing movement into the next presumed room, suggested an interlinking of casemate rooms.

Phase III

The latest phase appeared to entail the construction of towers along the destroyed or abandoned line of the earlier fortification wall. Spaces between these towers could allow passage through and access between the settlement areas (**Fig. 21**).

Conclusions

The Iron II remains at Al Bālū‘ cover roughly 11 ha, based on the visible architecture mapped by the GPS surveys in 2010 and 2012. Excavations in 2012 and 2017 confirmed that the predominant remains date to the Iron II period, with at least two main phases of occupation. GPS survey also mapped a Middle-Late Islamic village to the southwest and possible Roman remains to the west, for a total site size of 25 ha. Further excavation of the Iron Age and Islamic settlements is planned for the 2019 season. Continued excavation under the five-year research plan will contribute to the The Balu‘ Regional Archaeological Project's major goals of building a better picture of the ceramic typology of the Al Bālū‘ region, especially in the Iron Age, as well as a better picture of the social and economic activities throughout the millennia at this important site.

20. The Iron II fortification's loom weights in the casemate room.

21. The Iron II fortifications viewed from the east: towers on either end, casemate room in center, and outer wall at end of 2017.

Acknowledgements

The work at Al Bālū‘ could not have succeeded without the financial and logistical support provided by several organizations and individuals. The authors would particularly like to thank the following: Barbara Porter and the staff of the American Center of Oriental Research in ‘Ammān, La Sierra University, Theologische Hochschule Friedensau, Thomas Levy and the Edom Lowlands Regional Archaeological Project (University of California San Diego), The Helen Rich Memorial Fund (The Oriental Institute), and The Edward L. Ryerson Fellowship in Archaeology (University of Chicago). The directors also would like to thank the staff and volunteers of the Center for Near Eastern Archaeology at La Sierra University.

The Balu‘ Regional Archaeological Project.
KHirbat Al Bālū‘ 2010, 2012, and 2017 Seasons.

Monique D. Roddy,
Walla Walla University,
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La Sierra University,
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Friedbert Ninow,
La Sierra University
Theologische Hochschule Friedensau, Director.

Site: KHirbat Al Bālū‘ (**Fig. 1**).
Coordinates: 31°21’36.6”N / 35°46’58.9”E.
Location: Central Al Karak Plateau.
Project Name: The Balu‘ Regional Archaeological Project.
Dates of Fieldwork Seasons:
15 August to 7 September, 2010;
12 August to 13 September, 2012;
6 August to 25 August, 2017.
Sponsors: La Sierra University and Theologische Hochschule Friedensau.

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EMPLOYMENT THROUGH HERITAGE FOSTERING A LEGAL FRAMEWORK WITHIN THE JORDANIAN CRM JOB MARKET

Maria Elena Ronza
Contributor: Christina Danielli

Introduction

This article aims at presenting the outcomes of the first year and half of Sela's Employment through Heritage Project (EHP).

Founded in 2015, Sela for Training and Protection of Cultural Heritage is a Jordanian not for profit company operating in the Cultural Resources Management sector with the aim of protecting cultural heritage and building local capacities within communities to enable sustainable preservation of cultural heritage by promoting the active involvement of the host communities in its protection. Since its foundation, Sela implemented numerous training programs in collaboration with Jordanian and international institutions.

With the launch of EHP in 2018, Sela is attempting to create an enabling environment to the sustainability of cultural heritage by actively engaging communities in its protection.

By engaging host communities with the heritage in their courtyard, new collective memories are created and the bonding potential that heritage could play within the communities is enhanced. The shared sense of ownership towards the past and the heritage is the form of social capital that needs to be cultivated, because it has the potential to become a great vehicle for raising awareness and for the sustainable protection of heritage sites. Heritage sites are meaningful as tangible representations of the past and, as such, they are meaningful to communities if they are lively places that carry symbolic values. Communities need to be central in the management of heritage, but also heritage needs to be central in the daily life of the communities.

Employment through Heritage Project (EHP)

In 2018, Sela launched EHP-Employment through Heritage Project in cooperation with the Department of Antiquities of Jordan. EHP is a 4-years project supported by the DROSOS Foundation (https://drosos.org/en/).

The project's main aim is the formalization of the CRM job market in Jordan. Nevertheless, EHP has the potentials to play a major role in giving back centrality to heritage in the daily life of communities.

The Context

At present, knowledge-based academic study is prioritize within Jordan's formal training programs in archaeology and broader CRM fields. Such curricula typically offer limited opportunities for hands-on, applied field training. Moreover, the focus on a university degree as the essential prerequisite for a future career in the heritage sector has excluded entire segments of Jordan's population (particularly less affluent rural communities) from access to available and much needed employment opportunities within the sector.

The lack of formal vocational training programs within the sector has determined a *status quo* in which many "unskilled workers" have acquired an enormous baggage of skills

and field experience, but are not framed in a system that allow them to capitalize on their expertise.

EHP Objectives and Implementation Strategy

The project's overall goal is to engage skilled Jordanians within a formalized CRM employment sector. In order to accomplish this goal, it is necessary first to transform the previously informal and undefined archaeology/CRM employment sector into a formalized sector with agreed-upon professional and technical standards and certifications. To achieve this goal Sela is pursuing three key objectives:

1. Develop a formalized CRM employment sector.
2. Create a corps of formally trained and certified Jordanian CRM jobseekers.
3. Facilitate the employment of certified CRM personnel by Sela and Community of Practice.

Objective 1: Develop a Formalized CRM Employment Sector

The first needed step towards the formalization of the sector was the creation of a legal framework to operate in.

In 2018 and 2019, Sela has worked with DoA's appointed technical committee on drafting the new regulations for conservation and management of heritage sites in Jordan and on defining categories and classifications for formal vocationally based training and employment in CRM. The classifications aim at meeting the practical needs of site preservation and management while also opening the sector to non-university graduates, especially trained members of local communities. Within the regulations 15 new professional and technical profiles have been defined.

The Regulations for conservation and management of heritage sites in Jordan are currently in the process of being approved by the relevant Jordanian authorities.

In order to assure the enforcement of the regulations, Sela and DoA designed a training program for DoA junior employees aiming at providing the needed knowledge in CRM for the proper enforcement of the regulations. The program consisted of several courses held by experts and professionals in different fields of CRM.

Every year of the four years of EHP, Sela trains 6-20 DoA junior employees, of those 13 will be selected for advanced training.

The first cycle of training was concluded in June 2019. The training included courses in site assessment, water management, pottery reading, archaeological documentation, emergency

1. Training in emergency treatment of archaeological objects - Trainer: Fatma Marii from University of Jordan. Photo credit: Mohammad AlBdoul.

2. Training in use of total station - Trainer: Ehab Jariry from DOA. Photo credit: Mohammad AlBdoul.

3. Training on water management - Trainer: Giuseppe Delmonaco (ISPRA, Italy). Photo credit: Mohammad AlBdoul.

treatment of archaeological objects on site, mosaic and plaster conservation **(Figs. 1-3).**

Objective 2: Create a Corps of Formally Trained and Certified Jordanian CRM Jobseekers

The second step is to create formally trained and certified Jordanians to enter the job market.

Training of Trainers (ToT)

Starting in 2018, Sela built its capacity by successfully training and certifying five trainers to run the vocational training program in CRM for technicians and the vocationally based practicum for university students. Trainers were selected on the basis of their prior experience and their potential to succeed given a nine-month course.

Since the candidates already possess the necessary theoretical knowledge and several years of field experience, the courses focused on conveying teaching methods by which to pass on their experience. The training program consisted of a series of workshops taught by expert consultants and senior professionals between July 2018 and April 2019. Each workshop included a project/assignment **(Figs. 4-5)**. At the end of the nine months trainers were evaluated and certified by DoA.

ToT was implemented at the Petra Pool and Garden Complex (PGPC) under the scientific supervision of Penn State University-Behrend College. Training projects/assignments were designed to fit into PGPC conservation plan.

Certified Training Courses (CTC)

In the summer of 2019, Sela launched the first training programs for technicians in different communities in cooperation with DoA.

One year later at the end of the 2020 summer, Sela trained 10 members of two of the host communities of Petra (Umm Sayhūn and Wādī Mūsā), 11 members of the community of Ma'īn in Madaba region with the support of DoA and 9 community members from 'Ammān **(Fig. 6)**.

Several archaeological sites were selected with the DoA to host the training, such as. Mā'īn, 'Irāq Al Amīr, Yājūz, 'Abdūn, KHuraybat As Sūq, Rujm Al Malfūf, Udhruh.

The certified training programs are tailored to the categories and professional and technical profiles defined in collaboration with DoA during the first year of the project.

University Practicum

Within EHP, Sela proposes field training opportunities for national and international students. For Jordanian students, this is an opportunity to gain hands-on experience during their summer semester **(Fig. 7)**.

Sela offers training opportunities within different projects and helps expanding the students' network by engaging them with different national and international projects, within a training framework that is designed to match their field of interest/study.

4. Training in onsite documentation - Trainer: Eman Abdassalam (Sela). Photo credit: Mohammad AlAtrash.

5. Communication skills improving (TOT) - Trainer: Fawzi Abu Dannah (Hussein Bin Talal University). Photo credit: Mohammad AlBdoul.

6. Training in documentation at PGPC - Trainer: Mohammad AlBdoul. Photo credit: Mohammad AlBdoul.

Objective 3: Certified CRM Personnel are Employed by Sela and Community of Practice

Sustainability is a key objective of EHP and Sela is addressing it at different levels by creating job opportunities for trained technicians, by outreaching to other projects, by facilitating the creation of microenterprises within the communities engaged with EHP, and by testing sustainable materials for conservation works.

Creation of Job Opportunities

Since its foundation in 2015, Sela has implemented several projects in which local community members were trained on the job within foreign projects in Jordan. Sela managed local staff and built local capacity in each site with the aim of creating a workforce to sustain each project in the years to come. A basic database of skilled/trained technicians was established in 2015 with the support of USAID/SCHEP.

With the EHP, Sela is expanding and improving the existing database in order to adapt it to the newly defined categories. The database will become an open platform available to the Community of Practice and trainers and trainees will be registered for enrollment in future projects.

Currently, Sela trains and then employs the trainees in projects that fit their acquired skills.

During the first year of the project, Sela has created 70 formal job opportunities, of which 15 are long term contracts; and has trained 12 certified trainers, 115 community members, of which 21 are within the certified training framework, 14 national students and 15 international students.

Between June 2018 and December 2019, over 150 persons (40% women and 60% men) were involved into the project in different capacities from 7 different communities in Jordan.

Sustainable Heritage Initiatives and Communities' Engagement

Within the framework of EHP, an outreach officer is appointed to work within communities and identify potential partners that might sustain the heritage preservation.

By engaging and sustaining partner organizations within host communities, such as microenterprises, Sela secures continuous income for the preservation of the heritage in each community.

The first agreement for a sustainable income for heritage project was reached with the Productive Kitchen in Hīsbān, which is supporting heritage projects with every meal served.

Sela is reinvesting the income in heritage protection projects all over Jordan in cooperation with the Department of Antiquities of Jordan by running short training programs in minor archaeological sites.

Testing Sustainable Materials (Contributor: Christina Danielli)

Calcium Caseinate is a traditional material which conservators have been using for the consolidation of wall plaster and paintings. The main ingredient of Calcium Caseinate is Casein, a protein based organic compound that when mixed with an alkaline solvent develops bonding properties. Different factors contribute to the bonding power of this material, thus it

7. Emergency conservation training at PGPC for national and international students - Trainer: Ghadeer AlBdoul. Photo credit: Sela archive.

8. Conservation technicians, Ahmad AlMousah and Ghadeer AlBdoul preparing samples for testing calcium caseinate as consolidant. Photo credit: Christina Danielli.

is necessary to test different types of calcium caseinate and different proportions with its alkaline solvent on selected samples in order to establish its consolidating ability.

During the Sela Training program in May 2019, it was decided to test a locally produced Casein for the consolidation of stone and plaster elements in order to develop a more sustainable solution for the maintenance of archaeological sites in the Petra area.

The testing involved the use of two Casein products, one bought commercially and another produced locally from goat milk. The two products were mixed with the same percentage of alkaline solvent and applied on two samples of the same stone (two limestone and two sandstone samples) and on lime plaster samples offsite.

The two different Casein products were also employed to create a grouting mixture and a denser gluing blend for detached plaster fragments. The students involved in the trial created a database to record and number the different samples and percentages of the mixture applied in different proportions for the testing. The database will be implemented when further testing in the laboratory will give more accurate results **(Fig. 8).**

A week after the application of the different Calcium Caseinate combinations the samples treated with the commercial Casein and the ones treated with the local Casein did not show visible differences after drying. The color of the stone did not undergo visible color alterations in either of the samples treated with commercial casein and the locally produced one. Additionally, the compactness of the treated samples with both products was visibly improved, showing a great reduction in flaking and pulverization of the stone surface.

Further testing will be necessary to understand factors concerning the penetration of the product and the compressive strength of the stone after treatment, as well as the ageing and susceptibility to biological attack when applied to stone in an exterior environment.

If the testing proves successful it will be an important step forward for developing a sustainable conservation product that can be produced locally and contribute to the involvement of the local community.

Why is this Project Important?

Sela is still unique in the Jordanian CRM horizon, but it represents the type of genuinely local development which can accomplish huge steps towards sustainable preservation. Sela represents the voice of the resiliency of Jordanian host communities, and their connection with the heritage[1].

Thanks to the support of the Drosos Foundation, with EHP Sela has the opportunity of having an impact at the national level by giving voice to host communities and by grasping local contributions for a more sustainable management of the Jordanian heritage.

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1. On the concept of resiliency and engagement with places and landscapes, see Smith and Waterton (2009), Heritage, Communities and Archaeology, Bloomsbury.

PRELIMINARY REPORT ON INVESTIGATIONS OF WĀDĪ ATH THAAMD CLAY, CENTRAL JORDAN

Maria-Louise Sidoroff

Introduction

Wādī Ath THamad, and the clay therein, has been of interest to geologists (Bender 1975; Cordova *et al.* 2006), potters (Jacobs 2008; Sidoroff 2013: 79), and archaeologists (Braun 2007; Daviau 2012; Steiner 2006).This preliminary study of clay in Wādī Ath THamad begins with a geological overview of the region and describes investigations to determine if recent deposits of alluvial clay in the *wadi* were suitable for pottery manufacture.

So far, there is no evidence of pottery workshops in the Al Mudaynah Ath THamad Regional Survey area (Daviau *et al.* 2012), world-wide data (Arnold 1985: 21) attest to potters' preferred distance of one kilometer to travel for clay resources. This includes evidence from antiquity: Petra ('Amr 1997), Ayla (Parker 2014), and Lehun (van As and Jacobs 1995). This preference also holds true in Jordan for modern household workshops (Ali 2010; London and Sinclair 1991) and an industrial factory (Sidoroff 2015) as well as elsewhere in the region (Nicholson and Patterson 1985; Annis 1996-1997; Hasaki 2005). Furthermore, suitable potting clay from Wādī Ath THamad has been already identified by the Leiden University Ceramic Laboratory (Jacobs 2008).

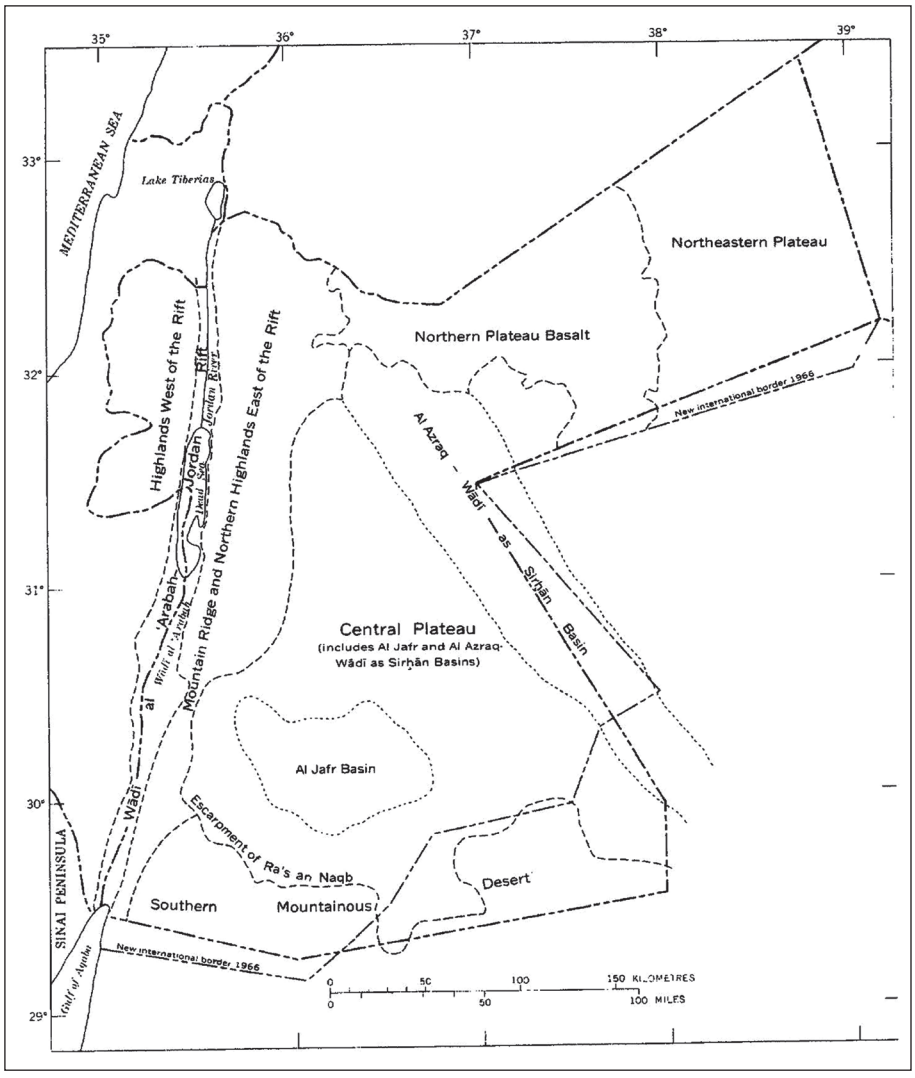
There are two complex archaeological sites within less than a kilometer of the *wadi*, the Iron Age town KHirbat Al Mudaynah and a Nabataean settlement with reservoir and villa (Daviau *et al.* 2012).This investigation seeks evidence to answer the question: Was Wādī Ath THamad the resource procurement zone for ceramic artisans who responded to consumer demands for domestic ware, ovens, and other clay objects?

Geology of Wādī Ath THamad Region

During the late Eocene, calcareous sediments were deposited in a shallow marine environment at a time when all of Jordan probably remained covered by the Tethys Sea (Bender 1975: 111). In this marine environment lived organisms that formed calcium carbonate shells and skeletons. When these animals died, their shell and skeletal debris accumulate as sediment that formed into deposits of limestone, the regional parent rock. The weathering of these formations creates the ath-Thamamad graben comprised of Cretaceous sediments.

The Wādī Ath THamad lies on the Mādabā-DHībān Plateau in the Northern Highlands east of the Rift (**Fig. 1**). The drainage of the Wādī Ath THamad graben is controlled by this tectonic structure. The depressed block of land which includes the Wādī Ath THamad is bordered by parallel faults between 10-20m above the *wadi* bottom, which is easily identified by the reddish brown color of its fill where pockets of sedimentation occurred (Cordova *et al.* 2005: 42). Red Mediterranean soil (RMS) (**Fig. 2**) comes from sediments eroded from more recently exposed Red Mediterranean Soils on the adjacent plateaus (Cordova *et al.* 2005: 33).

The Thamamd Terrace (**Fig. 3**) is a prominent feature; it is the highest of all the tectonic increase in land elevation. This is typical in a river system, due to the deposition of sediment in terraces between 10-20m above the *wadi*



1. Physiographic-geologic provinces, Jordan, (Bender 1975: 59).

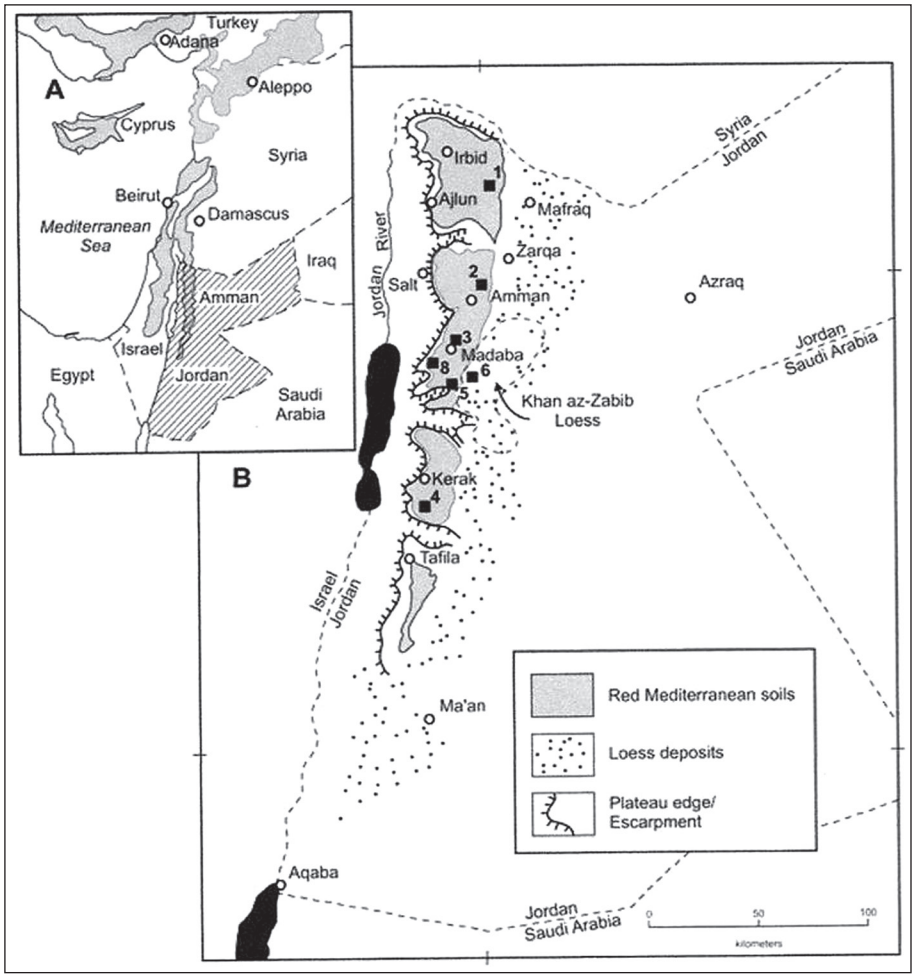
bottom, which is underlain by a thick and varied sequence of alluvial fill. Annual precipitation events in Central Jordan deposit between 200 and 400mm of water (Cordova *et al.* 2005: 30). Fine textured clay develops during transport through interaction of fast-moving waters and boulders. This naturally levigated alluvial clay is laid down several meters thick in recent deposits (Braun 2007). Annual precipitation events in central Jordan deposit between 200 and 400mm of water (Cordova *et al.* 2005: 30). Fine textured clay develops during transport through the interaction of fast moving waters and boulders. This naturally levigated alluvial clay is laid down several meters thick in recent period deposits (Braun 2007).

Color changes occur in raw *wadi* clay due to the presence of calcareous materials and RMS. Comparative analysis of colors of dried sediments, sampled in various years and locations, shows a variety of colors. For example, dried samples collected at 1-2 meters depth by Braun (2007) (**Fig. 4)** are very pale brown at 1-2 meters whereas Cordova's dried samples are light gray from one meter and yellowish brown at two meters depth from the surface (Cordova *et al.* 2005: 36).

Methodology

The approach in this report includes previous studies of Wādī Ath THamad clay and artifacts from excavations in widely separated time periods: Iron Age II town KHirbat Al Mudaynah (*ca.* 800-700 BC) and a Nabataean settlement (100 AD) with reservoir and villa (Daviau *et al.* 2012). (**Fig. 5**) aerial view)

To assess whether recent deposits of Wādī Ath THamad clay were suitable for pottery manufacture, samples were collected by University of Toronto graduate student G. Braun



2. Distribution of Red Mediterranean Soils in the Eastern Mediterranean,and deposits in Jordan (Cordova et al. 2005: 33).

(2007) and five years later by the author. The two groups of moist clay were tested for the property of plasticity. Test tiles were formed then fired to analyze for color and hardness. Also included, are two petrographic studies: a quantitative analysis of *wadi* clay and a study of pottery from the Nabataean site.

Method to DetermineP of a Clay Through Analysis of Particle Size of the Moist Clay

The term clay refers to very fine particles of a specific size, smaller than 2 micrometers. Typically, a good potting sediment must carry 35% of fine clay particles (Rice 1987: 38-39). In moist samples, this particle size is the indication of potting clay with good plasticity. For this analysis, 40ml of water were shaken in a clear plastic container with 10 ml moist clay until the clay particles were in complete suspension.

As explained by geochemist Velde (2012: 3), if one takes the product of weathering (that is, soil) and puts it into a beaker or glass, then stirs it up, a mechanical sorting is affected. The lightest and, more importantly, the smallest grains settle more slowly. As most silicates have about the same density (around 2.5 times that of water), grain size is an important factor in settling. The finer the grain, the more friction is affected on its surface as it falls through the water. This action is basically controlled by the ratio of the surface of the grain to its volume. As clays are the smallest materials in RMS, they tend to stay afloat longer and can be separated from larger grains. If the water remains cloudy after 2 hours this indicates the soil is god potting clay.

Test Firings for Color and Hardness Uniformity

Jordan probably remained covered by the Tethys Sea (Bender 1975: 111). In this marine environment, organisms existed capable of forming calcium carbonate shells and skeletons. When these animals died their shells and skeletal debris accumulate as sediment that formed into deposits of limestone becoming the

regional parent rock. The weathering of these formations creates the Ath THamad graben comprised of Cretaceous sediments.

Besides quantities of clay within the *wadi*, growing along the edges of the *wadi* are grasses and low lying shrubs, which modern inhabitants collect for cooking fuel (pers. com.). They are also documented as a fuel among modern potters in the Middle East (Matson 1966: 151; 1974: 346) and elsewhere (Miller 2009: 125; Rice 1987).

For uniformity, all test firings were conducted in electric kilns with oxidizing atmospheres and colors were recorded with Munsell Soil Color codes. In order to understand the limits of the temperature range of fired local clay, test samples were fired at both low (650°C) and high (1023°C) temperatures.

A set of rectangular tiles (N=9) was made with Braun's moist clay samples, each measured: 5×3×0.5cm. The clay exhibited sufficient plasticity to roll out the ties without crumbling. A. Cordell, Director, Ceramics Lab, Florida Museum of Natural History, conducted the firing in an electric kiln at 650°C. This low temperature was used because spalls occur in pottery fired at high temperatures due to an abundance of calcium carbonate in the regional parent rock. During a firing, calcium carbonate decomposes and forms lime between 650°C and 900°C depending on duration and the atmosphere in the firing (Rice 1987: 98). When the fired object is exposed to atmospheric moisture, the lime swells and defects appear such as cracking and spalling in the clay walls.

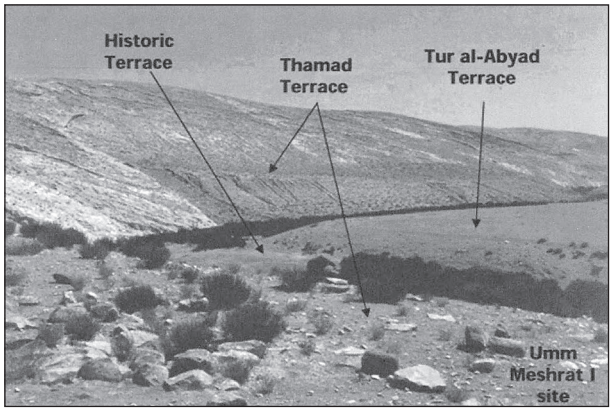
Round clay tokens (N=22), made with samples collected by the author, each measured 3cm diameter×0.5cm thickness. All were fired to cone 06 (1023°C) in the kiln of an art pottery studio. The following year another set of clay samples was collected by the author in Jordan. This time, upon return home, U.S Customs considered the moist clay samples as organic material and confiscated most of the clay. Only a small sample the size of a lemon was permitted. Two very thin tiles (2mm thick) were formed and fired hard at 650°C. This low temperature provides an insight into the technology of cooking pots with very thin walls, which were were excavated at the Nabataean settlement **(Fig. 6).**

The third group in the color study was Iron Age unfired clay artifacts excavated at KHirbat Al Mudaynah: loom weights (N=12) and oven fragments (N=5). The artifacts were later fired at 800°C by Laboratory Director Jacobs, at Leiden University (Jacobs 2008).

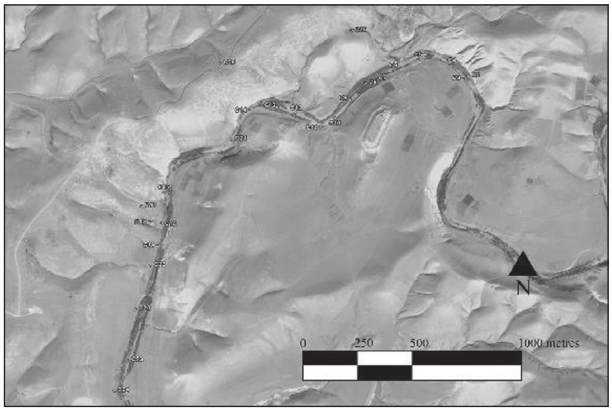
Methods in Quantitative Observations of Thin Sections of *Wadi* Clay

Fired samples of *wadi* clay collected by Braun (**Fig.4**) were thin sectioned at Spectrum Petrographics, Vancouver, WA. A select group of thin sections (N=9) was examined with a Westover petrographic microscope at 25× Grain size range was measured with Wentworth Scale (1922).

In a petrographic study of a group of Nabataean sherds (N=24) the slides were examined for provenance and technology with a focus on the *wadi* as a possible source of clay (Sidoroffand Ownby 2016) The study facilitated comparison of painted and unpainted ware excavated at the Reservoir and Villa at the Nabataean settlement.



3. Wādī Ath THamad (Cordova et al. 2005: 46).



4. Clay sampling map of Wādī Ath THamad (Braun 2007).

Results

Multidisciplinary evidence in this investigation of Wādī Ath THamad clay confirms the recent alluvial deposits as suitable for pottery manufacture and strongly suggests the clay was used by potters in antiquity.

