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In Memoriam

Judith McKenzie
Bert de Vries
Samar Habahbeh

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List of Abbreviations

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

System of Transliteration from Arabic

Consonents

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

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

Common Nouns

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

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Judith McKenzie
(1957-2019)
An Outstanding Scholar, a True Human Being and a Friend

Dana Firas

Dr. McKenzie is known for her important award winning publications on Petra and Alexandria and has lectured at many universities. Over four decades, she gained international recognition for research excellence and exceptional scholarship on the art and architecture of Egypt and the Levant spanning the Hellenistic, Roman into Early Islamic periods. Her work in Petra was groundbreaking. Judith made Petra her home the 1980s and with the support of Jordan's Department of Antiquities, proceeded with new techniques and meticulous study to identify and resolve issues related to the age and styles of the monuments in Petra. Not only did she relate differing architectural styles from evolution to coalescence to build a new chronology of some of the monuments in Petra, she also linked the study to social identities and an emerging cultural profile for that period. Her findings were published in 1990 in her seminal book The Architecture of Petra, which included a large number of drawings and photographs.

Her work in Jordan did not end there. Judith returned in 2001 to investigate Nelson Glueck's reconstruction of Khirbat at-Tannūr, a Nabataean Temple north of Petra, which he excavated in 1937. Judith located Glueck's field records in what Alan Walmsley described as a "remarkable tale of modern detective work in archeology"[1]. She worked on producing a new reconstruction of the Temple with drawings by Sheila Gibson. The results were published in 2013 in two highly acclaimed volumes.

In connection with her work on the Temple, a Spanish art dealer contacted Judith in 2018 to authenticate three carved stone blocks which were being put up for sale by a descendent of a Spanish diplomat who had served in Jordan. Judith contacted me immediately to alert me to the sales. Once she confirmed the stones were original and belonged to the altar platform, we worked together to try to return the stones to Jordan. Her guidance throughout the process and careful negotiation with the dealer were instrumental in getting the stones successfully repatriated to Jordan within months and are currently with the Department of Antiquities in Jordan.

In almost all her work, Dr. McKenzie invested substantial time, effort and resources to produce educational materials in both Arabic and English, a testament to her incredible commitment to providing reliable and accessible resources for the Arabic-speaking world. It was through one of these efforts that I got to know Judith. I was impressed and touched by her dedication to establishing Manar Al Athar, a free digital platform to make available in Arabic and English photographs that are curated and labeled to scholars and researchers globally.

It was born out of Judith's realization trough her work with universities in the Middle East that there was an important need for high-resolution free photographs of archeological sites and important works of art and architecture for researchers, scholars, students and teachers for their own work and teaching. The collection covers the period 300BC to the present.

Judith approached all her projects with passion. One of her projects, a children's story, touched me deeply. I will remember with great fondness her kindness and thoughtfulness

1. Alan Walmsley (2019) Judith McKenzie 1957–2019, *Levant* 51: 1, 1-5, DOI: 10.1080/00758914.2020.1741886.

towards my own family. Knowing my son's great love for elephants, Judith engaged Hashem on a brief children's story set in Petra. Together they named the characters and built the plot. She also made sure that the books was available in both Arabic and English.

Her loss was felt deeply by myself, my family, Jordan, the Middle East and the world at large. She is one of a kind and her contributions to historical knowledge, archeology and cultural awareness in the Middle East will remain unparalleled.

In Memoriam Dr. Bert de Vries
(March 4, 1939-March 28, 2021)

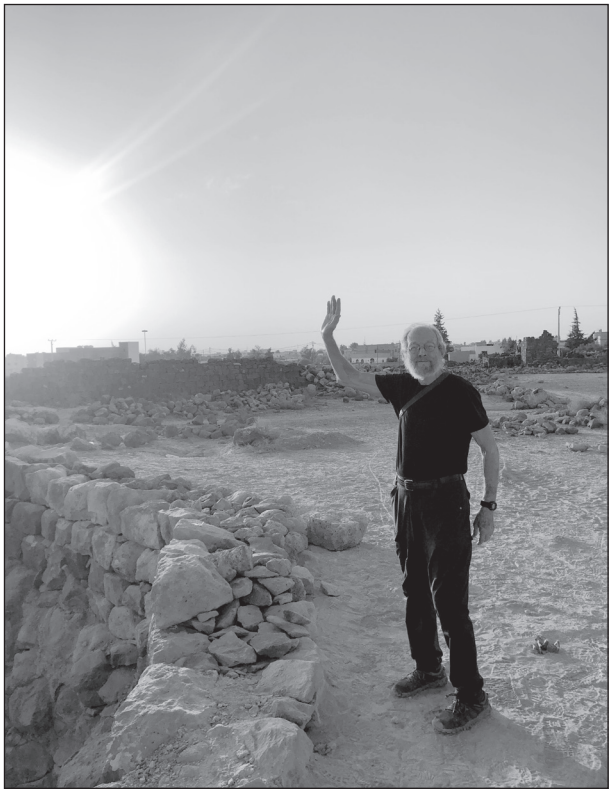
By
Jenna de Vries Morton and Mr. Muaffaq Hazza
with thanks to
Eng. Dana El-Farraj, Eng. Mais Haddad,
Eng. Jehad Juleiman and Samar Srour

The name Dr. Bert de Vries is the definition of Archaeologist. His version is characterized by boundless curiosity, meticulous rigor, and inexorable love for the human narrative revealed layer by layer in the course of the endeavor. A simple pot sherd transported him to an indisputable moment of human experience. As an architect surveyor his drawings gave that experience a place—a place in Jordan. For half of a century Jordan has been the beneficiary of Dr. de Vries as a model practitioner in an evolving field. His legacy honors the craft and the country in equal measure.

Bert was born in Zierikzee, Zeeland, the Netherlands. As a child, he and his family were internally displaced by the escalation of WWII. They eventually emigrated to Canada in 1952. His childhood memories gave voice to the punctuated narrative of displacement. His telling bore no hint of self-pity, only determination peppered with disdain for discrimination.

That determination carried him to Calvin College in the United States where he eventually earned degrees in Physics and Engineering, followed by a bachelor's degree in Divinity from Calvin Theological Seminary. Captivated by History, he earned his PhD from Brandeis University in Mediterranean Studies. He joined the faculty of Calvin College in 1967 where he taught history and archaeology until 2018.

Jordan instantly captivated Bert when he arrived for his first field season as an architect surveyor at the Tall Ḥisbān excavation directed by Dr. Siegfried Horn in 1968. He returned to Ḥisbān for field seasons in 1971 and 1973 with Dr. Horn and in 1974, 1976 and 1978 under the direction of Dr. Larry Gerrity.



Bert waves goodbye.

Jordanian culture had the same effect on Bert's wife Sally who accompanied him on early Ḥisbān digs, and who became something of an expert in the textiles of the region (under the tutelage of Mrs. Widad Kawar). The two of them never stayed away long and even carted their four small children with them to ʻAmmān when they helped to establish an NGO to support Palestinian refugees from 1972-74, between excavations. It was during that time that Bert's commitment, not just to the scientific practice of archaeology, but to the deep value of the humanities in education was actualized. His

ability to connect his personal narrative with that of another suffering population removed by time, place, language and culture translated knowledge into a surrogate, a suave, a pattern, a prophylactic. Bert's commitment to peace was conceived.

Before that Bert Fell in Love

An avid hiker, between seasons at Ḥisbān he had begun to explore Jordan's universe of material culture that the archeologist in him felt compelled to record. Those who know him can picture him striding up a barely perceptible incline in the desert with intense purpose describing what must lay beneath the surface to anyone who had tagged along, and who would surely have been scratching their heads because they saw only dirt where Bert saw Nabataeans, Romans, Byzantines, Umayyads, Abassids, Mamluks...

Then there Was Umm al-Jimāl

Imagine how he must have felt that day in the late spring of 1971, after a bone-rattling ride in a four-by-four along unpaved tracks in the desert for more than two hours, when the jagged outline of the ruins of the black basalt city of ancient Umm al-Jimāl rose above the skyline before him. He felt like he had discovered it! On that day he fell for Umm al-Jimāl, the site which would become Sally's and his second home for the next fifty years.

In truth, he had not discovered it. Umm al-Jimāl had been there in various states of construction, occupation and inhabitation for more than 2000 years. Indeed, the Masaeid people, were living inside the site when he arrived. It was they who solidified his enchantment with the place as they welcomed him as an honored guest from the moment he stepped out of the old Land Rover.

He was also not the first archaeologist to document the site. As far as we know, Howard Butler had that honor in 1905. Butler's drawings offered a starting point from which Bert drew up his own plan to discover the story of the people who had lived in Umm al-Jimāl over time. Dr. Tom Parker recalls participating in excavations there in 1977, 1980 and 1984. Periodic field seasons followed all the way until the 2019 field season when Dr. DeVries co-directed with his successors Dr. Darrell Rohl, who took his place at Calvin University, and Dr. Elizabeth Osinga, who wrote her doctoral dissertation on the ceramics of Umm al-Jimāl with Bert's support[1].

Over his last two decades in archaeology in Jordan Bert began to craft his theory of Community Archaeology which both engages local communities in their own cultural narrative, but more importantly relies upon local expertise which has traditionally been overlooked, or worse hidden, as a result of accepted power dynamics. A lifelong student, Bert was keenly aware of post-colonial/post-Orientalism self-consciousness. He also actively opposed jingoistic behavior. But mostly he was an observer whose innate humility allowed him to see expertise where it had not been expected. Published in a chapter in the Oxford Handbook for Archaeology, edited by Dr. Bethany Walker in 2021, and in the One World Archaeology journal, edited by Dr. Arwa Badran and Dr. Shada Abu Khafaja, his perspective on Community Archaeology is what Dr. DeVries will likely be best remembered.

The Umm al-Jimāl Archaeological Project (UJAP), a working group made up of foreign and local scholars and practitioners, was that theory in practice. Led by Bert they collectively developed a comprehensive set of interpretive and educational materials based on the site narrative from the Nabataean through the Ottoman and modern periods. That story, grounded in the archaeological record, is told simply and beautifully in the Umm al-Jimāl Interpretive and Hospitality Center conceived by Bert and designed by Eng. Ammar Khammash and Eng. Shatha al Haj, with the narrative theme of How Did They Live? How Do We Know? He also spearheaded the creation of Hand by Hand Heritage Umm al-Jimāl, a local company formed to reinforce Umm al-Jimāl's sense of place and to share it with the world.

That simple, profoundly personal story

1. As may be typical in the field, Bert chafed at the constant necessity to raise funds to support fieldwork. On the other hand, his enthusiasm was infectious and he was intensely grateful to all of those who supported the work in Umm al-Jimāl through grants, including but not limited to: Calvin University, ACOR, USAID, SCHEP, UNESCO, The Gerda Henkel Stiftung, the University of Bergen, GIZ, VNG, the Norwegian Refugee Council, the PAX Fund, the Mary and Tom Gallagher Foundation. Bert and Sally also personally established a fund at ACOR to support fellows doing research in Jordan, which lives on.

of human life became the basis for Bert's dream of UNESCO World Heritage status for Umm al-Jimāl. More than any monument, the continuity of the human experience across time, imperial occupation, religious practice, environmental change and conflict is the outstanding value of Umm al-Jimāl, of Jordan, of life on earth.

Dr. Bert de Vries was a leader with distinction in archaeology in Jordan. He served as the director for the American Center of Research (ACOR) from 1988 to 1991, and as an ACOR Board member for countless years thereafter. He developed close relationships with his colleagues like Dr. Tom Parker, Dr. James Sauer, Dr. David McCreery and Dr. Barbara Porter. He was always grateful for the permission to do the work granted and facilitated by the Department of Antiquities. He collaborated very closely with the Ministry of Tourism and Departments of Antiquities in ʻAmmān and in al-Mafraq, working collegially with Directors Adnan Hadidi, Ghazi Bisha, Monther Jamhawi, Yazeed Elayan, Ismael Milhelm, Emad Obeidat and formed fast friendships with ministers like Ambassador Lina Annab, and General Secretary Issah Gammoh, as well as H.E Mayor Hassan Fahed al-Ruheiba of Umm al-Jimāl. He was proud to contribute to the beginnings of the Friends of Archaeology of Jordan and he and Sally actively supported the development of the al-Hussein Society for the Physically Challenged in ʻAmmān. Bert and Sally's relationships in Jordan ran the gamut from shopkeepers to royalty, but titles paled next to their friendships. At the 2019 opening of the Umm al-Jimāl Interpretive and Hospitality Center presided over by HRH Princess Dana Firas, Dr. de Vries was presented with the prestigious King Abdullah Medal of Excellence by his dear friend HRH Prince Raad bin Zeid.

Ever humble and embarrassed by such recognition, Dr. de Vries placed greater value on his interaction with colleagues like Dr. Khalid Bashira, and Dr. Hanadi Taher with whom he could debate and from whom he could learn. He saw his greatest accomplishment in the success of each of his students like Paul Christians and Jeff DeKock whom he viewed as colleagues on the same journey. Foreign or Jordanian, He loved to expose them to the romance in the history and culture of Jordan. If he was ever proud it was to have facilitated the careers of young scholars, particularly those like his true protege Muaffaq Hazza from Umm al-Jimāl whose expertise will serve as an insurance policy for the preservation of Bert's beloved site.

This narrative only glances across the surface of the accomplishments of Dr. de Vries through his years of teaching and activism. Put simply, his mission was peace through common understanding. He saw archaeology, history, and the humanities generally, as the requisite tools. Jordan was his proof of concept. He persists through the local and international community of experts, friends, his wife Sally, and his children and grandchildren all of whom he inspired to carry on his legacy in Umm al-Jimāl, in Jordan, and wherever they are in the world.

It seems appropriate to close with an exerpt of Bert's own musings, jotted down just seven days before he died, as he pondered future writing topics. He wrote under the topic "Be of Good Cheer!" funerary inscriptions at Umm al-Jimāl:

"What happens when loved ones die unexpectedly. My mother always had her eyes on heaven, but Hieronymus Bosh, inured by the Black Death, gave us the most horridly graphic pictures of hell. I've written about tombstones at Umm al-Jimāl and its ancient environs. One of the key elements discussed is the stock phrase "Be of Good Cheer! No one on Earth is immortal" – an address of the survivors to their deceased son, daughter, mother or father. A reversal is an address of the deceased to the living passerby at Umm Qays: "As you are, I was, as I am, you will be; so live your life before it is too late!" ...these epitaphs speak to me…we live to serve, not to escape."

... Dr. Bert de Vries

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http://whc.unesco.org/en/tentativelists/6335/
http://www.ummeljimal.org/

PRELIMINARY REPORT OF THE FIFTH SEASON OF THE DANISH-GERMAN JARASH NORTHWEST QUARTER PROJECT 2015

Georg Kalaitzoglou, Achim Lichtenberger, Heike Möller, Rubina Raja
With contributions by:
Pernille Bangsgaard, Christoph Eger, Stephen Merkel / Michael Prange,
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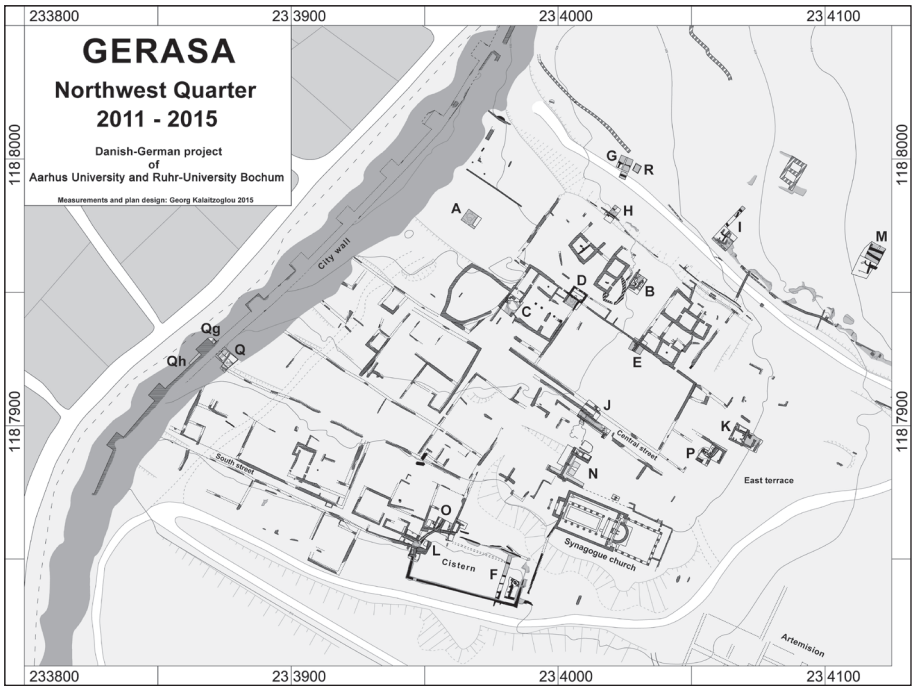
Introduction[1]

Between 21st July and 30th August 2015, the Danish-German team from Aarhus University (Denmark) and Ruhr-University Bochum (Germany) conducted its fifth campaign in the Northwest quarter of the ancient city Gerasa, modern Jarash, in Northern Jordan.

On the basis of results from the last campaigns, which included architectural, geodetic and geophysical surveys, as well as the excavation of thirteen trenches, it was decided to lay out five additional trenches and to extend one of the trenches excavated in 2014. The trenches were chosen to gain further insight into the settlement history of the Northwest quarter of the city, which is the highest area within the ancient city walls. The project, directed by Achim Lichtenberger and Rubina Raja, is funded by the Carlsberg Foundation, the Danish National Research Foundation (grant number: DNRF 119), the Deutsche Forschungsgemeinschaft (DFG) and H.P. Hjerl Hansens Mindefondet for Dansk Palæstinaforskning.

Based on results from the 2011 to 2014 campaigns, it was decided to continue with the exploration in some of the areas already excavated (**Fig. 1**). The cave complex and the structures of the central street in Trench J were especially chosen for further studies. Trench J was re-opened, and a new trench, Trench N, was laid out further south to explore the area of the supposed southern cave entrance. With Trench P, situated next to the Umayyad house in Trench K, excavated in 2014, the exploration of the so-called east terrace was continued in order to investigate further destruction deposits of the devastating earthquake of 749AD. With Trench O, located at the northwest corner of the large Roman cistern on the southern hill slope, the investigation of the relationship between

1. The team consisted of the two directors Prof. Dr. Achim Lichtenberger and Prof. Dr. Rubina Raja, head of the field team Georg Kalaitzoglou, heads of the registration team Annette Højen Sørensen and Heike Möller, architect Nicole Pieper (Vienna), conservator Margit Petersen (Viborg), the palaeozoologist Pernille Bangsgaard Jensen (Copenhagen) and the field and registration team: Malene Byø, Philip Ebeling, Julian Einschenk, Alessandra Esposito, Luisa Goldammer-Brill, Niels Benjamin Hansen, Charlotte Bach Hove, Nicole Jezewicz, Hans-Peter Klossek, Kevin Kremser, Mie Egelund Lind, Kevin Luijer, Line Egelund Nielsen, Mette Normann Pedersen, Alex Hunter Peterson, Sören Pfeiffer, Sara Ringsborg, Ulrike Rübesam, Karen Elizabeth Spencer, Janek Sundahl and Nicolai Broen Thorning. Dr. Peter Hambro Mikkelsen, Director of Department of Conservation and Natural Science at Moesgaard Museum (Denmark), and Peter Mose Jensen assessed the potential for archaeobotanical sampling, while Dr. Holger Schwarzer (Münster University, Germany) examined the ancient glass finds and Ingrid and Dr. Wolfgang Schulze (Essen, Germany) the Late Byzantine and Early Islamic coinage of the years 2012 to 2015. A sampling project for geochemistry and environmental history research was started by Prof. Dr. Ian Simpson (University of Stirling, Scotland) and Dr. Søren Munch Kristiansen (Aarhus University, Denmark). We would like to thank the director general of the Department of Antiquities, Dr. Monther Jamhawi, for permission to conduct the 2015 campaign and the director of the Department of Antiquities in Jarash, Ahmad Shami, for his and his staff's support during our campaign. Furthermore, thanks go to our representatives of the Department of Antiquities, Akram Atoum and Ali Oweisi, who were an invaluable help during our campaign. Many thanks also go to Christina Levisen who undertook extensive editing of this report



1. Plan of the Northwest quarter with trenches A-R (2012-2015).

the large water reservoir and the residential area in the vicinity was continued. On the northern hill slope, Trench R was laid out next to Trench G, which was excavated in 2013, to allow further investigations of the stratigraphy and to allow geochemical analysis of various soil layers. Already from the beginning of the project, the plan was to analyse the city walls, so in 2015 sondages on both sides of the city wall (Trench Q) were excavated in order to gain stratigraphic and chronological data for this important monumental undertaking and to establish its connection to the younger terrace wall system of the Northwest Quarter. A dating of the city wall, which forms the western border of the Northwest Quarter, is not only essential for the settlement history of the Northwest Quarter but will add more information to our understanding of the urban development of Gerasa in general.

In total, the six trenches J and N-R (**Fig. 1**) covered an area of approximately 347m². Altogether, 257,535 finds (diagnostic as well as undiagnostic) were processed during the campaign [A first evaluation and interpretation were made during the first registration process, called "total registration", to gain an insight into the chronology of the contexts. The pottery was arranged by functional groups (see catalogue) and within these groups by fabrics. An overview photo was taken of each piece of evidence. In a second step, new pottery types or fabrics were collected for further documentation to complete the typology- and fabric-based catalogue. The assorted sherds (diagnostics) - rims or bases, seldom handles - have been described, drawn and photographed, and kept for further studies. Each has a find number. Other sherds were dumped at the end of the season in the respective trenches from which they had been excavated, after statistical documentation had taken place. All bones and finds of metal, glass and stone, as well as assorted pieces of mortar and wall plaster, were kept]. The most important finds will be presented in the catalogue following the main text of this article in order to give an overview of the material culture of the 2015 campaign. The finds presented include metal, bones, architectural elements, stone artefacts, terracotta and pottery [Appendices with small reports by the specialists are included in this report].

General Outlook

After the 2015 campaign, samples were taken out on loan to Denmark and Germany for further studies, among them charcoal, mortar, raw glass, pottery and some metal slag. It is noteworthy that pigments were found in damaged vessels in fill layers of Trenches J and O (pl. 18). Further analyses will contribute to the determination of the provenance of these materials and to an understanding of the production

chain from raw material to use, for example as painting on walls [Extensive amounts of wall-painting were found in Trench P. Pigment analyses of the painting and the raw material found will contribute to a better understanding of ancient techniques.].

Elemental mass spectrometry and petrography were undertaken on various pottery samples [A short report concerning the first results by Merkel and Prange is attached to this report], and the results complement analyses that were done decades ago by other missions, thus contributing towards a more comprehensive understanding of the local fabric composition of Gerasa's extensive and long-lived pottery production (Watson 1989; Uscatescu 1996; Tarboush 2015). Samples of local and imported amphorae were analysed for their contents to gain an insight into food supply on a local/regional but also intraregional level [The samples are marked in the catalogue. See appendix by Springer and Polla].

Main Discoveries

The most surprising discovery was a large hall with floor mosaics and dated mosaic inscriptions in Trench N. The function of this hall is yet unclear, but it probably relates to the "synagogue church" south of it. Another important discovery was a second underground cave in Trench N, connected with the cave already partly excavated in 2014 (Trench J). Together, they form a pre-Byzantine cave complex. A large pottery deposition that was already discovered in 2014 (Lichtenberger *et al.* 2018), mainly dated to the end of the 3rd to the late 4th century AD, was further explored in the 2015 campaign by examining the fill layers of Trenches J and N. Their composition, consisting of locally produced table-, cooking- and common ware, provides a representative overview of the spectrum of local productions in Late Roman times. It also contributes to the studies of macro-regional networks by the numerous imports included in the contexts. Remarkable is the import of Almagro 50 Amphorae (pl. 14-15), which were probably produced on the Iberian Peninsula, and which are rarely found in the Eastern Mediterranean (*cf.* Bezeczky 2013: 179-180).

The excavation of parts of an undisturbed Umayyad courtyard house in a destruction context in Trench P offers insight into Islamic building complexes and their inventories immediately prior to the destruction caused by the earthquake in 749AD.

The excavation at the city walls provided new data for the chronology of the walls. It is suggested that at least this stretch was constructed in Roman times and destroyed by the earthquake in 749AD.

General Remarks on the Pottery

The find groups of the 2015 campaign are, in general, similar to the ones of the 2012-2014 campaigns. Overall, the type variation and development are quite low over the centuries compared to other sites, at least when it comes to locally produced wares. While in the older contexts, up to Byzantine times, table- and cookingwares dominate the functional groups, in Late Byzantine/Early Umayyad times, the composition changes slightly, and common wares, especially basins but also storage jars, occur in higher quantities. From the late 5th century AD onwards, tableware is mostly reduced to imitations or local variations of imported types, such as ARS and LRC Ware plates (Jarash Bowls).

Imported finds are rare; however, the few imported finds give insight into the exchange networks of Gerasa. African Red Slip Ware, of which the earliest finds are dated to the 3rd century AD and the latest to the 5th century AD, as well as the spectacular discovery of a high quantity of Almagro 50 Amphorae, probably produced in Spain or Portugal, demonstrate an interconnection between Gerasa and the westernmost parts of the Empire in the Roman and Early Byzantine periods.

Early imports of Eastern Sigillata A (ESA) and later Late Roman C Ware (LRC), produced in the Phokaean region, attest to interaction with Eastern Mediterranean neighbours. Amphorae, such as Kapitän II and Late Roman 1 (LRA 1), confirm the exchange connections and, although quantitatively low in number, provide insight into exchange networks, at least from Early Roman to Late Byzantine times within the Eastern Mediterranean.

The low import of pottery in general was due to the high amount of locally produced vessels in Gerasa itself. Several pottery dumps and kiln

sites (Kehrberg 2011 and Kehrberg 2009 for the Umayyad kiln sites *cf.* also Zayadine 1986) - the earliest of a Late Hellenistic/Early Roman date and the latest of an Umayyad date - have been discovered in Gerasa, indicating a tradition of pottery production from the early days to at least Umayyad times. With the Jarash bowls, the production of pottery reached a level of surplus in Byzantine times (Watson 1989 with a list of finds from Jarash at other sites in Jordan).

Roman-period material derives from fill layers in Trenches O, Q and R, and the earliest finds can be dated to the 1st century AD, consisting of imported tableware (Eastern Sigillata A, ESA) (pl. 5.40-44) and local (*cf.* Braemer 1989) or regional productions of the late 1st century BC or 1st century AD (pl. 3.19-22); however, Roman material is scattered all over the Northwest Quarter, and residual finds of Roman potsherds can be observed in much younger contexts.

The quantity of finds reached its peak in Late Roman/Byzantine times and continued into the Umayyad period. Especially Trenches J and N brought to light large quantities of Late Roman/Byzantine sherds. Particularly in Trench P, but also in other trenches, a large amount of sherds of the last occupation phase, before the earthquake of 749AD, were discovered. The absence of Abbasid finds, together with only very rare finds in earlier seasons, lends support to the assumption that only parts of Gerasa "Jarash" were resettled after the earthquake had destroyed the city, while other parts, such as the Northwest Quarter, remained more or less deserted until the Middle Islamic period (*cf.* Kalaitzoglou *et al.* 2018; Lichtenberger and Raja 2015a).

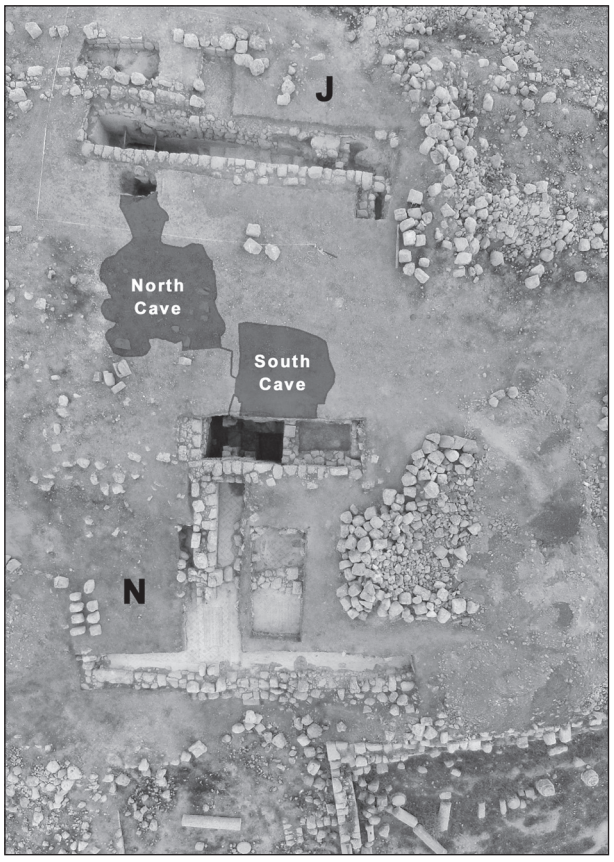
In 2015, only a few Mamluk sherds were found, all stemming from surface layers in Trench P (pl. 18.107-110). The youngest find is a fragment of an Ottoman pipe that was found in the top-soil layer of Trench N (pl. 18.104). It is the first Ottoman pipe found in the Northwest Quarter. Comparable pipes were found around the North Theatre [For further research concerning the Middle Islamic period in Jarash, see Peterson's current PhD project within the framework of the project Ceramics in Context: http://pure.au.dk/portal/en/projects/ceramics-in-context-Jarash-phd-project%28a145a00f-1fca-482d-9a2d-bc87dc22fa8c%29.html].

Stratigraphy and Contexts

Trench J

Trench J is situated on the southern side of the hilltop plateau. Its eastern part was already excavated during the 2014 campaign [Trench supervisor was Ulrike Rübesam]. The surface of the so-called Central Street with buildings running along its northern side was unearthed along with an older rock-cut shaft with a staircase south of the street, leading into a rock-cut cave room [For the previous results concerning Trench J, see the preliminary field report on the 2014 campaign in Kalaitzoglou *et al.* 2018]. After the 2014 campaign, the street and building remains were backfilled, while the shaft and the cave were secured and covered for further exploration in 2015. Especially the connection between the street and the rock-cut shaft needed further clarification, and the interior of the cave room was intended to be examined in more detail. Furthermore, it remained to be examined whether there was an older cave entrance located to the south (behind a later blocking wall); however, illicit digging activities in the cave undertaken between the campaigns not only destroyed the interior and excavated parts of the cave floor, but also the southern blocking wall had been removed, and a tunnel had been dug into the enormous earth fill behind the wall. East of the tunnel, another cave, the so-called South Cave, was discovered and also destroyed by the illicit excavation (**Fig. 2**). Although regrettable, the destruction yielded some important findings with far-reaching implications.

The amount of finds from Trench J is extensive, due to the large Late Roman pottery deposit that was brought to light in 2014, sealing the staircase of the northern entrance (*cf.* Lichtenberger *et al.* 2018; *cf.* Kalaitzoglou *et al.* 2018). The same pottery fill was encountered during the 2015 excavations in several evidences of the northern part of the trench. The fill material contains very well-preserved pottery, primarily of Late Roman date, and its unique composition makes it easy to recognize. The fill contained numerous Western-Mediterranean imports of Almagro 50 amphorae (pl. 14.89-90, pl. 15.91) occurring in two different types of fabric, Hayes 50B plates (pl. 5.39) and some Eastern Mediterranean amphorae, type Kapitän II (pl. 15.92). The fill was furthermore mixed



2. Air photo of trenches J and N with position of the caves.

with local table- and cookingware, as well as local storage jars or amphorae.

Noteworthy among the finds is a pottery base with traces of orange pigment (pl. 18.106). Apart from the well-preserved fill, the pottery of the other evidences occurs in the same preservation conditions as is characteristic of the other trenches. In these younger fills, the pottery is worn and medium to highly fragmented, as is typical for secondary deposits.

Apart from the Roman cave, the earliest contexts (phases 1-2) in Trench J, such as the quarry works or the northern cave entrance, contained hardly any finds. The earliest finds in these northern fills stem from phases 3-5 and can be dated to the Late Roman period. Large-scale building activity connected with the creation of the Central Street is well attested and took place in the Byzantine period (phase 6). Traces of Early or Middle Islamic activities were not detected in this campaign.

The Cave Room

It is clear that the cave room (J14-J-80) had an older phase in which it served as an oil-press installation, and that the original entrance was a wide southern opening, which was later blocked by the south wall (ev. J14-J-103). Thus, the second building phase, as described in the preceding excavation report, has become the third phase in Trench J. In the debris of the southern blocking wall (ev. J14-J-103), fragments of a press-pier were found. The shape and working traces of the press-pier resemble the ones found in 2012 in Trench B. After the round base of the central pillar (ev. J14-J-104) had been destroyed, it turned out to be a discoid grinding stone of a crusher (trapetum). The round niches in the west wall of the cave turned out to be oval-shaped settling basins for the oil (ev. J14-J-99b). These basins were cut into the bedrock and have a smaller bowl-like depression in the bottom (**Fig. 3**). It is clear that these basins were filled and covered by a new floor when the oil-press installation fell out of use. Under the modern dump, an untouched fill of soil and pottery (ev. 17) was found, and in the bowl-shaped depression, another soil fill (ev. 18) was encountered. The finds from both evidences point to the filling process and the conversion of the cave room being of Late Roman/Early Byzantine date. In this second phase, a door was situated behind the later blocking wall, as is attested by a door jamb (ev. 28) set against the eastern rock wall. The western jamb was not excavated, because it was too dangerous to excavate the dense but unstable soil fill (ev. 25); however, since the later blocking wall was set against bedrock on both sides, it is most likely an entrance of about 1.7 meters in width. The fill (ev. 25) is identical to that of Trench N (J15-N-57), and from this side, it is obvious that the bedrock runs northward, and that this fill was brought in from above. Although it remains



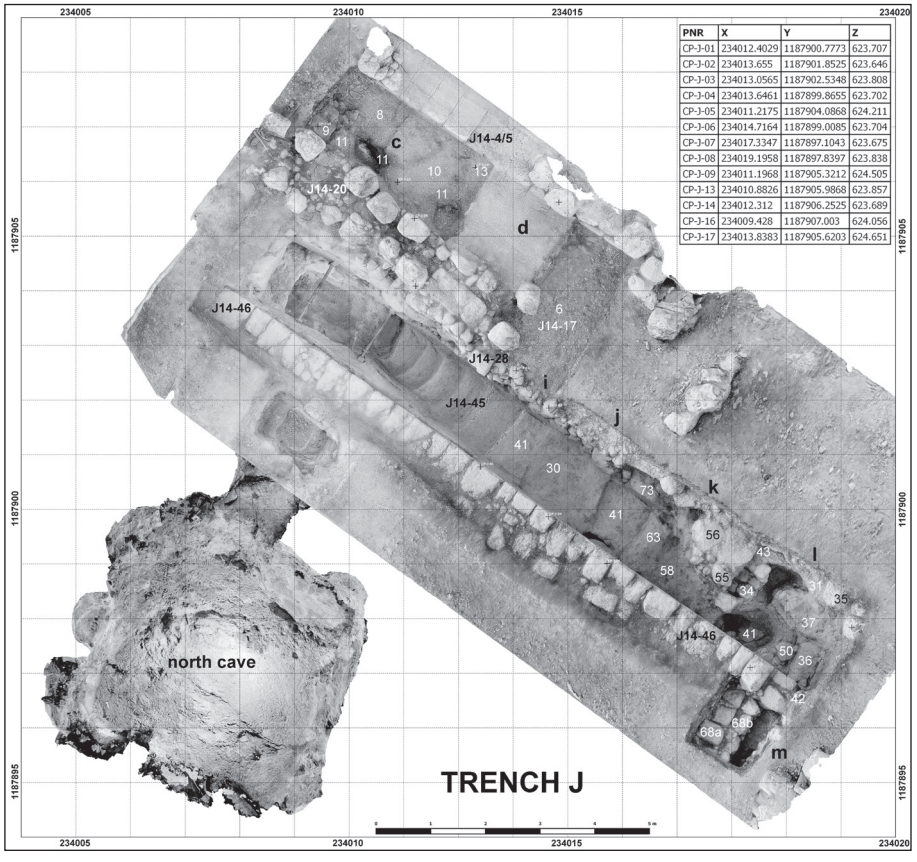
3. Trench J, south cave oil basin in front of the west wall.

unknown how wide the entrance area was, it is apparent that the area south of the former cave entrance was not covered by rock. The blocking wall (ev. J14-J-103) must have been erected before the area south of it could be filled (ev. 25), since the north cave (ev. J14-J-80) was found empty. The same is apparent for the south cave (ev. 27) [in Trench N, the cave is labeled ev. 75], since its main entrance was blocked by the wall (ev. 29) [in Trench N, the wall is ev. 85] before the area in front of it was filled (ev. J15-N-57). This implies that both the north cave (J14-J-80) and the south cave (ev. 27, J15-N-75) belong to the same complex in the second phase, and that their older history was also closely linked, as will be described in the context of Trench N below.

Building Phase 1 (Roman)

The earliest phase in this area is an east-to-west-running trench cut into the bedrock (**Fig. 4**). It was most probably created to quarry limestone blocks. In the 2015 campaign, the rock trench and the long parallel running wall (ev. J14-J-46) were followed for about 13.5 meters in an easterly direction to trace their extension. While the end of the wall was not found, the end of the rock-cut trench was reached only about 4.8 meters beyond the eastern limits of the 2014 excavation. The worked part of the limestone rock (ev. 41) has a total length of 8.7 meters, and the remaining 4.0 meters have an unworked natural rock surface. At the eastern end of the worked part, the trench widens from 1 meter to about 1.5 meters, and the rock surface slopes downward. On both sides of the upper steps in the staircase shaft (ev. J14-J-45), shallow V-shaped grooves were found, which could stem from cutting the stairs, but their shape is slightly rounded. Traces of a similar channeling were discovered further east where the rock-cut trench starts. These grooves surround the shape of a rectangular block, which was quarried in this place (**Figs. 4-5**). The bedrock north of the rock-cut trench and below the later Central Street displays a natural and uneven surface with deep depressions similar to the eastern part of Trench J.

This first phase characterised by open quarrying is not datable with any precision, since associated finds are not at hand. But some observations suggest an approximate dating in the



4. Trench J, excavated structures.



5. Trench J, structures in the rock-cut trench, view from north.

Roman period. First of all, it is obvious that the quarry works are older than the wall (ev. J14-J-46), because the bedrock was not cut in order to construct the wall. This is evident from the fact that although the wall runs along the southern side of the rock trench, it rests on the uneven rock surface and extends in both directions beyond the quarry work. Secondly, the quarry is older than the second utilisation phase of the north cave, because the western part of the trench was later transformed into a staircase and used to access the cave after the older south entrance had been closed. Since the north cave fell out of use in the late 3rd-early 4th century AD, an earlier Roman date for the quarry is plausible (Lichtenberger *et al.* 2018).

Building Phase 2 (Roman)

The long wall (ev. J14-J-46) seems to be the oldest-built structure in Trench J. There is the possibility that the first utilisation phase of the subterranean cave is contemporary with or even older than this wall, but the lack of direct connections and datable material in the foundation prohibits any assessment. The long wall (ev. J14-J-46) was built on top of the southern quarry wall (ev. 41). For the most part, the wall rests on a thin soil layer above the rock and follows the irregular rock surface. Further east, where the rock remained unworked, as in the eastern sectors k and l, a thicker foundation fill (ev. 52) of stones and clayish soil was brought in to level the wall alignment. This fill contained only very small and non-diagnostic sherds. In sector j at the eastern end of the quarry, a cleft in the bedrock was filled with small stones to retain the wall stones (**Fig. 5**). In the eastern part of Trench J, a backfill would have been expected to protect the wall foundation (ev. 52) and level the uneven surface of the bedrock (ev. 41), but this area was disturbed down to bedrock and backfilled when the Central Street was constructed. Over an excavated length of 13.5 meters, neither a doorway nor an opening was found in the wall. Communication from north to south was thus impossible in this area. The masonry of well-fitted rectangular blocks with smooth bosses only in the northern wall face proves that this side was the outside. Taking these observations into consideration, the wall seems to have been the northern limit of a large building complex situated south of it. Several walls adjoining the long wall from the south confirm this conclusion, although some of the walls are surely younger. A younger age is attested for the (ev. J14-J-83-) wall, which was partly excavated and removed in 2014, because it was built into the pottery-rich fill above the vertical rock shaft. But another wall (ev. 68), unearthed in sector m at the western end of Trench J, was composed of an older wall (ev. 68a), made of larger blocks, and a younger wall (ev. 68b) of a very simple building technique, set from the east against the older wall. Because of the limited space in sector m, it was not possible to prove whether the older wall (ev. 68a) belongs to the large building complex, but this possibility cannot be ruled out.

Building Phase 3 (Late Roman)

The use of the staircase shaft (J14-J-45) and the rock-cut trench to access the north cave can be divided into two Late Roman sub-phases on the basis of two succeeding floors. It is probable that also the second phase correlated with the two utilisation phases of the north cave and the staircase shaft [in phase 2 (now phase 3), the cave was used, and in phase 3 (now phase 4), mostly the staircase shaft was used, *cf.* Lichtenberger *et al.* 2018]. The new results enable a description of the construction of the cave access in more detail.

After the staircase shaft (ev. J14-J-45) had been dug, the wall (ev. J14-J-28) was built on the northern side of the former rock trench to fill all the gaps in the bedrock and to create a wall parallel to the older wall (ev. J14-J-46). The newly built wall was made of mostly small

and irregular stones and set between the rising bedrock in the west and a step (ev. 73), cut into the bedrock to enter the corridor-like cave entrance from the north. Inside this corridor, the V-shaped grooves and the worked bedrock were covered with a mortar layer (ev. 30) in sectors i and j. In sector k, the residual clay (ev. 66) in the rock depressions, as well as the uneven rock surface, was covered by a thin foundation layer of a very compact yellowish soil (ev. 65), and this was covered with the same mortar (ev. 30). Pottery finds are rare. The sherds are worn and no diagnostic sherds were found.

The relatively flat area further east seems to have been left untouched. To be stabilised, the northern wall (ev. J14-J-28) must have been backfilled to some extent also from the north, as the excavation in the northern sectors c and d displayed an uneven rock surface with deep depressions, filled only with some sterile residual clay (ev. 13). Such fills were removed by later building and filling activities associated with the foundation of the Central Street. Since the step (ev. 73) leads in northern direction, it is likely that an older building discovered north of the later Central Street also belonged to this third phase. Of this building, only the southwest corner walls (ev. J14-J-56 and ev. J14-J-57) were excavated in 2014, but it is evident that it was built over by a younger edifice (ev. J14-J-4/5) before the Central Street was laid out.

For the dating of this phase, we have to rely on the relative stratigraphy, because dated material is available only from the foundation layer (ev. 65) below the mortar floor (ev. 30), and this pottery was broken into small pieces of which hardly any were diagnostic.

Building Phase 4 (Late Roman)

This phase is attested only in sector k and probably also in sector l, where the flooring was renewed and an eastern exit was built. In the easternmost sector l, the original filling of the south-wall foundation (ev. J14-J-46) must have been removed to place a stone step (ev. 36) and its stone foundation (ev. 50) from the north against the wall (ev. J14-J-46). While the foundation was laid and the stone step was placed, the northward-rising bedrock (ev. 41) was covered with thick mortar layers. First, the mortar (ev. 47, ev. 48 and ev. 51) was filled in against the foundation (ev. 50) and up to its top. In the next step, the mortar (ev. 37) was placed on top of the former to reach the upper side of the step (ev. 36). Then the step (ev. 36) was covered with a thin mortar layer (ev. 43), visible only in the east baulk. It is likely that the step and the leveled mortar platform east of it were meant to create a new eastern exit of the rock-cut trench. Immediately west of the step (ev. 36) and the mortar platform, only soil layers laid against them were found (ev. 49, ev. 45, ev. 46). They did not contain any diagnostic sherds; however, in sector k, parts of a second floor made of mortar (ev. 63) were discovered on almost the same level. It was better preserved only on the northern side. The southern part was disturbed by the younger fill layer (ev. 58). The pottery of this fill is similar to the large Late-Roman pottery deposition found in the staircase shaft in 2014 (Lichtenberger *et al.* 2018), consisting of Almagro 50 (pl. 14.89-90, pl. 15.91) and Kapitän II amphorae (pl. 15.92) mixed with local table- and cookingwares and some storage vessels (pl. 12). Part of this floor (ev. 62) also covered a thin residual clay layer (ev. 61) on top of the rock step (ev. 73) belonging to the northern exit. In front of the northern exit, the new floor (ev. 63) was separated from the older mortar floor (ev. 30) by the thin soil layers (ev. 59 and ev. 60). While the mortar was void of finds and the foundation layer (ev. 60) held only small and hardly diagnostic sherds, the uppermost foundation layer (ev. 59) contained a composition of Late Roman to Early Byzantine pottery, which again is very similar to the material found in the fill of the staircase shaft and also above the new floor; however, due to the poor preservation of the new floor, these sherds might have been intrusions from the later covering fill layer (ev. 58).

Building Phase 5 (Late Roman)

In this phase, the cave fell out of use, and the staircase shaft, as well as the corridor-like access, was filled. The filling material between the walls (ev. J14-J-28 and ev. J14-J-46) was relatively homogeneous and consisted mainly of soil and large amounts of well-preserved Late-Roman pottery. Different fill portions and layers of soil and pottery can be discerned [The sequence of undisturbed fill layers from bottom

to top is ev. 16/26, ev. 14, ev. 58, ev. 4/5, ev. 57, ev. 33 and ev. 3]. Clusters of stones (ev. 15, ev. 21 and ev. 55) and also some boulders occurred in the western part of the trench close to the staircase shaft (ev. J14-J-45). A dating of this fill is based on the homogeneity of the finds and the radiocarbon dates from the 2014 campaign. The charcoal from the lower portion of the fill in the staircase shaft favours a date in the 4th century AD, and the pottery is mainly of the same date. Similar finds were also unearthed outside the staircase shaft north of the wall (ev. J14-J-28). In sectors c and d, a cluster of stones (ev. 9) was deposited in a bedrock depression, which was backfilled (ev. 12) with similar pottery as described above. Thus, the filling activity seems to have been limited not only to the cave access but reached also the area north of it. Although the reason for this filling activity remains unknown, it was not immediately connected with the construction of the Central Street, as becomes evident in the next phase. Nevertheless, it is more likely that the final closure of the caves also caused the filling of the entrances, and both were initiated by large-scale activities in the vicinity prior to the construction of the street. It is remarkable that the majority of fillings north of the long wall (ev. J14-J-46) contain mainly Late Roman and only a few Early Byzantine finds, whereas the fills south of the same wall contain finds from the Byzantine to Umayyad periods [samples of the older and younger fill excavated in 2014 were used for fabric and content analysis and therefore occur in the catalogue of this report. See J14-Jc 61 and J14-Jc-67 (for the older fill) and J14-Je-77, J14-Jc-84 and J14-Jh-95 (for the younger fill)].

Building Phase 6a (Byzantine)

Building phase 6a is characterised by a complete transformation of the area into a residential area with a long street arranged parallel to the filled shaft. In the preceding report, this phase was labeled as phase 4 of either Late-Roman or Byzantine date. On the basis of more dating material, it is now possible to assign this building phase to the Byzantine period.

The excavation under the street in sectors c and d clarified that the south wall (ev. J14-J-4/5) of the younger house was built partly on bedrock (ev. 11) and partly on the residual clay (ev. 13). The higher portions of the bedrock were later covered by a layer of mortar (ev. 10). This mortar also covered parts of the older filling (ev. 12) in the rock depressions and was set against the stone fill (ev. 9) as well as against the house wall. Above this, the fill layer (ev. 7) was placed to cover the stones of ev. 9 and served as the foundation for the street. The street consisted of a rough mortar surface (ev. 6) above a thick mortar underlay (ev. 7). Both were set against the house wall, and the mortar surface also covered the older wall (ev. J14-J-28). It is therefore evident that the older walls (ev. J14-J-28 and J14-J-46), bordering the rock-cut trench, were cut down and leveled before the Central Street was covered with mortar (ev. 6). Furthermore, it could be clarified that the street never extended over the backfilled area south of the wall (ev. J14-J-28). The southern roadside required stabilisation east of this wall, too, and this is a plausible explanation for the fact that the backfill in the eastern part of Trench J was disturbed and partly removed and filled in again. Such a disturbance of the Late-Roman fill is evident only in the eastern sectors k and l. In sector l, the old fill (ev. 32 and parts of ev. 33) was removed, and the mortar (ev. 31) was brought in to stabilise the southern side of the street. During the working process, an obviously ephemeral installation (ev. 34) was built into the remaining fill (ev. 33) connected with the mortar (ev. 31). It was built of irregular stones of different sizes and was only 1.2 meters wide and about 0.7 meters long. The installation was constructed as a base of small stones of irregular form and size, with two side walls of larger rectangular stones. The bottom bore traces of burning, and charcoal was found in it. It is therefore probable that this installation (ev. 34) was an oven used during the building activities. This oven was used for only a short period, which is proved by the fact that the remaining space between it and the southern wall (ev. J14-J-46) was filled, as was the oven itself, covered with parts of the same fill (ev. 32). This is attested by joints between the pottery from fill in ev. 32 and ev. 33 and sherds of a large basin (joint on pl. 8.63). In the neighbouring sector k, similar activities took place concurrently. Here, the older filling was removed down to ev. 57,

and a cluster of stones (ev. 55) was deposited in the fill, but a gap was left between both the stones and the wall (ev. J14-J-46). While the gap was filled again with the removed filling (ev. 54), the area north of the stone cluster (ev. 55) was stabilised with soil and mortar (ev. 56). During this phase, the western part of the oven (ev. 34) was also covered by the same mortar.

A dating of these large-scale building activities in Trench J is complicated, since a lot of older material was reused, and most of the building structures yielded no finds. The removed and refilled portions of the old fill (ev. 33, ev. 32 and ev. 54) revealed no distinct younger material. Larger amounts of Late Byzantine pottery are present only in the layer of ev. 53 above ev. 54, but it was covered by topsoil. Additional finds of Late Byzantine pottery came to light only embedded into the street surface (ev. 6) and on top of it.

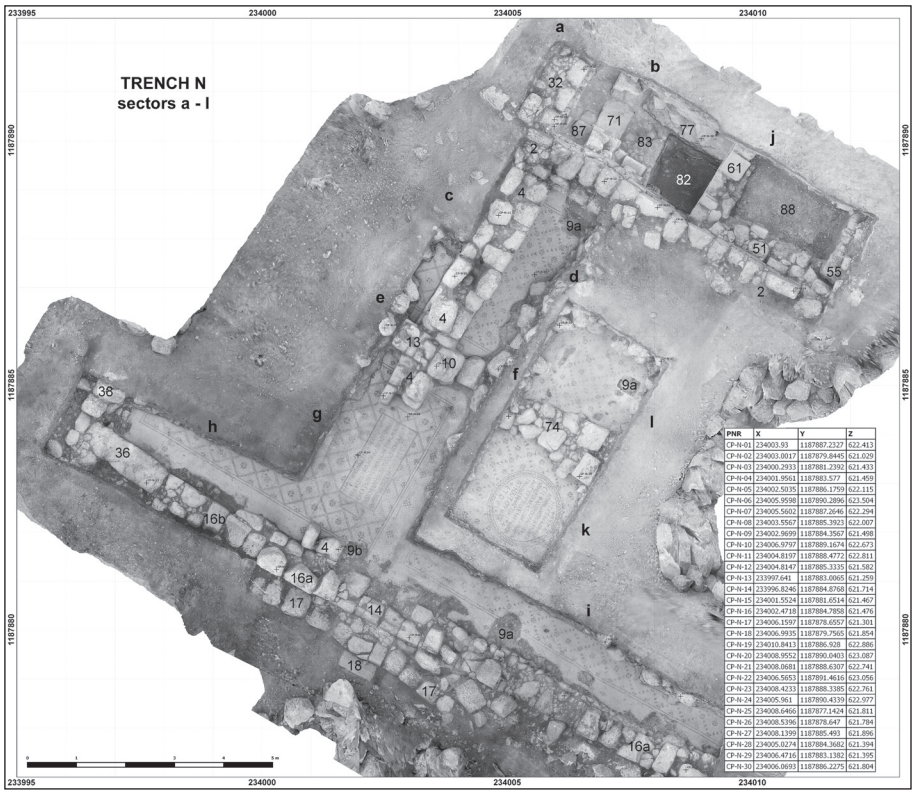
Building Phase 6b (Byzantine)

In this phase, the younger part of the wall in sector m (ev. 68b) was built from the south against the wall (ev. J14-J-46). It forms the western wall of a room that was built against the older wall (ev. 68a) on top of a fill layer (ev. 74). The fill layer was covered by the mortar floor (ev. 72), which ran against both the wall (ev. 68b) and the older wall (ev. J14-J-46) and contained only few diagnostic sherds of Byzantine date. The succeeding layers above this floor are a clayish reddish soil layer (ev. 71), containing a Byzantine coin (minimus (J15-Jm-71-1)), a layer of yellowish-greyish soil (ev. 70) and the stone layer (ev. 69). They probably all stem from the collapse of this room. The stone layer (ev. 69) (similar to the other soil layers, in that it yielded hardly any finds) was covered by a fill rich in Late Byzantine pottery (ev. 67), including a Jarash Lamp (*cf.* for the type pl 17), common ware (*cf.* for the types pl. 10), some cookingware (*cf.* for the types pl. 2 (casserole), storage jars/amphorae (*cf.* for the types pl. 13-14) and a few tableware items. It also ran against a repair (ev. 42) in the wall (ev. J14-J-46). The repair was recognisable by the different kind of stones used to fill the gap. The pottery fill (ev. 67) is very similar to a layer found in the 2014 campaign in the vicinity of the vertical shaft and the wall (ev. J14-J-83), which rested on a similar high level. These younger buildings south of the wall (ev. J14-J-46) seem to be part of a larger building complex connected with Trench N to the south. The walls (ev. 68a and b) seem to be more or less in line with a wall (J15-N-55) excavated at the eastern limit of Trench N and founded on a similar level. If it is not the same wall, it could well belong to the same building complex.

Structures or finds that attest Early and Middle Islamic activities were not found in Trench J. Even the stones (ev. 35) in the northeast corner of sector l, which seem to form a corner-like structure, were embedded into a layer (ev. 2) disturbed in modern times, containing a minimus (J15-Jl-2-21). The topsoil covering the entire Trench J contained one of the few Late Roman C (LRC-ware) tableware imports (pl. 6.45).

Trench N

The main aim of Trench N was to find the assumed southern entrance to the north cave in Trench J as well as to clarify if an east-to-west running terrace wall was hidden under a terrain edge in the same area [Trench supervisor was Ulrike Rübesam]. Since the south cave had already been discovered at the beginning of the excavation by surface cleaning, the trench was laid out further to the south and only about 10 meters south of Trench J, with two sectors on top and another two sectors south of the aforementioned terrain edge (**Figs. 1, 2**). Among the most important discoveries in this trench, aside from the confirmation of an older utilisation phase of the cave system, was the finding of a large mosaic hall with well-preserved mosaic pavements next to the so-called synagogue church, which was an older synagogue that had been transformed into a church in 530/31AD, at the latest (**Fig. 6**) (Kraeling 1938: 234-241, 323, 324 and 484 for the inscription with date 530/31AD. Most recently, for the synagogue church, *cf.* Dvorjetski 2005). The excavation of the mosaic hall required extensive work and forced an extension of the trench in several directions to detect the boundaries of the hall. Thus, a total of 13 sectors (a-m) were explored with a total area of 108m², although some of the western sectors (a, c and e) were only cleaned and the top soil removed or partly excavated. Since an eastern boundary of the mosaic hall



6. Trench N, excavated structures.

was not found, sector m was placed about 11.5 meters east of Trench N on the line of the southern wall and at a spot where a north-to-south running wall seemed to exist.

To sum up, the earliest activities were connected with the use of a Roman cave complex, which ended with the erection of the mosaic hall in the Byzantine period. The history of the hall is documented by four phases from its founding to its destruction, probably by an earthquake in Umayyad times. While Trench J was characterised by large Late Roman pottery fill, Trench N was dominated by later fill of Late Byzantine/Early Umayyad pottery. Roman finds are rare in original contexts but occur in later fill. It is remarkable that solely in the vicinity of the church, pottery with Christian symbolism occurs, such as a Jarash Bowl (pl. 3.26) with an incised cross, as well as a stamped cross on the ground of an imported Late Roman C plate (pl. 6.47) and a pilgrim flask with an impressed bust of a male (pl. 16.97). The youngest find is an Ottoman-period pipe (pl. 18) that was found in one of the surface layers (ev. 3). Until today, not many Ottoman pipes have been found in Gerasa, and the actual type is unique so far. Other examples stem from the North Theatre (Clark and Bowsher 1986: 264-267).

Sector M (Byzantine)

Since the stratigraphy in sector m was seriously disturbed and cannot be linked to the results in other sectors, it seems reasonable to summarise the results separately. This sector, with a length of 2.6 meters and a width of 1.8 meters, was placed only 3 meters north of the church on top of a long terrace wall (see **Fig. 1**). In the sounding, walls running east to west were found on both sides of an arched doorway, in which a floor made of smooth whitish mortar was situated (**Fig. 7**). The masonry of the walls and the collapsed arch seemed to be of good quality, because well-fitted blocks were used. Because of the restricted dimensions of the sounding, it is not possible to come to far-reaching conclusions, but it is obvious that the floored space must have been roofed. The wall west of the arch seems to take approximately the same course as the terrace wall along the northern side of the church and could thus be the northern wall face of the same wall. Furthermore, this wall seems to be more or less in line with the south wall of the mosaic hall (ev. 16a). Different to this situation, the wall east of the arch starts further north but does not seem to be connected with a wall taking a course parallel to the southern terrace wall. Although it is

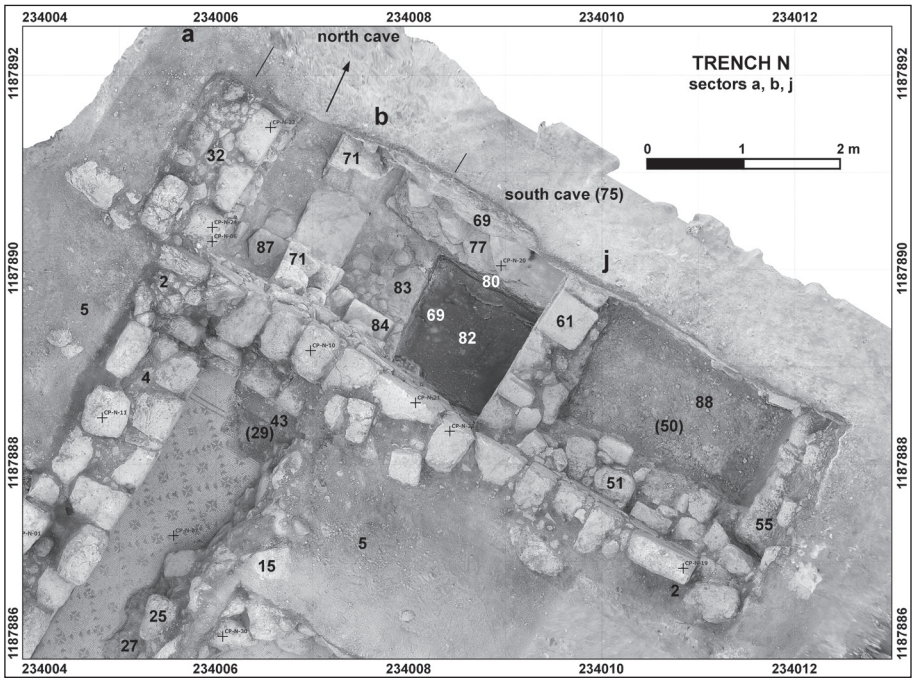


7. Trench N, structures in sector m, view from west.

almost impossible to get a clear view of the architectural setting north of the church, it is very likely that the structures in sector m and the mosaic hall further west were integrated into the retaining wall system around the church. Thus, a Byzantine date is most likely, even though these walls were marked as later walls in the plan by Kraeling (Kraeling 1938: plan XXXVI). Finds worth mentioning from sector m are fragments of decorated marble slabs and an arm fragment of a marble statue (pl.23.145).

The Roman Cave System

The south cave (ev. 75) (J15-J-27) has an almost rectangular shape and measures about 4 meters (east to west) by about 3.2 meters (north to south) and is thus smaller than the north cave (see **Fig. 2**). It was cut from the south into a rock cliff (ev. 69) of about 3 meters. The front was straightened and bends northward in the direction of the north cave, which is situated only 3.5 meters further north. In front of the cave, a vestibule-like entrance room was found (**Fig. 8**). Its eastern side was closed by a wall (ev. 61), which was built against the rock. The western boundary was formed by a wall corner (ev. 84), also set against the rock wall and accessible through a wide door (ev. 71). The gap between the eastern wall (ev. 61) and the western wall corner (ev. 84) suggests that either another door must have been situated on the south side of the small room, or another room was situated further south. The lack of a door frame seems to favour the latter suggestion, but this could not be proved, since this part was later built over by the north wall (ev. 2) of the mosaic hall. Access to the vestibule in front of the south cave, as well as to the south entrance of the north cave, was afforded by a staircase (ev. 87) set from the west against the southwest corner of the vestibule, leading from a higher level in the south down to the caves. Since the bottom of the south cave lies at a still deeper level, a pedestal (ev. 83) was placed inside the vestibule behind the threshold, leading down to a mortar floor (ev. 82) on top of the bedrock (ev. 69) in front of the cave entrance. From this floor, further steps must have led down into the cave, but a staircase is not visible and probably



8. Trench N, excavated structures in the northern sectors a, b and j.

remains hidden under a younger blocking wall (ev. 77) and deliberate fill (ev. 80 and ev. 57). The approximately 3.13 meters wide rock-cut opening in the southern side of the cave was partly closed by a wall (ev. 85, J15-J-29) from inside. This wall was bound to the outer wall (ev. 61) from both sides, and in its longer western part of 1.83 meters in length, a door was placed, which could be closed from inside. From inside, an upper door stop is visible, cut into the bedrock ceiling, and the lower part of the stone-built western door jamb was found still *in situ*. On the shorter side east of the outer wall (ev. 61), an opening seems to have been left in the upper part of the wall for a window (**Fig. 9**). Since the interior of the south cave was destroyed by illicit digging, the floor was found covered with the debris of the wall (ev. 85), and heaps of the younger fills were set against this wall from outside. The only original installation that could be identified is a rectangular lamp niche, cut into the centre of the eastern rock wall. A small opening in the southwest corner of the cave is probably modern and was dug during the looting. It is too narrow and irregular to be a regular entrance, and it bears fresh traces of modern work [The opening measures only 0.82m in width and about 0.65m in height, and the soft rock is only 0.35m thick].

Cuts and beam rests in the vertical rock (ev. 69) attest to the vestibule originally being roofed. Some stones resting on top of the rock cliff above the beam holes could have been connected to such roofing. Not only the threshold and the pedestal, as well as the floor inside the vestibule, were covered by mortar but also the outer staircase and the access way to the north cave. This suggests another roofed room or passage situated in front of this cave.



9. Trench N, western door frame inside the south cave, view from north.

The lack of finds from undisturbed contexts prevents a precise dating of the south cave. The interior of the cave was completely disturbed, and in the vestibule almost no pottery was found. A copper coin (J15-Nj-81-1) embedded into the top of the mortar floor (ev. 82) awaits analysis, and the same applies to the charcoal samples from the same floor. But the stratigraphy and building sequence suggest that the structures belonging to the cave are the oldest in this spot. If alterations have not taken place - and there is no evidence so far - the north cave and the vestibule are contemporary with the first phase of the north cave in Trench J. For this reason, a dating in the Roman period is likely.

The Byzantine Mosaic Hall

Three major phases can be distinguished for the Byzantine mosaic hall that was discovered south of the cave. In the first phase, the hall was built, and the first mosaic floor was laid. In the second phase, the hall was enlarged to the west, and this part was covered with a new mosaic. The third phase is characterised by the transformation of the long hall into smaller room units for different purposes than in the preceding phases. The building structures belonging to the mosaic hall in the first and second phases are recognisable from the mosaics because the mosaics were set against them. These are the north wall (ev. 2), the south wall (ev. 16a/b) with the bedrock (ev. 36) and the door (ev. 14), the west wall (ev. 38) and the only inner buttress (ev. 13) found so far. Since the east wall was not yet detected, only the minimum dimensions of the enlarged hall can be determined. The hall was at least 15 meters in length and 10.46 meters in width, with an area of more than 157 m². The buttress (ev. 13) was situated not on the centre line of the room but was offset about 0.6 meters to the north. The span of the roof beams was thus measured at 3.85 meters and 4.47 meters, far less than the 7.15 meters in the nearby church. The mosaics of the first and second phases together covered an area of more than 123.8 m² (see **Fig. 1**).

An architectural connection between the so-called “synagogue church” and the 45-year-younger mosaic hall is clear. The hall was located on a long terrace, which retained the higher

terrain north of the church, and both buildings were accessible from a small courtyard in front of the church. From here, there was access to a corridor, towards which inscriptions were orientated within the mosaic hall.

Building Phase 1 (Byzantine, before 576AD)

In its first layout, the mosaic hall seems to have been shorter, and it ended behind a prominent joint visible between the older and younger parts of the south wall (ev. 16) (see **Fig. 6**). This joint corresponds with the western side of the buttress (ev. 13), and the older mosaic could be detected only west of this line. Architectural observations, together with the soil stratigraphy, confirm that the north wall (ev. 2) of the mosaic hall was built over the walls (ev. 71, ev. 84 and ev. 61) of the Roman cave vestibule and on top of a soil fill of Late Byzantine date (ev. 80), which covered the Roman mortar floor (ev. 82). The north side of the hall was therefore situated at a distance of about 1.8 meters from and parallel to the rock cliff (ev. 69), and the pavement of the hall was laid on a 1.4-meter-higher level. The gap remained open for the most part, as only the entrance to the south cave had been blocked from the outside by a rubble wall (ev. 77) to stabilise the foundation layer (ev. 80). On top of the foundation fill (ev. 80), only the younger fill (ev. 57) was found, which could have been deposited soon after. This area was completely backfilled with an almost 2-meter-thick layer (ev. 57), mainly of soil with small pieces of charcoal, partly well-preserved pottery sherds and a few larger stones (ev. 58), as well as pieces of wall plaster and some stucco profiles. The fill consists of a large Late Byzantine pottery deposition with mostly well-preserved sherds. It consisted of locally produced tablewares, such as Jarash Bowls (pl. 3.26, pl. 4.29), cookingware (pl. 2.13-16), common ware (pl. 8.62), fragments of Jarash Lamps and one pilgrim flask (pl. 16.97). It occurs mixed with imported tableware (LRC), one fragment with a stamped cross (pl. 6.47), African Red Slip Ware of Hayes Type 91B (pl. 5.38) and fragments of LRA 1 amphorae - one with dipinto (pl. 16.96). All of them are of 5th- and 6th-century AD date. Architectural elements, such as tegulae and wall plaster (pl. 20-21), many glass finds and some metal objects (*e.g.* a lot of different-sized nails [See Eger in this report, cat. 150]) are also well-preserved in the fill layer. However, the context is mixed with Roman finds, such as a fragment of a Kapitän II amphora. Charcoal samples taken from the fill (ev. J15-J-25) in front of the north cave are available as well. Besides some Roman sherds, the backfill (ev. 57) contained large amounts of Byzantine pottery of the 6th century AD. Of the 40 coins found in this fill, 8 were not identifiable, and 19 have not been analysed yet. The remaining coins are composed of 12 so-called minimi and one Late Roman coin. On this basis, we have to assume a Byzantine date for the filling activity. The charcoal samples taken from the same fill (ev. 57/J15-J-25) inside the tunnel of only 1.2 meters in height, which was dug by the looters, seem to contradict such a young date. The sample from the bottom was dated to 340-535AD [Sample no. 23928 (J15-Jh-22), Department of Physics and Astronomy, Aarhus University (Denmark), C_{14} age 1636±28, d13C (dual-inlet) -24.88±0.05, calibration curve IntCal13, 1σ 383-526AD (383-429AD 60.2%), 2σ 340-535AD (340-435AD 73.7%)], while the sample from the middle part yields the date 411-543AD [Sample no. 23929 (J15-Jh-23), Department of Physics and Astronomy, Aarhus University (Denmark), C_{14} age 1585±28, d13C (dual-inlet) -23.7±0.05, calibration curve IntCal13, 1σ 423-535AD, 2σ 411-543AD] and the date given by the sample from the soil ceiling is 428-605AD [Sample no. 23930 (J15-Jh-24), Department of Physics and Astronomy, Aarhus University (Denmark), C_{14} age 1522±28, d13C (dual-inlet) -23.15±0.05, calibration curve IntCal13, 1σ 437-592AD, 2σ 428-605AD]. The same compact fill (J15-J-25) sealed the southern blocking wall (ev. J14-J-103) of the north cave.

The entrance situation found in the older south wall (ev. 16a) formed a stairway between the mosaic hall and the small yard west of the "synagogue church". The threshold (ev. 14) has a length of only 1.07 meters and the door a width of only 0.8 meters, underlining that this narrow door could have been secondary and not the main entrance. Against this, a low wall (ev. 17) of only about 5 meters in length was set from the south. A single stone step (ev. 18) of only 0.74 meters in length was attached from the south against the low wall, completing the

stairway. The door and the attached wall seem to belong to the original layout of the hall, because the first was integrated into the old south wall, and the second seems to have protected the foundation of the wall. Nevertheless, it is possible that the low wall (ev. 17) and the step (ev. 18) were attached or modified in a later phase. However, this could not be proved, since these structures were disturbed as a result of seemingly having been excavated already in 1929 [In the plan given by Kraeling 1938 (plan XXXVI), only the northwestern boundaries of the yard were marked as excavated, although it is obvious that a wider area was unearthed, and the door with two steps were found; *cf.* Crawfoot and Hamilton 1929: 212].

The mosaic (ev. 9a) of this first layout (ev. 19a) of the hall has a geometric decor of lozenges with rosettes and a tondo inscription field, in which the date March 576AD for the mosaic is given (see **Fig. 6**) [The publication of the inscriptions of the mosaic hall is in preparation by R. Haensch, A. Lichtenberger and R. Raja]. The inscription is situated close to the entrance and facing west. Thus, it was readable to a visitor entering the hall and walking through it. The foundation (ev. 43) of the mosaic was just a soil layer mixed with soft mortar, small stones and some non-diagnostic pottery sherds. This was apparently the first flooring of the building.

The sparse finds from the wall foundation (ev. 80) can be dated no closer than to the later Byzantine period. A precise dating of the first phase is possible on the basis of the inscription, which gives the year 576AD for the tessellation. It is self-evident that the construction of the hall must have been finished before the mosaic could be laid, and the temporal interval between the two events could not have been too long, although it has to be emphasised that the date 576AD could refer only to a repair phase, thus making the hall several decades older.

Building Phase 2 (Byzantine, before 591AD)

In this phase, the former west wall was removed and the hall enlarged in westerly direction for about 5 meters (see **Fig. 6**). The joint between the older (ev. 16a) and the new south wall (ev. 16b) is also discernible by a change of the wall thickness as well as an offset course of the wall stones. Furthermore, the slightly northward-bending course of the new south wall required that the southernmost rows of tesserae were laid in a wedge shape. On its course, part of the bedrock (ev. 36) was integrated into the new part of the south wall. The west wall (ev. 38) was also attached to the bedrock (ev. 36) but could be traced for only 1 meter in northern direction. Although only about two meters of the southwest corner were excavated, it seems as if another wall diverges from the corner in southern direction. This wall was probably aligned with the wall that constitutes the western limits of the court in front of the church (see **Fig. 1**). Inside the room, a new mosaic (ev. 9b) was laid with decor similar, in terms of style and technique, to the older mosaic (ev. 9a). Most of the framed fields of the older mosaic (ev. 9a) were retained. In the northwestern part of the hall, a new field seems to have been laid out, differing from the old in the form of the lozenge lines and the dimensions of the rosettes, but also differing from the mosaic in the room south of it [It was not possible to prove this deduction without removing the rest of the younger wall (ev. 4)]. In contrast to this, the southern field of the new mosaic (ev. 9b) was shifted to the east and attached to the old. The junction between the two mosaics is a curvy seam with a slight disorder of the tesserae rows. In this field, a tabula ansata was placed close to the entrance with a new inscription facing east. Thus, the inscription was readable when entering the hall and situated facing the old inscription. The new inscription gives the date July 591AD for the tessellation of "*this western part of this kellion*", which was therefore completed only 25 years after the laying of the other part of the mosaic.

Building Phase 3 (Umayyad)

The main features of this phase inside the hall are some walls and at least one door, which were carefully built directly on top of the mosaics, thus dividing the long hall into smaller units. This shows that the hall was still in good order and useable when these additions were made. North of the hall, a complete modification took place, because the space between the hall and the rock was backfilled, as was the open surface of the bedrock. On this higher level, buildings were erected and set against the north wall (ev. 2) of the hall. Fully excavated was the new wall

(ev. 4), which was carefully founded on top of the mosaic between the south wall (ev. 16a) and the north wall (ev. 2). This wall integrated the buttress (ev. 13) and covered the younger inscription field [The southern part of the wall (ev. 4) had to be removed to document the inscription hidden underneath]. An installation of large boulders (ev. 10) was set on top of the mosaic (ev. 9a), against the eastern side of the buttress (ev. 13) and connected to it by means of mortar. This seems to be the western jamb of a doorway situated at the western end of a wall, leading in an easterly direction, and was perhaps connected with the older roof supports further east. A trail of debris containing only undiagnostic sherds (ev. 74) was unearthed east of the door (ev. 10), in sectors k and l; it seems to be the remains of this wall. It is obvious that the former spacious open hall was split into smaller rooms by the new walls. The southern entrance was obviously kept, and in the eastern part of the hall, at least two rooms were created by the construction of the wall (ev. 74) between the old buttresses. Access from the south to the north room was possible through the door (ev. 10). In contrast to this, the western part of the former hall was completely separated from the rest by the wall (ev. 4). An entrance to this western room could have existed only in the west wall (ev. 38), because in the western part of the south wall (ev. 16b), no door was found, and the north wall (ev. 2) was too high up. The continuous utilisation of the hall explains the lack of deposits with datable material in the interior. What was found are the disturbed and eroded remains of the destruction debris. The last hall modification thus took place between the end of the second phase and the destruction of the hall.