Results of Particle Test of Moist Clay from Wādī Ath THamad and Colors of Fired Clay

Overall, samples of naturally levigated *wadi* clay may be characterized as having medium size clay particles since 75% of the clay samples from the *wadi* settled within less than 1/2 hour. This test suggests the clay might not be well suited for pottery. (**Table1)**

Since fine clay particles form the best potting clay, the author consulted L. Cowell, an experimental potter who made vessels with Braun's **clay sample** (WaT c 21), which is of medium not fine particle size**.** Cowell found this clay very plastic ("fat"). In an experimental study, she was able to throw several small thin-walled (3mm) Petra style bowls on a fast wheel. Each bowl was completed in less than one minute (Sidoroff 2013: 79).The bowls fired hard in Cowell's electric kiln at cone 06 (1023°C).

Results of Fired Colors in *Wadi* Clay Samples and Iron Age Artifacts

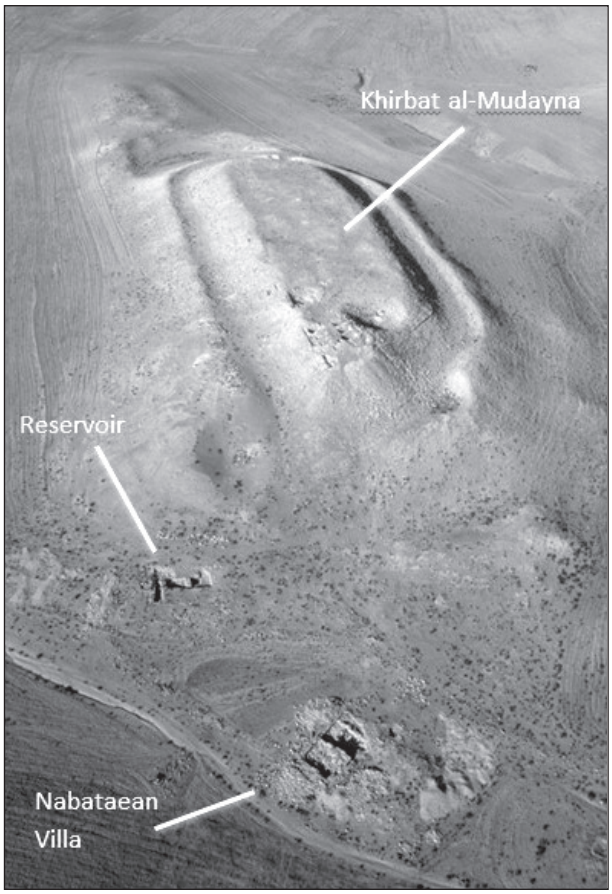
Color data from fired *wadi* clay and refired Iron Age artifacts were from three contributors: Braun (2007), Sidoroff (2013) and Jacobs(2008) (**Table 2**).

Braun's clay tests (N=9) fired to 650°C could be broken at the corner with two exceptions (WaTc 20 (pink) and WaTc 24(reddish yellow). Both samples were gathered at 1-2 meters depth with Braun describing them as RMS due to iron content. Clay that contains iron becomes a reddish or pinkish color when fired in an oxidized atmosphere between 850°C- 1000°C degrees Hamer and Hamer 1975: 25).

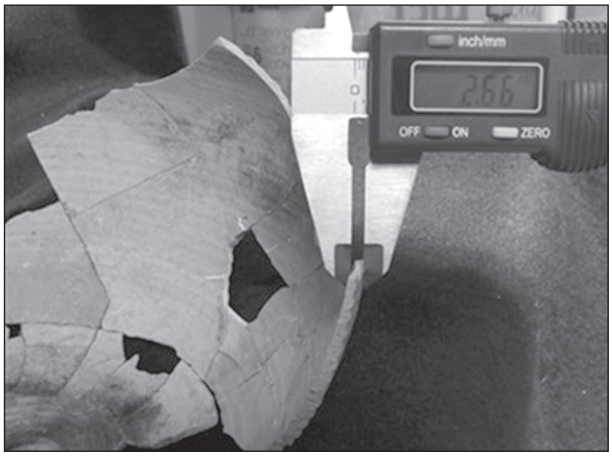
Reddish yellow (7.5 YR 6/6) the most frequent fired color of recent *wadi* clay is also the color of Iron Age refired loom weights. This reddish color*Terra Rosa* was influenced by Red Mediterranean soils in the regional clay(**see Fig. 2**).

Most of the Sidoroff clay tokens (N = 22) fired at 1023°C spalled upon removal from the kiln. Only four tokensfired hard: two 5YR7/4 (pink) and two7.5YR7/6 (reddish yellow). The small lemon size ball of clay was formed into two thin test tiles (thickness = 2mm) and fired hard at 650°C.

Clay in the Iron Age loom weights (N=7) fired hard at 800°C though containing Ostracoda (N=3) and organic fiber (N =2), both probably



5. Aerial view of KHirbat al-Muddyna and the Nabataean settlementon the south bank of a bend in Wādī Ath THamad (APAME_1998052-DLK-0006, David Kennedy).



6. Cooking pot P704, thickness of walls 2.66mm (Photo: B. Haberstroh MD).

added as temper (Jacobs 2008). The clay in some loom weights (N=4) was identified as good for pottery manufacture. Oven fragments (N = 5) fired to light colors: white, pale brown with more than half fired pink (Jacobs 2008). Light firing clay may be exclusive to oven construction and firing temperatures have been controlled at 800°C.

Table 1: Unfired and fired clay colors with results of particle test.

Sample #	Color of unfired clay	Unfired clay particle size	Color of Oxy fired clay	UTM coordinates (WGS84 datum) (Braun 2007)	Extraction location (Braun 2007)	Comments (Braun 2007)
WaT c 5	7.5YR 7/3 (pink)	medium	7.5YR 6/6 (reddish yellow)	36R 0776116/3498839	*wadi* bed	recent alluvial deposit
WaT c 7	10YR 7/4 (very pale brown)	medium	7.5YR 7/4 (pink)	36R 0775921/3498747	*wadi* bed	recent alluvial deposit; relatively few inclusions
WaT c 17	10 YR 7/4(very pale brown)	fine	7.5YR 7/4 (pink)	36R 0774862/3498138	vertical cut in upper terrace	located 1-2 meters below surface; adjacent to Umm Meshrat I
WaT c 20	10 YR 7/4 very (pale brown)	medium	7.5YR 7/4 (pink)	36R 0774843/3497665	vertical cut in lower terrace	located 1-2 meters below surface; adjacent to Umm Meshrat I; RMS deposit?
WaT c 21	10YR 7/4 (very pale brown)	medium	7.5YR 7/4 (pink)	36R 0775270/3498454	*wadi* bed	recent alluvial deposit; relatively few inclusions; 2 kg to L. Cowell
WaT c 22	10YR 7/4 (very pale brown)	medium	7.5YR 6/6 (reddish yellow)	36R 0774910/3497865	bank of lower terrace	surface; eroded RMS deposit?
WaTc 23	10YR 7/4 (very pale brown)	medium	7.5YR 6/6 (reddish yellow)	36R 0774910/3497426	*wadi* bank	Historical recent alluvial deposit
WaT c 24	10YR 7/4 (very pale brown)	medium	7.5YR 6/6 (reddish yellow)	36R 0774756/3497290	vertical cut in lower terrace	located 1-2 meters below surface; RMS deposit
WaT c 25	10YR 7/4 (very pale brown)	finel	7.5YR 6/4 (light brown)	36R 0775805/3498957	vertical cut in upper terrace	located 1-2 meters below surface; RMS deposit

Table 2: Fired colors of *wadi* clay and refired Iron Age artifacts (Braun 2007; Jacobs 2008).

Fired colors of Wādī Ath Thamad clay & artifacts	Wādī Ath Thamad (Braun 2007, Sidoroff 2011)	Iron Age loom weights, KHirbat Al Mudaynah Jacobs (2008)	Iron Age oven fragments, KHirbat Al Mudaynah (Jacobs (2008)	Total	Comments
white			1 (10YR 8/1)	1	
pink	4 (7.5 YR 7/4)		5 7YR 8/3	9	Frequent fired color of Wādī Ath Thamad, Artisans chose ow iron clay
very pale brown		3 (10YR 7/3)	1 (10YR 8/3)	4	Iron Age artisans chose low iron clay.
light brown	1 (7.5YR 6/4)			1	
red				1	M.Steiner (2006) "red" may be reddish yellow if Munsell coded
reddish yellow	10 (7.5YR 6/6)	4 (5YR 6/6)		14	Frequent fired colors of Wādī Ath Thamad clay and artifacts

M. Steiner identified "red" as the dominant color of Iron Age fired clay bodies in domestic ware excavated at KHirbat Al Mudaynah. Her analysis of the ceramic fabric suggests at least three specialized pottery workshops serving Iron Age markets (Steiner 2006: 107). Based on the fired color of the clay, there are probably functional differences such as red firing clay better for cooking pots. For other objects, fired colors were pink and pale brown with large amounts of micro fossils and less iron.

Results of Quantitative Observations of Thin Sections of Local *Wadi* Clay

Quantitative analysis indicates over 60% of the samples are dominated by fine angular shaped grains and 75% of larger grains range between 1 and 0.5mm (**Table 3**)**.** In thin section slides, large grains were either sub-angular or sub-rounded suggesting transport over a long distance from the source. Rapid flow of clay into the *wadi* during the rainy season creates natural levigation, a process that would retain the very small angular grains, the fine black needle shaped grains (possibly hematite, after Cordova (2005) or basalt, after Braun 2012). Red iron oxides contributed to the strong yellowish red color of the test tiles.

Results of the study of Nabataean cooking pot and unpainted bowls indicated similar technological style of levigated clay, wheel forming, and oxidized atmosphere in firing. Two unpainted bowls were spectrographically different from other fire ware bowls and similar to one cooking pot. Potentially the three were made with *wadi* clay, although overall similarity to the clay samples was low (Sidoroff and Ownby 2016: 211). However, the lack of very common silty quartz in the pottery pastes may suggest an even older deposit of clay or a source on the terrace was exploited as well.

In Nabataean vessels and *wadi* clay with fine black inclusions present in test tiles and artifacts, may signal a signature of Wādī Ath THamad clay. Two unpainted bowls (N74/3.2 and L32/7.4) present fine black inclusions, possibly Biotite in the clay body (Sidoroff and Ownby 2016). In a quantitative thin section analysis of *wadi* clay (see **Table 3**) similar inclusions are also present. Fine black inclusions are also noted as hematite Cordova *et al.* (2005) and Braun (2007) suggested basalt.

Table 3. Quantitative observations of thin sections with binocular microscope, ×25.

Code	Small grains in sample (%)	Shape of small rains	Large grains in sample (%)	Size of large grains (mm)	Shape of large grains	Comments
WaT c 5	50	angular and needle	2	1 ~ 0 .5	subangular	15% fine black/red grains and clasts
WaT c 7	50	angular and needle	< 1	< 0.5	subangular	thin black rims around some large grains and 15% fine black/ red grains
WaT c 17	1	angular and rare needle	< 1	< 0.5	subangular	rare fine black/red grains and rare tiny or large grains 2 complex clasts
WaT c 20	50	angular and needle	3	< 0.5	Subangular oval, and unusual	fine 15% black/red grains and clasts
WaT c 21	2	angular and no needle	< 1	< 0.5	subangular ~ subrounded	rare black/red grains and rare tiny or large grains
WaT c 22	50	angular and rare needle	1	< 0.5	subangular ~ subrounded	15% fine black/red grains and clasts
WaTc 24	50	angular and rare needle	< 1	< 0.5 and rocks > 1mm	subangular ~ subrounded	15% fine black/ red grains and many clasts
WaT c 25	40	angular and needle	1	> 1	subrounded	new types of grains

Discussion

This study presents thought provoking evidence that the quantities of fine naturally levigated clay in Wādī Ath THamad may have influenced development of ceramic workshops in the region. As Peacock pointed out (1982: 9), workshops are favored when there is availability of raw materials, labor, and markets. Regional surveys and excavations at nearby complex sites, Iron Age KHirbat Al Mudaynah and a Nabataean settlement, revealed great quantities of domestic, industrial, and ritual ceramic wares. However, no pottery workshop has been uncovered in the region to date.

Analysis of 2,830 Iron Age sherds from surface survey identified six fabric types all with small inclusions and fired in oxidized atmospheres (Daviau and Steiner 2000: 15, N.42). Daviau identified the clay as "local" because the great quantity of sherds in the region displayed technological uniformity in fabric types. Fine inclusions in the fabric of regional pottery through time suggest the primary resource procurement zone was the naturally levigated clay from Wādī Ath THamad.

The colors of fired artifacts reveal potter's behavior in choice of certain clay for a particular function. Iron Age potters chose light firing clay for a specific type of vessel such as kraters while iron rich clay from Red Mediterranean Soils was for ovens and red fired cooking pots (Steiner 2006: 1007).

A group of Nabataean sherds was examined petrographically with a focus on the *wadi* as a possible source of the clay (Sidoroff and Ownby 2016). Results indicated similar technological style in the sherds: levigated clay, the potter's wheel for forming, and an oxidized atmosphere in firing. Two unpainted bowls were spectrographically different from other bowls and similar to one cooking pot. Potentially the three vessels were made with *wadi* clay (Sidoroff and Ownby 2016: 211).

Quantitative petrographic data indicate some Nabataean artifacts present a fabric with fine black inclusions, which are also in some *wadi* clay samples. Observations by scholars found similar particles in local pottery and test tiles of *wadi* clay. Once identified, the particles may be a signature mineral of Wādī Ath THamad clay.

Experimental data confirm the workability of recent clay deposits, which flow from the same parent formations as clay during the Iron Age and Nabataean periods.

Conclusion

Preliminary data in this study suggests Wādī Ath THamad qualifies as a potential resource procurement zone for artisans who satisfied demands for ceramic wares at nearby complex archaeological sites.

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PRELIMINARY REPORT ON THE 2016 AND 2018 EXCAVATIONS REVEALING A RELIEF ICON AND RITUAL SPACES ON THE NORTHWEST SIDE OF THE ABILA AREA E PILGRIMAGE COMPLEX

Robert W. Smith

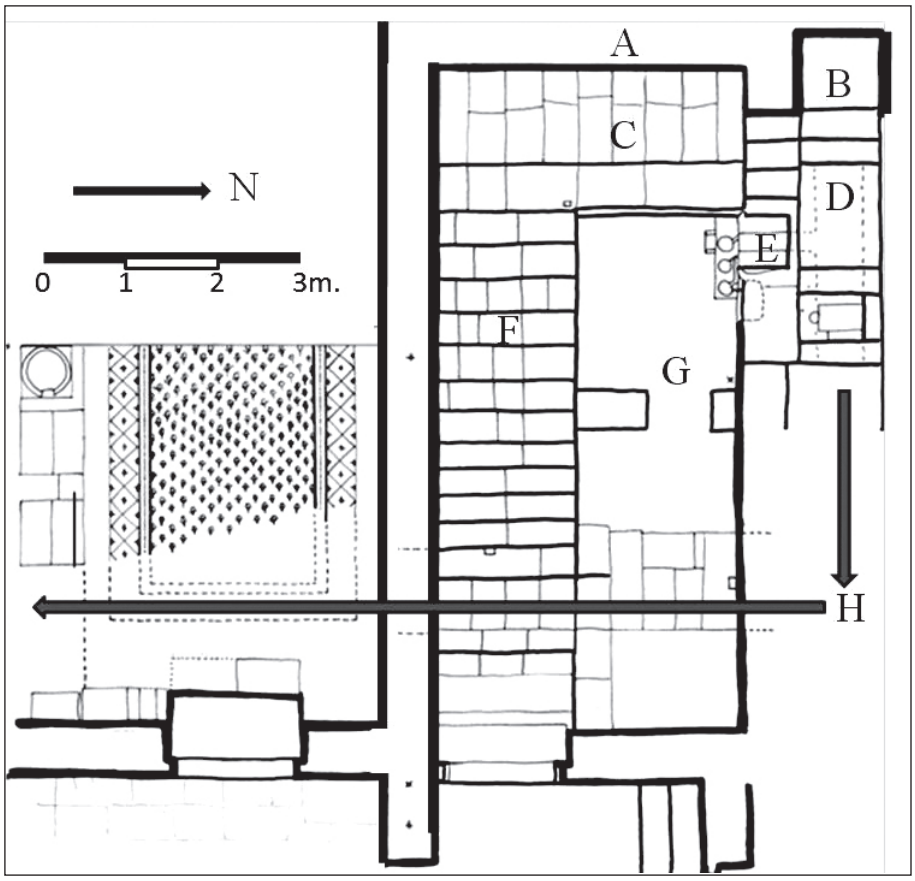
Introduction

The ongoing Abila Excavation at Quwayliba[1], north of Irbid, Jordan exposed significant architectural remains and artifacts from ritual spaces during the 2016 and 2018 seasons. The spaces and objects described in this report have been located northwest of the five-aisle transept church, in a pilgrimage complex at the center of the site identified by the excavators as Area E. These discoveries illuminate the ritual activities of pilgrims during the Byzantine and Umayyad periods and the enduring traditions of the community. The ritual areas of the complex were under reconstruction from the damage caused by the early eighth century earthquakes when the great earthquake of 749 AD demolished the pilgrimage complex. That seismic upheaval capped off existing problems of persistent plague and unusual environmental events that exacerbated, social, political and economic change that diminished Abila. The surviving resident community subsequently salvaged valuable materials they could repurpose from the pilgrimage complex. The architecture and artifacts they left in the remains of the complex, including most prominently a fragment of an extremely rare carved-stone figural relief icon from the context of the mid-eighth century iconomachy, are indicative of the creativity in attracting pilgrims and the persistence of local traditions in the face of theologically inspired opposition.

General Description of the Excavation

In 2016, work in Area E took place in three excavation units that revealed portions of the ritual spaces west of the portico and passage flanking the west end of the five-aisle pilgrimage church. These units are identified as squares E 87, E 88 and E 78 even though their dimensions where slightly modified from the regular five-meter grid with the emergence of prominent walls that made this expedient. In 2018, the expedition excavated square E 77 and returned for further work in E 87. Dr. W. Harold Mare's efforts of 2002 in removing more than two meters of jedder soil that accumulated above these squares, expedited excavation. These four squares served as the venue for some of Abila's pilgrimage specific rituals over a period of almost two centuries during which there were architectural reconfigurations. Discussion of investigation of the water supply to the complex that began in square E68 during 2018 will be covered in a subsequent report that

1. The Abila Archaeological Expedition initiated in 1980 by Dr. W. Harold Mare of Covenant Seminary, St. Louis, MO and now directed by Dr. David Vila of John Brown University, Siloam Springs, AR. conducts research at Quwayliba, the site of ancient Abila, in the Bene Kenana District under a permit granted by the Department of Antiquities of the Hashemite Kingdom of Jordan. The author of this report has served as the Area E Supervisor from 2006 to the present. During the 2014, 2016 and 2018 seasons, Emmad Obeidat of the Bene Kenana District served as the lead on-site representative of the Department of Antiquities. The following report is also made possible through the heavy efforts of persons employed from surrounding communities. Area E excavation staff members in 2016 included: Dr. Maxie Burch, Michael Bennett, Melissa Endicott, Josafat Guillen, Marissa Johns, Gabrielle Marcy, Jacob Russell and Henry Vila. In 2018, the staff included Andrew Bohlender, Keegan Case, Lexie Craft, Eathan Davine, Anyelca Dubon, Marissa Johns, Jane Malkey, Daniel McCarley, and Ana Rodriquez.



1. Map of the ritual area features in excavation units E88 and E78: a) the cascade tower, b) the cascade, c) the observation platform, d) the location of the icon in its tertiary setting, e) the location of the relief's secondary setting, f) the stairway to the observation platform, g) the lower ritual room, h) the subfloor water supply channel to the atrium.

addresses the water systems of the pilgrimage complex. (**Fig. 1**). (Map of Excavation Units).

Excavations in 2014 adjacent to the five-aisled transept church in squares E97 and E98 exposed wide portico and a passage on the west side of the five-aisle basilica. Two openings punctuate the limestone ashlar wall that flanks the west side of this north-south running processional (Smith 2018a). The raised thresholds of these doorways suggested that secured enclosed spaces extended to the west. The excavators anticipated uncovering valued controlled spaces, but not the extent to which these spaces played a role in the pilgrimage experience in the complex. The discovery of an icon in tertiary use outside of the central ecclesiastical structure was most surprising. The following description will progress from the units E87 and E 77, which exposed an expansive shaded mosaic floor adjacent to the *atrium*/ courtyard that might have accommodated the incubation of pilgrims, to the units E 88 and E 78 that exposed ritual spaces where sacralized water created the core of the Abila pilgrim's experience.

Discoveries in Squares E87 and E78 (Fig.2) (Architectural Structures in E87 and E77)

Square E87 is located west of the processional way opposite the entrance to the northernmost aisle of the five-aisle pilgrimage church. The square is bounded on the east side by a *ca.* 65cm.-wide wall constructed of sawn, local, argillaceous limestone ashlars. It stands preserved in four courses to a height of *ca.* 1.5m. A 1.3m. wide doorway punctures the wall and at the conclusion of the 2014 excavations, the sediments filling the doorway revealed that the space to the west was all one *stratum* of collapse debris consisting of major stone architectural elements surrounded by light-colored lime rich soil and few pottery sherds. The northern side of the square follows the top of a wall perpendicular to the processional way that separated the spaces accessed by the two aforementioned entrances. The east side of the square begins with a short wall stub projecting into the processional way at a point opposite the northern wall of the church. The square's northern edge continues to the west along the top of the aforementioned wall for 5m. On the

south side of the square, there is no preserved evidence of any wall. Excavation through the collapsed architectural debris in this square did not result in the discovery of any intact ceramic, metal or glass objects. The excavators found two damaged monolithic limestone columns and two limestone Corinthian capitals in the square that had formed part of an east-west colonnade along the south side of the square. The flooring and the walls of the exposed room reveal two major phases of development in the utilization of the enclosed space.

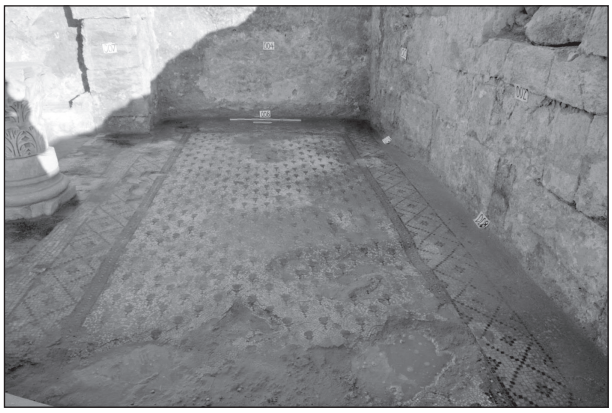
The hard hematitic limestone threshold of the doorway through the western wall of the processional way provided a transition into the ritual space in square E87. The 20-centimeter tall threshold would have kept any water in the passage from intruding into the room. The pivot points for two swinging doors pierce the sides of the threshold. These pivots, the doorjambs and 70cm by 1.4m. door well indicate that the double doors swung open into the room to the west and suggest that the builders intended to create a securable entrance. Rectangular limestone pavers that step-up 10cm. to the height of the rest of the floor in the room surround the stone-paved door well.

A *ca.* 3.3m.-wide carpet mosaic originally covered the center of the floor of the ritual space exposed in square E87. Falling masonry deeply indented and damaged the mosaic floor's surface in places, but the original pattern is clearly preserved. A 30cm. wide border of plain large *ca.* 2cm. wide off-white limestone *tesserae* surrounds a carpet mosaic. The outer edge of the carpet is set with an additional 30cm. wide band comprised of the same large plain *tesserae*. A single row of *ca.* 2cm. wide black *tesserae* outlines this second wide band. Inside the black borders, black single *tesserae*-outlined squares with sides of *ca.* 20cm. are set on the diagonal. In the off-white colored center of the squares, the mosaicist inserted a smaller black *tesserae*-outlined design. The design is a square made up of three black *tesserae* on each side that surround four red hematitic limestone *tesserae* with a single white cube in the center. This common motif like others found in the flooring of the earlier three-aisled basilica that lays below the adjacent eighth century five-aisled sanctuary form crosses and may also have been intended to communicate belief in a triune divine being. The Abila mosaicists, here as in other parts of the pilgrimage complex, flaunted the 427AD prohibition of Emperor Theodosius II against installing crosses on floors where people might trample them beneath their feet like something of no consequence (Habas 2015). In a second *ca.* 10cm, wide black *tesserae* bordered band, the intervening space was filled with red *tesserae* and a single row of alternating black and white *tesserae* run down the middle of the band. Within the broad surrounding border is a 1.9m. wide field comprised primarily of *ca.* 1cm. wide white *tesserae*.

The central white field of the carpet mosaic is regularly set with red flower buds on black stems formed using simple geometry. The mosaicists spaced the flower buds in rows at 20cm. intervals. The mosaicists formed the units that are reminiscent of a "bouquet of flowers," with a compass set at *ca.* 10cm. The compass-inscribed rows of adjacent circles in the wet mortar setting bed alternated with a 10cm. offset each row thereby forming columns and diagonal lines of flowers. The overlapping circles from the alternate rows thereby cut arcs from the adjacent circles. When the top two arcs are ignored, the resultant semi-circular top of the floral units had a diameter of twenty centimeters. The bases of the units extended ten centimeters from the center of rotation and perpendicular to the base of the previously mentioned arc of 180 degrees. The overlapping of circles from the row below meanwhile cut arcs out of the base. The resultant "bouquet shapes" fit perfectly together. The mosaicists created half "boquets along alternating rows in the central field, on the sides of the field (**Fig. 3**). ("Details of the E 87/77 Carpet Mosaic Construction). The western end of the mosaic continues into square E77. In the eastern side of square E87, the floor mosaic breaks off in a swath *ca.* 1.2m. wide that extends across the eastern side of the room from a repaired cut through in the northern wall to a break in the southern stylobate. A portion of the large white mosaic outside the carpet remains preserved in the northeast corner of the room, from the door well to the wall.

On the southern, *atrium* side of the carpet mosaic, the flooring abuts a *ca.* 70cm. wide

2. Architectural structures in E87 and E77.



3. Details of the E 87/77 carpet mosaic construction.

line of large rectangular basalt and limestone ashlars set with their top surface at the same level as the mosaic flooring and *ca.* 15cm. above the hematitic limestone slabs forming the border of the opus sectile floor of the *atrium* to the south. The line of ashlars forms a step up from the *atrium* and protects the southern edge of the *tesserated* flooring. At the western end of the room, the line of stones is broken away in line with the eastern end of the preserved mosaics. In the southwest corner of E87 a plinth and a limestone column base remain in situ on the line of ashlars and demonstrates that the line of rectangular stones are the remains of a stylobate. Supporting monolithic limestone columns like one found in the collapse debris above the mosaic floor flanked the south side of the room in square E87. The preserved column base has notches cut out that suggests that the intercolumnal space may could have been closed at one time by stone chancel-type screening, or that the base was recycled from a previous location where such screening abutted a column. No fragments of either, recyclable marble or argillaceous screening fragments like those found in the South *Atrium* Chapel were recovered.

The east-west running wall north of the previously described carpet mosaic is preserved in four courses above the floor to a typical height of 1.5 meters. Elements in the wall suggest phases in the architectural development. As this plaster-finished wall was exposed in 2016, it became apparent that a *ca.* 1m. wide opening through the wall had been cut at a point *ca.* 1.5m. into the room. While the flanking portions of the wall were made of tightly fitted sawn ashlars, irregular boulders and interstitial chinking stones roughly filled this opening. No plaster filled in the gaps or obscured the modification. Interestingly this partially repaired cut through the wall lines up with the break in the eastern end of the carpet mosaic and the break of the stylobate alongside the *atrium*. The 2018 excavation of a probe below the floor in this break in the flooring revealed an anticipated water channel. The excavators anticipated possibly discovering ceramic piping that carried water to a fountain or other water feature in the *atrium* based upon the previous discovery of two fitting fragments of a spiral-fluted limestone column in the north-eastern corner of the *atrium*. The creative developers of the complex carved a vertical hole through an existing *ca.* 20cm. diameter and *ca.* 50cm. tall column to form a pipe that the excavation identifies as the vertical water shaft and possible head of a fountain. Instead of ceramic piping, the excavation discovered a limestone slab-sealed plastered-channel that was *ca.* 30cm. wide and 20cm. deep in section capable of carrying a large volume of water. Since the channel was firmly sealed, it could have still moved water that was under pressure to a fountain. Soil sediments and small pieces of charred wood choked the water channel. The cut through the wall and cut through the mosaic flooring to create the sealed water channel constituted a significant modification that was functional, but had not yet received the final finishing repairs to the mosaic floor above or plastering to the wall through which it cut, when the earthquake of 749 AD destroyed the complex. The excavator anticipates that the carbon sample taken from the channel will confirm that the channel was choked with

sediments that accumulated following the great earthquake. Further evidence of related structural modifications related to this water channel will appear in the subsequent description of the ritual antechamber in the excavation of the adjacent square E88 to the north. The destructive early eighth century seismic events in the region may have stimulated the water system modifications that were largely completed when the site was destroyed a little over two decades later in 749 AD.

In square E87, excavation exposed in the fill around collapsed architectural debris, a sherd from a ceramic *paten* with a cross impressed in the center of the concave interior. Christians of late antiquity used such liturgical vessels for the consecration and distribution of Eucharistic bread. It follows a typical Syrian model in which finely levigated red clay is employed with a shallow profile and no foot ring (Sandin 2017). (**Fig. 4**). (Cross-impressed Paten Base Sherd from E87). This sherd provides insight into the ceramic liturgical vessels used in the Area E complex. Architecturally, a well-preserved Corinthian style capital with two rows of acanthus leaves and volutes carved from limestone found to have fallen from the easternmost column on the stylobate will provide information for future study on capitals from Abila. Square E87 preserves the architectural remnants of the eastern end of a significant decorated covered space adjacent to the *atrium* of the five-aisled transept church.

Square E77 is located west of square E87. This unit was extended to the west to the massive terrace wall that defines the west side of Area E and which served as a means to transport ‘Ayn Quwaylibah’s water from the tunnel outlet below the Area G church across the saddle between KHirbat Umm Al ‘Amad and Tall Abīl, to the pilgrimage complex. Square E77 is the location of the western end of the previously described mosaic floor found in E88. The 1.9m. wide field of red flowers on a white background surrounded by borders like those in E87 previously described continue in E77. The carpet mosaic here was generally better preserved and extended 3.3m. south from the northern east-west running wall to the stylobate along the north side of the *atrium*. The western end of the mosaic extends up to the terrace wall that runs at an angle of *ca.* 6 degrees off the orientation of the rest of the pilgrimage complex structures. The result is that there is a trapezoidal white mosaic border at the west end of the room. The patrons unfortunately left no dedicatory inscription at this eastern end where they had space. Such an omission of a dedicatory inscription appears to have been the standard practice at Abila. None of the six extant mosaic surfaces discovered in Area E has dedicatory inscriptions naming patrons.