Much more informative are the evidences in the sectors excavated north of the hall (see **Fig. 8**). A wall (ev. 32) of 1 meter thickness was founded on top of the fill (ev. 57) and set against the northern wall face of the hall. The lower part of this wall was backfilled with soil (ev. 49 and ev. 56) from the east to cover the foundations. The soil was filled with well-preserved fragments of local tableware, cookingware and amphorae, as well as some Jarash Bowls. Furthermore, imported tableware - a Late Roman C Ware (pl. 6.48) - as well as one minimus were among the finds. Since flooring was not found east of the wall (ev. 32), it is probable that this part constituted the outside, and that the building extended west of the wall. In the northeastern part of the trench, a room 3.25 meters in width and at least 1.90 meters in length was unearthed on almost the same level. It, too, was built on top of a fill (ev. 57) and against the wall (ev. 2). This is evident from inside the north cave where the fill east of the wall (ev. 61) is visible. For the layout of this room, the old wall (ev. 61) was reused as the west wall. Against the hall, a new south wall (ev. 51) was set and connected to the new east wall (ev. 55). The masonry of the inner walls was bound by a thick mortar coating, and the floor (ev. 88) was made of mortar as well. So far, such a thick mortar coating has only been met in cistern contexts, but the mortar floor (ev. 88) seems to not be waterproof. The top of the fill (ev. 49 and ev. 56) must have marked the walked-on level between the two new buildings north of the hall.

A date for this enormous building activity can be established on the basis of finds in the foundation layers (ev. 49 and ev. 56). The foundation layer (ev. 49 and ev. 56) confirms that mainly Byzantine pottery from the 6th century AD was incorporated in the fills, and the coins do not contradict this [In ev. 49, only a minimus was found (J15-Nj-49-1) and in ev. 56 only a corroded fragment]. At this point, we have to mention another complex unearthed on top of a thin soil layer (ev. 78) above the floor (ev. 88). There, an open fireplace (ev. 50) was found, which was covered by soil and wall debris (ev. 48). It must therefore belong to a later phase of the eastern room before it was destroyed. The soil layer (ev. 78) underneath the fireplace contained Late Byzantine pottery, well preserved and consisting mainly of locally made table- and cookingwares, a high amount of amphorae or storage jars and an imported Late Roman 1 Amphora, similar to the finds from the backfill (ev. 57). A sample from the charcoal in the fireplace yields the early date 92-252AD [Sample no. 23927 (J15-Nj-60), Department of Physics and Astronomy, Aarhus University (Denmark), C_{14} age 1826±26, d13C (dual-inlet) -25.27±0.06, calibration curve IntCal13, 1σ 139-225AD, 2σ 92-252AD]. This is far too old, because the fire place (ev. 50) is not only younger than the buildings above the backfill

but also much younger than the mosaic hall, for which a reliable date is at hand. Also in ev. 57 Roman intrusions have been noticed in a context of a much later date.

Phase 4 (Destruction, Umayyad)

A sudden destruction of the former mosaic hall is evident from a broken grey-ware vessel (ev. 29 and ev. 28, pl. 12), which was found in front of the north wall under the wall debris and pressed into the older mosaic pavement (ev. 9A). The reason for this destruction was a heavy earthquake, the impact of which can also be traced in other areas of the trench. An undulation of the mosaic pavement is clearly visible in sector l and could be the result of an earthquake. Furthermore, it is discernable that mainly the soil body with the mosaic and the walls on top of it moved in southern direction, and that the bedrock either did not move or only moved slowly. In front of the south wall, but especially in front of the bedrock (ev. 36), the mosaic was bent upwards like a carpet. Inside the hall, the remains of the destruction, like the debris (ev. 24 and ev. 25), were better preserved close to the north wall (ev. 2). The upper portions of the debris were either lost by erosion or disturbed and partly removed in much later times when this area was used for agriculture (ev. 5 and ev. 15). In the southern part of the hall, under the top soil (ev. 3) and a layer of brownish soil, only a relatively thin layer of yellowish soil (ev. 12, ev. 40 and ev. 70) of Late Byzantine/Early Umayyad date was preserved on top of the mosaic. It contained mainly pottery, but also some tiles - among these one imbrex (pl. 20.126). In other parts, too, this layer was replaced by a layer rich in humus (ev. 22, ev. 37 and ev. 35), with hardly any diagnostic sherds and two tegulae (pl. 20.122-123), probably of Late Byzantine date. In front of the south wall (ev. 16), pieces of wood (ev. 53 and ev. 54) were embedded into the layer of yellowish soil (ev. 40). This layer also appeared close to the north wall (ev. 21, ev. 22, ev. 27, ev. 28 and ev. 34) where it was much better preserved, covering not only the mosaic but also the broken grey-ware basin (ev. 29). Since the layer of yellowish soil seems to cover most parts of the floor and some of the objects as well, it is likely that it stems from the collapsed roofing of the hall.

North of the hall, traces of the destruction are less distinct, because the contexts are closer to surface level and this area was leveled in modern times. Above the walked-on level and inside the eastern room, debris of collapsed stones (ev. 42 and ev. 48) and soil (ev. 20) remained undisturbed. This soil layer contained a high amount of pottery of mixed dates. The earliest finds are Roman imports (Eastern Sigillata A, ESA); however, a lot of local Byzantine tableware (Jarash Bowls) and local lamps, as well as fragments of a LRA 1 Amphora, are mixed in the context along with architectural remains (pl. 20.125). Two Islamic coins, found in the same context, date the fill to Umayyad times. It was covered by a relatively thick layer of mixed topsoil.

The finds from the debris and the layers inside the hall stem mainly from the Late Byzantine to Early Umayyad period, although some Roman sherds were present. The only *in-situ* find, the grey-ware basin (ev. 29), can be dated between the 7th and middle of the 8th century AD (pl. 12). The same goes for the finds in the surrounding yellowish soil (ev. 28), in which fragments of this vessel were found as well. A more precise date for the earthquake is gained from the debris north of the hall. While the stone collapse (ev. 42 and ev. 48) did not contain finds, ev. 20 was a mixture of Roman to Late Byzantine pottery. Among the coins from this layer, two Umayyad coins suggest a later date, the late 7th to perhaps the early 8th century AD, to be specific [One is an Islamic copper coin with a countermark (J15-Nj-20-80) and the other an Umayyad copper coin of perhaps Standing Caliph type (J15-Nj-20-42). The rest of the coins are two minimi and one Late Roman coin (J15-Nj-20-11) struck at the end of the 4th century AD]. On this basis, it seems justifiable to take the earthquake of 749AD to have caused the destruction.

Trench O

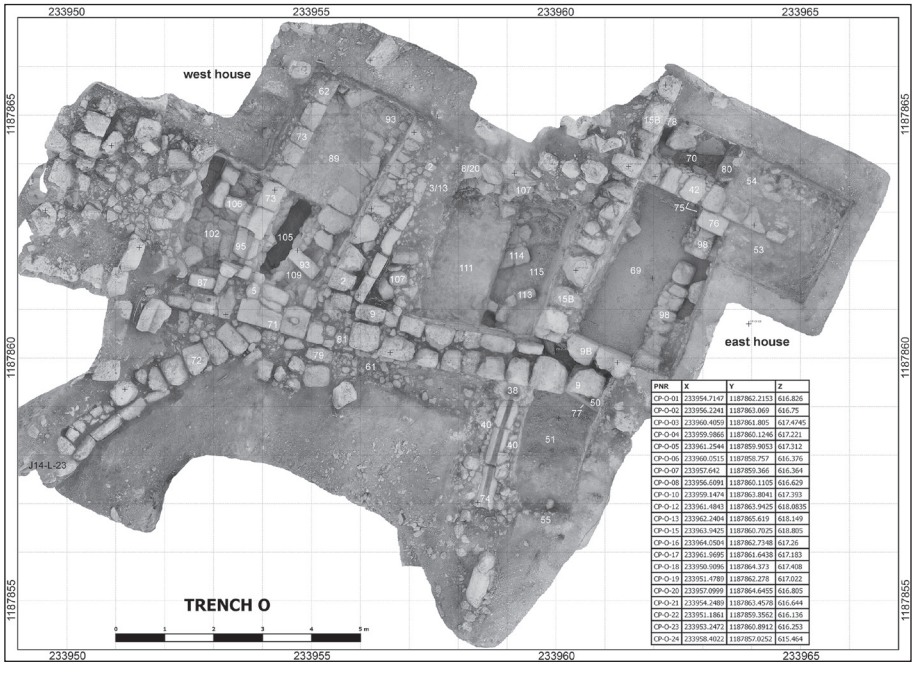
With Trench O, situated along the northwestern edge of the large Roman cistern, the investigation of the cistern and the surrounding area was continued (see **Fig. 1**) [Trench supervisor was Malene Byø]. To gain a better overview, it was decided to open an area with 12 sectors (sectors a to l), resulting in a total area of about

70.5 m² (**Fig. 10**). Below a mostly thin layer of topsoil (ev. 1), an intentional fill (ev. 3 and ev. 13) was unearthed, which covered the entire area and the leveled remains of multi-phase buildings situated north of the Roman cistern. The cistern itself, as well as the discovery of the continuation of a built water channel (ev. 109), enable us to link the stratigraphy in Trench O with the main building phases detected in trench L in 2014 (for the results of the 2014 season, see Kalaitzoglou *et al.* 2018). Furthermore, it is possible to establish a connection with the structures unearthed in Trench F based on a retaining wall (ev. 55) found in Trench O, which also takes a course inside the cistern parallel to the northern border, supporting an intentional fill (ev. 51 and ev. 47) very similar to the one found in 2013 further east (for the results of the 2013 season, see Kalaitzoglou *et al.* 2017).

The building sequence in Trench O starts with the Roman cistern (phase 1) and could be traced through several phases of Byzantine habitation along the northern edge of the former cistern (phases 2-4), until the area was finally covered and leveled in Umayyad times. It is noteworthy that, especially in the layers of Roman date, hardly any material was found. This changes in Late Byzantine/Early Umayyad contexts, where the quantity of finds increases. The sherds are in general high to medium fragmented and not very well preserved. This points to secondary deposition in almost all evidences, with the oldest finds dating back to Roman times.

Phase 1 (Roman)

Traces of the first phase were found under the younger wall (ev. 9) in the southeastern part of the trench. There, a thick mortar lining (ev. 77) covers the natural bedrock (ev. 50) and marks the vertical northern side of the Roman cistern (for the Roman date and dating method see Lichtenberger *et al.* 2015). Although the bottom of the cistern was not reached in this very limited part of the trench, the situation was very similar to that of Trenches F and L, where the mortar coating covered the northern and western sides of the cistern in the same way. In all three trenches, the mortar coating of the cistern marks the oldest phase, since distinct traces of quarrying predating the cistern were not found. North of the cistern, the bedrock rises from west to east for about 1 meter, and its surface is uneven and unworked in most parts, showing traces of cutting and leveling only in some places. Especially under and west of the later east house, such rock work is present. The concrete floor (ev. 69) was set against low rock walls (ev. 75), onto which the wall (ev. 42) and arch support (ev. 76) were later built. Immediately north of this wall, the rock remained unworked and is still fissured. The younger wall (ev. 15B) was also built on top of a vertically cut rock step, and the wall (ev. 114) west of it



10. Trench O, excavated structures.

was founded on the leveled rock (ev. 115) at the bottom of this step. In this place, a natural canal was unearthed leading southwards into a natural gully, which must have already been closed in Roman times to keep the cistern clean. Since traces of rock cuttings occur only in the vicinity of the concrete-like floor (ev. 69), it is probable that these features belong together as parts of the same construction. The floor, of which only the northern and western limits could be detected, is very compact and made of pebbles embedded into a hard mortar. This technique is different from all other floors excavated so far in the Northwest quarter. Furthermore, the idea that this pavement predates the building erected above it is proved by the facts that it was set against rock walls, and that the walls (ev. 9B, ev. 15B and ev. 98) were founded on top of it. Therefore, it cannot be ruled out that it belonged to a larger hydraulic construction extending in eastern direction along the northern side of the cistern. This would match well with the sought-after sedimentation tank of the Roman cistern; however, this remains to be clarified in the next season.

Another structure probably of this early date is the base of a wet-built two-faced wall (ev. 114) resting on top of the leveled bedrock east of the concrete floor. Its southwestern-to-northeastern orientation is completely different from the structures found in higher levels, and a mortar layer mixed with soil (ev. 116) is connected to the wall and covers the bedrock north of it. To this installation, one can perhaps add the rounded structure (ev. 113), which was set with mortar against a protruding part of the bedrock (ev. 115). The function of these structures is still debatable, but they could belong to the Roman cistern, because they were all built outside the water basin and on bedrock. Original deposits of Roman date were not found in this place, since even the lowest soil layer (ev. 112), which covered the bedrock, contained pottery of Late Byzantine to Umayyad date and runs against the post-Roman wall (ev. 9). A thick fill layer (ev. 104) of probable Roman date, containing small and worn sherds, was found further west under the so-called west house. There, it covers the unworked bedrock, and the western wall (ev. 73) of the younger house was founded on it. Although the sherds in this brown layer are worn (pointing to a secondary deposit), they seem to be of purely Roman date.

In general, the find rate of Roman contexts is very low. Neither coins, nor metal or glass of Roman date could be found in non-mixed contexts. Ev. 104 is one of the few useful contexts, containing pottery - mainly table- and cooking-wares, and also a Roman lamp, some amphora fragments and a better preserved terracotta figurine (pl. 134a-c). Remarkable is the find of a vessel containing traces of green pigment (pl. 18.105) in the same context.

Phase 2a (Byzantine?)

Most of the buildings excavated could not have been built before the Roman cistern fell out of use and its northern part was separated by a wall and filled, because their southern walls (ev. 9, ev. 81 and ev. 87) were built on top of this fill. Only the so-called east house is situated fully outside the cistern, and furthermore, it shows a slightly different orientation parallel to the northern cistern edge. Therefore, this building could belong to an older phase. Its orientation was given by the rock step (ev. 115), as well as the rock walls (ev. 75) and the older concrete floor (ev. 69) upon which the house was built. Of this house, only the southwestern corner was excavated, but it is obviously part of a larger building complex extending in an eastern and northern direction. What was excavated in the eastern part of the trench is the ground plan of an oblong room 3.5 meters in width in a north-south direction and at least 3.4 meters in length in an east-west direction. The total extension in eastern direction could not be determined in this campaign. The western boundary of the complex is given by the wall (ev. 15B) whose southern part rests on the concrete floor (ev. 69), and whose course at surface level follows the rock step for at least 13 meters. This wall was connected by mortar to the southern wall (ev. 9B), which rests on the concrete floor, together forming a corner. In a later phase, the southern face of this wall (ev. 9B) was replaced by another wall (ev. 9). Parallel to the southern wall, the northern wall (ev. 42) takes course. This wall was built on top of the rock-cut wall (ev. 75), which had to be leveled for this purpose with a thin foundation layer (ev. 84). Two buttresses supported an arch, bridging the room

from north to south. One (ev. 76) was set on the bedrock wall against the northern wall (ev. 42 and ev. 76), and on the south side, a similar buttress was built on top of the concrete floor and into the wall (ev. 9B). The southern, western and northern walls were linked by a white wall plaster (ev. 34), which also covered the arch support (ev. 76). The older concrete floor was also used as a floor in the first layout of this room. North of the wall (ev. 42), an open space or courtyard was situated. This is evident by the presence of only two fill layers (ev. 70, ev. 67 and ev. 68) covering the uneven bedrock (ev. 80) and protecting the foundation of the wall (ev. 42). The top of the stony fill layer (ev. 67 and ev. 68) marks the slightly higher walked-on level outside the room and contains a few - mostly undiagnostic - finds of probable Late Byzantine/Early Umayyad date.

The dating of this phase is difficult, since almost none of the associated layers or structures contained any artefacts or diagnostic finds. Since the west wall (ev. 15B) seems to be part of the overall plan of the housing on the south slope, this argues for a post-Roman, probably Byzantine or even later, date.

Phase 2b (Byzantine?)

This sub-phase is attested by an alteration of the east house that cannot be connected with the other building structures. The transversal arch was closed with a wall (ev. 98), dividing the room into a small western room and an eastern room. At 3.5 meters in length and only 1.4 meters in width, the new room was very small and accessible through a door at the northern end of the wall (ev. 98). Since this wall was built on top of the concrete floor (ev. 69) and the northern door jamb set against the plaster coating (ev. 34) of the buttress, it is most probable that the modification took place not too long after the house had been built. Its interior must have been still intact. The only finds that can be connected with the construction of the wall (ev. 98) are three small copper coins [J15-Oe-98-2, J15-Oe-98-3 and J15-Oe-99-1] (minimi) found in the wall core (ev. 99), which for now cannot be dated more precisely than Late Roman to Umayyad.

The next building phase of the house can be related chronologically to the other buildings.

Phase 3 (Byzantine)

In this phase, large-scale alterations took place, which can be linked with evidences excavated in Trenches F and L. In phase 2 of Trench L, the western part of the cistern was separated from the rest by a tower-like structure with a staircase leading into the cistern, and the area outside the cistern was transformed into a habitation area. In Trench F, a high wall (ev. J13-F-19) was found inside the cistern, which takes course parallel to the cistern's north side, thus separating a narrow and backfilled northern strip from the southern part of the basin, which was by then used for housing (for Trench F, see the preliminary field report in Kalaitzoglou *et al.* 2018). As an extension of this wall, which must have met the tower-like structure in Trench L, a very similar wall (ev. 55) was discovered in Trench O. This wall (ev. 55) is most probably the same wall that was found in Trench F (ev. J13-F-19); it was built to support a fill (ev. J13-F-12 and J13-F-16) very similar to the fill (ev. 51 and ev. 47) unearthed north of the wall (ev. 55 in Trench O). These congruent features confirm that, in this phase, the entire northern part of the older cistern was filled up to its edge, and a staircase was constructed at the western side to grant access to the settled part of the cistern. The latter is apparent from the results in Trench L.

In Trench O, all built structures except the east house demonstrate prior filling of the cistern, because their southern walls were built above the northwest corner of the cistern, and must therefore rest on the fill. The evidence for dating the filling is limited, because finds were scarce or non-diagnostic. The lower fill (ev. 51) was sterile, and the upper fill (ev. 47) contained a few diagnostic sherds, mainly tableware, cookingware and some food-preparation ware of Roman to Late Byzantine or Early Umayyad date. Ev. 48, a small concentration of pottery between these two evidences, contained few sherds of Late Byzantine date.

The oldest building assigned to this building phase is the so-called west house in its first layout. Of this house, only the southeastern part with a door was excavated in the eastern part of the trench. If not already in this phase, at least in the next phase, it belonged to a larger building complex extending northward. This complex

was connected by walls to the neighbouring complexes west and southwest of it (see **Fig. 1**). Especially informative is the connection by a wall of the southwest corner with a house of the same phase, excavated in Trench L. This wall connection created an almost right-angled inner corner, leading to the south street on a zigzag course above the fill along the northern side of the former cistern. Such a course was already assumed for this phase based on the results in Trench L.

The ground plan of the east house is defined by the eastern wall (ev. 62 and ev. 73) and a western wall, which is outside the trench but takes a parallel course 3.1 meters further west (see **Fig. 10**), as well as the south wall (ev. 87) connecting both walls. An exterior door (ev. 95) is situated in the eastern wall (ev. 73), next to the southeast corner. The northward extension of this room was excavated to a length of 4.95 meters, but it most probably met an east-to-west running wall, visible on surface level at 7.2 meters (see **Fig. 1**), resulting in an oblong building with an area of about 22.3m². The floor of this first layout was a pavement of irregular shaped stones (ev. 102) laid into soil (ev. 103). The dating of this building relies on finds from the foundation layers and the floor. They all consist of few diagnostic, unspecific and badly preserved sherds. The eastern wall (ev. 73) and the threshold of the door (ev. 95) were founded on top of the fill layer (ev. 104), which contained only worn fragments of Roman pottery (pl. 21 and pl. 22.134a-c). In the foundation layer (ev. 101), which was set from the west against the wall and the door to level the terrain outside, no diagnostic sherds were found. Inside the house, in the soil (ev. 103) between the pavement stones, some sherds of grey fabric were found. They point to a post-Roman date. A similar date was assumed for the connected building in Trench L, and this house also was founded on a fill layer rich in Roman pottery.

Phase 4 (Late Byzantine - Early Umayyad)

In this phase, major alterations occurred, as the house was consolidated and the zigzag course of the street changed to a more diagonal course, because the water channel (ev. 72 and ev. 109) was laid. As a result of discovering the built water channel (ev. 72 and ev. 109) in Trench L also (ev. J14-L-23), we are able to correlate this phase with the fifth building phase of Trench L.

In this phase, the west house was transformed into an enclosed building complex that extended eastward to the east house. Parallel to the wall (ev. 62 and ev. 73), the new wall (ev. 2) was built on top of the former walked-on level (ev. 101), with hardly any diagnostic sherds. A wall (ev. 9) was built in alignment with the south wall (ev. 87), with the two meeting in the corner (ev. 81). The southern wall (ev. 9) was built on the upper part of the cistern fill (ev. 47) to connect the extension of the west house with the south wall (ev. 9B) of the east house. The cistern fill contains a few diagnostic sherds of mixed date. The earliest finds date to Roman times (Pl. 3), but a handle with painted decoration in white and brown dates to the Umayyad period. The door (ev. 95) in the wall (ev. 73) had to be blocked by a wall (ev. 110), because the corridor between the walls (ev. 2, ev. 62 and ev. 73) was filled (ev. 100) to construct the water channel (ev. 109). Above this fill, a thin foundation layer (ev. 88 and ev. 94) was laid for the new clay floor (ev. 89), reaching the tops of the covering slabs (ev. 93) of the channel. The clay floor contained pottery finds of Late Byzantine to Early Umayyad times. Inside the former west house, the level was raised with a similar fill (ev. 97) of the same period, containing just a few diagnostic sherds, in which the foundations were laid for a small wall enclosure (ev. 106) set against the western face of the wall (ev. 73). Since the new clay floor (ev. 91) was found both inside and outside this enclosure, it could not have been a bench or a podium. The few worn diagnostic sherds date to Late Byzantine/Early Umayyad times.

After implementing these building activities, the room was accessible only from further north, but the entrance (ev. 71) to this enlarged building complex was situated in the south wall next to the blocked door. At the same time, the threshold of the new entrance served as a cover for the water channel (ev. 72/109), leading from the north through the corridor and underneath the door in a southwestern direction to the south street. South of the house, the street was paved with stone slabs (ev. 79) next to the channel or covered with smaller stones and soil (ev. 61).

Of this street surface, only a small strip along the walls (ev. 87 and ev. 9) was not eroded or covered by topsoil. Since neither a floor nor any structures or installations were found in the space defined by the walls (ev. 2, ev. 9 and ev. 15B), the space between the two houses was not used for domestic purposes.

Inside this enclosure, only a yellowish fill (ev. 111) was found that covered the older structures and ran against the walls (ev. 2 and ev. 9). The preservation of the few finds in the fill was very good. One complete basin with comb-decoration (pl. 11) and the base of a storage vessel (pl. 13) were found, both of Umayyad date. A water inlet (ev. 38), which was set with mortar against the southern face of the wall (ev. 9) in this phase, indicates that the room might have been roofed and that a water pipe could have been connected to the inlet. The soil inside the inlet (ev. 39) contained a few sherds, among them a piece of tableware (Jarash Bowl, pl. 4.32) of Late Byzantine date. A channel (ev. 74) is attached to the inlet; it consists of four carved column drums which led above the backfill and through the top edge of the retaining wall (ev. 55) into the former cistern. Both the inlet and the channel were fixed to the backfill and protected carefully by a compact foundation of stones and mortar (ev. 40, ev. 41, ev. 45 and ev. 49); the channel was covered by stone slabs.

The building sequences prove that all these modifications belong to the same construction process and certainly took some time to be accomplished. For the contemporary building phase 5 in Trench L, a date in the Byzantine period was assumed. For Trench O, the youngest finds seem to favour a slightly later date in the Late Byzantine to Early Umayyad period.

The fill (ev. 100) under the channel and corridor floor is mixed in date. A few, mostly undiagnostic sherds point to a date in Late Byzantine/Early Umayyad times (pl. 4.28, Jarash Bowl). However, there is a coin of Late Roman date in the fill too [J15-Oi-100-1 is a copper coin of Constans as Caesar, struck 333-337AD]. In the corresponding fill (ev. 97) above the older pavement inside the former west house, sherds of probable Early Umayyad date were found. In the new clay floors inside the room (ev. 91) and in the corridor (ev. 89), the youngest sherds are Late Byzantine to Umayyad. An Umayyad date is assumed for the well-preserved pottery found in the fill (ev. 111, pl. 11.73 and pl. 13.84). Even in the fill (ev. 10) between the older wall (ev. 9B) and the later attached wall (ev. 9), the few pottery sherds included fragments of Late Byzantine to Early Umayyad times - these being the youngest [in this fill, a minimus was also found (J15-Oc-10-1)]. The eroded soil (ev. 24) above the wall (ev. 9) contains a fragment of a lamp (pl. 17.101), probably of Umayyad date. The find contexts connected to the street south of the wall (ev. 9) cannot clarify this dating further, since they were partly eroded and disturbed [ev. 41 for example was contaminated by modern material].

Because of the dating material, we can also add to this fourth building phase the third alteration of the east house. The wall (ev. 98), which was built in phase 2b to close the arch and divide the room, was broken down to the lowest course, and also a higher part of the northern door jamb was kept. This re-enlarged room was filled with a layer of stones and soil (ev. 64 and ev. 65) that contained a lot of pottery of Late Byzantine and Early Umayyad date, including a fragment of an LRA 1 Amphora with dipinto (pl. 16.95) and a lot of common ware, mainly large basins (pl. 8.61) and tableware. A new simple clay floor (ev. 90) was laid on a higher level, and yielded a few finds of Byzantine and Early Umayyad date. The surface, located to the north outside the room, seems to have remained unchanged. In the fill (ev. 64) and new clay floor (ev. 90), pottery of the Late Byzantine to Early Umayyad period was found, as well as some minimi [Two minimi stem from the floor (ev. 90; J15-Oe-90-1 and J15-Oe-90-2) and three minimi from ev. 64 (J15-Oe-64-22, J15-Og-64-2 and J15-Og-64-7)]. It is therefore most likely that this alteration took place in this phase as well.

On this basis, it is both possible and necessary to refine the dating of building phase 5 in Trench L, which is contemporary with phase 4 in Trench O, as Byzantine/Late Byzantine to Early Umayyad.

Phase 5 (Early Umayyad)

The following phase was a complete modification of the area north of the former cistern. In none of the rooms was debris of a sudden destruction or gradual decay found. The walls

were cut down, and the spaces between them were backfilled to the level of the terrain. The interior of the east house and the area north of it were deliberately backfilled at the same time with corresponding layers of soil and some big stones [The layer sequence inside the room is ev. 57, ev. 53 and ev. 44; outside the room it is ev. 56, ev. 54 and ev. 43]. Above the preserved walls, continuous fill layers of soil and smaller stones covered the ruins (ev. 31, ev. 37 and ev. 30), creating a large leveled area north of the former cistern. It is remarkable that, in the upper fill layers (ev. 53, ev. 54, ev. 32, ev. 31 and ev. 30), a lot of semi-finished tesserae were found, along with big lumps of such tesserae embedded in mortar. The lumps (ev. 36, ev. 52, ev. 58 and ev. 59) were found only above and north of the wall (ev. 42, **Fig. 11**). This presence of typical tessellation waste shows that such waste products were available to fill this area in Early Umayyad times (Piccirillo 1986: 40). An Early Umayyad date for the filling activity is attested by an Islamic coin [J15-Og-53-5 is a copper coin with an Islamic but unreadable inscription] found in the fill layer (ev. 53). The pottery of the fill - more than 230 vessels of cooking- and tableware - is difficult to narrow down in date to productions of Byzantine and Late Byzantine to Early Umayyad times. Different to the other contexts, these fill layers are the only pieces of evidence containing a lot of archaeological material, certainly secondarily deposited due to their state of preservation.

In the western part of the trench, a very similar filling practice was observed, since the walls of the west house, too, were cut down to a distinct level, and the ruins backfilled and leveled.



11. Trench O, a lump of raw tesserae (ev. 52) bond by mortar.

The area next to the former east house between the walls (ev. 2 and ev. 15B) was filled with layers containing fair amount of big stones (ev. 108 and ev. 107), perhaps to adjust the higher level of the east house and the area east of the long wall (ev. 15B). The few pottery finds of these layers date to Early Umayyad times (pl. 10). Also a few tegulae and a coin have been found (pl. 19 and pl. 20), as well as a chain link of copper alloy (Kat. 18). The stones used for this purpose probably stem from the demolition of the walls. In the area west of the wall (ev. 2), even thin fill layers (ev. 85 and ev. 86) would have been sufficient to level the ruins. They contained only a few sherds, mostly common ware of Early Umayyad date and an earlier Byzantine coin (minimus, J15-Ob 86-15). The entire area was then covered with a dense and compact packing of stones up to fist size (ev. 3) set in soil (ev. 13). It contains mixed material of Roman, Late Byzantine and Early Umayyad date (pl. 10.70), including two cosmetic spoons or probes of copper alloy (Kat. 7), one possible furniture fitting and a knife (pl. 24.153). This kind of platform ranges from the wall (ev. 15B) in the east, of which the uppermost stones were still visible, to the buildings north of the south street. This is proved by a room in Trench L, which was covered with a corresponding stone packing. The finds stemming from the backfill confirm that the filling activities of the west and the east house took place simultaneously. In the fill layers (ev. 107 and ev. 86) underneath the stone packing (ev. 3 and ev. 13), Early Umayyad pottery was found, and in the stone packing itself, which contained a chronologically mixed find composition, an Umayyad copper coin was also found [J15-Oa-13-13 originates from the Damascus mint and shows an overstrike]. It is worth mentioning that under the topsoil in the upper part of the stone packing (ev. 3 and ev. 13), some Middle Islamic sherds were also found. These could, however, be modern intrusions like the fragment of modern glass found in the uppermost fill layer (ev. 30) above the east house.

So far, there is no indication that the residential area in the vicinity of the cistern was destroyed by the earthquake of 749AD, or that the plot was transformed after this date into spacious platforms. Based on the dating material, it

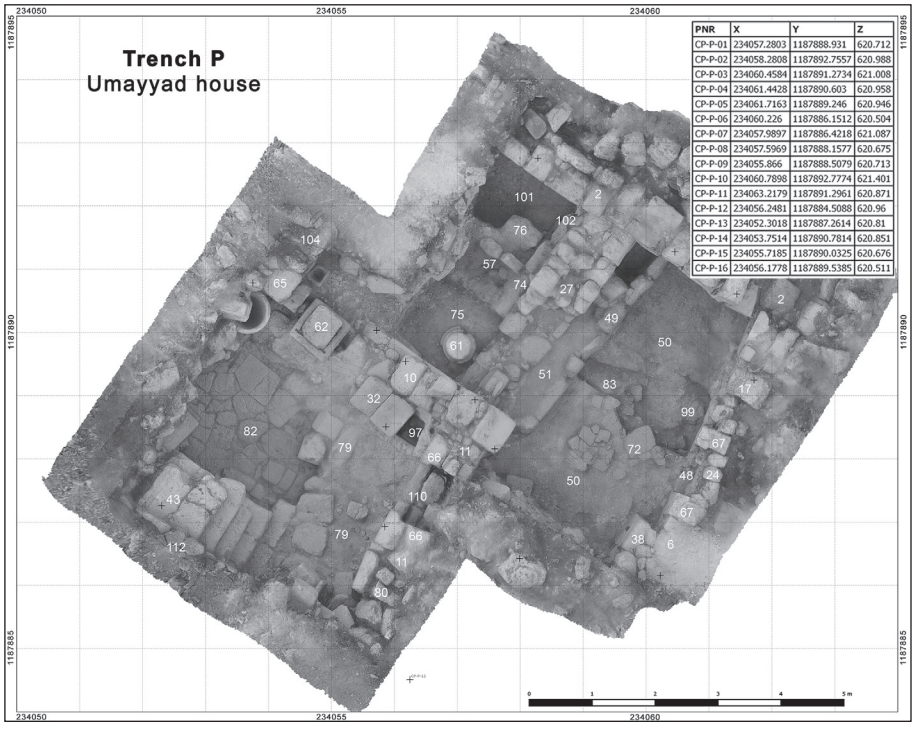
is more likely that this transformation happened before the earthquake, although the purpose of this intervention remains obscure.

Trench P

The main aim of Trench P was to continue with the research of the eastern terrace and to find other undisturbed destruction contexts that could possibly be related to the earthquake of the year 749AD [Trench supervisor was Line Egelund Nielsen]. Therefore, a square of 6 by 6 meters was opened (sectors a to d) south of Trench K, with some wall structures already visible at the surface. This area was later extended towards the southwest with a square of 5 by 5 meters (sector e) with some overlap. In this trench, only 4.3 meters south of the Umayyad edifice excavated in 2014, another large house with an inner courtyard was found, covered completely by debris. If the house plan is more or less symmetrical, and the rooms were arranged around the courtyard, parts of the northeast wing and most of the courtyard were excavated (**Fig. 12**). An additional east room behind the eastern wall (ev. 6/17), attested by a blocked door (ev. 67) opening towards the east, was left unexcavated for the next campaign. About 51.50m² could be excavated out of a total of at least 188.50m², which is the estimated size of a symmetrical and square ground plan of the courtyard house. The area of the eastern room cannot be determined with any precision yet, but if it were linked with the east wall of the house in Trench K, which continues towards the south, this room would add some 66.50m², resulting in a total area of about 255m² for the house (see **Fig. 1**). As a result of illicit digging in Trench K, two blocked and formerly not visible doors were discovered in the west wall of the house (see **Fig. 1**). Since both doors are relatively narrow, they could not be the main entrances to the house in Trench K but rather connected the excavated room with other rooms further west. Hence, this house also seems to have been much larger than previously suspected.

The dimensions and the diversified ground plan with an inner courtyard is different from the one- or two-room house found so far and underline the high living standard of the building in Trench P. Like the house excavated in Trench K, the edifice in Trench P had a relatively short occupation history with only minor architectural changes prior to its destruction by a heavy earthquake.

Since the destruction context is undisturbed, the finds in general are well preserved and not greatly fragmented, which underlines the fact that there was no heavy accumulation process after the abandonment of the site. Nevertheless, destroyed vessels sealed by the destruction



12. Trench P, excavated structures.

debris were not unearthed. The earliest material dates to Late Byzantine/Early Umayyad times, and the youngest finds stem from a surface layer and date to the Ayyubid-Mamluk period. Umayyad pottery dominates in the destruction layers. The main steps of its building history can be traced based on the construction sequences and the two succeeding floors, beginning and ending in the Umayyad period.

Building Phase 1 (Umayyad)

In its first layout, the edifice seems to have been planned as a spacious building with rooms arranged around an inner court with a rock-cut cistern situated under the northern part of the building (**Fig. 13**). This bottle-shaped cistern (ev. 77) was found intact and almost empty; it measures about 4.5 meters in diameter and 3.8 meters in depth [since the opening was still closed by a square stone slab (ev. 62), only a pile of the broken mortar coating and washed in soil was found in the center of the cistern. Because of safety concerns and the narrowness of the opening, the cistern was measured using the Structure from Motion (SfM) technique]. It was cut into bedrock and lined with stones and mortar. The edifice was built on three levels rising from north to south, since the courtyard lies on a higher level than the surrounding rooms, and the massive built staircase (ev. 43) at its southern end leads to a still higher level.

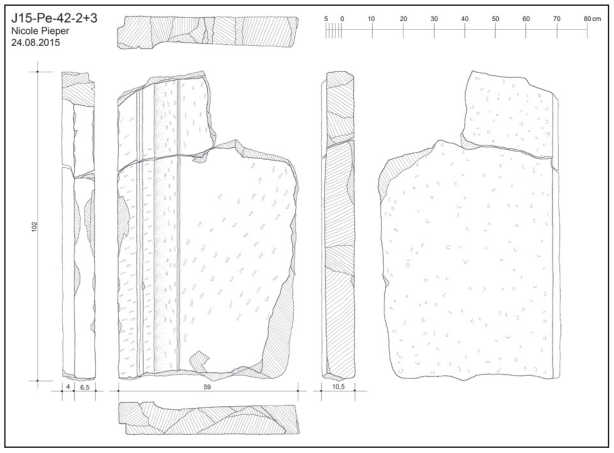
The walls of the first phase rest on bedrock (ev. 99), which was leveled and covered in places with mortar (ev. 103) to fill gaps and cracks. One of the outer walls in the first layout is the north wall (ev. 2), which can be followed on the surface in western direction for at least 5 meters beyond the trench limits (see **Fig. 1**); it also continues towards the east. The eastern limit is given for now by the interim east wall (ev. 6 and ev. 17) with the door (ev. 67), which provided access to another room further east. Of the walls which surrounded the atrium, only the northern and eastern walls, as well as a small part of the southern limits, were excavated. The northern limit is defined by a wall (ev. 10) which runs against another wall (ev. 104), first on a higher and then on a deeper level. Along its course, the wall (ev. 10) runs over the round opening of the cistern (ev. 109). This consists of four stones and is a constructional part of the wall (ev. 10). The opening was covered by a square-shaped well-head (ev. 63) resting on a thin foundation (ev. 107). The about 2-meter-wide opening above the well-head was spanned by an arch leading from the higher western part of the wall (ev. 10) to the arch support (ev. 65) which was built into the southeast corner of the wall (ev. 104). The wall (ev. 104) runs in a northerly direction and seems to have divided the rooms north of the atrium. Access to the cistern from the north was granted by the staircase (ev. 105), set from the east against the wall (ev. 104, **Fig. 13**). Towards the east, the atrium is bordered by the wall (ev. 11) with the two doors (ev. 66 and ev. 80). Both doors connect the atrium with the eastern rooms. Although the area east of the doors was not excavated, it is most probable that one or two staircases led from the lower level to the doors and the atrium. The northeast corner of the atrium was connected with the eastern wall (ev. 6 and ev. 17) by an arch leading from the corner of the walls (ev. 10 and ev. 11) to the base (ev. 38) in front of the wall (ev. 6 and ev. 17). On the southern side of the atrium, a short east-to-west running wall (ev. 112) and the tower-like staircase (ev. 43) were found. Since the wall (ev. 112) is only as wide as the staircase and covered with stone slabs, it is perhaps not the southern wall of the atrium which takes course somewhat further south, but it could belong to it as a partition wall. The flight of stairs leads eastwards from the platform on top of the staircase (ev. 43) down to the courtyard.

Next to the staircase, fragments were found of a banister that was made of a reused stone slab



13. Trench P, northwest corner of the atrium with well head and staircase, view from north.

set into a groove along the western side of the staircase platform (**Fig. 14**). In the northeastern inner corner of the atrium, a vertical water pipe (ev. 31) is still *in situ* and coated with mortar [segments of the collapsed clay water pipe (ev. 18) were found in the debris next to the wall corner]. It drained rainwater from the roof into a channel (ev. 97), which was covered with stone slabs (ev. 32) and mortar (ev. 33), and through it into the cistern (ev. 77). As the channel was coated with plaster, it formed a bench-like structure along the northern side of the courtyard. In this first building phase, the courtyard had a pavement of irregular stone slabs (ev. 82), suggesting an open courtyard without roofing. This would also explain the noticeable height of the threshold (ev. 110) under the door (ev. 66) and the installation of the stone-blocking structure (ev. 106) in the gap between the well-head (ev. 63) and the wall (ev. 104). These features would have kept rain water inside the courtyard for collection in the cistern. Since the round basin (ev. 64) rests on the pavement (ev. 82) of the atrium, and the younger floor (ev. 79) was later placed against it, this installation can also be assigned to the first building phase. The square-shaped well-head (ev. 63) with a round opening bears a square cutting with two side slots for pins of a cover plate. This proves that the well-head could be closed originally, either with a thin stone slab or more likely with a cover plate made of wood and a hinge of other material. The square stone (ev. 62) found on top of the well-head is slightly too long and does not fit into the cutting, and therefore, it seems to be a later substitute. The original lid was to open towards the south, hindering access from this side. Some rope marks solely on the south side of the opening, prove that water was later pulled from the south, as opposed to the first phase, in which water seems to have been pulled with a rope winch, perhaps mounted on the arch.



14. Trench P, fragmented banister slab (J15-Pe-42-2-3) of the western staircase side (ev. 43).

In the east-to-west direction, arches [wedge-shaped imposts were found still *in situ* at both ends of the wall (ev. 10) and arch supports (ev. 65 and ev. 38)] were used to bridge the gaps and support an upper floor in a north-to-south direction. The walls (ev. 104 and ev. 27) served as room dividers in the corridor-like space surrounding the atrium and as supports for an upper storey. The wall (ev. 27), although built on bedrock, must have had a door at its southern end in the original layout, otherwise the western part of the northern rooms would have been separated from the eastern rooms. In a later building phase, this door was closed. The floor of the first building phase in the rooms outside the courtyard was a simple clay floor (ev. 101 in sectors a/c and ev. 83 in sector b/d), which covered a thin foundation layer (ev. 96) west of the wall (ev. 27). This was brought in to level the lower bedrock. The finds from the early phase contain hardly any diagnostic sherds.

The flooring on the first storey was different from that of the basement and must have been mosaic pavement, because large amounts of tesserae, as well as larger mosaic pieces (ev. 9, ev. 29, ev. 39) and large stones with mosaic pieces still attached to them, were found in the debris above the rooms outside the atrium (**Fig. 15**). The mosaic pavements, and the fragments of painted wall plaster found along the north and east walls (ev. 2 and ev. 6/17), which were not connected with the walls - being above them (ev. 27), demonstrate that the upper rooms were well equipped and decorated with more value than the basement. The same conclusion was drawn for the house in Trench K.

Specific functions of the rooms around the courtyard could not be detected, and it is possible that they served more or less as corridors or storage rooms. In its first layout, the basement of the courtyard house does not seem to have been used for residential purposes. Rather, it was open space and well appointed, with doorways granting access to the courtyard and the communication around it.



15. Trench P, collapse (ev. 22) of the upper storey in the northeast wing of the building.

Building Phase 2 (Umayyad)

Some alterations of the original layout took place in this phase, of which new floors and the closing of some of the doorways are the most important interventions. In the courtyard, the older pavement was covered with a layer of reddish-brownish soil, onto which a new floor (ev. 79) was laid. This floor consisted mostly of mortar mixed with some soil and raised the level inside the atrium to the top of the water channel (ev. 97) and the lowest step of the southern staircase (ev. 43). In the eastern part of the courtyard, a row of stones was laid into the new floor, leading from the staircase to the water channel. The function of this installation is not yet clear, but some of these stones are reused architectural elements. The round stone basin (ev. 64) was kept and integrated into the floor, and north of the well-head a small hollowed stone of cubic shape (ev. 84) was placed onto the new floor, which north of the well-head also covered the staircase (ev. 105). Most probably in this phase, the cover of the well-head (ev. 63) was modified and the stone slab (ev. 62) used as a cover.

In the north and northeast rooms, divided by the wall (ev. 27), many modifications took place. The door at the southern end of the wall (ev. 27) was closed with masonry, thus blocking access between the two rooms. East of the wall, a new clay-mortar floor (ev. 50) was laid out, which consisted partly of a cluster of different-sized stones, which was placed in front of the door (ev. 67). As with the row of stones in the new courtyard floor, it is unclear what purpose this installation served. One of the stones is part of a decorative relief, placed face down. It is also probable that the door (ev. 67) was blocked by the wall (ev. 24) in this phase, but this cannot be ascertained because both the older door and the blocking wall rest on the foundation wall (ev. 48), which is part of the eastern wall (ev. 6 and ev. 17). Therefore, none of the succeeding floors run against the blocking wall (ev. 24).

On top of the new floor (ev. 50), a low wall (ev. 49) was built parallel to the wall (ev. 27) at a distance of 0.4 meters, thus forming a long but narrow trough some 0.44 meters in depth, of which the floor (ev. 50) was the bottom. The trough was filled with enormous amounts of new white tesserae. Hardly any other finds, except some soil, undiagnostic sherds and tegulae (pl. 20.120-121) were associated (**Fig. 16**) [only very few black tesserae and some examples with mortar sticking on them were found]. It is still uncertain why the inhabitants stored mosaic stones in this trough, and whether this



16. Trench P, built stone trough ev. 49 with tesserae fill (ev. 51), view from south.

construction was accomplished in the beginning of the second phase or constituted a later addition.

West of the now-closed wall (ev. 27), a new floor (ev. 60 and ev. 75) was laid, and at the same time a foundation layer (ev. 111) was filled in, onto which the following structures were built. The very basic wall-like structure (ev. 74) consists of a column drum and rough masonry and was built from the west against the wall (ev. 27). The gaps between it and the north wall (ev. 2) were filled with stones (ev. 102). When this was completed, a hearth or oven (ev. 57) made of clay and some bigger stones was set from the west against it. Later, the large stone (ev. 76) was placed north of the hearth and next to the wall-like structure. South of the hearth, a Corinthian column base (ev. 61) was set on top of the new clay floor (ev. 75), probably to be used as a table or rack. These features created a kitchen that was installed in this phase in the room between the walls (ev. 27 and ev. 104). The kitchen was accessible only from the west or from the courtyard across the well-head. The hearth shows at least three renewals of its clay coating, all baked and separated by layers of ashes [the layers were counted from ev. 68 as the youngest to ev. 70 as the oldest], pointing to a longer period of use. Inside the youngest hearth, a mixture of soil, ashes and undiagnostic pottery sherds (ev. 56) was found, which are probably the remains of the last use, contaminated by debris. The waste from frequent cleaning of the hearth (ev. 57) was found south of it. It is a wedge-shaped layer (ev. 59) full of ash, which accumulated in front of the hearth above the floor (ev. 75) as well as the northern part of the column base. The quantity of finds around the hearth is very low. The layer (ev. 59) consists of a very low number of vessels of table- and common ware of Late Byzantine and Early Umayyad date. North of the hearth, to its rear, another soil layer rich in charcoal (ev. 55) was found above the floor (ev. 60). Pottery finds from this place (ev. 55) date to Umayyad times. The vessels are very low in number and well preserved (pl. 13.78-79). Also, this layer seems to stem from the cleaning and renewal of the hearth. Embedded in it, two fragments of hardened but unbaked clay plates (ev. 58) were found, which could stem from the clay lining of the hearth.

Most characteristic of this last phase of the edifice is the modification of its layout and probably also its function, before it was destroyed by a heavy earthquake. The formerly well-organised structure with easy access to all rooms was altered to a compound of smaller, separated units with more rural function. Based on the remains of a more luxurious interior, such as mosaics [ev. 9, ev. 13, ev. 29 and ev. 39 were found solely in the northern rooms], white and painted wall plaster (*cf.* pl. 21.130-132) [ev. 35, ev. 44, ev. 45, ev. 54 and ev. 100 were found solely in the northern rooms] and stucco-profiles [ev. 26, ev. 28 and ev. 36 were found in the debris above the wall (ev. 27)] found in the debris, this most probably applied only to the ground-floor rooms. A comparable transformation was observed in the neighbouring house in Trench K.

The Earthquake Destruction of the House

A heavy earthquake caused the final destruction of the courtyard house. This is indicated by the proximity to the destruction complex in Trench K and is also evident from the very similar kind of destruction in this trench and the shifting of the walls. The debris found inside and also above the walls consists mainly of collapsed wall stones (ev. 3, ev. 12, ev. 14, ev. 21, ev. 25, ev. 71 and ev. 73) and a few tegulae (pl. 19.119), as well as large amounts of soil of different kinds (ev. 8, ev. 13, ev. 15 and ev. 30), stemming from the wall cores and wall lining. It is mainly a yellowish-clayish soil (ev. 16), which is very similar to the soil found in the collapse of the neighbouring house (ev. 3 in Trench K). Ev. 15 and ev. 16 contained architectural remains, such as fragmented waterpipes, a few tegulae (pl. 19.113-118) and wall plaster (pl. 21.128-129), mixed with a low amount of pottery, amongst which was one well-preserved Jarash Lamp (pl. 17.102), and a metal strainer (pl. 25.161). Only very few and small fragments of roof tiles were found, suggesting that the courtyard house had no tiled roof.

The Date of the Courtyard House

The finds from the courtyard house were less rich than in the house excavated in 2014 in Trench K. Datable finds of the first building phase are sparse because of the renewal of

the floors. Destroyed *in-situ* vessels stemming from the last phase were not found, and pottery finds are generally rare except in the vicinity of the hearth (ev. 57). The accumulated soil layer (ev. 55) north of the hearth contained Umayyad pottery (pl. 13.78-79). The debris, especially the soil (ev. 16), holds a great deal of datable pottery, of which the youngest is also Umayyad. A sieve (pl. 12.76) with a production phase not before Umayyad times supports this dating. The sherds are not greatly fragmented and, in general, the quantity of vessels is very low due to the non-existent accumulation in the debris layer. Among the better preserved pottery are table wares (pl. 7.57), cooking wares, storage jars (pl. 12.76) and one outstanding find - a sieve, produced in the manner of the common grey-ware basins (pl. 11.74). Among the architectural elements were tiles, plaster and painted plaster. Glass and metal finds are very common; the latter included a keyhole plate, knives and large nails (pl. 24.147 and 151; pl. 25.159 and 162).

More distinct than the pottery, which only provides a rough date, are the coins. The youngest coins prove that the courtyard house in Trench P was built and destroyed in Umayyad times. In the lowest foundation layer (ev. 96) above bedrock (ev. 99) and the mortar coating (ev. 103), an Islamic copper coin was found [J15-Pbd-96-2x. A charcoal sample (ev. 85) taken from the same foundation layer under the floor (ev. 83) obviously stems from old wood, since it gives a Late Roman date. Sample no. 23933 (J15-Pbd-85), Department of Physics and Astronomy, Aarhus University (Denmark), C_{14} age 1697±26BP, d13C (dual-inlet) -22.75±0.05, calibration curve IntCal13, 1σ 332-391AD, 2σ 256-407AD]. In the north room, on the oldest floor (ev. 83) above this foundation, only some minimi and Byzantine coins of the 5th and 6th century AD were found [J15-Pbd-83-1, J15-Pbd-83-1x to J15-Pbd-83-4x, J15-Pbd-83-5x]. The fact that older coins are only found at a higher level coincides with the Late Byzantine pottery recovered from those contexts. Between the stone slabs of the oldest pavement (ev. 82) in the courtyard, an Umayyad coin of the Tabariya mint appeared [J15-Pe-82-1x], proving that the first layout of the house was in use in Umayyad times. Also in the debris (ev. 16) of the house, some better-preserved Umayyad coins are the youngest among older coins [*e.g.* J15-Pc-16-2x (Umayyad of Iliya mint in Jerusalem), J15-Pb-16-4x (Umayyad of Jarash mint), J15-Pc-30-4 (Arab-Byzantine)]. The two Byzantine coins stemming from the 6th century AD [J15-Pa-75-1x and J15-Pc-75-2x], found on the younger floor (ev. 75) under the waste layer (ev. 59), prove that older coinage was still available, only to be lost during Umayyad times. The composition of coins found in Trench P differs in some respect from what was found in 2014 in the neighbouring house. Aside from the coin hoard, which included Byzantine and pre-reform Umayyad coins, the remaining identifiable coins in Trench K consisted of 11 or 12 Umayyad coins, six Late Roman coins, only four minimi and no further Byzantine coins. In contrast to this, the monetary finds in the courtyard house in Trench P consist of only five Umayyad coins and the same number of Byzantine coins, eight minimi and only three Roman coins, of which one even dates to the 1st century AD. Although some of the pre-Umayyad coins probably stem from the collapsed construction material, this explanation is most unlikely for the Byzantine coins found on the floor surfaces in the courtyard house.

Radiocarbon samples taken from the layers in the hearth (ev. 57) confirm the Umayyad dating of the courtyard house and its destruction by the earthquake in 749AD. Charcoal from the middle layer (ev. 69) with no pottery finds yields a date between 650 and 770AD [middle layer: sample no. 23931 (J15-Pc-69), Department of Physics and Astronomy, Aarhus University (Denmark), C_{14} age 1319±36BP, d13C (AMS) -21±1, calibration curve IntCal13, 1σ 658-764AD, 2σ 650-770AD].

Modern and Middle Islamic material (pl. 18.107-110) stems from the uppermost layers (ev. 5 and parts of ev. 13). The presence of some Ayyubid-Mamluk sherds, together with Umayyad pottery, in ev. 8 can be explained by the rodent burrowing (ev. 23) documented in sectors c and d.

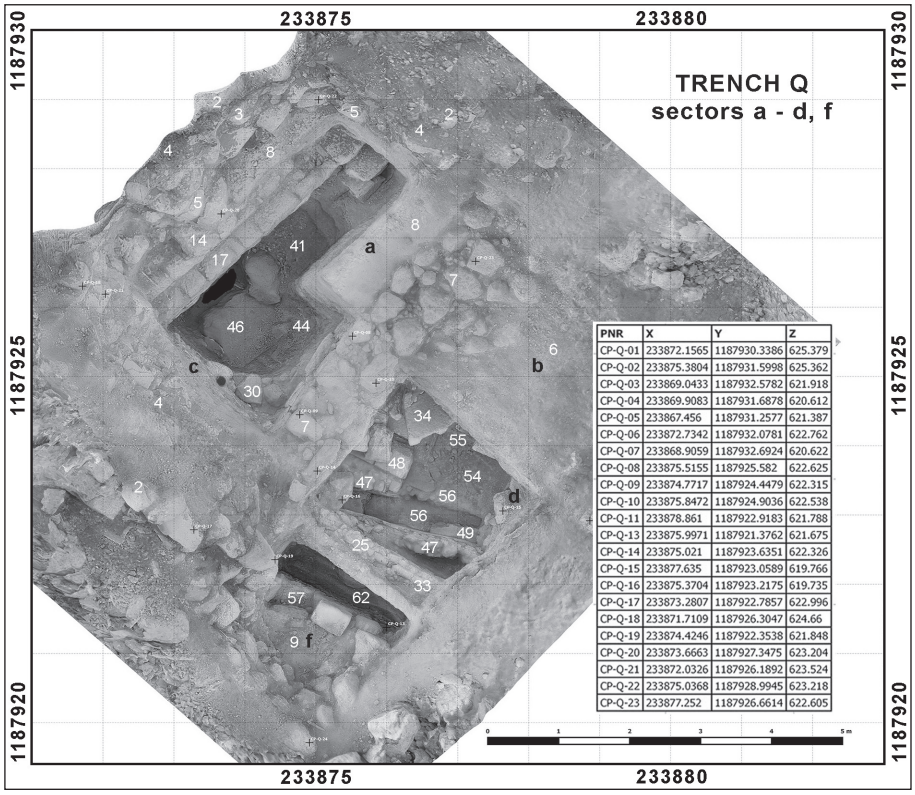
Even though no *in-situ* finds were preserved, the finds present the inventory of the house-complex before its destruction. The finds are well preserved and the low fragmentation hints at a low accumulation process - that is to say, an undisturbed destruction context. The

quantity of sherds in general, but also the variation of types, is low, especially in the earliest building phases of the complex. However, this characterisation continues in later phases. Even though the quantity of fragments increases, the number of vessels and the type variation remains low. Mainly common ware, especially basins and storage jars, dominates the composition of finds, which seems to be typical for this type of Umayyad context. The catalogue of finds of this trench contributes once more (*cf.* Trench K) (Kalaitzoglou *et al.* 2018) to a better understanding of the inventory of Umayyad houses in Jarash.

Trench Q

Jarash is encircled by a 4-km-long and partly well-preserved city wall with 111 towers or massive bastions and some monumental gates. Previous excavations demonstrated that the city wall has a long history of repairs and renewals, but no consensus has so far been reached regarding the date and conception of the original wall. The assumed dates range from the 1st century AD to the Late Roman period [Kraeling 1938: 41 (1st century AD); Kehrberg and Manley 2001 (early 2nd century AD); Seigne *et al.* 1986: 55-59 (3rd/4th century AD)]. To advance the discussion with new archaeological data and to connect this monument with the interior system of retaining walls, we decided to explore the city wall, which forms the western boundary of the Northwest quarter, with three sondages (Q, Qg and Qh) - from the inside as well as from the outside (see **Fig. 1**). The squares were placed close to one of the bastions [we decide to use the more accurate term bastion, because the structure lacks an interior room] where one of the terrace walls meets the city wall. To sum up the results briefly, the explored part of the city wall is of Roman date, and since the wall already existed when the structures inside the wall were built, it is most likely that the city wall stems from at least the 2nd century AD.

On the inside, a main square (Trench Q, sectors a to d) measuring approximately 7.0 by 5.0 meters was laid out, and was then extended with sector f (2.50 by 2.15 meters) towards the south (**Fig. 17**) [trench supervisor was Alessandra Esposito]. On the outside, a rectangular sondage (Trench Q, sector g) measuring 1.40 by 1.25 meters was placed in the northern corner between the wall and a bastion. South of this bastion, a trench 5.50 meters in width and 1.0 meter in length was excavated later (Trench Q sector h) [trench supervisor of the trial trenches outside the wall was Sören Pfeiffer]. While the stratigraphy inside the wall was found well preserved,



PNR	X	Y	Z
CP-Q-01	233872.1565	1187930.3386	625.379
CP-Q-02	233875.3804	1187931.5998	625.362
CP-Q-03	233869.0433	1187932.5782	621.918
CP-Q-04	233869.9083	1187931.6878	620.612
CP-Q-05	233867.456	1187931.2577	621.387
CP-Q-06	233872.7342	1187932.0781	622.762
CP-Q-07	233868.9059	1187932.6924	620.622
CP-Q-08	233875.5155	1187925.582	622.625
CP-Q-09	233874.7717	1187924.4479	622.315
CP-Q-10	233875.8472	1187924.9036	622.538
CP-Q-11	233878.861	1187922.9183	621.788
CP-Q-13	233875.9971	1187921.3762	621.675
CP-Q-14	233875.021	1187923.6351	622.326
CP-Q-15	233877.635	1187923.0589	619.766
CP-Q-16	233875.3704	1187923.2175	619.735
CP-Q-17	233873.2807	1187922.7857	622.996
CP-Q-18	233871.7109	1187926.3047	624.66
CP-Q-19	233874.4246	1187922.3538	621.848
CP-Q-20	233873.6663	1187927.3475	623.204
CP-Q-21	233872.0326	1187926.1892	623.524
CP-Q-22	233875.0368	1187928.9945	623.218
CP-Q-23	233877.252	1187926.6614	622.605

17. Trench Q, excavated structures.

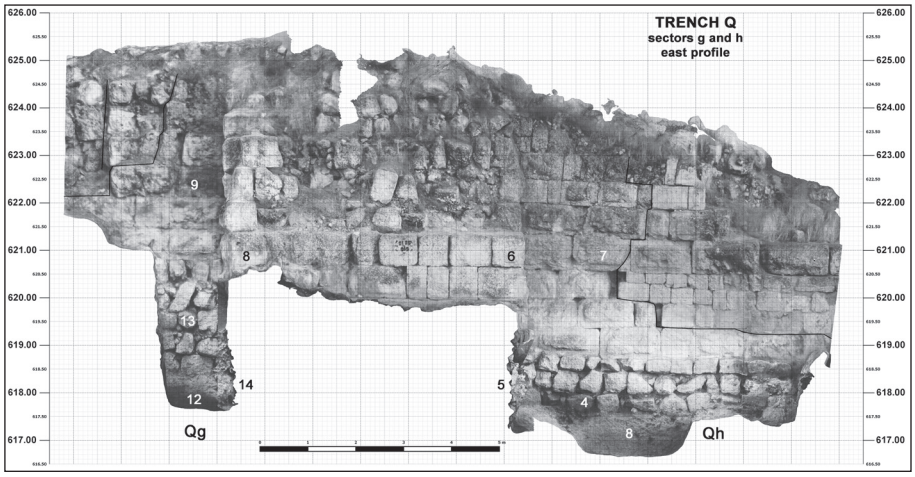
all layers above the outer wall fundament were eroded or deeply disturbed by modern activities [evidence 1 to 7 in sector g were mixed with modern waste, and the same applies to ev. 1 in sector h, which covered the shallow remains of the original fill (ev. 2)]. Therefore, no occupation deposits could be detected on the outside, and even the ancient fill south of the bastion, which formerly covered the foundations, was washed away by erosion for the most part [in sector h, the shallow remains of such an original fill (ev. 2 and ev. 3) were found covering the virgin soil]. Therefore, a dating of the city wall from the outside has to rely on finds and samples stemming solely from the foundation layers. This evidence has to be compared with the results from inside the city wall, where the inner wall face was not traceable; however, a wall set against it as well as structures in front of it were excavated.

To give an overview of the finds in general, they are not well preserved due to the fact that they stem mostly from fill layers. Sherds of pre-Roman date were not found, and the earliest finds date to the late 1st or 2nd century AD. Inside the wall, a sequence from the Late Roman until the end of the Byzantine period was found, ending with the earthquake destruction in Umayyad times.

Building Phase 1 (Roman)
Outside the City Wall (Sectors G and H)

The wall was built in stepped sections from south to north on relatively steep terrain, sloping in a southern and western direction (**Fig. 18**). On the outside, the stone foundations under the walls and bastion are between 1.65 and 2.50 meters high and were set only in some places on the solid limestone rock, which was leveled in sector g (ev. Qg-12). However, as such bedding was only rarely available, they were mainly set on the softer virgin soil (ev. Qh-8). The stepwise building process is easily seen from the levels of the wall bases. The base of the wall (ev. Qh-7) south of the bastion starts at a level between 618.60 to 618.95m. asl., whereas the bastion walls (ev. Qh-6 and Qg-8) start between 619.00 and 619.30m. asl., and the wall (ev. Qg-9) north of the bastion starts at 620.80m. asl. Although the terrain could have been prepared all at once, this stepwise construction required the completion of the preceding parts, which seems to argue against an organisation involving contracted teams working simultaneously. It is obvious in sectors Qg and Qh that the bastion could not have been built before the southern wall (ev. Qh-7) was built, and that the northern wall (ev. Qg-9) was not erected before the bastion foundation (ev. Qg-14) was laid and the bastion was built on top of it. In addition, the foundations and surrounding area must have been backfilled before the walls and bastion were raised.

The stone foundations on the outside consist of quarry stones of different size and shape with soil in the interstices and partial wide gaps. In sector g, only the lowest fill layers set against the stone foundation were found undisturbed. The lowest layer (ev. Qg-11) was a more clayish-reddish soil, which covered the bedrock and filled the interstices of the foundation. A few pottery sherds, but no diagnostics, occurred only in the upper parts of this layer. Above this, a quite different fill layer of loose grey-to-whitish soil (ev. Qg-10) was found with some more pottery



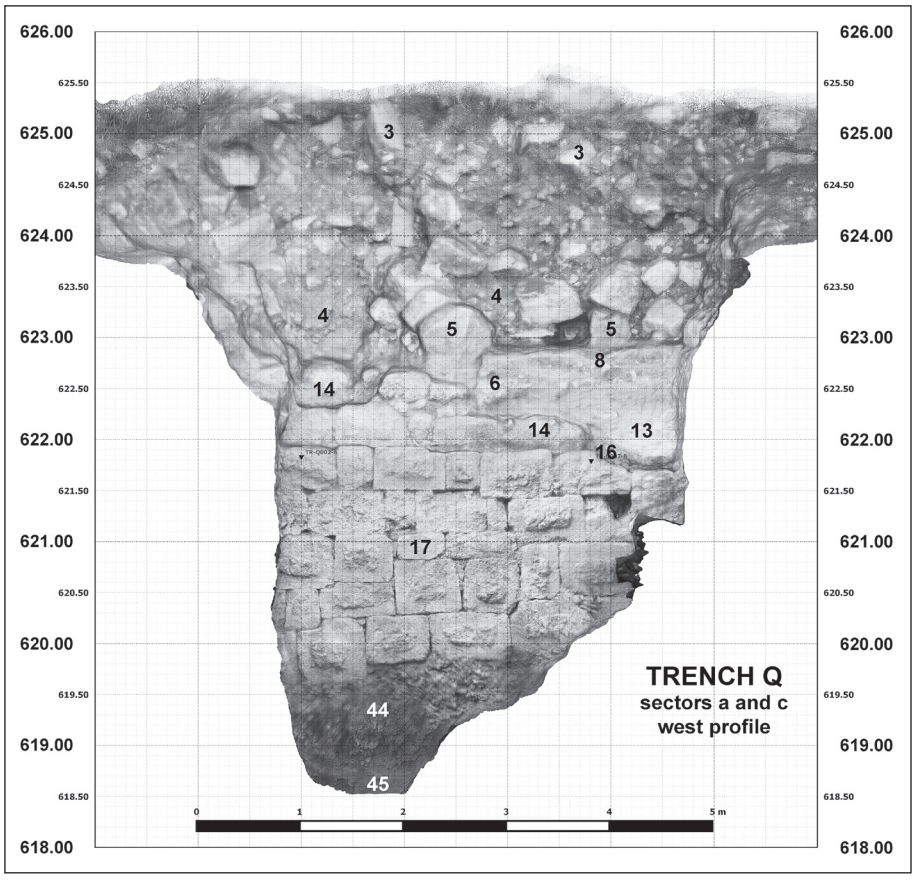
18. Trench Q, east profile of sectors g and h.

sherds, but again with hardly any diagnostic or datable material. In general, the sherds are quite small and worn. All layers above this contained modern waste. In sector h, the basal layer under the stone foundation consists of a very compact yellowish virgin soil (ev. Qh-8), without any anthropogenic residues. This was covered by a layer of clayish and reddish-to-brownish soil (ev. Qh-3), very similar to the lowest fill in sector g. Only the top of this layer held some small finds of Roman date. The most outstanding find was one fragment of a relief bowl of imported Gaulish tableware (pl. 5.37). In contrast to sector g, the next fill layer (ev. Qh-2) consisted of brownish soil with fist-sized stones and only few finds of Roman date, among them common ware, cookware and some tableware, mostly imported Eastern Sigillata A (ESA) of Early Roman date. A precise dating of these foundations is difficult due to the fact that most of the pottery sherds are undiagnostic and badly preserved. Nevertheless, the finds seem to be purely Roman. In addition, some samples were taken for both radiocarbon and optically stimulated luminescence (OSL) dating. The latter especially should yield a reliable date for the backfilling of the foundations. The results of the sample dating will be published soon in another report.

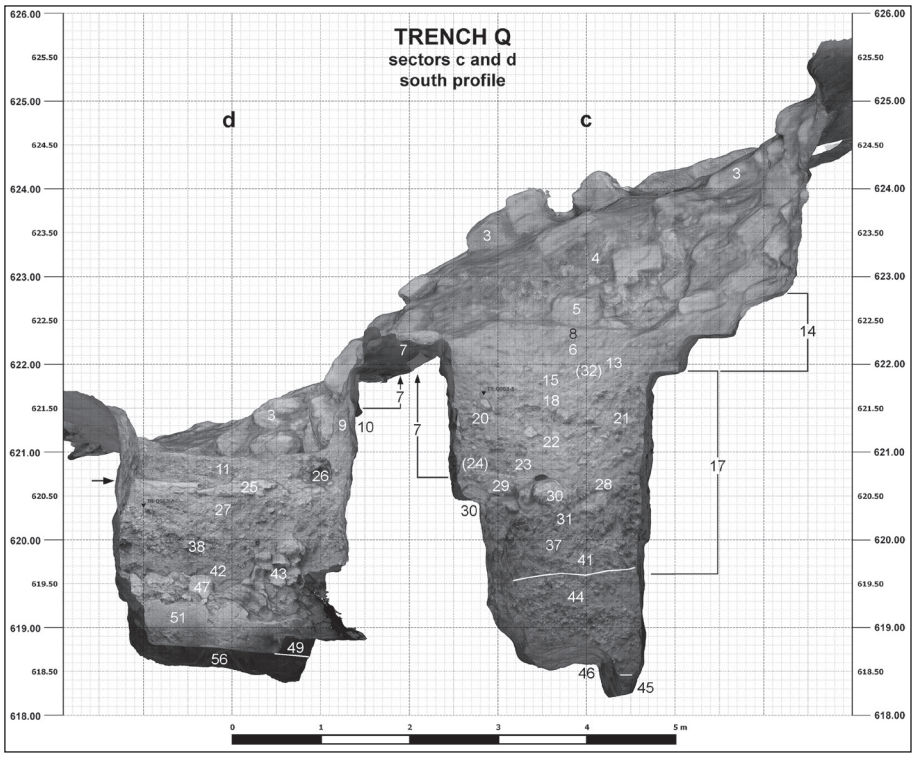
Since no undisturbed contexts were preserved of the time after the city wall was founded, later repairs and modifications are visible only on the wall faces. The wall (ev. Qh-7) south of the bastion shows signs of repair with smaller stones, and in the more southern part also modern restoration with cement. Only the stone fundament, as well as the first course of wall stones and the zone closer to the bastion, seem untouched by later alterations. On the outer face of the wall (ev. Qg-9) north of the tower, only an ancient repair is visible. A vertical line about 1 to 1.5 meters north of the tower indicates that parts of the upper courses seem to have been collapsed or removed, and that this part was filled later with smaller stones laid in irregular masonry. At the moment, it is not possible to date these ancient repairs.

Inside the City Wall (Sectors A-D and F)

Inside the wall in sectors a and c, a wall face (ev. 17) was unearthed with similar masonry - albeit of smaller stones - at a distance of about 1.4 meters in front of the reconstructed course of the inner wall face (see **Figs. 1, 19**) [The reconstruction of the wall course is based on the geodetic survey and the measured width of the wall]. It does not seem to be part of the city wall and could not be part of the bastion, since the wall face extends further north beyond the limits of the bastion. The parallel course and distance between the inner and outer wall faces seem to match best with a stairway leading up to the parapet walk, most probably from the north. Not only the masonry of the probable staircase is different, but also the foundation is not the same as that of the city wall. It was not built on the uneven bedrock surface (ev. 46) or the residual clay (ev. 45) in the depressions (**Figs. 19, 20**). Prior to construction, the area was covered with thick soil and gravel fill (ev. 44) to level the building ground, with the building stones being set directly onto this fill without a stone foundation. The lowest stone courses were protected by the fill layer (ev. 41), and this was covered by soil with a thick mortar layer (ev. 40) of a following phase, set from the east against the wall (ev. 17). As a result of the observation that the probable staircase was not founded on bedrock, and that it is neither part of the city wall nor of the bastion, and that it is not the oldest structure inside the city wall, contemporaneity cannot be deduced from the stratigraphy. A terminus post quem for construction in Roman times is assumed based on the pottery and C_{14} dating [Sample no. 23488 (J15-Qac-44-75), Department of Physics and Astronomy, Aarhus University (Denmark), C_{14} age 1816±25BP, d13C (dual-inlet) -26.41±0.05, calibration curve IntCal13, 1σ 140-237AD, 2σ 128-314AD (128-254AD, 93,5%). Sample no. 23493 (J15-Qac-44-6), Institut for Fysik og Astronomi, Aarhus University (Denmark), C_{14} age 1819±26BP, d13C (dual-inlet) -22.83±0.05, calibration curve IntCal13, 1σ 140-235AD, 2σ 126-316AD (126-254AD, 93,4%). The wide range and similarity of both samples derives also from their position on a calibration plateau. The same goes for the sample no. 23492 (J15-Qd-11-37)] of the fill layer (ev. 44) and residual clay (ev. 45) between the second half of the 2nd and the first half of the 3rd century AD. The pottery mainly consists of local cooking- and tableware (pl. 3.21) and only a few items of



19. *Trench Q, west profile of sector a and c.*



20. *Trench Q, south profile of sectors c and d.*

imported tableware, exclusively Eastern Sigillata A (ESA) and an imported Roman lamp of unknown origin (pl. 17.99). The covering mortar layer (ev. 40) contained a small amount of similar Roman pottery (mainly tableware, also imported ESA, pl. 5.43). It is noteworthy that grey, worn body sherds occur in the same layers. This can be observed elsewhere in Roman

contexts of the same trench. Since the sherds are very small and differ in condition from others in the same contexts, they could be later intrusions; however, since they regularly occur, we also have to rethink the commonly accepted dating of the first occurrence of local grey ware and possibly shift the production date backwards into Late Roman times [since grey and orange ware consist of the same clay and temper, and colour is just based on different firing methods (see Merkel and Prange in this report), it is possible that a few kilns produced grey ware already in Late Roman times].

Similar to the situation outside the city wall, the southward-sloping terrain inside the wall is very steep and exposed to erosion. It therefore had to be protected by a retaining structure from the beginning, which seems to be the Roman period. The enormous soil body preserved in this place confirms that this structure is still intact or underwent reconstructions. This observation is important for the lowermost contexts unearthed in sectors d and f and for their relation to the long terrace wall.

Only 2 meters east of the staircase, the situation is different, because the lowermost structures unearthed in sector d [sector b was excavated only up to ev. 6 so as not to destabilise the wall (ev. 7)] are the remains of a podium-like structure and a built drain, and both rest on the worked bedrock surface (ev. 56, **Fig. 21**), and both are therefore older than the staircase. The rectangular pedestal (ev. 48) was made of boulders similar to the rustication masonry used for the city walls and the wall (ev. 17). Some of the smaller outer stones were set in mortar, as can be seen by the imprint of a missing block (ev. 55), and the outer face of the pedestal was coated with mortar (ev. 53). Only the lowest courses were preserved, and they were covered by a pile of similar boulders (ev. 42) and very loose soil (ev. 43). Above this, concentrations of smaller stones (ev. 39) and a large stone slab (ev. 34) were found. The more compact soil (ev. 52) east of the pedestal and under the stone fill was grey, deriving from disintegrating mortar coating. Since no traces of this pedestal were found in the neighbouring sector c, it was probably not longer than 2.5 meters and perhaps the same in width [because of safety concerns, it was not possible to follow this structure underneath the wall (ev. 7)]. Several interpretations are possible for a pedestal located east of the city wall but not fully parallel to it. Its non-exalted setting and its simple, bare construction seem to exclude prestigious functions. If one takes the position as well as the massive construction into consideration, an ephemeral constructional function cannot be ruled out. The trapezoidal stone slab (ev. 34) with two broad notches in its longer side, which was found above the pedestal - although not *in situ*, looks like the counterweight of perhaps a building crane. But this remains speculative.

After the pedestal was built, a drain (ev. 47) was constructed next to it (**Fig. 21**). A relative later construction date is attested by the fact that the north wall of the drain, consisting of small stones and soil, was set against the base of the pedestal. The drain leads from east to west towards the city wall, and its base was cut into the bedrock (ev. 56). The side walls consist of small- to medium-sized stones, set in soil, and the interior was coated with hydraulic mortar (ev. 51) and covered by flat stones. Because of the weakness of the side walls, the vicinity of the drain must have been backfilled and the



21. Trench Q, water drain (ev. 47) built against the pedestal (ev. 48), view from east.

drain itself covered to protect it. From this, it follows that the base of the pedestal (ev. 48) must also have been covered with a fill of at least 0.6 meters in thickness, corresponding to the thickness of the fill (ev. 44) below the wall (ev. 17) in sectors a and c. Although the drain could be traced only in sector d because of its course, it was possible to establish its straight continuation for about 3.5 meters in a westerly direction from the eastern edge of a covering slab in the southwest corner of the sector [this measurement was done with a laser rangefinder from inside the hollow space above the mud layer (ev. 49)]. At this point, the course of the drain turns downward or to the south. Although the measured distance is a little too short to reach the wall (ev. 17) and bends southwards, it would have run parallel to the wall. However, since the wall (ev. 17) rests on top of the surrounding fill (ev. 44), the drain was built prior to the wall. The absence of an outlet on the outside attests that the drain did not cross the city wall, arguing for a southern course alongside it. A thick mud layer (ev. 49) inside the drain and the skeleton of a rat document the last phase, before it fell out of use.

The dating of these structures, founded on bedrock and stratigraphically older than the wall (ev. 17), can be done based on radiocarbon dates and the pottery found in the fill layers (see above ev. 44 and ev. 45). The remains of the mortar coating (ev. 53) covering the pedestal (ev. 59) without any pottery finds is dated based on the radiocarbon date of a piece of charcoal, dating with greatest probability between 209 and 342AD [sample no. 23491 (J15-Qd-53), Department of Physics and Astronomy, Aarhus University (Denmark), C_{14} age 1771±27BP, d13C (dual-inlet) -24.20±0.05, calibration curve IntCal13, 1σ 235-326AD, 2σ 142-342AD (209-342AD, 87,7%)]. Thus, an overlap of only 45 radiocarbon years is given with the older date for the fill (ev. 44) in the 2nd or 3rd century AD under the relatively younger wall (ev. 17). A piece of charcoal from the mortar lining (ev. 51) inside the drain (ev. 47), which was built after the pedestal, gives a remarkable earlier 14C date, namely one between 71 and 220AD [sample no. 23490 (J15-Qd-51-1), Department of Physics and Astronomy, Aarhus University (Denmark), C_{14} age 1877±26BP, d13C (dual-inlet, extreme small) -23.96±0.05, calibration curve IntCal13, 1σ 77-208AD, 2σ 71-220AD]. The overlap with the pedestal mortar is only 11 radiocarbon years, and with the foundation fill of the wall (ev. 17), it is at least about 92 radiocarbon years. Although the data seem to contradict each other, they all meet in the first quarter of the 3rd century AD. The pottery finds, mainly tableware and common ware from the original fill (ev. 52) and destruction layer (ev. 42 and ev. 43) above it, do not contradict a Roman date in the 3rd century AD (pl. 6.53 and pl. 14.88). In sum, a date in the 3rd century AD is probable for all three structures - the pedestal, the drain and the staircase, although they were built one after the other. Since no direct connection exists, it is not yet clear if this date is valid also for the foundation of the city wall in sectors g and h.

Another structure built on bedrock is a retaining wall (ev. 57) in sector f, which seems to be the prolongation of the long east-to-west running terrace wall, visible on the surface (see **Fig. 1**). This sector had to be separated from the neighbouring sector d by a baulk under the younger clay water pipe (ev. 31, **Fig. 17**). The retaining wall (ev. 57) was built on top of a thin foundation of small stones (ev. 59) above a layer of compact clayish soil (ev. 61), which covered the bedrock (ev. 62). The bedrock in this place is unworked for the most part but shows traces of leveling next to and under the wall foundation. The upper part of the retaining wall (ev. 57) was badly eroded; hence, the upper fill layers and parts of the younger wall (ev. 7) are missing. The preserved part of the stratigraphy shows a simple sequence of successive fill layers. The lower fill, which was laid from the north against the retaining wall, was preserved. The lowest fill (ev. 61) runs under the wall foundation and the fill layer (ev. 60) against it, and both must be, if not the same, then at least contemporary with the backfill of the drain. The next layer is a thick fill (ev. 38) of brownish soil with flecks of disintegrated mortar, which runs against the retaining wall. This layer contains a medium-high quantity of pottery, mainly tableware, cookingware and few common ware items of Roman date, including an imported Kapitän II amphora.

In this fill, a 3-centimeter-thick, horizontal mortar band (ev. 58) was also found. Of this

layer, only the southern parts were encountered undisturbed in sector d, and there they cover the drain (see **Fig. 20**). This fill, therefore, belongs to filling activities after the construction of the pedestal and the drain, and is most probably contemporary with the lowest fill set against the Roman wall (ev. 17). Pottery finds were rare in the foundation (ev. 59) under the retaining wall and in the lowest fill layers (ev. 61 and ev. 60), but the sherds from ev. 60, consisting mainly of local table- and cookingwares, yield a Roman date. For this fill, a radiocarbon date is also available, and it ranges from 24 to 209AD [Sample no. 23489 (J15-Qf-60), Department of Physics and Astronomy, Aarhus University (Denmark), C_{14} age 1907±28BP, d13C (dual-inlet) -23.38±0.05, calibration curve IntCal13, 1σ 71-126AD, 2σ 24-209AD (24-170AD, 93,6%)]. Although this date is somewhat earlier than the early charcoal from the mortar coating of the drain, there is still an overlap in the first quarter of the 3rd century AD. Since the foundation fill (ev. 60) of the wall (ev. 57) must run against the drain (ev. 47), both structures were connected. And since all other fills (ev. 41 and 38) are younger than the retaining wall (ev. 57), this simple structure must have been built in Roman times to retain the foundations and protect them from erosion. Taking into consideration that older and younger wood was used for the mortars, and that charcoal of similar diverse age found its way into the fill, it is possible that all structures described so far originate from the same construction process, which probably took place in the earlier 3rd century AD.

The results can be summed up as follows: First, the pedestal (ev. 48, ev. 53 and ev. 55) was built on the leveled and cut bedrock, and probably shortly after that, the water drain (ev. 47, ev. 51) was constructed next to it. These evidences did not contain any pottery. Immediately after that, the retaining structure (ev. 57, ev. 59) was set from the east against the city wall to retain not only the backfill of the drain (parts of ev. 38, parts of ev. 42 and ev. 52), but also the foundation fill (ev. 44) onto which the staircase (ev. 17) was built, as well as the fill (ev. 41) covered by the mortar (ev. 40). These fills had to protect the staircase foundation. All of these features display a logical sequence of building steps that can be related to the construction of the city wall in this area. But since the staircase (ev. 17) was set against the eastern face of the city wall and the connecting point of the city wall, and the retaining wall (ev. 57) could not be excavated, it is currently not possible to prove contemporaneity. Since the oldest structure, the pedestal (ev. 48) built on bedrock, seems to yield a radiocarbon date in the 3rd century AD, the other structures have to be contemporary or younger. This seems to be confirmed by the pottery of these contexts which consists mainly of local table- and cookingwares, and is not very well preserved. Although examples of the 1st and the 2nd centuries are present (ESA tablewares), pottery of the 3rd century AD (Kapitän II Amphora fragments) dominates.

Building Phase 2 (Late Roman)

Although the excavated part of the retaining wall (ev. 57) was most likely built in the 3rd century AD, the same wall seems also to be part of the retaining wall system which covers the southern slope of the Northwest Quarter, and which was built in Byzantine times as could be attested in the eastern trenches, L as well as N and O. It is therefore most probable that parts of the original backfill were disturbed by attaching new parts of the terrace walls. While the stratigraphic sequence in sectors a and c seems to be undisturbed, mirroring a detailed construction history, the stratigraphy in sectors d and f, but especially in sector d, seems to display such later disturbances apart from erosion (see **Fig. 20**). While only the upper fill layer (ev. 8) was washed away in sector b, about 1 meter of the upper stratigraphy is missing in sector d, and in the southernmost sector f, as much as about 2 meters are missing. In sectors a and c, the datable finds enable us to distinguish between seven successive building and filling phases, because the layers were protected from erosion by the wall (ev. 7) built in the second phase. In sector d, outside the protective wall, only the three earlier phases can be traced.

The second phase is one of the main building phases in this place, and the space between the walls (ev. 17 and ev. 57) was filled up to a high level, on which first a clay water pipe was constructed, and after that, a wall was built forming a room about 2.10 meters in width and more than 6 meters in length (see **Fig. 17**). For

the new building, the pedestal (ev. 48) was torn down in sector d, causing also the demolition of the eastern part of the water drain (ev. 47). The area was filled with the pedestal debris (ev. 42) and with soil layers (ev. 43, ev. 38 and ev. 27) of Roman date (see above). In sector f, the fill (ev. 38) was found running against the retaining wall (ev. 57) and was not clearly distinguishable from ev. 27 in its upper part. In sectors a and c, the fill (ev. 37 and ev. 31) above the former surface (ev. 40) corresponds with these filling activities, and it is most probable that both were also set against the retaining wall (ev. 57). On top of the corresponding fill in sector d (ev. 27, ev. 31 and the trapezoidal stone slab in ev. 34), the clay water pipe (ev. 33) was laid on a bed of compact mortar (ev. 25). A line of mortar spots and disintegrated mortar reached the wall (ev. 57). Since the clay water pipe is situated at the southern end of sector d and takes a northwest-to-southeast course, it could be traced only in sector d, but the curved stone cluster (ev. 30) in the southeast corner of sector c was found at the same level and could therefore belong to a more massive part of the water pipe foundation. Both the stone cluster (ev. 30) and the mortar bed (ev. 25) of the water pipe were covered by fills of varying thickness, onto which the wall (ev. 7) was founded. This wall was built against the retaining wall (ev. 57) and takes a northern course parallel to the older wall (ev. 17). Where the wall was unearthed, the bottom of its eastern wall face lies about 70 to 80 centimeters higher than the bottom of the western wall face and rests partly on a stone fill (ev. 10) [The foundation of the eastern wall is at an elevation of 621.40 to 621.50m. asl, and the western wall face at about 620.70m asl]. It is probable that the wall was constructed on diverse foundation levels in the vicinity of the water pipe with the aim of protecting it from pressure and minimising the filling effort by integrating the pedestal debris (ev. 42 and ev. 43).

The western face of the wall (ev. 7) rests only 5 centimeters above the top level of the stone slab (ev. 34) on top of the debris and the top of the mortar coating (ev. 25) of the water pipe [the top level of both is about 620.65m asl.]. Inside the new room, created by the walls (ev. 57, ev. 17 and ev. 7), two horizontal lenses of compact mortar (ev. 28) indicate a surface or floor level on top of the foundation fill (ev. 29), consisting of Roman pottery, mainly local tableware and cookware with traces of fire use. The surface outside the room must have been at a higher level, because the water pipe and wall foundation (ev. 10) must have been covered to be protected. Of this fill, only the lowest part remained undisturbed, because in the fill (ev. 11) some Late Byzantine sherds were found among mainly Roman pottery (pl. 6.50).

Outside the room, a Roman cooking pot with pinched handles (ev. 26; pl. 1.3) was found on top of the water-pipe mortar coating (ev. 25), lying on its side and embedded into the lowest part of the fill (ev. 11, **Fig. 20**). On top of the surface inside the new room, a very similar cooking pot, but with oval handles (ev. 24; pl. 1.1), was deposited in an upright position against the lowest stone course of the wall (ev. 7, **Fig. 22**). Both vessels are similar to the specimens discovered in 2012 in Trench A, and their surfaces were also charred. Since the newly found vessels were deposited in the same building process, and both were physically linked to specific structures, an interpretation as foundation deposits is most likely. Deposited cooking



22. Trench Q, cooking pot deposit (ev. 24) at the bottom of the wall (ev. 7), view from west.

pots have already been found in earlier excavations along the city wall (*cf.* Kehrberg and Manley 2003: 84) and have been discussed lately by Lichtenberger and Raja, with special reference to three finds in Trench A from 2012 (Lichtenberger and Raja 2015b).

A firm dating of this building phase is given by the Roman cooking-pot deposits, probably of the 3rd or 4th century AD (ev. 24 and ev. 26) on both sides of the wall (ev. 7). A charcoal sample from the undisturbed soil (ev. 11) which has been in contact with the cooking pot (ev. 26) yields a date between 86 and 240AD [Sample no. 23492 (J15-Qd-11-37), Department of Physics and Astronomy, Aarhus University (Denmark), C_{14} age 1842±27BP, d13C (dual-inlet) -26.24±0.05, calibration curve IntCal13, 1σ 133-214AD, 2σ 86-240AD]. Although this date confirms a Roman age for this building process, it is too early compared with the charcoal from the foundation deposit (ev. 44) under the staircase (ev. 17), built in the first phase, and it can only be seen as a terminus post quem for the deposits. A charcoal sample taken from the mortar coating (ev. 25) of the pressure water pipe supports an early date (between 65 and 216AD) [sample no. 23926 (J15-Qd-25-PP3, B-sample), Department of Physics and Astronomy, Aarhus University (Denmark), C_{14} age 1884±28BP, d13C (dual-inlet) -25.36±0.66, calibration curve IntCal13, 1σ 72-205AD, 2σ 65-216AD] and thus contradicts the dating of the first phase, since the fill layers (ev. 38 and ev. 27) underneath the water pipe contained purely Roman pottery [A Late Roman copper coin (J15-Qd-38-26) struck around 400AD or slightly earlier could be intrusive].

The dating evidence inside the new room is scarcer but seems to attest a Late Roman date for the second building phase. Among Late Roman pottery in the fill and foundation layers (ev. 37, ev. 31 and ev. 29) - mainly local table- and cookingwares, with the exception of one ESA body sherd and a small fragment of a Roman lamp - only one coin (J15-Qac-37-13) of probable Late Roman date was found, as well as an earring of copper alloy (pl. 25.159).

Building Phase 3 (Early Byzantine)

This and the next phases are attested only west of the wall (ev. 7). This space was filled (ev. 23 and ev. 22), and a new floor consisting of soil (ev. 10 and ev. 21) and mortar (ev. 19) was established on a higher level between the walls (ev. 17 and ev. 7). Joints between the pottery sherds in ev. 19 and ev. 20 prove that they belong together. The few finds are of Late Byzantine/Early Umayyad date, including an import of a Late Roman Amphora 1 (LRA 1) and a local Byzantine cooking pot, but they mainly consist of local tableware. The finds from the fill layers below (ev. 22 and ev. 23) enable us to date the foundation of the new floor to the Early Byzantine period. The Roman cooking pot (ev. 24, pl. 1.1) remained untouched but was backfilled, as is attested by small Early Byzantine sherds in the layer (ev. 23). The layer (ev. 22) under the new floor level contained Roman to Early Byzantine pottery, mainly tablewares, a noteworthy high amount of common ware, mainly basins and some cookingwares of local or regional production, but also some imported finds, such as a fragment of a Kapitän II Amphora. African Red Slip (ARS) tableware, type Hayes 91B, produced in the first half of the 5th century is the youngest find in the fill. A late Roman coin (J15Qc-22-2) was also part of the fill. In the floor, only few and worn fragments of probably Byzantine date were found. It seems that the raising of the floor level took place not too long after the second phase.

Building Phase 4 (Byzantine)

In this phase, the floor between the walls was raised again (ev. 17 and ev. 7). For this, the space was filled (ev. 18), and a new thin mortar surface (ev. 35) was laid. In the fill layer (ev. 18), Byzantine pottery of the 6th century AD was found, consisting of a high amount of tablewares, and a few cooking- and commonware items, all of local or regional production.

Building Phase 5 (Late Byzantine)

In the fifth phase, substantial alterations took place. The upper part of the staircase (ev. 17) was removed, and the stone foundation (ev. 16) was laid on top of the older wall (ev. 17) for a new wall (ev. 14), which was built further to the south, directly on top of the old wall (see **Fig. 19**). Above the floor of the fourth phase, a fill layer (ev. 15) was found between the old wall (ev. 7) and the new wall foundation (ev. 16). The new about 6-centimeters-thick floor (ev. 32)

was laid onto this fill between the old and the new walls (ev. 7 and ev. 14). In this floor, very few and worn sherds were found; worth mentioning is a piece of Late Roman C (LRC) tableware and a piece of common ware. According to these finds, the phase has to be dated in the Late Byzantine period. The foundation fill (ev. 15) contained larger amounts of pottery and a coin (minimus, J15-Qa-15-8) stemming from the 6th century AD at the latest. Outside the room, the layer (ev. 11) was covered by the thick fill layer (ev. 9) and the layer (ev. 6) with a high amount of pre-Umayyad pottery mixed in date from Roman to Late Byzantine times - mainly local tableware, however with an imported LRA 1 amphora (pl. 16.94). The same layer (ev. 6) was found in sectors a and c inside the room, where it belongs to the sixth building phase. It is therefore probable that the long terrace wall east of the trench was attached at some point between the fourth and the fifth building phases.

The Late Byzantine contexts in Trench Q contain mostly mixed and worn finds. Pottery of the 6th century AD dominates, although some earlier sherds are also present. Common ware is rare as are imports. The composition of functional groups in this and the preceding phase is very similar, as table- and cookingwares clearly dominate. The next phase, however, is characterised by having more common wares.

Building Phase 6 (Umayyad)

In this phase, the area in front of the city wall was completely altered. The space west of the wall (ev. 7) was backfilled again (ev. 13) up to the two lowermost courses of the wall (ev. 14). This wall, which was only built in the preceding phase, was broken down to the lowermost courses, as was the older wall (ev. 7). Part of the debris (ev. 12) of the younger wall (ev. 14) were integrated into the fill (ev. 13) or covered by the fill layer (ev. 6) (see **Fig. 19**). The debris of the wall was also embedded into the fill (ev. 6), but due to erosion, it is preserved only in sector c (see **Fig. 17**). This filled and leveled area east of the city wall and north of the retaining wall (ev. 57) was then covered with a simple clay surface (ev. 8), most probably to create an even space on top of the long terrace wall. Umayyad pottery found in the fill layer (ev. 13) proves that these alterations took place in Umayyad times. In accordance with characteristics of later fills, common wares occur in very high quantity, especially large basins used as table- and cookingwares. The shift from low to high quantity of grey-ware basins seems to be typical for Umayyad contexts (*cf.* Trench P).

Phase 7 (Umayyad, 749AD)

The last event that can be traced in Trench Q is the collapse of the city walls. The stones (ev. 5) and the core fill (ev. 4) of the city wall were found fallen on top of the Umayyad soil surface (ev. 8, **Fig. 19**). This kind of collapse seems to have been caused by a heavy destructive event. According to the dating of the surface (ev. 8), it is most probable that the devastating earthquake in the year 749AD caused the destruction. The upper sections of the wall debris (ev. 2 and ev. 3) were disturbed in modern times, and contaminating modern material was found in parts of the soil collapse (ev. 4).

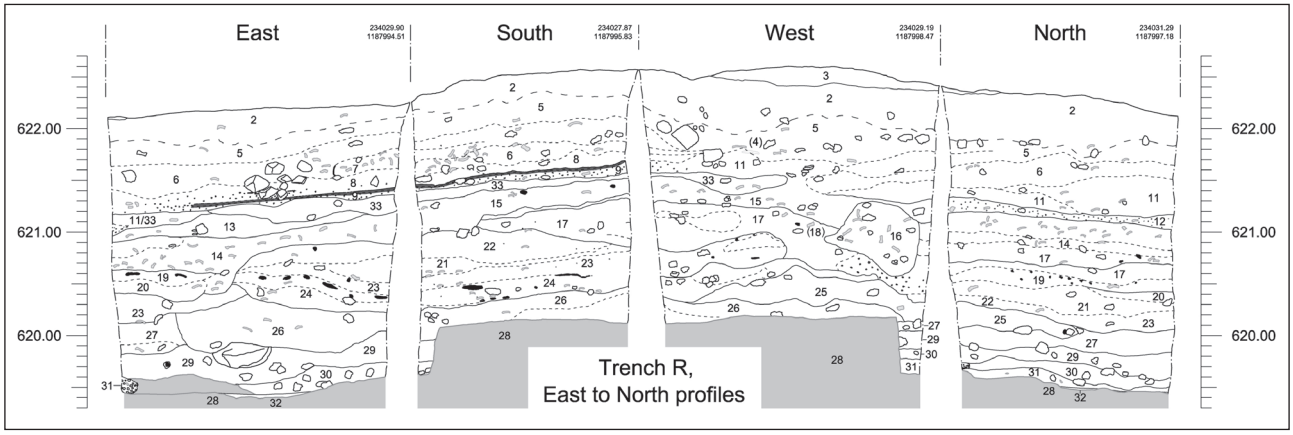
Trench R

For this trench, a square of 3.0 by 2.5 meters was opened just 1 meter east of Trench G, which was excavated in 2013 (see **Fig. 1**) [Trench supervisor was Sören Pfeiffer. For the results of Trench G, see the preliminary field report on the third season: Kalaitzoglou *et al.* 2018]. The main aim of working in this area again was to investigate a detailed soil stratigraphy for geochemical sampling, which provides insight into the environmental history and possible agricultural activities on the northern slope of the hill. In spite of the proximity to the area already excavated, the situation met in Trench R differs in some respect to the 2013 discoveries, and only a few of the known features appeared in the new trench, although a chronological composition of finds was found, with modern material in the top layers and Roman material in the lowest part of the stratigraphy. However, especially traces of human activities were sparse, and none of the short terrace walls were found.

Some structures and features can be assigned to human activities. Two succeeding mortar layers (ev. 9 and ev. 12) were unearthed, which are divided by a layer of brownish soil (ev. 11 and ev. 33). On top of the lower mortar surface (ev. 12), a heap of bigger stones (ev. 10) was intentionally deposited in crescent shape, against

which the upper mortar surface was set. As the mortar did not cover the heap completely, it seems to be a more accidental ensemble than a functional structure or part of a lane. Nevertheless, the upper mortar layer (ev. 9) can be linked with the compact mortar surface of a lane or a simple road, which was discovered in Trench G at a slightly higher level. The only additional feature that could be anthropogenic is a concentration of charcoal (ev. 18) found below the lower mortar layer. This round place contained fragments of bones and iron and was situated on top of a soil layer with bigger stones (ev. 19), and it was encircled by a compact soil layer (ev. 17), which contained pottery and more worn bone fragments, especially concentrated in the northeast corner of the trench (ev. 16). The charcoal indicates that this place is of Roman date (ev. 18, 86-240AD) [Sample no. 23934 (J15-Rac-18-2), Department of Physics and Astronomy, Aarhus University (Denmark), C_{14} age 1842±28BP, d13C (dual-inlet) -19.15±0.05, calibration curve IntCal13, 1σ 132-215AD, 2σ 86-240AD (115-240AD, 89,3%)], and it contained a bronze weight of Roman or Byzantine origin (pl. 24.151). Nevertheless, in the underlying layer (ev. 19), early Byzantine pottery was present. Even the bedrock, although situated only 1 meter east of Trench G, differs significantly from the soft and yellowish virgin soil found in 2013. The bedrock (ev. 28) in Trench R was reached about 2.5 meters under the surface and consists of a solid brownish variety of the limestone, which is fractured vertically into pieces of brick size with veins of softer yellowish lime in the interstices. Towards the northeast, the rock is limited by a vertical step of up to half a meter in depth (**Figs. 23, 24**). This natural depression is filled with a rather loose reddish-to-brownish residual clay (ev. 32), which contained no finds. Although this kind of soil is a natural weathering product of the lime rock, its loose consistency most probably derives from dislocation. The surface of the brownish rock is even and lies at an elevation between 620.13 and 620.16m asl. This is only up to 0.3 meters below the uneven surface of the virgin soil in Trench G (sectors b and d) and about 0.45 meters below the top of the solid rock in sector f of the same trench. Therefore, the main erosion direction in this place had to follow the bedrock surface from west to east. Consequently, the softer virgin soil, present in Trench G, was washed away in the same direction. This explains the channels and depressions cut into the surface of the virgin soil and leads to the conclusion that, since the virgin soil bears traces of erosion, original or older deposits had been washed away. Younger material accumulated above the bedrock only after the erosion had been stopped or decelerated east of the trench. Trench R, on the one hand, confirms the geological diversity of the northern slope beyond the rock cliff, a characteristic already noticed in Trenches G, I and M; on the other hand, it shows that the conjunction of soft and solid rock intensifies the effect of erosion.

The profiles (**Fig. 23**) clearly show that the erosion followed the bedrock surface. The thin layers (ev. 31 to ev. 27) accumulated beyond the rock step, since the depression functioned as a trap for stones as in ev. 30. After heavier erosion events, the direction of erosion shifted from time to time in a more northerly as well as in a southerly direction. Especially the layer (ev. 24), which is rich in botanical material, indicates that the main inclination has shifted at some point from east to south and later in an



23. Trench R, drawing of the profiles.



24. Trench R, bedrock and east profile, view from west.

easterly direction again (**Fig. 24**). In the west and east profiles, an irregular formation of the stratigraphic sequence and erosion unconformity is visible. This is rather typical for sections cut against the direction of the erosion. Similar limited lenses, filled flutes and gullies deriving from erosion events were already visible in Trench G. In contrast to this, the south and north profiles (**Fig. 23**), both nearly oriented in the direction of the erosion, show a slightly inclining and almost undisturbed sequence of mostly thin layers. This sequence of thin layers with well-defined limits starts underneath the mortar layers (ev. 9 and ev. 12) [In trench G a very similar sequence was met on almost the same level starting with evidence J13-G-22]. Plowing would have completely mixed up the soil body and destroyed the limits of the deposits. Therefore, it is unlikely that tillage took place in Trenches G and R underneath the mortar layer (ev. 9), although the accumulated soil could stem from agriculture. Above the mortar surface, the soil is mixed up, probably as a result of plowing in modern times.

The conclusion based on the 2013 season could thus be refined, in that the numerous strata found between the ground surface and the bedrock result in the upper parts being attributable to mostly anthropogenic effects, whereas the areas closer to bedrock seem to result from natural processes of erosion and aggradations. Since the youngest finds identified so far in the lowest layers of Trench G probably stem from Byzantine to Islamic times, the structures unearthed above them must be younger, and the finds of Roman date in Trench G as well as in Trench R could be later intrusions, even though there is no evidence of Islamic pottery in the lowest layers of Trench R. In Trench R, the rock depression seems to have functioned as a trap, not only for stones but also for old soil and finds. This suggests that pre-Islamic surfaces must have been washed away by erosion in an eastern direction. A possible source of the Late Roman material dominating the lower layers in Trench R and Trench G is the building structures of most probably Late Roman date visible in the magnetogram northwest of Trenches G and R (see Kalaitzoglou *et al.* 2012: fig. 2, fig. 3 and fig. 7).

The finds of Trench R in general are worn and not very well preserved, due to erosion events and accumulation processes. This clearly distinguishes them from the better-preserved finds in the other trenches. In general, only a few diagnostic sherds were found, mainly tableware, some cookingware fragments and amphorae of local production. Only some imported tableware (pl. 5.40-42, 44, Eastern Sigillata A) and amphorae of the types Kapitän II and Almagro 50 were found, as well as three coins and a few pieces of glass and metal.

The earliest pottery was found in the lowest layers and was of Early Roman date (pl. 3.19, goblet) but the majority originated from the 2nd and 3rd centuries AD. The youngest material can be dated to Late Byzantine/Early Umayyad times, and the uppermost layers (ev. 1-3) held some modern finds.

While the upper layers (ev. 4-12) are mixed with Roman and Byzantine-to-Umayyad material, containing fragments of a Byzantine/Late Roman amphora, as well as small sherds of Roman Kapitän II and Late Roman/Early Byzantine Almagro 50 amphorae. In the same layers, chronologically heterogeneous coins were found, such as a Nabataean example (J15-Ra-11-2, Aretas IV), a Byzantine minimus (J15-Ra-5-3) and also an iron fitting of Roman or later date (pl.24.148). From ev. 13 downwards, the Umayyad material disappears, and the layers consist mainly of Byzantine pottery mixed with Roman material (ev. 13-20). A small Roman or later bronze bell (pl. 25.158), as well as a small bronze weight (pl.24.151) of the same date, were found in the same layers. The lower layers (ev. 21-30) seem to have purely Roman material (cookingware: pl. 1.4 and 6; imported tableware: pl. 5.40-42, pl. 44; and local tableware: pl. 3.19, pl. 5.35-36, pl. 6.55). A Roman coin (J15-R-25-1, Caracalla or Elagabalus) and

a radiocarbon date from one of the lowest layers (ev. 30) confirm a Roman date [A charcoal sample from ev. 30 yields a very early date between 45BC and 66AD. Sample no. 23935 (J15-Rabd-30-4), Department of Physics and Astronomy, Aarhus University (Denmark), C^{14} age 1990±26BP, d13C (dual-inlet) -22.33±0.06, calibration curve IntCal13, 1σ 37BC-51AD, 2σ 45BC-66AD].

Archaeometric Analysis of Ceramics from Jarash

Stephen Merkel and Michael Prange

Introduction

The documentation of material characteristics of the pottery from Jarash is important to explore a variety of archaeological questions regarding production, technology and trade. A selection of sherds was sampled for ceramic petrography and for quantitative elemental analysis in order to characterise local types of ceramic and identify fabric types that may have been imported. The analysed sherds are listed in more detail in the catalogue. All sherds have also been drawn and are shown on the plates (**Table 1**). Additionally, a study of the firing properties of the ceramics was carried out to relate the range of colours (grey, orange and red) represented in the main fabric group.

Table 1: List of samples and plates.

Sample No.	Cat. No.	Type	Plate
1	J14-Je-77, 1037	GW	Pl. 8.60
2	J14-Je-77, 1017	GW	Pl. 10.69
3	J14-Je-77, 1030	GW	Pl. 9.67
4	J14-Je-77, 1088	OW	Pl. 2.17
5	J14-Je-77, 1087	OW	Pl. 2.16
6	J14-Je-61, 1112	OW	Pl 1.5
7	J14-Je-77, 1107	OW	Pl. 2.14
8	J14-Je-77, 1070	OW	Pl. 13.81
9	J14-Je-77, 1051	OW	Pl. 2.11
10	J14-Je-77, 1052	OW	Pl. 1.7
11	J14-Je-77, 1079	OW	Pl. 6.54
12	J14-Je-77, 1059	OW	Pl. 2.10
13	J14-Jc-68, 1000	OW	Pl. 13.83
14	J14-J-77-1	OW	Pl. 4.31
15	J14-Jc-61, 1130	RW	Pl. 6.51
16	J14-Jc-61, 1113	RW	Pl. 1.2
17	J14-Jc-61, 1123	F	Pl. 2.12
18	J14-Je-77, 1066	F	Pl. 13.80

1. Thin Section Analysis

In order to characterise the mineralogy of ceramic fabric, a total of 18 thin sections were prepared at the German Mining Museum, Bochum, for polarised light- and scanning electron microscopy. Reflected and transmitted light microscopy was performed on a Zeiss Galaxy Axiophot microscope with the capability of 2.5 to 40 times magnification. A Zeiss Gemini scanning electron microscope with a Thermo UltraDry Silicon Drift X-ray Detector (EDS) was used for imaging and for semi-quantitative elemental analysis with the purpose of mineral identification.

1.1 Ceramic Fabrics and Nonplastic Inclusions

Under the microscope, the base clays of all sherds appear to be non-micritic, though calcareous inclusions are often present, and the paste of sample 16 is notably reddish, due to the presence of substantial amounts of iron oxide. The ceramic fabric contained numerous inclusions of different types. The categories include quartz/feldspar, calcium carbonate, argillaceous inclusions, iron oxides, ferromagnesian silicates, and mica (**Table 2**). The inclusions were classified by their size, shape and frequency. For the classification of particle sizes of silt and sand, the USDA standard was used.

1.1.1 Quartz and Feldspars

Quartz is the most common inclusion type in all the ceramic fabric sampled from Jarash. For 17 of the 18 sherds, the particle sizes range from silt (0.005-0.05mm) up to coarse sand (0.6mm), and in sample 3, they can be up to 2mm, but in all sherds, the largest fraction by volume is between very fine sand to medium-sized sand (50μm-200 μm) (**Table 3**).

The grains typically have a low sphericity and are sub-angular to sub-rounded. In addition to quartz, feldspars were identified, which show similar characteristices in terms of size and morphology. Feldspars ranging from othoclase and microline to plagioclase could be found, but feldspars are infrequent in relation to quartz with a ratio of less than 1:10.

1.1.2 Calcium Carbonate

Calcium carbonate was identified in all samples, except for 16, 17 and 18. All sherds experienced some post-depositional effects, such as the crystallisation of calcium carbonate on the exterior surfaces and in the porosity, and an ef-

Table 2: Breakdown of types and frequency of inclusions in the ceramic samples identified by petrography. The estimation of the percentage of quartz and calcium carbonate was aided through ImageJ software using both SEM backscatter and cross polarized microscopy images.

	Quartz (vol.)	Calcium Carbonate (vol.)	Argill. (mm)	Iron Oxide (mm)	Ferro-Magnesian (mm)	Mica (mm)
1	22%	4%	<1	<0.2	Rare <0.05	Rare <0.05
2	26%	5%	<0.3	<0.05	Rare <0.05	Rare <0.05
3	19%	9%	<0.6	<0.05	n.d.	Rare <0.05
4	14%	2%	<0.3	<0.05	n.d.	Rare <0.05
5	11%	2%	<0.3	<0.05	n.d.	Rare <0.05
6	10%	2%	<0.2	<0.05	Rare <0.05	Uncommon <0.1
7	18%	2%	<0.2	<0.1	n.d.	Rare <0.05
8	12%	2%	<0.2	<0.05	n.d.	Rare <0.05
9	34%	2%	<0.2	<0.1	Rare <0.05	Rare <0.05
10	21%	2%	<0.4	<0.1	Rare <0.05	Rare <0.05
11	24%	2%	<0.3	<0.05	Rare <0.05	Rare <0.05
12	18%	2%	<0.3	<0.1	Rare <0.05	Rare <0.05
13	9%	5%	<0.4	<0.1	n.d.	Very Rare <0.05
14	16%	3%	<0.6	<0.1	Rare <0.05	Rare <0.05
15	26%	4%	<0.3	<0.05	Rare <0.05	Uncommon <0.05
16	24%	0%	<0.2	<0.05	Common <0.07	n.d.
17	29%	0%	<0.2	<0.05	Rare <0.05	Common <0.1
18	18%	0%	<0.2	<0.05	Rare <0.05	Uncommon <0.1

Key: Very Rare <4 instances per slide, Rare <15, Uncommon <30, Common – one visible in every 7mm^2 frame. N.D. is not detected.

Table 3: Particle size distribution of quartz inclusions in the ceramic samples. The values represent area percentages of a field of 7.4 mm^2. The distibutions show highest concentrations between 50µm and 200µm.

	5µm-20µm	20µm-50µm	50µm-100µm	100µm-200µm	200µm+
1	2.1	5.1	5.6	7.6	1.5
2	1.0	2.4	4.9	14.6	3.2
3	1.5	2.5	1.9	11.5	1.5
4	1.2	3.2	6.0	3.2	0.5
5	0.7	2.3	5.9	1.6	0.5
6	1.0	1.9	1.8	4.9	0.4
7	0.9	2.3	7.4	7.1	0.3
8	0.9	1.9	3.6	5.3	0.4
9	1.1	4.2	14.6	13.8	0.3
10	2.0	5.7	7.0	5.9	0.4
11	1.9	6.0	6.6	8.6	0.9
12	1.6	3.4	8.5	4.0	0.4
13	0.5	1.0	3.6	3.6	0.3
14	0.7	1.0	4.0	10.0	0.3
15	1.6	3.9	13.3	5.8	1.4
16	1.9	4.6	5.6	11.2	0.7
17	3.5	10.4	7.4	6.8	0.9
18	0.7	2.4	7.8	6.9	0.2

fort was made to distinguish this secondary calcium carbonate from the inclusions that appear to have originally been in the ceramic.

The calcium-carbonate inclusions are nearly always sub to well rounded and consist of micrite, but in sample 3**,** fragments of shell were found, in addition to the rounded inclusions. The shell fragments in sample 3 mostly consist of micrite, but aragonite is still preserved in some of them. The micrite inclusions tend to follow the particle-size distributions of quartz, with the highest frequency in the range of 50 µm to 200 µm; however, samples 1 and 3 have larger inclusions of up to 1mm. Silt- and sand-sized inclusions are particularly common in samples 3 and 13.

The majority of the calcium-carbonate inclusions are rounded micrite grains and are probably physically weathered limestone. Since they correspond to the quartz-silt and sand-sized grains, it can be assumed that they entered the clay together, but there is variability in the proportion of quartz to micrite. Some sherds, such as sample 9, have substantially more inclusions, while others have relatively few. In sample 3, seeing that the ceramic was fired under mildly, but not strongly, reducing conditions, the presence of aragonite shell fragments is an indication that the ceramic was not heated above ca. 850°C; otherwise, the original shell structure would have decomposed and recrystallised as micrite.

1.1.3 Argillaceous Inclusions

Argillaceous inclusions are common in the ceramic samples, and nearly all can be described as 'clay pellets' according to Whitbread's definition (Whitbread 1986). They are typically spherical and contain silt-sized inclusions of quartz and/or micrite. There are fissures and voids surrounding the argillaceous inclusions, indicating that a certain amount of shrinkage occurred. There are colour differences between the argillaceous inclusions and their surrounding ceramic matrix. In most sherds, they are darker than the matrix, due to their density, but in the sherds that witnessed highly oxidising firing conditions, the inclusions can be reddish-orange with a more intense colour than the matrix. A sampling of pellets from samples 3 and 16 show that there is variability in the composition, with some pellets displaying compositions very close to the ceramic matrix and others having higher alumina and lesser calcium oxide, like the inclusion in **Fig. 25**, indicating that it is richer in clay than the matrix. Others have higher iron-oxide contents with a silica to alumina ratio comparable to the ceramic matrix.

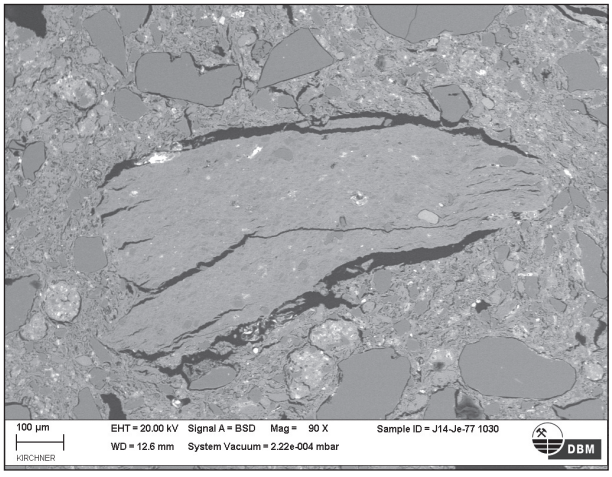
This type of inclusion also has a particle-size distribution like quartz, and most of the pellets are in the range of 50 µm to 200 µm, and larger inclusions are relatively common. Samples 1 and 3 tend to have larger inclusions and thus also have larger clay pellets. It can be argued that the clay pellets were naturally in the clay used for the ceramics.

1.1.4 Iron Oxides and Other Opaques

Iron oxides were easily visible, due to their high reflectivity under the reflected-light microscope. However, with the SEM, it was determined that not all the highly reflective inclusions were simple iron oxides; ilmenite (titanium iron oxide) inclusions were often encountered. Chromites containing iron oxide, magnesia and alumina were detected by the SEM in sample 16. Silt-sized opaque particles were detected in all sherds and are clearly of the same origin as the clay. Sand-sized opaques were less common, and they tend to not be larger than 100 µm. Sample 3 has a 0.5-mm fragment of iron oxide with the visual characteristics of hammer scale, a waste material from iron smithing.

1.1.5 Ferromagnesian Silicates

These types of minerals were detected by polarised-light microscopy and were confirmed with the SEM. Small, typically silt-sized inclusions of ferromagnesian minerals were identi-



25. Argillaceous rock fragment in sample 3. The rock fragment is dense with little porosity and contains silt-sized inclusions of quartz and iron-titanium oxides.

fied in about half of the slides. The most common minerals have a blue-green or green-brown pleochroism. Alumosilicates containing calcium, iron, and magnesium have similar compositions to hornblende. Ferromagnesian minerals are slightly more common in sample 16. The minerals either have a green-brown or green-pink pleochroism and may be hornblendes and orthopyroxenes, respectively.

1.1.6 Mica

Silt-sized grains of muscovite were found in all samples, except for sample 16. Muscovite could be easily identified, due to its sheet-like structure and its birefringence colours. It was only common in sample 17, which clearly differentiates this ceramic from the others.

2. Elemental Composition

The eighteen samples were analysed by inductively coupled plasma mass spectrometry, using Thermo Scientific Element XR to measure the major-, minor-, and trace-element concentrations. Analyses were performed with liquid solutions prepared from pulverised samples. Samples were crushed using steel implements and milled using an agate ball mill. The digestions of silica-bearing samples (ore, slag and crucibles) had been carried out with a μPREP-A™ microwave, using concentrated acids. The sample size was 100 mg of pulverised material. The sample material was digested in PTFE pressure vessels with a mixture of concentrated acids (6ml HCl: 1.75ml HF: 4.8ml HNO3) for forty minutes at 250°C. Finally, digestions had been diluted with ultra-pure water up to 100ml.

For main-element analysis, sample solutions had been diluted 1:100 and for traces 1:10 with 5 percent HNO_3 solution. The analyses were carried out with a FAST SC-system, ST 5532 PFA μ-FLOW nebulizer, a Peltier-cooled PFA spray chamber and a 1.8-mm sapphire injector in triple detector mode at all three mass resolutions (m / Δm), depending on the elements of interest. In all, the concentrations of 51 elements were measured, and 21 of the most important elements are listed in **Table 4**. The values are consistent with those presented by Uscatescu (Uscatescu 1996: 210), with the exception of higher values of strontium and lower cobalt contents in the samples from the Danish-German Northwest Quarter Project.

Table 4: ICP-MS results of ceramics from Jerash and four geologic samples.

Sample	SiO_2	Al_2O_3	Fe_2O_3	CaO	MgO	Na_2O	K_2O	TiO_2	MnO	SrO	P_2O_5
1	66.5	15.6	5.27	6.10	1.80	0.22	1.82	1.38	0.069	0.028	0.18
2	63.7	16.7	4.58	7.12	1.61	0.23	2.36	1.24	0.063	0.025	0.21
3	56.7	12.4	5.17	13.1	1.92	0.35	2.86	0.89	0.087	0.027	0.26
4	74.2	12.4	3.83	4.10	1.41	0.29	1.12	1.54	0.063	0.023	0.13
5	68.8	21.1	4.61	3.91	1.54	0.32	2.01	1.60	0.059	0.030	0.15
6	77.1	16.4	4.92	5.31	1.51	0.28	1.61	1.63	0.072	0.025	0.21
7	80.5	15.0	4.27	2.84	1.47	0.25	1.40	1.59	0.065	0.021	0.12
8	76.7	16.5	3.92	3.64	1.47	0.29	1.67	1.53	0.054	0.026	0.12
9	57.1	14.4	4.01	2.73	1.24	0.17	1.37	1.45	0.055	0.020	0.14
10	67.8	18.6	4.30	3.00	1.33	0.20	2.07	1.56	0.057	0.025	0.16
11	74.3	15.9	3.95	3.56	1.50	0.31	1.76	1.50	0.055	0.025	0.12
12	69.2	18.7	4.54	3.23	1.37	0.21	1.89	1.66	0.062	0.025	0.14
13	56.4	14.6	5.21	12.3	1.82	0.29	1.86	1.13	0.080	0.024	0.18
14	63.9	18.4	5.66	6.07	1.84	0.26	1.68	1.43	0.077	0.027	0.17
15	65.6	16.0	5.16	7.13	1.37	0.29	2.38	1.38	0.084	0.026	0.20
16	70.0	16.4	8.13	1.63	1.28	0.34	1.52	1.69	0.140	0.012	0.12
17	81.5	21.5	3.78	2.05	1.25	0.25	1.59	1.91	0.050	0.032	0.14
18	75.4	26.0	4.22	0.86	0.98	0.18	1.65	1.68	0.041	0.033	0.12
37	9.9	2.97	2.70	46.0	0.90	0.044	0.63	0.24	0.037	0.069	0.071
39	8.8	3.09	0.87	41.1	0.98	0.037	0.58	0.19	0.017	0.054	0.043
40	7.5	2.49	0.70	49.1	0.95	0.031	0.41	0.16	0.026	0.049	0.048
41	8.1	3.04	0.83	54.3	0.89	0.036	0.33	0.14	0.010	0.086	0.060
42	4.0	1.29	0.48	56.4	0.72	0.051	0.23	0.06	0.015	0.082	0.095
all amounts given in wt.%											

Sample	Co	Cr	Ni	V	Zn	Ce	Nd	Sm	Gd	Th	Zr
1	17	115	44	143	58	107	44	7.9	7.0	15	209
2	14	108	44	138	58	96	40	7.7	7.0	12	158
3	17	109	54	122	61	63	28	6.0	5.6	6.6	129
4	15	99	42	109	62	94	35	7.2	6.3	13	230
5	15	128	48	147	68	123	46	8.9	8.0	16	183
6	16	115	62	132	83	103	39	7.7	6.5	13	165
7	13	104	39	108	66	95	38	7.1	6.4	12	186
8	18	107	60	128	72	105	40	7.8	6.6	13	159
9	12	108	33	126	59	92	37	7.3	6.2	13	162
10	13	117	43	137	61	118	47	9.2	8.2	17	180
11	13	112	32	117	68	101	43	7.8	7.1	14	245
12	17	137	66	148	74	118	48	9.2	8.1	16	218
13	18	120	50	123	74	75	32	6.2	5.7	8.9	177
14	22	136	48	153	76	106	44	8.8	7.7	13	197
15	20	118	45	126	84	91	36	7.2	6.3	12	170
16	28	169	77	175	136	102	46	9.1	8.5	12	223
17	11	117	32	135	54	116	47	9.0	8.1	16	234
18	11	120	31	127	76	145	57	11	8.6	19	172
37	8.2	30	8	38	29	15	6.2	1.3	1.2	2.4	40
39	1.3	23	< 1	28	41	9.5	4.3	0.9	0.8	1.5	28
40	0.8	16	< 1	21	15	8.7	4.1	0.8	0.8	1.1	22
41	1.9	24	4	28	16	10	5.0	1.1	1.0	1.2	21
42	1.5	11	4	18	15	7.3	3.6	0.8	0.8	0.8	10
all amounts given in ppm											

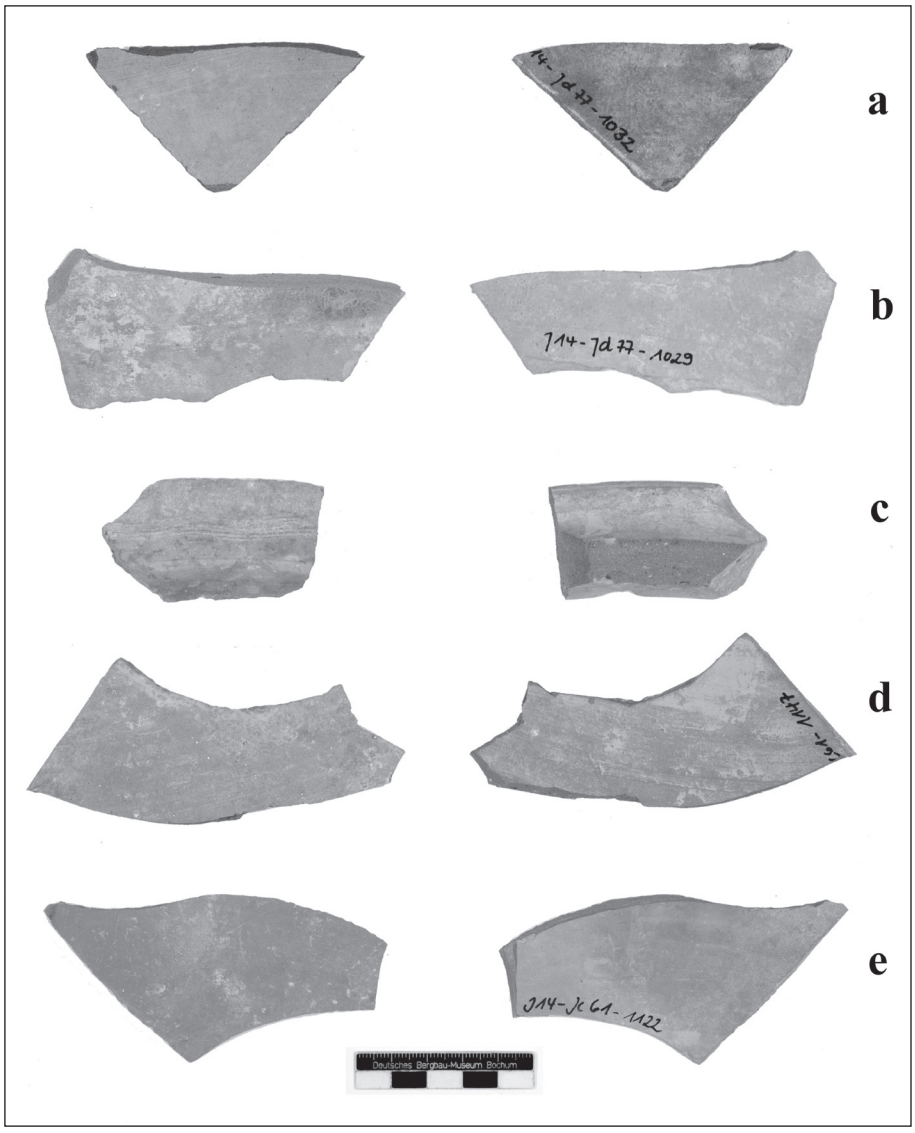
3. Firing Experiment

Five sherds were selected for refiring; three grey-ware items and two orange-ware items (**Table 5** and **Fig. 26**). They all belong to the main local fabric group [The sherd sections were analysed semi-quantitatively by portable X-ray fluorescence and were determined to be compositionally consistent with the majority of the samples from Jarash analysed thus far. Iron oxide, one of the most important compounds for the colour of the ceramic, varies very little among the sherds chosen for this experiment (*ca.* 4-5%)] and have been chosen in this category mainly by colour and secondarily by their functional group. To get a representative result, two grey-ware items of different pottery types were chosen, both belonging to the large group of basins with incised fingerprints (Sherd A is from a similar vessel type as pl. 9.67; Sherd C is from a similar vessel type as pl. 10.69-70). One more sample, Sherd B, was a mixture between orange and grey ware, belonging to the same family of basins (similar in type to pl. 10.71). Furthermore, two orange-ware sherds, D and E, were selected; both are cookingware items (similar to casseroles with lid, pl. 2.13-14). The experiment was designed to show how the ceramics changed as a function of temperature in an oxidising environment. Each sherd was sectioned into six parts. Five of the sections were heated in an electric oven in intervals of 75°C, starting at 750°C, *i.e.* 750° C, 825°C, 900°C, 975°C and 1050°C. At each 75°C-interval, a fragment of each sherd was removed from the oven to cool.

Table 5: The sherds of the refiring experiment.

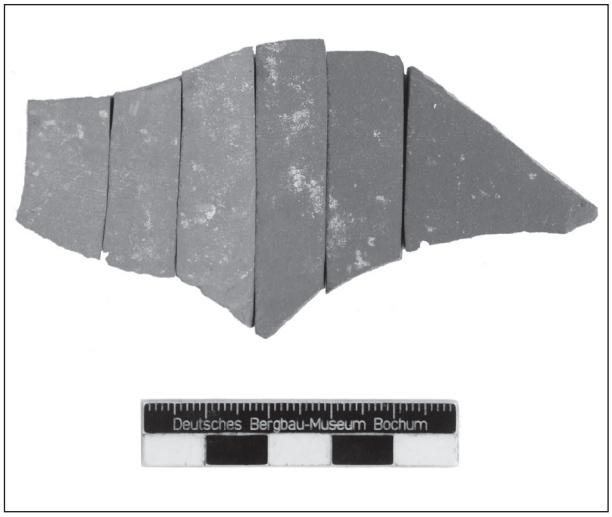
	Cat. No.	
a	J14-Je77-1032	Gray Ware
b	J14-Jd77-1029	Gray Ware
c	J14-Je77-1000	Gray Ware
d	J14-Jc61-1147	Orange Ware
e	J14-Jc-61-1122	Orange Ware

The grey wares showed a clear colour change; at 750°C, all three sherds became salmon coloured, but a pronounced shift to orange occurred between 900°C and 975°C. An intense orange colour developed at 1050°C. The orange ware also altered during the experiment. No effect could be seen on the exterior surfaces of sherd D, but the reduced core of the sherd gradually oxidised and disappeared between 975°C



26. Sherds used for refiring.

and 1050°C. Sherd E showed no changes, until it witnessed a colour change at 900°C, and this means that the original ceramic was fired below this temperature. The intensity of the orange colour of sherd E became stronger at 975°C and was a deep orangish-red at 1050°C (**Fig. 27**). Comparing the final products (**Fig. 28**), the same intense orangish-red colour can be found on sherds B and E. The same shade of pinkish orange developed in sherds A and D. Sherd C is a less intense orange but is closer to sherds B and E than A and D.

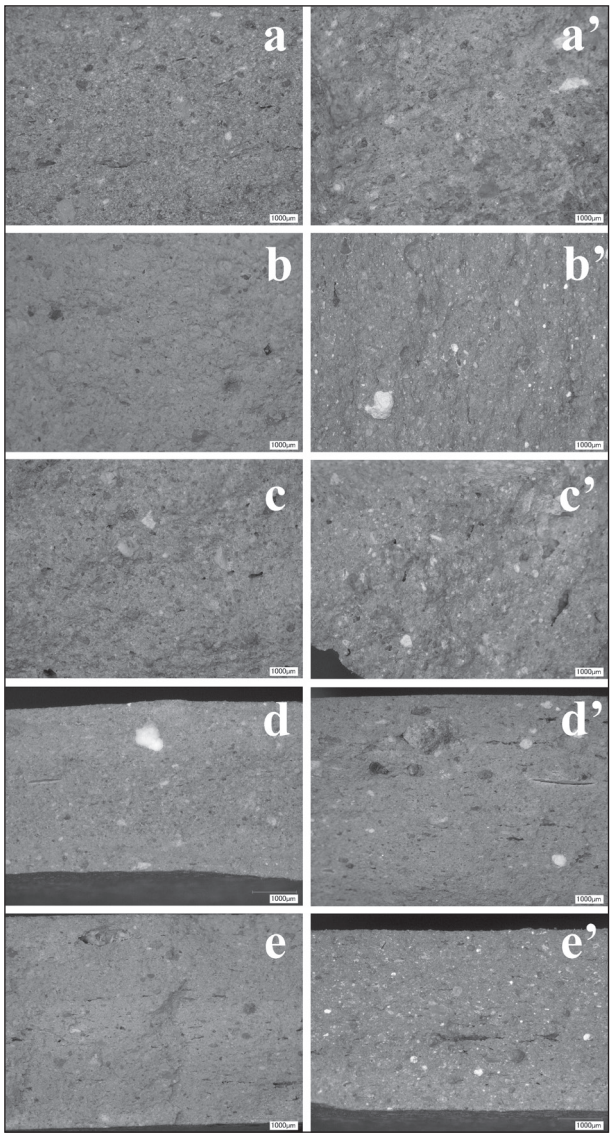


27. Refiring experiment of Sherd E (J14-Jc-61-1122) grading from non-refired on the left to 1050°C on the right. A clear color change is seen between 825°C and 900°C with subsequent darkening as the temperature increases.

4. Discussion and Conclusions

4.1 Clay Processing and Provenance

A close study of the ceramic fabric combined with elemental analysis forms a foundation for discussing technological aspects of production and the classification of ceramics, with the pos-



28. Microscope images of the ceramic fabrics taken in fresh breaks before refiring and after refiring to 1050°C.

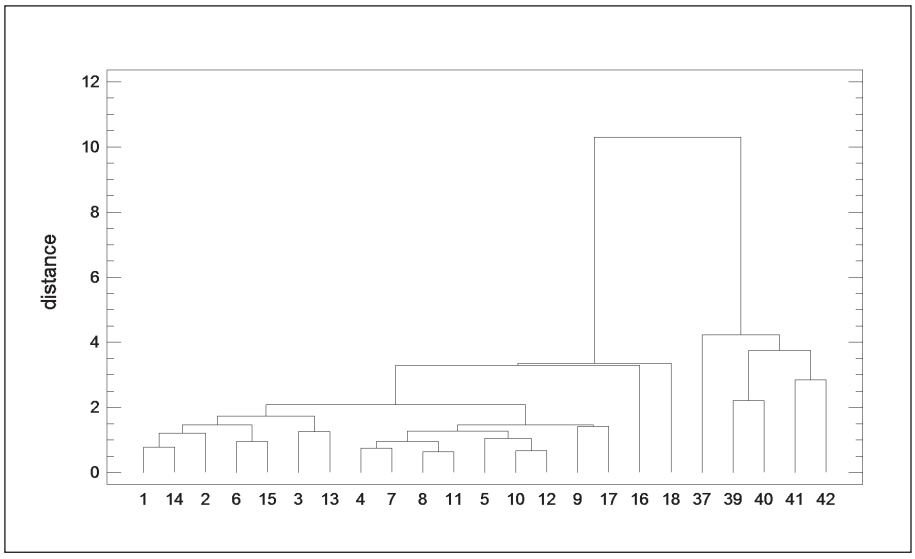
sibility of determining provenance. First, the mineralogy can be used to define groups that are compositionally similar or different. It is clear that samples 16 and 17 are mineralogically distinct from each other and the rest of the sherds sampled. It is evident that sample 16, due to its chromite inclusions and higher concentrations of ferromagnesian minerals, can be linked to the weathering of mafic igneous rock, and sample 17 is distinct, due to the presences of significant amounts of muscovite, such as silt- and sand-sized inclusions. The bulk of the sherds (1-15) have relatively similar characteristics, with silt- to sand-sized quartz and micrite inclusions with minor amounts of mica, ferromagnesian minerals, iron oxides and clay pellets. This bulk of samples could be called the local ceramic. Sample 18 does not fit into the large group, due to a lack of silt-sized micrite.

The bulk of the sherds are thus roughly similar but have differing quantities of non-plastic inclusions. The small size of the inclusions points to natural inclusions that were in the clay deposit, and the larger inclusions (>200 μm) in the ceramic are not sufficiently distributed to argue for an intentional tempering. There seem to be similarities in the sizes of clay pellets, which should be associated with the clay, and the calcium-carbonate and quartz inclusions. If intentional tempering did occur, it would have been with a fine-to-medium sand fraction, of the same types of natural sediment already found in the clay as silt, with varying amounts of quartz and calcium carbonate. One sample from this group stands out (sample 3) because of its shell fragments, which probably originate from the weathering of a fossiliferous limestone.

Sherd sample 2 is an unusual example, where intentional tempering seems to have occurred. The sherd exhibits a two-layered structure: the main layer is consistently 8-mm thick and represents the basic wheel-thrown form; however, a second layer was applied to the interior of the vessel, which has higher relief (3-6mm). A clear boundary at the joint of the two layers can be seen under the microscope, and the two kinds of fabrics are visually distinct. The main layer fits the description of the 'local' fabric thus far, but the added layer appears to be made with the same base clay but contains substantially more sand-sized (100-300 μm) rounded quartz and calcium-carbonate inclusions, though the size and frequency of the clay pellets appear to be constant between the two layers.

To prove levigation of the clay would require sampling of the local clay deposits to examine the natural distribution of particle sizes. Most of the quartz inclusions in the sherds show a normal distribution around fine-sand size (in terms of volume). Some fabrics have a higher fine to medium sand fraction, but interestingly the clay used for the amphora (sample 13) seems to be the same base clay but with substantially less silt and sand. One might consider whether this clay was levigated, but of course, it is also possible that a particularly clean part of a clay deposit could have been exploited for pottery with specific functions.

The elemental compositions help to confirm many of the groupings determined by micros-



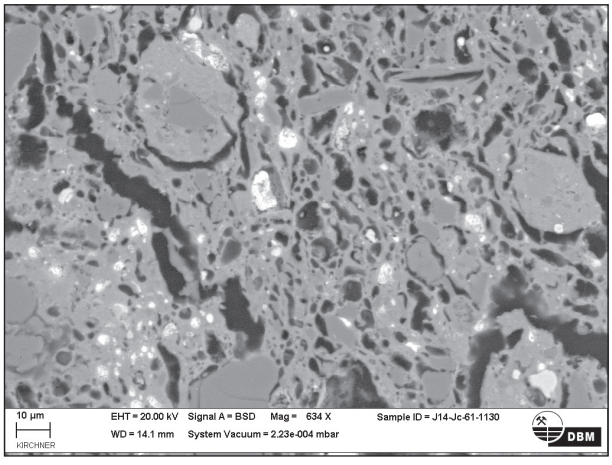
29. Cluster analysis of the elemental compositions of the 18 ceramic samples and the four geologic samples.

copy. A cluster-analysis was performed [statgraphics centurion and the algorithm "group average method" were used], using twenty major, minor and trace elements (see Ottoway 1974 and Ottoway 1982). The cluster analysis (**Fig. 29**) shows that three major ceramic groups were formed; the geological samples collected for comparison form their own group but are irrelevant, because they contain very little clay; sample 16 was analysed for its iron content and its trace elements and sample 18 was analysed for its alumina content. These two samples form distinct groups, and the rest form a large group of samples that are chemically similar. Sample 17**,** though similar elementally to samples 1 to 15**,** is mineralogically different and should therefore not be part of the group. This is an excellent example, showing the interdependence of elemental analysis and microscopy in studying archaeological ceramics.

4.2 Firing Temperature

The data established through the refiring experiments and the analysis of thin-sections allow some conclusions can be drawn about the firing of the Jarash ceramics. Firstly, the greyware items become orange when fired in an oxidising atmosphere and closely resemble the orange wares when sufficiently fired. It is clear that the same clay can be used for both types of pottery. There are some mineralogical characteristics that help to estimate firing temperature, such as the aragonite shell fragments in sample 3, which point to temperatures below 850°C.

During the refiring experiment, two of the sherds became deep-reddish to orange at high temperatures, and this raises the question of whether a difference between orange ware and red ware may be related to firing temperature. Two red-ware sherds were sampled in this study, and it is clear from the elemental and mineralogical examination that sample 16 is not related to the 'local' ceramic, but sample 15 does appear to be made of the local clay type. Perhaps to imitate imported ware, or to follow a trend in fashion, an increase in the firing temperature could have caused the orange-ware ceramic to darken and become reddish. The microstructure of sample 15 shows significant levels of vitrification, marked by the rounded porosity (**Fig. 30**), which was not detected in the orange and grey ware examined under the SEM. This is evidence that this 'red ware' was likely fired in the range of 950°C to 1050°C to enhance the reddish appearance of ceramic.



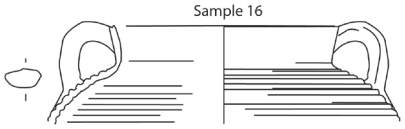
30. Microstructure of sample 15. The rounded porosity (black) indicates that vitrification was occurring at high temperatures (>950°C).

Pl. 1



1

Sample 16



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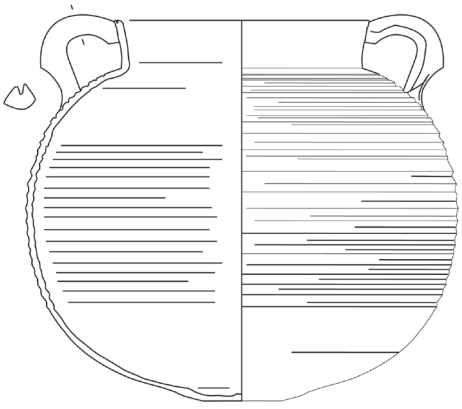

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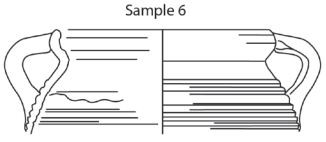
Sample 6



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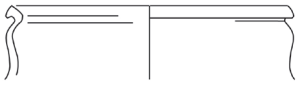
6

Sample 10



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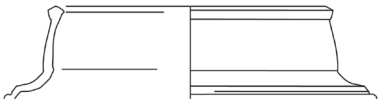

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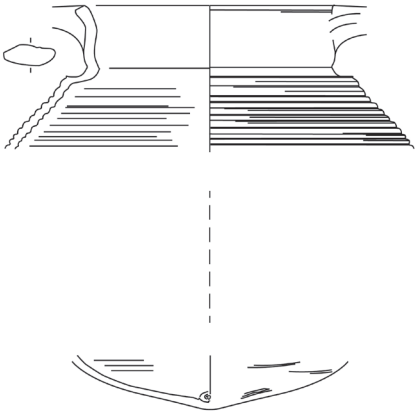


0 5cm

CATALOGUE

Chronology

Hellenistic	: 332 - 63BC
Roman	: 63BC - 250AD
Late Roman	: 250 - 400AD
Early Byzantine	: 400 - 450AD
Byzantine	: 450 - 550AD
Late Byzantine	: 550 - 640AD
Late Byzantine /Early Umayyad	: 600 - 700AD
Umayyad	: 640 - 749AD
Abbasid	: 700 - 10th century AD
Fatimid	: 11th - 12th century AD
Ayyubid	: 12th - mid 13th century AD
Mamluk	: mid 13th - 16th century AD
Ottoman	: 16th century - WWI.

Arrangement of the Catalogue
Catalogue number and plate
Inventory number
Short description
Measurements (in cm) [in general, only the diameter is given for the pottery. For other find groups, the size of the sherd is noted].
Fabric [the fabric of the wheel-thrown pottery is described through the use of a fabric code. As a point of departure, mould-made and handmade pottery, as well as other find group entries (*i.e.* terracotta), are described using using the Munsell Colour Charts as colour codex].
Context [the context is added if the sherds have not been excavated in season 2015].
Further description, if necessary.

References
Date [the date is given by references and context. Finds without references are dated by context].

Catalogue Abbreviations

AE	: copper-alloy 'bronze'.
D.	: depth.
Diam.	: diameter [the max. diam. is given].
ext.	: exterior.
FE	: iron.
H.	: height.
int.	: interior.
L.	: length.
PB	: lead.
T.	: thickness.
W.	: width.
Wt.	: weight (in g).

All measurements are given in cm.

Catalogue Authors
Inked drawings by Heike Möller, Janek Sundahl and Mette Pedersen (lamps and terracotta).
Plate layout: Heike Möller.
Photos of catalogue finds: Philip Ebeling and Nicolai Thorning.
HM : Heike Möller (pottery).
AL : Achim Lichtenberger (terracotta, marble, limestone).
AP : Alex Peterson (Mamluk and later finds).
DC : Dorothea Csitneki (Jarash Bowls).
MP : Mette Pedersen (lamps).
PE : Philip Ebeling (tiles, wallplaster).
RR : Rubina Raja (terracotta, marble, limestone).
SK : Signe Krag (jewellery).

Introduction

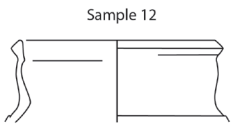
The catalogue aims to present a representative spectrum of finds from the Northwest Quarter, mainly from the 2015 campaign [Two Masters theses (working-titles): Doro Csitneki, *Gerasa: Untersuchungen zu den "Jarash Bowls"* and Signe Bruun Kristensen, *Defining shape and function in locally produced Reddish Ware* are under way. Preliminary registration reports for earlier campaigns include: Lichtenberger *et al.* 2013, 217 and 2018 with further studies by Peter Fink-Jensen and XRF analysis of selected artefacts found in the Northwest Quarter of the ancient city of Jarash. Some finds from the 2014 campaign are also included]. It will contribute to an established draft of typology and fabric to characterise the local/regional ware, on the one hand, and imported wares, on the other hand [Even though much pottery of Jarash, ancient Gerasa, is fairly well known, there are still large gaps to fill - the local Roman ceramic material for example is until now, except for some published finds, unknown to us typologically, stylistically and chronologically. The same can be said for imported finds which urgently need detailed analysis. The published work so far mainly focuses on Late Byzantine and Early Islamic finds on the one side (due to the high quantity of finds from these periods), whether locally or regionally produced, and - to a lesser extent - on Hellenistic and Early Roman pottery. Imported finds are rarely published: General overview *e.g.* Uscatescu 1996. Numerous articles in: Zayadine 1986 (Jarash Archaeological Project 1981-1983) including articles concerning the kiln sites of Byzantine and Umayyad date; Pierobon 1984; recently: Kehrberg 2009: 493-512 and Kehrberg 2011; Brizzi, Sepio and Baldoni 2011: 345-369].

The report aims at presenting an overview of finds from the trenches mentioned in the report. Another part of the catalogue discusses pottery samples from the Late Roman and Late Byzantine/Early Umayyad pottery fill in Trench J, excavated in 2014 and 2015 [*cf.* this report, see also Kalaitzoglou *et al.* 2018; Lichtenberger *et al.* 2018. The samples are marked by an additional field in the catalogue: context], which have been used for fabric and content analysis (*cf.* Merkel and Prange in this report).

Typology by Functional Groups

To maintain consistency throughout the find documentation, the pottery typology is arranged according to functional groups. The definition of groups, as well as the fixed terminology of each subgroup, simplifies and standardises the designation of pottery types and provides a basis for further ceramic studies. Five functional groups have been defined:
- **Cookingware**: all vessels that are used on fire to prepare food.
- **Tableware**: vessels that are used on the table.
- **Common ware**: all vessels that are not used on the table or for cooking - in Jarash mainly food preparation and storage jars.
- **Transport vessels**: all vessels used for transporting goods - in Jarash exclusively amphorae.
- **Domestic furnishing and other specialised vessels**: *e.g.* lamps and lanterns.

Pl. 2



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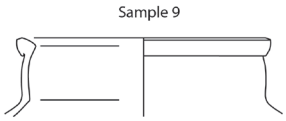

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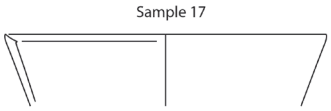

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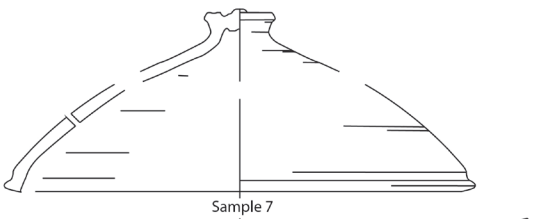

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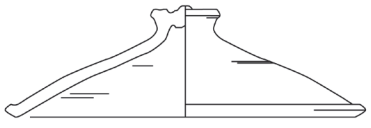

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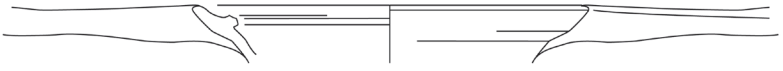

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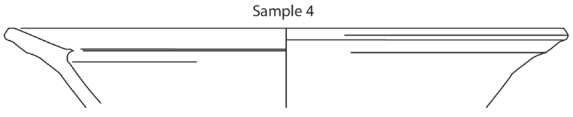

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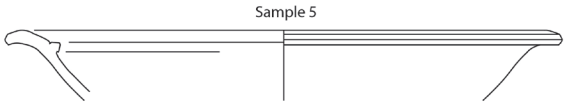

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The catalogue is arranged according to the functional groups, beginning with cookingwares, always starting with locally produced vessels, followed by imports. In general, all vessels presented in the catalogue are wheel thrown. One imported bowl (pl. 5) and all lamps (pl. 17) are mold-made. The only handmade pottery can be dated to the Middle Islamic period, *i.e.* the Ayyubid/Mamluk periods (pl. 18.107-110).

Fabrics

Microscopical analyses of all fragments have been made on the fresh break, using magnifying glasses with 10x and up to 20x magnification. This method allows an initial classification into one of the groups listed above (for the first classification of local/regional fabrics with a description, see Lichtenberger *et al.* 2013, 2017, 2018). A catalogue of all collected fabric is used as a reference during the campaign and is sorted by fabric types of 1) local/regional production: orange ware, grey ware with its subtypes, and 2) imported fabric [the codes are used in the catalogue. GW: grey ware; OW: orange ware. For descriptions of fabric, see Merkel and Prange in this report. These categories are very preliminary, and further studies have to be undertaken to clearly define subgroups, however, the vessels in the catalogue are generally made of the main fabric, only some cooking pots and tableware occur in a different reddish-brownish fabric noted as OW 10 fabric. Since the imported finds have not been analysed yet, a full description of the paste is given in the chapter's introduction, unless a standardised code can be used, as is the case for African Red Slip Ware, for example].

The 2015 campaign focused on intensive studies of the local/regional fabric in order to go beyond a simple description of fabric and preliminary grouping [preliminary fabric description and congruence to fabric codes of other excavated areas, *cf.* Lichtenberger *et al.* 2013: 14-15; Lichtenberger *et al.* 2017, 2018]. Representative samples of each local/regional fabric group have been selected for elemental mass spectrometry and petrographical analyses (*cf.* Merkel and Prange in this report), to get the chemical fingerprint of the productions and determine a definition of "local" wares in comparison to regional imports [earlier fabric studies concerning early pottery production in Jarash has been made by Braemer 1989, for later productions see: Watson 1989, concerning "Jarash Bowls" and Uscatescu 1996. Recent: Tarboush 2015].

In general, the main fabric occurs in two different colours: **orange ware (OW)** and **grey ware (GW)** - samples 1-15 (Merkel and Prange) [as described by Lichtenberger *et al.* 2013: 14-15. The orange ware is similar to the fabric described under fine ware, *cf.* Lichtenberger *et al.* 2017 "orange ware". The Munsell colour is not indicated in the catalogue, since it corresponds to the Munsell Colour Charts description given in the earlier reports]. Nevertheless, there are some fabric types that differ from these, not only in colour but more importantly by different inclusions (Merkel and Prange, sample 16-18). These fabric types require further analysis to clarify whether they have been regionally imported or are of a local origin but from a different clay deposit [This could be the case for Sample 16 and 17, *cf.* Merkel and Prange in this report].

Catalogue

Cookingware (HM)

Cooking Pots

Most of the closed cooking pots are Roman globular cooking pots (pl. 1.1-4) with a ribbed surface and vertical handles, oval or pinched in shape and a round, sometimes slightly knobbed, base. They often carry an incised groove on top of the rim, and sometimes the rim is slightly S-curved, probably to carry a lid. Often, they do not show any traces of burning; therefore, it is possible that they have also been used as simple storage jars. Some occur with a thin reddish slip.

Later examples, of Byzantine date, have an S-curved neck and often a thickened and sometimes recessed rim on the outside. Their surface is ribbed, and two vertical handles are oval in shape (pl. 1.7-9, pl. 2.7-11).

Five samples of cooking pots (sample 16; pl. 1.2; sample 6, pl. 1.5; sample 10, pl. 1.7; sample 12, pl. 2.10; sample 9, pl. 2.11) have been analysed by elemental mass spectrometry and petrography. Three cooking pots (sample 10, 12, 9) are part of the main local fabric group (*cf.* Merkel and Prange), and the same observation can be made regarding another smaller cooking pot of Roman or Late Roman date (sample 6). One Roman pot differs from this group of local fabric (sample 16) and was probably imported.