4. Cross-Impressed Paten base sherd from E87.

While there are some *ca.* 5cm. rectangular holes cut into the terrace wall above the west end to the *tesserated* area that could have supported construction scaffolding, there is no evidence preserved of any typical ecclesiastical architectural features like the apse carved into the terrace wall at the west end of the south *atrium* chapel. Architectural features from an earlier configuration of the space could exist below the mosaic flooring.

The stylobate found in E87 continues westward alongside the south side of the carpet mosaic in square E77. A 60cm square column base stands in situ 1.4m west of the column base in E87. When the stylobate approaches the terrace/aqueduct wall, a rectangular pilaster *ca.* 60cm square abuts the wall and forms the terminus of the bench that runs at the base of the terrace wall on the west side of the *atrium*. This masonry construction made up of sawn ashlars mortared together stands to a height of over 1.6m. This pilaster supported the western end of a line of timber lintels that stretched over the two capital surmounted columns to the processional wall in the east. These lintels that rested *ca.* 5m above the stylobate carried the southern end of the roof covering the mosaic

floor all the way to the processional wall.

The ashlar wall running along the north side of the mosaic-paved space in E77 provides evidence regarding the sequence of construction in the adjacent structures. A vertical crack of over 2.5m. in the masonry of the wall, from the level of the mosaic to the top of the preserved wall, located at a point 2m east of the terrace wall indicates that the northern wall abutted a previously constructed structure that stood against the terrace/aqueduct wall. After the masons constructed the northern wall, they then laid the southern stylobate. Mosaicists subsequently installed tessellated flooring on the slightly elevated northern portion of the *atrium* to complete the project. In a later period, remodeling efforts designed to enhance the water features of the complex required cutting through the eastern end of the northern wall and the mosaic carpet to accommodate the installation of the sub-floor water channel.

The space exposed in squares E87 and E77 west of the doorway from the processional had an undetermined early use that appears to have necessitated the installation of a strong securable entrance. Later preserved construction obscures the architecture in this space during the earlier phase of the pilgrimage complex. The clerical authorities and patrons of the *ca.* 4m wide by *ca.* 9.5m long area repurposed the space. They designed it to serve as a nicely floored shaded area from which worshippers could observe the proceedings in the *atrium* where water rituals took place and the clergy held court. This space located between the *atrium* and additional water ritual areas in squares E68 and E 78 to the north may have served as an inviting venue for the incubation of pilgrims seeking relief from afflictions and revelation through dreams. The presence of a prayer in Kufic inscribed on a paver outside the doorway points to continuing special appreciation for the area during the last century during which pilgrims came to the complex. The unfinished remodeling of the water system is an indication of the vibrancy of the pilgrimage activity in the complex up to the mid-eighth century.

Discoveries in Squares E88 and E78 (Fig. 5) (Architectural Remains in E88 and E78)

Square E88 is located west of the formerly marble *opus sectile* paved passageway along the north side of the five-aisle pilgrimage church. The square is bounded on the east side by a *ca.* 65cm. wide sawn-limestone ashlar wall that stands four courses to a height of *ca.* 1.5m. A *ca.* 1.3m. wide doorway punctures the wall in the southeastern corner of the square. At the conclusion of the 2014 excavations, the sediments filling the doorway revealed that the space to the west was filled with a 1.5m deep *stratum* of disturbed collapse debris consisting of major stone architectural elements surrounded by light colored soil and few pottery sherds. A *ca.* 65cm thick east-west ashlar wall that separates square E87 from square E88 marks the south side of the excavation unit. A north-south masonry wall line *ca.* 4m to the west of the processional way in the northwest corner of the room marks its western boundary. The architectural structure centered in square E88 is an anteroom that provides separate access ways to both an upper ritual space and a lower ritual space in square E78.

5. Architectural remains in E88 and E78.

The Anteroom in E88

The entryway to the anteroom is 1.3m. wide. The large opening has incorporated faux molding at the foot of the jambs. On the eastern side of the doorway, holes in the masonry, indicate that a finishing wooden decorative element affixed to the masonry surrounded the door opening in the passage wall. From the processional passage, pilgrims had to step over a 15cm. tall and 25cm wide hard hematitic limestone threshold and pass through a pair of wooden doors. These doors turned on pivots in the corners of the threshold behind the doorjamb and opened to the west away from the processional route. Moving west over the threshold the pilgrims stepped into a 1.6m by 60cm door well. The floor of the door well stands 10cm higher than the exterior processional floor and would not have been subject to flooding. The bottom of the door well preserves in situ a portion of the mosaic flooring of an earlier structure in square E88. The mosaic has a 15cm wide light red colored border that surrounds a black field in which red squares outlined with lighter *tesserae* are set on the diagonal. The squares of the checkerboard have sides of *ca.* 26cm. This flooring is reminiscent of the mosaic in the southern half of square E108 in that it is a checkerboard set on the diagonal, but with two differences. In the door well, there is no evidence of a red frame around the checkerboard field and the outlining of the red squares in slightly lighter colored *tesserae* is not present. Rectangular hematitic limestone pavers frame the western side of the door well and surmount the checkerboard mosaic floor that disappears from sight beneath the pavers.

Moving west from the entrance and door well, the nearly square anteroom, which measures *ca.* 3.5m wide north to south and *ca.* 3.4m wide east to west, provides access to two ritual spaces to the west, in square E 78. The eastern wall of the anteroom is made of tightly bonded sawn limestone ashlars covered with a thin lime plaster. The southern wall of the room is built of similar sawn ashlars carefully surfaced with the same fine plasterwork. The southern wall was subject to modification with a *ca.* 1m wide cut that begins *ca.* 1.5m west of the southern jamb of the entry way. Unfinished boulders and chinking stones without a smoothing plasterwork finish fill the wall cut. This blocked up section of the wall corresponds with the cut found in the southern wall face exposed in E 87. The wall cut also aligns with a series of reused basalt pavers and flat-sided architectural elements that bisect the floor of the antechamber north to south and run to a discontinuity in the northern wall of the antechamber. The stone flooring feature stands slightly proud of areas of flooring comprised of large white *tesserae* to both the east and west. The excavators interpret the strip of reused rectangular basalt stones transecting the anteroom between the wall cuttings in the northern and southern walls as the covering to the subfloor water line carrying

6. The Abila relief icon in-situ.

7. Detailed Image of the Abila Relief Icon.

sacralized water from square E 78 to a water feature in the *atrium*. Subsequent excavation of a probe beneath the basalt paving may reveal not only the continuation of the water conduit but also remains of the earlier phase of mosaic flooring in the anteroom.

The west side of the anteroom provided pilgrims with two potential paths. On the north end of the west side pilgrims could pass through a *ca.* 75cm wide doorless opening on the same level into a ritually significant lower space in square E78 described later in this report. On the south end of the west side of the anteroom a 1.6m wide set of stone paved stairs abuts the southern wall. It ascends *ca.* 1.2m up six steps to the west toward an upper platform in E 78 on steps with a *ca.* 20cm rise and 30cm tread made from recycled basalt and limestone ashlars. Chiseled incisions on the surfaces of the limestone steps, worn smooth by traffic, served to reduce the peril of slipping. The stairway is of sufficient width to accommodate two-way traffic. The anteroom served as a transitional area in the movement of pilgrimage traffic to and from adjacent sacred spaces. The fill in the anteroom preserved only a few body sherds and no special objects. Excavators recovered no evidence of burnt timber rafters and conclude either that post-earthquake salvagers removed and repurposed surviving elements of wooden superstructure along with the entry door or that the anteroom was not roofed at the time of the earthquake.

The Stairway and Observation Platform in E78

The excavation of square E78 revealed artifacts and architecture that highlight new details of the rituals and focus of the Area E pilgrimage complex. On the south side of the square the 1.6m. wide staircase that ascends westward from square E88 ascends a further six steps with a wider *ca.* 40cm. tread and a continued rise of *ca.* 20cm. The stairway is thus *ca.* 4.2m long and helped pilgrims ascend *ca.* 2.4m to a 1.6m wide stone-paved platform. The platform extends 3.5m. to the north. The row of eight, *ca.* 1.1m long by 40cm. wide paving stones on the western side of the platform adjacent to the tower are cracked along a line *ca.* 50cm from the tower. The compression of these pavers by the impact and weight of fallen ashlars indicates that the materials below the surface are not bedrock or solid masonry. The elevated platform provided pilgrims a highly desired close up view of the cascading waters falling from the aqueduct outlet high above in a channel built into the tower and washing an icon in the waterway on the north side of square E78. The narrow width of the access to the cascade and possible foundation of a low barrier suggest that pilgrims did not typically move beneath the cascade from the south. The 1.6m wide platform and 1.6m-wide stairway suggests pilgrims ascended the stairway on the right side so as to move most directly to the best observation point and went back down to the processional way with their right shoulder against the tower and staircase wall. Future excavation in square E79 will add to understanding of the potential for ritual activities like lustrations in the cascade. The northwest corner of the observation platform also provided local service personnel access to components of the water system hidden below and within the tower and terrace wall to the west in square E68. The builders hid the access to the sub-floor features behind a vertical 1.5cm thick slab of metamorphosed stone that served as a "man-hole" in the wall of the northwest corner of the platform. The vaulting and 80cm. wide corbel-roofed passageway hidden below is largely located in square E68. Excavation of this unit is incomplete, and its details will be the subject of a subsequent report.

The west side of the observation platform abuts the masonry structure built along the face of the north to south terrace/aqueduct wall in E68. The excavators in 2016 considered the structure a possible "stairway" that provided ascending pilgrims from the *atrium* with an elevated overview of the ritual areas below. Following the excavation of E77 in 2018, the excavators now understand the feature in E68 as a partially collapsed *ca.* 7m tall tower that served to bring the aqueduct's water into the complex in a dramatic fashion. It was not a means by which pilgrims accessed the pilgrimage complex. A water channel groove cut into the exposed eastern face of the terrace wall where the southern wall of the tower has fallen away preserves indications of the pre-

tower phase of the water supply system to the pilgrimage complex. Aqueduct supplied water was important to the complex before builders constructed the tower with its cascade.

The Cascade and Water Sacralization in E78

Water diverted from ʻAyn Quwaylibah by the Upper Umm Al ʻAmad aqueduct splashed into the complex within a three-sided masonry chute located in the northwest corner of square E78. This cascade is a *ca.* 4m tall, 90cm wide and 85cm. deep feature in the tower wall. Water-laid mineral deposits covered its surface. The western wall, however, has a more irregular pattern of deposition that may suggest a plastered surface treatment in a deliberate attempt to accentuate the perception of a large volume of the water. The previous excavations by Dr. Mare exposed the top of this feature, but since fallen stones filled it, the excavation did not understand its potential significance. The aqueduct at the top of the terrace wall had earlier supplied water that flowed along lower channels in the terrace wall to fill the cisterns in the *atrium* and a running water feature at the southwest corner of the chancel in the five-aisled church (Smith 2018b). During later phases of development water fell down the vertical chute in east side of the tower and splashed on the horizontal stone platform at the bottom and flowed *ca.* 3.25m east until a drain swallowed it. In a region where there are long dry summers and a modest annual rainfall, such running water was remarkable and played an integral part of the miracle commemorated and the memories created in the complex (Smith 2020).

In the last major phase of the pilgrimage complex at the time of the great earthquake, the water that landed on the horizontal platform below the tower washed down over two *ca.* 15cm-tall steps and then flowed over a partially preserved bas-relief icon carved into an argillite slab. The icon bearing the image of a codex-carrying saint whose upper head was broken away was set face up in a bed of mortar. The head of the saint was set against the bottom step. Falling water washed over the icon before draining through a channel to the east. In the final configuration of the ritual space a portion of the icon sacralized water was diverted into the ritual space just one meter to the south through a chute made of two repurposed curved roofing tiles. Most of the water fell into a masonry-covered water system below that remains to be excavated. The system the runs west to east provided water to other parts of the complex. At the time of excavation in 2016, a rectangular hole, 30cm wide and 50cm long, appears to have swallowed the "river" of water. This opening, however, is within a depression 50cm. wide and 70cm long surrounded by a bed of mortar. The excavator suggests that the large opening once housed a rectangular pierced device, which served as a grate that caught and drained the water. That object made either of metal or marble did not survive in situ and the excavator suspects that salvagers pried it up and recycled it after 749 AD.

The splashing waterfall first, provided both an auditory and visual component to the hierotropy of the pilgrimage center and second, supplied a treasured commodity when its water was sacralized by flowing over the icon. From the north side of the observation platform in E78 and the top of the tower abutting the terrace 4m above at the top of the tower in E68, pilgrims could observe the waterfall and icon. The icon-sacralized water also played a role in the Abila pilgrimage experience in the adjacent lower ritual room.

The Lower Sacred Space and Ritual Features in E78

A ritual room measuring *ca.* 1.8m wide and *ca.* 2.0m long is located north of the stairway and east of the observation platform in E78. Pilgrims accessed this space floored with large white *tesserae* by passing through a *ca.* 75cm-wide opening from the northern end of the anteroom in E88. Beneath a *stratum* of collapsed masonry, a layer of charred material covered the floor. This layer contained numerous small glass fragments and the excavators found a nearly intact glass vessel the northeastern corner of the room near the entrance. The mosaic floor does not have any decorative design and it is dented from falling masonry. The presence of glass fragments in the ashes on the floor suggests that the room had a timber roof that created a dark interior that needed illumination and that the tumult of the great earthquake caused a fire

when lit glass oil lamps smashed on the floor. The ritual focus was on the north side of the lamp-illuminated room.

In the northwest corner of the lower ritual room in E78, a 56cm-deep and 60cm-wide rectangular niche is preserved inset into the north wall to a height of *ca.* 2m. In the bottom of the niche, 20cm-wide ashlars flank each side and between them is a 20cm gap. The excavators found two crushed thin-walled cooking pots in situ within the niche atop the ashlars. In the soil that filled the pot on the eastern side, they retrieved a bronze coin with an Arabic inscription. At the bottom of the open space beneath the ledges on which the pots rested, an argillite slab inclines steeply down to the north and drained water from the niche into the hidden water system behind the back northern wall of the niche. The western wall of the niche is incised with a 2cm deep, *ca.* 4cm wide and 80cm tall vertical groove that extends up from a point 20cm above the top of the ashlars in the bottom of the niche. The eastern wall of the niche has no matching groove, but instead a chord of the stone in the eastern niche wall is cut away. The cuttings in the sides of the niche are evidence that the niche was once closed off with a *ca.* 60cm-wide and 80cm tall stone slab that was placed at an angle into the niche. One side of that slab was inserted into the groove on the west side of the niche, the slab was pivoted forward through the cutaway wall on the east side like a closing door. The feature that closed the niche matches closely with the preserved dimensions and reconstruction of the relief icon described later in this report.

8. View of the Area E water ritual area from above.

9. View of the Area E water ritual area from the south.

The builders of the pilgrimage complex embedded a *ca.* 25cm wide and 95cm long slab of argillite in the tessellated floor of the lower ritual room beneath the at one time closed niche. Carved into this slab are three circular 2cm deep bowl-like depressions connected by narrow channels to the drain in the floor of the niche. Any water that dripped down from the water supply above or that overflowed the depressions flowed onto the floor and ran into the base of the niche through a drain in the floor that ran northward beneath the argillite floor installation. When excavators first exposed the slab, the two westernmost 12cm diameter bowl depressions were sealed over with mortar and only the eastern bowl depression was open. This modification provides evidence of changes in the use of the niche above. In an earlier configuration water dripping from above, down the closed face of the niche, fell into the then open two western depressions. In the last phase of usage of the lower room in E78, the water ritual that took place on the slab employed a new reduced water supply using only the eastern depression.

The eastern bowl-like depression in the ritual room floor has both a 1cm. deep water supply groove and a drainage groove. The water that flowed into the depression came from a *ca.* 45cm wide curved topped niche cut into the base of the north wall 15cm east of the larger rectangular niche. The bottom of this secondary niche was found closed off with a 1.4cm thick and *ca.* 25cm tall rectangular piece of hard black metamorphic stone inserted into a groove in the west side of the niche wall. Installers swung it forward to close off the front of the niche in a manner similar to which the large rectangular niche to the west had been closed. In the top at the back of the niche is a water supply channel

formed from two *ca.* 40cm-long curved roof tiles that drained sacralized water which had flowed over the icon at the base of the cascade and through the drain grate feature described above. That feature thereby drained a portion of the sacralized water into the niche below and created a reservoir of *ca.* 40 liters of water. The reservoir never overflowed since a hole in the back northeastern corner *ca.* 22cm from the base drained excess water back into the water drainage system. The interior of the closing stone of the floor-level niche is sealed with mortar along the edges and is only punctured by a *ca.* 2mm hole bored at the base which allowed a thin stream of water to run through a groove into the bowl-shaped depression and then through a second channel into the drain. A copious water supply was not needed for the ritual activities in the lower ritual room during either the first or second phases of utilization, but a continuous supply of non-stagnant water was significant for the creation of eulogia that took place there.

The lower ritual room with its water features was a special stop for pilgrims during at least the last two phases of the Area E complex. At the time of the 749 AD earthquake before the timbers of the superstructure fell and burned, the room still with its one open bowl-like depression in the floor continued to function as an installation for filling eulogia such as small glass vials of sacralized water. The cooking pots found in the niche could have been placed there by the complex staff to serve pilgrims by collecting sacralized water that dripped from above or the offerings of pilgrims. It is possible also, however that the pots served subsequent salvagers as a moving repository for valuables they had collected. Further study of the Byzantine/Umayyad transitional coin will contribute to understanding of the early Islamic currency used at Abila. Field observations include that it retains the Byzantine weight system with the letter "M" and remnants of Christian symbols on the reverse (Gousous 2014: 41, coin #121; Gousous 2004: 349). Such coins, like the pilgrimage complex, reflect the cultural overlapping of the Byzantine-Umayyad transition.

The second to last phase of the utilization of the lower ritual room is indicated by the western two depressions in the argillite slab in the floor and the wall modifications in the sides of the larger niche. The size of the opening to the niche corresponds with the relief icon fragment later situated in the steam of water that flowed in the channel above. A scenario that explains the architectural evidence is that the carved relief fragment still preserved to its full height including an upper guilloche border was installed vertically at the front of the niche. In the time before the early eighth century earthquakes, water from the artificial stream above washed down over the face of the modified icon, as it was illuminated and animated by flickering oil lamp light. Pilgrims collected the subsequently sacralized water in eulogia below the front face of the icon and surplus water then ran back into the water system through the drain in the floor to serve elsewhere in the complex. The evidence from the frame and figures on the icon that is going to be described indicate that in this niche the icon was in secondary use.

The Relief Icon that Sacralized Water in the Pilgrimage Complex

Description of the Carved Relief Fragment

The preserved Abila icon found by the 2016 expedition at the foot of the cascade feature in square E78 is a fragment of a larger carved raised-relief panel that depicts a saint (**Fig. 6**). It is carved from a 6cm. thick *ca.* 58cm tall and 50 cm wide slab of light grey (Munsell 2.5YR 7/1) argillite that may have originated from a local quarry site deep in the Yarmuk Valley. This type of sedimentary material exported from the region near Quwaylibah is composed of poorly lithified clay particles with a hardness of *ca.* 2.6 on the Mohs scale. The material does not have laminar bedding. When the stone of the icon breaks, it produces a conchoidal fracture. The argillite of the icon has a slightly greasy feel and it effectively resists water penetration. This material is the same as that into which the bowl-like depressions were carved in the floor of the lower ritual room in E78. The material is also the same as the stone used to pave the floor and sidewalls of the *frigidarium* of the Late Roman period bath complex that remains

largely intact beneath the nave of the Area E basilica. The largest preserved rectangular slabs of argillite in the *frigidarium* measure only *ca.* 4cm thick but extend up to *ca.* 1.2m long and 60cm wide. Smaller thinner slabs of this type stone also form the sides of the ritual water channel located on the south side of the chancel in the five-aisled transept basilica. It is possible that the argillite of the relief panel like that in the chancel water channel were spolia from the earlier bath complex in Area E. The homogenous stone with a hardness around that of steatite provided a superb medium that could be carved away to create both the raised-relief field of images and an ornately carved frame to the panel. This type of sculptural approach produced images that observers such as Abila pilgrims appreciated in low-light interiors since they were more visible than painted panels. In flickering lamplight, the figures became animated.

The largely intact lower left corner of the original relief carving constitutes the icon. A deeply incised 10cm-wide border flanks the left side and base of the icon. The guilloche deeply carved in the border forms a series of circular frames occupied by a regular pattern of three carved symbols. From left to right the sequence of symbols at the base of the frame is a symmetrical four-armed cross; a three-petaled symbol, later called in French a *fleur-de-lis* and a stylized four-petaled flower with a round center. The *fleur-de-lis* found on this frame is one of the earliest preserved Byzantine uses of this symbol later associated with Mary, the mother of Jesus. The design in this context could arguably be a variant symbol of the cross of Jesus like the adjacent symbols. The tetrapetalous flower could however be a symbol that also preserved an allusion to the four evangelists radiating from Jesus and possibly Mary in the center. The motifs in the frame probably correlated with the image in the center of the original composition. The frame may arguably suggest that the central focus of the carving was Jesus, possibly in conjunction with Mary.

The portion of a broad bold frame preserved in the bottom left corner indicates that the original composition of the relief carved composition was much larger than that which is preserved. The left side of the panel outside the guilloche is chamfered creating also a 2.5 centimeter wide tenon that allowed the panel to be inserted into a vertical restraining mortise like that typically found in the sides of chancel posts. It would have held the icon in an upright position where it was expected to be viewed in its initial and possibly also secondary installations. The finished base of the stone panel does not have a similar flange. This indicates that the designers anticipated that it would be held in place by gravity in a groove or on a ledge.

The central rectangular field where the preserved image is located is set off by a plain 12 mm-wide frame. Inside the frame, the field is carved back about 6mm from the top surface and is flat and unadorned with the exception of the remaining portions of two raised figures and a *ca.* 3.5 cm diameter raised disc to the right of the neck of the figure on the left. The largely preserved person on the left stands on two exposed feet that show the individual as moving to the right but pivoting to face the viewer directly. A shallow incision on the figure's right foot that appears to be a thong crossing the top of the foot suggests the presence of sandals. The figure wears an ankle-length mantle draped over both shoulders. This old-fashioned attire found in Byzantine iconography is probably a *himation.* The figure wears the loose-fitting upper garment over a long *chiton* that may be evidenced near the ankles and around the person's neck. The right arm protrudes from the heavily draped garment and the right-hand points towards the figure's left with two fingers that largely obscure the thumb folded behind. The fingers point to a rectangular object held upright from the bottom by the left hand, which extends from the folds of cloth. The right-hand position on the figure may be conveying a more specific message, but it mainly directs the viewer's attention to the left. The rectangular object supported in the left-hand rests at the top on the subject's left shoulder. This object is commonly found in contemporary painted Byzantine artwork. The object is a codex. If the book were open, it would suggest that the figure was teaching the viewer. When it is closed, however, as appears to be the case here, the focus is upon completed revelation from God. The overwhelming majority of examples

of persons in Early Byzantine images carrying codices are depictions of Jesus Christ, the *Logos* or of the Four Evangelists, who wrote the canonical gospels. Occasionally in later religious images, other saints also carry codices containing the Christian scriptures from which they teach. Since the figure is not wearing a wool *omophorion*, symbolic of pastoral responsibilities the haloed person on the left side of the carving was not a venerated bishop.

As the viewer moves up the carved figure's body from the clothing, it becomes obvious that the person is male since the face is bearded. Bearded faces are common for adult males in Byzantine images. The beard is modest, symmetrical and slightly pointed. A flat closed mouth above the beard creates a moderately stern visage. The upper portion of the face from the bottom of the nose up is broken off with the top of the field and upper guilloche border framing to the panel. On the shoulders at both sides of the neck, the arcs of the perimeter of a 14 cm diameter halo that once extended around the head are preserved. The arcs of the halo in the field unfortunately are not preserved high enough to absolutely determine if the figure had a cruciform halo. If the arms of a cross were portrayed in the halo, then the subject could be definitively identified as Jesus Christ. The absence of an arm of the cross in the slightly better-preserved portion of the halo to the subject figure's left suggests that the figure never had a cross in the halo. Such nimbed figures without cruciform halos are typically depictions of saints in Byzantine iconography. The *ca.* 3.5cm diameter disk that stands proud of the background field above the figure's left shoulder and may once have preserved an identifying abbreviation of the saint's name as is found in many painted icons. Perhaps a very careful cleaning of the top surface of the disc will reveal the name of the saint.

A second figure on the right of the relief fragment, which has otherwise been broken away is indicated by a preserved fragment of clothing. The folds on the garment are the same as those on the left side of the more fully preserved figure. This fold of a mantle billows out behind the moving figure and exposes the side of a foot. The similar position and location of the clothing on the second figure indicates that the second figure was of the similar size and was also moving to the right of the relief. The presence of a second figure proceeding in front of the more preserved fragment together with the absence of evidence for a cruciform halo suggests that the preserved figure on the left was a saint and not Jesus. The image on the Abila relief bears some similarities with the codex-holding "Christ Pantocrator," that adorned the gold coins of Byzantine Emperor Justinian II (685-711AD) and which came to be a standard image in the apses of post-iconoclastic period Byzantine churches. Such images of "Christ Almighty" with cruciform halos often focus on the singular figure, but in six and seventh century examples, other figures sometimes accompanied Jesus (Weitmann 1976). Early preserved examples include a painted icon from Bawit, Egypt of Jesus carrying a codex and standing with his arm around the alleged miracle-working Saint Menas of Egypt (Louvre Museum, Accession # AF 11565). More commonly, codex-carrying Evangelists associated with the production of the Canonical Gospels flank a central Jesus. A most colorful and complete *secco* painting of that scene is recently restored on the ceiling of the southern lobe of the sanctuary of the Red Monastery at Sohag, Egypt[2]. Images like the aforementioned suggest possible reconstructions of the complete original Abila bas-relief composition.

Reconstructions and the Initial Use of the Abila Relief Carving

Based on the presumptions that the ornate frame would have continued in a uniform width all around the relief, and that the sculptor vertically centered the image, the carved panel would have once had a total vertical height of *ca.* 80 cm. If the preserved figure was matched by a second figure of the similar size, and the two figures were horizontally centered, with uniform framing continuing all around, the icon would have been *ca.* 80 cm wide not counting the 2.5cm mounting flange presumed to exist on both sides. If the original composition in the

2. An interactive view of the sanctuary and particularly the image of Jesus flanked by the Evangelists is available at http://www.360cities.net/image/red-monastery-sohag-egypt#2.10,-83.70,90.0 https://www.360cities.net/image/red-monastery-sohag-egypt

central field of the panel was more extensive and had, two sets of opposing equal-sized and evenly spaced figures depicting the four evangelists in the field, it would have been *ca.* 1.4 m wide. If those pairs of equally sized evangelists however flanked a slightly larger figure of Jesus, or of an enthroned Mary with an infant Jesus on her lap in the center, the carved panel could have attained a width of over 1.8m. The cruciform symbolism of the frame suggests that Jesus would have been the central subject in the original composition and that the long five-figure composition was more likely.

The preserved Abila icon fragment, as mentioned earlier, bears evidence on its preserved left side flange that its patrons presented it originally to viewers in a vertical position. In the *atrium* chapel of the Area E complex, about 20m south of the icon find spot, excavators found two chancel screens broken in situ that provide preserved on site examples of how church decorators made local carved stone chancel screens of a similar size stand upright. The flanges on the sides of the screens fit into vertical grooves cut into the sides of flanking chancel posts and architectural elements like columns and walls. The flange and the carving technique suggest that the Abila complex builders originally positioned the carved panel vertically in the interior of the ecclesiastical complex where diffuse natural light and oil lamps made it visible. Since the back of the icon fragment is flat and not carefully finished, it suggests that worshippers viewed the icon only from the front carved side.

The intact original image-bearing panel could have originally served as chancel screening held between posts in the south-east end of the nave where overhead piping brought water into a special water feature or could have been affixed against an interior wall. The evidence of the preserved dimensions of the flange indicate it would be similar in height to the size of the grooves in preserved chancel posts found in the adjacent five-aisle transept church. The distances between vertical chancel post sockets in the focal sacred space (*hierateion*) of the central apse of the Area E Pilgrimage Church flanking the central steps and gate are also *ca.* 2m in length. These chancel screen sections are unusually long and could accommodate the projected length of a five-figure panel. In the studies of chancel screens of the period from the region made by Lihi Habas there are, however, no parallels for such long, ornately bordered, local stone-carved chancel screens containing bas-reliefs of human figures (Habas 2009). Two spaces between chancel posts on the south side of the chancel area could accommodate the more modest two-figure reconstruction. Since no fragments of carved screening made of argillite stone were found in the chancel area and since the material from which the icon is carved would not have been salvaged by lime makers like the marble decorations stripped from the church, an originally wall-mounted relief carving may be the better hypothesis.

The excavation of Area E exposes two architectural venues beyond the chancel beneath the dome of the transept church could have provided suitable venues for the presentation of a long original relief carving. First, there is a unique architectural feature flanked by projecting ashlars that form pilasters in the southern wall of the five-aisled pilgrimage church just west of the southern transept chapel. While a wall-mounting here could have provided space and a focal location for a large raised relief panel, there is no evidence of any attachment clamps in the wall or architectural features in the adjacent floor like the base for screening that would have restrained enthusiastic pilgrims.

Since the preserved fragment of the icon does not show any particular wear suggesting frequent handling or kissing, a second, and perhaps superior possible location of the initial presentation of the complete relief panel in the basilica is a *ca.* 7m long section of the interior of the eastern wall of the church. There the stone foundation of a stone feature with sockets for posts and grooves for screens remain in the floor *ca.* 1m west of the eastern wall of the church. It would have restricted enthusiastic worshippers' access to the wall extending from the south side of the nave to the southern semi-circular chapel. This expansive wall space in the transept provided local religious leaders a place to affix important visuals like carved, tessellated or painted images for display and veneration in a secure venue. If subsequent excavation reveals further fragments of the

relief panel, improved reconstructions of the length and the location of the new evidence may help clarify argument regarding the panel's initial location in the complex. The high-quality large-scale relief carving of sainted figures attracted devoted attention that continued even after unknown forces broke the object. Neither fear of earthquakes or iconoclasts kept the devotees at Abila from reusing the treasured image and making it an icon.

Reconstruction of the Secondary and Tertiary Use of the Abila Relief Fragment

Preserved evidence found in the remaining architecture of the Abila pilgrimage complex suggests that devotees venerated the remains of the carved relief panel as an icon in two locations in square E78. After the venerated panel was likely initially broken in one of several local earthquakes or by another cause, devotees of the complex who had resources to effect renovations to the pilgrimage complex initiated the construction of the lower ritual space in E78. The potential use of fragment of the relief may have helped to inspire their plans to enhance the aqueduct water that had long supplied the facilities in the area. The builders first installed the fragment preserving the full image of a saint vertically in the large rectangular niche of the lower ritual room in E78. There with water flowing from above and washing over its face the carving became a water-sacralizing icon. The niche was an integral part of the room and not an afterthought. The previously described dimensions of the fragment, the presence of a vertical groove able to accommodate an 80cm tall panel, the cutaway chord of the east wall of the niche and the presence of bowl-shaped depressions in the floor above a drainage system support the case for the insertion of either the preserved relief fragment or another such significant water resistant panel. It is possible that a rectangular section salvaged from the center of the original relief carving, perhaps even bearing the image of Jesus could have been employed. The problem with this alternative panel theory is that no remains of such a panel are preserved. This makes the preserved relief carving fragment the most likely candidate.

After the icon fell from its elevated location in the niche (possibly as a result of seismic activity) or was removed and the top guilloche frame was broken off, the devotees of the pilgrimage center repositioned the subsequently smaller surviving fragment in a third location. They set it horizontally in the watercourse two steps beneath the cascade where excavators found the icon on the upper level, north side of square E78. They positioned it so that the somewhat energy-diminished water flowed over the icon and that pilgrims on the observation platform could see it beneath the surface. The flow of the water over the venerated icon subsequently transformed the perceived quality of all the water in the complex. The waters flowing over the submerged figure on the icon probably recalled an earlier era baptism or some other aspect of the experience of the persons and events connected with the miracles associated with the pilgrimage complex. In Byzantine artistic depictions of Jesus' baptism, observers can see his lower body partially revealed through the rippling waters of a pool filled by the Jordan River. The Jordan fills the pool through a waterfall set in the background or to the side.

When the icon-blessed water drained out of sight, it went on to carry its blessings to water features downstream. A small amount of the water flowed through the conduit formed of roof tiles into the previously described lower reservoir niche in the northwest corner of the ritual space and from there into a *eulogia*-creating bowl depression. The greatest part of the consecrated water fell into a larger lower channel, large enough for a small person to crawl into and move eastward. While excavations revealing further details of the water system remain to be conducted it is apparent that at least some of the water continued 2.5m. east and then turned ninety degrees and flowed south through the subfloor water channel towards the *atrium*. The construction of this final portion of the water system required that two substantial east-west walls had to be cut and that the flooring in the affected spaces in E88 and E87 removed in order to provide for the added water channel. After that installation, the perhaps impoverished, but still determined devotees of the pilgrimage complex began to rebuild the walls and restore the flooring. The excavator suggests that the subfloor channel provided water for a fountain

in the *atrium*. Clarifying the destination of the added water channel will require further excavation beneath the opus sectile floor level in the *atrium* in square E86.

Conclusion

The Christian leaders of Abila's apparent defiance of Byzantine Emperor Leo III's proclamation banning the display of human images in Christian worship in the early eighth century has parallels in the earlier history of the Abila Christian community. This is seen first, in the installation of crosses in the mosaic flooring of the three-aisled basilica in defiance of an imperial proscription of the practice and second, in sixth century Bishop Alexander of Abila refusing to denounce Origenism in the time of the reign of Emperor Justinian (Cyril of Scythopolis 1991). While some neighboring clerics opposed Emperor Justinian I unscathed ,while holding to heterodox positions, Bishop Alexander of Abila suffered exile to Constantinople. The difference was that he lived at a time when Byzantine rule effectively reached into the urban centers of *Palaestina Secunda* and he was not one of the strategically tolerated miaphysite Ghassanids who had settled just to the north of Abila and helped Byzantium maintain a buffer against the Persians. The Byzantine Emperors who had alienated many of their former subjects in Palestine and Arabia over religious and economic issues prior to the Battle of the Yarmuk in 635 AD had only residual historical and cultural influence when they were no longer in control of the Levant. The clergy of Abila in the mid-eighth century were under the political jurisdiction of *Jund Al Urdunn* in *Bilad Ash SHam* which was ruled by Umayyad caliphs. The Sufyanid Umayyad Caliphs were initially pragmatic and less zealous about eradicating religious icons than their increasingly prescriptive Marwanid and later Abassid successors. During the time when the Abila relief fragment icon was on display in the Area E pilgrimage complex, Umayyad rulers like Hisham and Walid ibn Yazid were overseeing the construction of the royal retreat at Quṣayr ʻAmrah (قصير عمرة) with its incongruous figural frescoes on the vaulted ceilings. While zealous, iconoclastic Muslims might have publicly opposed the presence and use of icons amongst the tolerated Christians who submitted to Islamic rule, they do not have the political will to aggressively pursue the elimination of religious images held in high esteem by the monks and laity in a still substantial Christian population. Iconodules like those who appear to have persisted at Abila, were not in peril of exile. Among the mixed population of *Jund al-Urdunn* that came to the Abila pilgrimage site with its icon were Arabic-speaking and Kufic-writing individuals. It appears possible that both Christians and Muslims continued to be drawn to holy sites like that at Abila, which they associated with biblical figures. They came because they believed the water was blessed and it affected miracles. They left evidence of their devotion in inscribed prayers on columns, walls and paving stones in the Abila pilgrimage center (Smith *et al.* forthcoming).

The stone-carved fragment the Abila Archaeological Expedition discovered at Quwayliba during the summer of 2016, preserves a rare surviving sculpted religious image of late antiquity from the Levant. The initial reason for the dearth of such stone-carved images in relief is that artists produced more realistic, two-dimensional painted images with fine details in color at a cheaper price. The second significant cause of the paucity of such images emerges from the fact some of the Christian community in the Patriarchate of Jerusalem and pious Muslims struggled over the appropriateness of such sculpted images and engaged in a war on images. The fragment of the stone-carved panel with a haloed figure, survived first, because it was protected by the veneration of local and visiting devotees and second, by the piles of ashlars that covered it as a result of the massive earthquake of 749 AD. The recovery of this icon in the context of ritual specific architecture should stimulate the quest to find how other pilgrimage sites used physical senses and architecture to generate religious experiences. It will also contribute to discussions of the responses to iconoclasm in the region, to the study of early Christo/Islamic relations, to questions pertaining to the origin and meaning of the *fleur-de-lis* in Byzantine iconography.

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SAHIL HAWRĀN EPIGRAPHIC SURVEY

Stefan Jakob Wimmer

Introduction

The region to the northeast of Irbid and northwest of Ar Ramthā is known as Sahil Ḥawrān or Southern Huran Plain. It is traversed by the impressive Wādī Ash Shallālah canyon, a southern tributary to the Yarmouk River. The villages in this area have in many cases their old village centers preserved, that is private and public structures built mainly in the Ottoman Period, from the local black basalt stone. The village kernels are usually being deserted and partly decaying, but normally not torn down and built over. New houses are being clustered around the ancient quarters. Thus, a large amount of old building substance can still be seen and inspected, even when ruined.

The black basalt architecture of private as well as public or religious character, is evidently almost exclusively from the (later) Ottoman Period and partially from the (earlier decades of the) twentieth century. Time and again, remains of more ancient buildings have been identified in these villages, reused in the existing walls and structures (*spolia*). Of utmost importance was a large fragment of an Egyptian *stela* from the New Kingdom (13th century BC), which was detected in the wall of Ash Shaykh Khalīl -Mosque in the town Aṭ Ṭurrah during a survey by the Jordanian Department of Antiquities in 1999 (Wimmer 2002). Siegfried Mittmann, and Ulrich Hübner and Peter Weiss were able to publish three Byzantine period Greek funeral inscriptions from the surrounding of the same mosque (Mittmann 1970: 166-167; Hübnerand Weiss 2007).

Nabil Bader and Hani Hayajneh published several Greek and one Northern Arabic inscriptions from locations south of Irbid (immediately to the south of our survey area; Bader and Hayajneh 2009), and Nabil Bader and Martha Habash five Greek inscriptions, again from villages south of Irbid (Baderand Habash 2005). Yet, it had not been attempted to survey the remaining village structures systematically for inscriptions and other ancient *spolia*[1]. Currently (2020), the region is included in the systematic prospection conducted by Nabil Bader and Jean-Baptiste Yon for the preparation of Vol. 1/1: *Jordanie du Nord-Ouest* in the series *Inscriptions de la Jordanie*[2]. Our results are, as far as they are relevant, offered as a contribution to that enterprise[3].

1. The region was part of a seminal survey in 1963-1965 by Siegfried Mittmann (1970: esp. 6-26). More recently an archaeological survey of the larger region is reported by Melhem 2012. A broader approach is pursued by the Northern Jordan Project, directed by Bethany Walker, since 2003, which partially covered this region (Walkerand Shunnaq 2011 [Aṭ Ṭurrah], Corbett and Keller *et al.* 2014: 640 [Kharjā, Ash Shajarah]). An epigraphical survey further to the east is conducted by Nabil Bader, Julien Aliquot and Abdulqader Al-Husan (Al-Husan and Aliquot 2019: 45), and *cf.* also Bader 2009. The Southern Ḥawrān Survey of 1985, too, was conducted further to the east (Kennedy, MacAdam and Riley 1986; MacAdam and Graf 1989).
2. Les inscriptions grecques et latines de la Syrie (IGLS) XXI, 1/1; *cf.* www.ifporient.org/igls.
3. The underground tunnel system (the so called "Qanat Fir'awn") in and around Wādī Ash Shallālah, which have been considered to be part of a trans-regional water supply system (Döring 2004), was investigated at the time of our survey by Stephan Kempe and Ahmad Al-Malabeh. They informed us that numerous Greek painted graffiti are preserved on the tunnel walls. They would obviously deserve a separate investigation and publication, as they might shed light on the actual nature of the tunnels (*cf.* Kempe/Al-Malabeh 2017; Döring 2009: 165 fig. 17).

The Aims of the Survey

The Sahil Ḥawrān Epigraphic Survey (SHES) therefore undertook the task to visit the villages in the defined area, enquire with villagers and local authorities about remaining *spolia*, and look through the existing walls and structures that came into question, in a purely non-destructive way, *i.e.* without digging and without damaging any of the existing structures. The primary aim was to identify and publish previously unknown inscriptions, regardless of their date and type of script. In addition, architectural spolia or otherwise reused, ancient anepigraphic elements were also recorded.

The survey area was defined as limited by: 1) the Jordanian national border with Syria to the north; 2) road no. 25 (running through Ar Ramthā to the east); 3) road no. 10 (from Irbid eastwards to the south); 4) road no. 35 (from Irbid northwards to the west) (**Fig. 1**).

In this area of roughly 200 km^2 fifteen villages and small towns are located and were all surveyed: Adh DHunaybah, ʻAmrāwah, Ash SHajarah, Aṯ Ṯurrah, (east of Wādī Ash SHallālah); Al Yarmūk, Kharjah, Abu Al Lūqas, ʻAlʻāl, Ḥarīmā, Al Mughayr, Marw, Ḥakamā, Sāl, Bushrā, Ḥuwwārah (west of Wādī Ash Shallālah). The town of Aṯ Ṯurrah, located in the north-east of the survey region, is its major settlement and yielded a large number of results and among them the most important ones (For a historical survey of Aṯ Ṯurrah, *cf.* Walker, Shunnaq *et al.* 2011). In addition, the offices of the Department of Antiquities at Ar Ramthā were visited, and the inscriptions and *stelae* which originate from the survey area and are stored there were included in the survey documentation.

The survey was conducted in October and November 2010 (29/10-07/11/2010; permit no. 2010/84) by the author together with Khaled Janaydeh as representative of the Department of Antiquities. It was funded primarily by the "Deutscher Verein zur Erforschung Palästinas" (see Acknowledgements).

The Results of the Survey

In total, we were able to document 18 inscriptions plus 31 non-inscribed objects. The majority of the inscriptions are in Greek (G1-11), one fragmentary Greek or Latin (X1), and three in Arabic (A1-3). Already known (and published by the surveyor, Wimmer 2002) was the important Egyptian *stela* fragment from Aṯ Ṯurrah, (E1). Of distinguished significance among the non-inscribed objects is a *stela* from Aṯ Ṯurrah, representing a lunar deity (kept in the DoA office at Ar Ramthā). Due to its importance it was published separately in Wimmer and Janaydah 2011 (ae1).

Egyptian Inscriptions (E1-2)

E1. Stela from Aṯ Ṯurrah

Dimensions: 56:28:26cm.
Preservation: fragment.
Material: basalt.
Location: inside Maqām Ash SHaykh Khalīl.
Registration No.: SHES 2010-13, 29/10/2010.
Literature: Wimmer 2002; Walker and Shunnaq *et al.* 2001: 521.
Commentary: This important royal *stela* from the Ramesside period was first noticed in 1999 by the Department of Antiquities and published by this author[4]. The same mosque has several other ancient *spolia*: a Greek epitaph (G1) and a Roman votive altar (ae2). The structure is described in Walker and Shunnaq *et al.* 2011, 521f. The *stela* was cut on three sides to fit into a wall pillar, close to the ground, and turned by 90 degrees. What remains, is only a section of the lower eight lines of an originally much larger *stela*, with a representation on top of pharaoh interacting with one or more deities, and a lengthy text below, as the two completely preserved *stelae* of Sethy I and Ramesses II from Baysan (Bayt Shan) show[5].

Another fragment of a Ramesside *stela* (Sethy I) was found at Tall Ash SHihāb, just five kilometers, across the modern border with Syria, to the north of Aṯ Ṯurrah, reused in a village wall (Smith 1901; Wimmer 2008). Another

4. In coordination with and authorized by the Department of Antiquities, then directed by the late Dr. Fawwaz al-Khraysheh, this *stela* was studied and presented by the present author to the Third International Congress on the Archaeology of the Ancient Near East on 18 April 2002 in Paris. Regrettably, the congress organizers have not published the proceedings. Due to the special importance of royal Egyptian inscriptions outside Egypt, and the continuing requests on detailed information, I made my contribution available online (by 2009), now on https://www.academia.edu/34935504/A_New_*Stela*_of_Ramesses_II_in_Jordan_in_the_Context_of_Egyptian_Royal_*Stelae*_in_the_Levant. It comprises a detailed editio princeps of the *stela*.

5. Rowe 1930: pl. 41, 46. - For a complete overview on all royal Egyptian *stelae* in the Levant *cf.* Wimmer 2002, and more recently Millard 2011: 305f., Tucci 2016: 99, Levy 2017: 19, and Wimmer forthcoming. To be added is Wimmer and Heindl 2018. Note further that a Ramesside *stela* from Meydaa near Damascus, discovered in 2008 and published by Lagarce 2010, is a private monument by an army officer under Sethy I, not a royal *stela*.

15 km to the north, a famous Ramesside *stela* (Ramesses II), known as the "Stone of Job" had been standing for centuries in a mosque in the village of Ash SHaykh Sa'd (*cf.* now Dijkstra 2018, who has shown that the monument is still preserved (or, at least, was so in 2006, personal e-mail communication 09/04/2020) in front of the local archaeological museum at Dir'ā).

Inscription

(The following is abridged from Wimmer 2002: 3-5):

1 [...] --?-- [...]
2 [...] Nprj wtT.n Gb [...]
3 [... s]mn jwa.w Hr ns.wt=sn [...]
4 [...] rn Dsr nxb(.t) nswt n Km.t [...]
5 [...] mr(j) on rn=f on (n) aH[a.w ...]
6 [...] jr.t=sn m jwn.w m s.t=sn jr[...]
7 [...] bST.w sbtj=s[n ...]
8 [... (Wsr-]MAa.t-[Ra] stp-n-Ra)/ sA Ra (Ra-mss mrj-Jmn)/ [...]

1 [...] --?-- [...]
2 [... of] Nepri, begotten by Geb, [...]
3 [...] who [es]tablishes the heirs on their thrones [...]
4 [... of] name, sacred of titulary, King of Egypt, [...]
5 [...] the beloved [...], brave of name, the bravest of war[riors, ...]
6 [...] to make them as columns at their place, to make [...]
7 [...] the rebels, th[eir] fortification [...]
8 [... (Wsr-]MAa.t-[Ra] stp-n-Ra)/, the son of Ra (Ra-mss mrj-Jmn)/ [...]

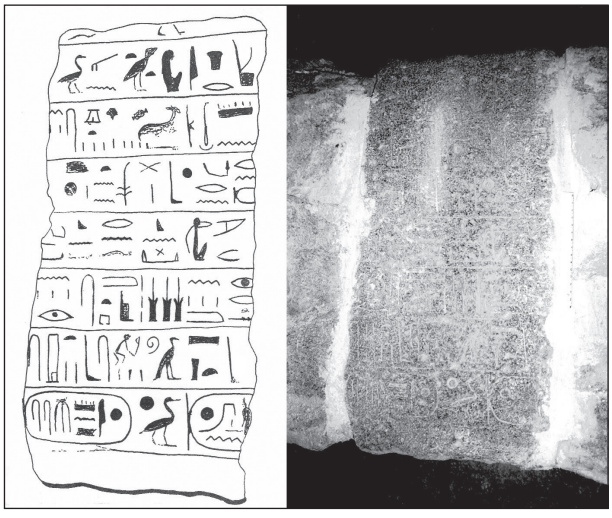
Nepri is a cereal God and personifies grain. The king can sometimes be addressed as "the son of Nepri", referring to his quality as nourisher of Egypt. Geb and Nepri are often mentioned together, the first as earth God producing plants and vegetables, and both responsible for the fertility of the ground and its products in food supply. In addition, Geb is a God of divine kingship. The kings of Egypt are considered the heirs of Geb, sitting on his throne. It may not be a coincidence that this reference to the two Gods comes from a very fertile region in the Egyptian province of Canaan.

It is tempting to take line 6 as referring to Egyptian building activity. The bellicose context of the following line would suggest some kind of fortification or residence for military personnel. For line 7, compare phrases like "the rebels crushed, their strongholds destroyed", "who causes the rebels to flee from their fortifications." This could indicate actual fighting. Fitting allusions at historic events into the last lines of a *stela*, preceded by exceedingly long royal titulary and litany, is common practice. On the other hand, such wording may as well be part of the usual praise. In Ramesses' II *stela* from Baysan (Bayt Shan), he is called "an effective wall for Egypt": sbtj pw mnx n Km.t. The allusions in lines 6 and 7, positioned toward the end of the inscription, and taken in combination, would seem to opt more in favour of a reflection of actual events.

The free space below this line marks the bottom of the *stela*. Luckily the line preserves enough of the royal name for a safe identification. Moreover, the spelling can give us a clue for an approximate date. The element  was used exclusively in Ramesses' regnal years 2-20 (Loffet 1999, 4, with further lit.).

E2. Unprovenanced Scarab

Dimensions: *ca.* 1.8:1.3:0.8cm.
Preservation: complete.
Material: glazed steatite.
Location: private possession in the village of Ḥarīmā.
Registration no.: (no registration no.), 2/10/2010.
Commentary: In the village of Ḥarīmā we were directed to a private home where a woman possesses (among several ancient coins and uninscribed beads) a scarab. We were told that the scarab had been in the possession of the family's female line for several generations. Its provenance is therefore unknown and not necessarily



1. E1, facsimile and photo (SJW)

from Harīmā itself or the surrounding. We include the find here due to the relative scarcity of scarabs in the region (The corpus of stamp seals from Jordan Eggler/Keel 2006 lists from this region only two scarabs, from Tall Al Fukhkhār and Tall Al Mughayr [both Ramesside: 288f., 308f.]). It has a shining, dark green-brown glazed surface, in the deep carvings the beige-grey steatite stone is visible, the most common material for scarabs.

Inscription

The back and sides display little elaborate carvings, the wings are unmarked, the head is shaped by only a few crude marks. The base display symmetrically arranged hieroglyphs, a frequently attested design group known as so called nefer-signs. They are not to be read as a coherent inscription, but convey magical and royal power symbols to protect the seals' owners. In the upper register, an anx-sign 𓋹 for "life" is flanked by two reed-symbols (*sw*, 𓋴) for *njsw*, "king." Sometimes this symbol is confused and merged with the sign for "year" (*rnpt*, 𓇋). Here, is it very closely connected to the upper parts of the two anx-signs below, as if the engraver had the *nfr*-sign 𓄤 for "good, beauty" in mind. The impression that he was not very well skilled and at home in Egyptian hieroglyphs is confirmed in the lower register, where the sign in the middle, flanked by two 𓋹, looks like a much aborted 𓄤, composed of an upside down 𓋴 with an angular bottom component (like the sign 𓊪 for the consonant *p*, meaningless in this context), where the sign 𓌹, *nb*, "all, every" might rather be expected.

A model that might originally have inspired this arrangement of symbols might have read "life (given by or to) the king," or "all good and life"—but the original model was not fully understood and flawed by the engraver. Therefore, the scarab was most certainly produced locally, somewhere in the Levant, not imported from Egypt.

Comparable designs are dated to the MB IIB period (*ca.* 1650-1550 BC), *cf.* Eggler/Keel 232f. no. 72 (Pella), 272f. no. 2 (Saham); Keel 2020, 70f. no. 173 (unprovenanced).

Greek Inscriptions (G1-11)

G1. Epitaph from At Turrah
Dimensions: 36:29cm; roughly rectangular.
Preservation: complete.
Material: basalt.
Location: inside Maqām Ash SHaykh Khalīl, At Turrah.
Registration no.: SHES 2010-14, 29/10/2010.
Commentary: The small *stela* is inserted in the southwestern wall pillar of the Maqām Ash SHaykh Khalīl at ground level, turned by 90°.

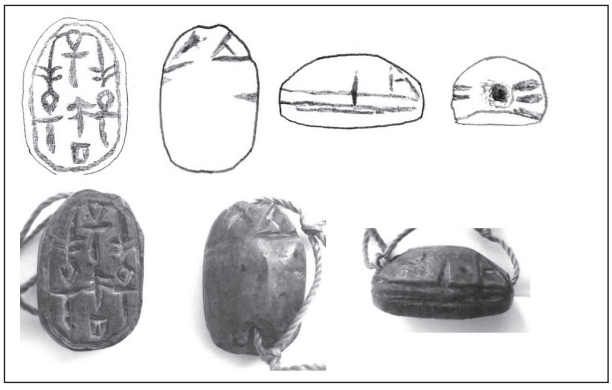
Inscription:
pew/ciae/twn/k;
"Peosia, age 29"

The modest stone has a basic text pattern only, with line dividers: PN (fem.), and the indication of the deceased's age. The name Peosia is not attested, the reading might therefore be questionable (For a comprehensive analysis of over 2,000 funerary *stelae* from Hawrān *cf.* Sartre-Fauriat 2001: II 103-117. They are dated between the 1st and the 6th century AD).

G2. Epitaph from At Turrah
Dimensions: 62:29: *ca.*12cm; roughly rectangular.
Preservation: complete.
Material: basalt.
Location: in the garden of a private home in At Turrah.
Registration no.: SHES 2010-15, 31/10/2010.
Commentary: The *stela* of average dimensions is set in the ground, in the enclosure of a flower-bed, and could not be lifted. Its precise thickness is not clear. The surface is partly polluted by mortar and concrete.

Inscription
aUD/Yn/etr
"Auden, age 100"

The PN Auden is not attested, but the reading is safe (For an incomplete fem. PN, tentatively reconstructed as A[Y]Δ(H) *cf.* Sartre-Fauriat 2001: I 269). It should be compared with the Arabic PN *'Awda*, or *'wdn* (*cf.* Harding 1971, 447 ['WD], 448 ['WD, 'WDN]). For a fem. PN AYΔH *cf.* Bader 2009: 148-150 nos. 235-240, and Sartre-Fauriat 2001: I 269. MacAdam and



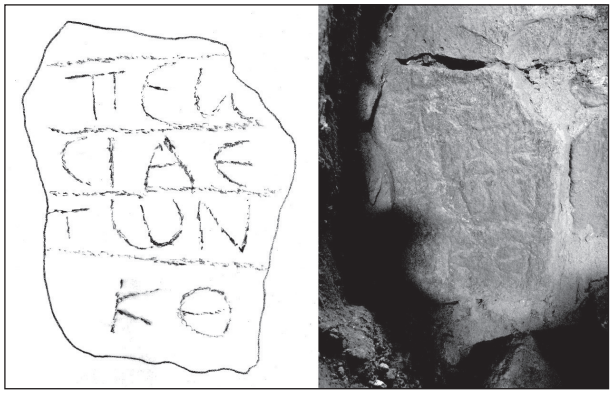
2. E2, facsimile and photo (SJW).

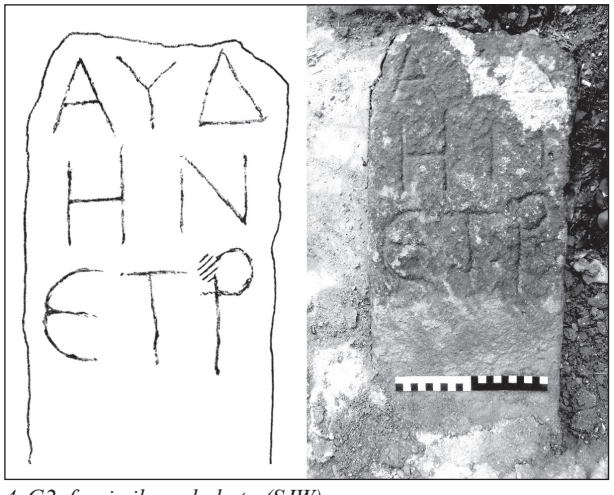
Graf (1989, 180, with further attestations) note that the high numeral "is merely an indication that the deceased had been very advanced in years".

G3. Epitaph from At Turrah
Dimensions: 66:30:22cm; irregular width, curved on top and right side.
Preservation: complete, but the lines are written very tight to the right edge.
Material: basalt.
Location: in front of a private home in At Turrah.
Registration no.: SHES 2010-16, 31/10/2010.
Commentary: The stone lies on the side of a street, next to the entrance of a private home.

Inscription
;ar/cigly/gori\(?)/etä
"Be well, Gregorios, age 60"

The inscription is not entirely clear. In the PN, the first r has changed with l. The last sign is tiny and squeezed at the end of the line. The numeral is presumably ä (=60), rather than z (=7). For the very customary funerary salute θαρσι *cf.* Simon 1936 and Sartre-Fauriat 2001: II 221.

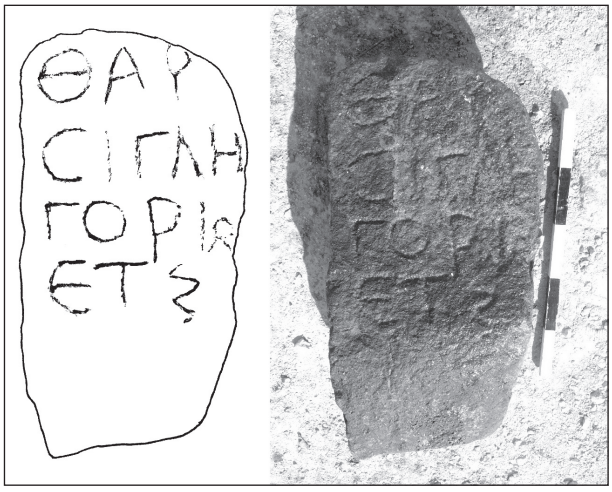

3. G1, facsimile and photo (SJW).

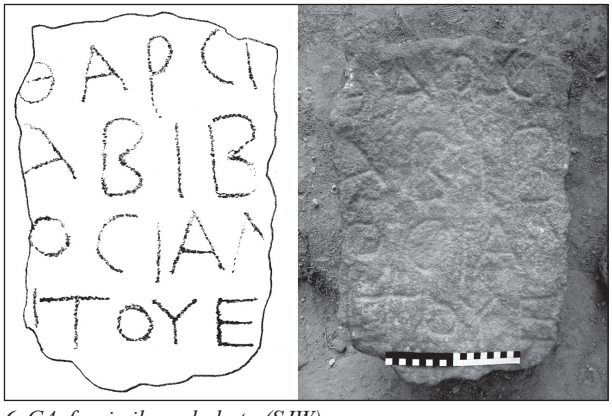

4. G2, facsimile and photo (SJW).

G4. Epitaph from At Turrah
Dimensions: 50:33:20cm; roughly rectangular.
Preservation: complete on top and at the right side, but a few cm are missing at the left side; unclear at the bottom.
Material: basalt.
Location: next to a private home in At Turrah.
Registration no.: SHES 2010-17, 31/10/2010.
Commentary: The stone lies under an olive tree in the northeastern outskirts of the town.

Inscription
;arci/abib/ocial/itou E
"Be well, Abibos Ialitou, (age) 5"

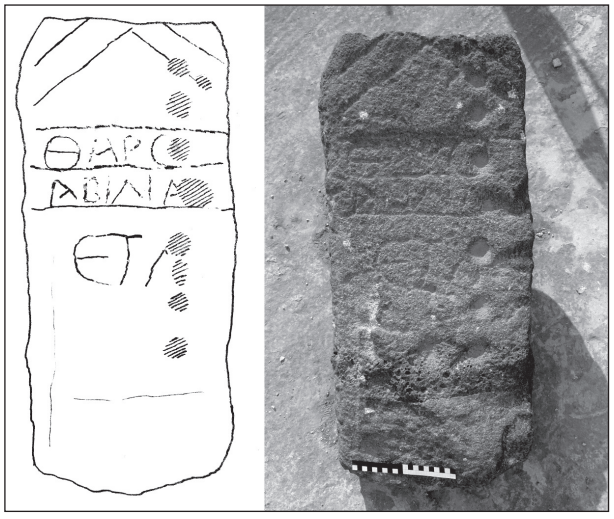
The PN Abibos is clearly the Semitic Habîb, *cf.* Meimaris and Kritikakou-Nikolaropoulou 2005: 239 no. 143, Desreumaux 1998, 487 with variations and literature. The patronym Ιαλιτος is not attested in this form. Could it be a variant of Ιαλοδος (Sarte 1985, 173; Bader 2009: 119 no. 152, 158 no. 265, 166 no. 290)?