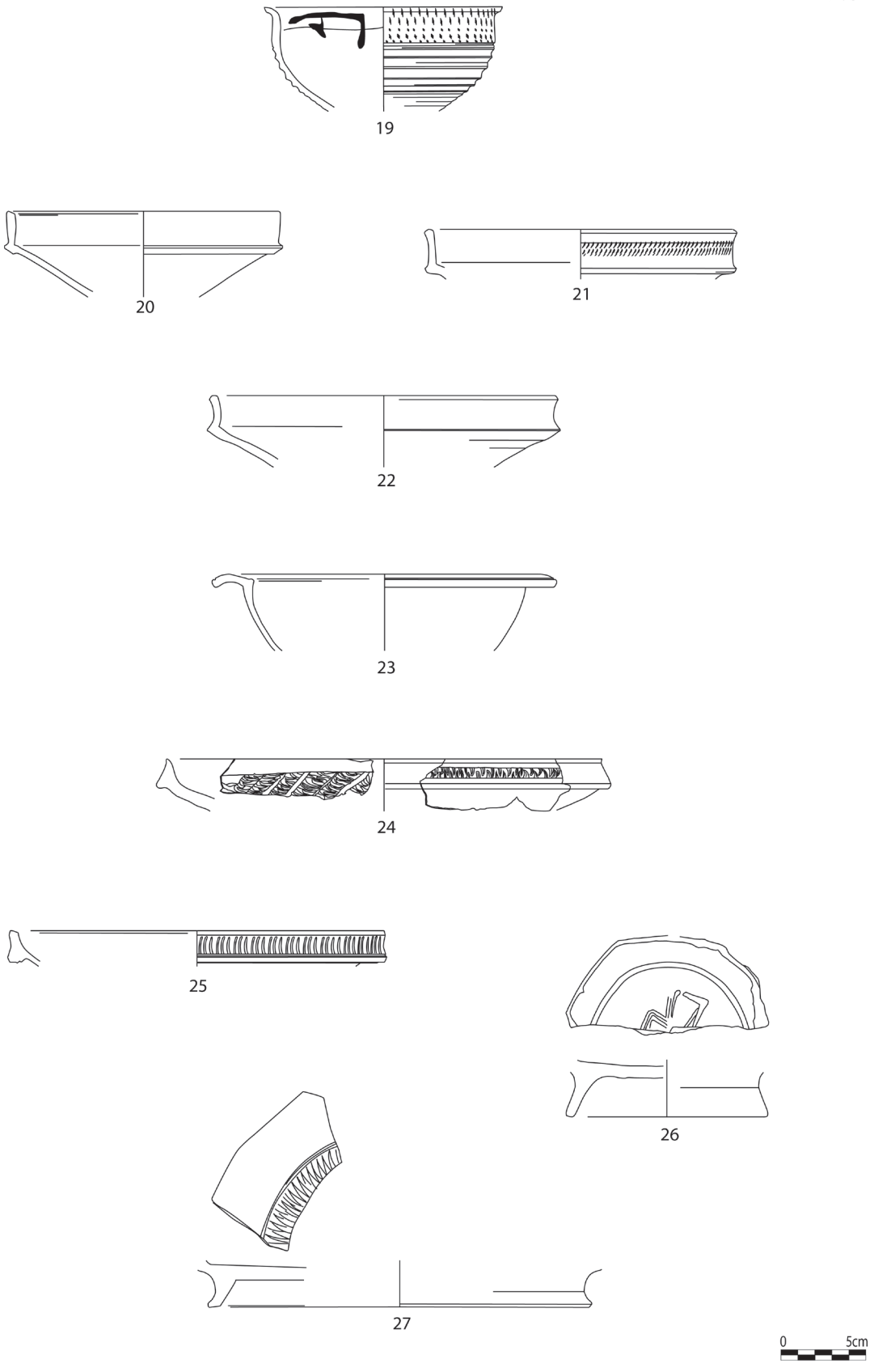
Cooking Pots

With Incised Groove on Top of the Rim

1.
Pl. 1.1
J15-Qac-24-1
Intact profile.
Diam.: 11.0.
Fabric: OW.
Two oval handles attached vertically at rim and shoulder.
Round base.
References: Uscatescu 1996: 136 (Type XXXIV-5) and pl. 38.31-32 - with further references. Date: Late Roman; slightly earlier in date *cf.* Brizzi, Sepio and Baldoni 2011: 360-362, fig. 10.7 from a context dating to the beginning of the 3rd century AD.
Date: Roman-Late Roman.

2.
Pl. 1.2
J15-Jc-61-1113
Rim.
Diam.: 10.4.
Fabric: OW **- sample 16** (*cf.* Merkel and Prange in this report).
Two oval handles attached vertically at rim and shoulder.
Context: Late Roman pottery fill in Trench J.
References: Uscatescu 1996: 136 (Type XXXIV-5) and pl. 38.31-32 - with further references. Date: Late Roman; slightly earlier in date *cf.* Brizzi, Sepio and Baldoni 2011: 360-362, fig. 10.7 from a context dating to the beginning of the 3rd century AD.
Date: Roman-Late Roman.

Pl. 3



3.
Pl. 1.3
J15-Qac-26-1
Intact profile.
Diam.: 11.6.
Fabric: OW 10.
Two pinched handles attached vertically at rim and shoulder. Round base.
References: Uscatescu 1996: 136 (Type XXXIV-5), pl. 38.31-32, p. 138 (Type XXXIV-11), pl. 39.33 - with further references. Date: Late Roman; slightly earlier in date *cf.* Brizzi, Sepio and Baldoni 2011: 360-362, fig. 10.7 from a context dating to the beginning of the 3rd century AD.
Date: Roman-Late Roman.

With Small Groove on the Outside of the Rim
4.
Pl. 1.4
J15-R-22-15
Rim.
Diam.: 7.3.
Fabric: OW 10.
Two pinched handles attached vertically at rim and shoulder.
References: Lichtenberger *et al.* 2017: fig. 85 - with further references; Uscatescu 1996: 138 (Type XXXIV-11), pl. 39.33 - with further references.
Date: Late Roman.

With S-Curved Neck
5.
Pl. 1.5
J14-Jc-61-1112
Rim.
Diam.: 10.0.
Fabric: OW - sample 6 (*cf.* Merkel and Prange in this report).
Two pinched handles attached vertically at rim and shoulder.
Context: Late Roman pottery fill in Trench J.
References: -
Date: Late Roman.

With Thickened Rim on the Outside
6.
Pl. 1.6
J15-R-29-12
Rim.
Diam.: 6.7.
Fabric: OW.
References: possible related to Uscatescu 1996: 136 (Type XXXIV-5) and pl. 38.30 - with further references.
Date: Late Roman.

With Thickened and Sometimes Recessed Rim on the Outside and S-Curved Neck
7.
Pl. 1.7
J14-Je-77-1052
Rim.
Diam.: 13.1.
Fabric: OW - sample 10 (*cf.* Merkel and Prange in this report).
Context: Late Byzantine/Early Umayyad pottery fill in Trench J.
References: Lichtenberger *et al.* 2017: fig. 86-87 and fig. 95; Uscatescu 1996: 135-136 (Type XXXIV-3, subtype 3D-G) and pl. 83.509-516, pl. 84.517, 520 - with further references.
Date: Late Byzantine-Early Umayyad (6th-7th century AD).

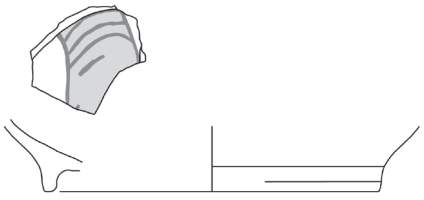
8.
Pl. 1.8
J14-Je-77-1054
Rim.
Diam.: 12.8
Fabric: OW.
Context: Late Byzantine/Early Umayyad pottery fill in Trench J.
References: Lichtenberger *et al.* 2017: fig. 86-87 and fig. 95; Uscatescu 1996: 135-136 (Type XXXIV-3, subtype 3D-G) and pl. 83.509-516, pl. 84.517, 520 - with further references.
Date: Late Byzantine-Early Umayyad (6th-7th century AD).

9.
Pl. 1.9
J15-Qc-20-5-6
Cooking pot rim and base.
Diam.: 11.9.
Fabric: OW.
Two oval handles attached vertically at the rim.
References: Lichtenberger *et al.* 2017: fig. 86-87 and fig. 95; Uscatescu 1996: 135-136 (Type XXXIV-3, subtype 3D-G) and pl. 83.509-516, pl. 84.517, 520 - with further references.
Date: Late Byzantine-Early Umayyad (6th-7th century AD).

10.
Pl. 2.10
J14-Je-77-1059
Rim.
Diam.: 9.4.
Fabric: OW - sample 12 (*cf.* Merkel and Prange in this report).
Context: Late Byzantine/Early Umayyad pottery fill in Trench J.
References: Lichtenberger *et al.* 2017: fig. 86-87 and fig. 95; Uscatescu 1996: 135-136 (Type XXXIV-3, subtype 3D-G) and pl. 83.509-516, pl. 84.517, 520 - with further references.
Date: Late Byzantine-Early Umayyad (6th-7th century AD).

11.
Pl. 2.11
J14-Je-77-1051
Rim.
Diam.: 11.3.
Fabric: OW **- sample 9** (*cf.* Merkel and Prange in this report).
Context: Late Byzantine/Early Umayyad pottery fill in Trench J.
References: Lichtenberger *et al.* 2017: fig. 86-87 and fig. 95- with further references; Uscatescu 1996: 135-136 (Type XXXIV-3, subtype 3D-G) and pl. 83.509-516, pl. 84.517, 520 - with further references.
Date: Late Byzantine-Early Umayyad (6th-7th century AD).

Pl. 4



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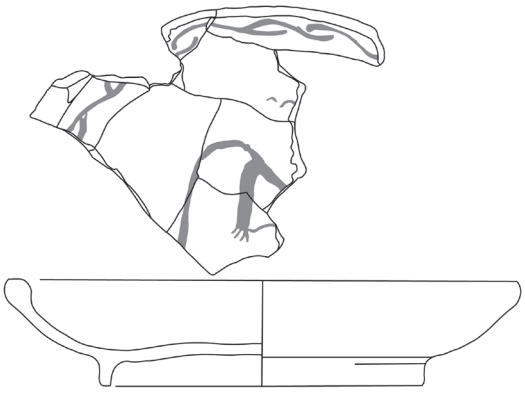

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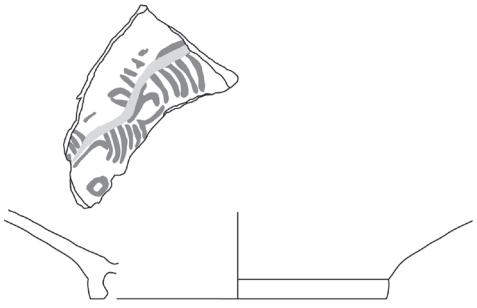

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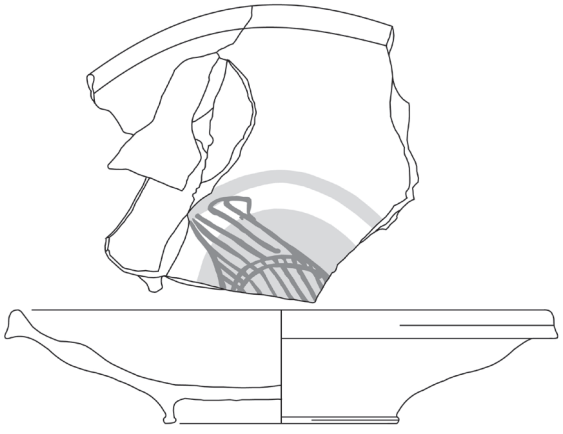

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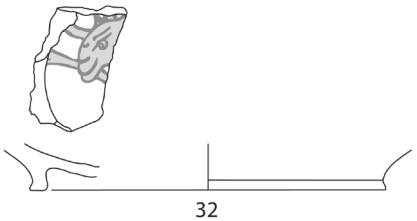
Sample 14



32



Casserole/Pan

Most of the open cookingware items are casseroles with cut rim and horizontal handles attached to the rim or slightly below the rim. The handles are wide "double folded" handles, but some casseroles have smaller handles, folded in the same manner. The diameters vary between 14 and 21 cm. A lid with a cut rim and concise knob can be attributed to a casserole (pl. 2.12-14). They were probably made during one production process by simply cutting the upper from the lower part of the vessel (*cf.* Uscatescu 1996: 300, fig. 1-13). Often, one single hole was pierced in the lid just above the rim. This allowed steam to exit easily during cooking.

Other casseroles that have possibly also been used as frying pans are numerous and occur in many variations, mostly with an outward-directed rim and an internal ledge of different widths (pl. 2.16-18), possible for carrying a lid (pl. 2.15). Some examples have narrow and elongated handles directly attached to the rim; others show small horizontal looped handles (Lichtenberger *et al.* 2013: 34, fig. 93). Numerous vessels of this common type carry decorations that are irregular set and of white paint on the rim and handle, whereas others are covered only with a thin red slip.

Four casseroles have been analysed, using elemental mass spectrometry and petrography (sample 17, pl. 2.12; sample 7, pl. 2.14; sample 4, pl. 2.17; sample 5, pl. 2.18). They all belong to the same fabric group with one exception: sample 17 is mineralogically different (*cf.* Merkel and Prange in this report) and does not belong to the fabric type assumed to be local.

Casserole
With Cut Rim
12.
Pl. 2.12
J14-Jc-61-1123
Rim.
Diam.: 14.3.
Fabric: OW - sample 17 (*cf.* Merkel and Prange in this report).
Context: Late Roman pottery fill in Trench J.
References: Uscatescu 1996: 106-107 (Type XVI-1, subtype 1A-B), pl. 73.385 and 387; with further references. Lichtenberger, Raja and Sørensen 2013: 34-35, fig. 90.
Date: Byzantine/Late Byzantine-Early Umayyad (5th, but mainly 6th-7th century AD). Due to the good context in Trench J, the date of casserole production needs to be shifted to the Late Roman period; *cf.* Montlivault 1986: 71, pl. 19.2 referring to a Byzantine workshop in Jarash producing this type of pottery.
Date: Late Roman.

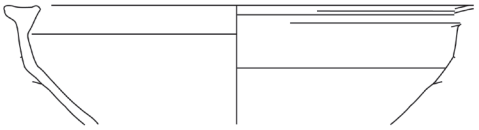
13.
Pl. 2.13
J14-Je-77-1107
Rim.
Diam.: 2.3.
Fabric: OW - sample 7 (*cf.* Merkel and Prange in this report).
Two horisontal "double"-handles are attached slightly below the rim.
References: Lichtenberger, Raja and Sørensen 2013: 34-35, fig. 91; Uscatescu 1996: 106-107 (Type XVI-1A), pl. 73.381 - with further references. Date: Late Byzantine (6th century AD); *cf.* Montlivault 1986: 71, pl. 19.2 referring to a Byzantine workshop in Jarash producing this type of pottery.
Date: Late Byzantine.

Lid
With Cut Rim
14.
Pl. 2.14
J15-Nb-57-227 and 28
Whole profile reconstructed.
Diam.: 21.3.
Fabric: OW.
A small hole was cut in the lower part of the lid.
References: Uscatescu 1996: 111 (Type XVI-1), pl. 73.386 and p. 111-112 (Type XVIII-1 and 2), pl. 74.407-409 and 411 - with further references. Date: Late Byzantine-Early Umayyad (6th-7th century AD). Lichtenberger *et al.* 2017: fig. 81; Kenkel 2012: Kat. LIV, pl. 22.KDe6.1 with further references. Date: Roman-Byzantine; *cf.* Montlivault 1986: 71, pl. 19.2 referring to a Byzantine workshop in Jarash producing this type of pottery.
Date: Late Byzantine.

15.
Pl. 2.15
J15-Nb-57-227
Intact profile.
Diam.: 16.1.
Fabric: OW.
A small hole was cut in the lower part of the lid.
References: Uscatescu 1996: 111 (Type XVI-1), pl. 73.386 and p. 111-112 (Type XVIII-1 and 2), pl. 74.407-409 and 411 - with further references. Date: Late Byzantine-Early Umayyad (6th-7th century AD). Lichtenberger *et al.* 2017: fig. 81; Kenkel 2012: Kat. LIV, pl. 22.KDe6.1 with further references.
Date: Roman-Byzantine; *cf.* Montlivault 1986: 71, pl. 19.2 referring to a Byzantine workshop in Jarash producing this type of pottery.
Date: Late Byzantine.

Casserole/Pan
With Outward-Turned Rim and Internal Ledge
16.
Pl. 2.16
J15-Nb-57-109
Rim.
Diam.: 18.0.
Fabric: OW.
The narrow and elongated oval handle is directly attached to the rim. White irregular stripes painted on the handle top and internal side of rim and body.
References: Lichtenberger, Raja and Sørensen 2013: 34-36, fig. 92 and 94 with further references. Uscatescu 1996: 109-110 (Type XVII-3A), pl. 75.396-397; deco. related to: Uscatescu 1996: 110 (Type XVII-3, subtype 3C and E) pl. 75.399 and 403 with further references.
Date: Late Byzantine-Early Umayyad (6th-7th century AD).

Pl. 5



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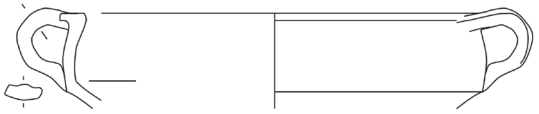

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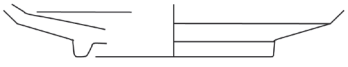

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17.
Pl. 2.17
J14-Je-77-1088
Rim.
Diam.: 25.0.
Fabric: OW - sample 4 (*cf.* Merkel and Prange in this report).
Context: Late Byzantine/Early Umayyad pottery fill in Trench J.
References: Lichtenberger, Raja and Sørensen 2013: 34-36, fig. 93-94 with further references. Uscatescu 1996: 110 (Type XVII-3, subtype 3C and 3D), pl. 75.400-401 with further references.
Date: Late Byzantine (6th century AD).

18.
Pl. 2.18
J14-Je-77-1087
Rim.
Diam.: 25.0.
Fabric: OW - sample 5 (*cf.* Merkel and Prange in this report).
Context: Late Byzantine/Early Umayyad pottery fill in Trench J.
References: Lichtenberger, Raja and Sørensen 2013: 34-36, fig. 93-94 with further references. Uscatescu 1996: 110 (Type XVII-3, subtype 3C and 3D), pl. 75.400-401 with further references.
Date: Late Byzantine (6th century AD).

Tableware (HM)
Bowls

Most common are small carinated bowls with vertical rims (pl. 3.20-22), sometimes decorated with a fine rouletting on the exterior rim. They are of Early Roman date. As their fabrics indicate, these types were probably locally produced, but their form clearly relates to some examples of Eastern Sigillata (ESA) [Regarding the local production of early Roman table wares, *cf.* Braemer 1989]. Some of them are covered with a thin slip that changes from orange to pinkish-beige. Unique, though probably locally produced, is the goblet (pl. 3.19) with traces of reddish and brownish painting on the interior and exterior, with small rouletting outside just below the rim (Braemer 1989).

One bowl with a small flaring, slightly convex rim, resembles African Red Slip Ware (ARS) of the 3rd and 4th century AD and is probably a local imitation (pl. 3.23). Bowls with carinated bodies and flat horizontal outturned rims are very common in Roman and Late Roman contexts (pl. 5.33-36). Vertical oval-to-flat handles are attached to rim and body. Intact vessels show that up to four, possibly even more, handles could have been attached to a vessel. The shape of the rim makes it possible to carry a lid. Some of the examples carried traces of burning, underlining their assumed use either as a casserole or a simple tableware bowl. The largest group of open-form table ware is the so-called Jarash Bowls (see below) of the Byzantine period. One bowl with a triangular hooked rim, covered with a thick white slip and zigzag motif on the inside and outside, cannot be classified within that group, although it is related to Jarash Bowls due to its form (pl. 3.24).

Three other fragments can be categorised as Jarash Bowls with incised and stamped decorations. One fragment with overhanging rim shows rouletting decoration on the exterior (pl. 3.25) and finds its comparison in Late Roman C Ware (LRC). One base with a cross motif is related to African Red Slip Ware (ARS) (pl. 3.26). The zig-zag motif on another example is very common on local pottery in Byzantine and Umayyad times. It does not only occur on tableware but is also visible on common wares (especially later basins) (*cf.* pl. 12).

Goblet
With Slightly Out-Turned Rim
19.
Pl. 3.19
J15-Rbd-31-7
Rim.
Diam.: 13.4.
Fabric: OW.
Rouletting in five rows on the exterior just below the rim, interior traces of reddish and brownish paint visible.
References: Braemer 1989: 162, fig. 11.46.
Date: Early Roman.

Bowls
Carinated, with Vertical Rim
20.
Pl. 3.20
J15- Ok-47-5
Rim.
Diam.: 15.5.
Fabric: OW.
References: Type related to ESA-form, *cf.* Hayes 1985, Atlante Form 45 and 50; Lichtenberger *et al.* 2017: fig. 15; concerning a local production in Jarash, *cf.* Braemer 1989: 158-160 (Group b1), fig. 5-6. Date: Early Roman (2nd half 1st century AD); the production probably continued at least into the 2nd century AD, *cf.* Brizzi, Sepio and Baldoni 2011: 360-362, fig. 10.2 with finds in an early 3rd century AD context.
Date: Roman.

21.
Pl. 3.21
J15- Qac-45-10
Rim.
Diam.: 17.7.
Fabric: OW.
Rouletting on the exterior rim.
References: Type related to ESA-form, *cf.* Hayes 1985, Atlante Form 45 and 50; Lichtenberger *et al.* 2017: fig. 15; concerning a local production in Jarash, *cf.* Braemer 1989: 158-160 (Group b1), fig. 5-6. Date: Early Roman (2nd half 1st century AD); the production probably continued at least into the 2nd century AD, *cf.* Brizzi, Sepio and Baldoni 2011: 360-362, fig. 10.2 with finds in an early 3rd century AD context.
Date: Roman.

Pl. 6



45



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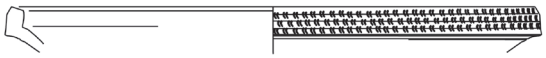

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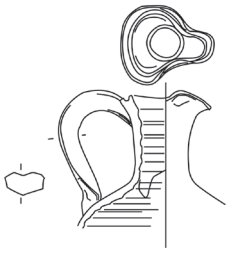

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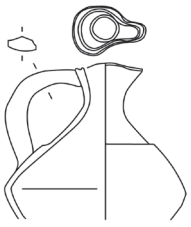

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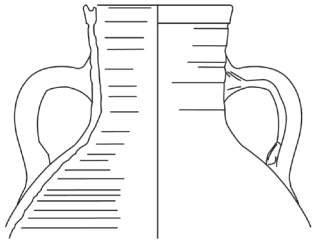
Sample 15



51



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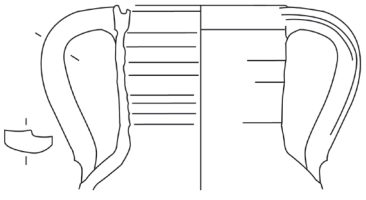

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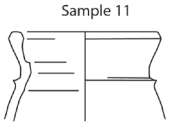
Sample 11



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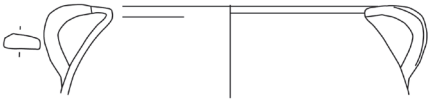

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22.
Pl. 3.22
J15- Nb-57-53A
Rim.
Diam.: 19.5.
Fabric: OW.
References: Type related to ESA-form, *cf.* Hayes 1985, Atlante Form 45 and 50; Lichtenberger *et al.* 2017: fig. 15; concerning a local production in Jarash, *cf.* Braemer 1989: 158-160 (Group b1), fig. 5-6. Date: Early Roman (2nd half 1st century AD); the production probably continued at least into the 2nd century AD, *cf.* Brizzi, Sepio and Baldoni 2011: 360-362, fig. 10.2 with finds in an early 3rd century AD context.
Date: Roman.

With Small Flaring Rim, Slightly Convex
23.
Pl. 3.23
J15- Jl-5-19
Rim.
Diam.: 19.5.
Fabric: OW.
Fine groove at lip.
References: Probably of local production, this type can be related to Hayes 1972, ARS Form 52B, *cf.* Hayes 2008: 222, fig. 31.1001-1003 and pl. 51 (late 3rd-4th century AD). Due to the context (a Late Roman pottery fill), a later production in Byzantine times can be excluded, even though the form also resembles the later type (Hayes 1972), ARS Form 94 (late 5th-early 6th century AD), *cf.* Jarash bowl: Watson 1989: 225-226, fig. 1.12a. Regarding the phenomenon that the type survives in Jarash from the 3rd century AD up to Late Byzantine/Early Umayyad times, *cf.* Brizzi, Sepio and Baldoni 2011: 362-363, fig. 11.12.
Date: Late Roman?

With Triangular Hooked Rim
24.
Pl. 3.24
J15-Og-57-21
Rim.
Diam.: 25.3.
Fabric: OW.
Incised (zig-zag) -band on the floor, irregular chiseling along the exterior rim. Whitish thin slip on surface.
References: Uscatescu 1996: 94 (Type XII-3, motif 8a), fig. 39.43 with further references.
Date: Byzantine.

Jarash Bowls with incised/stamped decoration
With Overhanging Rim and Flat Underside, Grooved
25.
Pl. 3.25
J15-Ok-30-25
Rim.
Diam.: 21.0.
Fabric: OW.
Rouletting on exterior rim.
References: Local production - "Jarash Bowl?", type related to Hayes 1972, LRC Form 3, subtype 3E, 3C/H; *cf.* Hayes 2008: 241, 243, fig. 39.1278, fig. 40.1294 (1st half of the 6th century AD); Uscatescu 1996: 60 (Type IV-Form Hayes 3F), pl. 45.1278 and 1295 with further references.
Date: Late Byzantine (6th century AD).

with medium-high ring base
26.
Pl. 3.26
J15-Nb-57-121
Base.
Diam.: 11.6.
Fabric: OW.
Stamped cross on floor.
References: Local production - "Jarash Bowl", stamped motif could relate to Hayes 1972, ARS style E(i), *cf.* Watson 1989: 241, fig. 2b.v.
Date: Late Byzantine (6th century AD).

With Ring Base
27.
Pl. 3.27
J14-Je-77-45
Base.
Diam.: 21.6.
Fabric: OW.
"Chisel" (zig-zag)-band in circle on the floor, framed by two finely grooved lines.
Context: Late Byzantine/Early Umayyad pottery fill.
References: Local production - "Jarash Bowl"; *cf.* Watson 1989: 232, fig. 3.3; Uscatescu 1996: 69-78 (Type X, motif 18c) fig. 29 and fig. 66.304 with further references.
Date: Late Byzantine-Early Umayyad (6th-7th century AD).

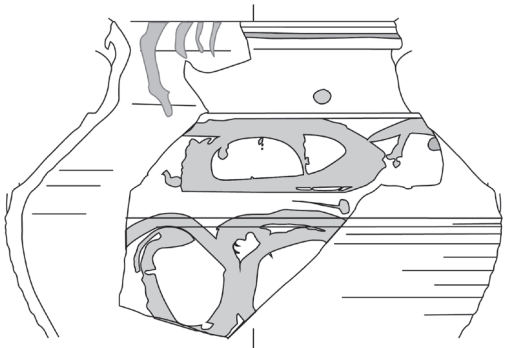
Jarash Bowls with painted decoration (DC)

The Jarash Bowls (pl. 4.28-32) show a selection of varying depictions on local tableware. These range from floral/ornamental motifs to animals and human figures. The ornamental motif can be seen as the main motif on all painted bowls. The inhabited grape motif is the most common one, but different ornaments are used and stylised for the patterns on this bowls. Animals and human figures are included in this framing motif. Better known is the fact that motifs originating either from mosaic art or pattern books are taken and placed on the bowls. This is apparent on the misfired piece, where the lower part of a basket is preserved. The motif is common on mosaic pavements and as an architectural element and is usually surrounded by peacocks or pigeons.

One misfired bowl (sample 14, pl. 4.31) was analysed using elemental mass spectrometry and petrography. Its fabric is part of the main local production in Jarash that also includes common and cookingwares (*cf.* Merkel and Prange in this report).

Jarash Bowls with painted decoration (DC)
With Hourglass-Shaped Ring Base
28.
Pl. 4.28
J15-Oi-100-3
Base.
Diam: 15.2.
Fabric: OW (Munsell: painted decoration: 10YR 5/1 and 2.5YR 3/6).
Bi-chrome painting on interior, reddish outlines with buff filling. Motif could be part of a tunic.
References: Local production - "Jarash Bowl", related to Hayes 1972, ARS Form 105.
Date: Late Byzantine-Early Umayyad (6th-7th century AD).

Pl. 7



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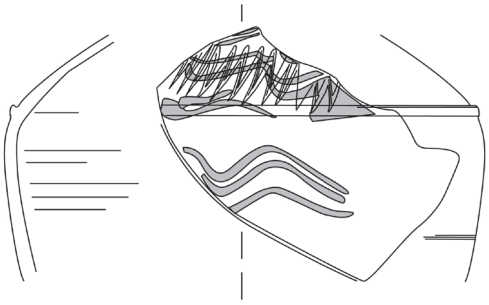

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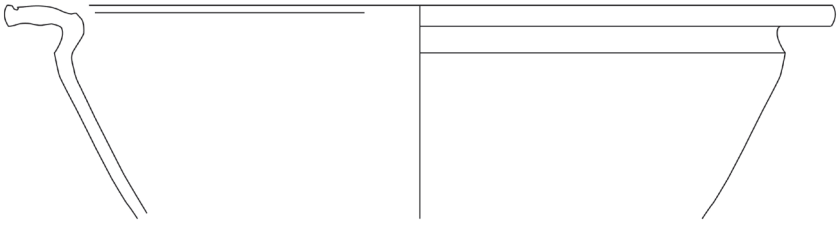

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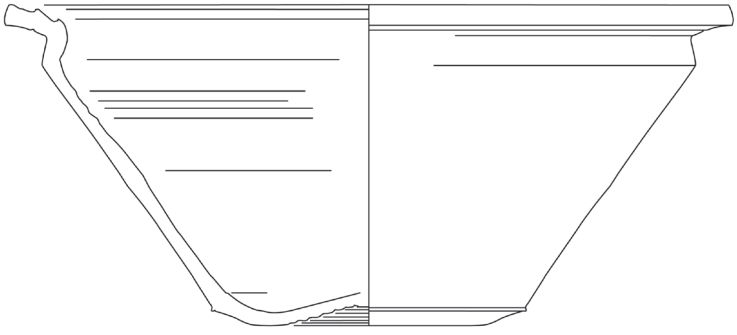

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0 5cm

With Knobbed Rim and Ring Base
29.
Pl. 4.29
J15-Nb-57-231
Intact profile.
Diam: 23.5.
Fabric: OW (Munsell: wash: 10YR 8/2; painted decoration: 10R 4/4).
Bi-chrome painting on interior, thick matt buff/white wash covering the complete interior, reddish ornamental pattern (waveband) surrounding the upper interior body, in the centre an unidentifiable motif (stylised cross?).
References: Local production - "Jarash Bowl", related to Hayes 1972, ARS Form 105; Decoration: *cf.* Uscatescu 1996: pl. 59 (Type X), fig. 238-240.
Date: Late Byzantine-Early Umayyad (6th-7th century AD).

With Edgy Ring Base
30.
Pl. 4.30
J15-Nb-20-61
Base.
Diam: 13.4.
Fabric: OW (Munsell: painted decoration: not available).
Bi-chrome painting on interior, reddish, stylised floral motif, buff wavy line running across floral pattern.
References: Local production - "Jarash Bowl", decoration: *cf.* Uscatescu 1996: pl. 54 (Type X), fig. 196-197 and fig. 200.
Date: Late Byzantine-Early Umayyad (6th-7th century AD).

With Triangular Hooked Rim and Ring Base
31.
Pl. 4.31
J14-Li-80-10
Intact profile.
Diam: 24.7.
Fabric: OW (Munsell: painted decoration: not available) - sample 14 (*cf.* Merkel and Prange in this report).
Bi-chrome painting on interior, centred, two buff concentric circles compose background, reddish lines form a basket or container.
References: Local production - "Jarash Bowl", related to Hayes 1972, ARS Form 104A, 105; *cf.* Uscatescu 1996: pl. 50.166-169 (Type X-11A and 12A). Decoration: *cf.* Uscatescu 1996: pl. 59.238-240 (Type X).
Date: Late Byzantine-Early Umayyad (6th-7th century AD).

With Ring Base, Pointed Outside
32.
Pl. 4.32
J15-Of-39-3
Base.
Diam: 16.1.
Fabric: OW (Munsell: painted decoration: 10R 4/4 and 7.5YR 8/1).
Bi-chrome painting on interior, reddish outlines with buff filling depicting the head of an animal, probably a camel or a gazelle.
References: Local production - "Jarash Bowl", *cf.* decoration: Uscatescu 1996: 85-86 (Motif 31-32), fig. 27.
Date: Late Byzantine-Early Umayyad.

Bowls (HM)
Carinated with Horisontal, Out-Turned Rim
33.
Pl. 5.33
J15- Qd-9-21
Rim.
Diam.: 21.0.
Fabric: OW.
Handle attachment just below the rim and on carination visible.
References: Lichtenberger *et al.* 2017: fig. 64; Uscatescu 1996: 108 (Type XVI-5), pl. 38.24 with further references.
Date: Roman (2nd-4th century AD).

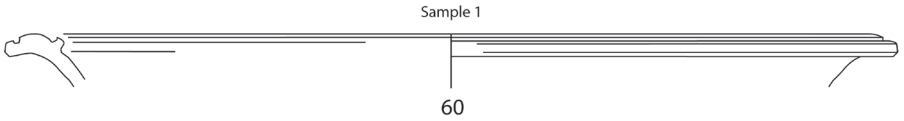
34.
Pl. 5.34
J15- Qac-40-6
Rim.
Diam.: 18.9.
Fabric: OW.
Handle attachment just below the rim and on carination visible.
References: Lichtenberger *et al.* 2017: fig. 56; Lichtenberger *et al.* 2018: fig. 46; Uscatescu 1996: 108 (Type XVI-5), pl. 38.23 with further references.
Date: Roman (2nd-4th century AD).

35.
Pl. 5.35
J15-R-29-9
Rim.
Diam.: 26.8.
Fabric: OW.
References: Related to Uscatescu 1996: 108 (Type XVI-5), pl. 38.23 with further references.
Date: Roman (2nd-4th century AD).

36.
Pl. 5.36
J15-R-29-10
Rim.
Diam.: 14.9.
Fabric: OW.
Handle attachment just below the rim and on carination visible.
References: Uscatescu 1996: 108 (Type XVI-5), pl. 38.23 with further references.
Date: Roman (2nd-4th century AD).

Tableware (HM)
Western-Mediterranean Imports
Western-Mediterranean tableware imports are rare. The body fragment of a Sigillata, probably of south-Gaulish origin was mould made and belongs to the bowl type Dragendorff 37. The fabric is well levigated, light orange-reddish in colour with very fine yellowish inclusions. The slip is thick, dark reddish-brown in colour. Finds of this type and origin are rare, not only in Jarash but in the whole Eastern Mediterranean [regarding Gaulish Sigillata and the scarcity of them in the Eastern Mediterranean, see *e.g.* Kenkel 2012: 131 with further references].

Pl. 8



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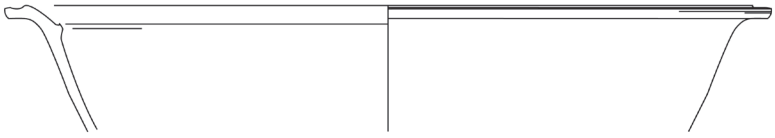

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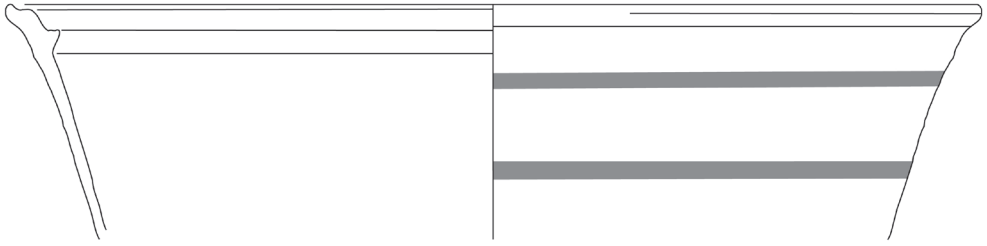

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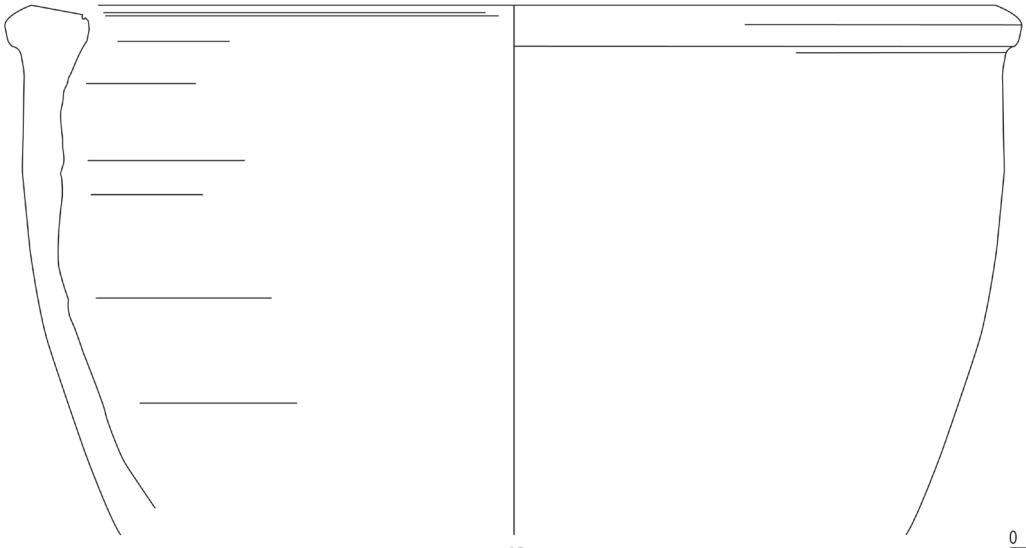

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More common are imports of African Red Slip Ware (ARS). Their spectrum of types even influences the local pottery production in Jarash (*cf.* pl. 3.22) from Roman times onwards. Most common are bowls with a plain rim of ARS fabric group C, probably of central-Tunisian origin (*cf. e.g.* Bonifay 2004: 50-51). This type was found mainly in Trenches J and N and seems to be the most commonly imported type of ARS in the Northwest Quarter. The other example, with flange on the exterior below the rim and hooked at the edge, possibly belongs to ARS fabric group D. Production sites of this fabric group have been mainly discovered in the north of Tunisia (*cf. e.g.* Mackensen and Schneider 2002: 128).

South Gaulish
Bowl
Relief Decorated/Moulded
37.
Pl. 5.37
J15-Qh-3-7
Body.
Fabric: Gaulish Sigillata, see above.
Relief decoration: grapes and leaves.
References: Could refer to Hayes 2008: 195 (Type: Dragendorff Form 37), pl. 43.739-741.
Date: Roman (1st-2nd century AD).

African Red Slip Ware (ARS)
Bowl
With Flange on Exterior Below Rim, Hooked at Edge
38.
Pl. 5.38
J15-Nb-57-55
Rim.
Diam.: 33.2.
Fabric: ARS D2?
References: Uscatescu 1996: fig. 43.97 (Hayes ARS Form 91B); Bonifay 2004: 177 (Type 50), fig. 95.
Date: Byzantine (1st half of 5th century AD).

With Plain Rim
39.
Pl. 5.39
J14-Jc-67-1128
Rim.
Diam.: 21.3.
Fabric: ARS C2.
With tiny beveled foot.
Context: Late Roman pottery fill in Trench J.
References: Lichtenberger *et al.* 2018: fig. 2; Hayes 1972, ARS Form Hayes 50A; Uscatescu 1996: fig. 42.89 (Hayes Form 50B).
Date: Roman (late 3rd-early 4th century AD).

Tableware
Eastern-Mediterranean Imports

Among the Eastern-Mediterranean finds, Eastern Sigillata is the most common tableware import in Roman times (Hayes 2008: 20). Their shapes were even copied in the locally produced pottery shapes (*cf.* pl. 3.20-22). The original production centre of the ESA found in Gerasa remains uncertain [Regarding archeometrical analyses of ESA in general, see *e.g.* Schneider 2000: 532; Slane 1997: 394-406]. Further analysis is necessary. Typically, the fabric is whitish-yellowish in colour, high fired and well levigated with hardly any inclusions. They are covered by a thick, deep-reddish slip that sometimes turns out a bit flaky. The ESA productions found during the 2015 campaign all resemble productions of the 1st century AD.

While ESA dominated the imported tableware in early Roman times, Late Roman C Ware, also known as Phocaen Red Slip Ware, seems to be the most imported ware in the Byzantine period, even though its quantity compared to the local tableware is very low. Especially the type with overhanging rims (pl. 6.45-46) finds similarities in the contemporary local "Jarash-Bowl" production. The fabric, in general, is light red-reddish brown in colour and well levigated. Small yellowish-white inclusions are frequent. They are covered by a very thin colourless slip, and sometimes, dark discoloration occurs along the vessels' rim due to the firing process [Concerning the fabric of LRC Ware, *cf. e.g.* Ladstätter and Sauer 2005: 146]. Further petrographic analyses are necessary to characterise the fabric types found in Jarash more precisely and attribute them to production centres.

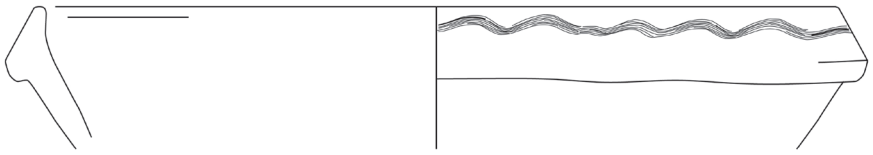
Eastern Sigillata A (ESA)
Bowl
With High Ring Base, Small in Diameter
40.
Pl. 5.40
J15-R-29-13
Base.
Diam.: 3.7.
Fabric: ESA, see above.
References: Hayes 2008: 140 (Type: Atlante II Form 51?), fig. 7.179.
Date: Early Roman (1st century AD).

With Ring Base, Carinated Body
41.
Pl. 5.41
J15-R-29-11
Base.
Diam.: 8.8.
Fabric: ESA, see above.
References: Hayes 2008: 128-129 (Type: Atlante II Form 29-30), fig. 3.45, 47 and 52.
Date: Early Roman (late 1st century BC-1st half 1 century AD).

Plate
With Ring Base
42.
Pl. 5.42
J15-R-25-6
Base.
Diam.: 12.5.
Fabric: ESA, see above.
References: -
Date: Early Roman.

With Vertical and High Ring Base
43.
Pl. 5.43
J15-Qac-40-7
Base.
Diam.: 12.8.
Fabric: ESA, see above.
References: Related to Hayes 2008: 137 (Type: Atlante II Form 29-37), fig. 6.144 and 147.
Date: Early Roman (late 1st century AD).

Pl. 9



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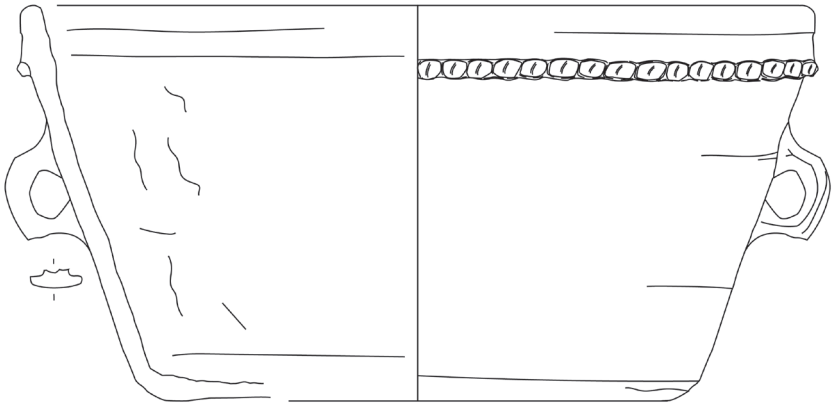

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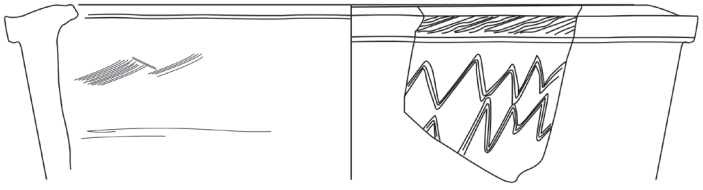

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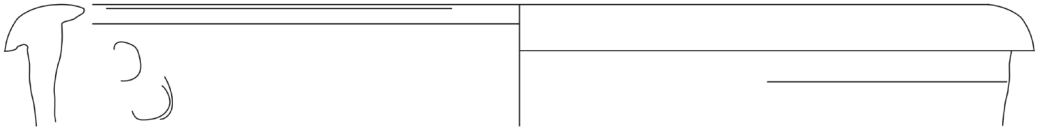
Sample 3



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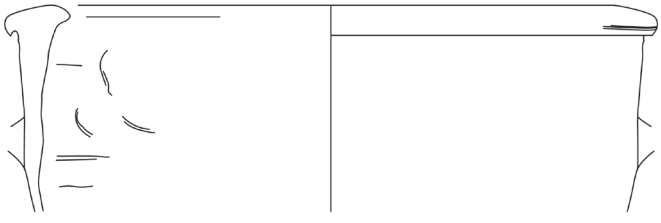


68

0 5cm

Jug
with ring-base
44.
Pl. 5.44
J15-R-25-7
Base.
Diam.: 6.7.
Fabric: ESA, see above.
Wheel-turn marks clearly visible on the inside.
References: Hayes 2008: 135, fig. 5.125 and 147.
Date: Early Roman (late 1st century BC-1st half of 1st century AD).

LATE ROMAN C Ware (LRC)
Bowl
With Overhanging Rim and Flat Underside, Grooved
45.
Pl 6.45
J15-Jk-1-3
Rim.
Diam.: 19.8.
Fabric: LRC, see above.
References: Hayes 1972, LRC Form 3; Uscatescu 1996: fig. 45.122-128 (Hayes Form 3E/F).
Date: Byzantine (5th century AD).

46.
Pl. 6.46
J15-Nb-57-57
Rim.
Diam.: R 21.0 cm.
Fabric: LRC, see above.
References: Hayes 1972, LRC Form 3; Uscatescu 1996: fig. 45.122-128 (Hayes Form 3E/F).
Date: Byzantine (5th century AD).

Stamped Cross
47.
Pl. 6.47
J15-Nb-57-233
Base.
Diam.: ?
Fabric: LRC, see above.
References: Hayes 1972, LRC Motif 71c; Ladstätter and Sauer 2005: cat. 110 (Stempelstil Gruppe III).
Date: Late Byzantine (6th century AD).

With Slightly Overhanging, Thickened Rim, Flattened on Top
48.
Pl. 6.48
J15-Nb-49-15
Rim.
Diam.: 24.1.
Fabric: LRC, see above.
References: Related to Hayes 1972, LRC Form 3 and Form 10C; *cf.* Hayes 2008: 243 (transitional form to 10), fig. 40.1298 and Hayes 2008: 246 (Form 3H), fig. 42.1332.
Date: Byzantine (late 5th-6th century AD).

Tableware
Jugs/Trifoiled Jugs

The closed shapes are dominated by jugs with trifoiled rim in different sizes (pl. 6.49-50). Sometimes, they are slipped with a thin reddish slip on the interior and exterior. Another type occurs in different variations with incised grooves on the rim and handles that are either attached to the rim or neck and end on the vessels shoulders (pl. 6.51-53). The shape of the rim suggests that it carried a lid.

Two Late Byzantine/Early Umayyad jars are decorated with white paint on the exterior and the interior rim. One of them (pl. 7.56) additionally carries uneven incised zig-zag lines on the vessel's shoulder. The combination of incised lines and white paint is very common on vessels of this kind. Two pieces have been analysed by elemental mass spectrometry and petrography (sample 15, pl. 6.51; sample 11, pl. 6.54). Both can be attributed to the main fabric group, which was locally produced (*cf.* Merkel and Prange in this report).

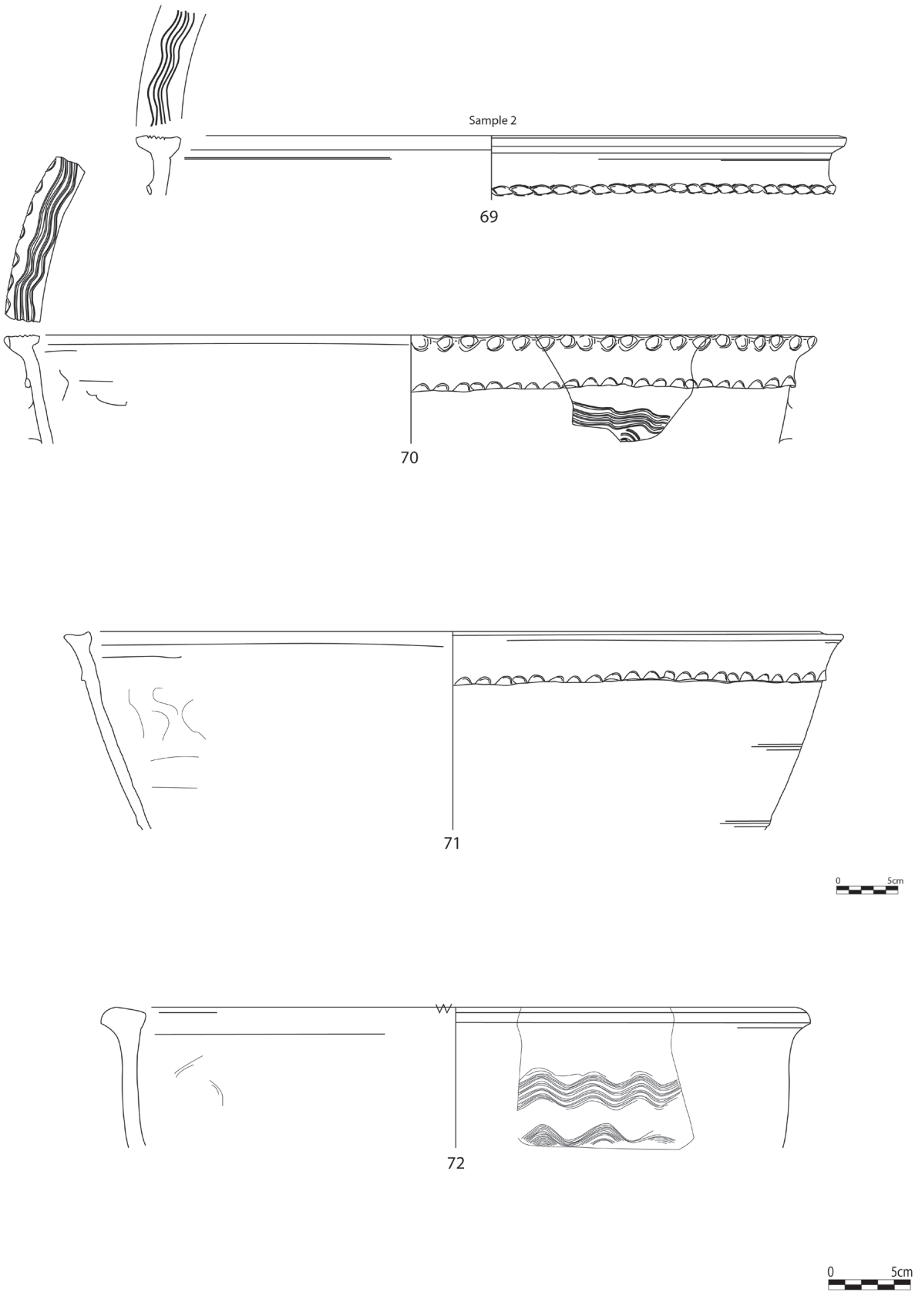
Jug
With Trifoiled Rim
49.
Pl. 6.49
J14-Jc-61-1145
Rim.
Diam.: 4.3 and 3.7.
Fabric: OW.
Oval handle is attached to the rim and shoulder.
Context: Late Roman pottery fill in Trench J.
References: Related to Rasson 1986: 67-69, fig. 18.3.
Date: Late Roman.

50.
Pl. 6.50
J15-Qd-11-4
Rim
Diam.: 3.4 und 1.8
Fabric: OW
Oval handle is attached to rim and shoulder.
References: Lichtenberger *et al.* 2017: fig. 73; related to Rasson 1986: 67-69, fig. 18.3.
Date: Late Roman.

With Groove on Top of the Rim (Bifid)
51.
Pl. 6.51
J14-Jc-61-1130
Rim.
Diam.: 8.8.
Fabric: OW - sample 15 (*cf.* Merkel and Prange in this report).
Oval handle is attached to rim and shoulder.
Context: Late Roman pottery fill in Trench J.
References: Rasson 1986: 67-68, fig. 18.3; Clark and Falkner 1986: 248-249, fig. 20.10; Brizzi, Sepio and Baldoni 2011, fig. 10.1.
Date: Roman (3rd century AD).

52.
Pl. 6.52
J14-Jc-61-1134
Rim.
Diam.: 6.7.
Fabric: OW.
Oval handle is attached to neck and shoulder.
Context: Late Roman pottery fill in Trench J.
References: Rasson 1986: 67-68, fig. 18.3; Clark and Falkner 1986: 248-249, fig. 20.10; Brizzi, Sepio and Baldoni 2011, fig. 10.1.
Date: Roman (3rd century AD).

Pl. 10



53.
Pl. 6.53
J15-Qd-43-17
Rim.
Diam.: 7.9.
Fabric: OW.
Oval handle is attached to rim and shoulder.
References: Rasson 1986: 67-68, fig. 18.3; Clark and Falkner 1986: 248-249, fig. 20.10; Brizzi, Sepio and Baldoni 2011: fig. 10.1.
Date: Roman (3rd century AD).

Jar
With S-Curved Neck and Profiled Shoulder
54.
Pl. 6.54
J14-Je-77-1079
Rim.
Diam.: 7.0.
Fabric: OW - sample 11 (*cf.* Merkel and Prange in this report).
Context: Late Byzantine/Early Umayyad pottery fill in Trench J.
References: -
Date: Late Byzantine/Early Umayyad.

With Outward-Folded, Horisontal Rim
55.
Pl. 6.55
J15-R-22-16
Rim.
Diam.: 12.5.
Fabric: OW.
Oval handles are attached at rim and upper body.
References: Uscatescu 1996: 131 (Type XXXII-2) and pl. 38.29 with further references.
Date: Roman (3rd century AD).

Jar?
With on-the-Outside Thickened, Overlapping Rim and Slightly S-Curved Neck
56.
Pl. 7.56
J14-Je-77-21/22 and 49
Rim.
Diam.: 13.1.
Fabric: GW/OW.
Context: Late Byzantine/Early Umayyad pottery fill in Trench J.
Oval handle is attached to rim. Irregularly set whitish circular lines in two rows on shoulder and exterior body. Inside are traces of white paint.
References: Uscatescu 1996: 141-142 (Type XXXV-1, 2 and 6), pl. 86.539-542.
Date: Late Byzantine (6thcentury AD).

57.
Pl. 7.57
J15-Pc-16-75a
Body.
Diam.: 21.0.
Fabric: OW.
Traces of irregularly set whitish wavy lines on the exterior of shoulder and body. Traces of white paint also on the interior rim. Incised zig-zag pattern on shoulder just underneath the white paint.
References: Uscatescu 1996: pl. 80.479 (Type XXVIII) and pl. 85.530 (Type XXXIV-13).
Date: Late Byzantine-Early Umayyad (6th-7th century AD).

Common ware (HM)
Food Preparation/Basins

Basins with flaring, slightly profiled rims and a reduced neck are very common from the Roman period onwards. One intact profile shows the concave-curved base of the vessel (pl. 7.56-57); later variants have a steeper rim, and some occur with white stripes on the outside (pl. 8.62).

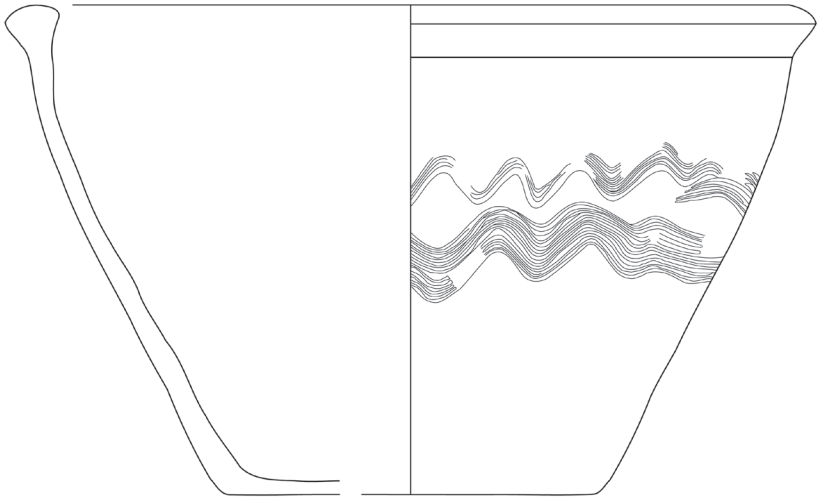
In Byzantine times, large wheel-made basins (pl. 9.65-pl. 12.75) are available, carrying a second layer of clay on the interior that is pressed against the interior wall and covers the whole inner surface [This became apparent when looking at the thin-section of a basin (sample 2, pl. 10.69) *cf.* Merkel and Prange in this report]. Fingerprints are visible on the interior, irregularly scattered along the wall and floor of the vessel [The visible fingerprints on the inside have often misleadingly led to a description of this type of vessel as hand-made, rather than wheel-thrown, *cf. e.g.* Brizzi, Sepio and Baldoni 2011: 362 and fig. 11.14-15]. This characteristic treatment occurs on numerous types, all of which are large basins from the Byzantine period onwards into Umayyad times. Vessels are made mainly of grey-ware fabric, but they also occur in orange ware. They are often comb-decorated, mostly with irregularly set wavy lines on the rim (pl. 10.69-70) or exterior (pl. 10.72-79). Particularly, one type with a horizontal rim, overlapping the interior and exterior, occurs very often with a pie-crust pattern. One vessel with a sieved bottom remains a unique find until now (pl. 11.74).

Three samples have been chosen for elemental mass spectrometry and petrography (sample 1, pl. 8.60; sample 3, pl. 9.67; sample 2, pl. 10.69). Two of them belong to the large basins with irregularly scattered fingerprints on the interior. They are all part of the main local fabric group (*cf.* Merkel and Prange in this report).

Basins
With Flaring, Slightly Profiled Rim and Reduced Neck
58.
Pl. 7.58
J15-Qd-52-11
Rim.
Diam.: 37.5.
Fabric: OW, misfired sherd.
References: Uscatescu 1996: 104 (Type XV-5B) and pl. 72.375 with further references. Late Byzantine (6thcentury AD); from earlier Late Roman to Byzantine contexts *cf.* Clark and Falkner 1986: 248-249, fig. 20.16. (4th-5th century AD). Due to the pure Roman context in Trench Q, it is most likely that this type was already produced in the 3rd century AD.
Date: Roman.

59.
Pl. 7.59
J14-Jc-67-11A
Intact profile.
Diam.: 32.9.
Fabric: OW.
Context: Late Roman pottery fill in Trench J.

Pl. 11



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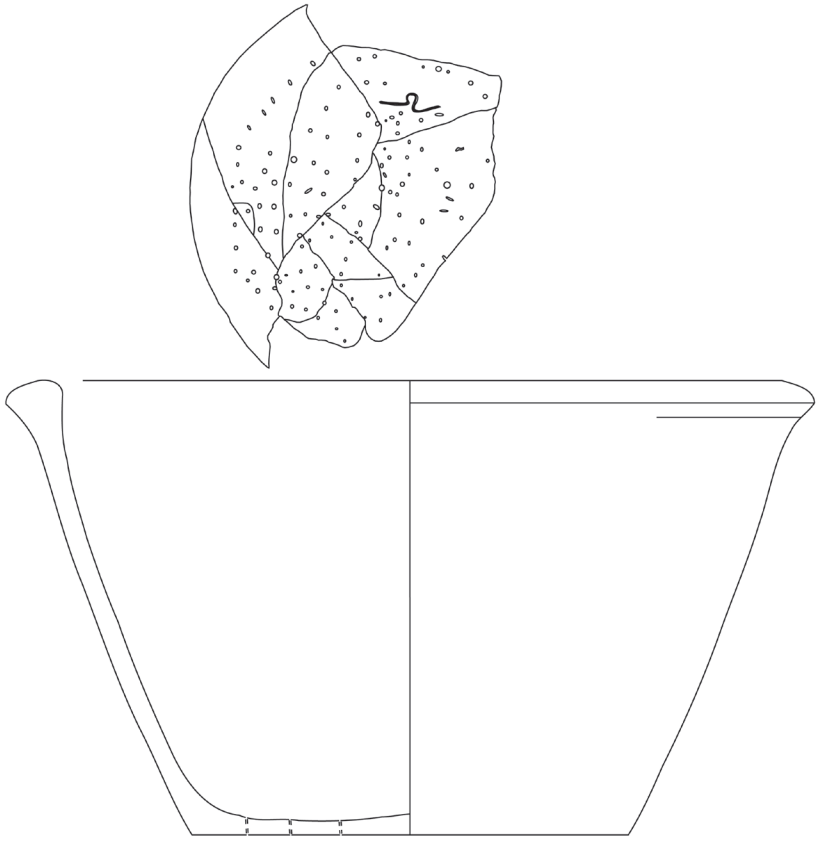


74

0 5cm

The concave base is slightly stepped.
References: Lichtenberger *et al.* 2017: fig. 107; Uscatescu 1996: 104 (Type XV-5A) and pl. 71.372 - with further references. Late Byzantine (6thcentury AD); from earlier Roman (3rd century AD) contexts, *cf.* Clark and Falkner 1986: 248-249, fig. 20.17. Due to the context (see above), the basin shown here was produced no later than Late Roman times.
Date: Roman.

With Flaring Rim and Internal Ledge
60.
Pl. 8.60
J14-Je-77-1037
Rim.
Diam.: 40.5.
Fabric: GW - sample 1 (*cf.* Merkel and Prange in this report).
Context: Late Byzantine/Early Umayyad pottery fill in Trench J.
References: Uscatescu 1996: 105 (Type XV-8) and pl. 72.379 with further references.
Date: Late Byzantine (6th century AD).

61.
Pl. 8.61
J15-Oe-64-14
Rim.
Diam.: 34.7.
Fabric: GW.
References: Uscatescu 1996: 105 (Type XV, subtype 7A and 7B) and pl. 72.377-378 with further references. Late Byzantine, from earlier Late Roman-Early Byzantine context (4th-5th century AD), *cf.* Clark and Falkner 1986: 248-249, fig. 20.15.
Date: Late Byzantine.

62.
Pl. 8.62
J15-Nb-57-229
Rim.
Diam.: 44.2.
Fabric: GW.
With two white stripes on the exterior body.
References: Uscatescu 1996: 105 (Type XV-7B) and pl. 72.378 with further references.
Date: Late Byzantine.

With Thickend Rim
63.
Pl. 8.63
J15-Jl-32-1
Rim.
Diam.: 45.7.
Fabric: OW.
Small groove on the interior rim.
References: -
Date: Due to the context (Late Roman fill), the basins cannot have been produced later than in Late Roman times.

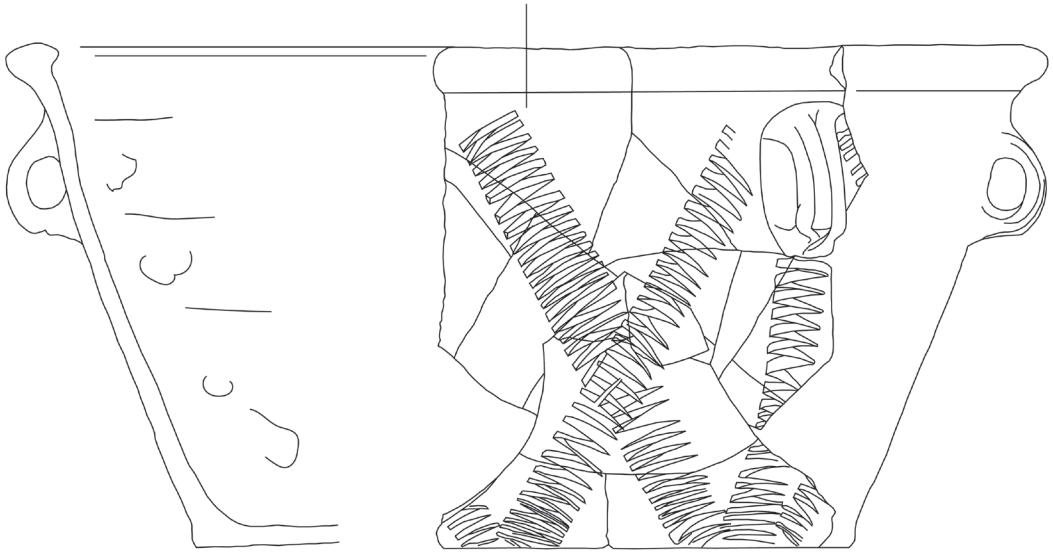
With Ledged Rim
64.
Pl. 9.64
J15-Oe-57-34
Rim.
Diam.: 38.1.
Fabric: OW.
Wavy incised lines are decorating the outer part of the rim.
References: Lichtenberger, Raja and Sørensen 2013: 39-40, fig. 110; Uscatescu 1996: 168 (Type XLII-7) and pl. 99.671. Date: Late Byzantine-Early Umayyad (6th-7th century AD); of earlier Byzantine date, *cf.* Winnet and Reed 1964: pl. 65.20.
Date: Byzantine-Early Umayyad.

Basins, wheel-thrown, but in a later production process hand molded on the inside
With Ledged Rim
65.
Pl. 9.65
J14-Je-77-6A
Intact profile.
Diam.: 35.0.
Fabric: GW.
The rim is decorated with a "pie-crust" pattern. Two vertical handles are attached to the vessel's body.
Context: Late Byzantine/Early Umayyad pottery fill in Trench J.
References: Lichtenberger, Raja and Sørensen 2013: 38-39, fig. 101; Lichtenberger *et al.* 2017: fig. 103; Lichtenberger *et al.* 2018: fig. 75; Uscatescu 1996: 146-147 (Type XXXVI-1, subtypes 1A and 1B, Type XXXVI-2A) and pl. 86.545-548, related also Type XXXVI-2, subtypes 2B-2D, Type XXXVI-3, subtypes 3A and 3B, pl. 87.549-554 with further references.
Date: Late Byzantine-Early Umayyad (6th-7th century AD).

With Incurved and Almost Horisontal Rim, on Exterior Slightly Out-Turned/Overlapping
66.
Pl. 9.66
J15-Qd-11-26
Rim.
Diam.: 30.8.
Fabric: OW.
The rim is cut carelessly on the interior and exterior. Two lines of incised irregularly set zig-zag pattern decorate the body just below the rim.
References: Decoration similar to Lichtenberger *et al.* 2018: fig. 77; Uscatescu 1996: 169 (Type XLII, subtypes 6A-6C), pl. 98.665-667 and pl. 99.668 with further references.
Date: Late Byzantine (6th century AD).

67.
Pl. 9.67
J14-Je-77-1030
Rim.
Diam.: 45.4.
Fabric: GW - sample 3 (*cf.* Merkel and Prange in this report).
The rim is almost pointed on the inside and outside.
Context: Late Byzantine/Early Umayyad pottery fill in Trench J.
References: Uscatescu 1996: 169 (Type XLII, subtypes 6A-6C), pl. 98.665-667 and pl. 99.668 with further references.
Date: Late Byzantine (6th century AD).

Pl. 12



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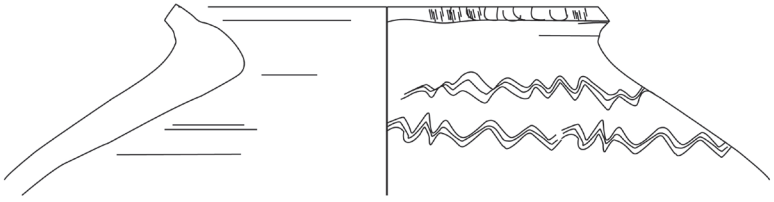
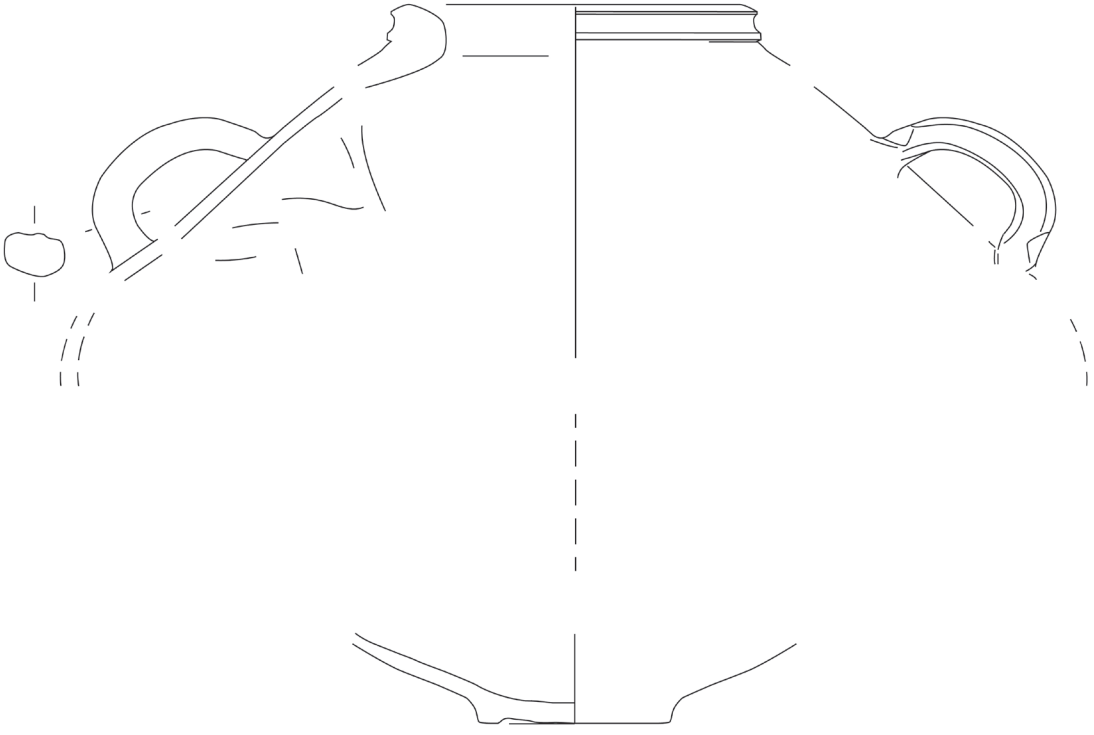


76

0 5cm

77



0 5cm

68.
Pl. 9.68
J15-Of-9-10
Rim.
Diam.: 28.9.
Fabric: GW.
The rim is rounded on the inside and outside, and on the outside, it is slightly overlapping. Handle attachment on the body is visible.
References: Uscatescu 1996: 105 (Type XV-8), pl. 72.380 with further references.
Date: Late Byzantine (6th century AD).

With Horizontal Rim, Overlapping the Inside and Outside
69.
Pl. 10.69
J14-Je-77-1017
Rim.
Diam.: 54.8.
Fabric: GW - sample 2 (*cf.* Merkel and Prange in this report).
Combed decoration on top of the rim. The ledge is decorated with a "pie-crust" pattern.
Context: Late Byzantine/Early Umayyad pottery fill in Trench J.
References: Lichtenberger, Raja and Sørensen 2013: 38-39, fig. 106; Uscatescu 1996: 150 (Type XXXVI-13), pl. 91.587 with further references.
Date: Late Byzantine-Early Umayyad (6th-7th century AD).

70.
Pl. 10.70
J15-Ob-13-19
Rim.
Diam.: 62.5.
Fabric: GW.
Combed decoration on top of the rim, "pie-crust" pattern on the outside. The ledge is decorated with a "pie-crust" pattern. The exterior body just underneath the ledge is comb decorated. Handle attachment on the body visible.
References: Lichtenberger, Raja and Sørensen 2013: 38-39, fig. 102; Lichtenberger *et al.* 2017: fig. 114; Uscatescu 1996: 150 (Type XXXVI-13), pl. 91.587; *cf.* also Uscatescu 1996: 148 (Type XXXVI-8), pl. 89.567 and p. 149 (Type XXXVI-11A), pl. 90.577 for the pattern with further references.
Date: Late Byzantine-Early Umayyad (6th-7th century AD).

71.
Pl. 10.71
J15-Oe-57-44
Rim.
Diam.: 60.1.
Fabric: GW.
The rim is decorated with an incised wavy pattern on top as well as a "pie-crust" pattern on the outside. The ledge is decorated with a "pie-crust" pattern. The exterior body just underneath the ledge is comb decorated. The body just underneath the ledge is decorated with irregularly set wavy lines and other geometrical patterns. Handle attachment on the body visible.
References: Lichtenberger, Raja and Sørensen 2013: 39-40, fig. 105; Lichtenberger *et al.* 2017: fig. 111; Uscatescu 1996: 146-147 (related to Type XXXVI-2D), pl. 87.551. *Cf.* also Uscatescu 1996: 147 (Type XXXVI-3B and 4, subtype 4A and 4B), pl. 87.554-557 and p. 147 (Type XXXVI-4, subtype 4C and 4D), pl. 88.558-559 with further references.
Date: Late Byzantine-Early Umayyad (6th-7th century AD).

With Thickend Rim
72.
Pl. 10.72
J15-Ob-107-1
Rim.
Diam.: 41.1.
Fabric: GW.
Double line of combed decoration on exterior body.
References: Lichtenberger *et al.* 2018: fig 82; Uscatescu 1996: 152 (Type XXXVI-20), pl. 106.736 ("transitional") with further references.
Date: Early Umayyad (7th century AD).

73.
Pl. 11.73
J15-Ob-111-1
Whole profile.
Diam.: 35.3.
Fabric: GW.
Double line of combed decoration on exterior body.
References: Uscatescu 1996: 151 (Type XXXVI-16, subtype 16A and 16B), pl. 110.779 and 781 with further references.
Date: Umayyad (7th - 8th century AD).

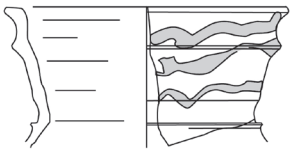
74.
Pl. 11.74
J15-Pd-16-6x
Whole profile.
Diam.: 35.3.
Fabric: GW.
The base is covered with both small and large holes, irregularly set. Sieve.
References: Type refers to Uscatescu 1996: 151 (Type XXXVI-16, subtype 16A and 16B), pl. 110.779 and 781 with further references.
Date: Umayyad (7th-8th century AD).