5. G3, facsimile and photo (SJW).

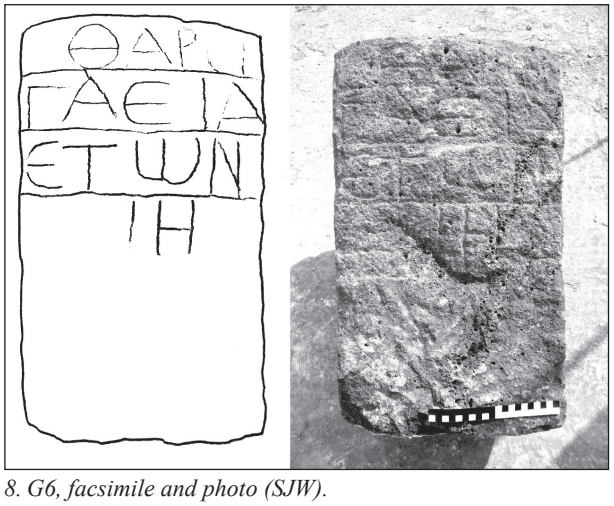

6. G4, facsimile and photo (SJW).

cf. also Harding 1971, 682 (YLṮ). Following is an **E**, not in the usual cursive but in angular shape, after a small lacuna, presumably to be read as the numeral 5, with et(wn) missing. Alternatively, the **E** might be the initial letter of Et (wn, or the like); below line 4, minor traces of what might possibly remain of letters, could be assumed, in which case the stone would be broken with the lower part of a supposed line 5 missing. It would be difficult, however, to conclusively assemble these supposed traces to -t(wn) plus a numeral, so the first option is more reasonable, with **E** for "5" as the end of the inscription.

G5. Epitaph from Aṯ Ṯurrah
Dimensions: 86:38:22cm; rectangular.
Preservation: complete.
Material: basalt.
Location: found in Aṯ Ṯurrah (according to KHirbat Al Janāydah), kept in the DoA office Ar Ramthā.



7. G5, facsimile and photo (SJW).



8. G6, facsimile and photo (SJW).

Registration no.: SHES 2010-07, 31/10/2010.
Commentary: The inscription is very shallow and difficult to discern. The *stela* is decorated on top with an incised triangular tympanum. Only 2 short lines of inscription follow with line dividers, after which the year date is enlarged in the centre. The lower half of the elongated stone is uninscribed. At some later date, *ca.* 7 cup holes were set roughly in a line towards the right edge of the stone.

Inscription
;arci/abilia/et l(?)
"Be well, Abilia, age 30"

The numeral is damaged by one of the later cup holes. The fem. PN Abilia is not attested, the reading is unsafe due to the bad preservation. Could it be related to Semitic *hbl* (*cf.* Harding 1971: 607)?

G6. Epitaph from Aṯ Ṯurrah
Dimensions: 64:36:25cm; regular, with diminishing width from top to bottom.
Preservation: complete.
Material: basalt.
Location: found in Aṯ Ṯurrah (according to KHirbat Al Janāydah), kept in the DoA office Ar Ramthā.
Registration no.: SHES 2010-08, 31/10/2010.
Commentary: The rectangular shape of the stone is worked well, the sides were smoothened as if for a building block. The inscription, with line dividers, is shallow, line 1 is not well preserved.

Inscription
;arci/gaeia/etwn/i(?)y
"Be well, Gaeia, age 18"

The numeral is set as a separate line, a little to the right of the middle due to a fissure in the texture of the basalt. Should this fissure be a later break, mi could be a possible reconstruction, with a very low middle part of m, rendering an age of 48. The PN Gaeia is reminiscent of the DN Γαῖα, but unattested in this form.

G7. Epitaph from Aṯ Ṯurrah
Dimensions: 65:30:20cm; roughly rectangular.
Preservation: complete.
Material: basalt.
Location: found in Aṯ Ṯurrah, kept in the DoA office Ar Ramthā.
Registration no.: SHES 2010-09, 31/10/2010.
Literature: Mittmann 1970: 166, Tf. VII.
Commentary: Along the left margins the stone is rubbed of so that the initial letters in each line are very shallow. This *stela* was seen and published by Siegfried Mittmann

1970, 166. At that time, it marked a tomb in the Muslim cemetery of Aṭ Ṭurrah. According to the photograph (Mittmann 1970: Tf. VII, Abb. 13), the stone was still standing upright, with the part below the numeral in the ground. If this was the original position of the *stela*, the Roman earth grave would have been reused over a long time. Otherwise the *stela* would have been reused and set up at a Muslim grave. Both options are interesting as in each case they document a remarkably liberal adoption of a pre-Muslim memorial for a Muslim grave. Mittmann presents a second such case from the same cemetery: a badly preserved *stela* for an 11 year old child, again in situ at a Muslim grave (Mittmann 1970, 167, Tf. VII, Abb. 14) (On another Greek epitaph, which Ulrich Hübner found deposited in front of the Maqām Ash SHaykh Khalīl (*cf.* E1, G1) in 2006, it was communicated by locals that it, too, originated from the Aṭ Ṭurrah cemetery where it had marked a Muslim grave (Hübner and Weiß 2007: 177. I had seen it in December 2002, next to another, badly preserved epitaph. Both had disappeared by 2010). It may be speculated that most, if not all epitaphs now scattered around the town, were removed from the same cemetery). This second *stela*, like the first, was at some time removed from the cemetery and could, unfortunately, not be retrieved. Both cases indicate that the Muslim cemetery most probably preserves the site of the older, Byzantine and Roman graveyard of Aṭ Ṭurrah.

Inscription

;arci/krcpi/naet/p

"Be well, Krispina, age 80"

The PN should read Κρισπινα, the first i was omitted (*cf.* Mittmann 1970, 166).

G8. Epitaph from Aṭ Ṭurrah

Dimensions: 61:25:24cm; roughly rectangular.
Preservation: broken on left side.
Material: basalt.
Location: found in Aṭ Ṭurrah (according to KHirbat Al Janāydah), kept in the DoA office Ar Ramthā.
Registration no.: SHES 2010-10, 31/10/2010.
Commentary: The stone has a peculiar brown patina on the inscribed side and on the right side, which does not cover the letters and must therefore predate the inscription. The margin along the right side is straight, but irregular on all other sides. The left side is broken, resulting in the loss of the initial letter in lines 1-3.

Inscription

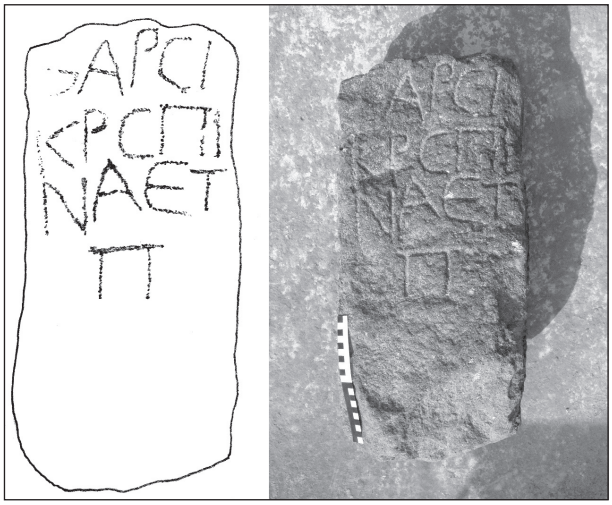
¬;arci/¬g(?)erm(?)a/¬n(?)e et/me

"Be well, Germanos(?), age 45"

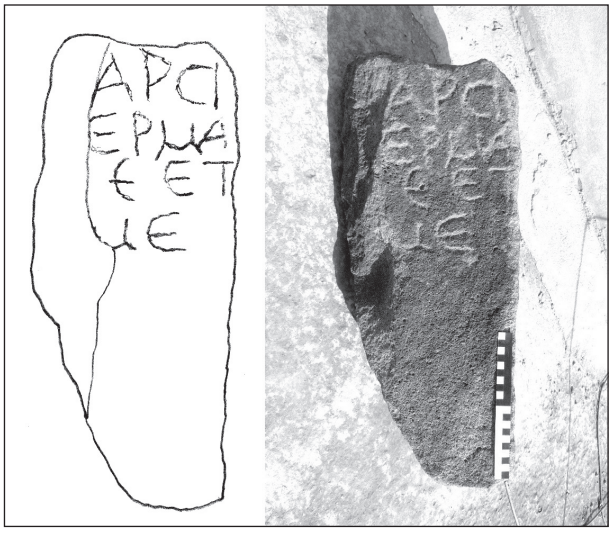
For the reconstruction of the PN *cf.* Mittmann 1970: 199, here in the vocative. *cf.* also Gatier 1998: 371 (no. 21), 405 (no. 124); Al-Husan and Aliquot 2019, 47, 48. This PN is fairly common and therefore probably derived from the Semitic *grm* (*cf.* Sartre 1985, 193).

G9. Epitaph from Aṭ Ṭurrah

Dimensions: 58:46:20cm; roughly rectangular.
Preservation: broken at the bottom.
Material: limestone.
Location: found in Aṭ Ṭurrah (according to KHirbat Al Janāydah), kept in the DoA office Ar Ramthā.
Registration no.: SHES 2010-11, 31/10/2010.
Commentary: The inscription, carved in soft limestone, is mostly very shallow, only line 1 is deeper and clear. The letters vary in size and intensity. The bottom is broken with parts of the inscription missing at the lower right side and possibly below. The limestone, the physical appearance, and the (partly obscure) structure of the inscription differ from all other epitaphs of the region (but *cf.* G11) (Limestone is extremely rare for epitaphs from Ḥawrān, according to Sartre-Fauriat 2001: II 103 n.1). Perhaps its provenience from Aṭ Ṭurrah should therefore be doubted.



9. G7, facsimile and photo (SJW).



10. G8, facsimile and photo (SJW).

Inscription

;arci/elpidic/omyrou/ovv/zy¬.../e¬...

"Be well, Elpidi(o)s Homerou, off[icial], he lived (for X) y(ears)"

For the PN Elpidios, *cf.* Gatier 1998, 384 (no. 71), Sartre 1985, 199, Canova 1954, no. 163; for Homeros *cf.* Bader 2009: 208 no. 412(?), Meimaris and Kritikakou-Nikolaropoulou 2005: 346f. no. 259, Gatier 1998: 418, with lit. Line 4 has only the three letters ovv centred in the middle, the abbreviation for οφφικιάλιος, "official" (*cf.* Avi-Yona 1974: 91; Littmann *et al.* 1910: 417f., no. 795/5), followed by zy. This abbreviation for ζηεν, "he lived," is commonly combined with ετ(ων) plus numeral, of which we have only the e preserved (*cf.* Avi-Yona 1974: 67; Wiegand 1905: 327f.; Sticotti 1899: 103f.).

G10. Epitaph from 'Amrāwah

Dimensions: 83:38:21cm; rectangular.
Preservation: complete.
Material: basalt.
Location: kept in the garden of a private home, to the west of 'Amrāwah.
Registration no.: SHES 2010-01, 29/10/2010.
Commentary: The *stela* is well preserved and the inscription clear, written very regular between line dividers; the numeral is larger.

Inscription

atti/kian/ocat/tiki/anou/etwn/oy

"Attikianos Attikianou, age 78"

For the PN and the identical patronym *cf.* MacAdam and Graf 1989: 178, Sartre 1985: 185, 189. It is not attested frequently and may be an example for Greek renderings of Semitic roots (atq; ibid.). The letters wn in line 6 form a ligature.

G11. Relocated Epitaph from Kitm (now in Al Mughayr)

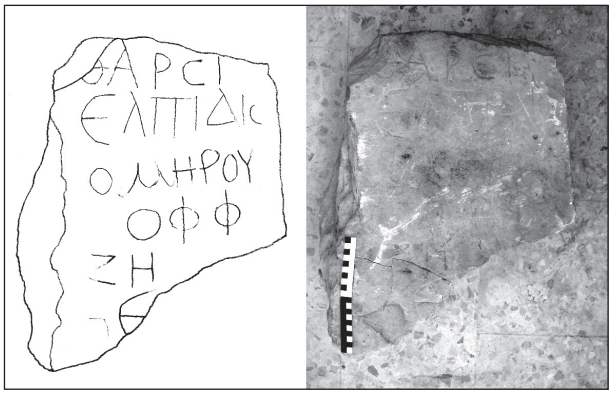
Dimensions: 108:49:18cm, rectangular.
Preservation: complete but broken in two parts.
Material: limestone (*cf.* supra n. 13).
Location: Al Mughayr , next to a field east of the village.
Registration no.: SHES 2010-03, 01/11/2010.
Literature: Bader and Hayajneh 2009.
Commentary: This epitaph is broken in two parts but nearly complete. It was found in 1999 by Nabil Bader in front of a cave in the western part of the village of Kitim, *ca.* 18km southeast of Irbid (*i.e.* some kilometers outside to the south of our survey area) and published in 2009 by Bader and Hayajneh. There is no doubt that the epitaph seen by us outside the village of Al Mughayr is identical with Bader's Tf. 21/A. When and why it was removed to its new location, remains unexplained (We were shown this epitaph outside the village by a villager from Al Mughayr. In the possession of the same villager are the three Arabic inscriptions [see below]).

Inscription:

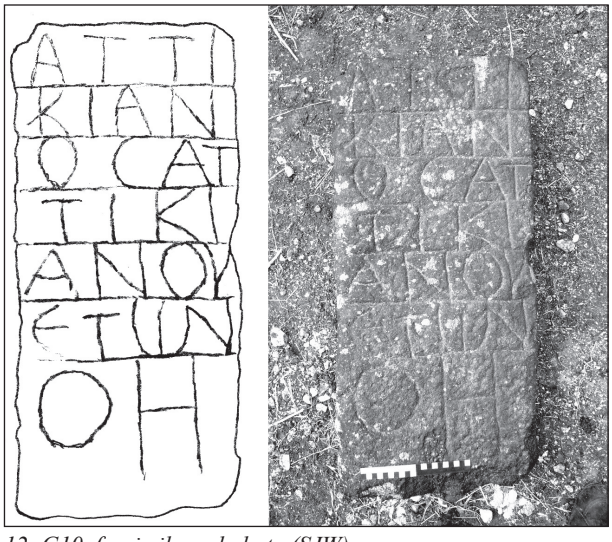
;arcei/cabein/ocma¬l/<eoukai/oudica;a/natoc/etwnke

"Be well, Sabinos Malcheou, and no one is immortal, age 25"

The large stone is inscribed with line dividers. The end of line 3 is damaged. The PN Sabinos is frequent. An epitaph of a Roman veteran of the *legio III Cyrenaica* named Sabinos was found in Tall Ash SHihāb, a few kilometers north of At̲ T̲urrah (beyond the modern border to Syria), from where it is supposed to originate (Weber 2006: 49). *cf.* also Mittmann 1970: 170 no. 6, 204



11. G9, facsimile and photo (SJW).



12. G10, facsimile and photo (SJW).

no. 48; Canova 1954: no. 397; Sartre 1985: 234, Sartre 1998: 556, 560; for the Semitic Malch(e)os (The patronym was here read Μα[λ]χου by Bader, omitting the e) *cf.* Mittmann 1970: 182f. no. 19; Sartre 1985: 214, Sartre 1998: 557. For the solacing statement "no one is immortal" *cf.* Mittman 1970: 166 fn. 3, and comprehensively Simon 1936 (According to Sartre-Fauriat 2001: II 221, the formula appears in Ḥawrān, when dated, exclusively in the 4th century AD).

Nondistictive Inscriptions (X1-2)

X1. Epitaph(?) from Sāl

Dimensions: 86:44:22cm, roughly rectangular.
Preservation: fragment.
Material: limestone (*cf.* supra n. 13).
Location: in the village cemetery of Sāl.
Registration no.: SHES 2010-12, 04/11/2010.
Commentary: One among many broken and dilapidated epitaphs in the cemetery preserves only two large letters in its upper part. The letters are deeply incised, with no traces of more letters below or left of the I/T.

Inscription

Ic or Tc

If the first letter is read as I, it has short horizontal bars on top and bottom, and is much larger than the following c. Its lower part is shallower and could be considered a depression in the stone surface, in which case the letter is T. The c is probably complete (not a broken o). IC is of course frequent in the abbreviation IC XC (for Ιησους Χριστος, "Jesus Christos"), but the letters are too unspecific for any plausible identification. They could be Greek or Latin (Epitaphs from Ḥawrān inscribed in Latin are extremely rare, *cf.* Sartre-Fauriat 2001: II 104. - For Tall Sāl, where the cemetery is situated, *cf.* Melhem 2012: 45. His survey mentions Roman and Umayyad pottery [but not Byzantine]).

13. G11, facsimile and photo (SJW).

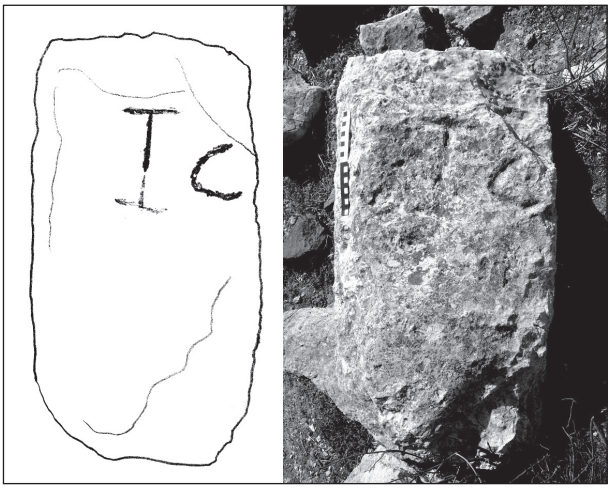
X2. Fragment from Ḥuwwārah

Dimensions: *ca.* 39:26cm, rectangular.
Preservation: fragment.
Material: limestone.
Location: Abū Al-Qasim Mosque.
Registration no.: SHES 2010-02, 03/11/2010.
Commentary: The small block is inserted in the western exterior wall of the mosque (2nd course from bottom), cut to the size of the other building stones, and surrounded by modern cement covering the edges of the block.

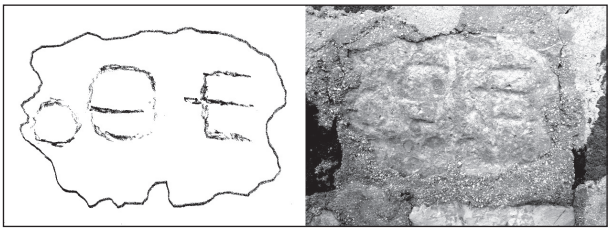
Inscription

The letters are weathered and difficult to read. Due to its fragmentary nature a safe identification of the inscription is not possible. The three preserved letters may be compared with Safaitic (or even Thamudic) awḥ. Due to the monumental character of the inscription, an identification as Greek o; E, however, should not be dismissed (ὁ θε[ός]?).

Two limestone epitaphs from Ḥuwwārah, inscribed in Greek, were published by Mittmann 1970: 168f., Tf. VIII.



14. X1, facsimile and photo (SJW).



15. X2, facsimile and photo (SJW).

Arabic Inscriptions (A1-3)

A1. Unprovenanced lintel

Dimensions: 52:25cm, rectangular.
Preservation: complete but broken in two parts.
Material: basalt.
Location: Al Mughayr, in the possession of a villager, provenance unknown.
Registration no.: SHES 2010-04, 01/11/2010.
Commentary: The text, in an archaic ductus, without punctuation, is framed at the left and right sides by a zig-zag décor pattern. The left part of the surface is partly blurred by a spilled, cement-like fluid.

Inscription

لااله\الااله وحده لا شريك
له محمد\د رسول الله
صمداحد

"There is no God but God alone, He has no partner with Him,
Muhammad is the messenger of God,
Indivisible, One"

The text preserves an early version of the *Shahada* (the Islamic testimony of creed). It differs from the standard formula by the insertion of "… alone, He has no partner with Him, …" (*cf. Qur'an Surat Al An'am* 6: 163) and the addition of the divine attributes "Indivisible, One" (*cf. Qur'an Surat Al Ikhlās* 112: 1-2) at the end. This extended wording is attested at the Dome of the Rock in Jerusalem (692AD/72AH) and in Umayyad inscriptions (*cf.* Wikipedia s.v. Schahada (German), https://de.wikipedia.org/wiki/Schah%C4%81da#Sakralbau, with lit. [02/09/2020]).

A2. Unprovenanced Epitaph

Dimensions: 105:25:15cm, rectangular.
Preservation: complete.
Material: basalt.
Location: Al Mughayr, in the possession of a villager, provenance unknown.
Registration: SHES 2010-05, 01/11/2010.
Commentary: A longish slab with three texts in archaic ductus, without punctuation. Inscription A and C, in a formal ductus, both start at the narrow ends of the slab and are oriented upside down against each other. Inscription B, in a more irregular ductus, follows inscription A without gap, and looks like a later addition. Between inscriptions B and C a part of the slab was left uninscribed. Inscription C appears to be a PN. If the slab was buried with its lower part in the ground, the name would have been not only upside down, but also invisible. The back side of the slab is crudely cut and uninscribed.

Inscription A

[ب]سم الله
اللهمعل
النبي××ا
منوالا اله
الاالله

"In the name of God
O God, (send blessing) upon
the prophet. (Ye who) be-
lieve, there is no god
but God"

Inscription B

و حد ولا
شريک له
وا × محمد

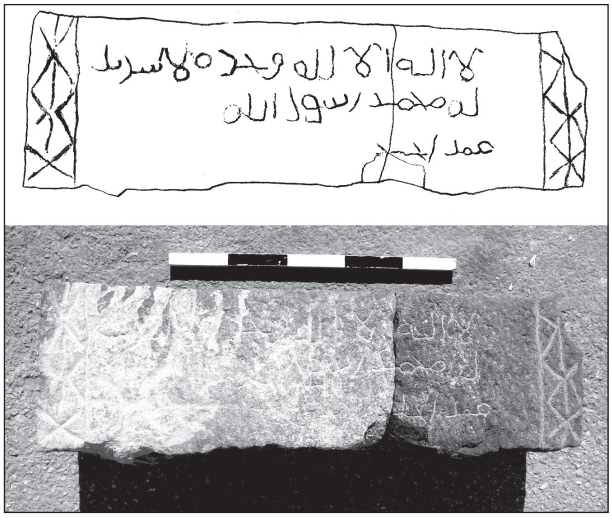
"alone, He has no
partner with Him,
and (the prophet) Muhammad"

Inscription C

عبد
الرحيم

"Abd Ar Rahim"

The ductus appears very early and may be compared to inscriptions dated to the late 7th century (*cf.* Al-Qaisy 2009: [y. 64 AH], Al-Husan 2006: 21f. [y. 70 AH]). For the brief form of the Basmala *cf. e.g.* Al-Husan 2006: 28, no. 3. The reading in A lines 2-4 is conjectural and based on attestations like *e.g.* Al-Husan 2006: 29 no. 4. In B, the group وا, line 3, is palaeographically identical with Al-Husan 2006: 21 no. 1. The rest of line 3 is difficult. There is hardly enough



16. A1, facsimile and photo (SJW).

space for our reconstruction. In C the first line is difficult to discern, and the letters are smaller than in line 2, but the reading appears safe.

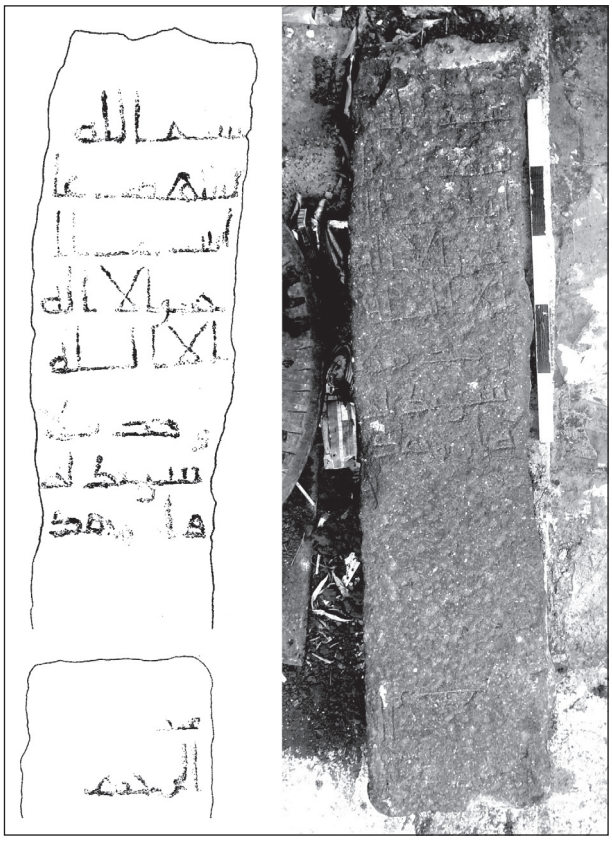
A3. Unprovenanced Epitaph, Two Blocks
Dimensions: right 57:36cm, left 57:37cm, both rectangular.
Preservation: two joining blocks, complete.
Material: limestone.
Location: Al Mughayr, in the possession of a villager, reportedly from the vicinity of the village.
Registration no.: SHES 2010-06, 01/11/2010.
Commentary: The text is a verse from the *Qur'an* frequently used for funeral inscriptions.

Inscription
يا ايتها النفس ا\المطمنة ارجعي الى \
ربك راضية \ مرضية فادخلى \
في عبادي \ وادخلى جنتى
"O reassured soul, return to your Lord, well pleased and pleasing,
and enter among My servants, and enter My paradise."
(*Qur'an, Surat Al Fajr* 89: 27-30).

Anepigraphic Objects (Selection; Ae1-14)

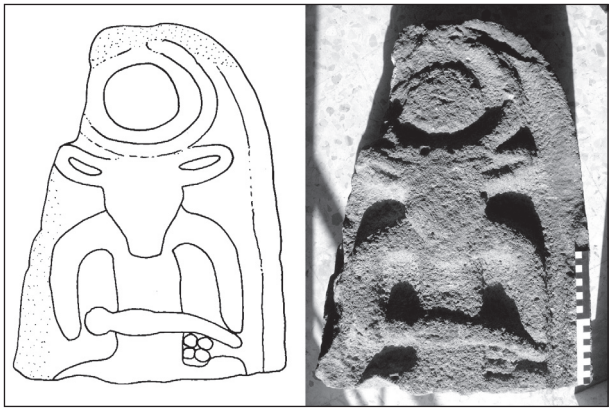
In the course of our survey a large number of uninscribed objects were identified and 31 of them recorded: mainly architectural elements (column bases, capitals and shafts, lintels, door sills and jambs, ornamented friezes), sarcophagi, and varia. While exceeding the scope of an epigraphic survey, a selection of these is presented in the following (Of importance is the head of a Roman basalt statue or a funerary relief, portraying a bearded man from At Turrah. It was acquired by the Syrian Antiquities Authority in 1929, is preserved in the Damascus National Museum, and was published by Weber 2006: 49 [Cat. 36]).

Ae1. Moon God Stela from At Turrah
Dimensions: 58:43:26cm.
Preservation: broken at the bottom and at the left edge.
Material: basalt.
Location: found in At Turrah, kept in the DoA office Ar Ramthā.
Registration no. and date: SHES 2010-45ae, 31/10/2010.
Literature: Wimmer and Janayedh 2011.
Commentary: This outstanding object was noted and identified as an Iron Age Aramean Moon God *stela* at our visit to the DoA office at Ar Ramthā. It had been found by Khaled Janaydah in At Turrah, in the western part of the town, supposedly in 2003. Unfortunately no records



17. A2, facsimile and photo (SJW).

18. A3, facsimile and photo (SJW).

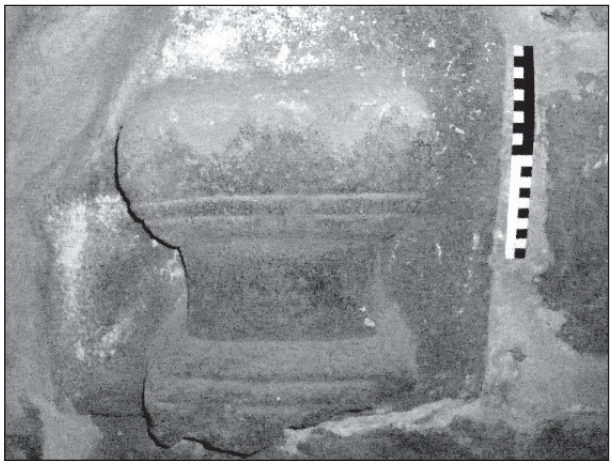


19. Ae1, photo and drawing (SJW).

exist on the exact location, circumstances and date of the discovery.

Description

The anepigraphic *stela* shows the cult symbol of an Iron Age lunar deity: a bull's head mounted on a zoomorphic stand with four extremities. The bull's horns are crescent shaped with a full moon disc in the centre. The zoomorphic stand carries a sword, next to which a small four-leaved rosette is depicted. The iconography of the moon god symbol has been shown to be essentially Aramean, with possible Hittite and Mesopotamian influences, and can be dated to the 9th and 8th centuries BC. Only four *stelae* of this kind have been known: 2 from southern Syria (Tall el Ash'ari, 'Awas), 1 from the northern shore of the Sea of Galilee (Tall/Bethsaida), 1 from Ayn Tab (modern Gaziantep in southeastern Tūrkiye); all of them are uninscribed. Due to the eminent importance of the At̲ T̲urrah-*stela*, being unique in the Kingdom of Jordan, it has been published separately and in full detail with historical discussion in Wimmer and Janaydeh 2011.



20. Ae2, photo (SJW).

21. Ae3, photo (SJW).

22. Ae4, photo (SJW).

Ae2. Votive Altar from At̲ T̲urrah
Dimensions: 42:42cm (block); 31:25:8cm ("altar").
Preservation: damages at the bottom right and top left.
Material: basalt.
Location: inside Maqām Ash SHaykh Khalīl, At̲ T̲urrah.
Registration no. and date: SHES 2010-46ae, 29/10/2010.
Commentary: A spolium in the northern wall of Maqām Ash SHaykh Khalīl (*cf.* above E1).

Description

The square block shows an object, protruding in semi-plastic technique, that resembles a Roman incense altar (*cf. e.g.* Menninga 2004: 48 [a similar but three dimensional object from nearby Abila]): a broad base, slender square pillar and a three-pinnacled basin on top. Since this representation of an altar was not functional, we assume a votive purpose.

Ae3. Sarcophagus from At̲ T̲urrah
Dimensions: 211:70:70cm.
Preservation: intact, with slight damages.
Material: basalt.
Location: outside Maqām Ash SHaykh Khalīl, At̲ T̲urrah.
Registration no. and date: SHES 2010-47ae, 30/10/2010.
Commentary: A few meters from the entrance of the mosque.

23. Ae5, photo (SJW).

Description

Typical Roman sarcophagus of the region, with basic decoration: two slightly protruding discs on one and two semispheric protrusions on the other longitudinal side.

Ae4. Sepulchral Lintel from Aṭ Ṭurrah
Dimensions: 198:38:42cm.
Preservation: complete.
Material: basalt.
Location: in front of a private home in Aṭ Ṭurrah, (same as G3).
Registration no. and date: SHES 2010-48ae, 31/10/2010.
Commentary: The monolithic lintel is deposited at the street side of a private home.

Description

A nicely executed, large lintel from a tomb, with a symmetric snake motive and flanking circular protrusions.

Ae5. Cornice Block from Kharjah
Dimensions: 130(visible):37:21cm.
Preservation: unclear, the visible portion is intact.
Material: basalt.
Location: used as a door lintel, above the entrance of the Old Kharjah Mosque.
Registration no. and date: SHES 2010-26ae, 02/11/2010.
Commentary: Both side ends are covered with mortar.

Description

The block features three parallel ribs between four plain strips of diminishing width. It could be a portion of a roof cornice (upside down) or a door jamb (turned by 90 degrees).

Ae6. Sepulchral Door from Kharjah
Dimensions: estimated width *ca.* 95cm.
Preservation: half part of a door wing.
Material: limestone.
Location: built in the exterior east wall of the Old Kharjah Mosque.
Registration no. and date: SHES 2010-27ae, 02/11/2010
Commentary: The limestone door wing is built in the mosque's outside wall at a height of *ca.* 2.5m; its measures could not be taken.

Description

Typical tomb doors from either basalt or limestone from the region display four false windows, two each in the upper and lower half (Similar doors can be seen *e.g.* in the Dar As Saraya Museum, Irbid). Depending on the orientation, this roughly square piece was the upper or lower part of a right or left wing. Both false windows have elaborate floral decorations. Circular knobs on all sides around the windows look like they were intentionally chipped away.

Ae7. Sarcophagus from Kharjah
Dimensions: 214:72:67cm.
Preservation: intact.
Material: basalt.
Location: built in the eastern wall of the Old Kharjah Mosque.
Registration no. and date: SHES 2010-34ae, 02/11/2010
Commentary: The sarcophagus is seen in the outside facade of the Old Kharjah Mosque, flanking the entrance to the left; its other side is exposed inside the mosque.

Description

The sarcophagus displays two monumental lion faces around a circular protrusion in the center (exposed inside the mosque), and a garland motive on the other side (exposed at the mosque facade). Another sarcophagus was exposed during earthworks, while we were present (2/11/2010), in the exterior western wall of the same mosque. It was mounted upside

24. Ae6, photo (SJW).

25. Ae7, photo (SJW).

down in the lower courses of the wall. The exposed side of this sarcophagus is undecorated.

Ae8. Niche Fragment from Kharjah
Dimensions: 56:63:54 cm.
Preservation: fragmentary.
Material: limestone.
Location: found among rubble next to the west wall of the Old Kharjah Mosque.
Registration no. and date: SHES 2010-33ae, 02/11/2010.
Commentary: At earthworks west of the mosque we discerned in the rubble a fragmentary block with a conch design.

Description

The block, with seven facets of a concave shell design, belongs to a shell-headed niche, possibly from a pagan temple or an early Christian church.

Ae9. Cornice Block from ʿAmrāwah
Dimensions: 87:67:29 cm.
Preservation: probably complete.
Material: basalt.
Location: built in an outside wall of a private home, with Ae10 and Ae11.
Registration no. and date: SHES 2010-19ae, 29/10/2010.
Commentary: ae 9, ae10 and ae11 are built in a modern court wall of a private home, a segment of which is composed of reused basalt blocks. ae9 and ae10 are decoratively set next to each other in the lower course of a plastered segment. Around the corner of the wall, the lower courses of an older basalt wall are visible.

Description

The right corner block of a Corinthian corniche, with crenulation and egg-and-dart molding around an obtuse angle.

26. Ae8, photo (SJW).

Ae10. Frieze Ornament Block from ʿAmrāwah
Dimensions: 106:45 cm.
Preservation: probably complete.
Material: basalt.
Location: built in an outside wall of a private home, with ae9 and ae11.
Registration no. and date: SHES 2010-20ae, 29/10/2010.
Commentary: *cf.* ae9.

Description

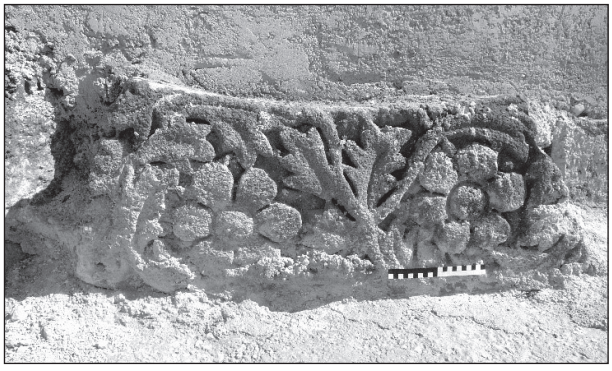
Ornamental architrave block with concave curved contours, showing two six-petal rosettes entwined by acanthus garlands; similar to ae11, but not identical.

Ae11. Frieze Ornament Block from ʿAmrāwah
Dimensions: 90:45 cm.
Preservation: partly broken.
Material: basalt.
Location: built in an outside wall of a private home, with ae9 and ae10.
Registration no. and date: SHES 2010-21ae, 29/10/2010.
Commentary: *cf.* ae9. ae11 is set in the wall segment composed of reused basalt blocks.

Description

Ornamental architrave block with convex curved contours, showing two six-petal rosettes

27. Ae9, photo (SJW).



28. Ae10, photo (SJW).

entwined by acanthus garlands; similar to ae10, nut not identical.

Ae12. Sculpture fragment from ʻAmrāwah
Dimensions: 40:29 cm.
Preservation: fragmentary.
Material: basalt.
Location: kept in the garden of a private home.
Registration no. and date: SHES 2010-22ae, 30/10/2010.
Commentary: In the same garden more unspecified basalt spolia are scattered.

Description

Fragment of a wing with five-six threads of scale-composed feathers curved at a right angle. The design is typical for Roman sculpture of winged divinities, especially Nike/Victoria[6].

Ae13. Lintel from ʻAlʻāl[7]
Dimensions: 174:38:54cm.
Preservation: probably complete.
Material: basalt.
Location: built in above the eastern entrance of the Old *ʻAlʻāl* Mosque.
Registration no. and date: SHES 2010-18ae, 7/11/2010.
Commentary: The door frame of the Old *ʻalʻāl* Mosque is composed of several reused basalt blocks.

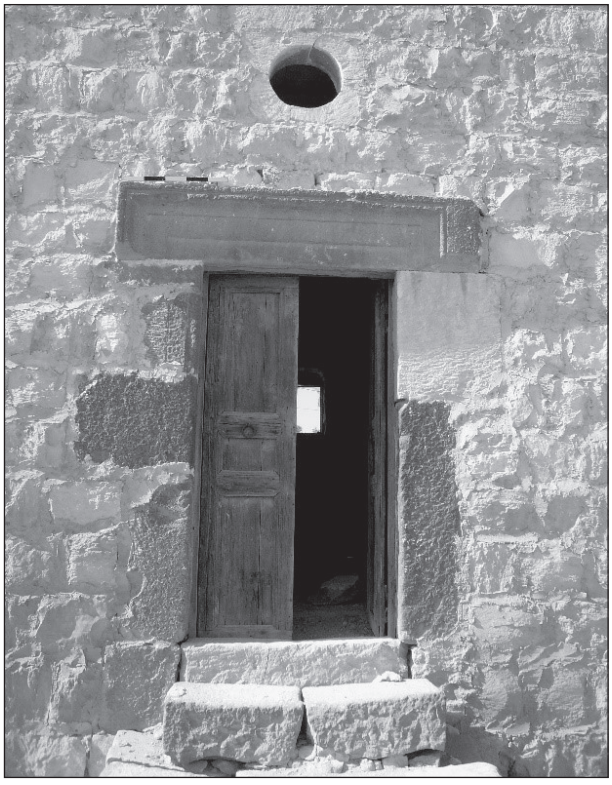
Description

Oblong block with a protruding structured edge around three recessed frames, digressing to an opening on one narrow end.

Ae 14. Sarcophagus from Marw[8]
Dimensions: 243:82:88 cm.
Preservation: complete.
Material: basalt.
Location: outside Al ʻUmarī Mosque.
Registration no. and date: SHES 2010-44ae, 7/11/2010
Commentary: In the dirt fill of the sarcophagus a broken lintel is dumped.

29. Ae11, photo (SJW).

30. Ae12, photo (SJW).



31. Ae13, photo (SJW).

6. *cf.* Weber 2006: pl. 25, 26; *cf.* also pl. 15 (winged sphinx). I have observed an almost complete, life-size sculpture of Nike/Victoria with identical wings exhibited in the garden of the Archaeological Museum of Sanliurfa (Tūrkiye), in May 2011. A photograph is online now, but the wings are not visible well: https://commons.wikimedia.org/wiki/Category:%C5%9Eanl%C4%B1urfa_Museum_Roman_Period_Hall?uselang=de#/media/File:%C5%9Eanl%C4%B1urfa_M%C3%BCzesi_Roma_D%C3%B6nemi_zafer_tanr%C4%B1%C3%A7as%C4%B1_heykeli.jpg (last view: 31/05/2020).
7. More decorated lintels were observed in Ḥakama and Al Mughayr.
8. More sarcophagi were observed in Kharjah, Ḥakamā and Al Mughayr.

Description

Two badly preserved (lion?) faces on one longitudinal side, and two protruding discs on the opposite side. Another sarcophagus from Marw, with a short inscription (MOY) next to the relief portrait of the deceased, was published by Mittmann 1970: 169, Tf. IX, Abb. 17.

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32. Ae14, photo (SJW).

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THE 2018 SEASON OF EXCAVATION AT MIDDLE BRONZE AGE ‘AYN QUSAYBAH

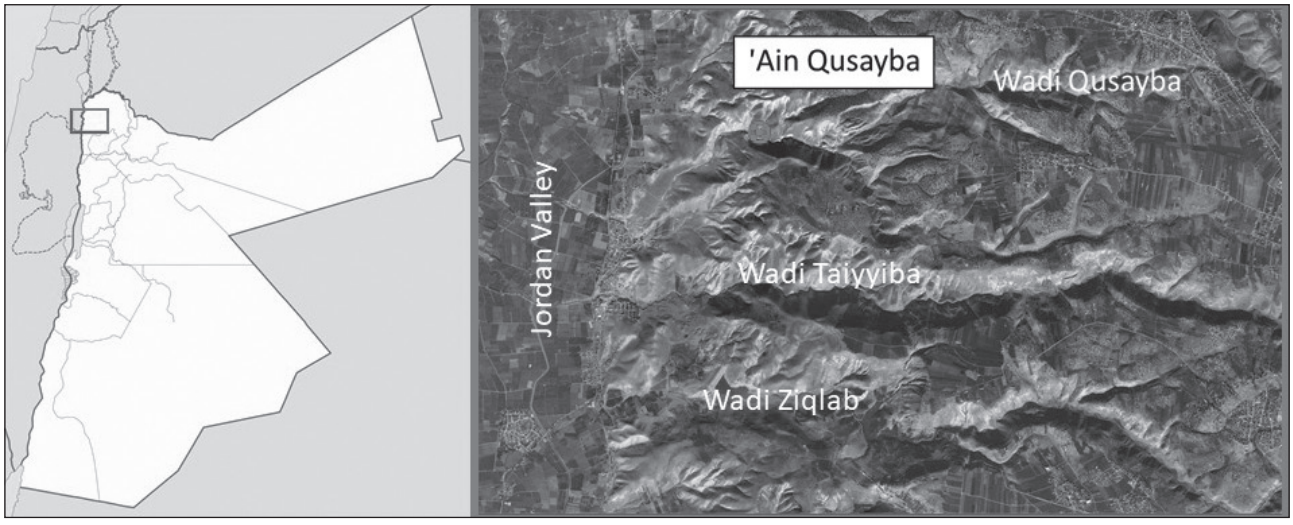
S. Edwards, N. Handziuk, S. Klassen and E.B. Banning

Introduction and Background

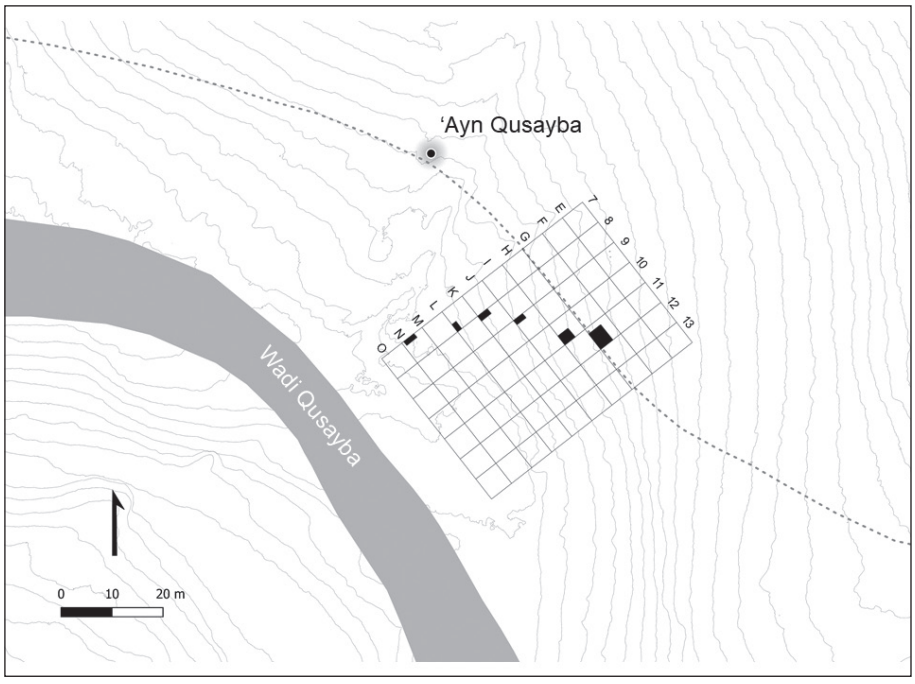
‘Ayn Qusaybah (WQ 120) is a small, unmounded site on the north bank of Wādī Qusaybah, in northern Jordan. Situated roughly 14km north-northeast of Pella/Tabaqat Fahl (**Fig. 1**), ‘Ayn Qusaybah lies 1km east of the mouth of the Wādī Qusaybah and the floor of the Jordan Valley, at an elevation around 100m below sea level. The site takes its name from a nearby spring, situated immediately to its west, and appears to extend along the slope about 120m from northwest to southeast (**Fig. 2**).

In 2012, the University of Toronto’s Wādī Ziqlāb Laboratory, directed by E.B. Banning, first detected ‘Ayn Qusaybah during an archaeological survey of Wādī Qusaybah and its catchment basin (Hitchings *et al.* 2016). Remains of stone walls were visible at the surface along a pedestrian path that traverses the site on a route from the Jordan Valley to the Mandah plateau (**Fig. 3**). A 1×1m probe, excavated next to one of these walls, exposed several wall courses. The ceramics collected during this small operation dated from the Middle Bronze (MB) Age through Roman periods.

Excavations at ‘Ayn Qusaybah resumed in August 2014 as part of a one-week, targeted operation to clarify the occupational history of the site (Banning *et al.* 2015). Several 1×2m units that were excavated downslope from the pedestrian path yielded little cultural material (**Fig. 2**). Further upslope, however, Area G11 yielded considerable architectural remains (**Fig. 4**), including stone walls preserved more than 1m in height and a door socket *in situ* in the southwest corner of a partially excavated room (**Fig. 5**). Although the horizontal exposure in G11 was limited to 3×4m, the results suggested that ‘Ayn Qusaybah was a substantial site with



1. Location of Wādī Qusaybah and ‘Ayn Qusaybah (WQ 120) in northern Jordan (basemap source: Google Earth).



2. Part of the excavation grid at 'Ayn Qus̲aybah, showing the location of units opened in 2014.

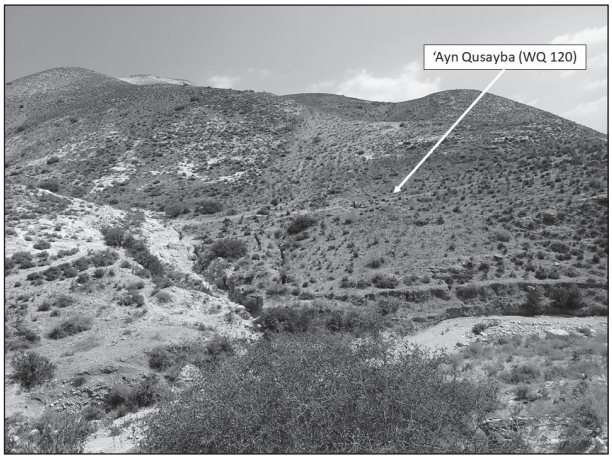
relatively good architectural preservation.

West of G11, excavations in Area H10 exposed several smaller, poorly preserved stone walls associated with two nearly complete, straight-sided cooking pots (**Fig. 6**). Combined with the finds on a surface in Area G11, the assemblage points to a Middle Bronze Age date for 'Ayn Qus̲aybah. However, the limited horizontal exposure of the architecture made it impossible to establish any coherent building plan. Moreover, the intervening pedestrian path prevented stratigraphic connection between Areas G11 and H10 (**Fig. 7**), making it unclear whether the MB remains in those units belonged to a single occupation in the early second millennium BC.

Research Goals

The research objectives of the 2018 season were to refine the occupational history of the site by connecting the excavations in Areas G11 and H10, and to delineate the plan of the previously exposed architecture by expanding to adjacent areas. To meet these objectives, four weeks of excavation focused on a 10×10m area that incorporated four distinct 5×5m units (**Fig. 8**). Area G11 would make up the northwestern sector of this area, with Area G12 to the northeast, Area H12 to the southeast, and finally Area H11 to the southwest. Area H11 ran adjacent to both Areas H10 and G11, making it a focal point of the excavation as it connected the previously opened units.

During the 2014 season, hand-held tablets were used to record excavation data as part of a paperless initiative first implemented during the 2012 survey of Wādī Qus̲aybah. For practical reasons, this system was not retained in the 2018 season except for recording photography, and paper forms were reintroduced for the stratigraphic and sedimentary descriptions. Digital recording of data continued to be applied as part of the excavation and documentation strategy, especially digital photogrammetry to generate 3D models and top plans of the exposed architectural remains. Overhead photos of



3. View of 'Ayn Qus̲aybah from the south bank of Wādī Qus̲aybah, looking northeast. Walls are visible at the surface where the footpath cuts through the site.

units, rectified in QGIS using multiple ground control points (GCPs), allowed digital mapping of architectural features in the laboratory rather than in the field.

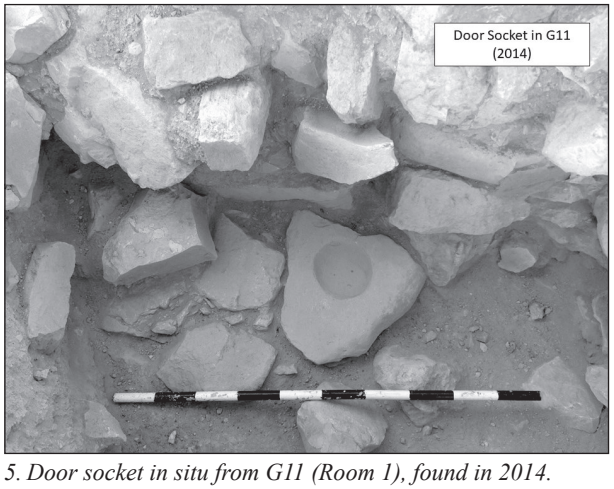
Results of the 2018 Season

Four weeks of excavation at ‘Ayn Qusaybah revealed parts of a sprawling domestic complex and evidence for three distinct Middle Bronze Age occupational phases. Architectural remains extended over all four 5×5m units, and appear to belong to several distinct buildings (**Fig. 9**). None of these structures have been fully delineated, as the horizontal exposure of this area remains limited.

Rooms 1 and 2

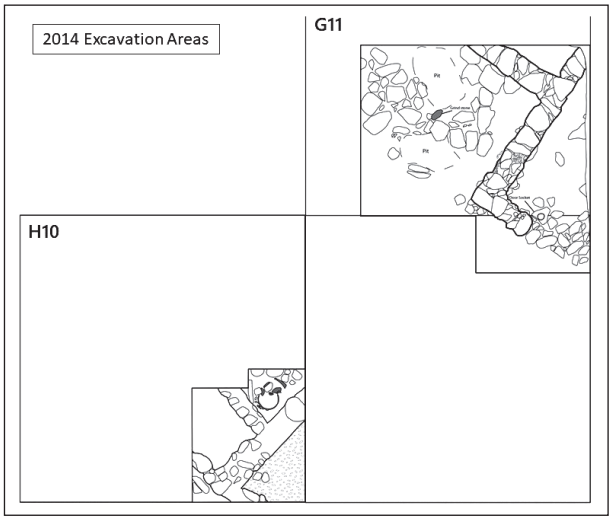
The western corner of Room 1 (R1) was partially exposed during the 2012 campaign in a probe along the southeast corner of what is now designated Area G11. Excavations in the western corner of R1 went down to a surface marked by a beaten-earth layer and door socket next to a blocked doorway (D100). Wall 100 (W100) forms the western side of R1. This wall was exposed along the north of Area H11, and

4. Overhead view of architectural remains uncovered in G11 during the 2014 season.

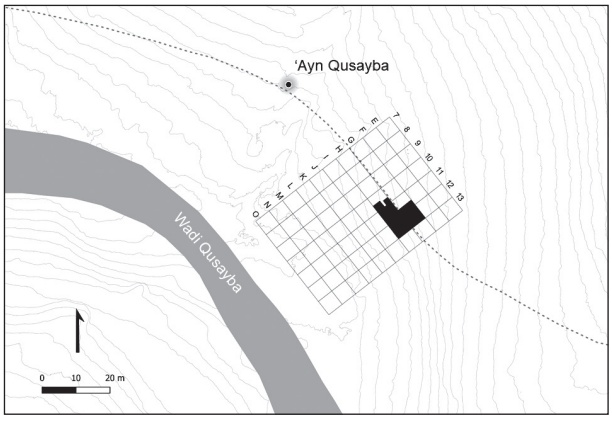


5. Door socket in situ from G11 (Room 1), found in 2014.

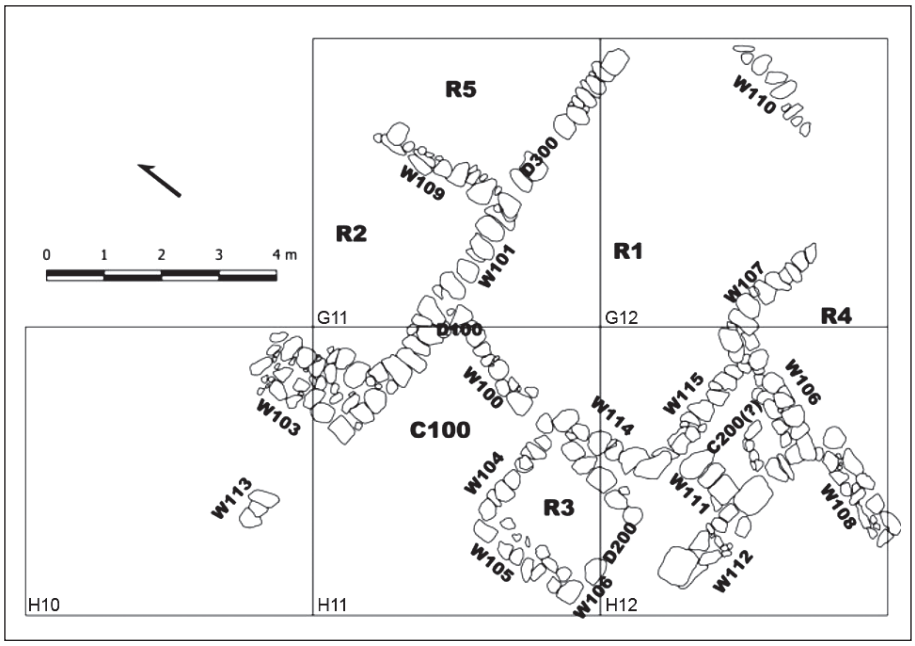
6. Straight-sided cooking pot in situ from H10, found in 2014.



7. Plan of Middle Bronze Age architectural remains from G11 and H10, excavated in 2014.



8. Part of the excavation grid at ‘Ayn Qusaybah, showing the location of units opened in 2018.



9. Middle Bronze Age architectural remains at 'Ayn Qusaybah.

continued south into Area H12 where it bonds with Wall 102 (W102). The northern boundary of R1 is marked by Wall 101 (W101), which extends southwestward beyond R1 into the northwestern half of Area H11. W101 forms a corner with Wall 103 (W103), which follows a north-south orientation. W103 was only partially exposed in the northwest corner of Area H11 and northeast corner of H10 during the 2018 field season. The corner formed by W101 and W103 marks the southwestern extent of Room 2 (R2), located north of R1. It is unclear whether R2 belongs to the same building as R1.

Wall 114 (W114) appears to have an orientation similar to that of W100, although it may belong to an earlier architectural phase, as it forms a corner with Wall 115 (W115) which appears to run under Wall 106 (W106) in the northeastern corner of H12 (**Fig. 10**). It is unclear if the room formed by W114 and W115 is contemporary with R1.

Excavation in the northeast corner of G11 exposed the eastern continuation of W101 into that part of the unit. This wall continues further east into Area F11, which was not excavated. We anticipated that a north-south wall, marking the eastern boundary of R1, would be found somewhere near the northeast corner of G11, but this was not the case. There was a small doorway (D300) in W101 that provided access to R1 from Room 5 (R5) in the northeastern part of Area G11. R5 remains poorly defined, except for its western boundary which is marked by the north-south Wall 109 (W109).

Near the end of the season, excavations in

10. Partially excavated Wall 115 and the overlying Wall 106.

11. Northwest corner of Room 3, looking south.

the northeast corner of Area G12 may have exposed parts of another north-south wall (Wall 110 [W110]) that could have been the eastern boundary of R1. If this is the case, R1 would be a considerably large, rectangular room within a sprawling complex. More excavations are needed in Area G12, as only topsoil was removed in most of the unit. The extensive wall tumble in Area G12 makes it difficult to delineate stone walls in this area.

Room 3

Room 3 (R3) occupies the eastern half of Area H11 and western half of H12 (**Fig. 11**). We fully delineated the plan of R3 in 2018. Wall 104 (W104) marks the northern extent of the room, while the western boundary consists of Wall 105 (W105). W106 is a small wall in the southwest corner of R3. A doorway (D200) which occurs in the southern part of R3, whose eastern side is formed by W100, is poorly preserved in this area.

Excavations in this room focused on a 1×1m probe in its southwest corner, exposing a thick layer of wall tumble and loosely packed soil over a hard plaster concentration along the north face of W105. Further work is necessary to infer the function of this small room, which was only partially excavated. Pottery collected in this probe included some probable Early Bronze Age sherds alongside later, Middle Bronze Age material.

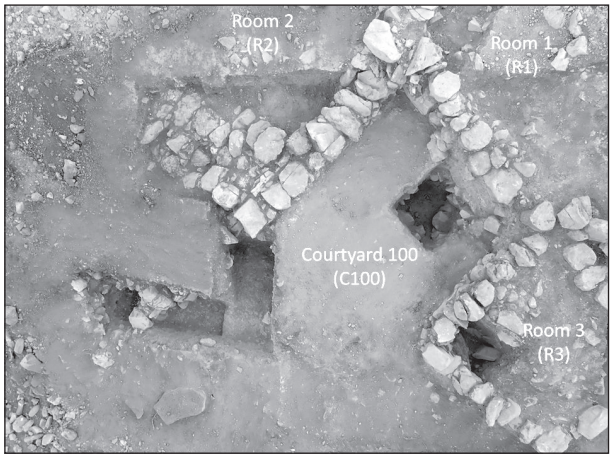
Courtyard 100

West of W100, excavations in H11 revealed an apparently exterior space or courtyard (C100). This area contained significant wall tumble, presumably originating from the surrounding architecture (**Fig. 12**). A probable surface at about 40cm depth was uncovered with a cluster of smashed sherds to the southwest. The wall tumble appears to have badly damaged this surface, as it is uneven and marked by large divots caused by the falling stones.

On top of the surface, in the northeastern corner of C100, was a large, flat stone, 0.80m in length, that may be the fallen lintel from the D100 doorway, 0.60m in width, to the east (**Fig. 13**). The surface in C100 was associated mainly with Middle Bronze Age ceramics. A 1×1m probe in the northeast corner of C100 explored the foundations of the surrounding architecture, which allowed us to investigate any earlier occupational phases that may have been in the area. This exposed a thick layer of wall tumble above a layer of mudbrick detritus mixed with darker sediment. The limited exposure of this probe made it difficult to articulate any surfaces or other features, but the pottery coming from it continued to date to the Middle Bronze Age.

Room 4

Room 4 (R4) is directly south of R1, bounded by W106 on the west and Wall 107 (W107) to the north. The north-south Wall 108 (W108) may be a southern extension of W106, but this area was not excavated. Excavations in R4 removed a thick layer of wall tumble and other post-occupational debris, revealing what appears to be a hard-packed surface with flat-lying pottery and some mudbrick inclusions.



12. Aerial view of excavation in H10, showing location of Courtyard 100.

13. Excavations in H10 (Courtyard 100), showing the possible lintel stone from Doorway 100.

A basalt grinding-stone fragment was in the southern part of the room. The limited exposure in R4 makes it difficult to assess the room's function, but the presence of the grinding stone suggests a domestic context. Given the different orientations of its surrounding walls, R4 likely belongs to a different structure than the building to which R1, to the west, belongs.

Courtyard 200

Abutting W106 to the south is a semi-circular, stone-lined bin (H12.009) (**Fig. 14**). This installation was filled with loosely packed sediment containing several potsherds, but nothing obviously organic. Samples of the sediment were collected for further analysis. The bin may have been an exterior installation on the outside of the building that included R4, but this remains to be determined. The bin abutted Wall 112 (W112) on the east, suggesting that it belongs to the latest architectural phase of the site. The area with the bin may have been a room, but the apparent lack of any walls to the west makes it more likely that it was an exterior courtyard (C200).