With Thickened Rim, Slightly Undercut Inside
75.
Pl. 12.75
J15-Nd-28-1
Intact profile.
Diam.: 46.3.
Fabric: GW.
Triangular diagonal tool used to create pattern; the decoration runs under the rim and on the exterior. Two vertical handles are attached to the vessel just below the rim.
References: Lichtenberger *et al.* 2018: fig. 80-81. For type, *cf.* Uscatescu 1996: 152-153 (Type XXXVI-24-25), pl. 107.746-750; for decoration itself, *cf.* Uscatescu 1996: 152 (Type XXXVI-21B), pl. 106.739 with further references.
Date: Late Byzantine-Umayyad (6th/7th century-first half of the 8th century AD).

Pl. 13



78



79

0 5cm

Sample 18

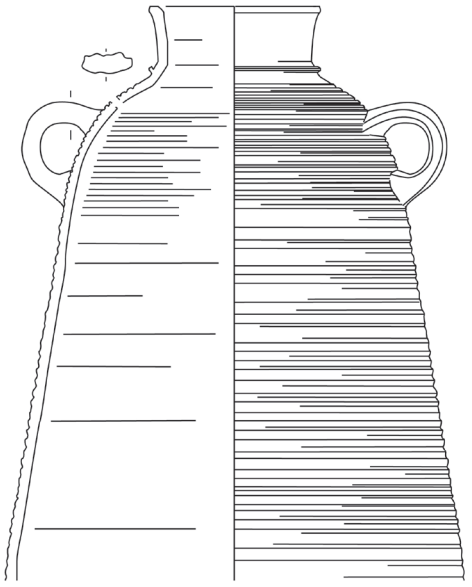


80

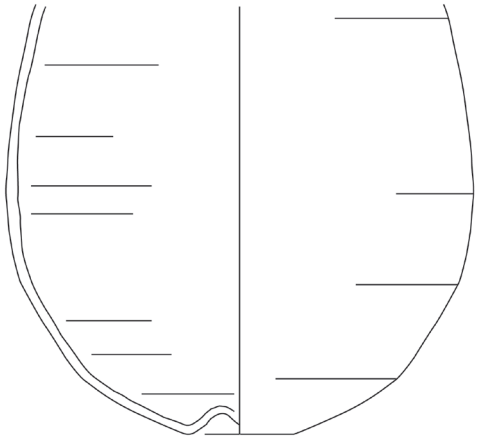
Sample 8



81

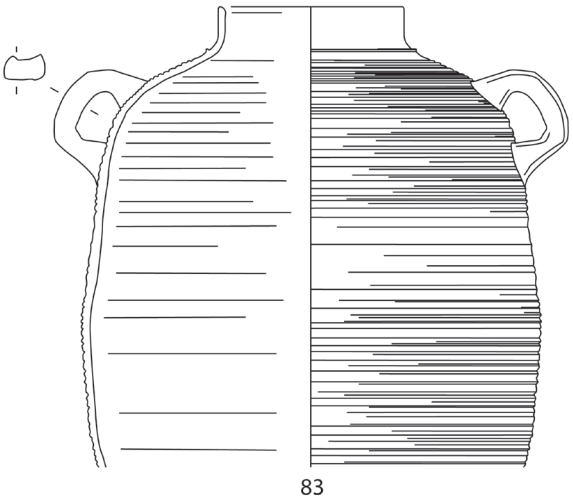


82



84

Sample 13



83

0 5cm

Common Ware/Transport Vessels (HM)
Storage Jars/Amphorae

In Byzantine and Umayyad contexts, numerous very large storage jars (pl. 12.76-77) of different types occur, often associated with large basins. Also earlier examples exist that were already produced in the Roman period. One vessel with two vertical, oval shaped handles can be reconstructed, due to the perfect find conditions (pl. 12.77). Some of the storage jars carry incised, irregularly set wavy lines on their neck. Smaller storage jars or bag-shaped amphorae were found in contexts not older than Late Roman times but mainly in Byzantine and Umayyad layers (pl. 13.80-84 and pl. 14.85). Their type resembles the bag-shaped amphora, which has a long tradition in the Levant, starting already in the Hellenistic period and continuing with slight variations up to the Umayyad period. Some types found in Jarash refer to the type of Late Roman Amphora 5/6 (LRA 5/6) [Concerning the typology of LRA 5/6, see *e.g.* Piéri 2005], an amphora that was produced in the Levant, but also in Egypt [Concerning the production sites in Egypt, *cf.* recently Dixneuf 2011] from Byzantine times onwards. Different to other places [*e.g.* Kenkel 2012: 231 remarks that, at Tall Zarʻā, not only does a large variety of types exist, but the same goes for fabrics and therefore productions], the fabric of these amphorae or storage jars is quite homogeneous, and first results of the elemental mass spectrometry and petrography showed that the fabric of these jars or amphorae fits into the main group of local production (sample 13, pl. 13.81 and sample 8, pl. 13.83). There is only one exception (sample 18, pl. 13.80) that differs slightly. These studies have to be further intensified, not only regarding the fabric analyses, but also in regard to the content analysis (*cf.* Springer and Polla in this report) and function of the vessels in general. Some of them have a hole pierced in after firing (*e.g.* pl. 13.82). These holes normally occur on amphorae carrying wine, since the holes are said to be necessary for the fermentation of wine.

Storage Jars
With Flaring, Inclined Rim
76.
Pl. 12.76
J15-Pb-16-161
Rim.
Diam.: 19.8.
Fabric: OW.
The rim is irregularly cut. Wavy irregularly incised patterns occur just below the rim.
References: Uscatescu 1996: 166-167 (Type XLI-9-11), pl. 97.650-653 with further references.
Date: Late Byzantine-Early Umayyad (6th-7th century AD).

With Flaring Rim, Profiled on the Outside
77.
Pl. 12.77
J15-Jk-58-24, 28-29
Profile partly reconstructed.
Diam.: 21.5.
Fabric: OW.
Vertical handles.
References: -
Date: Late Roman

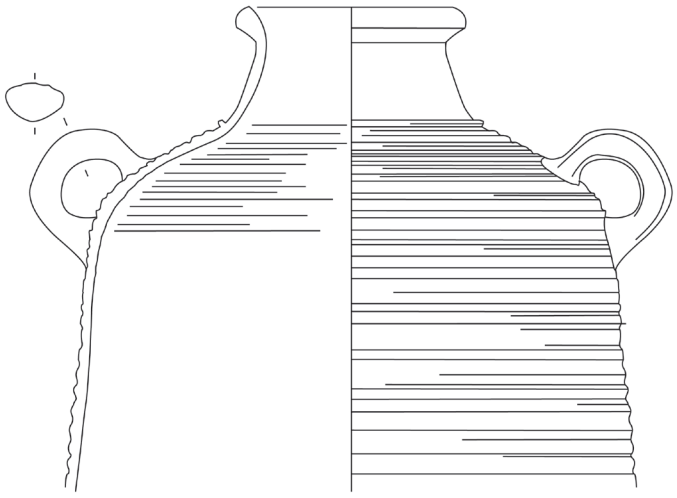
With Short Cylindrical Neck
78.
Pl. 13.78
J15-Pa-55-7
Rim.
Diam.: 9.4.
Fabric: GW/OW.
Traces of irregularly set wavy lines on the exterior neck, just below the rim. Traces of paint also on the interior of the rim, whitish in colour.
References: Uscatescu 1996: pl. 80.477 (Type XX-VIII-6); Ball *et al.* 1986: fig. 2.1.
Date: Late Byzantine-Umayyad (6th-8th century AD).

With Thickened Rim, Flattened on Top and Profiled Neck
79.
Pl. 13.79
J15-Pa-55-8
Rim.
Diam.: 12.5.
Fabric: GW/OW.
Surrounding ledge just underneath the rim. Three irregularly set horisontal wavy lines on neck just below the rim, whitish in colour.
References: Uscatescu 1996: 141-142 (Type XXXV-3, 5 and 10), pl. 105.725 and pl. 109.772, pl. 110.773; Ball *et al.* 1986: fig. 2.2.
Date: Umayyad-Abbasid (7th-9th century AD).

Storage Jars/Amphorae
With Short Cylindrical Neck
80.
Pl. 13.80
J14-Je-77-1066
Rim.
Diam.: 9.7.
Fabric: OW - sample 18 (*cf.* Merkel and Prange in this report).
Two oval-looped handles attached to the shoulder and upper body.
Context: Late Byzantine/Early Umayyad pottery fill in Trench J.
References: Lichtenberger, Raja and Sørensen 2013: fig. 123; Uscatescu 1996: 158-159 (Type XXXVII-1, subtypes 1A-1D), pl. 92.593-597 with further references.
Date: Late Byzantine-Early Umayyad (6th-7th century AD).

81.
Pl. 13.81
J14-Je-77-1070
Rim.
Diam.: 8.9.
Fabric: OW - sample 8 (*cf.* Merkel and Prange in this report).
Two oval-looped handles attached to shoulder and upper body.
Context: Late Byzantine/Early Umayyad pottery fill in Trench J.
References: Lichtenberger, Raja and Sørensen 2013: fig. 123; Uscatescu 1996: 158-159 (Type XXXVII-1, subtypes 1A-1D), pl. 92.593-597 with further references.
Date: Late Byzantine-Early Umayyad (6th-7th century AD).

Pl. 14



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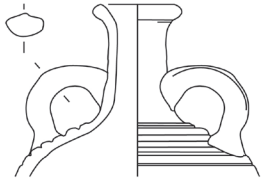

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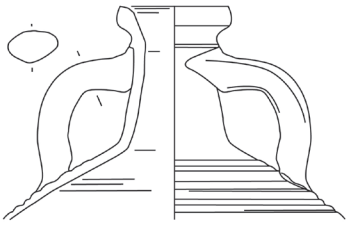

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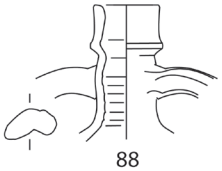
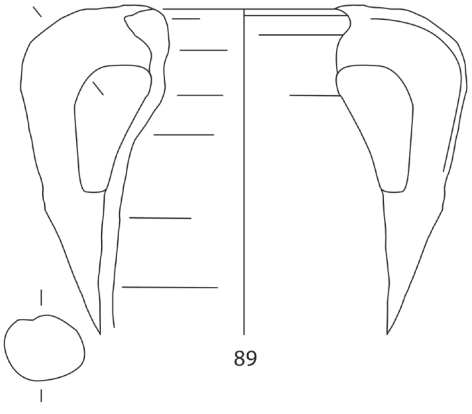
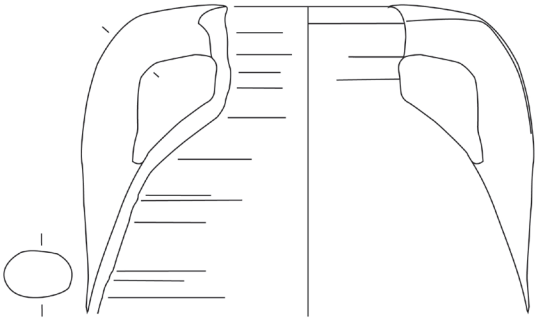


88

0 5cm



89



90

0 5cm

82.
Pl. 13.82
J14-Jh-95-7
Content of similar vessel type was analysed (*cf.* Springer and Polla in this report, Sample 10006)
Rim.
Diam.: 9.7.
Fabric: OW.
Two oval-looped handles attached to the shoulder and upper body.
References: Lichtenberger, Raja and Sørensen 2013: fig. 123; Uscatescu 1996: 158 (Type XXXVII-1C), pl. 92.594 with further references.
Date: Late Byzantine-Early Umayyad (6th-7th century AD).

83.
Pl. 13.83
J14-Je-77-1
Rim.
Diam.: 11.0.
Fabric: OW - sample 13 (*cf.* Merkel and Prange in this report).
Two oval-looped handles attached to the shoulder and upper body.
Context: Late Byzantine/Early Umayyad pottery fill in Trench J.
References: Lichtenberger, Raja and Sørensen 2013: fig. 123; Uscatescu 1996: 158 (Type XXXVII-1A), pl. 92.593 with further references.
Date: Late Byzantine-Early Umayyad (6th-7th century AD).

With Concave S-Curved Base
84.
Pl. 13.84
J15-Ob-111-11
Base.
Diam.: 6.5.
Fabric: OW.
References: Uscatescu 1996: 161 (Type XXVII-9), pl. 94.617 with further references.
Date: Late Byzantine (6th century AD).

With Thickened Curved Rim, Slightly Out-Turned
85.
Pl. 14.85
J14-Jc-61-10003
Content of similar vessel type was analysed (*cf.* Springer and Polla in this report, Sample 10003).
Rim.
Diam.: 10.4.
Fabric: OW.
Context: Late Roman pottery fill in Trench J.
References: Brizzi, Sepio and Baldoni 2011: fig. 10.6 (date: Roman, 3rd century AD) and fig. 11.13 (date: Late Byzantine-Early Umayyad, 6th-7th century AD). Same type continues from Roman to Late Byzantine/Early Umayyad period. Based on the context, the fragment belongs to the earlier production phase and was made no later than in Late Roman times.
Date: Late Roman.

With Slightly Out-Turned Rim
86.
Pl. 14.86
J14-Jc-61-10004
Rim.
Diam.: 4.0.
Fabric: OW.
Two oval handles attached to neck and shoulder.
Context: Late Roman pottery fill in Trench J.
References: Lichtenberger, Raja and Sørensen 2013: fig. 2; Rasson 1986: 67-69, fig. 18.4.
Date: Roman (3rd century AD).

With Slightly Out-Turned, Thickened Rim, Profiled
87.
Pl. 14.87
J14-Jc-61-10005
Rim.
Diam.: 5.2.
Fabric: OW.
Two oval handles attached just below the rim and shoulder.
Context: Late Roman pottery fill in Trench J.
References: Could be an earlier type of Uscatescu 1996: 125, pl. 79.464-469 (Type XXVIII-1, subtype 1B and 1C) and p. 122, pl. 78.456 (Type XXVI-17); possibly related to Rasson 1986: 67-69, fig. 18.4.
Date: Roman (3rd century AD).

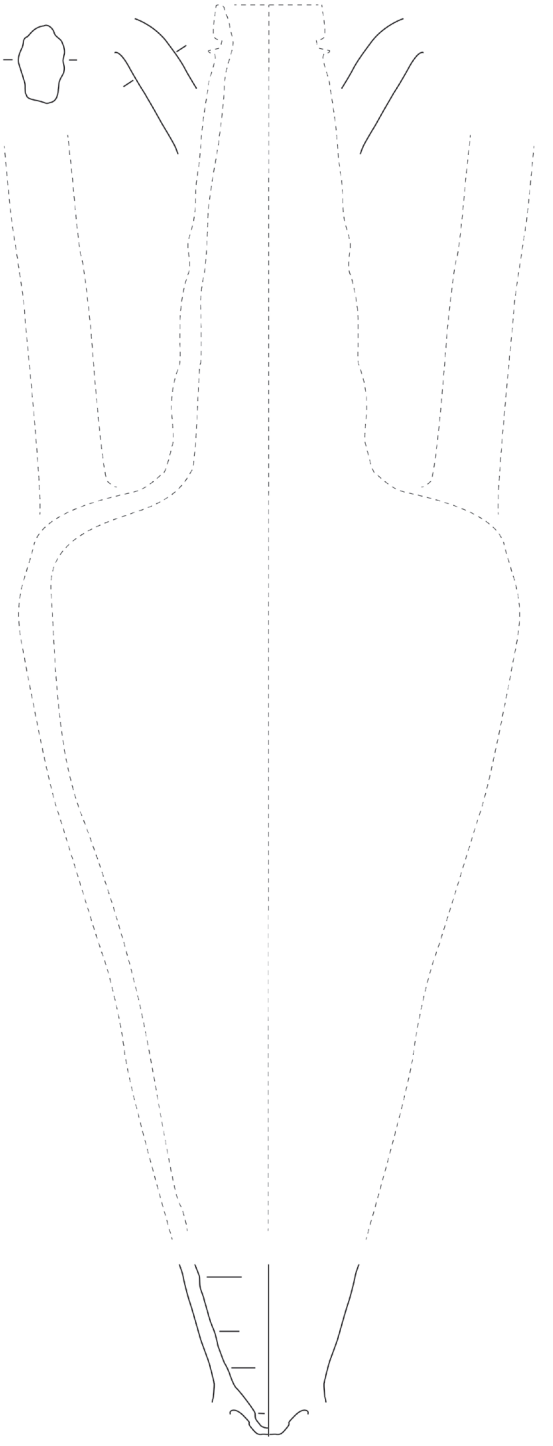
With High Vertical Rim, Exterior Slightly Undercut
88.
Pl. 14.88
J15-Qd-43-16
Rim.
Diam.: 3.0.
Fabric: OW.
Two oval handles attached just below the rim.
References: -
Date: Roman?

Transport Vessels (HM)
Amphorae
Western-Mediterranean Imports
Especially one large pottery fill found in Trenches J and N that can be dated to Late Roman times brought to light a high quantity of Almagro 50 (congruent with: Keay 22, Lusitana 6, Ostia 7, Peacock and Williams 22) Amphorae (pl. 14.89-90 and pl. 15.91). The vessels occur in two different types of fabric, one yellowish-brownish, sometimes slightly reddish in colour, hard and rough in fabric with some bigger quartz inclusions and some white and dark ones (AM50-1). Another production is yellowish-brown and much better levigated, with only a few very small brownish and whitish inclusions (AM50-2) [Regarding the fabric and kiln sites, *cf.* recently Bezeczky 2013: 179-180]. Kiln sites are known from the Iberian Peninsula, but further studies are needed to narrow down the production area of the examples found in Jarash. As for the contents of amphorae, fish and its derivates are generally suggested. However, content analyses (*cf.* Springer and Polla in this report) give further insights into this and will be studied in more detail (Bezeczky 2013: 180).

Pl. 15



91



92

0 5cm

Almagro 50
89.
Pl. 14.89
J15-Ji-5-2
The content of a similar vessel type was analysed (*cf.* Springer and Polla in this report, Sample 10009).
Rim.
Diam.: 13.0.
Fabric: AM50-2, see above.
References: Lichtenberger *et al.* 2018: fig. 68; Arruda and Fabião 1990: 199-213; Benoit 1962: 147-176; Dias Diogo 1991: 179-191; Fabião and Arruda 1990: 215-224; Fabião and Carvalho 1990: 37-63; Keay 1984; Manacorda 1977: 117-254; Mayet, Schmitt and Silva 1996; Raposo *et al.* 2005; Silva, Coelho-Soares and Correia 1990: 225-246; *cf.* Bezeczky 2013: 179 (Type 66) with further references.
Date: Roman-Early Byzantine (late 3rd-5th century AD).

90.
Pl. 14.90
J15-Jj-14-19
The content of similar vessel type was analysed (*cf.* Springer and Polla in this report, Sample 10010).
Rim.
Diam.: 12.2.
Fabric: AM50-1, see above.
References: Lichtenberger *et al.* 2018: fig. 68; Arruda and Fabião 1990: 199-213; Benoit 1962: 147-176; Dias Diogo 1991: 179-191; Fabião and Arruda 1990: 215-224; Fabião and Carvalho 1990: 37-63; Keay 1984; Manacorda 1977: 117-254; Mayet, Schmitt and Silva 1996; Raposo *et al.* 2005; Silva, Coelho-Soares and Correia 1990: 225-246; *cf.* Bezeczky 2013: 179 (Type 66) with further references.
Date: Roman-Early Byzantine (late 3rd-5th century AD).

91.
Pl. 15.91
J15-Jj-2-13; J15-Jj-26-14
Rim, handle and base.
Diam.: 13.0.
Fabric: AM50-1, see above.
References: Lichtenberger *et al.* 2018: fig. 68; Arruda and Fabião 1990: 199-213; Benoit 1962: 147-176; Dias Diogo 1991: 179-191; Fabião and Arruda 1990: 215-224; Fabião and Carvalho 1990: 37-63; Keay 1984; Manacorda 1977: 117-254; Mayet, Schmitt and Silva 1996; Raposo *et al.* 2005; Silva, Coelho-Soares and Correia 1990: 225-246; *cf.* Bezeczky 2013: 179 (Type 66) with further references.
Date: Roman-Early Byzantine (late 3rd-5th century AD).

Amphorae
Eastern-Mediterranean Imports

Several fragments of Kapitän II (congruent with: Benghazi Mid Roman Amphora 7, Hollow Foot Amphora, Kuzmanov 7, Niederbieber 77, Ostia 6, Peacock and Williams 47, Zeest 79) amphorae (pl. 15.91) were found in the Northwest Quarter of Gerasa. They all have the same fabric, red in colour with large, very clearly visible inclusions, and they were possibly produced in the Black Sea area. They are considered as wine amphorae (*cf. e.g.* Keay 1984: 137). Content analyses (*cf.* Springer and Polla in this report) could confirm this observation.

In Byzantine times, imports of Late Roman Amphorae 1 (LRA; congruent with: Ballana 6, Benghazi Late Roman Amphora 1, British B2, Carthage Late Roman Amphora 1, Keay 53, Kuzmanov 13, Peacock and Williams 44, Scorpan 8B) can be identified in few contexts. These amphorae, in different variations, are very common and distributed in the Western and Eastern Mediterranean, and different variations also occur in Gerasa. The fabric of the samples listed in the catalogue is hard and sandy, with quartz and a lot of larger opaque inclusions of different colour, visible by naked eye. The production centres were located in Cyprus or Cilicia [Regarding the kiln sites, see: Bezeczky 2013: 158-160]. Some samples carry a red dipinto on their shoulders (pl. 16.95-96) [Research on dipinti has been done by *e.g.* Fournet and Pieri 2008]. Content analysis (*cf.* Springer and Polla in this report) was undertaken for one of the samples (pl. 16.93).

Kapitän II
92.
Pl. 15.92
J14-Jc-61-8A; J15-Jl-33-21
Content of similar vessel type was analysed (*cf.* Springer and Polla in this report, Sample Kapitän II),
Handle and base, profile reconstructed.
Diam.: 8.1.
Fabric: Kapitän II.
References: Keay 1984; Bezeczky 2013: 149 (Type 44).
Date: Roman (3rd-4th century AD).

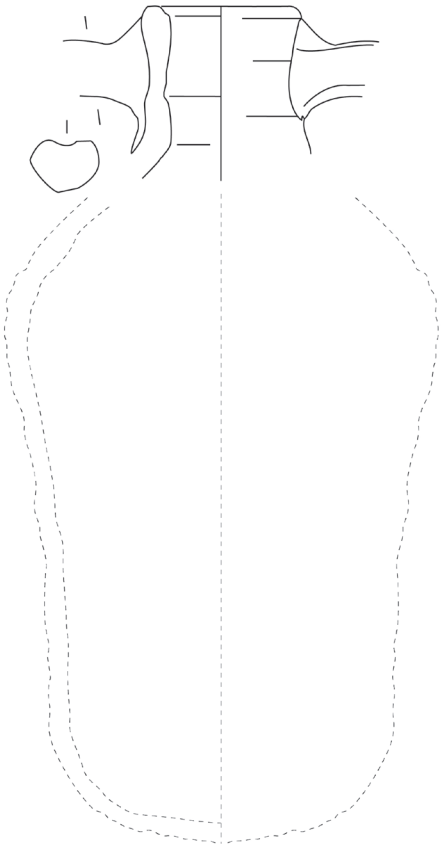
Late Roman Amphora 1
93.
Pl. 16.93
J14-Jc-84-24
Content of similar vessel type was analysed (*cf.* Springer and Polla in this report, Sample 10000).
Rim, profile reconstructed.
Diam.: 6.4.
Fabric: LRA 1.
References: Lichtenberger *et al.* 2018: fig. 69; Uscatescu 1996: 177 (Type XL-5B, LRA 1), pl. 96.637; Pieri 1998: 98-99 (Type LRA 1B1); Reynolds 2005: 591, fig. 31.
Date: Late Byzantine-Early Umayyad (late 5th?/6th-7th century AD).

94.
Pl. 16.94
J15-Qd-6-14
Rim.
Diam.: 9.1.
Fabric: LRA 1.
References: Lichtenberger *et al.* 2018: fig. 69; Uscatescu 1996: 177 (Type XL-5B, LRA 1), pl. 96.637; Pieri 1998: 98-99 (Type LRA 1B1); Reynolds 2005: 591, fig. 31.
Date: Late Byzantine-Early Umayyad (late 5th?/6th-7th century AD).

95.
Pl. 16.95
J15-Oe-64-26
Bodyfragment with dipinto.
Fabric: LRA 1.

Pl. 16

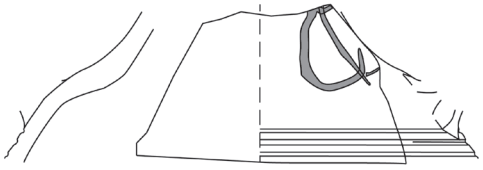
93



94



95



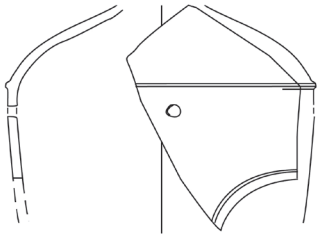
96



97



98



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References: Lichtenberger, Raja and Sørensen 2014 (in press): fig. 74; could refer to Pieri 1998: 98-99 (Type LRA 1B1); Reynolds 2005: 591, fig. 31. Dipinto: Fournet and Pieri 2008: especially 185, fig. 3-5 with further references.
Date: Late Byzantine-Early Umayyad (late 5th?/6th-7th century AD).

96.
Pl. 16.96
J15-Nb-57-56
Bodyfragment with dipinto.
Fabric: LRA 1**.**
References: Lichtenberger *et al.* 2018: fig. 74; could refer to Pieri 1998: 98-99 (Type LRA 1B1); Reynolds 2005: 591, fig. 31. Dipinto: Fournet and Pieri 2008: especially 185, fig. 3-5 with further references.
Date: Late Byzantine-Early Umayyad (late 5th?/6th-7th century AD).

Domestic Furnishing and other Specialised Vessels (HM)
Pilgrim Flask
97.
Pl. 16.97
J15-Nb-57-113
Diam.: ?
Fabric: OW?
References: Lichtenberger, Raja and Sørensen 2013: 44-45, fig. 138 with further references.
Date: Byzantine?

Lantern

In Trench J, some fragments of lanterns were found in a purely Late Roman pottery fill (ev. 58). Therefore, the production phase, usually assumed to be restricted to the Byzantine period, has to be modified to begin already in Late Roman times.

98.
Pl. 16.98
J15-Jk-58-14
Diam.: ?
Fabric: OW.
References: Lichtenberger, Raja and Sørensen 2013: 29-31, fig. 57-63 with further references; Uscatescu 1996: 117-118 (Type XXIII), pl. 101.702. Date: Byzantine-Early Umayyad (5th-7th century AD). Due to the context, a Late Roman pottery fill, the local production of the lantern already have taken place in Late Roman times.
Date: Late Roman.

Lamps (HM, MP)
Broneer XXV - Import?
99.
Pl. 17.99
J15-Q-44-88
Discus and shoulder, fragmented.
Fabric: Munsell: ext. surface: 10R 4/7. Import? Hard-fired, dense, break-reddish in colour with some small whitish inclusions, visible by naked eye. Reddish-brownish slipped.
Relief decorated discus with depiction of dwarf or pygmy. Shoulder is ornamented with impressed ovolo pattern, almost circles (double line).
References: Type Broneer XXV; *cf.* Rosenthal-Heginbottom 2012: 312 and fig. 2 with further references.
Date: Roman (late 1st-3rd century AD).

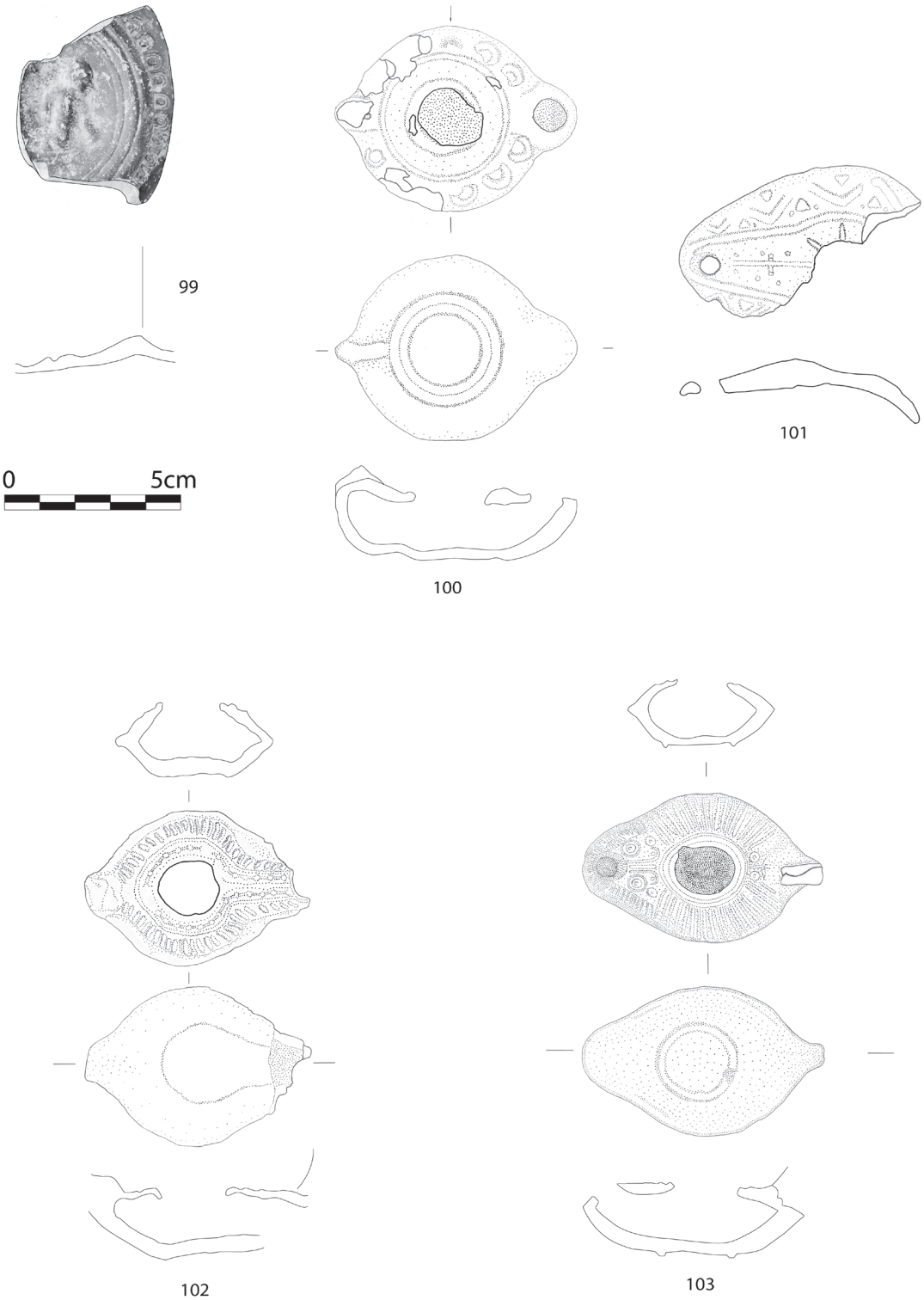
Jarash Lamps
100.
Pl. 17.100
J14-Jc-61-2
Intact.
Diam: Base: 3.8.
Fabric: Local production. Munsell: break: 10R 6/8; ext. surface: 2.5YR 7/8.
Mould made with intact wick hole and slightly oval/uneven fillinghole; burned areas and traces of soot on the exterior surface. Decoration consists of small semicircles on the sides of the body.
Context: Late Roman pottery fill in Trench J.
References: Local production - "Roman Jarash Lamp, Type JUTZ". Lichtenberger *et al.* 2018: fig. 32. Kehrberg 2011: 131-133 (Type JUTZ), fig. 2.18, with a typology of the locally produced Late Roman lamps in Jarash. This type was probably produced near the "Jarash Upper Tempel of Zeus"-Complex, Kehrberg 2011: 132.
Date: Roman (late 2nd-3rd century AD).

101.
Pl. 17.101
J15-Of-24-1
Discus and shoulder, fragmented.
Fabric: Local production. Munsell: break: 2,5YR 6/6.; ext. surface: 2.5YR 6/6.
Mould made, channel-nozzle lamp; decoration: geometrically lined pattern with triangles along the edge of the body. Above wick hole, a vertical line is flanked with six small dots.
References: Related to Lichtenberger, Raja and Sørensen 2013: 27, fig. 49; Lichtenberger *et al.* 2018: fig. 40-41.
Date: Late Byzantine?-Umayyad (6th?/7th-8th century AD).

102.
Pl. 17.102
J15-Pe-15-1x
Almost intact.
Fabric: Local production. Munsell: break: 2.5YR 2.5/1-5/1; ext. surface: 2.5YR 6/4-5/4.
Mould made with intact uneven filling hole; wick hole not preserved. Decoration consists of vertical lines along the sides and small circles around the filling hole and down the middle in the direction of the wick hole.
References: Local production - "Jarash Lamp". Kehrberg 2009: fig. 7.JH480e; see also Kehrberg 2011: 135-136, fig. 4.54, produced in Jarash, Hippodrome workshops.
Date: Late Byzantine-Early Umayyad (6th-early 7th century AD).

103.
Pl. 17.103
J14-Je-77-28
Almost intact, handle is not preserved.
Fabric: Local production. Munsell: ext. surface: 2.5YR 7/6-6/6.

Pl. 17



Intact mould-made lamp with exception of the handle; only the beginning of the handle is preserved. Incised decoration; vertical lines along the sides of the body, two small circles by the handle and circular decorations by the wick hole.
Context: Late Byzantine/Early Umayyad pottery fill in Trench J.
References: Local production - "Jarash Lamp" Lichtenberger *et al.* 2013: 27, fig. 53; Lichtenberger *et al.* 2017: fig. 48; Lichtenberger *et al.* 2018: fig. 38; Kehrberg 2009: fig. 7.JH7; see also Kehrberg 2011: 135-136, fig. 4.65, produced in Jarash, Hippodrome workshops.
Date: Late Byzantine-Early Umayyad (6th-early 7th century AD).

Ottoman Pipe (HM, AP)
104.
Pl. 18.104
J15-Nh-3-21
Ottoman Pipe.
Diam. pipe bowl: 2.4.
Fabric: Munsell: break inner core: 2.5YR 6/8; break outer core: 5YR 5/11; Int. surface: 5YR 5/11; ext. slip: 2.5YR 3/4.
Ottoman mould-made pipe. Incised decoration on exterior. Decoration: incised circular and vertical lines.
References: -
Date: Ottoman.

Vessels containing Pigments (HM)
105.
Pl. 18.105
J15-Oc-104-1
Vessel containing green pigment.
Diam.: -
Fabric: OW.
References: -
Date: Roman.

106.
Pl. 18.106
J15-Jk-57-5
Vessel containing orange pigment.
Diam.: -
Fabric: OW.
References: -
Date: Late Roman.

Handmade Vessels (AP)
Handmade Geometrically Painted Ware (HMGPW)

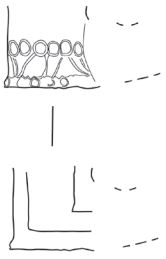
In comparison with previous campaigns, very little handmade geometric painted ware of the Ayyubid-Mamluk period was found during the 2015 campaign, as only a few sherds appeared in Trench P (pl. 18.107-110). HMGP ware is difficult to date but is commonly viewed as originating from the late 11th century and remaining in use throughout at least the 15th century [For more HMGP chronology, see Stern 2014; Milwright 2010: 155-156; Johns 1998: 65-93], and possibly as late as the early half of the 20th century (see Walker 2011: 214-215 and Walker 2014: 194). HMGP finds in Jarash are characterised as a hard-medium-fired coarse ware of rather sandy clay with many lime inclusions and tiny pebbles as well as quartz and reddish-brown inclusions. Decorated with paint that is thick, matte and flaking, the paint on HMGP vessels is often monochrome (sometimes bichrome), depicting intricate geometric designs in red, brown or black paint (Walker 2014: 200; Johns 1998: 66). Painted designs are applied to the exterior surface, and open forms may be painted on both surfaces. The shapes are many open bowls and closed jugs and jars. One notable characteristic found on sherds this year and in previous years is traces of textile impressions visible on the interior, revealing that many of the vessels were formed on sacks filled with wet sand or a bowl covered in fabric, a phenomenon observed by scholars researching HMGP in the past (see Franken and Karlsbeek 1975: 167; Walker 2014: 197-198). The material collected during the 2015 campaign did not present any significant diagnostic sherds. The sherds recovered (pl. 18.107-110) [Deco.: Franken and Karlsbeek 1975: fig. 67, no. 14] were painted with triangular geometric designs and grid patterns.

HMGPW
107.
Pl. 18.107
J15-Pe-5-37
Body.
Fabric: Munsell: break: 7.5YR 7/6; int. surface: 7.5YR 7/6; ext. slip: 10YR 8/3; deco.: 2.5YR 4/4.
8 joining handmade body sherds with buff slip and geometrically painted decoration on exterior, shape is hard to tell but seems to be part of large closed vessel; deco.: painted: ext.: linier, triangles, dots, net patterns, repeating.
References: Deco.: Franken and Klarbeek 1975: 74, fig. 53,5; shape: Tholbecq 1998: 162, fig. 6.
Date: Middle Islamic: (13th-15th century AD).

108.
Pl. 18.108
J15-Pe-5-35
Body.
Diam.: 9.6?
Fabric: Munsell: break: 7.5YR 7/6; int. surface: 7.5YR 7/6; ext. slip: 10YR 8/3; deco.: 2.5YR 4/4.
Body sherd likely part of the neck of a closed jug due to its small max. diameter, handmade and painted on exterior surface over a buff slip; deco.: painted: ext.: repeating triangles and net pattern.
References: Deco.: Franken and Klarbeek 1975: 74, fig. 53,5.
Date: Middle Islamic (13th-15th century AD).

109.
Pl. 18.109
J15-Pe-5-19
Body.
Diam.: 12?
Fabric: Munsell: break: 7.5YR 7/8; int. surface: 7.5YR 7/6; ext. slip: 2.5YR 3/4; deco.: 10YR 8/4.
Handmade body sherd, unknown form, with painted geometric pattern over a slip on exterior; deco.: painted: ext.: linier stripes, repeating triangles.
References: Franken and Klarbeek 1975: 170, fig. 51 A. 1.
Date: Middle Islamic (13th-15th century AD).

Pl. 18



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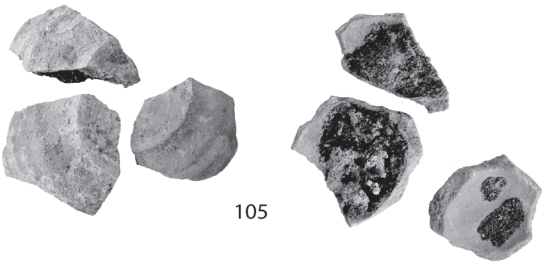

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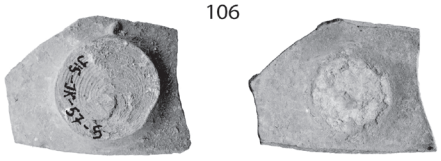
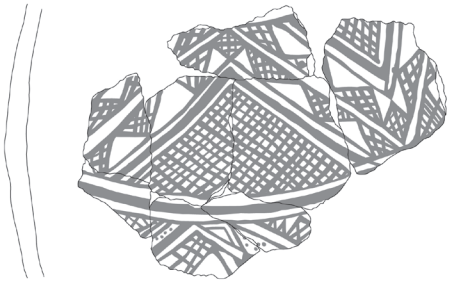


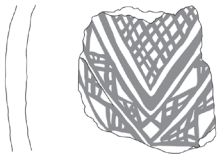
106

0 5cm

0 5cm



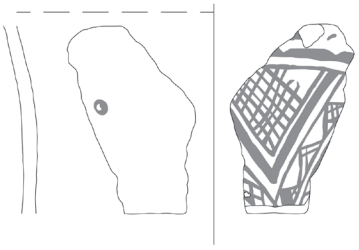
107



108



109



110

0 5cm

110.
Pl. 18.110
J15-Pe-5-23
Body.
Fabric: Munsell: break inner core: 2.5YR 6/8; break outer core: 10YR 7/3; int. surface: 2.5YR 6/8; ext. slip: 10YR 8/2; deco.: 10R 4/2.
Possibly closed shape and part of a neck, fragmented handmade body sherd with painted decoration on exterior and what is presumably an unintentional paint drop on interior; deco.: painted: ext.: linier, net pattern, repeating triangles; int: small circle.
References: Deco.: Walker 2014: 198, fig. 3; Franken and Klarbeek 1975: 170-171, fig. 51 A.36.
Date: Middle Islamic (13th-15th century AD).

Architectural Elements (PE)
Tiles

Most of the tiles excavated in the Northwest Quarter are of diverse style and technique. No context provided sufficient evidence to reconstruct a tiled roof. The tiles found within closed destruction contexts in Trenches P, K (*cf.* Lichtenberger *et al.* 2018) and E (*cf.* Lichtenberger *et al.* 2017) point to the reuse of tile fragments within walls and pavement foundations. Since these tiles were of diverse style and technique, it can be concluded that the tiles did not stem from a single roofed building but were cut to fit a special purpose.

In contexts of closed fillings, the variation and small amount of tiles point to a similar conclusion. Within the filling material, there were tile fragments from different buildings, which were moved around or scattered across the urban landscape, rather than from a single roof of a demolished house.

There is so far no tile group or fabric that can be clearly ascribed to one roofed building, such as the case of the Church of Bishop Isaiah (for the tiles, see: Clark 1986: 332 no. 19, 336 no. 28, 337 no. 29), where roof tiles have been found in stacks inside the church (Clark 1986: 313-315).

Roof Tiles - Tegulae
111.
Pl. 19.111
J15- Qc-8-1
Tegula, fragmented.
H.: 3.8; L.: 14.2; W.: 6.5; D.: 1.2.
Fabric: Munsell: break: 2.5YR 5/1; ext./int. surface: 2.5YR 5/1.
Tegula flange; part of the flange is handmade, overlapping the end of the other rim part on the inner face; finely smeared together and made curving on the outer rim face, narrowing the one end of the tile. Perhaps a discharge at the end of the line of tegulae on top of a roof.
References: Schneider 1950: fig. 15, no. 15 (much thicker, but the 90° angle from flange to body finds a comparison here).
Date: ?

112.
Pl. 19.112
J15-Ob-108-11
Tegula, fragmented.
H.: 5.7; L.: 15.2; W.: 16.7; D.: 2.5.
Fabric: Munsell not available. Hard-fired and rather finely levigated clay, including air pockets and lime, of which some is erupted.
Tegula flange: Flattened 'support' on the inner face of the flange. The 'support' is not as high as the flange but formed as part of it, not secondarily smeared against the flange.
References: -
Date: Early Umayyad.

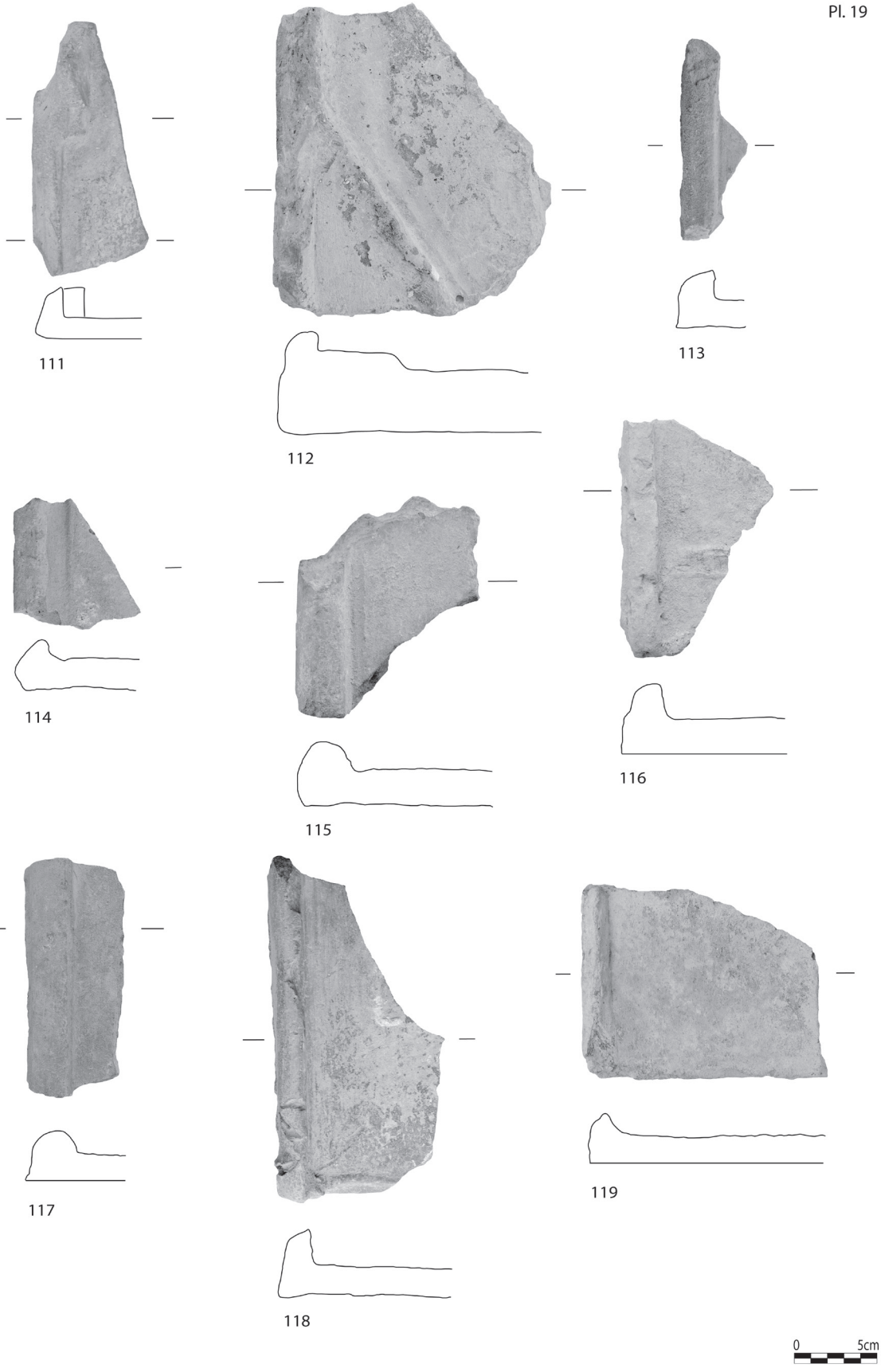
113.
Pl. 19.113
J15-Pb-15-15
Tegula, fragmented.
H.: 4.3; L.: 12.8; W.: 2.3; D.: 3.2.
Fabric: Munsell: break: 7.5YR 5/1; int./ext. surface: 7.5YR 8/3.Hard-fired and medium finely levigated clay, including a few lime and black spots.
Tegula flange: Flattened flange top, still sloping slightly outwards; deep channel running along inner flange face, not pressed into the body but into the sides of the flange.
References: Lichtenberger *et al.* 2018: fig. 87; Schneider 1950: fig. 15, no. 13; Vriezen and Mulder 1997: fig. 8:17 (Ware Types I-II).
Date: Late Byzantine-Umayyad.

114.
Pl. 19.114
J15-Pb-15-16
Tegula, fragmented.
H.: 7.8; L.: 8.1; W.: 3.9; D.: 3.1.
Fabric: Munsell: break: 5YR 6/4 - 7.5YR 8/2. Hard-fired and rather finely levigated, including some air pockets and a few lime spots.
Tegula flange: Similar to the tegula flange J15-Pb-15-15, but channel partly pressed into the body, and the sloping of the flattened flange top is steeper. Before reaching the bottom, the flange sharply curves inwards.
*References:AD*an-Bayewitz 1980: fig. 4, no. 5 (for an example with a flange jumping back towards the inner face of the tile bottom on the lower side of the flange).
Date: Late Byzantine-Umayyad.

115.
Pl. 19.115
J15-Pa-15-26
Tegula, fragmented.
H.: 3.3; L.: 13.9; W.: 11.4; D.: 2.1.
Fabric: Munsell: break: 2.5YR 5/6; int. surface: 2.5YR 6/6; ext. surface: 2.5YR 6/4. Hard-fired and medium fine levigated clay, including a few chaff, reddish brown and black spots, quartz, pebbles and lime, a few erupted.
Tegula flange: channel runs alongside the hand-formed flange. No plaster stains.
Reference: Briend and Humbert 1980: fig. 27, no. 14.
Date: Late Byzantine-Umayyad.

116.
Pl. 19.116
J15-Pc-16-7
Tegula, fragmented.
H.: 4.2; L.: 9.9; W.: 14.7; D.: 2.2.
Fabric: Munsell: break: 5YR 7/6; int. surface: 2.5YR 5/4. Hard fired and coarsely levigated clay, including some air pockets.
Tegula flange: Tool marks on lower surface; lime encrusted. Flange irregularly slopes on the outer face; inner

Pl. 19



face is regular and steep.
References: Schneider 1950: fig. 15, no. 15.
Date: Late Byzantine-Umayyad.

117.
Pl. 19.117
J15-Pc-16-8
Tegula, fragmented.
H.: 3.3; L.: 14.1; W.: 6; D.: 1.5.
Fabric: Munsell: break inner core: 7.5YR 7/6; break outer core: 7.5YR 6/1. Hard-fired and finely levigated clay with only some chaff and lime inclusions.
Tegula flange: carefully and regularly formed; no tool marks, finger impressions or plaster stains. Small ledge at bottom side. Lime encrusted. Whole flange is smoothly and regularly curved from the outer to the inner face.
References: Briend and Humbert 1980: fig. 27, no. 13; Schneider 1950: fig. 15, no. 6.
Date: Late Byzantine-Umayyad.

118.
Pl. 19.118
J15-Pc-16-80
Tegula, fragmented.
H.: 4.1; L.: 20.8; W.: 10.4; D.: 1.5.
Fabric: Munsell: break: 5Y 4/1; int. surface: 10YR 4/1; ext. surface: 10YR5/1. Hard-fired and rather coarsely levigated, including a few pockets of air, black spots, some pebbles and occasional lime.
Tegula flange: Outer flange face slopes softly downwards and becomes very steep after a sharp curve.
References: Schneider 1950: fig. 15, no. 16.
Date: Late Byzantine-Umayyad.

119.
Pl. 19.119
J15-Pbd-25-1
Tegula, fragmented.
H.: 3; L.: 14.1; W.: 11.5; D.: 1.5.
Fabric: Munsell: break inner core: 2.5Y 5/2; break outer core: 2.5YR 6/8. Hard-fired and coarsely levigated clay. Tool marks on bottom surface.
Tegula flange: covered in lime. Flange outside almost horizontal, tipped on top and softly concavely curved towards the bottom.
References: Alliata 1987: fig. 4, no. 6; Briend and Humbert 1980: fig. 27, no. 5a.
Date: Umayyad?

120.
Pl. 20.120
J15-Pa-51-1
Tegula, fragmented.
H.: 3.6; L.: 14.6; W.: 14.8; D.: 1.2.
Fabric: Munsell: break inner core: GLEY1 5/104; break outer core: 2.5Y 6/2; int. suface: GLEY1 4/1; ext. surface: GLEY1 5/104.
Tegula: flange on two sides. Narrow flange with steep wall on inside face of the rim. Wider, elongated rim sloping softly to the outside. Many finger-imprints from remodeling by hand.
References: Bass and van Doorninck 1982: 97-98 (Type 1), fig. 5-4 and fig. 5-5, nos. PT1-PT6; Konrad 2001: 120, pl. 80: 6, 136, pl. 80: 3, 5.
Date: ?

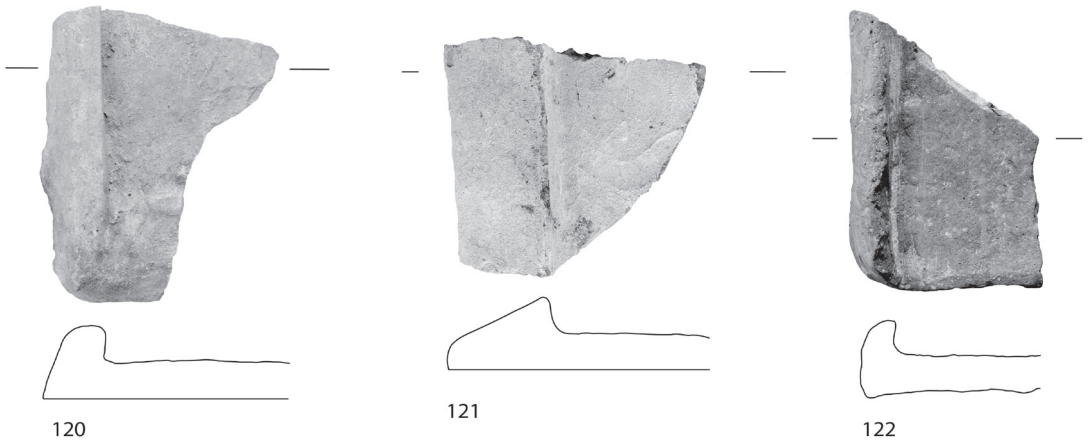
121.
Pl. 20.121
J15-Pa-51-5
Tegula, fragmented.
H.: 3.5; L.: 12.4; W.: 11; D.: 1.8.
Fabric: Munsell: break: 7.5YR 5/1; int. surface: 7.5YR 4/1; ext. surface: 5Y 5/1. Hard-fired and rather coarsely levigated, including a few air pockets, lime and some pebbles.
Tegula flange: wide and elongated rim slowly sloping towards a sharp edge. Tool marks on bottom side. The form of the surviving flange allows the reconstruction as a tile type with 3 flanges. Well and regularly produced.
References: Bass and van Doorninck 1982: 97-98 (Type 1), fig. 5-4 and fig. 5-5, nos. PT1-PT6; Briend and Humbert 1980: 86, fig. 27, no. 5, no. 5a-b; Konrad 2001: 120, pl. 80: 6, 136, pl. 80:3 and 5 (from Umayyad destruction layer).
Date: Umayyad?

122.
Pl. 20.122
J15-Nh-37-6
Tegula, fragmented.
H.: 3.6; L.: 13; W.: 8.7; D. (min): 1.5; (max.): 2.5.
Fabric: Munsell: break inner core: 10YR 6/4; break outer core: 2.5YR 6/6; int./ext. surface: 2.5YR 6/6; wash: 2YR 7/4. Medium-hard-fired and medium-finely levigated clay, including some air pockets, an abundant amount of lime and black spots as well as a few pebbles.
Tegula flange: a thin, matt and worn wash on surface; tool marks on bottom side.
References: Barnes *et al.* 2006: fig. 17, no. 4 (with inscription and from Umayyad context); Schneider 1950: fig. 15, no. 13.
Date: ?

123.
Pl. 20.123
J15-Nh-37-8
Tegula, fragmented.
H.: 3.7; L.: 13.9; W.: 9.3; D. (max.): 2.9; (min.) 1.7.
Fabric: Munsell: break: 5YR 5/4; int./ext. surface: 10YR 9/8. Medium-hard-fired and medium-finely levigated clay, including a few air pockets, lime, pebbles and some black spots.
Tegula flange: Tool marks on bottom surface. Straight ridge running away from flange at a 90° angle, on top of upper surface.
References: Adan-Bayewitz 1980: 25 (Type 1a), fig. 4, no. 2; Bass and van Doorninck 1982: 98 (Type 2), fig. 5-4 and fig. 5-5, nos. PT8, PT10, PT11, PT13, PT15, PT16.
Date: ?

124.
Pl. 20.124
J15-Nb-57-42
Tegula, fragmented.
H.: 3.4; L.: 18.6; W.: 16.1; D. (min.): 1.1; (max.): 2.9.
Fabric: Munsell: break: 10YR 5/1; int. surface: 10YR 6/2; ext. surface: 2.5Y 7/2.
Two joining tegula pieces; flanges on two sides, forming a corner with a narrow gap in between the two, one of which is flanged and leaning strongly inwards; the other is plain at top. Tegular body not straight but softly bended upwards.

Pl. 20



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123



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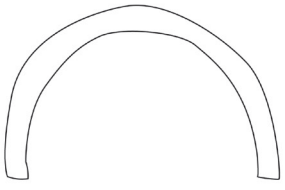

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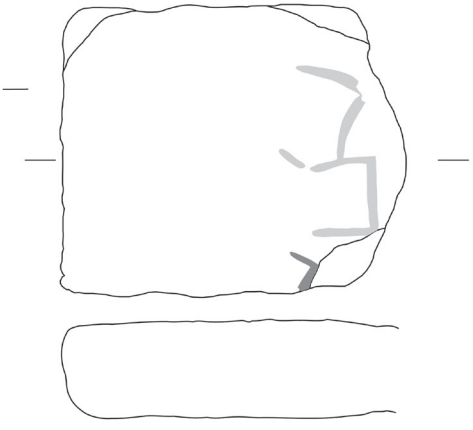


127



126

0 5cm

References: Briend and Humbert 1980: fig. 27, no. 5, no. 5a, no. 5b (for a comparison of a corner-flange tile with two different flange styles; gap in between is missing in this example); (none of the following pieces show any gaps between the two flanges or two different flange styles on the same tile): Bass and van Doorninck 1982: 97-98 (Type 1), fig. 5-4 and fig. 5-5, nos. PT1-PT6; Konrad 2001: 120, pl. 80:6, 136, pl. 80:3,5 (from Umayyad destruction layer); for an example of a flanged rim leaning inwards, *cf.* Schneider 1950: 123, fig. 15, no. 7.
Date: Late Byzantine.

Tubulus
125.
Pl. 20.125
J15-Nb-20-24
Tubulus, fragmented.
H.: 7.1; L.: 10.4; W.: 12.1; D.: 1.7.
Fabric: Munsell: break: 5YR 6/6. Hard-fired, coarsely leviagted clay, including some airpockets and lime.
Tubulus rim. A stick of bronze pushed into the clay on top of the outer edge; lime-encrusted. Rim on top flattened, curved outwards without a sharp break. In the inner edge of the two remaining tubulus walls, towards the inside regularly curved buldge.
References: Vriezen and Mulder 1997: fig. 12 (for technique and style).
Date: Roman-Byzantine.

Imbrex
126.
Pl. 20.126
J15-Ni-40-13
Imbrex, fragmented.
H.: 6; L.: 15.3; W.: 12.8; D.: 0.9.
Fabric: Munsell: break: 10YR 5/3. Hard-fired and rather coarsely leviagted clay, including air pockets, some lime and a fewblack and reddish brown spots.
Imbrex rim; marks visible on top. Coverd with lime on the inside. Varying body thickness; flat bottom rim, front-facing rim curved inwards and shaped by hand. Plaster spots on the outside.
References: Hirschfeld 2000: 45, fig. 72, 116 pl. XII: 101 (from a Byzantine layer); Lichtenberger *et al.* 2018: fig. 89 (for a comparison of the bottom rim, not the curving one); Vriezen and Mulder 1997: fig. 7:12 (for technique and style).
Date: Roman-Umayyad.

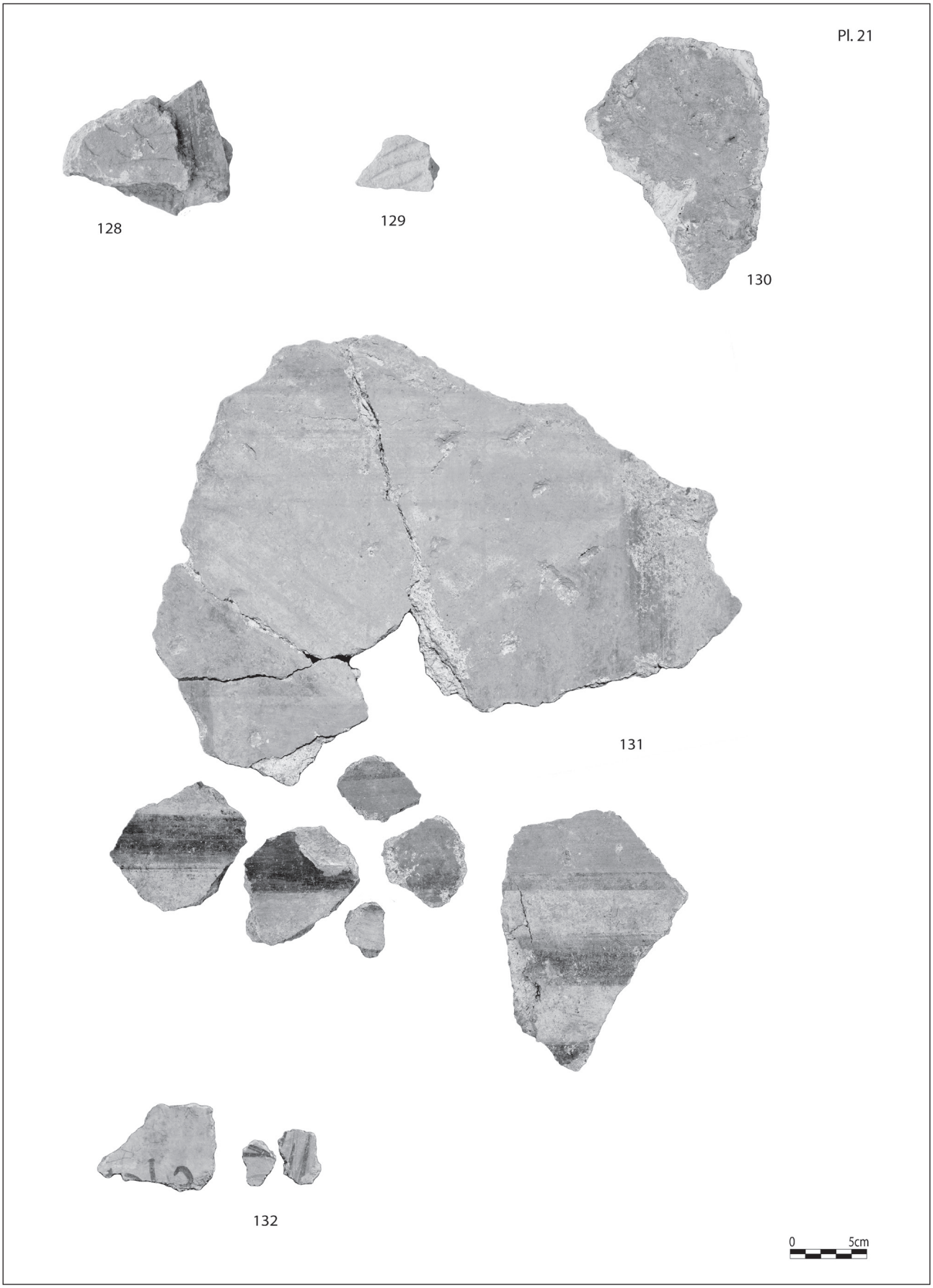
Brick
127.
Pl. 20.127
J15-Ob-108-10
Body, fragmented.
L.: 15.7; W.: 13.7; D.: 4.8.
Fabric: Munsell not available. Hard-fired but coarsly levigated clay, including many air pockets, some lime (some erupted).
Brick. On one surface incised inscription, maybe Arabic (see appendix by John Møller Larsen) or some sort of decoration ,made before firing.
Reference: -
Date: Early Umayyad.

Wallplaster (PE)
128.
Pl. 21.128
J15-Pd-16-14
Plaster, fragmented. Colour: white.
L.: 10 and 11.5.
2 pieces of unpainted wall plaster. Pottery sherd stuck in one piece. Same piece shows small, linear, curving impressions on the surface in irregular intervals or a fish-scale pattern.
References: Daviau 2010: 114; Bisheh 1979: pl. LIV:4; Mhaisen 1976: pl. 1.
Date: Umayyad.

129.
Pl. 21.129
J15-Pc-15-33
Plaster, fragmented. Colour: white.
L.: 6 and 8.
2 pieces of wall plaster. One flat piece showing linear, curving impressions at irregular intervals.
References: Daviau 2010: 114; Bisheh 1979: pl. LIV:4; Mhaisen 1976: pl. 1.
Date: Umayyad.

With Painted Decoration
130.-131.
Pl. 21.130 and 131
J15-Pa-35
Plaster, fragmented. Colours: red, white and yellow.
Size range from 4 to 25.
9 pieces of painted plaster fragments of considerable size. 4 big fragments could be put together in a sequence. The pieces consist of two layers of plaster: a rough, yellowish one, with many inclusions (chaff, clay and pebbles) and a finer, lighter one, spread upon the rough one. The fine layer was then smoothened and coloured in stripes or geometrical patterns in at least 4 different colours.
References: Concerning colours and patterns: Daviau 2010: 107, 113, fig. 5.10, fig. 5.11-13; 112-113; for a description of different layers of 'under-plaster': Daviau 2010: 108, 110, fig. 5.3, 113, fig. 5.9.
Date: ?

132.
Pl. 21.132
J15-Pb-54-1
Plaster, fragmented. Colours: white, yellow, orange, dark green and red.
Size range from 1 to 12.
Many pieces of wall plaster, some of considerable size, decorated mainly in bright red and yellow, probably in geometrical patterns, broad stripes or coloured fields. A few pieces are coloured in orange and dark green. Some smaller pieces show traces of what looks like cursive script in red on a light white background (see appendix by John Møller Larsen). Since there are no hints to floral or even more complex paintings in Ummayyad domestic contexts known so far, this must be excluded. Also, some pieces show just bi-coloured lines in red and yellow on a whitish background.
References: Concerning painted graffiti in red on white walls in Umayyad contexts: Daviau 2010: 107, 110, fig. 5.4, 112, 114, fig. 5.14, and discussion on p. 116-117.
Date: Umayyad.


Pl. 21
128
129
130
131
132
0
5cm

Terracotta (AL and RR)

133.
Pl. 22.133
J15-Jl-33-14
Fragment of an abdomen and lower part of an abdomen of a female.
H.: 4.81; L.: 3.82; D.: 0.59-0.72.
Fabric: Munsell: break: 2.5YR 7/6; int. surface: 2.5YR 7/6; ext. surface: 2.5YR 7/6. Rather finely levigated clay. On the backside/inside, fingerprints from smoothing are visible.
The mould-made fragment is broken on all sides. It depicts parts of an abdomen and lower part of an abdomen clothed in draped textile, which is depicted lying smooth on the body. The abdomen is visible through the depicted cloth, including the navel which is clearly visible. The drapery falls in a triangle towards the not visible genitals. The drapery below the abdomen falls in heavy folds.
References: -
Date: Roman (2nd/3rd century AD).

134.
Pl. 22.134a-c
The below numbers J15-Oc-104-13a-c belong together and consist of a total of four pieces of an Aphrodite figurine of the Anadyomene type. Figurines with the same motif were found in Jarash (Iliffe 1945: pl. III.29), but they were not made in the form of a plaque but fully three-dimensional. Even more similar to the one found in 2015 are three figurines from Hippos in the Decapolis (Erlich 2009: fig. 12).

Pl. 22.134a
J15-Oc-104-13 a
Fragment of lifted and bent left arm and shoulder of female figurine.
H.: 4; L.: 5.4; W.: 3.2; D.: 1.5.
Fabric: Munsell: break: GLEY 1 5/N; int. surface: 5YR 7/6; ext. surface: 5YR 7/6. Finely levigated clay.
The mould-made fragment depicts a left lifted and bent arm, which grasped the hair of the figure. A few hair strands are visible above the left shoulder of the figure, supporting this interpretation. In the middle of the arm, a piece of jewellery (arm ring) is visible on the inside.
Date: Roman (2nd-4th century AD).

Pl. 22.134b
J15-Oc-104-13 b
Two adjoining pieces belonging to a leg.
L.: 7.5; W.: 2; D.: 0.5.
Fabric: Munsell: break: GLEY 1 5/N; int. surface: 5YR 7/6; ext. surface: 5YR 7/6. Finely levigated clay.
The two mould-made pieces join together and represent part of a leg.
Date: Roman (2nd-4th century AD).

Pl. 22.134c
J15-Oc-104-13 c
Terracotta fragment of top of head.
H.: 2.2; L.: 2; W.: 2, D.: 1.
Fabric: Munsell: break: GLEY1 5/N; int. surface: 5YR7/6; ext. surface: 5YR7/6. Finely levigated clay.
This mould-made fragment depicts the top of a head. The hair is incised with lines running to the right and left from the central parting.
Date: Roman (2nd-4th century AD).

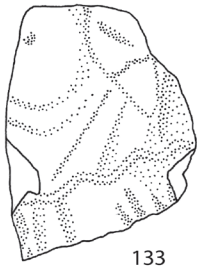
135.
Pl. 22.135
J15-Q-4-20
Terracotta fragment with hand.
H.: 3; L.: 2.2; D.: 0.5-0.7.
Fabric: Munsell: break: 2.5YR 7/6; int. surface: 2.5YR 7/6; ext. surface: 2.5YR 7/6.
Rather finely levigated clay. This mould-made fragment depicts a human right hand in high relief. The hand is broken off above the wrist. The parting between the fingers is incised with a tool after the moulding. The inside of the terracotta fragment is smoothed and rounded.
References: -
Date: Roman (2nd-4th century AD).

136.
Pl. 22.136
J15-Qd-11-2
Fragment with female legs.
H.: 6.3; L.: 4.6; D.: 0.7.
Fabric: Munsell: break: 5YR 7/6; int. surface: 5YR 7/6; ext. surface: 2.5YR 7/6. Rather finely levigated clay.
The front side of the mould-made fragment depicts a set of fragmented lower legs. A small fragment is left of the figure's right leg. Almost the entire left lower leg until the ankle is visible. There is a slightly thicker band visible right above the ankles, perhaps indicating some kind of rings worn around these. On the back side of the terracotta fragment, there are clear marks from fingerprints from the smoothing process.
References: Baramki 1936: pl. II.3, pl. IX.13 and 18.
Date: Roman (3rd/4th century AD).

137.
Pl. 22.137
J15-R-19-12
Fragment of a human face.
H.: 3.8; L.: 3.58; W.: 1.96; D.: 0.54-0.97.
Fabric: Munsell: break: 2.5YR 7/4; int. surface: 2.5YR 7/4; ext. suface: 2.5YR 7/6. Rather finely levigated clay.
Fragment of a human head seen frontally of which the top part is not preserved. Mould-made head of a human figure in relief with the head turned slightly to the left. The chin is chubby, and the neck is strong. The mouth is small and the nose fairly broad. What is visible of the eyes are slight depressions. Due to the fragmented state of the piece, it is not possible to say whether the figure had hair or not. The style is reminiscent of the figurines from Beit Nattif.
References: Baramki 1936.
Date: Roman (3rd/4th century AD).

138.
Pl. 22.138
J14-Jc-48-4
Fragment of terracotta relief with a female figure.
L.: 5.8; W.: 4.7; D.: 0.3-1.2.
Fabric: Munsell: break inner core: 5YR 6/1; break outer core: 2.5YR 6/6; int. surface: 2.5YR 6/6; ext. surface: 2.5YR 6/6. Rather finely levigated clay with some inclusions.
This mould-made fragment depicts a female figure, of which the head, face and parts of the upper torso are visible. The head is turned left, and the face is seen in profile. The hair is pulled back and collected in a knot at the back of the head. The head and face are turned slightly

Pl. 22



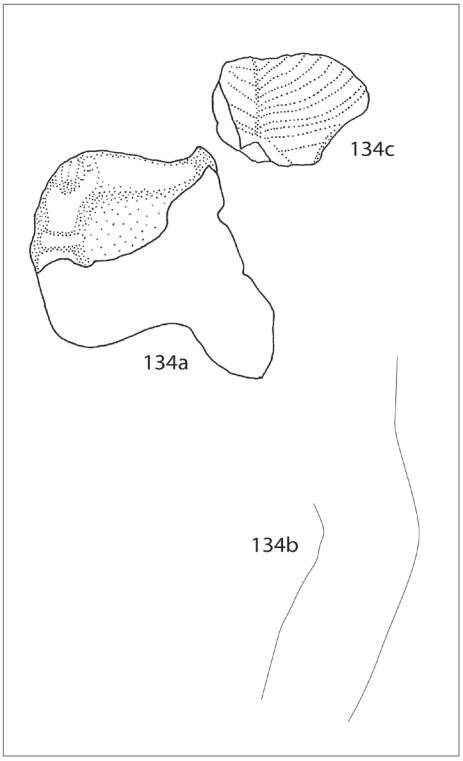
133



135



136





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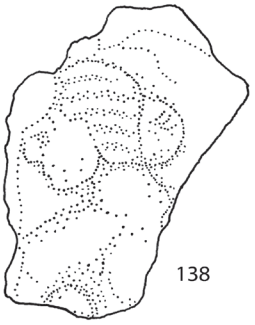

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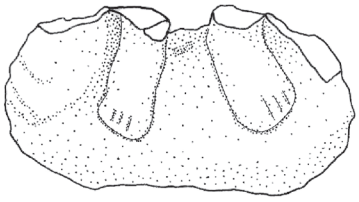

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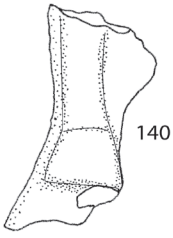
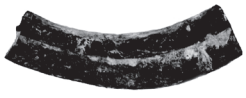


140

0 5cm



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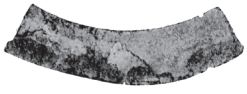




142



143



144

0 5cm

downwards. The upper torso is seen frontally.
References: -
Date: Roman (2nd/3rd century AD).

139.
Pl. 22.139
J14-Jc-67-18
Fragment of human feet standing on base.
H.: 3.6; L.: 6.5; W.: 2.1; D.: 0.3-1.1.
Fabric: Munsell: break inner core: 10R 7/4; int. surface: 10R 7/4; ext. surface: 10R 7/4. Rather finely levigated clay.
Mould-made fragment of terracotta figure showing a pair of feet with toes broken off above the ankle. The toes are incised with fine lines. To the right of the right foot, part of a base (?) is visible.
References: -
Date: Roman (2nd-4th century AD).

140.
Pl. 22.140
J14-Jc-67-18A
Fragment with animal hoof, horse-rider (?).
H.: 2.2; L.: 4.5; W.: 1.9.
Fabric: Munsell: break inner core: 10R 7/4; int. surface: 10R 7/4; ext. surface: 10R 7/4. Rather finely levigated clay.
Mould-made fragment of terracotta figure, probably from a horse-rider. The fragment depicts the lower part of an animal leg and hoof. The hoof belongs to a hind leg, and it is turned to the right.
References: Iliffe 1945: pl. II.17.
Date: Roman (2nd century AD).

Jewellery (SK)
141.
Pl. 22.141
J15-Qd-9-9
Inlay? Stone
Curving and thin inlay; wide inner groove; stone; fragmented; traces of firing.
References: -
Date: Late Roman-Early Byzantine.