In the southeast corner of Area H12, a hard-packed, beaten-earth layer with patches of hard plaster (**Fig. 15**) appears to have been a surface dating to the latest phase of occupation at the site. It is associated with Wall 111 (W111) and W112, which were mostly preserved to a single course, and may have been on top of this hard-packed layer. In some areas, wall stones were removed, exposing a hard-packed layer beneath. If this interpretation is correct, then W111 and W112 probably represent an architectural phase post-dating most of the rooms and other features described above. There was little pottery on this surface, which may have been swept clean in antiquity.

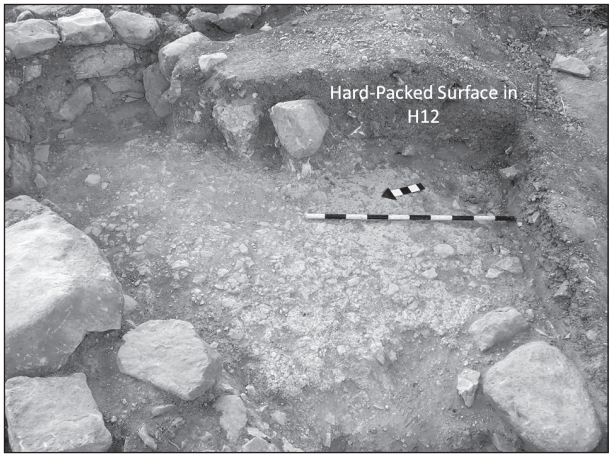
Stratigraphy and Preliminary Phasing

The results of the 2018 season at 'Ayn Qusaybah permit a preliminary reconstruction of the occupational history of the site. To date, we can identify at least three MB phases on the basis of stratigraphic relationships among architectural features (**Fig. 16**), numbered from the most recent downward. The following sketch of the occupational history of the site is preliminary, and further analysis of both the architectural remains and associated ceramics will further refine this sequence. Radiometric dating of select *loci* may also augment this reconstruction.

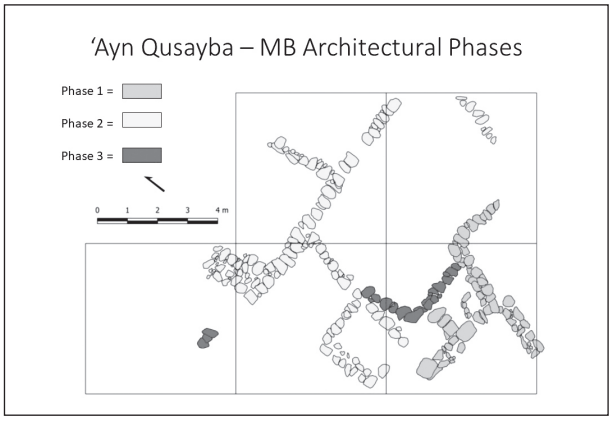
Phase 1

Phase 1 includes R4 in the northeast corner of H12, but also the abutting architecture

14. Stone-bin installation from H12.



15. Hard-packed surface from H12.



16. Phasing of Middle Bronze Age architectural remains at 'Ayn Qusaybah.

including W111 and W112. Also included in this phase is the hard-packed surface with plaster inclusions that probably represents the terminal use of the site in the Middle Bronze Age. Pottery collected from R4 is similar in style to Phase 2 material, suggesting that Phase 1 also dates to the MBIIB-C, but represents a rebuilding or repurposing of the earlier Phase 2 buildings. Further analysis of the pottery will likely reveal a more nuanced understanding of the differences between Phases 1 and 2. Currently, the best indicator of Phase 1’s later date is the construction of W106 on top of W115 of Phase 3. Further, the construction of W111 and W112, characterized by larger boulders and chink stones, is quite different from that of the earlier Phase 2 and 3 walls.

Phase 2

Phase 2 comprises R1, R2, R3 and C100. These features appear to represent a major occupation consisting of at least one, but probably two buildings, including exterior spaces. Finds from R2 include several small fragments of straight-sided cooking pots typical of Phase 3 material. However, the assemblage is dominated, for the most part, by cooking pots with out-turned rims more reminiscent of the later MBIIB-C periods. This suggests that Phase 2 represents a slightly later Middle Bronze Age occupation at ‘Ayn Qusaybah, with significant architectural remains.

Phase 3

Phase 3 is represented by Wall 113 (W113) and associated sediment layers first exposed in 2014. The poorly constructed wall was founded at a lower elevation than W101 to its northwest. W114 and W115 have been tentatively assigned to this earliest phase. W115 runs under W106, suggesting that it was constructed earlier. The stratigraphic relationship between W114 and W100 remains ambiguous, as only the south-western corner of R1 has been excavated so far. Future work may shed light on the relationship between these two walls and establish their precise phasing. Pottery collected in H10 in 2014 and 2018 confirm an early Middle Bronze Age occupation, owing particularly to the presence of two well-preserved, flat-bottomed cooking pots that correspond mainly to the MBIIA.

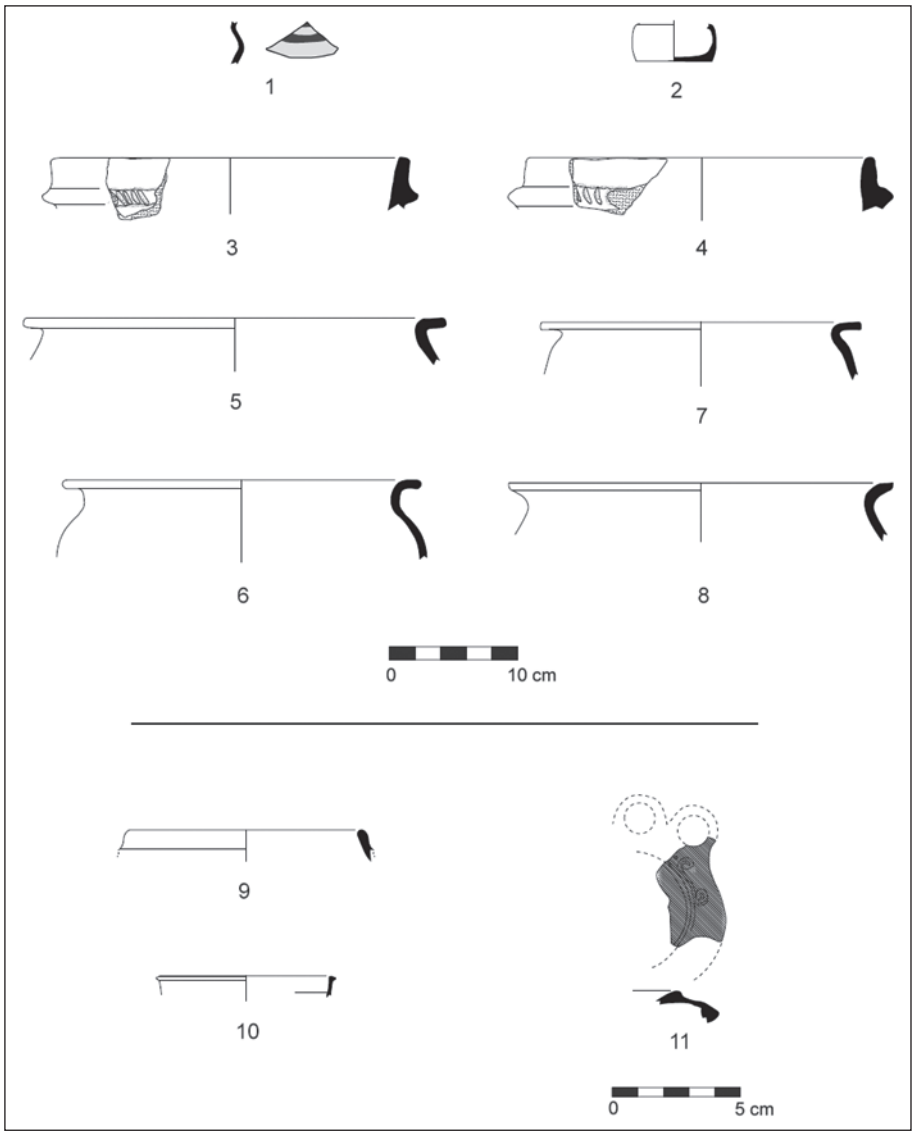
Middle Bronze Age Pottery from ‘Ayn Qusaybah

Several Early Bronze Age sherds were recovered in R3, in the southeast corner of H11 (**Fig. 17: 1-2**), including one with band slip decoration common to the region and suggesting an EBIB date (Banning *et al.* 2015: 3, 5, Fig. 5: 1-3, Fig. 6: 1). These may signify an Early Bronze Age phase at the site that our excavations have yet to penetrate. The overall context of these sherds appears to be the Phase 2 structures belonging to the MBIIB-C. They appear to be residual, but further work will be necessary to assess their significance.

The bulk of the pottery recovered at ‘Ayn Qusaybah points to a significant Middle Bronze Age occupation at the site. Most of the Middle Bronze Age pottery collected in 2018 constitutes a relatively common household or utilitarian assemblage. Several globular or closed carinated bowls were recovered (**Fig. 17: 3-5**), as well as bowls with simple or everted rims (**Fig. 17: 6-7**) and several distinct types of jars (**Fig. 17: 8-12**).

Missing from the ‘Ayn Qusaybah assemblage are clear examples of the specialist-produced Chocolate-on-White Wares (including White Wares) and Tall al-Yahudiyah Ware attested at Middle Bronze II sites in the central Jordan Valley and neighbouring regions (Maeir 2007, 2010). The ‘Ayn Qusaybah pottery appears to constitute a more utilitarian assemblage with mostly plain, local wares. Only one Middle Bronze Age sherd is confirmed as being painted. Its brown paint on a cream slip is typical of late Middle Bronze Age pottery (**Fig. 18: 1**), and preliminary analysis suggests it to be part of the monochrome decorated tradition based on criteria established by Fischer (1999). Given the likely agrarian nature of the site and its relatively secluded location in Wādī Qusaybah, a tendency toward utilitarian forms is not surprising. Further comparisons between the assemblages of ‘Ayn Qusaybah and contemporaneous sites in the central Jordan Valley, especially Tall al-Hayyāt (Falconer and Fall 2006), will be necessary.

The most diagnostic material collected in 2018 includes fragments of hand-made, straight-sided cooking pots with appliqué below the rim (**Fig. 18: 3-4**), as well as several other types



17. Representative pottery from 'Ayn Qusaybah. Early Bronze I (1-2); Middle Bronze Age bowls (3-7); storage jars (8-12).

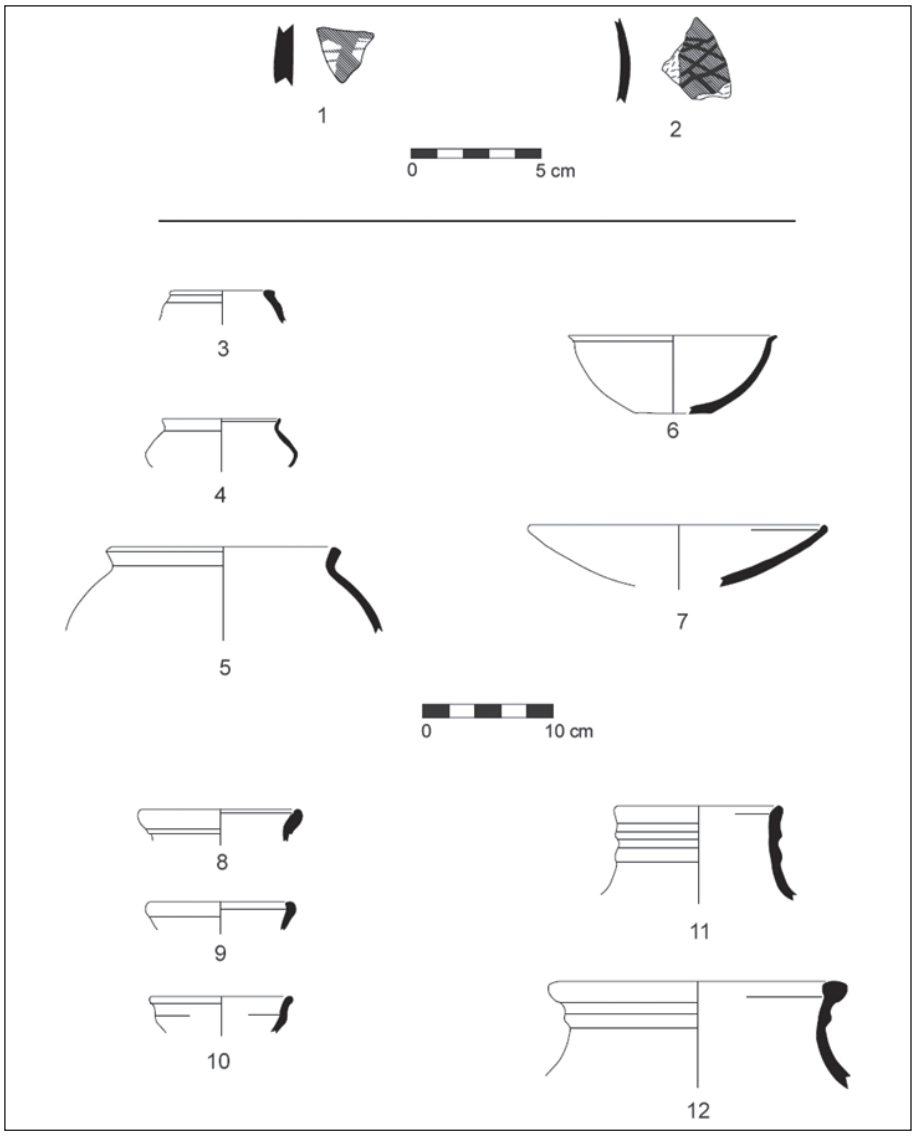
of cooking pots with out-turned rims (**Fig. 18: 5-8**). These latter forms are more prominent in later Middle Bronze Age phases, and appear to continue into Late Bronze Age I (Fischer 2006: 113, Fig. 118: 2-3; 174, Fig. 205: 2-3) suggesting that 'Ayn Qusaybah was occupied for several centuries around the beginning to the middle of the second millennium BC.

Examples of straight-sided cooking pots that were recovered during the 2014 field season (**Fig. 19**) compare favourably with those found in Middle Bronze IIA levels at Tall al-Hayyāt (*cf.* Falconer and Fall 2006: 54, Fig. 4.7: a-f, h-l), Pella (Bourke *et al.* 2006: 18, Fig. 12-13) and sites further afield, such as Aphek (Kochavi *et al.* 2000: 119, Fig. 8.10: 10), Jericho (Kenyon and Holland 1982: 370, Fig. 144), Tall Zeror (Kochavi *et al.* 1979: 158, Fig. 18: 14) and Tall Al Mutasallim (Megiddo) (Loud 1948: Pl. 7:10). This suggests that occupation at 'Ayn Qusaybah dates at least to Middle Bronze IIA. In contrast, the pottery collected in 2018 mainly reflects a Middle Bronze IIB-C date, indicating that the site was occupied for an extended period in the first half of the second millennium BC.

Small quantities of Iron Age II (**Fig. 18:9**) and Roman pottery (**Fig. 18: 10-11**) were collected during the 2018 season, all from near-surface contexts.

Other Finds

Small finds from the 2018 excavations were limited to two basalt grinding-stone fragments, a chert pounder, a ceramic jar stopper, and a large drain fragment. Faunal remains were rare, limited to a few specimens of sheep or goat.



18. Representative pottery from ‘Ayn Qusaybah. Middle Bronze Age painted ware (1) and cylindrical juglet (2); straight-sided cooking pots (3-4); cooking pots with out-turned rims (5-8). Later material dates to the Iron Age II (9) and Roman periods (10-11).

Future Work

Future excavations at ‘Ayn Qusaybah will continue to focus on refining the occupational history of the site. The presence of Early Bronze sherds suggests that occupation extends to at least the late fourth millennium BC, but we have yet to encounter architectural remains of this period. Further work will continue to investigate the MB phases at the site, which appear to indicate a relatively long occupation from the MBIIA to the end of the Middle Bronze Age.

Greater horizontal exposure is necessary to articulate more complete plans of the buildings. At present, the exposed walls are too fragmentary to infer any specific functions for the structures. On the other hand, the meagre small finds do suggest that these were mostly domestic units.

Future work at the site will emphasize not only the occupational history of ‘Ayn Qusaybah, but also its role in the regional economy during the Middle Bronze Age. The relationship between rural sites like ‘Ayn Qusaybah and such nearby centers as Pella and Tall Abu al-Kharaz remains

19. Straight-sided cooking pots with appliqué below the rim.

unclear, but we hope that future excavations will provide new insights into how these larger centers exploited the rugged tributary valleys east of the Jordan Valley over the *longue durée*.

On the whole, ʻAyn Qus̲aybah presents an interesting opportunity to explore a rural MB settlement that is not a *tall*, and that occupies the boundary between the Jordan Valley and the highland plateau to its east. Such sites tend to be overlooked in favour of the more prominent mounds found in the adjacent valley.

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FAUNAL REMAINS FROM EARLY BRONZE AGE AL LĀHŪN (JORDAN) AND A COMPARISON WITH CONTEMPORANEOUS ASSEMBLAGES IN THE SOUTHERN LEVANT

Eva Kaptijn, Mircea UdrescuWim and Van Neer

Introduction

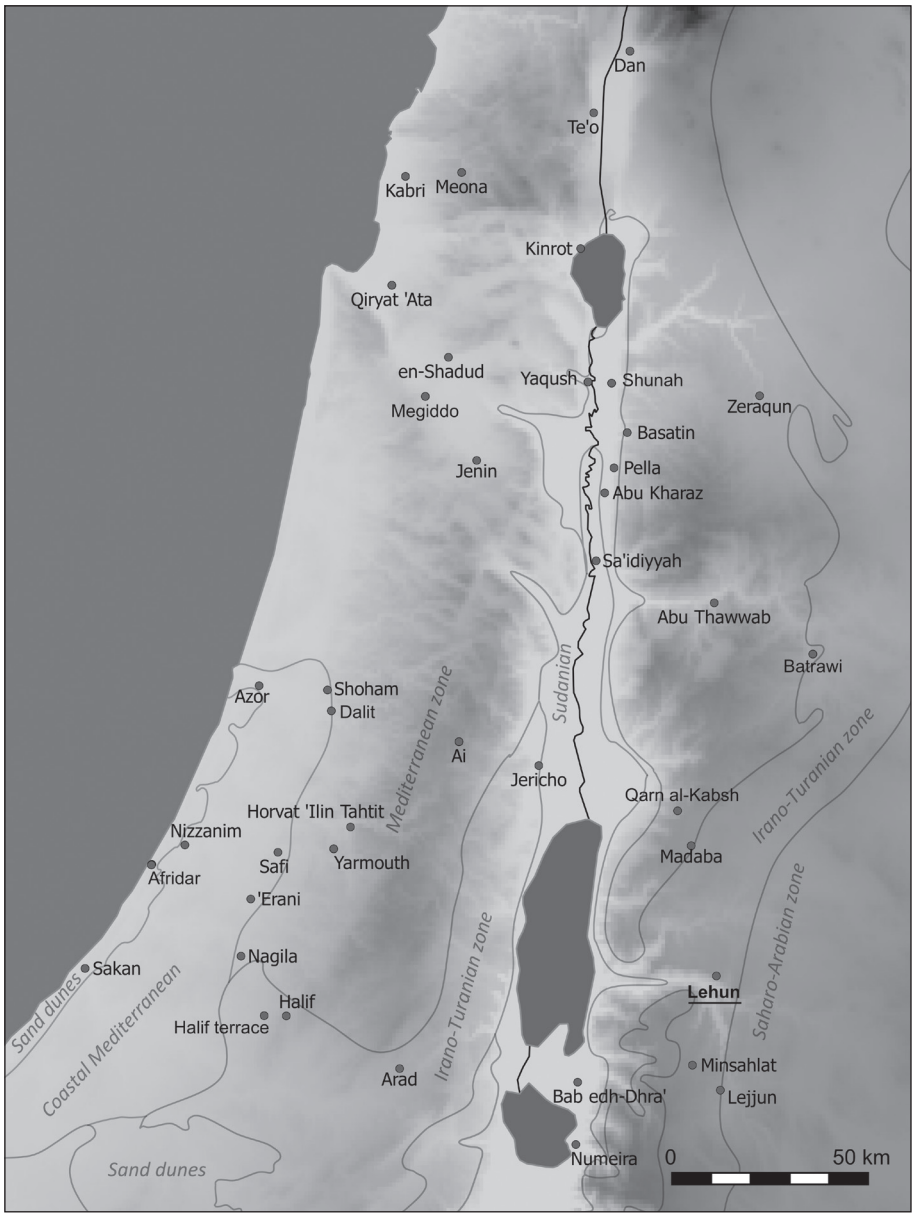
The archaeological site of Al Lāhūn (اللاهون) (Jordan) is located along the King's Highway, a biblical and touristic route connecting 'Ammān (عمّان) (105km north of Al Lāhūn) with Petra (البترا) (155km south) and Al 'Aqabah (العقبة) (285km south) (**Fig. 1**). The site is located at an altitude of 719-748m above sea level on the northern edge of Wādī al-Mūjib (وادي الموجب), which provides it with magnificent views over the 400m-deep and 5km-wide canyon.

Excavations at Al Lāhūn have been conducted by the Belgian Committee of Excavations in Jordan, in close cooperation with the Department of Antiquities of Jordan, under the direction of Denyse Homès-Fredericq (Royal Museums of Art and History [1978-2000]) and Paul Naster (Katholieke Universiteit Leuven [1978-1984]) (Homès-Fredericq 1997). Al Lāhūn is a multi-period archaeological site that sprawls over a large area of around 36ha. Remains of the major periods of occupation are found mostly at distinct locations, although a certain degree of overlap occurs (**Fig. 2**). While Early Bronze Age (EBA) (sector C1, B3) and Late Bronze/Iron Age settlements (sector D) are located on the edge of Wādī al-Mūjib overlooking the canyon, Nabatean (sectors B1+2), Late Roman/Early Byzantine (sector C2), Byzantine (sectors B1+2) and Mamluk (sectors A1+2) remains are mostly found away from the cliff, along the sides of Wādī Al Lāhūn.

The faunal assemblage discussed here was retrieved during the 2000 season and stems from the EBA settlement in sector C1, an area that was excavated between 1998 and 2000. Pottery discovered in these *strata* positions the settlement chronologically in the EBA Ib-III period (3,350-2,250BC). However, the EBA Ib material forms only a very minor proportion of the total excavated assemblage (Swinnen 2014: 51), which suggests that the assemblage under consideration dates almost completely to the EBA II-III period (3,000-2,250BC). During the EBA II-III Al Lāhūn was surrounded by a large wall, 5-5.5m wide, enclosing an area of *ca* 4.7ha. Although only a small portion of the settlement has been excavated, it is clear that (some of) the houses were arranged along streets and alleys. Interesting is the presence of two natural depressions that were modified to function as large water reservoirs (Swinnen 2014). The presence of mortars, olive presses, pottery and various household artefacts suggests the site was inhabited by people relying on both agriculture and pastoralism for their subsistence.

Material and Methods

As mentioned above, the fauna is derived from contexts that are datable to the EBA II-III and - potentially for a small proportion - EB Ib (*ca* 3,350-3,000BC) periods. The analysis of the archaeological remains in their stratigraphic context allowed for the separation of associated osteological remains into three groups: (1) material that with certainty stems from Early Bronze Age domestic structures; (2) material from Early Bronze Age layers that may to some extent have been mixed with more recent material; (3) material that was certainly mixed and has thus been excluded from the interpretations. All material was retrieved through hand collec-



1. Location of Al Lāhūn and other sites mentioned in the text. The EBA I site of Jāwā, located far to the east, is not indicated.

tion; no sieving was carried out.

The majority of the bone assemblage was identified in the field by the second author during the 2000 excavation season. A small number of bones that could not be readily identified on the spot were shipped to Belgium for additional analysis with the aid of the modern comparative collections then housed at the Royal Museum for Central Africa in Tervuren. Identifications in the field were facilitated by the use of published atlases (Schmid 1972) and, in the case of distinguishing between sheep and goat, the work of Payne (1971, 1985) and Prummel and Frisch (1986). Measurements were taken according to the guidelines of von den Driesch (1976). Estimations of age at death were made using the data of Silver (1976). Traces of human modification, such as cut marks or sawing, were recorded using the categories defined by Lauwerier (1988).

Results

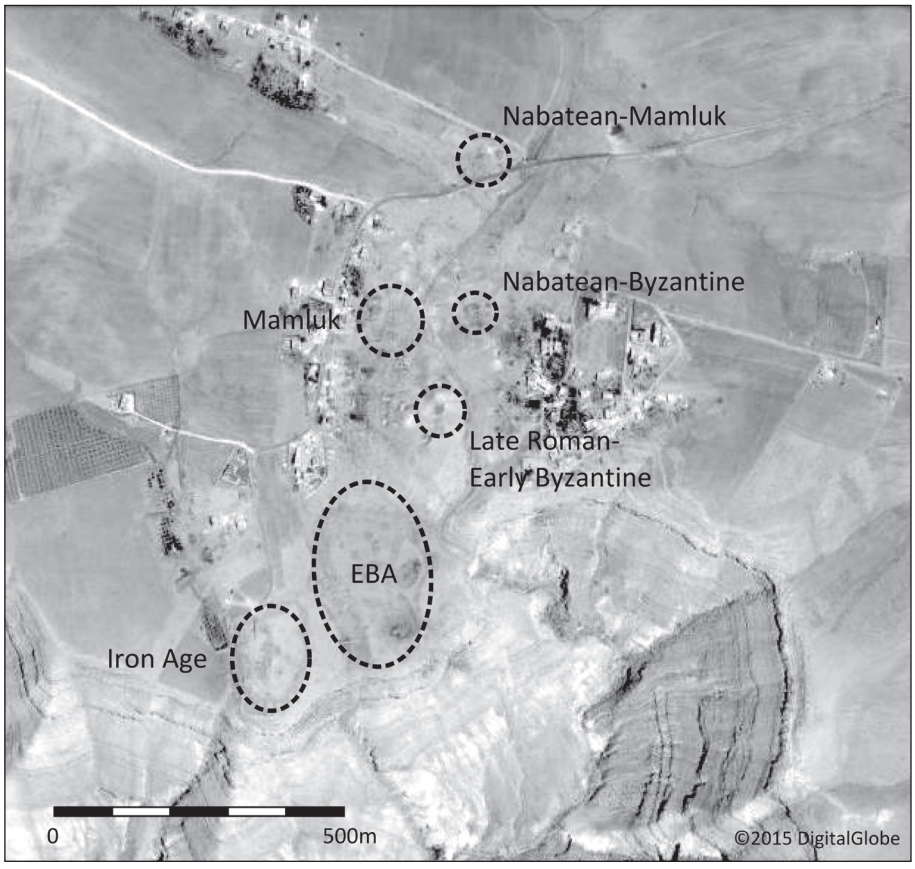
An overview of the studied material is given at **Table 1**. In total 1,342 remains have been analysed of which about half were identifiable. There were only two bird bones, which could not be identified further owing to their fragmentary state. The sole wild species that was recognised among the faunal remains is the mountain gazelle (*Gazella gazella*). A horncore of a male individual was found with the following dimensions (which clearly fall within

Table 1: Species list of the Early Bronze Age (EBA) and mixed levels from Al Lāhūn, expressed as number of identified specimens (NISP).

	EBA	cf. EBA	Total EBA	Mixed
Unidentified birds	2	-	2	-
Mountain gazelle (*Gazella gazella*)	1	2	3	1
Horse (*Equus ferus* f. caballus)	-	-	-	2
Donkey (*Equus africanus* f. asinus)	7	3	10	1
Equid (*Equus* sp.)	3	2	5	4
Pig (*Sus scrofa* f. domestica)	1	1	2	-
Cattle (*Bos primigenius* f. taurus)	8	4	12	11
Sheep (*Ovis ammon* f. aries)	23	9	32	15
Goat (*Capra aegagrus* f. hircus)	22	5	27	17
Sheep/goat	236	91	327	202
Total identified	303	117	420	241
Unidentified medium-sized mammals	252	183	435	195
Unidentified large mammals	21	14	35	16
Total unidentified	273	197	470	211

the size range of this species [*cf.* Tchernov *et al.* 1987: fig. 3]): greatest oral-aboral diameter at horncore base (29.7mm); least latero-medial diameter at base (20.1mm); index of maximum and minimum diameter × 100 (68.7). A distal humerus fragment and a phalanx can also be attributed to this species. On the distal part of the humerus a defleshing mark was noted (code 17 [Lauwerier 1988]).

Among the equid remains, two bones from the mixed layer pertain to horse judging from their large size. Ten smaller bones, all from Early Bronze Age levels, can confidently be identified as donkey (**Table 2**). It's likely that the five additional bones labelled as *Equus* sp. also belong to donkey. Worth mentioning is a scapula fragment of a donkey that shows numerous small incisions at the lateral side of



2. Map of the site of Al Lāhūn with the location of settlement traces from different periods.

its distal part (type 28 [Lauwerier 1988]) which may be related to the cutting of muscles at the level of the articulation with the humerus (**Fig. 3**).

The only two pig specimens to be found were a distal humerus fragment that was unfused and thus from an animal of less than one year of age (Silver 1975), and a metapodial of an individual that was even younger to judge from the very porous aspect of the bone surface.

The twelve cattle bones in the studied assemblage belong mainly to adult animals, but young individuals are also attested by two first phalanges that were unfused proximally (fusion age 18 months [*cf.* Silver 1975]). The vertical ramus of two mandibles was cut in a similar way (code 14 [Lauwerier 1988]), suggesting that there was a certain standardization in the processing of large cattle carcasses. One of the phalanges of the aforementioned young animals may have been a pendant: near the distal articulation it has a perforation of ~6mm in diameter (**Fig. 4**).