142.
Pl. 22.142
J15-Ni-40-11
Glass melon bead.
Diam.: 1.29; H.: 1.09.
Melon bead; bluish-green; opaque; centrally pierced; well preserved.
References: Eisen 1930: 29 (type 2), fig. 2, 1-34; Born 1975: 134-140; Czurda-Ruth 1979: 200-201; Riis and Buhl 2007: pl. III, s.
Date: Byzantine-Early Umayyad.

143.
Pl. 22.143
J15-0b-111-4
Glass bead.
Diam.: 1.1; Diam. hole: 0.3; H.: 0.8.
Globular bead; blue; opaque; centrally pierced; well preserved.
References: Smith 1973: pl. 80, Caj; Lichtenberger *et al.* 2018: fig. 168.
Date: Late Byzantine-Early Umayyad.

Worked Bone (HM)
144.
Pl. 23.144
J15-Qa-18-18
Worked bone, almost intact.
Diam: 0.4-0.8; H: 8.6.
Smoothed and rounded. Head has been carved round and double pierced. Two small horizontal lines are visible.
References: -
Date: Late Byzantine.

Marble (AL and RR)
145.
Pl. 23.145
J15-Nm-76-4
Marble fragment of arm.
L.: 11.4; W.: 7.9; D: 7.6.
Whitish marble, polished surface.
Marble fragment of lower part of arm. The marble has been cut off on all sides, apart from the surface, which is polished. The top and bottom, as well as the back side of the arm, are missing. The back side has been cut straight on both sides, forming a triangle. The piece has most likely been used in a secondary context as building material.
References: -
Date: Roman (2nd-3rd century AD).

Limestone (AL and RR)
146.
Pl. 23.146
J15-Pe-72
Limestone fragment of architectural decoration.
H.: between 15 and 21; L. (max.): 44.5; W. (max.): 52.
Limestone fragment of decorated architectural block.
This limestone block, which was found in a secondary use, is fragmented on all sides, and the exact original size cannot be worked out. The block slants towards the upper left corner. It carries fine chisel traces on the front, broader ones on the back and also on the short sides. In what is here defined as the upper part, a triangular field with decoration is visible. To the left, a simple volute is carved. From the left, under side of the volute, a wine leave extends towards the right. The leave spills over the underside of the decorated field, climbing over the architecturally defined edge of the decorated field. The block is worked in a high quality of craftsmanship.
References: -
Date: Late Roman-Early Islamic.

Selected metal objects of the Jarash Northwest Quarter - 2015 campaign
Christoph Eger
In 2015, the Danish-German excavations in the Northwest Quarter again yielded a considerable number of metal objects, of which 18 are registered in the preliminary catalogue below. Most of the objects are made of iron, a smaller number is made of copper alloy (which includes all kinds of copper base alloy, among others bronze). As already noticed in the 2014 report, the iron objects are badly corroded, and therefore, it is difficult to determine the exact shape as well as the function of a number of items.
The functional groups represented in the 2015 campaign are:
• Constructional and possible furniture fittings

Pl. 23

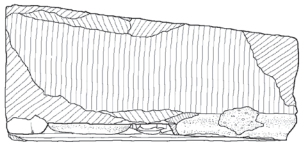


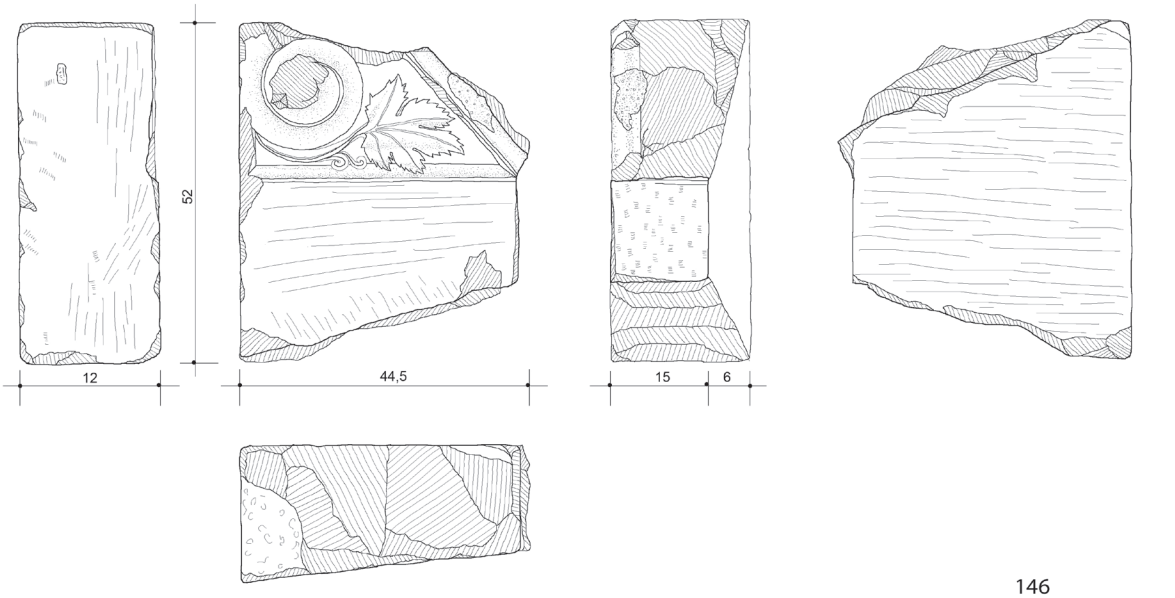


145

0 5cm

5 0 10 20 30 40 50 60 70 80 cm





146

Drawing: Nicole Pieper

- Household appliances and tools
- Weighing equipment
- Cosmetic implements
- Jewellery
- Weapon

Constructional and Possible Furniture Fittings

Large numbers of iron nails have been found. The varying sizes and some differences in the shape indicate a wide range of possible uses. At least the larger ones, such as J15-Pd-16-24x (pl. 25.159), were primarily used in wooden roofing. Iron fittings or attachments, such as J15-Ob-13-13 (pl. 24.155), could have been part of some smaller domestic furniture as well as the fitting with hinge (?) J15-Ra-5-2 (pl. 24.148). Doors were closed by means of a lock, which was covered by a keyhole plate. The circular type of these plates is already known from the 2014 campaign in Jarash. Parallels form Asia Minor and Greece are of Byzantine and Late Byzantine date. Remarkable are the rivets with big domed head, item J15-Pd-16-7x (pl. 24.147), a decorative element also known from a few parallel findings.

Household Appliances and Tools

At least two small knives have been excavated (pl. 24.151 and 154); another iron fragment could be part of a knife (pl. 25.162). Knives with a length of about 10-15cm and a simple, unspecific blade (oblong, slightly curved edge and a straight back) are a common form of domestic cutting instruments, which were used in every household through all periods since Hellenistic times. The organic handles, usually made of wood or bone, are all lost. They were sometimes closed by an ellipsoid metal plate, such as J15-Ob-13-13 (pl. 24.155), which was slid on to the haft. The Jarash item was probably lost when the handle was replaced or after the knife went out of use. Fragments of an object with a twisted needle-like shaft and a loop (pl. 24.149) might be regarded as remains of an awl - a tool usually used for perforating leather. However, this is not clear, and a reconstruction of the fragments as a hook seems possible too.

Weighing Equipment

There is almost no evidence for the use of balances and weighing activities in the excavated sectors of the 2015 campaign. The small, spherical pendant made of massive bronze, J15-Rac-18-3 (pl. 24.156), might be a small weight rather than a piece of jewellery/a pendant of a necklace. Some similar items from the American excavations in Corinth have been interpreted as weights by Davidson (1952) who dated all pieces to the Byzantine period or later. At other places, spherical weights with a loop at the top are known already from Roman contexts. This type of weight is used as a counter - or sliding weight for steelyard beams.

Cosmetic Implements

The two cosmetic spoons, J15-Ob-13-16 (pl. 24.153), belong to a group of instruments, which are often regarded as accessories of the female toilette such as kohl-sticks and spatulae. Sometimes, they were found kept together in a box. But the real function of the ear or cosmetic spoons is not very clear, and a use as medical or pharmaceutical instrument cannot be excluded, as these instruments also appear in the inventory of burials of doctors.

Jewellery

Just one metal find of the 2015 campaign is a piece of jewellery. The earring, J15-Qa-29-24 (pl. 25.163), is a variant of the so-called earring with one loop, a standard type of Byzantine jewellery of the late 4th to 7th century AD. Almost all known parallels are made of gold, and a lot of them have a richly decorated pendant fixed to the loop. They were part of the jewellery of the social elite in Byzantine times. The Jarash item clearly demonstrates that this type was also imitated in copper alloy to be acquired and worn by women of lower social status. While earrings were usually closed by a small hook, the ring of the Jarash earring is designed as an open ring without any hook. This is typical for some earrings of the late 4th and 5th century AD, after which it went out of use.

Weapon

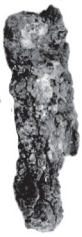
The upper part of a small lance head or an arrowhead (pl. 25.160) is so far the only weapon found in the excavations of the Northwest Quarter of Jarash. Because of the central rib and especially because of the unusual material for Roman and later weapons - copper alloy - there is little doubt that the lance head is a product of pre-Roman times. The corroded fragment does not allow a precise dating, so it could be of Hellenistic or even earlier times, when it was still common to use copper alloy instead of iron for weapons. It stems from one of the surface layers in Trench P and was mixed with other displaced material and finds of modern date. Other materials of clear Hellenistic date among the metal findings of the 2015 campaign are missing. The metal objects of the 2015 campaign represent a limited spectrum of findings: some daily-life tools, such as knives and the possible awl, few simple cosmetic accessories, a modest earring and a number of construction fittings (nails). All items would fit to a 'normal' household whose residents were not necessarily members of the city´s social elite. Referring to the metal findings only, it is hardly possible to reconstruct the way in which they made their living. Nothing seems to indicate specialised, professional handicraft being undertaken in this area.

Based on the huge amount of iron nails, it can be assumed that the roof of the building collapsed at a certain moment. Most of the objects are standard forms known since Roman times. Just the earring and the circular keyhole plate can be dated more specifically: the first item to the Byzantine period - and being an open ring even more precisely to the late 4th up to the 5th century AD; the latter item can be dated from the Late Roman up to the Late Byzantine period.

Metal
147.
Pl. 24.147
J15-Pd-16-7x
Iron. Keyhole plate.
Diam.: 12.2-12.8.
Circular plate with a central hole and a small rectangular groove on the upper left side. At least four rivets with domed heads of different size are fixed on the plate. At the rear side a smaller rectangular back plate. Almost complete, but broken in several pieces; badly corroded.
References: Waldbaum 1983: 72-73, pl. 24.385; Baitinger and Völling 2007: 138-142, pl. 56.634; Jantzen 2004: pl. 32.1184. See also a (rectangular) keyhole plate with rivets with domed head from a late 3rd century AD

Pl. 24





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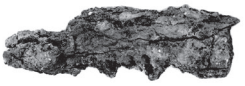


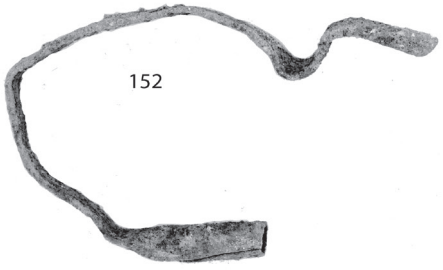
0 5cm



148



149



152



156

0 2cm



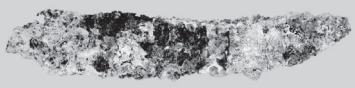
151



a)

b)

153



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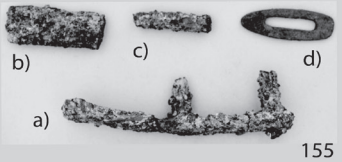


b)

c)

d)

a)

155

0 5cm

context in Jarash: Seigne 1986: pl. 14.2.
Date: Late Roman/Late Byzantine.

148.
Pl. 24.148
J15-Ra-5-2
Iron. Fitting or hinge.
L.: 2.3; W.: 1.8.
Small fitting of rectangular shape with rests of five loops (?).
References: K. Rafael in Patrich 2008: 440; 456, no. 91.

149.
Pl. 24.149
J15-Of-9-7
Copper alloy. Hook or lamp suspender.
L. longest fragment: 2; W. hook: 0.4.
Four fragments of a (one?) wire-shaped item with a loop at one end, probably a hook, as they were used for balances or as a part of lamp suspender; however, one cannot exclude that the pieces formed a twisted and broken awl.
References: Clark 1986: 268, pl. 29.2 I-J; Jantzen 2004: 10, pl. 1.5; for awls of Byzantine time see Jantzen 2004: 128, pl. 23.802-803; Platt and Ray Jr. 2009: 195 fig. 11.20 ("garment pins").
Date: Hellenistic/Roman and later.

150.
Without Pl.
J15-Nb-57-14
Iron. Several nails.
L. longest piece: 6.3; W. head: 1.8.
13 fragments of iron nails, all badly corroded. The nails are of different size; one has a bent shaft. The heads are flat or slightly domed; the shaft usually has a square section.
References: Waldbaum 1983: 68-69, pl. 21-22; Gaitzsch 2005: 52-54, pl. 36-37; Kazanski 2003: 14-21, 87-90, pl. 13-16; K. Rafael in Patrich 2008: 437, 439-440; 455, no. 52-72; selection of iron nails from Jarash: Clark 1986: 268, pl. 30.
Date: Hellenistic/Roman and later.

151.
Pl. 24.151
J15-Pb-16-3x
Iron. Knife.
L.: 8.5; W.: 2.
Blade of a small knife with a slightly curved edge and a straight back. The haft is missing; badly corroded.
References: Waldbaum 1983: 54-58, pl. 15.198; Clark 1986: 267, pl. 28.2; Gaitzsch 2005: 29-37, pl. 31.M4, M9; Jantzen 2004: 113, pl. 17.684; Kazanski 2003: 11; 82, pl. 8.41-42.

152.
Pl. 24.152
J15-Ni-39-7
Copper alloy. Band of unknown function.
L.: 6.6; W.: 0.6.
Twisted band of copper alloy with a wire-shaped central section and flat rectangular ends.
Date: Hellenistic/Roman and later.

153.
Pl. 24.153
J15-Ob-13-16
Copper alloy. Two cosmetic spoons or probes.
a) L.: 14.8; Diam. end: 0.5. b) L.: 11.7; Diam.: 0.3.
Both pieces have a plain and originally straight shaft of round cross section and a small bowl at one end; the shaft is now buckled and slightly twisted.
References: Waldbaum 1983: 105-107, pl. 41.619-634; K. Rafael in Patrich 2008: 446; 466, no. 188; Platt and Ray Jr. 2009: 200, fig. 12.1.2; Davidson 1952: 181, pl. 82.1319-1322; for decorated items of Late Byzantine and Islamic date, see Kazanski 2003: 28; 94, pl. 20.230-235.
Date: Roman and later.

154
Pl. 24.154
J15-Ob-108-1
Iron. Knife.
L.: 11.3; W.: 2.1.
Two fragments of a knife with a slightly curved edge and a straight back. A bigger part of the haft is missing; badly corroded.
References: Waldbaum 1983: 54-58, pl. 15.205; Clark 1986: 267, pl. 28.2; Jantzen 2004: 113, pl. 17.684; Kazanski 2003: 11; 82, pl. 8.41-42.

155.
Pl. 24.155
J15-Ob-13-13
Iron (a-c) and copper alloy (d). Lot of 4 pieces.
a) L.: 7.3; W.: 1.2; b) L.: 3.2; W.: 1.3; c) L.: 2.5; W.: 0.5; d) L.: 3; W.: 1.
The flat ellipsoid piece made of copper alloy is a small basic plate of a knife´s handle ("hilt guard"). There is obviously no functional correlation to the other three pieces made of iron. The biggest one (a) is an oblong rectangular fitting with two nails whose function is unknown (furniture fitting?).
References: Basic plate: Gaitzsch 2005: 34-35, pl. 33.M60-68; for a (silver) basic plate of a knife from Jarash, see Clark 1986: 267 ("hilt guard"), pl. 28.2 bottom; furniture fittings: Gaitzsch 2005: pl. 64.3; Jantzen 2004: pl. 26.842-843.

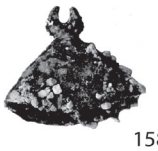
156.
Pl. 24.156
J15-Rac-18-3
Copper alloy. Small weight (?).
L.: 0.9; W.: 0.7.
Spherical, almost onion-shaped body with a loop at the top; probably a small weight.
References: Davidson 1952: 213, pl. 96.1641-1642.1644; Mutz 1983.
Date: Roman and Later.

157.
Pl. 25.157
J15-Jl-33-2
Copper alloy. Rest of a chain.
L.: 1.8; W.: 0.7.
Short fragment of a simple chain with five wire-shaped rings closed by welding or soldering.
References: Jantzen 2004: pl. 36.1229-1231.
Date: Hellenistic/Roman and later.

Pl. 25



157



158

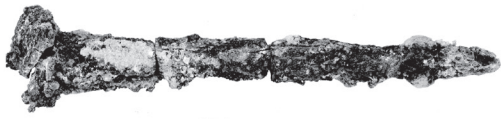


163



164

0 2cm



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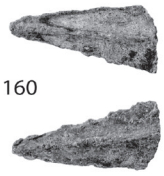

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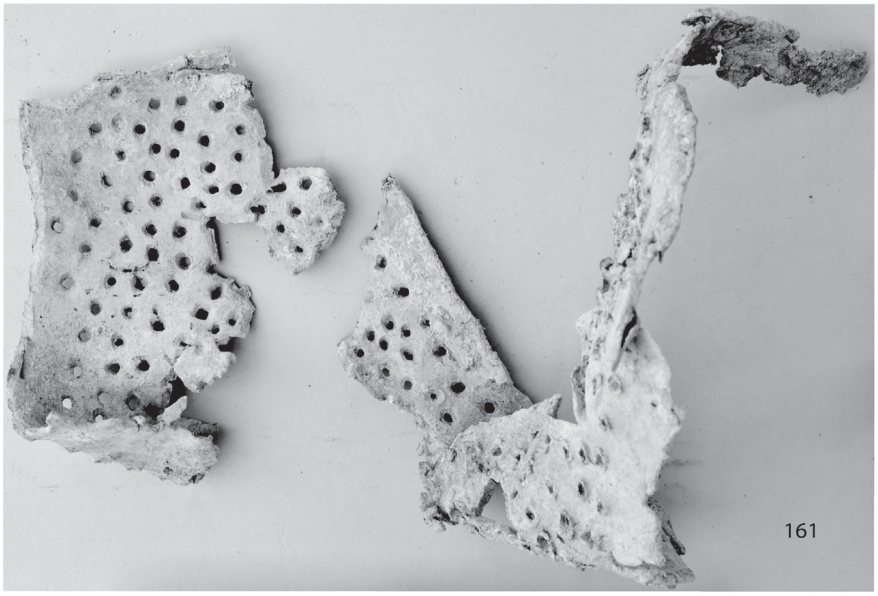
162



161

0 5cm

158.
Pl. 25.158
J15-R-13-1
Copper alloy. Small bell.
L.: 2.1; H.: 2.
Hemispherical bell with a loop at the top; bell dented, loop broken.
References: Waldbaum 1983: 42-44, pl. 8.92; Clark 1986: 268, pl. 29.2. H (catalogue: G); Vollenweider and Platt 2009: 300-301, fig. 14.2.6-8.
Date: Roman and later.

159.
Pl. 25.159
J15-Pd-16-24x
Iron. Large nail.
L.: 15.4; W. head: 3.3.
Large, tapered shaft, domed head; badly corroded; head broken.
References: Waldbaum 1983: 68-69, pl. 21.302; Kazanski 2003: 20, pl. 90.159 and 161; similar nails of large size from Jarash: Clark 1986: 268, pl. 30.1 right, pl. 30.2 right.

160
Pl. 25.160
J15-Pd-5-3
Copper alloy. Lance- or arrowhead.
L.: 4.6; W.: 2.
Upper part of a small lancehead or an arrowhead; preserved part of oblong, triangular shape; with a central, vertical rib of circular section.
References: Waldbaum 1983: 32-35, pl. 3.
Date: Hellenistic or earlier.

161
Pl. 25.161
J15-Pc-15-x
Copper alloy. Fragments of a strainer.
a) L.: 13.7; W.: 10.5; b) L.: 18.3; W.: 6.
Two large fragments of a strainer, both dented and twisted; covered with hundreds of small punched holes, more or less arranged in lines; the exact shape of the vessel, however, cannot be determined, but it is probably a bowl. As the fragments are of a curved body, one can exclude an anthepsa. This special vessel form had a flat perforated bottom and was common throughout Roman and Byzantine times.
References: Waldbaum 1983: 59, pl. 16.217; Davidson 1952: 73, pl. 51.555.
Date: Hellenistic/Roman and later.

162.
Pl. 25.162
J15-Pd-16-21x
Iron. Fragment of a knife (?)
L.: 7.1; W.: 2.4.
Fragmented blade with a rest of the haft; the exact shape can not be determined; badly corroded.
References: Waldbaum 1983: 54-58, pl. 14-15.
Date: Hellenistic/Roman and later.

163.
Pl. 25.163
J15-Qa-29-24
Copper alloy. Earring.
L.: 2.4; Diam. of the ring: 2.
Open, wire-shaped ring. Small, almost rectangular loop with lateral granulates.
References: Baldini 1999: 90-92, no. 9.

164.
Pl. 25.164
J15-Ob-108-13
Copper alloy. Chain link.
L.: 2.1; W.: 1.2.
Link of figure-eight type with a larger and a smaller ring; corroded.
References: Waldbaum 1983: pl. 54.946; Clark 1986: 269, pl. 32.1 mid row.
Date: Hellenistic/Roman and later.

Preliminary Report on the Results of GC/MS Analyses of the Amphorae Content

Andreas Springer and Silvia Polla

The contents of seven selected amphorae samples belonging to imported and local/regional types have been analysed, using gas chromatography-mass spectrometry (GC/MS). The aim of the scientific analysis is to get a better understanding of urban economies in Jarash by assessing patterns of use and reuse of transport containers and storage jars in context.

Methodology

Sherds were first surface-cleaned, and powdered samples were extracted using the extraction methods for wine and oil markers, analogous to the methodology described by Pecci *et al.* (2013) and Pecci, Ontiveros and Garnier (2013), including the derivatisation with BSTFA before analysis by GC-MS. The main difference to previous applications was that we used a rotary evaporator for removal of extraction solvents instead of a flow of dry nitrogen. The GC-MS method described in literature was customised for an Agilent G1969A GC-MS system equipped with a DB-5MS GC column (30m × 0.25mm, Agilent Technologies), including a temperature programme (1 min at 50°C, then a ramp of 5°C/min, 10 min at 300°C) utilizing added Dotriocontan to mark the end of the chromatogram and as internal standard. All found compounds were compared to the retention times and mass spectra of standards produced from pure compounds, derivatised using BSTFA.

Preliminary Results

The content of two amphorae of the type Almagro 50 (samples nos. 10009, pl. 14.89 - 10010, pl. 14.90) was analysed. This Lusitanian amphora produced in Portugal between the 3rd/4th and the 5th century usually shows a western Mediterranean distribution and probably transported fish products (Carandini and Panella 1981; Keay 1984). In both analysed samples, very small lactic acid was identified, a compound that refers to fermentation processes. Additionally, palmitic and stearic acid, which may originate from plant oils, such as *e.g.* olive oil as well as animal fat (see to this respect Woodworth *et al.* 2015: 53-54), were detected.

The analysis of one Late Roman 1 amphora (sample no. 10000, *cf.* pl. 16.93), for which both olive oil (Mitchell 2005) and wine (Piéri 2005) have been suggested, shows definitive oil markers.

The same oil markers were detected in both samples of the probably regional production of bag-shaped amphorae (samples nos. 10001 [Type *cf.* Lichtenberger *et al.* 2018: fig. 72] - 10002, *cf.* pl. 14.85) as well as in the "Byzantine" amphora (sample no. 10006, for the type *cf.* pl. 13.82). According to written sources, Palestinian bag-shaped amphorae, belonging to the family of Late Roman 5 and 6 Amphorae, should primarily contain wine but also oil, dry figs and fish sauce for the intraregional trade (Piéri 2005).

The analysis of the content of one amphora of Type Kapitän II (*cf.* pl. 15.92), considered as a wine amphora (Carandini and Panella 1981), shows both oil and wine as a probable source of the detected compounds. Although no direct evidence for wine has been detected at this stage, the presence of markers of fermentation processes, such as lactic acid (Garnier 2015: 34) was observed, indicating reuse/secondary use and/or interchangeability of contents (Peña 2007).

The Faunal Remains from Jarash, Northwest Quarter, Seasons 2012 to 2014

Pernille Bangsgaard

The faunal remains presented in this report include material excavated during the excavation seasons 2012 to 2014. The total collection originates from ten distinct excavation areas. The majority of the material was analysed on site in Jarash in August during the 2014 and the 2015 field seasons. A small selection of faunal material was, however, exported to Denmark and analysed at the Natural History Museum of Denmark, using the large comparative collections of skeletons available there. These mainly include remains from various bird and fish species, which are currently not represented in the small comparative collection available on site in Jordan.

All faunal material was identified to skeletal element and species or to the nearest possible taxon (*order, family* or *genus*). The registration of each bone fragment includes section of bone,

side and observation of various changes, whether human-induced or not, such as cut-marks, fire damage and evidence of pathology. The bones are quantified by number of fragments, NISP (*number of identified specimens*) and weight. When possible, all long-bone fragments were registered with age categories (*foetal, pullus, unfused and fused)* and all mandibles were registered with ontogenetic age when the information was available.

The Faunal Material

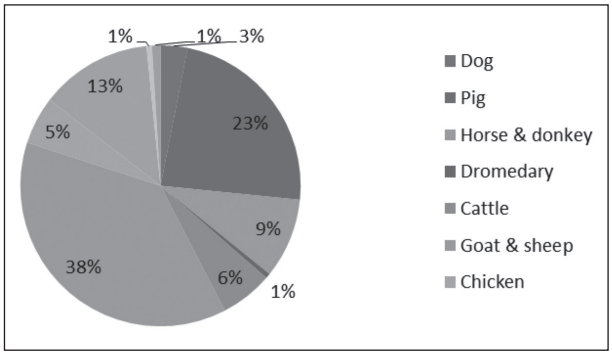
At present, a total of 5,927 fragments have been registered from the excavations (weight: 37,945.5 grams), of which 3,501 were registered during the 2015 season (see **Table 1** for the full species list). This year, it was decided to continue the faunal analysis chronologically, so the remainder of the 2012 season was analysed first, followed by all of the remains excavated in 2013. The 2012 season included material from Trenches A, B and C, whereas the 2013 season included material from Trenches D, E, F, G and H. The remaining trenches, J and K, were excavated in 2014 and analysed during the same field season. The large number of bones analysed means that the analysis is now more comprehensive, and that more statistics can be carried out.

The faunal remains were hand collected during excavation with little sieving or flotation for the majority of contexts. Only in the case of two complete pots was the content sieved to improve small-bone retrieval. It is therefore likely that some loss of small bones occurred as a result of this, in particular the retrieval of fish, bird and rodent bones, along with the minor bones from various small mammal species. The state of preservation is generally very good, meaning that most of the original surface of the bones is preserved, and post- or pre-excavation fragmentation is limited, leaving cut-marks and other minor changes still visible on the surface of the bone.

Bones with a sign of burning or calcined fragments are extremely rare, and only a total of 74 such fragments were identified in the entire collection, accounting for around 1.2 percent of the collection (see **Table 2**). The group includes 55 fragments, which were partly burnt black, 12 which were completely burnt black and 7 fragments which were burnt white, thus implying that the bones were mainly exposed to lower temperatures, or exposure was limited to short intervals. The fragments which could be identified include mainly the domesticated animals, sheep and goat, cattle, pig and equid, with a single mark on a *Phasanidae* sp. bone. The limited amount of burning could indicate that, for the majority, preparation of meat either did not include the bones or the foods prepared primarily included dishes where the meat would not be directly exposed to fire, such as a pot of meat and other ingredients simmering in liquid. The latter type of dish is well represented in the Early Islamic cookbooks known from the 9th century onwards (See for example Nasrallah 2007). Bones with cut- and chop-marks are more common in the collection, with 450 recorded fragments (see **Table 3**). The marks represent over 40 different locations and types, but the majority are typically associated with the skinning and dismembering process. They are mainly found on bones from domesticates, such as sheep, goat, cattle and pig, but fish and birds are also represented with 12 bones. As more material is identified, it should be possible to reconstruct the butchering pattern for the most common species in the collection.

The Species

A minimum of 30 species were positively identified in the collection, all of which are quantified in **Table 1**, according to the trench of origin. A general overview of the entire identified collection with percentages of total NISP is presented in (**Fig. 31**). Domesticates are by far the most common group of animals and include sheep (*Ovis aries*), goat (*Capra hircus*), pig (*Sus* sp.), cattle (*Bos taurus*) and



31. Distribution of the main species found at Jaresh, with procentage of total NISP.

Table 1: Full species list ot the registered faunal material.

	Trench A	Trench B	Trench C	Trench D	Trench E	Trench F	Trench G	Trench H	Trench J	Trench K	**Total**
Domesticated Animals											
Dog, *Canis familiaris*	2	5	1	10	7	4	2	6	31		**70**
Domesticated pig, *Sus domesticus*		3									**3**
Pig, *Sus* sp. *	9	171	11	28	90	69	52	24	37	36	**527**
Donkey, *Equus asinus*		3	4				2		26		**35**
Horse, *Equus caballus*				3	2	4		6			**15**
Horse/donkey, *Equus* sp.	4	7	9	9	1	2	3	8	115		**158**
Dromedary, *Camelus dromedarus*									1	1	**2**
Camel/dromedary, *Camelus* sp.						3	5	3			**11**
Cattle, *Bos taurus*		9	22	11	19	7	41	7	14	6	**136**
Goat, *Capra hircus*	2	12	2	6	6	15	20	5	11	12	**91**
Sheep, *Ovis aries*	2	14	1	5	11	17	16	8	10	34	**118**
Goat/sheep, *Capra hircus/ Ovis aries*	13	95	28	45	54	77	91	17	48	171	**639**
Chicken, *Gallus gallus domesticus*	8	55		3	10	22		3	10	8	**124**
Wild Animals											
Wolf, *Canis lupus*				1							**1**
Red fox, *Vulpes vulpes*										3	**3**
Carnivore, *Carnivora* sp.				1			1				**2**
Gazelle, *Gazella* sp.					1		2	1	2		**6**
Cape hare, *Lepus capensis*										1	**1**
Hedgehog, *Erinaceidae* sp			1								**1**
Mole rat, *Spalax* sp.								1			**1**
Black rat, *Rattus rattus*		3								1	**4**
Rat, *Rattus* sp.		4			1	1			1	1	**8**
Mice, *Muridae* sp.			1						1		**2**
Rodents, *Rodentia* sp.					1				7	1	**9**
Spur-thighed tortoise, *Testudo graeca*			2								**2**
Tortoise, *Testudo* sp.		7	11	6					1		**25**
Snakes, *Squamata* sp			117								**117**
Frogs and toads, *Anura* sp.			1								**1**
Chukar partridge, *Alectoris chukar*	2	1	2						1	4	**10**
Partridge and francolins, *Phasanidae* sp.	9	22	2	3	3	6	1	1	14	24	**85**
Pigeon and doves, *Columba* sp.		5								1	**6**
Ostrich, *Struthio* sp. #										1	**1**
Bird, *Aves* sp. #	44	64	3	2	5	9	6	1	6	50	**190**
Airbreathing catfish, *Clariidae* sp		1				2					**3**
Catfish, *Bagrus* sp		4									**4**
Fish, *Pisces* sp.			2	1						12	**15**
Crab, *Brachyura* sp.						1					**1**
Sea urchin, *Echinoderm* sp				1							**1**
Molluscs, *Mollusca* sp.										56	**56**
Ungulate, *Ungulata* sp.	3	19	25	12	8	14	28	7	131	42	**289**
Unidentified	89	411	143	146	244	356	554	138	598	477	**3156**
Total number of fragments	**187**	**915**	**388**	**263**	**463**	**609**	**859**	**236**	**1065**	**465**	**5927**
Total weight of fragments	**442**	**4283**	**1939,5**	**1109,1**	**3442**	**3180,5**	**6781,5**	**2333**	**9771**	**2013**	**37948**

Table 2: Distribution of burnt bones according to species

	black burnt	partly black burnt	white burnt	**Total**
Pig, *Sus* sp. *		8		**8**
Cattle, *Bos taurus*		2		**2**
Horse/donkey, *Equus* sp.		2		**2**
Goat, *Capra hircus*		2		**2**
Sheep, *Ovis aries*		6		**6**
Goat/sheep, *Capra hircus/ Ovis aries*	1	13	1	**15**
Partridge and francolins, *Phasanidae* sp.		1		**1**
Unidentified	11	21	6	
Total	**12**	**55**	**7**	**74**

Table 3: Distribution of worked bones according to species

	Chop-mark	**Cut-mark**	**worked**	**Total**
Pig, *Sus* sp. *	40	36	1	**76**
Horse/donkey, *Equus* sp.	1	12		**13**
Camel/dromedary, *Camelus* sp.	1	1		**2**
Cattle, *Bos taurus*	8	10		**18**
Goat, *Capra hircus*	4	3		**7**
Sheep, *Ovis aries*	8	11		**19**
Goat/sheep, *Capra hircus/ Ovis aries*	73	32		**105**
Chicken, *Gallus gallus domesticus*		6		**6**
Partridge and francolins, *Phasanidae* sp.		5		**5**
Fish, *Pisces* sp.	1			**1**
Ungulate, *Ungulata* sp.	14	16		**30**
Unidentified	120	48	12	
Total	**270**	**180**	**13**	

chicken (*Gallus domesticus*) as the main contributors. These species generally contribute as much as 85 percent or more of all identified bones (NISP), although there are exceptions to the rule, such as the collection from Trench A, where domesticates only include around 42 percent, mainly due to a high amount of unspecified bird and wild bird bones.

Wild Fauna

The small remaining group of wild species includes both various mammals, birds, fish and tortoise. Some of these are probably more likely to be commensal species, rather than an actual source of food, such as the small group of rodents. But many of the remaining species could certainly have served well for human consumption; these include gazelle (*Gazella* sp.), cape hare (*Lepus capensis*), red fox (*Vulpes vulpes*), pigeon (*Columba* sp.) and chukar partridge (*Alectoris chukar*). All of the identified wild species are also found in the general area today (Harrison and Bates 1991; Porter and Aspinall 2010). It was possible to identify a few fish remains to family. These include three fragments from the family of airbreathing catfish (*Clariidae* sp.) and four from the general group of catfish (*Bagrus* sp.). The latter includes multiple families, whereas the former only includes species living in freshwater. Although catfish is known to have been exported in large numbers from the Nile (Van Neer *et al.* 2004) it must be considered that the fish was caught locally in a nearby stream. The freshwater fauna of the Middle East is not well studied, but the family of airbreathing catfish is known to be present in Jordan and nearby countries.

Sheep and Goat

Sheep and goat are overall the most common species in the collection, with sheep being slightly more common than goat, which corresponds well with the typical pattern of traditional sheep and goat husbandry in the Middle East and elsewhere (Dahl and Hjort 1976). Interestingly, there is significant variation between individual trenches. Due to the higher amount of fragments from these two species, it was possible to generate a reasonable amount of data for age categories. The time-of-

death distribution is based partly on mandible teeth eruption and wear stages and partly on fusion of the long-bones, according to species and for the sheep/goat group, as can be seen in **Tables 4-7**. The mandibles clearly testify to a fairly spread-out distribution, with no clear concentration of time of death in the period from 6 months to 8 years of age. It is, however, worth noting that goat appears to be represented by younger animals compared to sheep, but this is based on a small sample size. The long bones include more material, but the trend of younger goats (which died before the age of 1½ years) is not so evident here. In fact, most appear to have reached an age of 1½ to 3 years, but there is little evidence of older or senile animals. Regarding sheep and the sheep/goat group, the main time of death appears to be later, in the high-age category of 3 years or older. Although based on a fairly small sample size, such distribution could suggest different patterns of use for the two species. It could be suggested that goat was primarily used for milk; thus, males would be killed off very young, and milking females would be killed off as milk production started to decline. For the sheep long bones, the pattern of a reasonably high proportion of adult and older individuals based on the late fusion group, suggests that wool production might have been of some importance in the area (Payne 1973).

Table 4: Distribution of goat, sheep and goat/sheep mandibles, which could be aged (Payne, 1973).

Age category	Goat	Sheep	Sheep/goat	total
6-12 months	2	1	-	3
2-3 years	1	2	1	4
3-4 years	-	-	4	4
4-6 years	-	3	1	4
6-8 years	-	4	-	4

Table 5: Distribution of goat bones, which could be aged (Reitz and Wing, 1999).

	Time of fusion (months)	Unfused	Fused
Early Fusion			
Metapodium, proximal	At birth	-	12
Radius, proximal	4-9	-	2
2. Phalanges	9-13	-	7
Humerus, distal	11-13	-	7
1. Phalanges	11-15	1	11
Early Fusion Total		**1**	**39**
Middle Fusion			
Tibia, distal	19-24	1	-
Metapodium, distal	23-36	1	7
Calcaneus	23-60	2	1
Middle Fusion Total		**4**	**8**
Late Fusion			
Humerus proximal	23-84	-	2
Radius, distal	33-84	-	5
Late Fusion Total		**0**	**7**

Table 6: Distribution of sheep bones, which could be aged (Reitz and Wing, 1999).

	Time of fusion (months)	Unfused	Fused
Early Fusion			
Metapodium, proximal	At birth	-	18
Radius, proximal	3-10	-	5
Humerus, distal	3-10	2	8
Pelvis, acetabulum	6-10	-	1
2. Phalanges	6-16	-	10
1. Phalanges	6-16	-	8
Early Fusion Total		**2**	**50**
Middle Fusion			
Metapodium, distal	18-28	1	13
Middle Fusion Total		**1**	**13**
Late Fusion			
Calcaneus	30-36	2	2
Femur, distal	36-60	1	-
Humerus, proximal	36-42	1	2
Radius, distal	36-42	1	4
Femur proximal	23-84	-	2
Late Fusion Total		**5**	**10**

Pig

Pig is the second most important species at Jarash as counted by the number of identified fragments, and this is particularly clear in Trenches B and E, where it is in fact the most numerous species. With an increase in the amount of identified material during the current 2015 season, it is now possible to estimate the time of death for pigs based on mandibular tooth eruption and wear, along with long-bone fusion (see **Tables 8** and **9** for the results). The evidence from the mandibles clearly suggests a

Table 7: distribution of sheep and goat bones which could be aged (Reitz and Wing, 1999).

	Time of fusion (months)	Unfused	Fused
Early Fusion			
Metapodium, proximal	At birth	-	24
Radius, proximal	3-10	-	9
Humerus, distal	3-13	-	4
Scapula	5-13	3	8
Pelvis, acetabulum	6-10	4	26
2. Phalanges	6-16	-	3
1. Phalanges	6-16	-	5
Early Fusion Total		**7**	**79**
Middle Fusion			
Tibia, distal	15-24	2	19
Metapodium, distal	18-36	2	-
Middle Fusion Total		**4**	**19**
Late Fusion			
Tibia, proximal	23-60	6	1
Calcaneus	23-60	2	3
Ulna, proximal	24-84	2	-
Femur proximal	23-84	11	3
Femur, distal	36-60	5	2
Radius, distal	33-84	5	-
Vertebrate	48-60	14	35
Late Fusion Total		**45**	**44**

reasonably early time of death for the majority of the pig population, around the age of 6 months to 1 year to be precise. The data based on long-bone fusion suggests a slightly older age, from 1½ to 3 years of age. Combined, the tables clearly suggest that pig was kept as a supply for meat, as the animals were killed around the age at which the meat gain would be optimal.

Cattle

Interestingly, the evidence points to a completely different distribution for cattle, for which data is available from long-bone fusion (see **Table 10** for the results). It is evident that the overwhelming majority of the animals were in the oldest category, which begins around 3 years of age and older. This clearly supports the assumption that cattle primarily served other functions, such as a beast-of-burden or milk production, and only secondarily as a meat resource. Thus, they were not killed and consumed, until after they had out-served their primary purpose.

Table 8: Distribution of pig mandibles, which could be aged (Lemoine *et al.* 2014).

Age Category	Number
≤1 month	2
1-8 months	2
3-5 months	4
6-8 months	6
6-12 months	6
8-16 months	3
12-16 months	1
12-52 months	3
30-72 months	2

Table 9: distribution of pig bones which could be aged (Reitz and Wing, 1999).

	Time of fusion (months)	Unfused	Fused
Early Fusion			
Metapodium, proximal	At birth	1	40
Scapula	12	2	6
Pelvis, acetabulum	12	3¤	10
2. Phalanges	12	-	3
Humerus, distal	12-18	6	2
Early Fusion Total		**12**	**61**
Middle Fusion			
1. Phalanges	24	8	1
Tibia, distal	24	12	3
Calcaneus	24-30	-	4
Metapodium, distal	24-27	27	2
Middle Fusion Total		**47**	**10**
Late Fusion			
Ulna, proximal	36-42	6*	-
Ulna, distal	36-42	8*	-
Humerus, proximal	42	1#	-
Tibia, proximal	42	3	-
Femur, distal	42	4¤	-
Femur proximal	42	1	-
Radius, distal	42	1	-
Vertebrate	48-84	19	7
Late Fusion Total		**43**	**7**

*2 foetal, 2 pullus, ¤ 2 pullus, 1 pullus

Dog

The majority of dog remains originate from two evidences in Trench J, amounting to 31 of a total of 70 fragments (from Trench Jc,

Table 10: Distribution of cattle bones which could be aged, according to trench (Reitz and Wing, 1999).

	Time of fusion (months)	Unfused	Fused
Early Fusion			
Metapodium, proximal	Before birth	0	8
Radius, proximal	12-18 months	0	1
Scapula	7-10 months	0	1
Pelvis, acetabulum	6-10 months	0	6
Humerus, distal	12-18 months	0	2
2. Phalanges	18-24 months	0	4
1. Phalanges	18-24 months	0	13
Early Fusion Total		**0**	**35**
Middle Fusion			
Tibia, distal	24-30 months	0	2
Metapodium, distal	24-36 months	0	6
Middle Fusion Total		**0**	**8**
Late Fusion			
Calcaneus	36-42 months	0	2
Femur proximal	42 months	2	3
Humerus, proximal	42-48 months	0	2
Radius, distal	42-48 months	1	3
Ulna, proximal	42-48 months	1	-
Ulna, distal	42-48 months	1	-
Vertebrate	84-108 months	2	1
Late Fusion Total		**7**	**11**

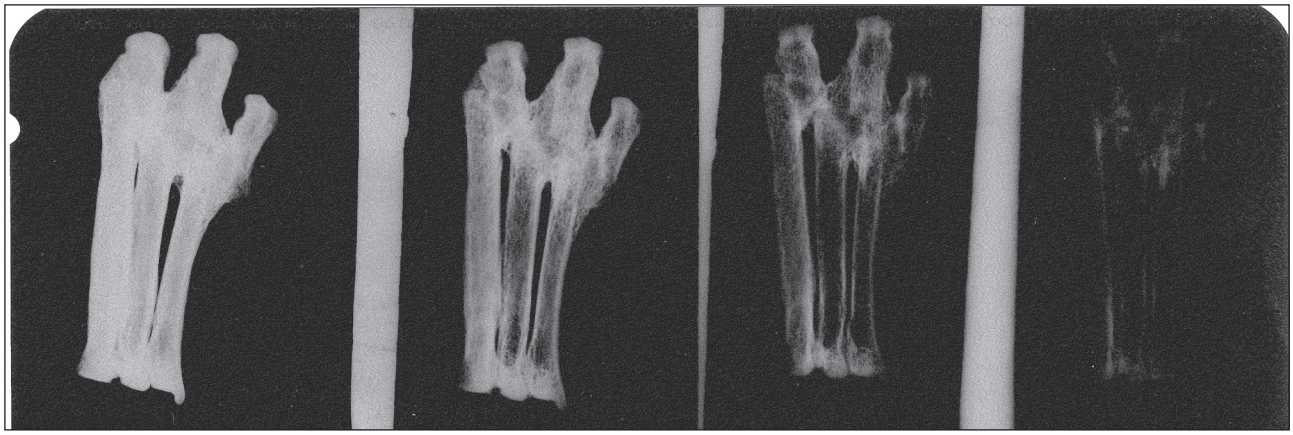
ev. 67 and ev. 68). Three complete long bones indicate that the dog had a shoulder height of around 50cm [Two radii with GL: 147mm and 171.4mm and one femur with GL: 170.1mm. These and all other measurements mentioned in this report were taken according to von den Driesch 1979]. As there are no duplicates of any one bone among the dog remains from Jc, it is likely that the fragments originate from a single individual. All of these long bones are fused, and the animal would therefore have been more than two years of age when it died (Based on Silver 1969). Among the remaining 39 fragments from dogs are three metapodia with excessive new bone depositing, thus locking three otherwise separate bones together. An X-ray of the material in Copenhagen revealed clear fractures of all three, with bone regrowth stabilising the fractured remains and dislocating the bones in a permanent position (see **Fig. 32**) [trench Jc, ev. 35]. The remaining bones are dispersed among all the trenches, and clearly illustrate that dog was generally present at Jaresh.

Equid

The overwhelming majority of the Equus remains originate from two evidences in Trench Jc (141 fragments of a total 208) [trench Jc, from ev. 67 (find#1, find list# B149) and 68 (not yet numbered)]. Among the 141 fragments, 26 could be identified as donkey (*Equus asinus*) based on a series of distinct morphological markers (Johnstone 2004). As no elements could positively be assigned to any other equid species, it must be considered likely that the remaining fragments were also from donkey. Among the collection, five measurements can be used to calculate the shoulder height of the animals [Two metatarsals with GL: 230mm and 217.4mm, two tibia with GL: 305mm and 280mm and one radius with GL: 288,5mm]. They indicate a shoulder height between 133 and 115 cm. Included in the collection are 19 fragments, which display signs of various pathologies. These do not appear to be of a traumatic origin. Instead, all are consistent with old and working animals (see **Fig. 33** for an example). It might therefore be suggested that the bones were from older caravan donkeys that had out-served their purpose as pack animals. The equid group does, however, also include some 15 fragments, which could be identified to horse. These are distributed among 4 different trenches and could well be from multiple individuals [Horse remains were identified from Trench D (3), Trench E (2), Trench F (4) and Trench H (6)].

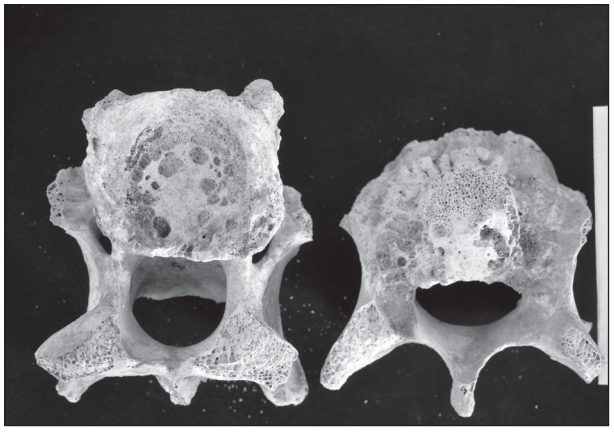
Dromedary

Among the remaining domesticated mammals, it is worth noting that among the small group of dromedary or dromedary/camel frag-

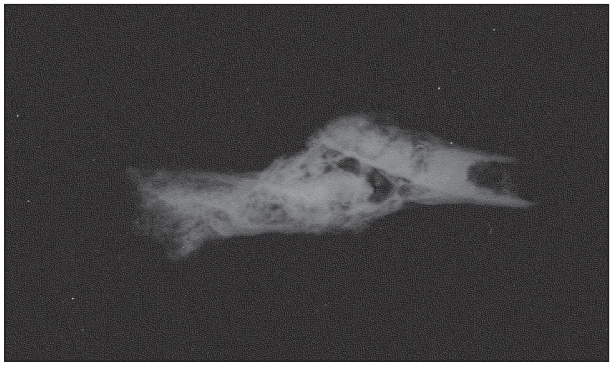


32. X-ray of three joined dog metapodiums with clear fracture and regrowth stabilising the bones.

ments (13 in total), eight display signs of fusion and none are unfused. The remains, therefore, follow the pattern seen elsewhere, namely that very few fragments are found inside towns, and those that are discovered are all from adult animals. This has elsewhere been interpreted as evidence for the animals' function in caravan transport, meaning that they rarely entered cities, and only when an animal became injured or too old was it butchered and consumed.



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



34. X-ray of a fractured and healed humerus from domesticated hen.

Domesticated Hen

The domesticated chicken is the main avian species in the collection, and it is represented by both bones and eggshell, in total 124 fragments. Additionally, the *Phasanidae* family and the general bird category are both likely to contain mainly elements from chicken, elements that were simply too fragmented to be assigned to a more specific category. The chicken remains include elements from the entire body; among these is a humerus with clear signs of a healed mid-diafyse fracture. The two ends were not placed in the anatomically correct position afterwards, and thus, the wing was shortened significantly (**Fig. 34**) [from Trench Gb, ev. 12]. Apart from representing a significant addition to the daily diet at the site of Jarash, it is worth noting that chicken was considered a good and light form of meat in both Byzantine and Early Islamic written sources (Dalby 2010: 71 and 143; Nasrallah 2007: 104).

Concluding Remarks

The collection of some 5,927 fragments from ten different areas of excavation has now been analysed during two single weeks of fieldwork in 2014 and 2015. Currently, a minimum of 30 species have been identified. These include a significant number of domesticates but also a smaller collection of various wild species. The present results testify to the potential output of a more detailed faunal analysis with significant diversity of data, regarding species, body-part preferences and food preparation. A more detailed study of the find contexts and a chronological development is underway.

Appendix on Two Possible Arabic Graffiti
John Møller Larsen

In the case of item cat. no. 127 (pl. 20.127) the character and quantity of the remaining incisions make it difficult to establish if we are looking at script or a decoration. On the assumption that the remains are indeed script, it seems that we should look at the figure turned 90 degrees to the right. We can then rule out Latin and Greek (unless we have a very coarsely executed ω). Within the Aramaic script family a possibility is Christian Palestinian Aramaic (Melkite Aramaic), but the remains are too meagre to suggest any meaningful reading [a chart of the Christian Palestinian script is found in Desreumaux 1998: 513]. Another possibility is Arabic, but in this case it is noteworthy that the shapes are made up of short contiguous straight lines rather than single flowing strokes. This would be simpler to explain if the lines had been incised after the brick had been fired. As long as the clay was wet, it would have been easy to add semicircular strokes with a finger or a tool. If the remains are Arabic they are open to numerous interpretations, partly due to the lack of diacritical points. So, the angular form to the right could be interpreted as *b*, *t*, *th*, *n*, or *y*. If the small oblique stroke above the other lines is an intentional part of a letter, we could read *k* or *l*. If it is not, a possibility is *n*; in that case we could for instance read *bn*. This could either be the Arabic *ibn* (*son of*) as part of a name or it could be *bānin* (*builder*, (*someone*) *building*) written defectively (without notation of the ā) unless the small oblique stroke is seen as a perpendicular *alif*, which is not very likely. Clearly, these suggestions are quite conjectural and would need corroboration from other finds.

In the case of cat. no. 132 (pl. 21.132) the fragment to the left clearly shows the remains of script. They could be interpreted as Syriac script in its Serto variant, but a more likely possibility is Arabic. The letter to the right may possibly be interpreted as *d* or *dh*, though it is unusual that the left part of the top of the letter points downwards. It is not possible to see if the letter is connected to the left. For the next two letters the lower parts are missing. The first can safely be taken as *alif* or *l*, while the second is most likely *j*, *ḥ*, or *kh* (letters only distinguished by means diacritical points). The remains to the left are tiny but would most readily fit the letter *h*. On the assumption that all letters belong to the same word and that we have all the letters of the word (which is likely since no letter is visible to the right of the first letter), we then have twelve possible permutations: *d-ʾ-j-h*, *d-ʾ-ḥ-h*, *d-ʾ-kh-h*, *d-l-j-h*, *d-l-ḥ-h*, *d-l-kh-h*, *dh-ʾ-j-h*, *dh-ʾ-ḥ-h*, *dh-ʾ-kh-h*, *dh-l-j-h*, *dh-l-ḥ-h*, *dh-l-kh-h*. However, the interpretation is further complicated by the fact that the *alif* either may be a root letter or may indicate the vowel ā. Also, the *h* may be either a root letter or a feminine ending. Still, in spite of the many possibilities only few words would actually fit: *dājjah* as an active participle in the feminine of the verb *dajja*, i.a. *creep along*, *walk leisurely*; or *duljah* (also found with alternative vocalizations) meaning a *night journey* or an *hour of the latter part of the night*. Without a context it is obviously impossible to know if any of these meanings could be correct. The remains on the middle fragment could possibly be one of the letters *j*, *ḥ*, and *kh* but may just as well be part of a decoration. Finally, the remains on the fragment to the right can only be interpreted as decoration.

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PRELIMINARY REPORT OF THE SIXTH SEASON OF THE DANISH-GERMAN JARASH NORTHWEST QUARTER PROJECT 2016

Georg Kalaitzoglou, Achim Lichtenberger, Heike Möller and Rubina Raja
with an appendix by Christoph Eger

Introduction

Between 24th July and 30th August 2016, the Danish-German team from Aarhus University (Denmark) and Ruhr University Bochum (Germany) conducted its sixth campaign in the Northwest quarter of the ancient city Gerasa, modern Jarash, in Northern Jordan.

On the basis of the results from the 2011–2015 campaigns, which included architectural, geodetic and geophysical surveys as well as the excavation of eighteen trenches, it was decided to lay out six new trenches. One trench was placed on the south slope, three trenches from the 2015 excavations were extended, one trench was related to the north-west corner of the so-called Ionic Building and another trench was placed at the highest point of the Northwest Quarter, an area that was initially investigated in 2012. The trenches were chosen to gain further insight into the settlement history of the Northwest Quarter of the city. The project, directed by Achim Lichtenberger and Rubina Raja, is funded by the Carlsberg Foundation, the Danish National Research Foundation (grant number: DNRF 119), Deutsche Forschungsgemeinschaft (DFG), the EliteForsk Prize, and H. P. Hjerl Hansens Mindefondet for Dansk Palæstinaforskning[1].

Based on results from the 2011–2015 campaigns, it was decided to continue the explorations located partly in areas already excavated (**Fig. 1**). The areas close to the rock-cut room in Trench A on top of the hill and the Middle Islamic courtyard house nearby were chosen for further studies, as they are located on the highest point of the Northwest Quarter and had yielded crucial information in earlier campaigns (Lichtenberger and Raja 2012, 2015a, 2015b; Kalaitzoglou, Lichtenberger and Raja 2013, 2017, 2021; Lichtenberger, Raja and Sørensen 2013,

1. The team consisted of Directors Prof. Dr. Achim Lichtenberger and Prof. Dr. Rubina Raja; Head of field Dr. Georg Kalaitzoglou, Head of registration Dr. Heike Möller, Architect Nicole Pieper (Vienna), Conservator Margit Petersen (Viborg Museum, Denmark); Dr. William T. Wootton (King's College, London, UK), who examined the mosaic finds; Dr. Holger Schwarzer (University of Münster, Germany), who examined the ancient glass finds and Dr. Christoph Eger (Xanten, Germany), who examined the metal finds; the sampling for geochemistry and environmental history was continued by Prof. Dr. Ian Simpson (University of Stirling, UK), Dr. Genevieve Holdrige and Dr. Søren Munch Kristiansen (both UrbNet, Aarhus University, Denmark); and Ingrid and Dr. Wolfgang Schulze (Essen, Germany) cleaned and re-examined the Late Byzantine and Early Islamic coinage of the years 2012 to 2016 after the campaign. Furthermore, the team included the following members: Christin Braeck, Malene Byø, Charlotte Kjær Christensen, Philip Ebeling, Holger Fleischer, Max Herbst, Gitte Lambertsen Hjortlund, Jesper Vestergaard Jensen, Marion Jobczyk, Hans-Peter Klossek, Signe Krag, Signe Bruun Kristensen, Mie Egelund Lind, Kevin Luijer, Line Egelund Nielsen, Mette Normann Pedersen, Alex Hunter Peterson, Julie Thomsen Raunstrup, Alexander Reso, Michael Schwab, Kristine Thomsen and Steff Elgaard Wiklund. We also thank Gry Barfod (AGIR and Urbnet, Aarhus University, Denmark), Jesper Olsen (Aarhus AMS Centre and UrbNet, Aarhus University, Denmark), Thomas Birch (UrbNet, Aarhus University, Denmark) as well as Stephen Merkel and Michael Prange (Deutsche Bergbaumuseum Bochum, Germany) for input on a variety of materials, which are currently undergoing further analyses but appear here in preliminary form. We would like to thank the director general of the Department of Antiquities, Dr. Monther Jamhawi, for authorizing the 2016 campaign and the director of the Department of Antiquities in Jarash, Ali Al Khayyat, for his and his staff's support during our campaign, as well as assistance in his capacity as representative. Furthermore, thanks go to our other representatives of the Department of Antiquities, Bilal Boreni and Iman Kuran, who were an invaluable help during our campaign. Many thanks also go to Christina Levisen and Eva Mortensen, who undertook extensive editing of this report, and to Dieter Korol for helping with the identification of some of the Late Antique architectural decorations.

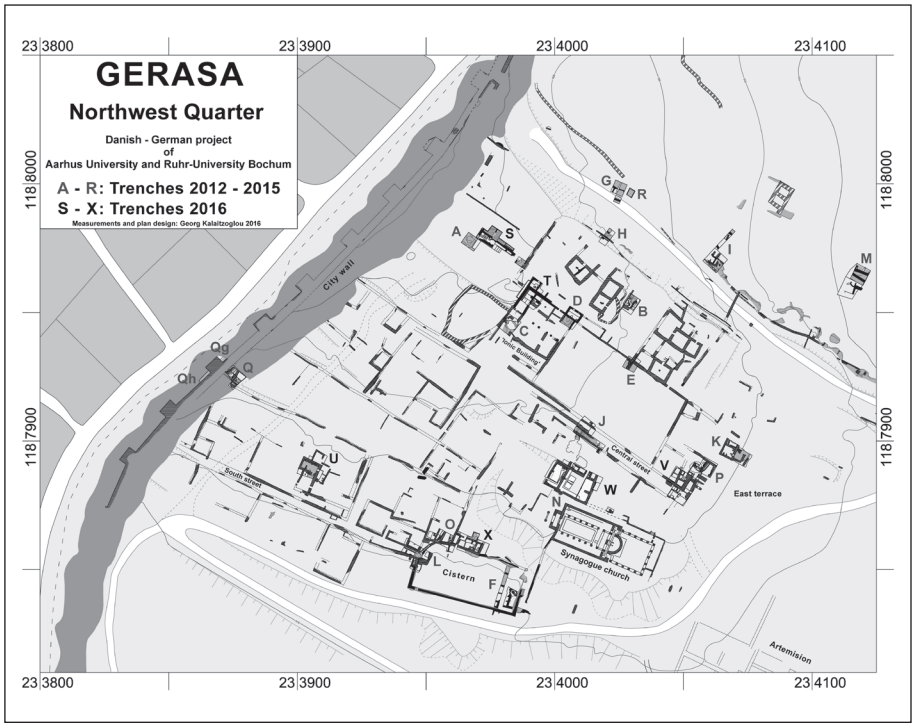
2017, 2021; Kalaitzoglou *et al.* in press). Next to Trench A, Trench S was laid out. Trench T was laid out across the north-west corner of the so-called Ionic Building to explore the construction history of this Middle Islamic house. Trench V, situated next to the Umayyad house in Trench P, excavated in 2015, continued the exploration of the so-called East Terrace in order to gain further insight into the ground plan of this building and investigate further destruction deposits of the earthquake of 749AD. With Trench X, located east of the house in Trench O at the north-west corner of the large multi-phase cistern on the southern hill-slope, the investigation of the relationship between the large water reservoir and this building was continued. On the southern hill-slope, Trench U was laid out above the ruins of a building north of the so-called South Street to allow further investigations of the settlement history between the Roman cistern and the city walls. Already in 2015, a hall with well-preserved mosaics had been excavated in Trench N, situated directly north of the so-called Synagogue-Church. With Trench W, the plan was to unearth most of the hall in order to gain more stratigraphic and chronological data for determining the relationship between this building and the church nearby, as well as the Roman cave complex situated immediately north of the hall (Trenches J and N).

In total, the six trenches, S to X (**Fig. 1**), covered an area of approximately 548m^2. Altogether, 168,428 finds (diagnostic as well as undiagnostic) were processed during the campaign. A collection is presented in the catalogue, including metal, architectural elements, stone artefacts, terracotta, jewellery, worked bones and pottery [a reference to the relevant catalogue number and plate is given whenever evidence is discussed in the text]. The material chosen for the catalogue includes finds that are important for the interpretation and characterization of the context, either because of their date of production or because of their function.

General Outlook

After the 2016 campaign, samples were taken to Denmark and Germany for further studies; among these were charcoal, mortar, glass and raw glass, pottery and tesserae. Furthermore, all coins found during the 2016 campaign as well as selected coins of the last years' campaigns were on loan for cleaning and further studies.

Elemental mass spectrometry and petrography was undertaken on various pottery samples, and these results – together with analyses done already in 2015 – will contribute towards a comprehensive understanding of the local and regional fabric compositions.



1. Plan of the Northwest Quarter with Trenches A-X (2012-2016).

Main Discoveries

One of the main discoveries of the 2016 campaign was a Roman-period cistern in Trench S. A contemporary building had stood on top of the cistern, and this – along with the cistern – was completely destroyed and intentionally backfilled at a later point in time. Neither the complete layout or function of the building nor the reason for its destruction is fully clear (Lichtenberger and Raja 2015b). However, the building seems to be a large monumental complex. Another important addition to our knowledge of the site was the discovery of a sediment basin in Trench X, north of the large multi-phase cistern, connected with the concrete floor already partly excavated in 2015 (Trench O). It is the oldest structure discovered north of the cistern, and was reused in Byzantine times as the floor of a later building.

Trench U on the south slope contributed insight into the extension of the Umayyad settlement in the Northwest Quarter. In contrast to the area next to the large multi-phase cistern where all the Byzantine buildings were destroyed and intentionally backfilled, it is now clear that parts of the settlement further east remained in use throughout the period until the earthquake of 749AD.

The continued excavation of the Umayyad courtyard house in Trench V on the east terrace uncovered the south-western part and entrance of this extensive Early Islamic building complex. The discovery of the first earthquake victim in the Northwest Quarter also counts among the finds. The remains of a young person, probably female, were found between large wallstones and collapsed soil close to the door inside the entrance corridor. Apart from this discovery, the destruction context offers insight into especially the pottery and other inventory immediately prior to the destruction caused by the earthquake in 749AD.

The excavation of the Mosaic Hall in Trench W, which consisted of two parts, provides additional information about the construction of the hall, Umayyad architectural changes and the effects of the earthquake on the building.

The excavated north-west corner of the Middle Islamic courtyard house in Trench T attests the multi-phase building history of this Middle Islamic edifice and will help to subdivide and refine the chronology of the material culture of the Middle Islamic period.

General Remarks on the Pottery

The 2016 excavations shed light on closed contexts, such as the destruction layers caused by the earthquake in Trench V or the Middle Islamic courtyard house in Trench T, which provide new data for the chronological series of pottery in Early and Middle Islamic times. This can now be related to a better understanding of changing dining habits, food-preparation and consumption patterns over the centuries [*cf.* also Trenches K and P from earlier excavations [Kalaitzoglou, Lichtenberger and Raja in press; Kalaitzoglou *et al.* in press)].

In the Roman to Early Islamic periods, Jarash was a pottery-production centre. The natural preconditions were favourable and ensured easy access to clay resources for the production of pottery in high quantity over the centuries. Since, in general, production was determined by functional aspects – especially if aimed mainly at the local or regional market – it was very standardized. After a functional shape was developed, hardly any changes were made over the following centuries. This is evidenced in Jarash. The local pottery production covers all groups: tableware, cooking and common ware as well as storage jars and amphorae with a very limited variation of types.

As already seen in previous years, imported pottery was rare in comparison with local productions. However, the few imported finds, regional and supra-regional, do offer insight into the exchange network of Gerasa/Jarash. The repertoire of the 2016 finds includes tableware, cooking ware and amphorae. Represented among the imported finds is African Red Slip Ware (**Pl. 4.27-28**), a tableware produced in the region of today's Tunisia, and – to a lesser extent – the Late Roman C Ware (LRC), which was made in Asia Minor at Phocaea (**Pl. 4.30-31**). One object found in the top soil of Trench S is unique: a cooking-ware lid (**Pl. 4.29**) of North African production. The export of African Cooking Ware was common in Late Roman and Byzantine times throughout the Mediterranean world. However, in Northern Jordan, finds are rare, and it is the first piece published from Jarash (Uscatescu 1992, 124-124).

Imported amphorae from Roman or Byzantine times are scarce compared to local ones found in this year's contexts. The locally or regionally produced bag-shaped types are common and occur in different variations (*cf.* **Pls. 11.63-65** and **12.66-67**).

One single find of an imported amphora in Trench W can be attributed to the Coan Dressel 2-4 production (**Pl. 13.71**). Byzantine/Early Umayyad finds such as the Late Roman 1 Amphora, probably produced in Cilicia or Cyprus (**Pl. 13.72**), demonstrate the connection between Gerasa and Eastern Mediterranean trade networks. Outstanding are the finds of the 749AD destruction layers in Trench V. At least ten bag-shaped amphorae (**Pl. 13.69-70**) were reconstructed. These were produced in one of the 8th century AD kilns in Egypt, probably along the Nile Valley (Dixneuf 2011: 149).

Roman-period material derives mostly from fill layers in Trenches S and W. The earliest finds are produced in the 2nd century AD. Roman-period material, however, is scattered all over the Northwest Quarter, and residual finds of Roman potsherds can be observed in much younger contexts as well. Several well-preserved cooking pots were found in Trench S (see **Fig. 6**; **Pls. 1.1** and **1.3-5**) (Lichtenberger and Raja 2015b).

Particularly in Trench V, but also in other trenches, sherds of the last occupation phase before the earthquake of 749AD were discovered (Lichtenberger and Raja 2015b). The destruction layers preserved the inventory of the buildings at the time of devastation, and the large amounts of pottery allow for analysis of the changes in production techniques and style in Umayyad times. Particularly noteworthy are new decoration patterns such as, for example, zig-zag patterns or a combination of incised zig-zag patterns and combed designed lines (*e.g.* **Pls. 5.37-38**, **6.39** and **9.54**). However, new developments in the production of very traditional types can also be traced, as in the case, for example, of large grey basins that are very common since Byzantine times. While the well-known productions survive, more developed types occur with a less elaborated rim and simple combed decoration (**Pl. 7.43-44**). The function of these large basins still remains unclear, but other vessels that can be clearly attributed to a specific use attest to new traditions of food preparation and dining habits. Stoves or braziers (**Pl. 5.37**), for example, document an elaborated way of cooking, and the existence of large "pans" or bowls documents changes in dining habits. Instead of using small plates, bigger bowls are used for eating (**Pl. 5.38**). Changes can also be documented in the production process itself: a new "red ware" occurs which is more intense in colour and points to a different firing technique (*e.g.* **Pls. 8.51** and **10.57-59**) (see Merkel and Prange in: Kalaitzoglou *et al.* 2021).

Middle Islamic (Ayyubid/Mamluk) sherds were uncovered especially in the Middle Islamic courtyard house in Trench T (**Pls. 14.73–78** and **15.79–84**). Noteworthy are well-preserved ovens (*tabuns*) of Middle Islamic times in the same trench (**Pl. 15.85**). The use of *tabuns* is common in the region and known from older evidences in the Northwest Quarter as, for example, one of Umayyad date found *in situ* in Trench X. It was made of a reused Grey Ware basin that was turned upside down in the ground (**Pl. 7.45**). The youngest pottery find is a fragment of a pipe from a top soil layer of Trench S (**Pl. 17.95**). It is the second Ottoman pipe found in the Northwest Quarter (Kalaitzoglou *et al.* in press).

Stratigraphy and Contexts

Trench S

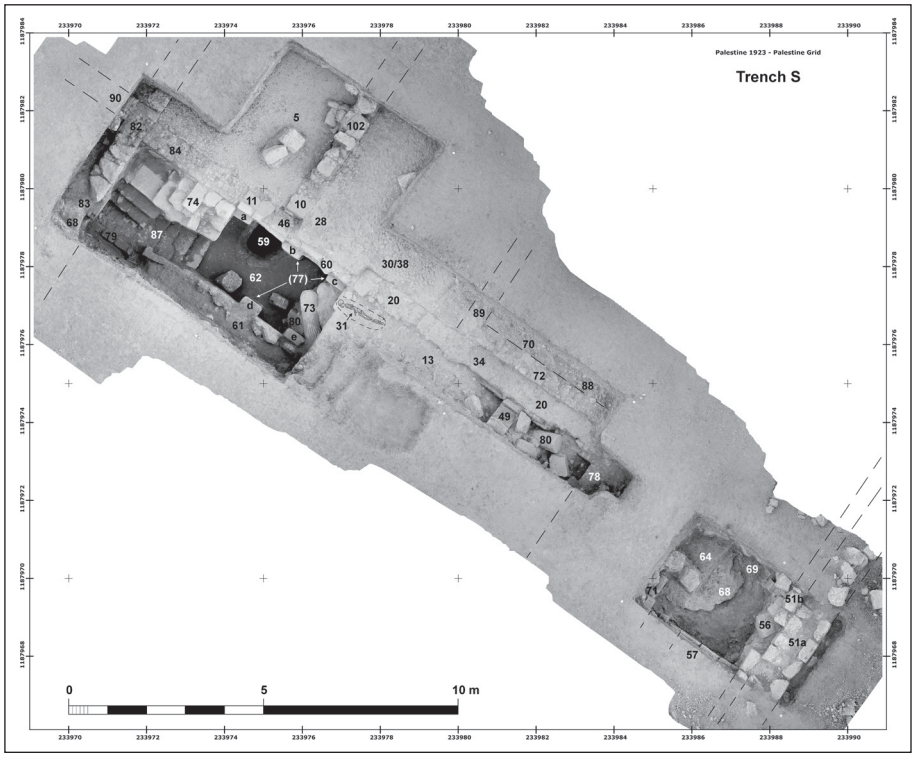
Trench S is situated on the hill-top plateau next to Trench A (see **Fig. 1**) [Trench supervisor was Max Herbst]. Trench A was excavated during the 2012 campaign. In Trench A, the southwest corner of a rock-cut room was found, which was systematically backfilled (Kalaitzoglou, Lichtenberger and Raja 2013: 58-63). According to the dating of several cooking-pot deposits in the fill and their radiocarbon dates, this filling took place in the later 3rd century AD (Lichtenberger and Raja 201b5). The aim of Trench S was to find the north-east corner of the structure and to clarify its function and potentially the reasons for the filling-in of the complex. What had initially seemed to be a simple room lined with mortar turned out to be a well-constructed cistern measuring 14.2m in length and 7.2m in width, with two chambers that were separated by a wall structure and supported by

arches (**Fig. 2**). While the cistern's state of preservation was good, the building above it was destroyed, and the building debris was used to fill the cistern in the process of closing it. The evidence from Trench S might modify the date of the filling, established in Trench A, since we cannot exclude the possibility that the closure of the cistern happened a century later, during the 4th century AD. A radiocarbon date from the cistern suggests that it was established, at the latest, during the 1st century AD, and this is an indication that the cistern is related to the roughly contemporary cistern on the south slope of the Northwest Quarter (Lichtenberger *et al.* 2015). Both cisterns might be related to the so-called Northwest Aquaduct, which was investigated by D.D. Boyer (Boyer 2016).

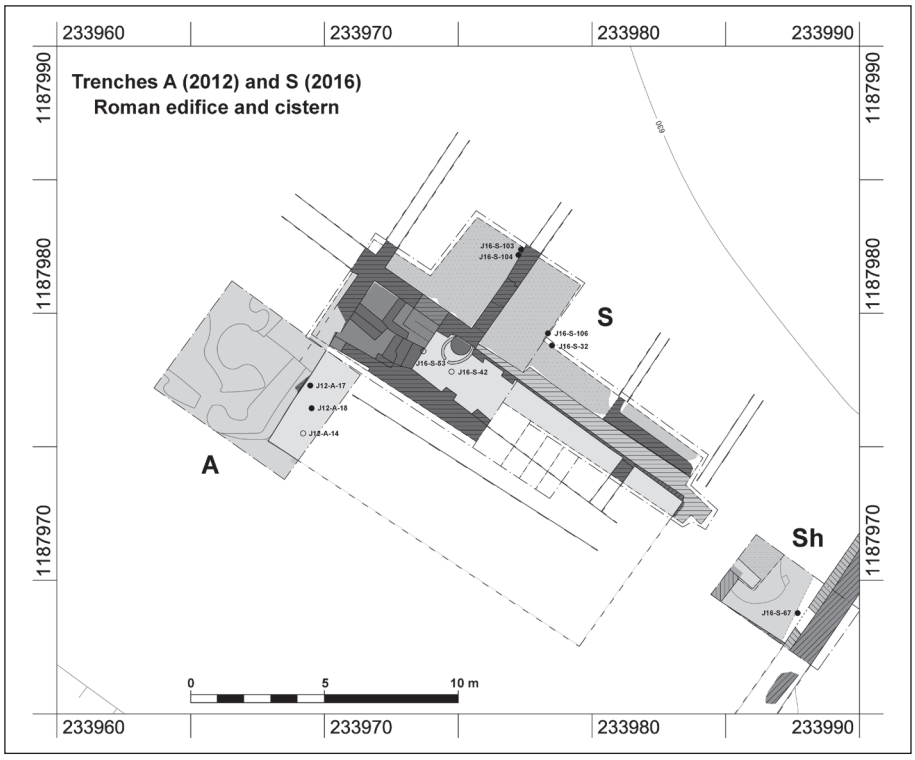
The Roman-Period Building with Cistern

Trench S yielded the remains of a monumental structure of Roman date, which consisted of a building and a cistern. The function of this prominent building, whose initial phase - according to radiocarbon data - dates to the 1st century AD [J16-Scd-59-5], has not been determined yet, but at one point during the later Roman period, this building was intentionally destroyed. The cistern had an elaborate entrance with a staircase leading down into it.

The excavated parts of the cistern were cut into the bedrock, and in its upper sections, its western (ev. 82), northern (ev. 11, 20, 60 and 84) and eastern sides (ev. 78) were stabilized by walls. Inside the cistern, an east–west-oriented wall structure (ev. 61) was located, which was connected with the western wall (ev. 82) and the bedrock (ev. 68), dividing the cistern into two compartments (**Fig. 3**). The northern compartment is 2m wide, whereas the southern compartment is between 4.0m and 4.3m wide. Pilasters (ev. 77a-e) constructed at regular intervals along the northern side of the cistern and the intermediate wall carried the roof of the cistern. An intact arch (ev. 49) in the eastern part of the northern cistern chamber and the remains of an arch (ev. 77c) attest that at least the northern chamber in the cistern was spanned by arches. The cistern was accessed by a staircase (ev. 74) located in the north-west corner, which turned ninety degrees halfway. The staircase led to a door that allowed access to the cistern (ev. 87). To the right of the staircase, a semicircular settling basin (ev. 59) was situated. The staircase and the door on the western side of the northern chamber show that the cistern could only have been filled with water up to a level below the threshold (ev. 87). The framing (ev. 79) of an opening, which was set



2. Trench S, excavated structures.



3. Trenches A and S, Roman edifice and cistern with cooking-pot deposits.

from the south against the staircase (ev. 74) and between the western bedrock (ev. 68) and the intermediate wall (ev. 61), thus lies above this maximum filling level.

The walls in Trench S did not only enclose the cistern but also served as the walls of the building, which was established above the cistern and extending further north. Since, in Trench A, no wall structures were found outside the cistern, it is probable that the building extended primarily north of the cistern. Since these walls were intentionally removed all the way down to their foundations, we rely on the remaining structures and the preserved concrete floors to establish the ground plan of the building above the cistern (**Figs. 2-3**). Distinguishable is a west room with a floor (ev. 5) between the walls (ev. 10/102, 82 and 11/84) (see **Fig. 2**). The room continues further north beyond the limits of the trench. The walls of the west room were not constructed directly on top of the cistern wall (ev. 20) but rest on a thin foundation of soil and small stones (ev. 46). Inside the room, a floor foundation (ev. 45) was laid, on which a mortar floor (ev. 5) was placed. The foundation (ev. 45) was set against both the wall foundation layer (ev. 46) and the walls (ev. 10/102 and 11/84). From this room, the cistern was accessible by a door in the middle of the southern wall (ev. 11/84). The lowest part of a door-frame preserved in the eastern wall (ev. 10/102) shows that the west room was accessible from the east. The mortar floor (ev. 5) was laid on top of the foundation layer (ev. 45) of soil and small stones. The wall (ev. 90), of which only a small part was excavated, proves that another room was situated west of this room. Not only the door in the wall (ev. 10/102) but also the limits of the floor (ev. 28) indicate that east of the west room, another room was situated, which extended to the east and north. Since the floor (ev. 28) was cut at the northern limit of the cistern during the destruction of the complex, and since the tops of the arches (ev. 49 and 77c) lie below the floor level, it is likely that the floor (ev. 28) once covered the eastern part of the cistern. Like the mortar floor (ev. 5) in the west room, also the mortar floor (ev. 28/30/38) of the east room rests on a floor foundation (ev. 33). This central room was delineated to the east by the north–south-running wall (ev. 89), of which only the mortar foundation (ev. 89) was preserved and against which the floor (ev. 28/30/38) [All three evidences belong to the same mortar floor. Ev. 28 is the smooth surface layer, ev. 30 is the middle layer with pebbles embedded into mortar, and ev. 38 is the mortar and stone underlay of the

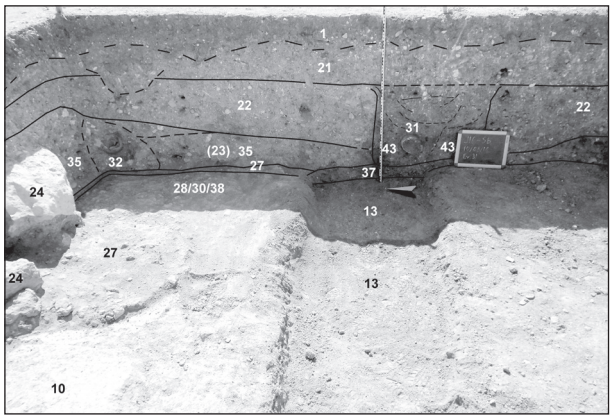
floor] was set from the west. East of this wall, another room was situated, which extended in a northerly direction. This eastern room was limited towards the south by the remains of the poorly built wall (ev. 72). Although this room is oriented parallel to the cistern, its southern limit does not reach the cistern. The central room therefore enclosed the eastern room, also from south. The south and west walls (ev. 72 and ev. 89) of the east room were constructed on top of a thin soil foundation (ev. 66), which covered the mortar layer (ev. 85) above the cistern's north wall (ev. 20). Inside the east room, the floor foundation (ev. 88) was set against the wall foundation (ev. 66) and the base of the wall (ev. 72). This floor foundation was covered by the underlay (ev. 70) of a floor that was made of mortar and soil. It ran against the underlay (ev. 38) of the mortar floor (ev. 28) in the central room. Since all the walls and floors rest on foundation layers, it is obvious that they are contemporary and built on an even mortar surface (ev. 34) that surrounded the northern edge of the cistern. However, since these foundation layers did not contain any finds, we await the dating of the charcoal samples to get a date for the construction of the rooms.

Aside from the well-constructed walls and compact floors, which were made of pebbles embedded into a hard mortar (ev. 30 and 38) and covered by a smooth mortar layer (ev. 5 and 28), only traces were found of the former interior of the building. In the north-west corner of the staircase (ev. 74), five layers of partly painted and unpainted wall plaster (ev. 75) were attached to the southern face of the wall (ev. 84). The use of wall plaster with a floral design in the entrance area of the cistern suggests that the building was elaborate, and that the cistern did not purely serve a functional purpose. This is underlined by a column drum (ev. 73) found in the cistern fill, which was lined with stucco and decorated with spiral fluting, as well as several fragments of stucco profiles (ev. 54). Although only the cistern and parts of the connected building were unearthed, it is obvious that the complex was not a simple house.

Since the building was destroyed and deliberately sealed, primary datable finds that can be connected directly with the Roman building are not at hand. A selection of exclusive finds (**Pl. 20.111-114**) found in the fill (ev. 13/105) at the top of the stairs could stem from the original house inventory, but these were without doubt thrown into the cistern at the time of the closing of the complex. However, at least the dating of the destruction and the backfilling of the cistern provide us with a *terminus ante quem* for the cistern complex.

The Destruction of the Roman Cistern Complex

The destruction of the Roman building with the cistern was intentionally and systematically undertaken. All the walls closest to the cistern seem to have been completely dismantled, and some of the stones were thrown into the cistern. Of the wall (ev. 10), only the lowest course of stones remained in place at the northern end of the trench. With the exception of single stones and limited concentrations of smaller stones (ev. 25 and 36), no accumulation or layers of debris were detectable on top of the room floors (ev. 5 and 28). However, the composition of the cistern fill suggests that beside the debris of the building, other material was also used to fill the cistern. Most of the homogeneous filling material consisted of a brownish soil (ev. 13) [Ev. 8, 17 and 37 and the eastern part of ev. 105 are the same and belong to this brownish fill. It is the same brownish fill material that in 2012 in Trench A was labelled ev. J12-A-6, J12-A-10, J12-A-16, J12-A-19 and J12-A-22] mixed with larger and smaller construction stones (ev. 80), stones of the arches as well as architectural elements such as the column drum (ev. 73). A thick layer of small- to medium-sized and mostly rounded stones (ev. 14) that hardly contained any soil covered this fill layer [In Trench A, this concentration of backfilled stones was labelled ev. J12-A-13]. Above this stone fill, additional layers of brownish soil were deposited (ev. 8, 13, 15-19, 27 and 37), of which ev. 27 and 37 also covered the southern parts of the Roman floors (**Fig. 4**). These fill portions were of a brighter colour, because the soil was mixed with the mortar of the removed walls. The remains of the building north of the cistern and parts of the cistern fill were then covered by additional fill layers. The western part was covered with a thick layer of yellowish and clayish soil (ev. 4) mixed with pieces of mortar and wall plaster, whereas the area east



4. Trench S, fill layers and deposits above the cistern, view from the west.

of the wall (ev. 10) was covered with a layer of greyish soil (ev. 35) mixed with smaller stones and pieces of mortar. Neither the brownish soil nor the small- to medium-sized stones stem from the construction material of the Roman building.

The dating of the filling activity has been done with reference to several independent criteria. The backfill (ev. 13) contained, aside from some building ceramics (tiles: **Pl. 18.96-99**; tubuli: **Pl.** 19.105-106; chimney: **Pl.** 19.108), mainly pottery of Roman to Late Roman date (**Pl. 3.21**) as well as some Roman to Late Roman lamps – some intact, some broken (**Pl. 16.86-88**). Only four underweight coins (minimi) were found, also Late Roman in date [The find numbers are J16-Sa-13-41, J16-Sc-13-8-9 and J16-Sc-13-16]. Embedded into this fill were the base of a Roman cooking-pot (ev. 42) and a complete cooking pot (ev. 53) **Pl. 1.5**), also of Roman or Late Roman date. Especially the last one resembles the shape and type of the deposited cooking pots found in 2012 in the same fill of Trench A (Kalaitzoglou, Lichtenberger and Raja 2017; 36-37, figs. 96-97). From the fill (ev. 13), several radiocarbon dates were extracted, and they allow a date in the 3rd to early 5th century AD. The upper smaller fill portions (ev. 15, 16, 17, 18 and 19) contained only small and non-diagnostic sherds and some fragments of wall plaster (ev. 12).

Regarding the date of the filling of the cistern, two interpretations are possible: one interpretation takes ev. 13, which dates to the 3rd century AD, as the date; the other privileges the layers on top of ev. 13, which hint at a 4th century AD date. These layers are either the upper fill of the cistern or a second phase of post-cistern use.

In ev. 8, which belongs either to the upper part of the fill (ev. 13) or to the second phase, apart from some pottery fragments, two Late Roman coins were found [J16-Sa-8-1x is a Late Roman bronze coin (AE3), and J16-Sb-8-13 is a Maiorina of Constantius Gallus minted in Siscia (351-354 AD)]. The following evidence also belongs either to the upper fill or to a second phase: the fills (ev. 37, 27 and 35) form a sequence, and from the northern part of the cistern, they reached in a northerly direction, stretching across the cistern (**Fig. 4**). Ev. 37 contained only non-diagnostic sherds and coins. The thin fill layer (ev. 27) covered the Roman mortar floor (ev. 28) and contained mostly small and non-datable sherds, except one Cententionalis of Constantius II (J16-Sb-27-1x) that was minted between 337 and 361 AD. Above this layer, an open fireplace (ev. 26) was found.

In the eastern part of the trench, the fill layer (ev. 35) was the last portion of the fill that covered the fireplace, the cistern fill and the remains of the walls (**Fig. 4**). It contained smaller and bigger sherds of Roman to Late Roman date and a fragment of a Grey Ware basin, which obviously is an intrusion from the overlying younger fill layer (ev. 22). In the west room, the fill (ev. 4) covered the floor (ev. 5) and filled the space between the walls. In addition to some non-diagnostic sherds and two broken vessels (ev. 103 and ev. 104), it contained large amounts of plaster, mortar and tesserae.

According to the dating results in Trench S and in Trench A, the destruction of the building and the filling of the cistern most probably took place in the 3rd or the 4th century AD. The date depends on whether the upper fill layers and the fireplace belong to the original closing phase of the cistern, or whether they belong to a second phase after the cistern had been already closed.

Cooking-Pot Deposits

In the fill layer of Trench A, several cooking-pot deposits were found. The intentional deposition of cooking pots in Trench S differs from the situation encountered in Trench A (Lichtenberger and Raja 2015b). In the fill (ev. 13) of the northern cistern chamber, cooking-pot

deposits are lacking (see **Figs. 3** and **6**). Although a small Late Roman cooking pot (ev. 53) (**Pl. 1.5**) was found between two large blocks next to the staircase (ev. 74), its position and the fact that it was empty attest that the cooking pot was simply thrown into the fill. A similar interpretation is possible for a cooking-pot base (ev. 42) that was filled with ashes and found in the undisturbed fill (ev. 13) between the pilasters (ev. 77b and 77d). In this case, it is more likely that the broken part of a used cooking pot was thrown into the fill than the bottom of a vessel only was deposited. In the backfill outside the cistern, however, cooking-pot deposits are well attested. In the baulk next to the corner of sectors b, e and j, two cooking pots (ev. 32/48 (**Pl. 1.1**) and 106 (**Pl. 1.3**)) were found in close proximity. The pots were positioned upright in a pile of stones that was surrounded by the fill (ev. 35) (**Fig. 4**). The deposited Roman cooking pot (ev. 67) either belongs to the backfill deposits, or it was placed in a foundation fill above the bedrock. Although only a limited area was excavated outside the cistern, the spatial distribution of the deposits seems to indicate that the water reservoir, in addition to the deposits found inside, was also encircled by vessel deposits from outside during the backfilling.

The Islamic Burial

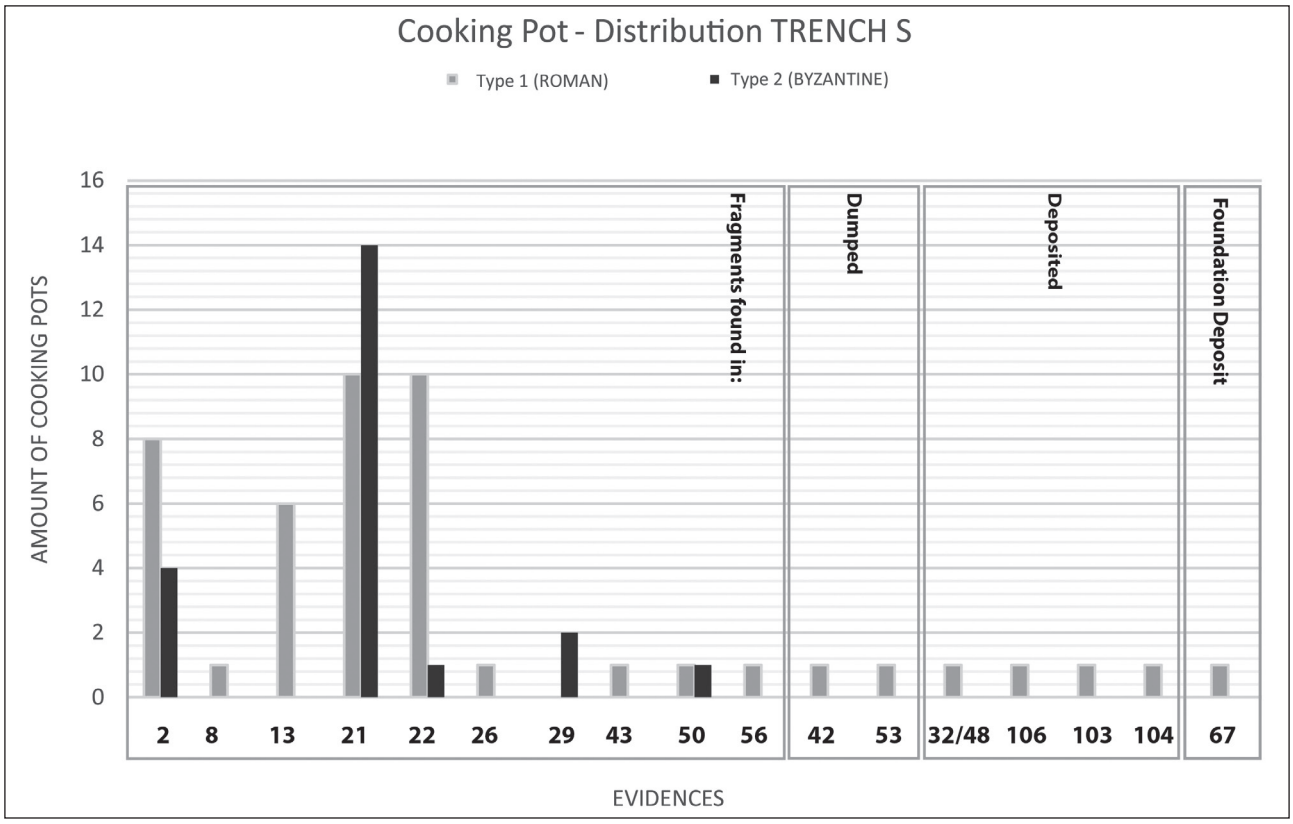
The fill layers (ev. 4 and 35) must have covered the cistern for a while prior to further activities. Stratigraphically, the next context is the fill layer (ev. 22) through which a pit was later dug, and a burial (ev. 31) was placed into the Late Roman fill (ev. 35) (**Fig. 4**). The burial is an inhumation of a young female lying on her right side and facing south, indicating that this was an Islamic burial (**Fig. 5**) (Eger 2015: 255-261, esp. 261). Apart from the bones, only a simple earring made of copper was found in connection with the body. The pit that was excavated for the inhumation was more than twice as wide as the body, and it was filled with a mixture of soil, mortar and small stones (ev. 43), which functioned as bedding for the body (**Fig. 5**). The body was sunk into this bedding (ev. 47) and covered with the previously excavated soil. The upper limits of the burial pit were invisible, whereas its horizontal extension was clearly indicated by the compact bedding (ev. 43), which also covered the cistern fill (ev. 37). Since both the Late Roman fill (ev. 35) and the bedding (ev. 43) were covered by the layer (ev. 22), it is most probable that the grave was excavated from the top level of the layer (ev. 22). The covering layer (ev. 22) is an almost 40-cm-thick fill that covers the entire area around the cistern. A Late Roman Amphora 1 (similar to **Pl. 13.72**) and fragments of Grey Ware basins attest that this layer already contained Umayyad material. The long time span between the Late Roman filling activities and the burial must have affected the surface and upper part of the fill (ev. 35), but in the contact zone between the Late Roman fill and the younger fill, a clear boundary was not detectable. The dating evidence inside the burial pit is sparse, because the bedding layer (ev. 43) contained only a few sherds of Roman to probable Byzantine date. The thick layer (ev. 21) above ev. 22 is mixed, and - if not disturbed - was deposited in modern times, as evidenced by a glass marble found in it. Above this follows only the surface layer of the modern soccer pitch. The exact date of the Islamic burial remains unclear. Until 749AD, this area was clearly intramural, which makes it more probable that the burial post-dates the earthquake. Therefore, at this point, it is more likely that the burial is of Middle Islamic date and related to the adjacent Middle Islamic hamlet.

Sector h

Sector h was initially excavated in an attempt to find the north-east corner of the Roman cistern, but later – in this sounding of about 15m^2 – multiphase structures were unearthed which



5. Trench S, sector e, Islamic female inhumation (ev. 31) above the cistern fill, view from the south.



6. Trench S, graph of the cooking pots and cooking-pot deposits.

spanned the time from the Late Roman to the Umayyad periods (see **Figs. 2-3**).

Phase 1 (Late Roman)

The oldest structure discovered in Sector H is an east–west-running wall (ev. 57) that was built on top of and partly against the bedrock (ev. 68). This wall extends beyond the western limits of the excavation square. Whether it also extended much further east is not clear but depends on the dating of the quarry works that were detected all over this area, leaving steep steps in the lower terrain east of the wall. If the wall is older, it could have extended further east; if it is younger than the quarrying, it should have stopped at the point where the Byzantine retaining wall (ev. 51a) began, and we have to assume that the wall (ev. 57) was set against a similar Late Roman retaining wall. Since the eastern part of the trench was not excavated down to bedrock, this remains unsolved. A door or just an opening in the western part of the wall (ev. 57) seems to have been closed in a later period – or perhaps, it was destroyed when the area was backfilled. The relative date for the wall (ev. 57) is indicated by the younger walls, which were either built against it or cover it in places. An approximate date is given by the foundation deposit of a Late Roman cooking pot (ev. 67 (**Pl. 1.4**) in the fill (ev. 65). This fill covered the bedrock (ev. 68) as well as pockets of residual clay (ev. 69) and served as the foundation of the mortar and soil floor (ev. 64). However, it also protected the base of the wall (ev. 57). The fill (ev. 65) is therefore contemporary with the construction of the wall (ev. 57), and both belong to the same Late Roman construction phase in which the floor (ev. 64) was installed. The layout and function of this Late Roman room could not be clarified, but it is obvious that it did not belong to the older Roman cistern complex.

Phase 2 (Late Roman or Early Byzantine)

In a later phase, when the wall (ev. 57) was still standing and the floor (ev. 64) was still intact, a short north–south-running wall (ev. 71) was built into the room. This wall does not continue further north, but was set against the northern face of the older wall (ev. 57) and could thus have been part of an added room, or the southern wall of a door giving access to the west. Since no younger floor was found, the

floor of the earlier phase (ev. 64) was used in this phase as well. There are no finds connected with this building phase that help us to specify its date or function.

Phase 3 (Byzantine)

In this phase, the area was considerably altered and the north–south-oriented, two-faced terrace wall (ev. 51a) was installed. Whether this wall covered or replaced an older terrace wall has not been clarified, as it has not been possible to excavate the area where both the fill (ev. 65) and the floor (ev. 64) meet the wall (ev. 51a), without removing the younger wall (ev. 51b). Since the two-faced retaining wall (ev. 51a), however, was built against and on top of the remains of the wall (ev. 57), the fill (ev. 65) as well as the floor (ev. 64) must have been cut when it was built. The function of this more than 25m-long wall was to establish a terrace and to retain the higher area west of it. This was necessary, since the bedrock east of the terrace lies some 3.5m deeper (see **Fig. 1**). The steepness of the terrain was most probably caused by the open quarry work, which underlay the younger structures on the hilltop. A possible reason for the construction of this terrace wall is the establishment of the more than 70m-long, rectangular building complex located south-east of the terrace (see **Fig. 1**). The results of Trenches C, D, E, J and T attest that this complex was built in the Byzantine period and was in use until the earthquake of 749AD.

The west side of the terrace wall was first filled with a backfill and foundation layer (ev. 56), which covers the floor (ev. 64) and also contained debris and larger stones - like a cubic marble block (ev. 63). On top of this, another layer (ev. 50) was deposited in order to fill and level the area west of the terrace wall. Ev. 50 consists of a looser, brownish soil but contains larger stones as well. Both layers were laid against the back of the terrace wall (ev. 51a). The two-part division of the terrace fill west of the wall (ev. 57) seems to correspond with the two succeeding fill layers (ev. 22 and 21) above the cistern. However, the composition and dating of the layers show that only the upper layer (ev. 50) corresponds with the lowest post-Roman layer (ev. 22) above the cistern, and that the lower foundation fill (ev. 56) did not reach the area around the cistern. The finds in this layer (ev. 56) are chronologically homogeneous and stem from the Byzantine period. The covering fill (ev. 50) holds more and mixed finds ranging chronologically from Roman to Late Byzantine/Umayyad times. The top of the upper fill (ev. 50) was disturbed, firstly, by the construction of the younger wall (ev. 51) and, secondly, by modern soil movements associated with the installation of the soccer pitch.

Phase 4 (Umayyad)

In this phase, an additional wall face (ev. 51b) was built into the upper part of the terrace fill (ev. 50) against the Byzantine terrace wall. Finds from the upper part of the terrace fill (ev. 50) suggest that this took place in Umayyad times. Of this wall, only the lowermost stone course was preserved, and it follows the visible part of the Byzantine terrace wall. Both walls were covered by top soil (ev. 1), which is contaminated by modern objects down to the top of ev. 50.

Correlating the results in both parts of Trench S, it is obvious that the area above the covered cistern was not occupied by building structures in a later period, and that the accumulation of post-Roman fill layers in the cistern area was caused indirectly by the construction of the large, rectangular Byzantine building complex, which required the construction of the terrace wall (ev. 51a) (see **Fig. 1**).

Trench T

Trench T was laid out across the north-western corner of the so-called Ionic Building. This building is an almost square courtyard house constructed in Middle Islamic times above the ruins of a Byzantine-period complex (see **Fig. 1**) [Trench supervisor was Jesper Vestergaard Jensen. The trench covers about 80m^2 in total]. The trench included interior parts of the building as well as exterior areas in order to examine remains of the Middle Islamic phase and the remains of the earlier complex, which is known to have been located here from earlier years' excavations (**Fig. 7**).

The Ionic Building was roughly rectangular, measuring 23.4×19m. It formed the main feature of a Middle Islamic hamlet in the centre of the Northwest Quarter (Kalaitzoglou, Lichtenberger



7. Trench T, excavated structures.

and Raja 2013; 2017). The Byzantine complex was a large, rectangular structure (75×35m), the exact function of which is not determined yet. The complex had been partly reused in the Umayyad period and was destroyed by the earthquake of 749AD. The main aim of Trench T was to further investigate the date and the function of the Middle Islamic house.

Earlier years' excavations had included Trench C, in the south-western corner of this building, which was explored in 2012 (*e.g.* Kalaitzoglou, Lichtenberger and Raja 2013: 68-75, figs. 15-21). The Middle Islamic structures in this trench had already been partly destroyed by illicit excavations, which had led to almost all remains of younger phases being removed. A circular bottle-shaped cistern and some structures of Byzantine to Umayyad date remained intact, but these had been excavated and backfilled already in Middle Islamic times. Therefore, both the older Byzantine to Umayyad and the younger Middle Islamic remains in Trench T should provide us with sufficient data for a closer dating of the occupation phases. Trenches C and D, excavated in 2013, covering the north-eastern and south-western corners of the same building (Kalaitzoglou, Lichtenberger and Raja 2017), had added important knowledge of both phases.

North of the northern wall, an undisturbed kitchen room was excavated, which dates back to the Byzantine period and was destroyed by an earthquake in Umayyad times. Inside the limits of the courtyard house, the remains of this earlier phase were destroyed and removed to establish the later Middle Islamic house. Above a deliberate backfill, two succeeding levels of simple clay

floors were detected in Trench D, but they were partly lost due to erosion. The finds associated with these floor levels were therefore too scanty to establish a clear chronological sequence, but it was, nonetheless, obvious that this building had gone through several alterations over time. The new Trench T was therefore laid out to contribute to our knowledge of the Middle Islamic phases and deliver further information about the older Byzantine and Umayyad phases.

Building Phase 1 (Byzantine to Umayyad)

In sector b, immediately north of the Middle Islamic courtyard house, an additional small room was found, which measured 3.6×3.1m. Since no walls were detected leading west, neither from this room nor from the long west wall (ev. 2), it is apparent that the western end of the huge Byzantine complex had been reached. The existence of another room, situated east of the north-west room, is indicated by the door (ev. 63) in the eastern wall (ev. 62) of the excavated room and by an additional north–south-oriented wall at a distance of 3.75m (see **Figs. 1** and **7**).

Excavation of Trenches D and E had already shown that the north side of the more than 70m-long complex was flanked by a row of smaller rooms. Although excavation did not go beyond floor level, it is probable that the north-western room was also constructed on top of worked bedrock that relates to an older stone quarry. The room was delineated by four walls, with a thickness of between 0.5-0.6m. The southern wall (ev. 3a) of the room is an extension of the long, but relatively narrow, north wall (0.7m) of the entire complex (**Fig. 1**). This wall is in line with the sections already unearthed in Trench D (ev. J13-D-5) and Trench E (ev. J13-E-2a). The west wall (ev. 28) and the east wall (ev. 62) of the north-western room were probably built against this wall. It was not clarified whether these walls bind into the south wall (ev. 3a), because the areas in which these walls meet the southern wall were covered by a younger wall (ev. 3b) and were therefore not excavated. However, the north wall (ev. 61) binds into both walls, suggesting that the room was constructed in a single event.

Two doors were found: a door (ev. 65) with a threshold (ev. 77) was situated in the eastern part of the northern wall (ev. 61), and a second door (ev. 63) was positioned in the southern part of the eastern wall (ev. 62), giving access to the room located eastwards. Both doors opened to the south, to the inside of the room. As in Trench D, there was no connection between the rooms north of the long wall and those south of it. Associated with this room was a mortar floor (ev. 76) and some stone steps (ev. 78), both set against the threshold of the northern door. Since the floor (ev. 76) was set against both the stone steps (ev. 78) and the threshold (ev. 77), the flooring must belong to the last phase of the room. Since the excavation did not go further down inside the room, it is unclear whether or not the mortar floor (ev. 76) covers an older floor. However, also in the kitchen in Trench D, only one floor was found above bedrock.

Compared with the kitchen in Trench D, the north-western room was about 1.7m shorter but extended about 1m further to the north. No window was found in this small room, which was built against the northern wall (ev. 3a) of the huge complex. Together with the adjacent room, a unit of two rooms of about 8.5m in length was once situated at the north-western end of the complex. It is obvious that, although the small rooms were set out in a row along the north wall of the complex, the rooms varied in their dimensions and did not, in their original shape, make up an even north façade.

At its western end, the north wall (ev. 3a) formed a corner with the wall (ev. 2). This wall was much thicker (approximately 1.05m) and constituted the western boundary of the complex, continuing for at least 26m to the south [In Trench C, this wall rests on bedrock, and in the 2012 campaign, it was labelled ev. J12-C-54a]. Inside the complex, only few traces of Byzantine structures were discovered; all remaining walls and floors seem to belong to the Middle Islamic building phases. At a distance of only 1.45m and parallel to the north wall (ev. 3a), the remains of a 1.0m-thick wall (ev. 68 and 82) were unearthed. This wall was covered by the younger wall (ev. 4), and its western continuation was cut at some point, so that it does not meet the west wall (ev. 2). Although this wall continues further to the east, below the Middle Islamic structures, it is not possible to determine what kind of room or structure this massive wall belongs to. The distance of only 1.45m between the wall (ev. 68/82) and the northern wall

(ev. 3a) points to this having been a corridor between the two walls. A row of square beam supports found in the southern face of the north wall (ev. 3a) must have belonged to a second floor inside the building, since they are placed too low to correspond with the Middle Islamic floor levels. However, no finds were related to this first building phase, but the condition of the walls and the alterations and overlying layers prove that this building complex was in use until it was destroyed by a heavy earthquake, probably the earthquake of 749AD.

Building Phase 2 and Earthquake Destruction (Umayyad)

The only discernable alteration in the second building phase is the construction of a wall (ev. 81) blocking the eastern door (ev. 63) of the north-western room. Thereafter, the neighbouring room was not accessible from the north-western room. This leads to the conclusion that the neighbouring room had a northern or an eastern door leading outside or into another room further east. The floor (ev. 76) was still in use when the rooms were separated.

This building phase was destroyed by an earthquake. This explains why the walls are in bad condition and bulging in a south-eastern direction. The thin soil layer (ev. 75) covering the floor (ev. 76) contained a mixture of fragmented pottery sherds ranging from Roman to Byzantine/Early Umayyad date, including an imported Late Roman C bowl of 5th century production (**Pl. 4.30**), late Byzantine/Early Umayyad basins (**Pls. 5.36** and **6.41**) and two intact Jarash lamps of 6th/early 7th century production (**Pls. 16.89** and **17.92**). The late Byzantine to Umayyad date seems to correlate with the finds from the thick debris layer (ev. 72) of compact yellowish soil (ev. 72) and tumbled stones (ev. 80). In this undisturbed debris layer, fragments of tableware, cooking and common ware, and transport vessels were found, all Umayyad production. It is therefore likely that this part of the building was destroyed in the earthquake of 749AD.

Building Phase 3 (1st Middle Islamic Phase)

Several hundred years after the earthquake, a large square courtyard house (the Ionic Building) was constructed over the ruins. For the construction of this 23.4×19.0m building, the terrain was cleared and levelled, and new walls were constructed to support the reused older walls and create the new interior rooms. Against the old north wall (ev. 3a), a new and slightly thinner wall (ev. 3b) was set against the wall from outside. It covered the joins of the older room walls (ev. 28 and 62) with the older north wall (ev. 3a). Although such an additional wall is lacking in Trench D, a similar situation was encountered further east in Trench E where, in Middle Islamic times, walls were set against and on top of older walls (see **Fig. 1**) (see the preliminary field report of the 2013 season: Kalaitzoglou, Lichtenberger and Raja 2017). At a distance of about 3.5m east of the west wall (ev. 2), the long wall (ev. 4) was built, running from the south against the older north wall (ev. 3a), which formed the inner wall face of the new massive north wall. Although the wall (ev. 4) looks like one of the oldest structures, it does not belong to the Byzantine phase because, in Trench C, the same wall rests on a fill above bedrock and older structures (*cf.* Kalaitzoglou, Lichtenberger and Raja 2013: 72, figs. 19-20, ev. J12-C-15). Between the west wall (ev. 2) and the newly built wall (ev. 4), a long rectangular room was created along the western side of the house, with a length of 9.3m and a width of 3.4m. The length of the room is given by a wall with a door south of the trench, which connects the walls (ev. 2 and 4). In the middle of the east wall of the west room, a door (ev. 8) with a threshold (ev. 73) was built, which opens into the room. This seems to be the layout of the north-west corner of the house in the first Middle Islamic building phase, and it corresponds with the elongated room already excavated on the opposite side in Trench D (see **Fig. 1**). Associated with these structures is a thin mortar floor (ev. 71) inside the oblong east room, which was set against the threshold. The older wall (ev. 68/82) was not completely removed or cut down to floor level, but it was built over by the wall (ev. 4) (see **Fig. 7**), indicating that this wall was planned to be integrated into the new ground plan – probably as a boundary, separating a small northern compartment of 1.36m in depth from the rest of the long room.

Outside the building, three different parts of a single walk-on level were found. Immediately

west of the house, this compact yellowish soil layer was identified and labelled ev. 54 and 55. North of the building, this layer lies at a slightly higher level – above the capstones of the Byzantine/Umayyad north-west room – and was heavily destroyed by the stone debris of the abandonment deposits that accumulated on top of the walk-on level. It is likely that the levelled walls of the older rooms served as retaining walls for the new walk-on level that was installed along the sloping northern side of the courtyard house. However, two *tabuns* (ev. 27 (**Pl. 15.85**) and 39) installed on top of each other, on top of the deliberate fill consisting of stones (ev. 79) and soil (ev. 35), confirm that the top of this underfloor terracing (ev. 35) marked the walk-on level in this area, above the ruins of the Byzantine north-western room (see **Fig. 9**). Furthermore, the later *tabuns* attest that the same walk-on level was in use throughout the Middle Islamic phase.

The layout of the first Middle Islamic building phase east of the long west room is unknown, since this area was not excavated down to bedrock, in order to preserve the younger structures. Nevertheless, the excavation in Trench D proved that, on the eastern side of the house, a similarly elongated east room was situated (see **Fig. 1**). This suggests, for the courtyard house, a more or less symmetrical ground plan in its original layout.

The dating of this layout relies on the finds belonging to the construction fills, which were uncovered exclusively outside the house, above the Umayyad destruction deposit (ev. 72/80) and inside the house under a later kitchen east of the elongated west room. The bulk of finds in the terracing deposit (ev. 35) inside the older north-west room are Umayyad but also include an earlier Byzantine and one Late Roman coin. A concentration of pottery (ev. 66) was embedded into the fill (ev. 35) and exclusively contained sherds of Umayyad date (**Pls. 1.8**, **2.13**, **10.56** and **10.59**). A large fragment of Handmade Geometric-Painted Ware (HMGPW) in ev. 35 (**Pl. 15.81**) shows that this backfill was brought in only in Late Ayyubid to Mamluk times.

Inside the house, a terracing deposit was only reached east of the wall (ev. 4) and below the floor-foundation fill of the later kitchen in the east room. Also this fill (ev. 52) held a mixture of older and younger finds – for example, a metal hook with the remains of a chain (**Pl. 23.139**), but the youngest objects are three painted Middle Islamic sherds datable between 1250-1300AD and 1300-1400AD (**Pls. 14.75** and **15.80**).

Building Phase 4 (2nd Middle Islamic Phase)

Characteristic of the second Middle Islamic building phase is the alteration of the interior layout of the Ionic Building. The floor level inside and outside the elongated west room was raised about 0.45m. Above the fill layers (ev. 70 and 67) and the concentration of larger stones (ev. 74), a thin mortar floor (ev. 64) was constructed. In the door, the fill layer (ev. 69) covered the threshold to the same level. This considerable lifting of the floor level necessitated a remodelling of the door opening, which was now too low in height. As it was impossible to raise the door lintel, the entire wall (ev. 4) had to be made higher which – in turn – would have necessitated the lifting of the roof. Thus, the installation of a higher floor level in the west room points to an extensive reconstruction of at least the western part of the house. Since the area east of the wall (ev. 4) was not excavated to a corresponding level, the extent of this reconstruction remains unclear. However, a remodelling of this area is highly probable because the new floor level extended above the fill (ev. 69), also in an easterly direction. This must have caused the same problem of raising the threshold and lintel levels in the adjacent doorways.

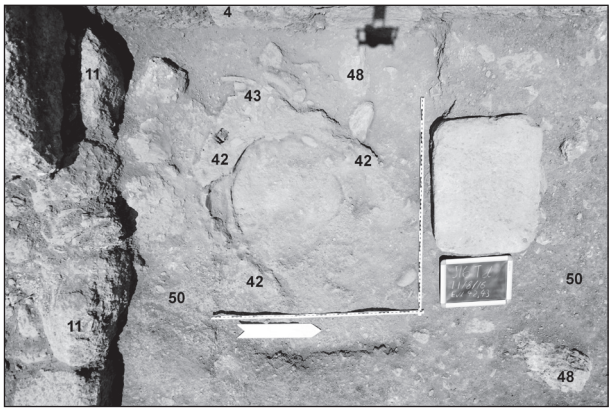
The bad state of preservation of the threshold (ev. 73) in the door (ev. 8) seems to indicate that it was used for a fairly long time prior to the reconstruction. The thin fill layer (ev. 70), which covers the older mortar floor (ev. 71), contained only older objects of Late Byzantine to Umayyad date, but the covering fill (ev. 67) held a fair quantity of Middle Islamic pottery whose youngest date is probably early Mamluk (**Pl. 14.78**) [apart from Roman to Umayyad pottery and a few Late Roman coins and some jewellery (see **pl. 22.124**), the excavated part of the fill contained seven painted, one green-glazed, 26 slipped unpainted Middle Islamic sherds and one fragment of a storage jar].

Building Phase 5 (3rd Middle Islamic Phase)

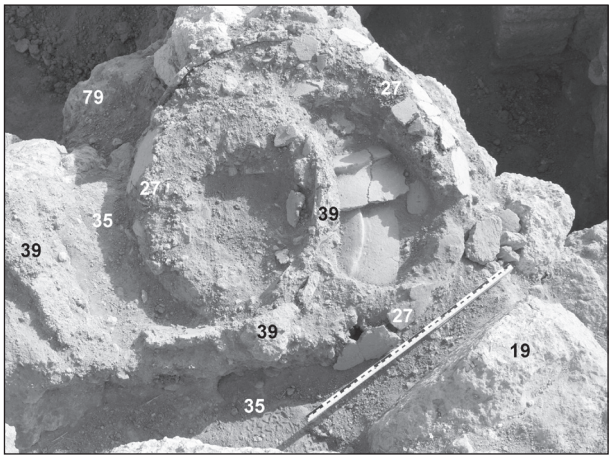
In this phase, further massive alterations of the interior layout of the house took place. Of these activities, more evidence is detectable in the west room, such as the raising of the floor level by another 0.4m, connected with the installation of a new threshold in the door (ev. 8) as well as the construction of a bench along the west wall (ev. 2). East of the west room, a new room was established with a high floor level, which served, most likely, as a kitchen. South of it, a hallway was established with a walk-on level corresponding to the floor level inside the west room.

The building sequence can be described as follows. First, into the door (ev. 8) and into the upper part of the earlier floor (ev. 64), a long rectangular stone (ev. 36/58) was set, which served as the new threshold of the door. On top of the older floor, a stone foundation was placed, and on top of it, a bench-like structure (ev. 24) was built along the inner side of the west wall (ev. 2/6). The bench was not built with massive masonry, but the approximately 0.2m wide gap between the bench and the wall was filled with soil and small stones (ev. 25). The interior of the room was then partly filled (ev. 60), and stone steps (ev. 38) were set against the new threshold (ev. 36/58). The backfill (ev. 60) served as a foundation layer for the new, compressed clay-soil floor (ev. 37), which covered the Byzantine wall (ev. 82). The area east of the west room seems to have been excavated down to the deliberate fill (ev. 52), and then the area was also covered with a layer of soil (ev. 50) and stones (ev. 48 and 51), on top of which a thick wall (ev. 11) was built. The wall (ev. 11) is about 3m long and up to 1.1m thick and is set from the east against the northern side of the door (ev. 8) in the wall (ev. 4). It forms the southern boundary of a new room established north of it. Between the eastern end of the wall (ev. 11) and the north wall (ev. 3a), a wall (ev. 57) just 0.45m thick was constructed, which forms the eastern limit of the room. Of this wall, only the lowermost course of stones was preserved, but it is most likely that a door was situated close to its northern end. Although south of the new east room, above the fill, a simple clay floor was laid (ev. 59), the interior of the new east room was filled up to a higher level, above the remains of the Byzantine wall (ev. 68). The remains of two successive *tabuns* (ev. 43 and 42) on top of the fill (ev. 50) (**Fig. 8**) prove that this room was used as a kitchen, and furthermore, they indicate that, on this level, a simple clay floor was situated, of which the larger part was destroyed by tumbled wall stones (ev. 16) or by erosion (on the term '*tabun*', *cf.* Ebeling and Rogel 2015).

Although the excavation reached the fill layer (ev. 52), an earlier floor was not found beneath the kitchen. South of it, in the newly created hallway, a sequence of floors and foundation fills corresponding with the west room sequence is discernable, if the fill layer (ev. 69) and the correlating floor levels (ev. 37 and 59) are taken into account. It is thus probable that this sequence was removed in the northern part when the kitchen was built. That the kitchen is a younger addition is also indicated by the wall structures situated further east (see **Fig.**



8. Trench T, sector d, older and younger tabun (ev. 43 and 42) inside the Middle Islamic courtyard house.



9. Trench T, sector b, older and younger tabun (ev. 27 and 39) outside the Middle Islamic courtyard house, view from the south.

1). There, the remains of a room are visible at ground level with a round pillar base. Since its massive southern wall is not in line with the south wall of the kitchen (ev. 11), it is impossible to install a door between the two walls. One gains the impression that this room was originally longer, and that the pillar base situated in the centre before the western end of the room was dismantled.

A date for this last building activity is given by the youngest artefacts found in the floor foundations. The foundation fill (ev. 60) below the new floor (ev. 37) contained not only worn Byzantine- to Umayyad-period sherds, but also larger pieces of Middle Islamic pottery (**Pl. 14.78**). Contemporary with this fill is an assemblage of six large Middle Islamic vessel fragments, which were laid against the new threshold (ev. 36/58). All examples are of HMGPW. In the fill (ev. 50) below the kitchen, among the older pottery, only a few Middle Islamic sherds were found, which cannot be dated accurately (**Pl. 15.83**). Into the top of the hallway floor (ev. 59), three fragments of Middle Islamic pottery were embedded, among which was a single piece of Middle Islamic Green Glazed Ware.

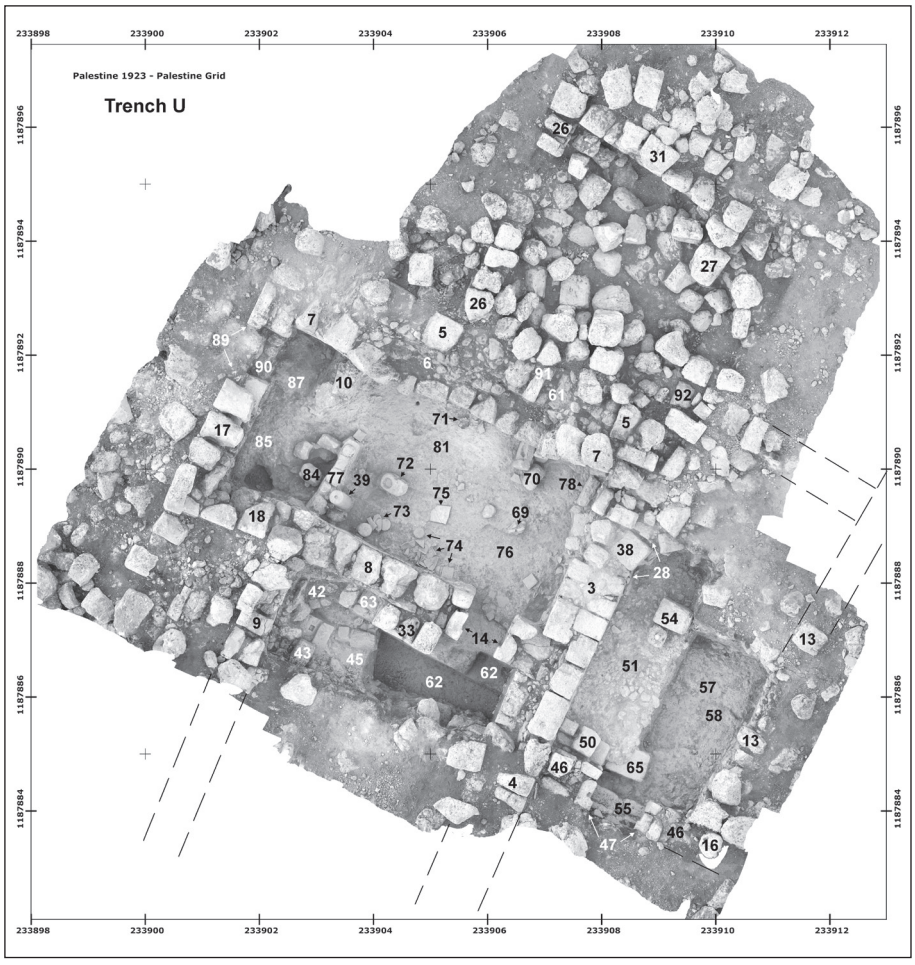
After this last occupation phase, the house was abandoned and natural decay started. The floors inside the house and the walk-on levels outside the house were covered by several abandonment deposits mixed with debris of the walls [The evidences are given in stratigraphic order: in the hallway: ev. 17 (soil) with ev. 18 (stones); in the kitchen: ev. 47 (soil) and ev. 13 (soil) with ev. 16 (stones); in the west room ev. 41 (soil), ev. 26 (stones), ev. 10 (soil) with ev. 15 (stones) and ev. 7 (soil); west of the house: ev. 21/45 (soil) with ev. 33/49 (stones) and ev. 22 (soil) with ev. 23 (stones); south of the house: ev. 29 (soil) with ev. 34 (stones) and ev. 19 (stones) with ev. 20 (soil)]. Most of the deposits were affected by erosion, and the uppermost layers were disturbed in modern times. For example, a small piece of plastic was found in ev. 20. The datable finds from the largely undisturbed lower deposits help to estimate the duration of the last utilization phase. The youngest pottery in the soil layer (ev. 13) above the kitchen floor stems from the Mamluk (**Pl. 14.74**) to Early Ottoman periods (**Pl. 15.84**). In the layer (ev. 10) above the west room floor (ev. 37), fragments of two large bowls were found which can be dated to around 1400AD and later (similar bowls: **Pl. 14.77-78**). It is therefore likely that the courtyard house was in use until the end of the Mamluk or beginning of the Ottoman period before it was abandoned.

Among the numismatic finds in Trench T, not a single coin of the Middle Islamic period came to light. Since a reliable chronology for the Middle Islamic common wares and for the Handmade Geometric-Painted Wares is not yet established, a precise dating of the building phases is not yet possible. A series of samples for radiocarbon dating was taken. The analysis is underway, and we hope to refine the pottery chronology for the Middle Islamic period based on these new data.

Trench U

The aim of Trench U was to explore a section of the western part of the south slope [Trench supervisor was Gitte Lambertsen Hjortlund]. The trench was laid out over a building north of the so-called South Street, and this building was connected to a long wall, which was part of a larger building complex (see **Fig. 1**). The building was part of the residential complex situated on a terrace, which was limited to the south by the South Street and extended in an easterly direction to the large Roman cistern and along its northern edge (see **Fig. 1**). Immediately west of the building in Trench U, a steep slope was situated. This must originally have been retained and stabilized by walls. About 7m north of the building, another east–west-oriented terrace was situated on a higher level. The elongated rectangular core of the house was north–south oriented and L-shaped. It measured about 13m in length and was up to 6m wide. It was divided into at least a northern room, the so-called north-western room, and a southern room. An eastern and another northern room were added in later phases. Of this building complex, only the northern part of about 90.2m^2 was excavated. The division by sectors a to d was laid out according to the known rooms, which were already visible on the surface (**Fig. 10**).

Since the residential area along the South Street had already come to light in Trenches L and O, dating exclusively to the Byzantine period, it seemed probable that the building remains



10. Trench U, excavated structures.

north of the street would also stem from this period. Similar to the trenches further east, it became obvious that the building complex in Trench U went through several phases. However, these covered exclusively the Umayyad period.

Open Quarry Work

Like in other trenches, especially on top of the hill, the walls were built on top of bedrock-cut walls or in areas where the bedrock had been levelled (Kalaitzoglou, Lichtenberger and Raja 2013; 2017). These rock dressings obviously belonged to an older stone quarry situated here, since they predate the construction of the house. This situation is underlined by a vertical step with a height of about 1.08m between the west and the south room of the core building. The higher floor level of the northwest room (617.01m asl) was neither accessible from the bottom of the levelled rock (615.94m asl), nor were traces of a rock-cut or built staircase found in the south room. Since no contexts were unearthed which have been connected with the quarry activities, only a relative date of the quarry can be established, predating the construction of the Umayyad building complex.

Building Phase 1 (Early Umayyad)

In the first building phase, most probably only the core building was established. It consisted of at least two main rooms divided by a wall (ev. 8). The communication between the two rooms was provided by a door (ev. 14), which was situated in the eastern part of the wall (ev. 8). The elongated south room stretches between the walls (ev. 4 and 9). It is 7.15m long and 4.2 to 4.7m wide. About 5.2m south of the wall (ev. 8), a door is situated in the western wall (ev. 9) of the south room, and it is probable that, in the opposite wall (ev. 4), an additional door was situated, but the southern part of the room was not excavated (see **Fig. 1**). The northwestern room was rectangular in shape and extended further west beyond the line of the western wall of the south room (ev. 9). In its original

layout, without the later-added wall (ev. 7), the room measured about 6.15m in length and 3.4-3.5m in width. All the walls and rooms of this phase were built on top of quarry walls and levelled bedrock areas. For unknown reasons, especially the eastern wall (ev. 3 and 4) is about 1m thick and thus much stronger than the north wall (ev. 5: 0.7m) or western walls (ev. 17: 0.7m and ev. 9: 0.65m). Even the dividing wall (ev. 8) between the west and south rooms is only 0.75m thick, and the same holds for its western extension (ev. 18). Since the thickness of the walls does not correspond with the rock steps, it is possible that the building was initially planned to be separated from the eastern part of the building complex.

In this first building phase, three doors (ev. 14, 28 and 89) gave access from three directions into the north-west room, and a window (ev. 91) situated in the eastern part of the north wall (ev. 5) provided the room with light (**Fig. 10**). In later stages, the eastern (ev. 28) and western (ev. 89) doors were blocked as well as the window (ev. 91). None of the doors had thresholds, indicating that wooden frameworks were used in the door openings.

Two floors can be assigned to the first building phase. The floor of the west room consisted, in its northern part, of the levelled bedrock surface (ev. 81 and 85) and, in the other parts, of a mortar layer (ev. 76 and 87) with some embedded stone slabs, which covered either the bedrock or, in the western part, a thin layer of residual clay (ev. 82) in the rock depressions. While the mortar floor (ev. 87) in the western part of the room was badly damaged and preserved only in patches, the mortar floor in the eastern part (ev. 76) must have been renewed, at least partly, since small areas are preserved, running against the base of the younger wall (ev. 7). The floor in the south room consisted of a thin mortar layer (ev. 66), which was laid partly on top of the upper bedrock edge (ev. 62), and it covered a thick fill deposit of soil (ev. 45) and stones (ev. 67) above the deeper parts of the bedrock (ev. 62). Although this floor, too, was preserved only partly, being badly damaged by the collapsed walls, it is certain that this was the only floor, and that it was set against the pilaster (ev. 33), the niche (ev. 63) and the basin installation (ev. 43) (**Fig. 10**). These installations must therefore belong to the first building phase as well.

The wall-like pilaster (ev. 33) with a length of 1.15m and a width of 0.45m was built from the south against the middle part of the wall (ev. 8) (**Fig. 10**). It is probable that it supported an arch spanning from north to south. The pilaster (ev. 33) rests on bedrock (ev. 62), and against its western side, a niche-like structure (ev. 63) was constructed. Both the niche and the pilaster were covered by the plaster (ev. 37). The niche (ev. 63) most probably belonged to an installation west and south of it. There, in front of the walls (ev. 8 and 9), a rounded basin was situated, which was surrounded by a layer of stones (ev. 43) connected by mortar (ev. 44). The inside of the low basin was lined with plaster (ev. 42), which was set against the wall plaster (ev. 37). This shows that the basin was lined with plaster after the pilaster (ev. 33) and that the niche (ev. 63) had been built and covered with the wall plaster (ev. 37). Since the stones (ev. 43) around the basin, however, were set into the top of the fill (ev. 45), and because the floor (ev. 66) was set against these stones, it is certain that the basin as well as the niche and the pilaster belong to the same construction process. The purpose of such an installation, comprising a built niche with a flat base and a rounded basin sunk into a stone base above the floor, is not clear. Since the floor (ev. 76) shows traces of a renewal, none of the installations in the north-west room can be assigned to the first building phase with certainty, but it is likely that the low banister wall (ev. 77/83), which separates a larger eastern compartment from a smaller western compartment, belongs to the first building phase. This wall rests on bedrock (ev. 81) and was set directly against the wall (ev. 8). Both walls were then lined by wall plaster (ev. 24), against which the mortar floor (ev. 76) was laid. If only the northern part of the floor was renewed, the banister wall must belong to the first building phase.

A date for the construction of the core building is given by the foundation fill (ev. 45). The fill (ev. 82) under the mortar floor (ev. 87) in the western part of the north-west room contained no datable objects. The fill (ev. 45) had to protect the base of the wall (ev. 4), which is the southern part of the east wall (ev. 3/4), and

it was built on top of the bedrock (ev. 62) along the upper edge of the 1m-high rock wall. In this foundation fill, below the floor level (ev. 66), pottery sherds, tiles (**Pls. 18.101** and **19.104**) and coins were found. The youngest sherds stem from the Late Byzantine to Umayyad periods (similar to **Pl. 6.42**), and as well as two Minimi, a pre-reform Umayyad fals was also found [J16-Uc-45-2x. It is an Umayyad pre-reform fals of phase 1 (Pseudo-Byzantine). J16-Uc-45-4x is a Late Roman Minimus, and J16-Uc-45-5x is a Minimus of undetermined date]. If this Umayyad backfill (ev. 45) is not the restoration of an older fill, the building complex must have been constructed in (early?) Umayyad times. Two Late Roman Minimi and a Byzantine coin found in the floor foundation (ev. 59) under the oldest floor (ev. 57) in the east room do not contradict this conclusion, since such coins were also in circulation in the Early Umayyad period [J16-Ud-59-1x is a Byzantine Follis of Justinian I, minted in Antioch. J16-Ud-59-2x, and J16-Ud-3x are Minimi of Late Roman date]. An indirect confirmation of the Umayyad construction date derives from radiocarbon dates of the collapsed wall underlay in the western part of the north-western room (**Fig. 11**). Three radicarbon dates are available from this destruction deposit (ev. 80). Whereas one is old, both younger ones point to an early Umayyad date [Sample no. 25899 (J16-Uc-80-3), Department of Physics and Astronomy, Aarhus University (Denmark), C^{14} age 1477±34BP, d13C (AMS) -23.00±1.00, calibration curve IntCal13, 1σ 556-622AD, 2σ 536-650AD (94.3%). Sample no. 25900 (J16-Uc-80-5), Department of Physics and Astronomy, Aarhus University (Denmark), C^{14} age 1375±47BP, d13C (AMS) -25.00±1.00, calibration curve IntCal13, 1σ 614-679AD, 2σ 582-716AD (89.6%). Sample no. 25901 (J16-Uc-80-8), Department of Physics and Astronomy, Aarhus University (Denmark), C^{14} age 1788±37BP, d13C (AMS) -26.00±1.00, calibration curve IntCal13, 1σ 145-325AD, 2σ 131-337AD]. Therefore, the collapsed walls must have been built after the youngest radiocarbon date of the middle of the 7th century AD.

The layout of the Umayyad core building was obviously not altered for a long period, and even the addition of the east room caused only minor modifications.

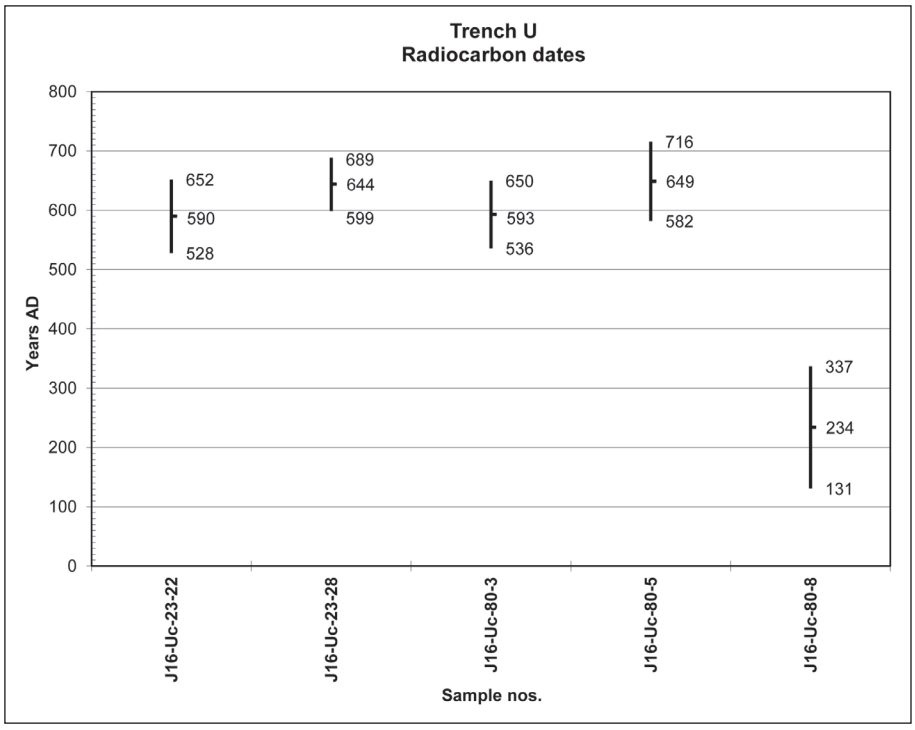
Building Phase 2 (Umayyad)

In this phase, the long rectangular east room was built from the east against the core building. Although only the southern half of the room was fully excavated and, in the northern half, only the surface was cleaned, it is evident that the room was north–south oriented and measured 7.6m by 3.5m. A wall joining with the eastern wall (ev. 13) in its northern half and leading for at least 4.3m in an easterly direction indicates that the east room was also connected to a larger complex extending to the east (see **Fig. 1**).

Whereas the southern wall (ev. 46) was set directly against the east wall (ev. 3/4) of the core building, the northern wall (ev. 92) bent from the north around the north-east corner of the core building. Both walls were connected by the eastern wall (ev. 13), which shows traces of an additional door. In the south-east corner of this building, an upright-standing column drum was integrated into the wall (ev. 13). Since the same feature was found several times in the Umayyad edifice in Trench V, it seems as if it was a common feature in Umayyad times to integrate column drums into the masonry. The only door (ev. 47) found was situated in the centre of the south wall (ev. 46), with a threshold (ev. 55). Connected with this building phase is a thin mortar layer (ev. 57), which covered both the bedrock (ev. 59) and a layer of residual clay (ev. 59), which filled gaps and depressions in the bedrock. The mortar floor (ev. 57) was not only laid against the walls and the door (ev. 47), but also against the threshold (ev. 55) and a base (ev. 50) in the south-west corner of the room. This base was built of stones and soil and rested on the bedrock. It is likely that it served as a bench next to the door.

In the core building, most probably no alterations took place in this phase. That the western door (ev. 89) was closed in this phase is possible but cannot be prooved. According to similar floor levels in the core building and the newly established east room, the eastern door (ev. 28) of the north-west room remained accessible. This door connected the new and the old parts of the house.

A precise dating of the second Umayyad building phase and the construction of the east room is not possible, since only very few finds



11. Trench U, graph displaying the radiocarbon dates.

were associated with the foundation layers and the floor.

Building Phase 3 (Umayyad)

In this phase, the floor level inside the east room was raised. Above the old floor (ev. 57), a fill layer (ev. 56) was laid, and a single stone step (ev. 65) was set into the fill (ev. 56), behind the south door. The difference between the fill (ev. 56) and the top of the stone step (ev. 65) was evened out by another fill (ev. 52). The top of this compact yellowish-brownish fill layer (ev. 52) served as a new walk-on level inside the east room. Although the new walk-on level reached a higher level than the threshold (ev. 55) of the south door (ev. 47), the door was still in use. The gap between the stone step (ev. 65) and the threshold (ev. 55) was filled with a loose, brownish soil (ev. 53). While the east room was still accessible from the south, the passage through the east door (ev. 28) of the west room had to be blocked by a wall (ev. 38). This was necessary because the new walk-on level was higher than the door base. On top of the walk-on level (ev. 52), three short limestone drums were found in front of the east wall (ev. 13). One was positioned horizontally (ev. 48) on the floor, secured by small stones and two very short drums (ev. 49a and b) with differing diameters; these were positioned upright about 0.3-0.4m south of the first drum. The assembly looks like a simple working space in which one could sit on the lying drum and process things on the standing drums. The worn condition of the top sides of the standing drums seems to support this assumption.

In the foundation fill (ev. 56), small and worn fragments of Byzantine and Early Umayyad pottery were found. Amongst them were small fragments of Jarash Bowls and Jarash lamps, as well as tile fragments (**Pl. 18.102**) and notable amounts of mosaic tesserae, of which some were glass. Two Late Roman coins and a Byzantine Follis give a terminus post quem [J16-Ud-56-8 and J16-Ud-56-21 are Late Roman Minimi, probably of the 5th century AD, and J16-Ud-56-9 is a Follis of Justin II minted in year 9 (574AD) in Cyzicus]. Ev. 52, the upper part of the walk-on level, contained highly fragmented and worn sherds of mixed date, ranging from the Late Roman to the Umayyad periods. Fragments of large basins (similar to **Pl. 5.36**) occurred frequently. Therefore, it is possible to conclude that the third phase is an Umayyad phase, postdating relatively the earlier Umayyad phases.

Building phase 4 (Umayyad)

In the fourth building phase, large-scale alterations took place. Against the northern side

of the core of the building and the north-west corner of the east room, a new room was constructed. This north room is delimited by three walls (ev. 26, 27 and 31) and seems to have a single entrance where the western wall (ev. 27) meets the east room (see **Fig. 10**). The construction of the north room must be the reason why a new wall face (ev. 7) was set from the inside against the north wall (ev. 5). This measure stabilized the north wall and, at the same time, closed the window (ev. 91). It is possible that, in the course of these building activities, the west door (ev. 89) was blocked by a wall (ev. 90). It is obvious that, in this phase, access to the north-west room was constricted via the south door (ev. 14) to a passage through the south room. If this observation is correct, the western compartment of the north-west room was used for different purposes - such as cooking. The hearth (ev. 84), made of three stones placed in U-shape against the banister wall (ev. 77/83), would then belong to this phase too (see **Fig. 10**). Further installations on the floor, of so far unknown function, are certainly younger than the wall (ev. 7), since they were set against this wall. Into the newly created north-east corner of the room, a stone structure (ev. 78) was placed, and about 1m further west, a parallel structure of three stones (ev. 70) was set against the wall (ev. 7) and attached to the floor with mortar (ev. 69). Both structures could have belonged together and supported a table. In the mortar (ev. 69), traces of ash and molten lead were discovered.

In the east room, the floor level was raised once again, and above a fill layer (ev. 51) of 0.2-0.3m thickness, a new walk-on level of compressed soil with embedded stone slabs was constructed. Since this layer covered the entire interior of the east room as well as the old threshold (ev. 55) and the stone step (ev. 65), the south door (ev. 47) was no longer in use. The lack of stone debris covering the uppermost walk-on level (ev. 51) argues for a lane or yard that was installed on top of the former east room.

Since most of the contexts yielded no finds, dating the last building phase has to rely on the walk-on level in the former east room. Only very few pottery sherds were embedded into the foundation fill (ev. 51), of which the youngest were of Umayyad date. However, an Umayyad post-reform Fals, found in the same context, proves that the fourth building phase has to be dated to the first half of the 8th century AD [J16-Ud-51-1x. It is an Umayyad post-reform al-Walid I (705-717AD) Fals of 20 *Qīrāt*, minted in Tabariyya].

Earthquake Destruction (Umayyad, 749AD)

It is obvious from the many destroyed objects found on the floor that the destruction of the building complex happened suddenly (see **Fig. 10**). First, the coating of the walls (ev. 60 and 80) and the roof collapsed. The thick layer of yellowish soil (ev. 23) as well as the embedded stone drum or roller (ev. 39) attest that the house had a flat roof. Since the roller (ev. 39) was found sticking vertically out of the yellowish soil of the collapsed roof, it is obvious that, like in modern times, the stone roller stayed on the flat roof and was used to compact it. In the lowermost collapse layer (ev. 60), fragments of an almost complete chimney were found (**Pl. 19.107**). The same layer covered the crushed fragments of a cooking pot and an amphora (ev. 71) of Umayyad date (**Pls. 2.10** and **11.65**) lying in front of the wall (ev. 7). In front of the opposite south wall (ev. 8), a large broken Grey Ware basin (ev. 74 (**Pl. 7.44**)) was found and, next to it, an assemblage (ev. 73) consisting of a short stone drum (J16-Uc-60-4x) and a broken marble slab with round moulding, both lying on a suspensura brick. Close to the centre of the room, a thin marble slab (ev. 75), broken into two, was found, as well as a worked piece of limestone with round carving (ev. 72), which had fallen from the roof, as evidenced by it being stuck in the roof collapse (ev. 23).

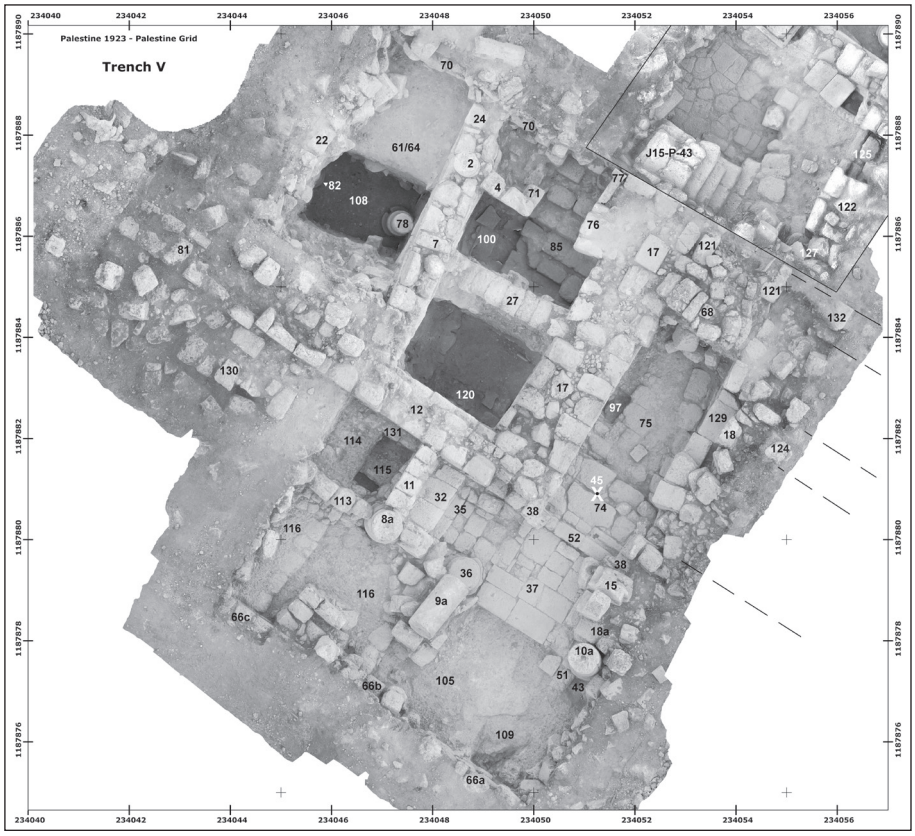
A date for the destruction of the core of the building is given by various evidences. In addition to pottery (**Pls. 3.22**, **4.32**, **8.51** and **11.60**), tiles (**Pl. 19.107**), stone objects (**Pl. 21.117; Pl. 22.123** and **125**) and metal finds (**Pl. 23.141**) that were covered and sealed by the first layer of destruction debris (ev. 60 and ev. 80), coins and radiocarbon samples are available. In the collapsed layer (ev. 60), both an Umayyad pre-reform Fals as well as an Umayyad post-reform Fals were found [J16-Uc-60-13x is an Umayyad pre-reform fals of phase 2, minted in Skythopolis. J16-Uc-60-6x is an Umayyad post-reform

fals, of which only the Shahada is readable]. Well-preserved vessels found *in situ* (**Pls. 4.33**, **5.34** and **12.67**) also date to the Umayyad period. Two charcoal samples taken from the soil of the collapsed platform roof date to the later 6th and mid 7th century AD respectively [Sample no. 25898 (J16-Uc-23-22), Department of Physics and Astronomy, Aarhus University (Denmark), C14 age 1485±49BP, d13C (AMS) -30.00±1.00, calibration curve IntCal13, 1σ 542-637AD, 2σ 429-652AD (429-494AD, 15.8%; 509-518AD, 1.4%; 528-652AD, 78.2%). Sample no. 25897 (J16-Uc-23-28), Department of Physics and Astronomy, Aarhus University (Denmark), C14 age 1382±34BP, d13C (AMS) -21.00±1.00, calibration curve IntCal13, 1σ 625-669AD, 2σ 599-689AD]. It is therefore possible that the collapsed roof of the core building (or at least its wooden beams) stem from the original building process.

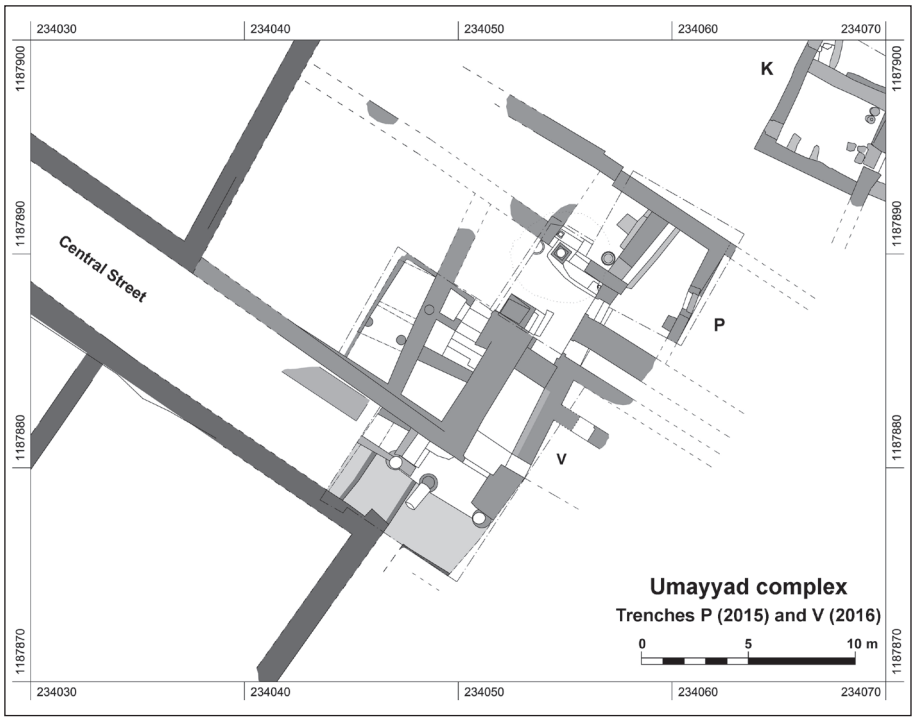
Both the north-west room and the south room of the core building, as well as the north room, were covered by a thick layer of collapsed stones (ev. 10 and 30). In contrast, the east room was covered by fewer stones (ev. 2), and in the inside the east room, above the last walk-on level (ev. 51), two thin, succeeding soil layers were unearthed (ev. 11 covered by ev. 12). The youngest coin found in ev. 11 is an Umayyad post-reform Fals [J16-Ud-11-12]. Combining the available evidence, a date in the 8th century AD is most probable for the destruction of the building complex. Since there is no evidence predating the mid 8th century AD, it is likely that the destruction of the building was related with the earthquake of 749AD. There is no evidence for later occupation of this area.

Trench V

With Trench V the exploration of the Umayyad complexes on the so-called East Terrace of the hill was continued (see **Figs. 1** and **12**) (*cf.* Kalaitzoglou, Lichtenberger and Raja in press; Kalaitzoglou *et al.* in press) [Trench supervisor was Line Egelund Nielsen]. In the 2015 season, the north-east wing of a building and the greater part of its central courtyard were excavated. In the 2016 campaign, the southern and central parts of the complex were explored, adding up to a total of 159.20m^2 of excavated area (107.66m^2 in 2016). However, this area covers only parts of the entire building since neither the western nor eastern limits were reached (*cf.* **Fig. 13**).



12. Trench V, excavated structures.



13. Trenches P (2015) and V (2016), reconstruction of the Umayyad residence.

The north–south extent of the building measures about 17.60m, including a narrow entrance hall (portico) 1.90m in depth on the south side. In an east–west direction the building was traced for about 16.30m, but on the east side at least one row of rooms remains unexcavated. It is most likely that the building extended in a westerly direction as far as a south-west–north-east running terrace-wall. Thus, the maximum east–west extent of the building can be assumed to be 26.00-26.50m, meaning that the excavated part is less than half of the original building.

The interior of the building does not display a symmetrical structure arranged around a central courtyard as earlier assumed (**Fig. 13**) (Kalaitzoglou, Lichtenberger and Raja in press; Kalaitzoglou *et al.* in press). On the southern side, parallel rooms open on to the courtyard. The main entrance was situated on the southern side, and it is the only entrance found until now. Three doors (ev. 125, 127 and 128) as well as three walls (ev. 123, 132 and 124) excavated along the eastern side of the building showed that small rooms and hallways were situated at ground level on this side (see **Fig. 12**). These opened on to the courtyard and led to the adjacent rooms. From these rooms a possible further row of rooms was accessible. The rooms along the northern side of the building turned out to have been smaller than those on the southern side, but they also opened directly on to the courtyard. It is therefore clear that the courtyard had a rectangular and not a square shape and that the courtyard, although it was not situated in the centre of the building, served as the central point of interchange. The rooms on the upper floors were accessible via a staircase (ev. J15-P-43) situated on the south side of the courtyard, (see **Fig. 12**).