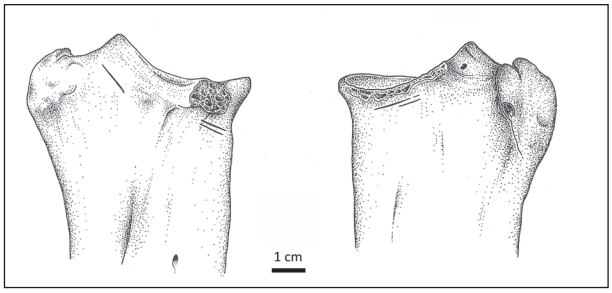
The majority of the faunal remains (92% of identified bones) belong to sheep and goat, and it appears that all skeletal elements are represented (**Table 3**). Around 60 elements allowed for a distinction to be made between the two species, which occurred in more or less equal proportions. The measurements of the best-preserved bones are given at **Table 4**. They show that both goats and sheep were medium-sized animals. Five of the six horncores could be identified, and all pertain to goats of 'aegagrus' type. Only a limited number of mandibles were available, making it impossible

Table 2: Measurements (mm) of the best-preserved donkey remains from the Early Bronze Age levels.

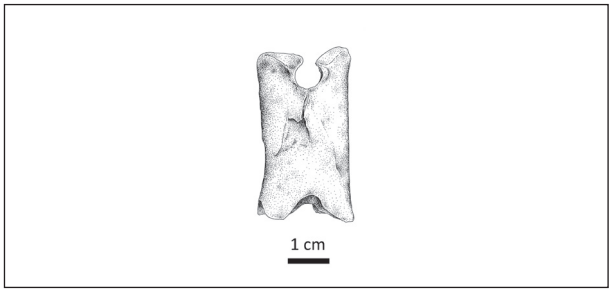
Scapula	
GLP	68.0
LG	43.0
BG	35.0
Astragalus	
GLl	45.8
GB	47.7
BFd	38.8
LmT	45.5
Calcaneum	
GL	84.3
GB	40.5

Table 3: Ovicaprid skeletal elements.

	EBA	**EBA possibly mixed**	**T O T A L**	
	NR	NR	NR	%
Skull	9	1	10	2.6
Horncore	6	-	6	1.6
Mandible	18	6	24	6.2
Isolated tooth	43	7	50	12.9
Vertebra	27	8	35	9.1
Rib	62	18	80	20.7
Scapula	16	9	25	6.5
Humerus	9	8	17	4.4
Radius	14	10	24	6.2
Ulna	5	1	6	1.6
Metacarpus	7	7	14	3.6
Pelvis	13	3	16	4.1
Femur	5	1	6	1.6
Patella	2	-	2	0.5
Tibia	11	9	20	5.2
Metatarsus	11	3	14	3.6
Metapodium	4	3	7	1.8
Astragalus	4	-	4	1.0
Calcaneum	3	3	6	1.6
Other tarsal	-	1	1	0.3
Phalanx 1	11	5	16	4.1
Phalanx 2	1	2	3	0.8
Total	281	105	386	100.0

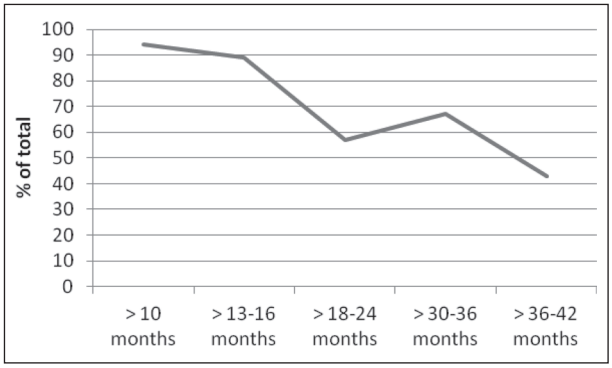


3. Donkey scapula with cut marks near its articulation.



4. Worked first phalanx of a young cattle.

to use mandibular wear stages (Grant 1982) to document slaughtering ages. Aside from two lower jaws with the second molar erupting, *i.e.* animals slaughtered before the end of their first year (Silver 1975), there are only mandibles with complete dentition. These show heavy to very heavy wear, and the same was true for the isolated maxillary teeth that were found. The dental remains thus indicate a majority of older individuals. The fusion state of the long bones (**Table 5**) allows for more precise documentation of slaughtering ages. The cull profile (**Fig. 5**) clearly shows that there was an emphasis on keeping older individuals and that herds were kept mainly for secondary products (*e.g.* milk; wool; hair; manure). Most sheep and goats were slaughtered for their meat when they were adult. Cut marks were observed in four instances on the distal humerus (type 24 [Lauwerier 1988]) and once on the proximal



5. Survival curve for ovicaprids.

Table 4: Measurements (mm) of the best-preserved sheep (O) and goat (C) remains from the Early Bronze Age levels.

Scapula	**O**	**O**	**O**	**O**	**C**						
GLP	27.4	31.2	32.1	33.8	33.1						
LG	22.4	25.8	24.6	25.4	26.6						
BG	17.4	20.5	20.2	19.8	22.3						
Humerus	O	O	O	C	C						
Bd	32.5	30.5	33.6	31.5	31.3						
BT	30.2	27.7	31.3	29.8	29.1						
Astragalus	O	O	C	C							
GLl	30.5	27.4	26.8	-							
Dl	17.3	15.4	14.8	14.8							
Bd	19.9	18.1	17.0	16.4							
Phalanx 1	O	O	O	O	O	O	O	O	C	C	C
GLpe	40.5	36.3	32.2	33.6	40.5	35.0	38.5	36.3	44.7	36.0	40.5
Bp	13.0	11.1	11.9	12.5	11.4	12.2	12.2	12.0	17.0	12.7	15.0
SC	9.4	8.5	9.7	10.8	8.8	9.4	9.6	9.2	13.8	10.7	11.9
Bd	11.4	10.0	10.8	11.6	10.8	11.8	12.0	10.4	17.5	-	14.4

Table 5: Fusion state of ovicaprid long bones.

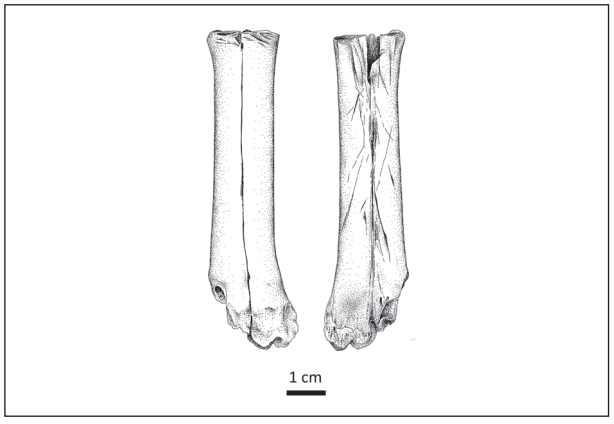
Fusing time	**Element**	**not fused**	**fused**	**% fused**
10 months	Distal humerus	-	10	
	Proximal radius	1	7	94%
13-16 months	Proximal phalanx	2	17	89%
18-24 months	Distal metacarpus	2	4	
	Distal tibia	1	4	
	Distal metatarsus	3	-	57%
30-36 months	Proximal femur	-	1	
	Proximal calcaneum	-	5	
	Radius	3		67%
36-42 months	Proximal humerus	1		
	Distal femur	2	1	
	Proximal tibia	1	2	43%

radius (type 13 [Lauwerier 1988]), indicating a separation at this articulation. Two astragali and a naviculocuboid show cut marks that are indicative of a severing of the foot at the articulation of the distal tibia and tarsal bones. Pathologies observed among the sheep and goat remains include a healed fracture of a rib and a mandible showing the results of a heavy periostitic reaction on its vestibular side, at the level of the third and fourth premolars. It seems that the latter deformation is due to the abnormal, oblique position that the P3 had taken with respect to the P4 which was in the usual position. Several unfinished bone objects were recovered, indicating that ovicaprid bone was used as a raw material. A proximal part of a goat metacarpal was found which was in the process of being transversely sectioned (**Fig. 6**). It also shows numerous fine, parallel traces at the level of the sulcus longitudinalis dorsalis, indicating that the craftsperson had started sectioning the shaft longitudinally. In addition to this unfinished object, three bone pins were found. These were in different stages of finishing and may have been made from ovicaprid long bone, possibly metapodials as suggested by the other piece mentioned.

The investigated skeletal material also included the remains of an immature human individual that, judging from the long bone measurements, was a newborn of 0-28 days' age (Fazekas and Koza 1978).

Discussion and Conclusion

The faunal assemblage excavated at Al Lāhūn has been compared with that of contemporaneous settlement sites in the wider region. In total, we compiled the faunal data from 43 sites for a total of 64 contexts (**Table 6**). The bone assemblages differ greatly in terms of the quantity of identified remains, which ranges from 17 to 9,198. In general, faunal assemblages are rather small, as is also the case for Al Lāhūn (n=420). There are 25 contexts with less than 200 identified specimens, 20 assemblages with 200-500 bones, 11 contexts with 501-1,000 specimens and only eight with more than 1,000 identified bones.



6. Metacarpal of goat with preparatory cut marks for the production of a bone object.

Wild Versus Domesticated

Only five out of the 420 identified remains from Al Lāhūn are from wild animals (three mountain gazelle and two birds). For comparative purposes we consider only the wild mammals here, as the proportion of other wild taxa (mainly birds and fish) can vary significantly depending on recovery methods. The low percentage of wild mammals identified at Al Lāhūn (0.7%) is not unusual for the Early Bronze Age southern Levant. All sites in the region show a low proportion of hunted wild mammals compared to domesticated food animals. On average, the faunal assemblages contain *ca* 5% wild species, with values ranging from 0.3% to 12%, and a few higher values for sites with small sample sizes such as Nizzanim (Yekutieli and Gophna 1994) and Dan (Wapnish and Hesse 1991; Yekutieli and Gophna 1994). The most common wild species are gazelle (*Gazella* spp.), followed at some distance by Cervidae (*Cervus elaphus; Dama mesopotamica; Capreolus capreolus*), wild boar (*Sus scrofa*) and aurochs (*Bos primigenius*). While the numbers are always low and hunted mammals constituted only a minor part of the diet, at some sites the proportion of hunted animals seems to increase in the later stages of the Early Bronze Age (EB IV) (Alhaique 2008: 352).

Equids

Equids have been found at most EBA sites. While the presence of domestic donkey is widely accepted for this period, the few reported finds of domestic horse (Tubb and Dorrell 1993: 72; Levy *et al.* 1997: 24; Alhaique 2008) have been questioned (Kansa 2004: 292; Allentuck 2013: 108). It is probably

Table 6: List of sites in the southern Levant that have yielded Early Bronze Age fauna, with indication of the relevant publications. The sites are ordered alphabetically; for each the sub-period is indicated, as is the quantity of faunal remains expressed as number of identified specimens (NISP). Both total NISP and NISP corresponding to the sum of domesticated food animals (ovicaprids; cattle; pig) are indicated.

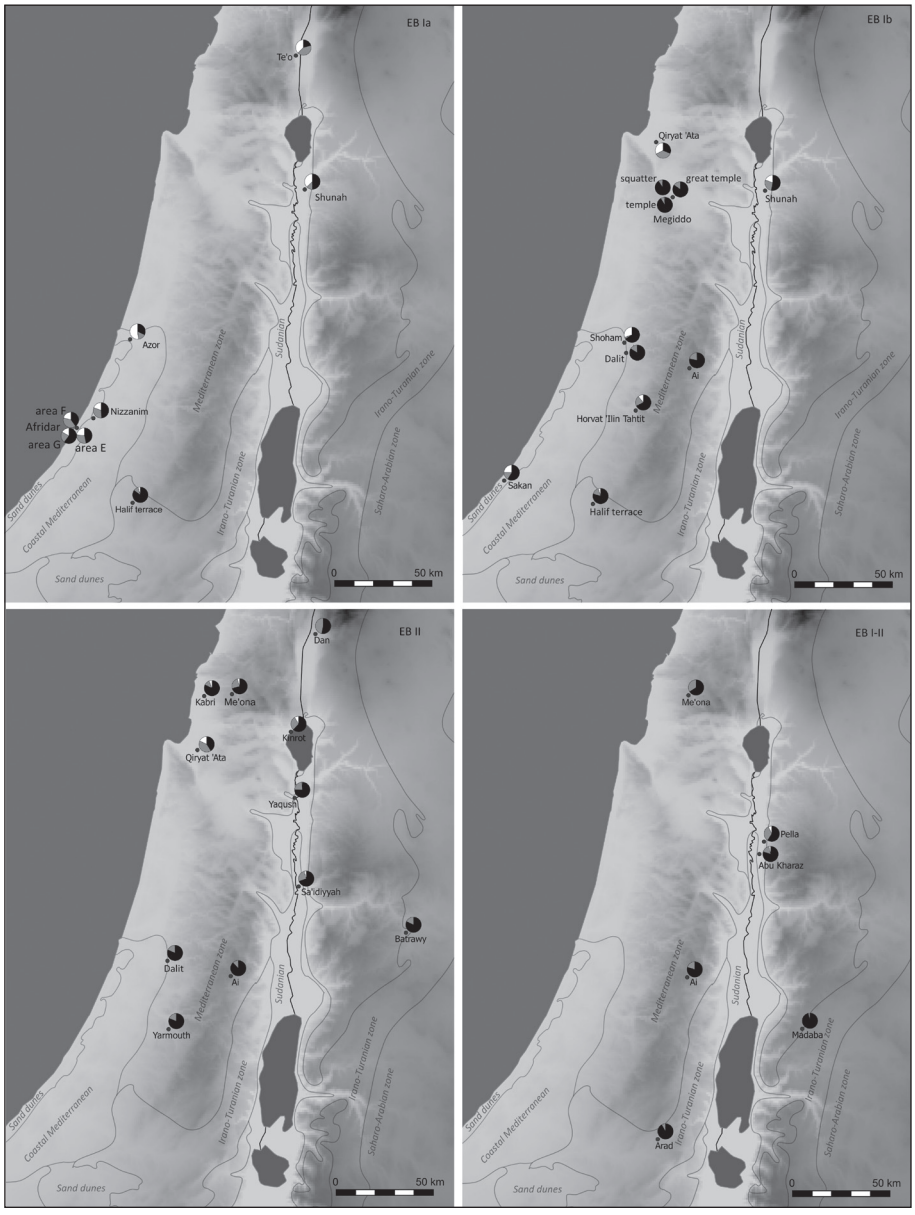
Site	Period	Total NISP	NISP O/C + Bos + Sus	Reference
Abū Al Kharaz	EBI-II	1107	1068	Fischer and Holden 2008
Abū Thawwāb	EB I	47	47	Köhler-Rollefson 2001
Afridar area E	EB Ia	527	346	Kansa 2004
Afridar area F	L Chal/EB Ia	303	227	Kansa 2004
Afridar area G	EB Ia	3277	3091	Kansa 2004
ʻAyy / At Tall	EB Ib	259	251	Hesse and Wapnish 2001
ʻAyy / At Tall	EB Ic-II	143	138	Hesse and Wapnish 2001
ʻAyy / At Tall	EB II	459	452	Hesse and Wapnish 2001
ʻAyy / At Tall	EB III	119	114	Hesse and Wapnish 2001
ʻArad	EB I-II	1784	1729	Kansa 2004
Azor	EB Ia	255	225	Kolska Horwitz 1999
Bāb Adh Dhirāʻ	EB I-III	237	182	Finnegan 1978, 1981
Al Basātīn	EB I	25	24	Gibbs *et al.* 2009
Al Batrāwī	EB II	57	50	Alhaique 2008; Alhaique and Di Fede 2010; Alhaique 2012
Al Batrāwī	EB IIIa	139	115	Alhaique 2008; Alhaique and Di Fede 2010; Alhaique 2012
Al Batrāwī	EB IIIb	499	358	Alhaique 2008; Alhaique and Di Fede 2010; Alhaique 2012
Dalit	EB Ib	228	210	Hellwing and Gophna 1984; Kolska Horwitz *et al.* 1996
Dalit	EB II	816	768	Hellwing and Gophna 1984; Kolska Horwitz *et al.* 1996
Dan	EB II	59	49	Wapnish and Hesse 1991
Dan	EB II-III	85	72	Wapnish and Hesse 1991
Dan	EB III	48	35	Wapnish and Hesse 1991
En Shadud	EB I	96	75	Kansa 2004
Erani	EB IIIb	752	626	Kansa 2004
Halif	EB III	1944	1886	Seger *et al.* 1990; Levy *et al.* 1997
Halif terrace	EB Ia	336	249	Levy *et al.* 1997
Halif terrace	EB Ib	384	331	Levy *et al.* 1997
Horvat ʻIllin Tahtit	EB Ib	1962	1851	Allentuck 2013
Jāwā	EB I	2544	2423	Köhler 1981(not on map, but in text)
Jenin	EB I	776	724	al-Zawahra 1999
Jericho / As Sultan	EB III	410	374	Alhaique 2000
Kabri	EB I	123	123	Kolska Horwitz 2002
Kabri	EB II	17	17	Kolska Horwitz 2002
Kinrot	EB II	340	303	Hellwing 1988-1989
Al Lāhūn	EB II-III	420	400	Udrescu *et al.* this paper
Al Lajjūn	EB II-III	106	98	Chesson *et al.* 2005
Mādabā	EB I-II	439	430	Harrison *et al.* 2000
Megiddo - great temple	EB Ib	576	562	Wapnish and Hesse 2000; Hesse and Wapnish 2001
Megiddo - squatter	EB Ib	308	301	Wapnish and Hesse 2000; Hesse and Wapnish 2001
Megiddo - temple	EB Ib	82	78	Wapnish and Hesse 2000; Hesse and Wapnish 2001
Me'ona	EB I-II	48	44	Kolska Horwitz 1996
Me'ona	EB II	66	61	Kolska Horwitz 1996

Minsahlāt	EB III	557	523	Makarewicz 2005
Nagila	EB III	469	437	Kansa 2004
Nizzanim	EB Ia	93	41	Yekutieli and Gophna 1994
Numayra	EB III	26	22	Finnegan 1978, 1981
Tabaqat Fahl / Pella	EB Ib-II	813	789	Bourke *et al.* 1994
Qarn Al Kabsh	EB I-III	76	73	Savage and Metzger 2002
Qiryat ‘Ata	EB Ib	574	385	Fantalkin and Sadeh 2000; Kolska Horwitz 2013
Qiryat ‘Ata	EB II	759	648	Kolska Horwitz 2013; Maher 2014; Fantalkin and Sadeh 2000
As Sāfī	EB IIIb	1226	1070	Shai *et al.* 2014
As Sa‘īdiyyah	EB II	50	46	Tubb and Dorrell 1993
Sakan	EB Ib	106	102	de Miroschedji *et al.* 2001
Sakan	EB IIIa	401	398	de Miroschedji *et al.* 2001
Sakan	EB IIIb	200	199	de Miroschedji *et al.* 2001
Shoham	EB Ib	179	109	Kolska Horwitz 2007
Ash SHūnah	EB Ia	223	223	Baird and Philip 1994
Ash SHūnah	EB Ib	335	335	Baird and Philip 1994
Te’o	EB Ia	26	24	Kolska Horwitz 2001
Uvda	EB II	64	49	Kolska Horwitz *et al.* 2001
Yaqush	EB I	524	475	Kolska Horwitz *et al.* 2001
Yaqush	EB II	397	387	Kolska Horwitz *et al.* 2001
Yaqush	EB III	349	332	Hesse and Wapnish 2001
Yarmouth	EB II	216	216	Davis 1988
Yarmouth	EB IIIa	882	882	Davis 1988
Yarmouth	EB IIIb	77	77	Davis 1988
Az Zayraqūn	EB III	9198	8883	Dechert 1995

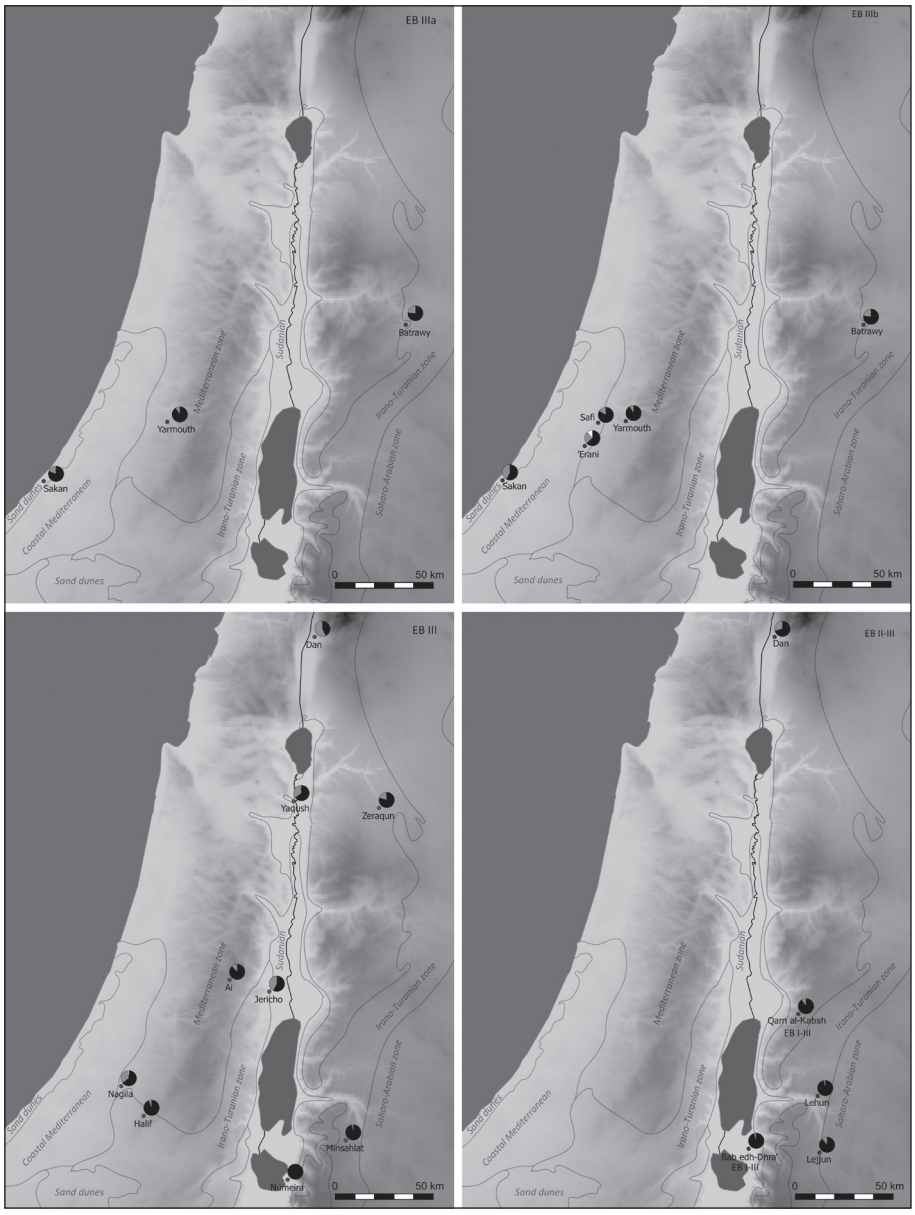
no coincidence that the only horse remains found at Al Lāhūn were from disturbed, likely younger contexts. At Al Lāhūn equids form a restricted proportion of the identified faunal assemblage (3.6%), as is also the case at most other sites, *e.g.* Al Lajjūn (اللجّون) (Chesson *et al.* 2005), Jāwā (جاوا) (Köhler 1981), Qiyat ‘Ata (Kolska Horwitz 2003, 2013), Arad (Davis 1976), Dalit (Kolska Horwitz *et al.* 1996), as-Sa‘īdīyyah (السعيدية) (Tubb and Dorrell 1993), as-Sāfī (Shai 2014), Halif (Seger *et al.* 1990) and Munsahilāt (منسهلات) (Makarewicz 2005). However, at a few sites equids were found in much higher proportions (up to 25%), *e.g.* Al Batrāwī (البتراوي) (EB II-III) (Alhaique 2008, 2012), the settlements of Bāb Adh DHirā‘ (باب الذراع) (EB I-III) (Finnegan 1978, 1981) and En Shadud (Kansa 2004), and also several sites on the southern coastal plain, *i.e.* ‘Erani (Kansa 2004), Azor (Kolska Horwitz 1999), Halif terrace (Levy *et al.* 1997) and Nizzanim (Yekutieli and Gophna 1994). The presence of equids has often been linked to trade, which fits well with the EBA I coastal-plain sites where ample evidence for contact with Egypt has been found (Levy *et al.* 1997; Kansa 2004: 291). Exceptional is the frequent occurrence of cut marks on equid bones at Al Batrāwī. At this site, equid bones show cut marks as frequently as those of cattle. Furthermore, the age profiles and levels of fragmentation are also similar to cattle, suggesting that equids and cattle received similar treatment, with equids in all likelihood being eaten. This processing of equids is not restricted to a single context, but occurs throughout all phases of the site (Alhaique 2008: 354). At Afridar a single cut mark was found on a donkey bone which has been related to potential skinning. At this site equid was most likely not eaten. Not only is the fragmentation rate much lower than that of consumed species, but equid bones are also often found in partial articulation (Kansa 2004: 291). The Al Lāhūn donkey scapula with cut marks is therefore not unique, but being just a single bone no further conclusions can be drawn from it about the possible use of equids for food or as a source of raw material.

Pig

Using raw data compiled from the sites listed at **Table 6**, the proportions of the major domestic food animals (ovicaprines; cattle; pig) have been calculated and the results plotted on the maps at **Figs 7** and **8**. Notwithstanding temporal and functional differences, the composition of faunal assemblages is clearly linked to the environment. Pigs are restricted to moister and more wooded regions, while the number of ovicaprids increases towards the more arid Irano-Turanian and Saharo-Arabian zones. Higher proportions of pig bone are found in the coastal Mediterranean zone, as well as in the northern river valleys like those of Yezreel and the northern Jordan. However, there is also a chronological differentiation in the frequency of pigs. Relatively high proportions of pig bone are present in EBA Ia and EB Ib contexts (as well as during the preceding Chalcolithic period), but their numbers decrease rapidly afterwards and during the later phases of the Early Bronze Age pigs only occur sporadically. It seems likely that this virtual disappearance of pig reflects the aridification that took place towards the end of the Early Bronze Age (Frumkin *et al.* 2001: 1184; Bar-Matthews *et al.* 2003; Cordova 2007: 190; Rosen 2007: 85). The small number of pig bones in the Al Lāhūn assemblages is mirrored at other sites of similar age.



7. Percentage of sheep/goat (black), cattle (grey) and pig (white) during EB I and II periods (Jāwā [EB I] outside map to the east: 9% cattle; 91% sheep/goat; no pig).



8. Percentage of sheep/goat (black), cattle (grey) and pig (white) during EB III periods.

Secondary Products

The two pig bones from Al Lāhūn are from animals that did not survive beyond one year of age. This is in line with evidence from other Early Bronze Age sites where pigs were always slaughtered young, before the age of two years (Bourke *et al.* 1994: 123; Kolska Horwitz 1996: 8, 1999: 36; Kansa 2004: 284; Kolska Horwitz 2013: 65). This is indicative of management focused on meat production.

Adults usually predominate among cattle remains found in the Early Bronze Age southern Levant, *e.g.* at Ṯabaqat Faḥl/Pella (طبقة فحل) (Bourke *et al.* 1994: 123), Jenin (جنين) (al-Zawahra 1999), Afridar (Kansa 2004: 286) and Qiryat Ata (Kolska Horwitz 2013: 67). Although the sample is small, this seems also to be the case Al Lāhūn. These slaughtering ages suggest that cattle were kept for meat, milk and potentially traction. While traction may well have been a reason to keep cattle, there is little direct evidence for it. At Afridar, many phalanges show exostoses which might have been caused by draught activity, but which could just as well have resulted from old age. As other bones in the assemblage show relatively few pathologies, it has been suggested that cattle may have been used for traction on a non-intensive scale (Kansa 2004: 284). Deformations were also attested at Jericho/Tall as-Sulṯān (تل السلطان) (Alhaique 2000: 310), but at Al Lāhūn no such pathologies have been found.

The age profiles of sheep and goat - the major species in the southern Levant - show that these animals were managed in diverse ways at different sites in the region. At Dan (Wapnish and Hesse 1991: 29) and Halif (Levy *et al.* 1997: 28) the absence of neonates and very young animals has been taken to indicate that herds were kept away from the site, while at other sites the presence of neonates suggests that flocks were at or near the site, *e.g.* Al Lāhūn. At most sites in the region the use of secondary products has been suggested, because of the rather late slaughtering of sheep and goats, but nowhere have strong indications been found for intensive specialisation in one or more secondary products. A focus on meat production has been suggested for a few sites, such as EB Ia Azor (Kolska Horwitz 1999), EB I-III Qarn Al Kabsh (قرن الكبش) (Savage and Metzger 2002) and the EB Ib squatter-occupation phase at Megiddo (Tall al-Mutasallim) (Wapnish and Hesse 2000), where most sheep and goats were killed at a young age - as were the sheep at EB III As Sāfī (Shai *et al.* 2014). However, at the majority of Early Bronze Age sites, including Al Lāhūn, 50-70% of sheep and goat reached maturity, *i.e.* Tabaqat Fahl/Pella (Bourke *et al.* 1994: 123), Al Handaqūq North (الحندقوق) (Mabry 1996: 146), Mādabā (Harrison *et al.* 2000: 226), Al Batrāwī (Alhaique 2008: 353, 2012: 345), Jenin (al-Zawahra 1999: 28), Yarmouth (Davis 1988: 147), Horvat Ilin Tahtit (Allentuck 2013: table 125-6), Qiryat 'Ata (Kolska Horwitz 2013: 67), Kinrot (Hellwing 1988-1989: 214) and the goats at As Sāfī (Shai *et al.* 2014). This delayed slaughtering age suggests wool may have been important, alongside non-intensive milk production and breeding. The fact that, at Afridar for example, very few animals were killed before they reached one year of age (Kansa 2004) seems to indicate that milk was not the primary focus. Otherwise the proportion of animals slaughtered young would have been much higher. The higher kill-off of subadults shows that meat was important at Afridar, while the predominance of females among the older animals found at the site was presumably related to breeding. Furthermore, the fact that sheep outnumbered goats suggests that wool was important, a supposition tentatively supported by the recovery of many spindle whorls in the excavations (Kansa 2004: 284).

Concluding, it can be said that the small faunal assemblage from Al Lāhūn corresponds rather well to wider trends in the animal economies of the southern Levant during the Early Bronze Age. Hunting played a minor role in subsistence, while among the domestic food animals sheep and goat were most frequently slaughtered, followed by cattle and pig. The representation of these species is heavily correlated with environmental conditions and is comparable to that seen at adjacent sites. Pigs were kept for their meat, while cattle and ovicaprids were also providers of secondary products (milk plus manure, wool and hair in the case of sheep and goats, and traction in the case of cattle). Donkeys must have been primarily used for transport, as no convincing evidence was found for consumption.

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