The excavation of the entrance area on the south side showed that the building was oriented with its long side towards the south. Along the south side of the building ran, not only the eastern extension (ev. 12/81) of the Central Street, but south of the street also older building complexes were situated (ev. 66a, 66b and 66c). It is thus apparent that the building was not isolated but integrated into the surrounding building structures. With its western side the building was most probably leaning against the eastern boundary wall of the large rectangular building complex, which occupied most of the hilltop (see **Fig. 1**). The Central Street is traceable over a distance of at least 87m, running towards the complex on top of the hill. Along the southern side of the street, spacious building complexes, which fill the space between the street and the terrace of the so-called Synagogue Church, are situated (Kraeling 1938; Haensch, Lichtenberger and Raja 2016). The area north of the

building was occupied by Umayyad structures; the southern part of one of these buildings was excavated in 2014 (Trench K) (*cf.* Kalaitzoglou, Lichtenberger and Raja 2015, 2021; Lichtenberger *et al.* 2017). Since this quarter was delimited to the west by the high terrace wall of the older rectangular complex, and since the large Umayyad edifice closed the access to the street, it is now apparent that the main way into the Umayyad housing area north of the edifice has to be located either east or north of the edifice. Alternatively, it was accessible by stairs from the west (see **Fig. 1**).

The Umayyad building has three main building phases with sub-phases. Before the edifice was constructed, the Central Street ran where the entrance portico later stood, and south of the street building complexes were situated. Most of the extant structures were erected in the first phase and underwent only minor changes in the later phases. In the second phase, the portico was extended to the west, and in the last building phase only a few floor levels within the building were renewed.

Building Phase 1 (Byzantine)

The oldest structures detected were the walls (ev. 66a and 66c) south of the Umayyad building (see **Fig. 12**). They are most probably contemporary with the eastern section of the Central Street. The wall ev. 66c was built on bedrock (ev. 109). The base of the wall was protected, and the rock in front of the wall levelled, by fill layer ev. 106, which also served as a foundation for the street surface (ev. 105). The street surface (ev. 105) was then set against the northern face of the wall ev. 66c. Since the street surface as well as two steps belonging to the street were also placed against the wall ev. 66a, it is clear that both walls are younger than the street but belong to the same construction phase. Since the street surface (ev. 105) runs under the portico pavement (ev. 37) as well as under the thin foundation layer (ev. 79), it is clear that the entrance of the Umayyad edifice is younger and covered the northern part of the street. An answer to the question of whether the portico was a later addition and whether the street was previously set against the south wall of the Umayyad building was achieved by a deep sounding undertaken west of the portico (**Fig. 12**). The sounding confirmed that, although the edifice south wall (ev. 12/81) is in line with the north wall of the Central Street, neither the street surface (ev. 105) nor the steps (ev. 116) were set against this wall or its foundation wall (ev. 131). The original width of the Central Street measured 4.60m between its northern and southern boundary walls. With the construction of the Umayyad house it was reduced to a width of 2.70m [Occupation of public space by private houses is typical for the Byzantine to Early Islamic periods and in Jarash was observed also at *e.g.* the South Decumanus, *cf.* Gawlikowski 1986]. Since the terrain slopes in an eastern direction, low steps (ev. 116) 0.30m in height and about 2.30m long were integrated into the street. In the south baulk of the trench only short stretches of three north walls (ev. 66a, 66b and 66c) were excavated, which belong to the building complexes south of the street (see **Figs. 12-13**). The older walls (ev. 66a and 66c) are in line and were built parallel to the street. A 1.20m-wide gap separates both structures and hints at a narrow lane or path leading between them to the south. The north wall (ev. 66c) of the western complex is in line with the street's south wall and can be traced over a distance of at least 55m. This wall was most probably linked to a north–south running wall extending some 4.20m south of the trench and visible on surface level (see **Fig. 1**). A bearing shows that this wall is also in line with the eastern step (ev. 116) of the street. The corner created by these two walls on the Central Street was modified in a later period since the wall (ev. 66b), which rests on both the street surface (ev. 105) and the eastern step (ev. 116), was built around it (**Fig. 14**). The eastern complex extends further to the east but must have formed another corner east of the lane, but this corner seems to have collapsed completely. The size and function of these complexes are still unknown, but the orientation of the walls indicates that the complexes were part of the Byzantine quarter stretching south along the Central Street (*cf.* **Fig. 1**).

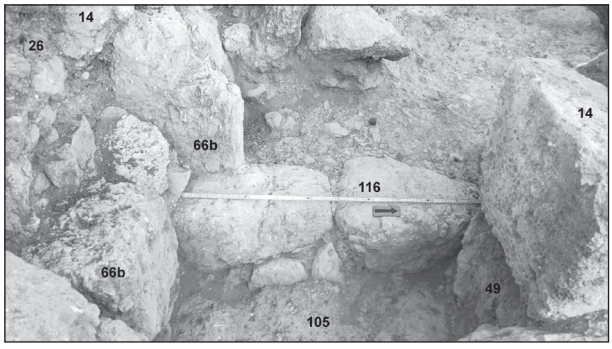
The evidence for dating this phase is sparse and relies on the finds from the foundation layer (ev. 106) of the street. In the excavated area only a few undiagnostic bodysherds were found, but a charcoal sample taken from the

fill below the wall ev. 66a gives a date of between 388-539AD [Sample no. 25882 (J16-Vc-200-1), Department for Physics and Astronomy, Aarhus University (Denmark), C^{14} age 1612±31BP, d13C (AMS) -19.00±2.00, calibration curve IntCal13, 1σ 399-532AD (399-433AD, 32.4%; 489-532AD, 35.8%), 2σ 388-539AD (388-539AD, 95.4%)]. If we take a sample (J16-Vi-87-1, see below) from the foundation of the Umayyad street surface as an upper limit (598-690AD), a construction date in the 5th/6th century AD is likely.

Building Phase 2a (Umayyad)

Major construction took place in this area in Umayyad times. It includes the founding of the large rectangular edifice north of the Central Street. The results of the previous excavation season showed that the edifice was founded in Umayyad times, and since all newly excavated walls bind into this complex, it is clear that they also belong to the same construction project.

The main entrance of the building in Trench V was situated on the south side of the building. To enter the building, one had to pass through the main door (ev. 38) with threshold (ev. 52) reaching a wide step (ev. 74) in the 6.00m-long entrance corridor between the walls ev. 17 and 18 (see **Fig. 12**). The corridor led under an arch (ev. 68) to a door (ev. 121), which gave access to the south-east corner of the courtyard. The stone pavement (ev. 75) inside the corridor is a renewal belonging to the next phase, caused by a repair of the wall ev. 18 (see below). The pavement was made of stones of irregular size and shape, and in its northern part did not reach the western boundary wall (ev. 17). Directly behind the main door (ev. 52), a small doorway (ev. 128) led to a room or hallway east of the wall ev. 18. Since the greater part of this room is located outside the trench, only the entrance and part of the wall ev. 18 were excavated. However, it is probable that the room was north–south oriented and extended from the south wall of the building to the wall ev. 124, located only 3.00m to the north. The door ev. 126 connected the small room with a hallway 1.30m in width situated between the walls ev. 124 and 132. Cleaning of the surface in this area revealed another east–west-oriented hallway east of the courtyard. This hallway was connected with the courtyard by the door ev. 127 (= J15-P-80) and led between walls ev. 132 and 123 in an easterly direction. Further east it is likely that more rooms were located. North of this hallway a corridor, which was excavated in 2015, is situated (Kalaitzoglou *et al.* in press). It is now clear that this corridor ended at the wall (ev. 123), and that it was connected with the courtyard by the door ev. 125 (= J15-P-66). Cleaning of the surface during the excavation thus offered new information about the ground plan east of the courtyard. It is now clear that two doors (ev. 125 and 127) linked the north-eastern as well as the eastern part of the building with the main entrance and courtyard.



14. Trench V, sector h, stratigraphic relation between stepped street (ev. 116) and house walls (ev. 66a and 66b), view from the east.

West of the entrance corridor two parallel basement rooms were excavated: the so-called Arched Room of about 6.20m² between the walls ev. 17 and ev. 7/24, spanned by a well-preserved arch (ev. 27), and the so-called Western Basement Room taking up 10.60m² between the walls ev. 7 and ev. 22. The Arched Room was accessible only from the courtyard. From the door ev. 77, a staircase (ev. 85) led down to a paved floor. The pavement west of the staircase (ev. 110) was made of thinner stone slabs, while the pavement (ev. 120) south of the staircase consisted of flattened stones set into a soil bedding. Behind the entrance, a small side chamber was situated west of the staircase. This chamber measured 0.9 by 1.2m and was enclosed by the walls ev. 4, 24, 70 and 71. It is obvious that a narrow entrance was located in the east wall (ev. 71), but the opening was almost completely destroyed by the 749AD earthquake. As indicated by the top of the stone and soil packing (ev. 72), found inside the chamber, the original chamber floor was on

the same level as the second step of the staircase (ev. 85). Opposite the chamber a buttress (ev. 76) was built on top of the staircase. This buttress has the same length as the side chamber, but it narrows the upper part of the staircase to the width of the door ev. 77. Since a reduction of the staircase does not seem to have been required for the construction of the room, the buttress must have served another purpose. It is evident that not only the side chamber but also the buttress (ev. 76) belong to the first layout, since the buttress is interlocked with the wall ev. 17 and the door ev. 77. It is therefore most likely that both structures, the chamber and the buttress, were retaining a heavy structure on the upper storey.

There is sufficient evidence for at least one upper storey, not only above the Arched Room but also above the entrance corridor. The staircase (ev. J15-P-43), which is situated in the courtyard at the end of the massive retaining wall ev. 17, led only to the top of the retaining wall between the Arched Room and the entrance corridor (*cf.* **Fig. 12**). Since this is at almost the same level as the arch (ev. 27) and buttress (ev. 76), and also as an abutment (ev. 16) which served for flooring along the south wall (ev. 12), it is likely that a mezzanine floor was located above the Arched Room. From this level another staircase must have led to an upper storey above the entrance corridor. Large amounts of tesserae as well as mosaic fragments found in the debris of both rooms show that the upper floors were laid with mosaics. Similar multi-storeyed houses are typical for the Early Islamic period in the region (*cf. e.g.* Walmsley 2007).

The Western Basement Room did not have access to the courtyard, and it was probably not covered by the intermediate floor like the Eastern Basement Room. The room is delimited to the south by the wall ev. 12/81, to the east by the diagonal wall ev. 7, to the west by the wall ev. 22 and to the north by the wall ev. 70. Like the Arched Room, it was of trapezoid shape and measured about 5.40m in length; its maximum width was more than 2.10m. The width is only approximate since the west wall (ev. 22) was not excavated. This wall was badly damaged by the earthquake in 749AD. It leaned so far to the east that further excavation would have destabilized it, and it was therefore left unexcavated. The floor in this first building phase was a layer of mortar (ev. 104) placed directly on the bedrock (ev. 108). Small gaps in the bedrock surface were filled with soil. Inside this basement room no traces of a staircase or an arch were found. However, two columns (ev. 78 and 82) placed opposite each other in the middle of the room in front of the walls ev. 7 and 22 were situated there. Each column consisted of three drums (a-c), of which the lowest had a Corinthian base, but the drums of the eastern column (ev. 78) are of different length and diameter. Both columns would not have been strong enough to support the compact floor of an upper storey. This is underlined by thin layers of small stones (ev. 103 and 107) placed under each pillar. It is therefore probable that they held the beams of a wooden ceiling. Although it is possible that a door was situated at a deeper level in the wall ev. 70, it is nevertheless evident that this room was not connected with the courtyard. The cleaning of the surface showed that the wall ev. 7 continued to the north and thus constituted the western limit of the courtyard, which lies at a higher level (see **Figs. 12-13**). It is possible that the Western Basement Room was accessible from the west. Between this room and the east wall of the large rectangular building to the west is sufficient space (7.50m) for at least two more rooms (see **Fig. 13**). The lack of further installations in the basement rooms suggests that they probably served as store-rooms, even though fragments of large storage bins were not found.

In front of the main entrance a portico or entrance-hall was built as a separate constructional element. It consisted of a 1.97m-wide stone pavement (ev. 37) flanked by two columns with Corinthian bases placed at a distance of 2.13m from each other. Each of the columns consisted of base (ev. 36 and 43) and of two upper drums. While the lower drums were left *in situ* (ev. 9a and 10a) on top of the bases, the uppermost drums, which had tumbled (ev. 9b and 10b), had to be removed during excavation for safety reasons. The diameter of the eastern column (ev. 43, 10a and 10b) measures 0.60m while the diameter of the western column (ev. 36, 9a and 9b) is only 0.55m. The minimum length including the base can be estimated to have been 2.20m. The portico was closed only on the east side by a wall (ev. 18a), which was built

between the edifice and the base (ev. 43) and drums (ev. 10a and 10b) of the eastern column. The western side seems to have been open until it was closed in a later phase. It is obvious from the constructional relationship between the pavement (ev. 37), the wall (ev. 18a) and the column base (ev. 43) that they all belong to the same building operation: the wall (ev. 18a) was built against both the base (ev. 43) and the column drum (ev. 10a). The stone pavement (ev. 37) was not only set against the wall (ev. 18a), but the column base also rests partly on the pavement (ev. 37). The wall (ev. 18a) thus most probably stands on the old street surface (ev. 105), and the pavement (ev. 37) with soil (ev. 48) in the gaps rests on a thin fill layer (ev. 79) above the old street surface (ev. 105). The foundations of the column bases differ slightly. The base (ev. 43) of the eastern column rests partly on the pavement (ev. 37) and partly on a foundation (ev. 51) made of a stone block surrounded by small stones and soil, covering the older street surface (ev. 105). The base (ev. 36) of the western column rests only on the pavement (ev. 37). The foundation layer (ev. 79) below the pavement (ev. 37) as well as the stone foundation (ev. 51) of the eastern column were covered by a soil fill layer (ev. 101) placed on top of the old street surface (ev. 105). This fill was covered by a compact layer of compressed yellowish soil (ev. 65), which served as the new surface of the street in front of the building. West of the portico a mortar surface (ev. 115) was found, thinner and different from the street surface (ev. 116). The mortar surface (ev. 115) survived the later extension of the entrance-hall, because the new structures were constructed on top of it. The thin mortar layer (ev. 115) covered an underlay of soil and stones, and both were set against a foundation wall (ev. 131) of the edifice south wall (ev. 12) and thus protected the foundations of the building and served at the same time as new street surface west of the entrance.

Although the base of the entrance-hall was built unconnected with the south side of the building, it is most likely that it belongs to the initial layout of the building as well. Large amounts of finds as well as fragments of a mosaic flooring, fallen from an upper level, attest that also the portico was equipped with an upper storey [For the finds from this destruction context, see below]. This storey must have been connected with the rooms above the entrance corridor. The upper storey thus extended beyond the southern limit of the house and covered the portico, suggesting that both features must have been linked together on this level.

All excavated walls were built directly on top of the worked bedrock, which sloped down in steps from south to north. In front of the building, below the Central Street, the top of the bedrock reaches an absolute elevation of 619.52m asl. The bedrock inside the Arched Room as well as inside the Western Basement Room lies at a 1.70m-deeper level, at about 617.80m asl. Both the south wall (ev. 12) and the wall ev. 17 rest on top of the vertically cut bedrock. It is apparent that the rock was levelled for the floors of the basement rooms and at least partly cut for the bases, but it was impossible to find evidence proving whether the rock cutting stemmed from older quarry works or from the time of the construction of the new building. However, it is evident that the slightly diagonal orientation of the wall ev. 7 between the basement rooms is not a constructional requirement. The same holds for the north–south-oriented walls of the building, which were not built parallel or with right angles. Most of them share a similar diagonal orientation, like the walls ev. 7 and 18, the eastern wall (ev. J15-P-6/17) in Trench P and the entire building in Trench K, but some of them show also slightly varying orientations. Contrary to these, the east–west-oriented walls display a strict parallel orientation. The reuse of older quarry walls, hidden under the building, would be an explanation for the irregularity of the ground plan.

The dating evidence for the construction of the edifice is sparse since almost no datable objects were found in the foundation fills. Neither the foundation layer (ev. 110) underneath the pavement (ev. 100) in the Arched Room, nor the fill (ev. 72) in the side chamber contained datable finds. In the core of the buttress (ev. 76) only a Late Roman copper coin was found [J16-Vf-96-1 is a worn example of an AE 3]. A similar situation was encountered in the Western Basement Room. Neither the mortar floor (ev. 104) nor the thin foundation layers (ev. 103 and 107) beneath the column bases contained datable artefacts. However, from the mortar floor (ev. 104)

a radiocarbon date is available. A small piece of charcoal embedded into the upper part of the mortar dates to between 535-655AD with 92.3% probability [Sample no. 25879 (J16-Vc-203-1), Department for Physics and Astronomy, Aarhus University (Denmark), C^{14} age 1470±40BP, d13C (AMS) -25.00±2.00, calibration curve IntCal13, 1σ 565-635AD (565-635AD, 68.2%), 2σ 435-655AD (435-448AD, 1.3%; 472-487AD, 1.8%; 535-655AD, 92.3%)]. From the lowest portions of the floor foundations (ev. 80, 97 and 99) inside the entrance corridor only very small and undiagnostic pottery sherds were found, and in the street area no pottery or coins were found in the foundations (ev. 51, 79, 101, 65 and 105). This lack of embedded objects hinders more precise dating. However, in the terracing fill (ev. 101) for the new street surface (ev. 65) a piece of charcoal was embedded, which most probably dates to the Late Byzantine/Umayyad period (598-690AD with 94.3% probability) [Sample no. 25878 (J16-Vi-87-1), Department for Physics and Astronomy, Aarhus University (Denmark), C^{14} age 1377±35BP, d13C (AMS) -21.00±2.00, calibration curve IntCal13, 1σ 633-673AD (633-673AD, 68.2%), 2σ 598-760AD (598-690AD, 94.3%; 751-760AD, 1.1%)]. This date matches well with the results gained from the excavation of the north-east wing of the same building in Trench P. According to these results, the courtyard house was most likely constructed in the Umayyad period (*cf.* Kalaitzoglou *et al.* in press). One stone block with a Greek inscription was found built into the face of the south wall (ev. 12/81), on the left-hand side next to the main entrance (ev. 38). It is a spolia that was cut to fit into the wall and was placed upside down. Mortar traces sticking on its front side prove that the wall was lined with plaster, and the inscription was thus covered.

Building Phase 2b (Umayyad)

At some point a repair of the western face of the wall (ev. 18) inside the entrance corridor was undertaken (see **Fig. 12**). This repair involved the renewal of most of the stone pavement (ev. 75). First, all parts of the old wall face as well as the northern part of the older pavement together with the upper parts of the foundation fill (ev. 80, 97 and 99) were removed. It seems as if only the area next to the arch (ev. 68) remained untouched. The new wall face (ev. 129), consisting only of one row of irregular stones, was set against the wall (ev. 18) in such a way that the gap between both wall faces was still visible (see **Fig. 12**). The new wall rested on a layer of small stones. On top of the fills (ev. 80 and 99) a new pavement (ev. 75) was laid against the base of the wall (ev. 129). The stones of the new pavement were of irregular size and shape, and were connected by soil and some mortar. Next to the wall (ev. 129) the stone slabs were laid in diagonal order and the new pavement did not reach the western boundary wall (ev. 17). In this strip along the wall (ev. 17), the top of the old fill (ev. 97) served as a walk-on level at a slightly lower level. A dating of this subphase is difficult since it is an isolated alteration, not physically linked with other datable contexts, and the foundation fills contained only few undiagnostic pottery sherds. A position in the stratigraphic sequence is indicated by the fact that the pavement (ev. 75) was the last floor laid in the corridor prior to the destruction caused by the 749AD earthquake. It is further evident that the step (ev. 74) as well as the southern part of the older pavement were reused. Since the next building activities followed different intentions, and because of the bad condition in which the pavement is preserved, an early date in the overall building history of the complex seems plausible for the repair. This suggestion is confirmed by the fact that the new pavement inside the corridor corresponds in elevation and technique with the younger floor in the courtyard, although the join between both floor levels was not excavated (see **Fig. 12**). In the courtyard, the stone pavement (ev. J15-P-82) of the first building phase was covered by a layer of reddish-brownish soil, onto which a new floor (ev. J15-P-79) of stones in soil and mortar was laid. The wall repair in the entrance corridor explains why the floor level in the courtyard had to be raised to a level corresponding to the entrance corridor.

Building Phase 3 (Umayyad)

The main feature of the third building phase was the extension of the portico in a westerly direction to create a space including a bench-like construction (ev. 32). West of the portico the northern part of the stepped street (ev. 116) had already been removed and was substituted

by a new surface (ev. 115). For the new column (ev. 8a) with its Corinthian base (ev. 34) a strong foundation (stylobate) had to be built. For the stylobate a hole was dug through the two street surfaces (ev. 115 and 116), and a simple stone drum (ev. 59) was sunk into the hole. The stone drum was surrounded and stabilized by a fill of soil (ev. 117) and stones (ev. 58), and on top of it the Corinthian base (ev. 34) and the column (ev. 8a) were placed. The western side of the portico pavement (ev. 37) was extended to the west with a row of smaller stones and a step of stones (ev. 35) next to it (*cf.* **Fig. 12**). Between the newly erected column and the edifice's south wall, a foundation of stones and soil (ev. 118) was placed on top of the mortar surface (ev. 115). On this foundation a low wall (ev. 11) was built, and the western part of a step-like bench (ev. 32), which also rests on the western end of a step (ev. 35), was placed here. Then another low wall (ev. 33) was set between the new column (ev. 8a) and the old column (ev. 9a). This low wall (ev. 33) rested on the foundation fill (ev. 58) and retained the wall foundation (ev. 118). While the wall ev. 11 limited the bench to the west, the low wall ev. 33 limited it to the south. With a column, the bench and two framing walls, the west extension of the portico was almost finished. Only the still-exposed western part of the wall foundation (ev. 118) and the base of the wall (ev. 11) had to be protected from erosion and were thus covered. For this purpose, a wall (ev. 113) was built. This wall consisted of medium-sized stones above a coarse foundation of smaller stones and was set against both the base (ev. 34) and the column drum (ev. 8a). Since the wall (ev. 113) was built on top of the old street surface (ev. 116) as well as on top of the mortar surface (ev. 115), it must be contemporary with the portico extension. With the wall (ev. 113) a compartment 1.80m in width and at least 1.75m long was created west of the portico extension and along the south side of the edifice. The interior was backfilled (ev. 112) up to a level corresponding to the top of the foundation wall ev. 131, and was covered with a thin mortar surface (ev. 114). While the fill (ev. 112) had to retain and cover the foundation of the new portico's west wall (ev. 11), the mortar surface (ev. 114) served as a walk-on level inside the small compartment (see **Fig. 12**). Since also the stylobate foundation (ev. 58) and the base of the wall ev. 33 as well as the base of the wall ev. 113 had to be protected, a layer of compressed soil (ev. 102) was placed on top of the steps of the street (ev. 116), which served as a new street surface west of the old portico.

Since the main deposits of this phase did not generate finds for dating we have to rely on the scanty finds from the fill (ev. 112) and the new street surface (ev. 102). In addition to some tesserae and a tile fragment from ev. 102, small and worn sherds of Umayyad pottery were found in both deposits.

Building Phase 4 (Umayyad)

The last phase was characterized by the installation of simple soil floors as walk-on levels in several parts of the building. This is apparently typical for the last Umayyad building phases, and was also encountered in Trenches K and P (Kalaitzoglou, Lichtenberger and Raja in press); Kalaitzoglou *et al.* in press; Lichtenberger *et al.* 2017). This feature allows us to unite separate building activities in one phase. During this phase also the backfilling of the entire Western Basement Room and the creation of a raised floor level happened.

In the northern part of the Arched Room a higher floor level (top of ev. 86) was installed west of the staircase above the pavement ev. 100, while the pavement ev. 120 in the southern part remained untouched. The surface of the new floor was completely destroyed by the debris of the earthquake of 749AD, but embedded into the underlay (ev. 86) a concentration of mortar and loose tesserae (ev. 95) was found.

The most extensive alteration took place in the Western Basement Room. This room was backfilled with three layers of coherent material, with a total thickness of almost 2m, with the aim of installing a new clay floor (ev. 61 and top of ev. 64) also in this room. The lowest layer (ev. 84) consisted mainly of brownish soil (ev. 84), with thick layers of charcoal and ash embedded, while the second layer was a mixture of stones (ev. 83) with the same soil (ev. 84). The uppermost layer (ev. 61 and ev. 64) was free of stones and consisted of a similar soil in the lower portions and a gradually more yellowish soil in the upper parts, which

was covered by a sterile and compact yellowish layer. In all three layers, except the yellowish top part which marked the walk-on level, considerable amounts of kitchen ware and bones together with charcoal and ashes were found. It seems as if kitchen waste was collected to be deposited in the former basement room. It is obvious that the closing of the entire storey must have caused the blocking of the former entrance, and that afterwards only a door at the level of the former upper storey was available. The door was not found during the excavation, and it might have been situated in the north wall (ev. 70) or the west wall (ev. 22).

Traces of a raised walk-on level were discovered also outside the edifice, in the compartment next to the extended portico. In the compartment above the mortar surface (ev. 114), a compact deliberate fill (ev. 111) was unearthed, consisting of several thin soil layers in the lower parts and small stones in the upper parts. The new surface on top of the fill (ev. 111) was not preserved due to the earthquake destruction and modern disturbance and erosion. Since the fill was restricted to the inside of the compartment and since it covered the mortar surface (ev. 114), it is evident that the new surface is younger than the portico's extension. To the west the new surface was probably limited by a thick, east–west-oriented wall (ev. 130).

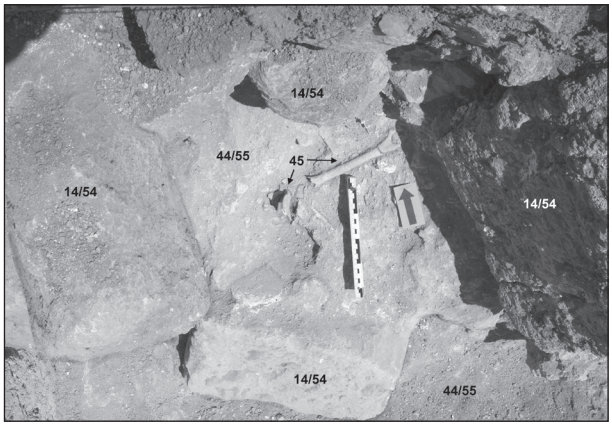
The archaeological evidence for the installation of the last floor levels before the destruction of the building suggests a date in the later Umayyad period. The floor foundation (ev. 86) in the Arched Room contained, aside from the tesserae and mortar concentration (ev. 95), only Late Umayyad pottery. Also the C_{14} date of a charcoal sample does not contradict such a dating [Sample no. 25883 (J16-Vdf-86-1), Department for Physics and Astronomy, Aarhus University (Denmark), C_{14} age 1218±62BP, d13C (AMS) -25.00±2.00, calibration curve IntCal13, 1σ 711-886AD (711-745AD, 13.8%; 764-886AD, 54.4%), 2σ 670-962AD (670-902AD, 88.4%; 920-962AD, 7.0%)]. It is therefore possible that the new floor was installed shortly before the earthquake of 749AD destroyed the edifice.

The dating evidence for the closure of the Western Basement Room cannot be supported by radiocarbon dates or coins. In layer ev. 84 large amounts of Umayyad pottery were found and the same holds for the covering layer ev. 64. Only the northern equivalent (ev. 61), which was not excavated further down, seems to have been slightly contaminated by material fallen from the upper storey. In ev. 61 some Roman sherds were found and more than 30 tile fragments as well as considerable amounts of tesserae, but Umayyad pottery (**Pls. 2.11-12**, **3.18**, **5.37**, **6.42**, **7.43**, **10.57-58** and **16.90**) clearly dominates the contexts. Noteworthy is the high amount of bag-shaped amphorae of local and regional production (**Pls. 11.64**, **12.66** and **13.68**), but a few imports, some of Egyptian production (**Pl. 13.69-70**), were also found.

The finds from the fill (ev. 111) in the compartment outside the building are not distinctive. Although the full spectrum of functional groups is present, as well as Jarash Lamps and also some tesserae and tile fragments, only a general dating to the Late Byzantine to Umayyad periods is possible.

The Earthquake Destruction of the Umayyad Building

It is clear that the building was destroyed in a catastrophic event. All evidence suggests that this was the earthquake of 749AD. A human skeleton was recovered in the destruction layers of the entrance corridor. The remains of a young person (ev. 45) were found 0.40-0.30m above the step ev. 74 (see **Fig. 12**). First appeared some skull fragments followed by an upper arm and a jaw jutting out from the compressed soil of the collapsed roofing and upper storey (ev. 44/60) between large blocks of collapsed stones (ev. 14) (**Fig. 15**). It is obvious



15 Trench V, sector i, human remains (ev. 45) in corridor debris, view from the south.

that the body was completely fractured by the heavy stones, which tumbled during the earthquake. The position and dry condition of the human remains required a cautious excavation before the bones could be documented *in situ*. However, during the night an illicit excavation took place, and the bones together with the find context (ev. 55) were vandalized. Afterwards only a few bone fragments were recovered from the dump (ev. 56) scattered around the find spot [The disturbed find context was called ev. 55 and the moved soil ev. 56]. At the spot where the human remains were initially encountered, an iron adze (J16-Vi-60-3x) (**Pl. 22.132**) was found at a deeper level above the threshold, which might have been amongst the personal belongings of the victim.

Most of the excavated rooms and areas were filled with at least two distinguishable portions of collapse and debris, a common feature for a building with more than one storey. The first collapse consisted of the wall linings, the underlays as well as the upper flooring mixed with wall-stones. The lower part of the Arched Room was filled with soil (ev. 73) and stones (ev. 29), while above the new floor level in the Western Basement Room more wall-stones (ev. 21 and 28) were found among the soil (ev. 20, 23 and 53). In the entrance corridor a layer of brownish soil (ev. 67) mixed with wall plaster was found covering the pavement, which obviously stems from the wall coating. Above this the hallway was completely filled with tumbled wall-stones (ev. 14) and collapsed soil and other building material (ev. 44, 60 and 69). The area in front of the building was then completely covered by the collapsed walls, columns and roofing (ev. 14 and 26).

The composition of the collapse deposits shows that the edifice had more than one storey and, furthermore, that the upper storeys were paved with mosaics and the walls coated with coloured plaster. Although a lot of roof-tile fragments were found in the debris they were too few and scattered all around to attest to a tiled roof. It is thus most likely that the edifice had a platform roof and that the tiles served as building material or as framing slabs or were used for other purposes such as for fire places. Concerning the find groups, some observations which give an insight into the assemblage available in the upper storey are to be mentioned. In the entrance-hall and on the street the pottery was much better preserved than in the basement rooms. This, on the one hand, attests that pottery was stored above the portico but on the other hand hints that preservation depends on the amount of debris that fell with the pottery. In the hallway pottery was not frequent but other find groups, such as tesserae or metal objects, were well attested and preserved. This makes it probable that the rooms above the hallway were more representative and did not serve as simple storerooms or kitchens.

Regarding the dating of the earthquake destruction, the excavation brings only limited new data. The identified coins are almost all from the Late Roman period. The only exception was an Umayyad pre-reform coin of phase 1 (J16-Vh-26-64; *c.* 638-680AD) [For the phases of Umayyad pre-reform coinage, see Schulze and Oddy 2012] found in the collapse (ev. 26) above the street. Umayyad pottery dominates in all collapse deposits. The collapse (ev. 49) on the street as well as an embedded concentration of sherds (ev. 50) contained large amounts of Umayyad pottery, which had fallen from the upper storey. In ev. 26 large amounts of Umayyad pottery were found: a Jarash Lamp (**Pl. 17.91**) and also metal finds, such as two fittings with hinge (**Pl. 23.135-136**), large amounts of tesserae, tesserae chips as well as mosaic fragments, pieces of mortar, 32 tile fragments, an antefix and an imbrex, and even a water pipe fragment and a suspensurium. Embedded into this collapse were concentrations of sherds (ev. 39-42), which all contained fragments of Umayyad vessels. Inside the hallway, the amount of Umayyad pottery decreased from the collapse (ev. 44) near the door in direction of the arch (ev. 68), while the amounts of tesserae and plaster remained the same and the number of small finds decreased. One arrowhead was among the finds (**Pl. 23.146**). From ev. 60 stem only a few sherds, however, of note is an adze or hoe made of iron (**Pl. 22.132**). In ev. 69, apart from an iron knife and various other well-preserved finds, cymbals and parts of a musical instrument (**Pl. 23.142-144**) were found. The layer (ev. 67), which covered the floor, contained a lot of tesserae and plaster but very few Umayyad sherds. A mix of Umayyad

pottery and building material, especially tesserae, mosaic fragments and mortar, was also unearthed in the Arched Room's destruction deposits (ev. 73, 25, 63 and 23). In ev. 23 and 25, some Byzantine to Late Byzantine sherds and two fragments of choir screens (**Pl. 21.119**) (a piece of a pilaster capital (**Pl. 21.118**) stems from ev. 73), a stone bead (**Pl. 22.126**) and a large knife (**Pl. 22.131**) were also found. The finds from the Western Basement Room show a similar composition, but storage jars of different sizes (**Pl. 8.46-48**, **9.54** and **10.55**) and fragments of basalt vessels were also present.

Three radiocarbon dates are available for the dating of the destruction. Two stem from the collapse deposit (ev. 73) in the Arched Room. One gives the date 686-894AD with 94.9% probability [Sample no. 25884 (J16-Vdf-73-24), Department for Physics and Astronomy, Aarhus University (Denmark), C_{14} age 1215±39BP, d13C (AMS) -20.00±2.00, calibration curve IntCal13, 1σ 728-878AD (728-737AD, 5.0%; 769-878AD, 63.2%), 2σ 686-937AD (686-894AD, 94.9%; 933-937AD, 0.5%)], and the other dates with 89.4% probability to 596-779AD. Both dates are in accordance with the assumed destruction of the earthquake of 749AD. The third date stems from the lowermost collapse layer (ev. 67) in the entrance corridor. The rather early date 579-668AD can be regarded as a terminus post quem and the sample was probably taken from material considerably predating the destruction.

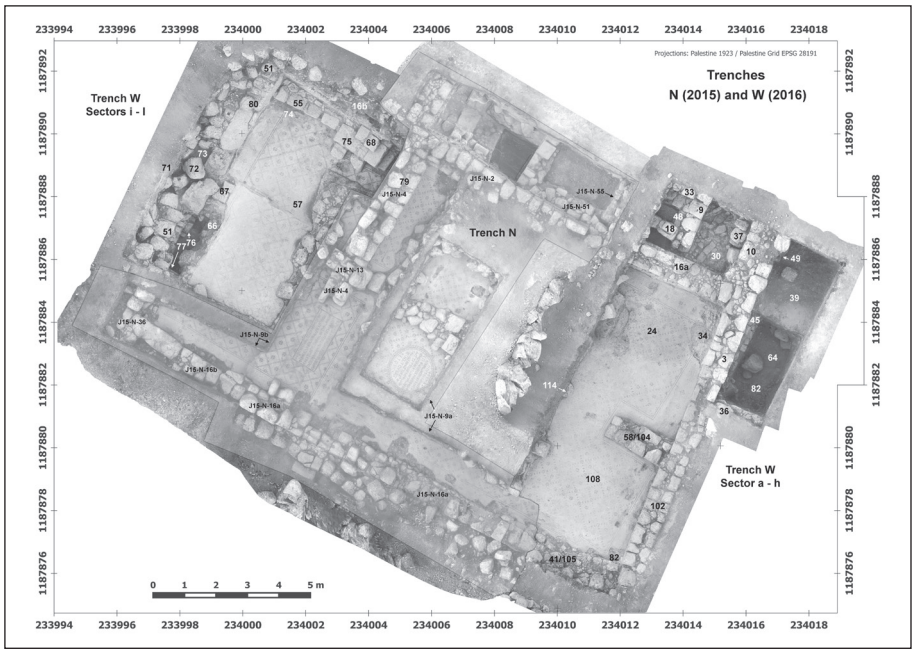
Trench W

With Trench W, the exploration of the so-called Mosaic Hall, which was discovered in 2015, was continued. This hall was a side building to the Byzantine so-called Synagogue Church (*cf.* **Fig. 1**). It has mosaic floors with inscriptions, which date the laying of the mosaics and provide us with information about the military donors of the building (Haensch, Lichtenberger and Raja 2016). Among the main aims of Trench W was to determine the eastern extent of the building, to investigate further parts of the mosaics and to clarify the layout of the western part. The western part was in the Umayyad period separated from the rest of the hall by a wall. Another aim was to find out more about the use of the area in the period before the construction of the hall, which would have been connected with the use of the Late Roman cave complex just north of the Mosaic Hall. Therefore, excavation was undertaken in two separate areas east and west of 2015's Trench N (**Fig. 16**) [Trench supervisor was Kristine Thomsen]. An area of 66.30m^2 (sectors a to h) was excavated around the supposed eastern end in order to detect the extent of the building. West of the wall (ev. 79) (= J15-N-4), an area of 46m^2 was opened to clarify the western extension of the complex (sectors i to l).

Aside from the Late Roman cave system, three major phases can be distinguished for the Mosaic Hall [For the results of the previous season, see Kalaitzoglou *et al*. in press]. In the first phase, the complex was constructed in front of the older caves, and the first mosaic floor, dated by an inscription to March 576AD, was laid. In the second phase, the hall was enlarged to the west, and this part was covered with a new mosaic which according to the inscription dates to July 591AD (Haensch, Lichtenberger and Raja 2016). Soundings in disturbed parts of both mosaics have shown that they are the only floors in the complex without earlier phases. A transformation of the long hall into smaller room units took place in the third phase, which can be dated to the Umayyad period. It was already clarified in 2015 that the hall was destroyed by the earthquake of 749AD (Kalaitzoglou *et al.* in press).

<u>The Phase before the Construction of the Mosaic Hall</u>

Only limited evidence was found belonging to the phase before the construction of the Mosaic Hall. In the deep sounding east of the east wall (ev. 3) of the Mosaic Hall, bedrock (ev. 82) was reached about 2.6m below the surface (**Figs. 16-17**). The top of the uneven bedrock surface was covered by a mortar layer (ev. 64), similar in thickness and consistency to the mortar floor (J15-N-82) discovered in 2015 inside the vestibule in front of the Late Roman south cave. In 2016 we discovered that south of the deep sounding, in the south-east corner of the Mosaic Hall, the bedrock (ev. 82) rises 1.40m and thus forms a depression in front of the bedrock cliff above the caves. Since the depression runs counter to the natural topography and does not follow the



16. Trenches N (2015) and W (2016), excavated structures of the Mosaic Hall.

direction of the slope, it is possible that the low bedrock is man-made, either related to older quarrying activity or to the construction of the caves. That the bedrock surface slopes down to the north and rises to the south, might explain why a staircase (ev. J15-N-87), which leads up in southerly direction, was set from the west against the south-west corner of the Roman cave vestibule. A rock depression under the northern part of the later Mosaic Hall is also an explanation for the soil fill under this part of the building.

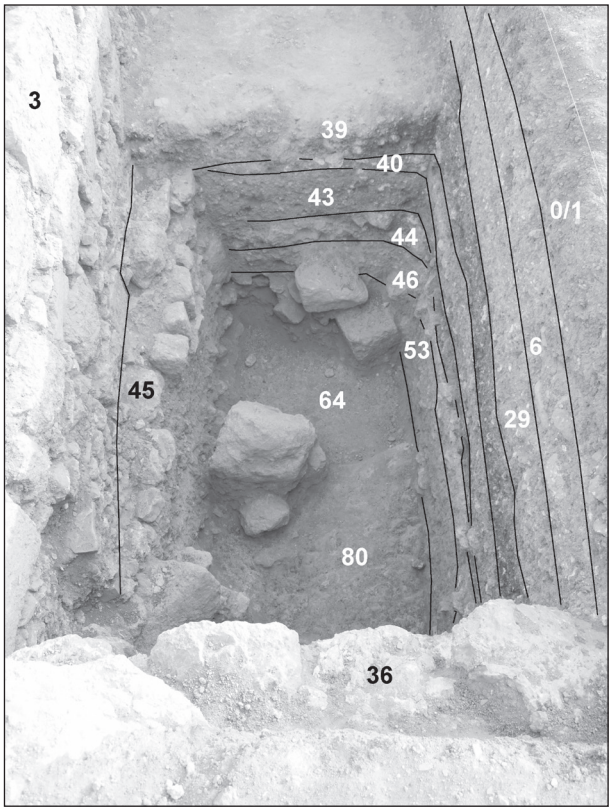
Since no finds were associated with the mortar layer (ev. 64), a precise dating of this phase is not possible. However, stratigraphically the mortar surface (ev. 64) belongs to the Late Roman cave system. The overlying fill layer (ev. 53), although it contained fragments of mostly Roman pottery but also some Byzantine tiles (**Pl. 18.103**), belongs to the foundation of the Mosaic Hall since it required that the caves were closed.

The Mosaic Hall

The Mosaic Hall in its last stage was roughly rectangular with a length of 18.49m on the south side and 17.15m on the north side. The width of the building was between 10.47m on the eastern side and 10.64m on the western side. This irregular shape is only partly due to the earthquake since, although the north wall was deformed and displays a curve, the south wall takes a more or less straight course (*cf.* **Fig. 16**).

Building Phase 1 (Byzantine, before 576AD)

In its original layout, the Mosaic Hall was already roughly rectangular but shorter. It ended west of the entrance in the south wall with a later-removed west wall behind a prominent join, which is visible between the older and younger parts of the south wall (ev. 41/105 =



17. Trench W, eastern sectors, deep sounding, view from the south.

ev. J15-N-16a) (**Fig. 16**). This join corresponds with the western side of a buttress (ev. J15-N-13) situated halfway between the north and south walls (ev. 16a and 41). It is now clear that the wall (ev. J15-N-32) also belonged to the original layout of the hall. This wall, oriented to the north, is not only in line with the supposed western boundary of the hall but also the thickness of 0.92m is the same as that of the northward extension (ev. 10) of the east wall. The older mosaic (ev. 24/108) was detected only west of this line. The original length of the hall thus measured 13.45m on the longer south side and 12.48m on the north side. The interior covered a total area of approximately 97.25m^2.

As a result of the excavations in 2015 it is certain that the north wall (ev. 16a = J15-N-2) was built on top of a foundation fill (J15-N-80) and over the Roman wall remains. A similar fill (ev. 53) was discovered under the foundation wall (ev. 45) upon which the east wall (ev. 3/102) was built. The same can be assumed for the foundation wall (ev. 49) below the northward extension (ev. 10) of the east wall, even if the excavation did not reach the same depth in this spot. It is thus clear, not only that the Mosaic Hall was built on top of a fill in front of the rock cliff, but also that in the first layout the gap between the building and the rock cliff was already closed at a higher level by two walls. The wall ev. 10 binds into the north-east corner of the hall and closed the gap on the eastern side, while the wall ev. J15-N-32 closed it on the western side. The space between the rock cliff and the Mosaic Hall was completely backfilled with a layer of almost 2m thickness (ev. J15-N-57), which dates to the Byzantine period, most probably prior to 576AD, since it predates the construction of the hall [For the dating, see the results of the 2015 season: Kalaitzoglou *et al*. in press]. Since the western wall (ev. J15-N-32) rests on top of this backfill, a retaining feature west of it was needed to protect this fill from erosion. This could be either a wall or more probably the protruding bedrock, since the bedrock west of this point had to be worked to extend the hall in the next building phase. A retaining wall for the foundation fill towards the south was not necessary because the bedrock rises for about 1.40m under the south wall (ev. 41/105). However, east of the Mosaic Hall not only this first fill (ev. 53) but also the covering fill layers [These fill layers are in stratigraphic order: ev. 46, 44, 43, 42, 40 and 39], which had to protect and stabilize the wall bases, had to be retained. Although such a terrace wall is not visible at ground level (see **Fig. 1**), it can be deduced by the wall (ev. 36) running in an easterly direction that was found in the southern baulk of sector d (**Fig. 16**). This wall (ev. 36) was built against the east wall (ev. 3/102), on top of the fill layer (ev. 43). Although the wall (ev. 36) was not built on top of the lowermost fill (ev. 53), on which the foundation wall (ev. 45) below the east wall (ev. 3/102) rests, but at a 0.3m-higher level, it is evident that it belongs to the same building and filling process, because the top of the foundation wall (ev. 49) under the bottom of the wall ev. 10 rises above this level. It is therefore probable that the terrace east of the Mosaic Hall had to retain a fill up to 2m high. Due to the disturbance of the upper fill layers by later ploughing activity, an associated surface or floor was not detected.

In the eastern part of the newly built hall only one buttress (ev. 58/104) which was connected with the east wall (ev. 3/102) was found. It served as an arch support for the roofing. Against the buttress and the walls a mosaic was laid (ev. 24/108), covering a foundation fill (ev. 34) of smaller stones, soil and mortar. This mosaic of 576AD is the earliest and only flooring of the building. In the hall of the first building phase only one rectangular mosaic field near the entrance was tesselated with an inscription field. The outer frame of the entire mosaic respects and surrounds the architectural features like for example the buttresses and even the protruding bedrock (ev. 82) in the south-east corner.

Since the foundation layer below the mosaic contained no datable finds, we have to rely mainly on the finds from the terrace-fill layers east of the hall (*cf.* **Fig. 17**) to confirm the date of the inscription, which gives both a year and month. The coins found in the terrace fill all date to the Late Roman period, and the pottery suggests a Byzantine date for the construction of the hall. In the lowermost fill (ev. 53) only pottery of Roman date was found. In the next layer (ev. 44) only Late Roman pottery was present, including a Roman cooking pot (**Pl. 1.2**), Roman tableware (**Pl. 3.17** and **3.19**), one African

Red Slip Ware import (**Pl. 4.29**) and a Dressel 2–4 Amphora (**Pl. 13.71**). Both succeeding layers (ev. 43 and 42) contained no pottery. In the following layer (ev. 40) not only larger amounts of wall plaster, tesserae and Roman sherds (**Pl. 2.14**) were found but also some Byzantine body sherds. In the covering fill layer (ev. 39), table-, common and cooking ware of the Byzantine to Late Byzantine periods (**Pl. 3.23**) in good condition dominate. However, the following layer (ev. 29) marks a break since this fill contained mostly Late Byzantine to Early Umyyad pottery, although Late Roman sherds were also present. This tendency is continued in the fill layer (ev. 6) close to the surface, which contained vast amounts of mixed pottery ranging from the Roman to the Umayyad periods. It is obvious that the last two layers (ev. 29 and 6) do not belong to the original terrace fill or that they were disturbed.

Building Phase 2 (Byzantine, before 591AD)

In this phase the Mosaic Hall was extended for 5.00m in a westerly direction and was thus enlarged by some 26m^2. Since the old west wall must have been removed and an extension of the northern (ev. 16b) and southern walls (ev. J15-N-16b) was necessary, the roofing must also have been renewed. For the construction of the new west wall (ev. 51) the bedrock (ev. 80), which was sloping southward in this area, was cut, thus forming the north-west corner of the building and part of the west wall. Inside the new bordering walls two low east–west-running retaining walls were built into the foundations (**Fig. 16**). One of the walls was built on the axis of the room between the older buttress (ev. J15-N-13) and the west wall (ev. 51), and partly also against the bedrock (ev. 80). This foundation wall was only discovered due to the earthquake damage and modern disturbance of the west wall (ev. 51). On top of this foundation wall a new buttress (ev. 67) was built to support the new roof. Further to the south, an additional wall (ev. 77) was erected parallel to the wall under the buttress. Since the wall ev. 77 binds into the west wall (ev. 51) and the other wall further north was set against the worked bedrock (ev. 80), it is impossible that they belonged to older buildings. It is more likely that these walls formed chambers to hold the foundation fill (ev. 66) of stones and soil mixed with mortar below the new mosaic (ev. 57). Before the new mosaic (ev. 57) was laid, the walls were lined with wall plaster. Traces of wall plaster (ev. 65) were discovered on the southern face of the north wall (ev. 16b), protected by the later bench (ev. 55), as well as on the southern side of the buttress (ev. 67). In the last case it was obvious that the mosaic was laid against the wall plaster (ev. 81). The only installation found in the newly created room is a small rectangular podium of 1.6m by 0.9m with a stone step on its eastern side, which was built against the southern face of the north wall (ev. 16b). The mosaic was tessellated against the podium and the step, and both were surrounded by the outer border framing of the mosaic pattern. The podium probably had a function relating to the use of the room by a military unit. It is possible that it served as a base for some objects, but since the room was reused in the Early Islamic period, alterations probably took place which make it difficult to establish exactly how the original installation would have functioned.

A dating of the extension of the hall is provided only by the new mosaic inscription, which gives the year 591AD. Additional evidence is not available at the moment since the foundation fill (ev. 66) yielded no datable objects.

Building Phase 3 (Umayyad)

The Mosaic Hall was in use until the 749AD earthquake. At the time of the Islamic conquest in 636AD at the latest, we have to assume that the Byzantine military unit left Jarash and the building was reused for other purposes. In the Islamic period it was divided into smaller units. To achieve this, a new wall (ev. 79/J15-N-4) was added, which was carefully built directly on top of the younger mosaic. Since the wall had no door, it separated a new western room from the rest of the hall. The remains of a door, found in 2015 next to the new wall, indicate that in the northern central part of the hall another room was installed next to the western room. Since traces of additional walls were not found in the eastern part of the hall, this part underwent no alteration. According to the debris found inside the destroyed building, we can deduce that the roofing was now changed, and a platform roof was installed (see below). Since

only few objects from the last phase of use were found on top of the mosaic, it is difficult to determine the function of the hall. In the eastern part of the building only a fragment of a roof tile (ev. 25), part of a basalt crusher (ev. 26), a short upright standing stone drum (ev. 114), fragments of an iron object and two stone slabs (ev. 107-2x to 107-3x), one with figurative incision (**Pl. 21.120**), were uncovered. Neither these objects nor a rectangular niche (ev. 113) in the east wall (ev. 3/102), which was framed with roof tile fragments and filled with a brownish soil, shed light on the function of the Mosaic Hall during the Umayyad period.

More instructive is perhaps the newly installed west room. This room measuring 4.5m by 9.0m was completely separated from the rest of the building by the wall ev. 79. Since no door was found in the preserved south wall, the well-preserved east wall or the still upstanding north wall, it is probable that the room was accessed through a door in the west wall (ev. 51). Since the part north of the buttress (ev. 67) was cut from bedrock, a door must have been situated south of it. However, because this part of the wall was so deeply disturbed in modern times by a pit (ev. 71), it is impossible to trace a door or to determine its location.

Inside the west room, between its north-west corner and the older podium, a bench (ev. 55) was built in Umayyad times. This installation does not belong to the original design of the Byzantine period, as attested by the fact that it was built against the wall plaster (ev. 65) and on top of the mosaic. The tesselated lines are good indicators for a distribution between original structures and structures added later since the outer framing of both mosaics respects and surrounds the original constructional features, like the roof supports (ev. 67, J15-N-13 and 58) and the podium (ev. 75). This bench is probably the only Umayyad installation found in this room. A large patch of ash and charcoal (ev. 74) on the mosaic in front of the bench as well as traces of heating on the bench stones indicate that the room was used for domestic purposes before it was destroyed by the earthquake. A terracotta figurine was also found in this context (**Pl. 20.110**).

The 2016 excavations provide little further dating evidence for the Umayyad phase. As in the last season, no coins were found on top of the floors and most of the other objects are older or not precisely datable. The youngest pottery embedded into the yellowish roof collapse (ev. 23/107 and 54) is of Early Umayyad to Umayyad date (**Pls. 2.15** and **3.23**), suggesting that the hall got a new flat roof in Umayyad times [A charcoal sample taken from the yellowish layer (ev. 54) is therefore too old since it gives the date 133-435AD. Sample no. 25869 (J16-Wik-54-10), Department of Physics and Astronomy, Aarhus University (Denmark), C_{14} age 1707±72BP, d13C (AMS) -15.00±3.00, calibration curve IntCal13, 1σ 245-406AD (245-406AD, 68.2%), 2σ 133-534AD (133-435AD, 88.7%; 451-471AD, 1.6%; 487-534AD, 5.1%)]. More conclusive and directly connected with the last use of the west room is a charcoal sample taken from the ash layer (ev. 74) covering the mosaic (ev. 57) in front of the bench. The radiocarbon date for this sample is with 86.9% probability 661-779AD, making it likely that the earthquake responsible for the destruction is the one of 749AD [Sample no. 25868 (J16-Wk-200-1), Department of Physics and Astronomy, Aarhus University (Denmark), C_{14} age 1272±36BP, d13C (AMS) -19.00±1.00, calibration curve IntCal13, 1σ 682-769AD (682-730AD, 40.4%; 736-769AD, 27.8%), 2σ 661-864AD (661-779AD, 86.9%; 791-828AD, 5.0%; 838-864AD, 3.5%)].

The Rooms North of the Mosaic Hall (Byzantine to Umayyad)

The 2015 excavations showed that on top of the fill between the bedrock cliff and the Mosaic Hall, small chamber-like structures were built. In 2016 similar structures were unearthed, and we are now able to reconstruct the building history. First, a small chamber was built against the north wall (ev. 16a) with a small gap in between. Although only the north-east corner (ev. 9) of the chamber was excavated in sector a, it is apparent that this chamber was also set against the eastern wall (ev. J15-N-55) of a room excavated in 2015 at a distance of only 1m to the west. The interior of the small chamber measured therefore only a maximum of 2.0m in length and 1.5m in width. Inside the chamber, a floor (ev. 60) made of large stone blocks and mortar, which was set against both

the chamber walls (ev. 9) and the north wall of the hall (ev. 16a), was discovered. East of the chamber and at almost the same level, an additional floor (ev. 30) was unearthed. This floor consisted of a thick mortar layer with embedded stones with flattened surfaces above a fill of soil and stones, and it was set against the chamber's wall (ev. 9) as well as the hall's north wall (ev. 16a) and the wall ev. 10. No entrance either to the small chamber or to the room east of it was found, but it is probable that at least the eastern compartment was accessible from the north, from the top of the bedrock.

Since no finds were associated with the construction of the chamber or with the floor, only relative dating is possible. It is clear that the floors and the chamber postdate the construction of the Mosaic Hall as well as the neighbouring room, which also dates to the Byzantine period.

In a later stage, the layout of the chamber and the anteroom were changed. A short and low wall (ev. 37) was set on top of the floor (ev. 30) along the wall ev. 10. This wall was made of medium-sized stones in poor masonry, and it did not reach the north wall of the hall. The interior of the small chamber was divided into narrow compartments by an east–west-running wall (ev. 18). This wall was set on top of the floor (ev. 60) between the eastern wall (J15-N-55) of the neighbouring room and the chamber's east wall (ev. 9). As a result, the larger northern compartment had a width of only 0.5m. The southern compartment and the gap between the chamber's east wall and the Mosaic Hall were closed by a fill of stones and loose soil (ev. 31). Between the new southern wall (ev. 18) and the chamber's north wall (ev. 9), a small step-like structure (ev. 48) was set on top of the floor (ev. 60) and against the chamber's east wall. Since the northern jamb and a keyhole of a door were preserved in the upper part of the chamber's east wall (ev. 9), it is conceivable that the structure (ev. 48) served as a step to enter the narrow compartment in the eastern anteroom from a higher level. The elevation of this lost floor level is indicated by the level of the door in the wall (ev. 9) and it roughly corresponds with the top of the wall ev. 37 in the anteroom. The latter was filled up to this level with a thick layer of loose soil (ev. 27) and stones (ev. 28) that furthermore was in contact with the fill ev. 31, which is therefore the same fill.

Since the raised floor of the anteroom was destroyed, we have to rely on the finds embedded in the fills (ev. 27 and 31) to date this construction. While the fill ev. 27 contained large amounts of finds, which range from the Late Roman to the Late Byzantine or Early Umayyad periods, the fill ev. 31 contained, apart from numerous tile fragments, mostly only small fragments of Late Byzantine wares, among them one cooking pot (**Pl. 1.6**) and a large basin (**Pl. 6.40**). With regard to the following building phase, a date in the early 7th century AD is therefore probable, making it impossible to decide if this modification took place already in the second or in the third building phase of the Mosaic Hall.

In a later phase the walls of the chamber were dismantled and cut down. On top of the ruins of the chamber's north wall (ev. 9) a new wall (ev. 33), of which only a short section was found in the north baulk of sector a, was built. The northern compartment of the chamber was filled with a layer of compact brownish soil (ev. 32), which also covered the base of the wall (ev. 33). Above this fill another fill layer (ev. 2) of compact yellowish soil was identified, corresponding in its upper elevation with a fill layer of compact yellowish soil (ev. 5) in the anteroom. Both layers seem to be part of a floor made of compressed soil and related to a new building structure established above the former chamber. Since only a small part of this structure was unearthed, the form and function of this building remain unclear. Dating derives only from the contents of the compact yellowish layers (ev. 2 and 5) since the fill (ev. 32) was almost empty of finds. In both layers the pottery was very fragmented but the youngest sherds tend to be of Late Byzantine to Umayyad date. Since the finds give only a terminus post quem and are almost contemporary with the finds associated with the preceding phase, it is likely that the new building was established during the Umayyad period.

Phase 4 (Umayyad 749AD, Earthquake Destruction)

After uncovering more mosaic areas in 2016, it became more and more apparent that

during the earthquake destruction large parts of the mosaic sank down. This is evident especially in the western part of the hall (**Fig. 18**). There waves in the mosaic layer were caused by a compression of the soil under the mosaic. Therefore, the mosaic sunk where no substructures ran under it. Due to this fact we were able to identify a wall in the foundation covered by the mosaic and running from west to east in the line of the roof supports (ev. 67 and J15-N-13).

We are able to trace three succeeding phases in which the earthquake debris of the building was deposited. In the eastern sectors a-h the mosaic was covered by a layer of compact yellowish soil (ev. 23/107) that was also found in the western sectors i-l (ev. 54) [It is the same yellowish layer excavated already in 2015 and labelled with ev. J15-N-22, J15-N-28, J15-N-40 and J15-N-70]. In the west the yellowish soil layer partly surrounded the stone debris (ev. 56) of the Umayyad wall (ev. 79/J15-N-4) and covered also the bench (ev. 55) as well as the podium (ev. 75) with the stones (ev. 68) on top of it. This thick yellowish layer stems from the collapsed roof of compressed soil that was used during the Umayyad period, and which collapsed first. In the eastern part of the hall closer to the walls the collapsed brownish underlay of the wall linings (ev. 8) was found as well as the displaced core (ev. 110) of the collapsed eastern buttress (ev. 58/104). These first collapse deposits were covered by a layer of wall-stone debris (ev. 14/112, 21 and 56), which was surrounded by the soil of the wall cores (ev. 15 and 22). This debris stems from the upper-wall portions. In the next phase the remaining parts of the walls collapsed to a level to which they were stabilized by the debris. To this uppermost debris belong a stone collapse (ev. 11/111 and 50/52) and the surrounding soil (ev. 19 and 47) (*cf.* **Fig. 18**).

Agricultural Use and Destruction in Modern Times

After the earthquake, the Mosaic Hall was subject to further disturbances, which damaged the walls as well as the western entrance.

The damage to and poor preservation of the south wall (ev. 41, J15-N-16a and 16b), being only a few courses high, is probably an effect of agricultural cultivation and erosion. Marks of modern iron ploughs on the crown of the east wall attest that the area was cultivated at some later point, and the same marks demonstrate that since then soil has eroded away. Later finds in the upper earthquake debris in the north-east corner of the hall also point towards further disturbance of the remains in more recent times. In ev. 19 a modern tin can and deeper in ev. 7 fragments of modern pottery were found. The most severe loss of architecture is the destruction of the southern part of the hall's west wall (ev. 51). The devastation was so extensive that it reached the foundations below the hall (**Fig. 18**). The large pit (ev. 71) was filled with dark humus soil in the upper parts, and in deeper levels (ev. 72 and 73) Umayyad pottery was found below the level of the mosaic foundation. Owing to the extent of destruction, it has probably been caused by heavy machinery in recent times.

Trench X

Trench X was laid out on the south slope of the Northwest Quarter, north of the large rock-cut cistern, above a Byzantine building (see **Fig. 1**). The westernmost part of this Byzantine-period so-called East House was excavated already in 2015 in Trench O (for the results, see Kalaitzoglou *et al.* in press). Two of the main aims of Trench X were to trace the eastern extension of the building and further to trace the concrete floor, already excavated in this building (Kalaitzoglou *et al.* in press). Since this concrete surface (ev. J15-O-69) was older than the Byzantine East House, a Roman date was supposed, as was a functional connection with the large Roman cistern. Already in 2015 we had assumed that this floor was related to a sediment basin



18. Trench W, western sectors, younger mosaic (ev. 57) and destruction of the west wall (ev. 51/80), view from the north.

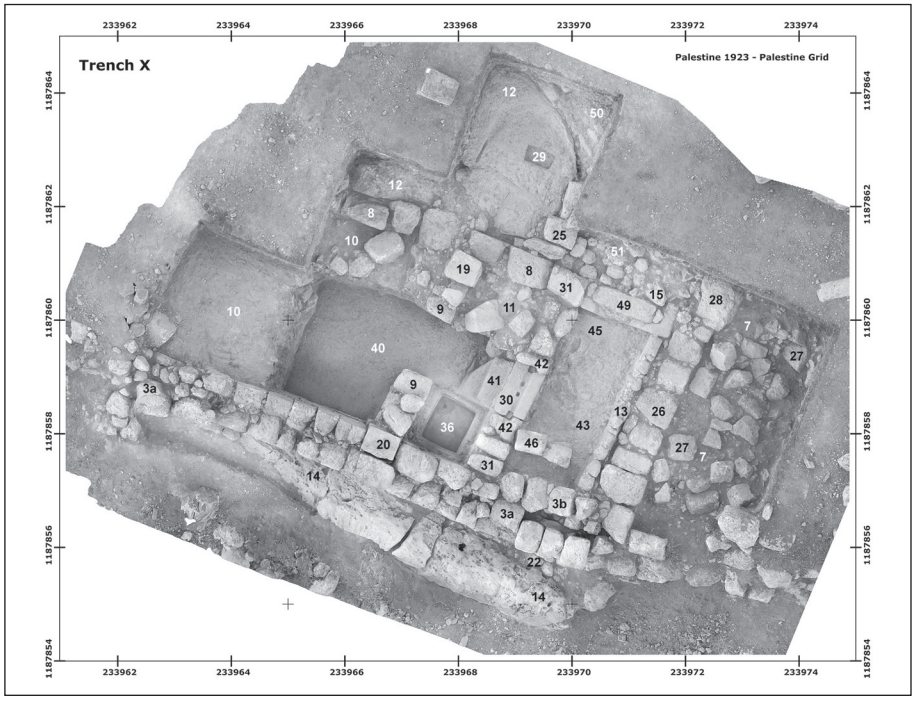
of the large cistern, and this was corroborated by the 2016 work. According to the preliminary results in the westernmost part, the East House was constructed over the concrete floor, and three building phases are traceable before the building was dismantled and covered by a deliberate fill in Umayyad times.

With nine sectors, labelled from a to i and covering a total of 72.5m^2, it was possible to uncover the entire ground level of the East House and also adjacent areas (**Fig. 19**) [Trench supervisor was Malene Byø]. The East House had an elongated rectangular plan with an overall length of 12.61m and a width of 4.85m. Since the entrance corridor at the eastern end was a later addition, the original length of the building was only 10.10m. The interior of this core building was divided into three compartments of different sizes: a larger central room 4.70m in length was flanked by two small compartments, 1.40m long for the western part and 1.20m for the eastern part. The house was integrated with an extensive building complex. On its western side, it was built against one of the terrace-walls, ascending uphill to the north (see **Fig. 1**). Regarding the reuse of the Roman cistern in the Byzantine period and the establishment of the residential quarter next to it, the excavation of a wider area yielded a better understanding of the constructional history (Kalaitzoglou *et al.* in press). The right-angled link between the East House's west wall (J15-O-15B) and south wall (ev. 3a = J15-O-9B), which takes a straight course along the cistern's north edge, makes it likely that the East House belonged to the earliest Byzantine buildings, founded already before the western and northern parts of the cistern were backfilled. East of this house the dense habitation seems to diminish, if not stop, since in sectors f and g no traces of built structures, but only an area filled with debris, was encountered.

Building Phase 1 (Roman)

Roman-Period Quarry Work

North of the East House, in sector e, traces of a stone quarry were discovered in the bedrock (ev. 12) (**Fig. 19**). Only the bottoms of cut channels, arranged in a rectangular shape to form quarry blocks, were preserved. Later, the rock surface was levelled, recognizable by pick marks and rounded edges. A rectangular depression (ev. 29), which is too deep for quarrying a stone block, was worked in later, too. Most of the rock surface was later covered with a thin layer of mortar, of which only scattered remains were found. It is obvious that the traces of quarrying are older than the levelling of the rock in this area. Since the levelling of the rock and the coating with mortar are related to the installation of a street or lane in the Byzantine period, a Roman date is to be supposed for the



19. Trench X, excavated structures.

quarry. Traces of quarrying were also found inside the cistern, and it is therefore evident that the quarry work predates the construction of the cistern.

Roman-Period Cistern

In the Roman period a sediment basin was built as part of the large rock-cut cistern to the south. It was uphill on the bedrock north of the water reservoir [For the dating of the large rock-cut cistern according to the mortar dating, see Lichtenberger *et al*. 2015: 119–127]. The dimensions of the basin are given by the limits of the concrete floor (ev. 40 = ev. J15-O-69), which constituted its bottom. In an east–west direction the floor measures about 8.50m in length and reaches from the top of a rock step at the western end of the East House to the bottom of a rock step (ev. 47) at the western end of the house. The western end of the floor was hidden under the west wall (ev. J15-O-15) of the house. In a north–south direction the floor measured about 4.40m and reached from a rock step, hidden under the north wall (ev. 8) of the house, to the bedding (ev. 24) on top of the northern cistern edge. Although the northern limit is hidden under the north wall, the upper edge of a rock cutting is still visible, and in 2015 the step (ev. J15-O-75) was also detected in the north-west corner of the house (Kalaitzoglou *et al.* in press). Although the dimensions of the basin are similar to the building constructed later above it, the orientation of the mortar floor is slightly different to the house walls built on top of the rock steps. This is obvious especially at the southern buttresses. Since the concrete floor (ev. 40) runs against the bases of the buttresses, at least the buttresses belong to the Roman layout. The south-eastern buttress extends to the north above the line of the south wall (ev. 3a = J15-O-9B), while the south-western buttress (ev. 20) was fully integrated into the Byzantine wall (ev. 3a). The northern sides of both buttresses are in line and parallel to the rock step (ev. J15-O-75) in the north-west corner of the East House. Of the northern buttresses only the north-western (ev. J15-O-76) was fully excavated. Since it rests on a rectangular, rock-cut base in front of the rock step, it is evident that it also belongs to the Roman sediment basin. It is therefore most likely that the base of the north-western buttress (ev. 19) also stems from the Roman period.

It is thus apparent that the rock was not only cut and worked for the quarry, but also later for the sediment basin. This basin seems to have followed the sloping rock surface and thus had to be built with walls. Since the rock slopes down vertically at the western end of the basin, a wall of waterproof masonry must formerly have been attached to this rock edge. No traces of such a wall were found, and it is likely that the wall was removed when the Byzantine building was constructed. The same can be assumed for the southern boundary of the sediment basin. The southern wall was removed when the Byzantine south wall (ev. 3a) was built along the northern edge of the cistern. The bedrock (ev. 14) still displays artificially flattened areas especially south of the eastern end of the sediment basin. This levelled area is outside the later East House but lies directly on the course of the Roman south wall, which had a slightly different orientation. Under the eastern part of the Byzantine south wall (ev. 3a) and the younger wall (ev. 3b), traces of ashlars (ev. 24) are visible. Since the Byzantine wall (ev. 3a) was built of coarsely shaped stones and rests on a foundation (ev. 22) of soil and smaller stones, it is likely that the stone bedding was initially prepared for the well-dressed blocks of the Roman sediment basin.

The northern wall of the basin was also dismantled. The excavation of the western part in 2015's Trench O showed that the former wall stood on the northern edge of a low rock-cut wall (Kalaitzoglou *et al.* in press). The north wall (ev. 8 = J15-O-42) of the East House, which substituted the Roman wall, was built in dry masonry of soil and stones and was not waterproof. The eastern end of the basin was bordered by a low, vertical rock wall (ev. 47). The higher rock surface (ev. 44) east of the basin is nicely levelled and a rock-cut staircase (ev. 41) leads down to the bottom of the basin. It is thus evident that, although also the eastern wall was removed, the sediment basin was accessible from the east side through a door. To sum up, the remains of the original Roman sediment basin are the northern and eastern rock walls, the bases of the four buttresses and the concrete floor, as well as the staircase and the levelled

area east of it. The buttresses suggest that the sediment basin was once covered by a roof.

Immediately south of the staircase a small square basin (ev. 36), which was cut into the bedrock and was used to collect the sediment during the cleaning of the sediment basin, is situated. In a low circular depression in the north-east corner of the square basin, the leftover sediment was collected and cleaned out. The upper half of the square cleaning basin was lined with strong hydraulic mortar (ev. 38), and the seam where this mortar meets the concrete floor (ev. 40) was covered by an additional mortar layer (ev. 48). Further evidence for the practical operating of the sediment basin are vertical canals at the southern edge of the bedrock (ev. 14). Since these canals were washed out by running water, it is likely that the overflow of the sediment basin was situated next to them, in the vicinity of the south-eastern buttress (ev. 20). However, because of the Byzantine remodelling, it still remains an open question how and from where the sediment basin was filled with water.

Dating evidence for the sediment basin is available only from charcoal samples. One sample taken from the underlay of the concrete floor (ev. 40) gives a radiocarbon date in the 3rd or early 4th century AD, which matches phase 2a of the large Roman cistern, during which it was still in use and underwent repairs [Sample no. 25865 (J16-Xd-100-1), Department of Physics and Astronomy, Aarhus University (Denmark), C_{14} age 1766±36BP, d13C (AMS) -24.00±1.00, calibration curve IntCal13, 1σ 231-333AD (231-333AD, 68.2%), 2σ 138-380AD (138-200AD, 11.1%; 206-357AD, 81.9%; 366-380AD, 2.4%). For the phases of the cistern, *cf.* Lichtenberger *et al*. 2015: 125]. Another charcoal sample was taken from the hydraulic plaster (ev. 48), which coated the edges of the cleaning basin (ev. 36). The embedded charcoal is much older and dates to the 1st or early 2nd century AD, matching with phase 1 of the cistern [Sample no. 25864 (J16-Xd-101-1), Department for Physics and Astronomy, Aarhus University (Denmark), C_{14} age 1948±33BP, d13C (AMS) -13.00±2.00, calibration curve IntCal13, 1σ 6-84AD (6-84, 68.2%), 2σ 34BC-127AD (34-31BC, 0.8%; 21-11BC, 2.8%; 2BC-127AD, 91.9%).]. The dating of the earliest phase of the sediment basin in the 1st/2nd century AD supports the idea that the cistern was built in connection with the expansion of Gerasa that took place under the emperors Trajan and Hadrian.

Building Phase 2 (Byzantine)

In this phase, when the cistern and sediment basin had fallen out of use, but the cistern had not yet been backfilled, the East House was constructed on top of the sediment basin. For the construction of a main room flanked by small compartments, the older walls were removed and only the bases of the buttresses were reused to support two arches. The arches spanned the house from north to south and supported the ceiling of the building. Some of the wedge-shaped stones of the arches are still *in situ*. Of the walls, first the south wall (ev. 3a) was built along the northern edge of the Roman cistern (see **Fig. 19**). Since this wall had to carry much load, it was built of two faces with a core fill (ev. 23) and it rested partly on bedrock (ev. 14) and partly on a foundation fill (ev. 22). This wall with a thickness of 0.85m continued further east beyond the eastern end of the building. In the next stage, the north wall (ev. 8) together with the east wall (ev. 31) were built on top of the bedrock edges; the north wall (ev. 8) was also set against the cut edge of the bedrock (ev. 12). In the east wall (ev. 31) a door (ev. 42) with threshold (ev. 30) was installed directly in front of the rock-cut staircase (ev. 41). The entrance of the East House was thus situated in the east on the central axis of the building. The concrete floor (ev. 40) was still intact and also served as a floor for the new building. The rectangular cleaning basin (ev. 36), situated next to the staircase, remained open with unknown function. Below the arches, walls with door openings were built (ev. 9) against the buttresses. While the door under the eastern arch was situated in the centre, the door under the western arch was not on the same axis. The area to the east, in front of the entrance, was not modified in this phase.

Since most of the structures were built on top of the bedrock or on older structures, the dating of this building phase is hindered by a lack of datable finds in the foundation fill (ev. 22). The finds from the core (ev. 23) of the south wall (ev. 3a), especially those from the eastern end, are mixed and seem to stem mostly from later

periods. Since the cistern fell out of use as a water reservoir in the 5th/6th century AD (Lichtenberger *et al.* 2015: 125), the Byzantine house was built immediately or soon after.

Building Phase 3a (Byzantine)

In this phase an entrance corridor was added to the east side of the house (see **Fig. 19**). Hence, the main entrance to the building was shifted from the east to the north. First a door, of which only the threshold (ev. 49) is preserved, was built from the east against the north-east corner of the house. Then a thin, low wall (ev. 13) made of a row of single stones and mortar as binder was built between the threshold and the south wall (ev. 3a). Since the wall (ev. 13) was covered with plaster on all sides and on top, it is evident that the wall (ev. 26) was built against it later, but the function of such a low and thin wall remains unknown. The wall (ev. 26) was constructed against the eastern side of the threshold (ev. 49) and against the south wall (ev. 3a) from the north, and thus it closed the entrance corridor to the east. The gap between the walls (ev. 13 and 26) was filled with soil and small stones. It is possible that the low wall (ev. 13) served as a bench in front of the new east wall (ev. 26). A row of stone steps (ev. 44) was laid on the inside against the threshold (ev. 49) and between the walls ev. 13 and 33, probably to facilitate easier access. Inside the entrance corridor, a mortar floor (ev. 43) was laid on top of the bedrock (ev. 45) and against all adjacent structures.

The area north of the East House and the new entrance were also altered in this phase. Between the bedrock (ev. 12) and the entrance (ev. 49), a short and low wall-like structure (ev. 25) was built against the north wall (ev. 8). Its western side is not straight but seems to follow the shape of the levelled bedrock. The space between this structure and a bedrock outcrop (ev. 28) was backfilled with soil (ev. 18) and a dense packing of stones (ev. 15). This foundation fill was covered by a layer of mortar (ev. 51) and served as the surface of a lane. This lane or path obviously led around the retaining structure (ev. 25) as well as the bedrock (ev. 12) and continued in a westerly direction. Traces of a mortar surface (ev. 50) uncovered on the north side of the bedrock surface (ev. 12) as well as the spots of mortar on top of the levelled bedrock belong to this evidence, which has to be interpreted as a lane.

An exact dating of this building phase is impossible since no datable objects were associated with the structures or their foundations.

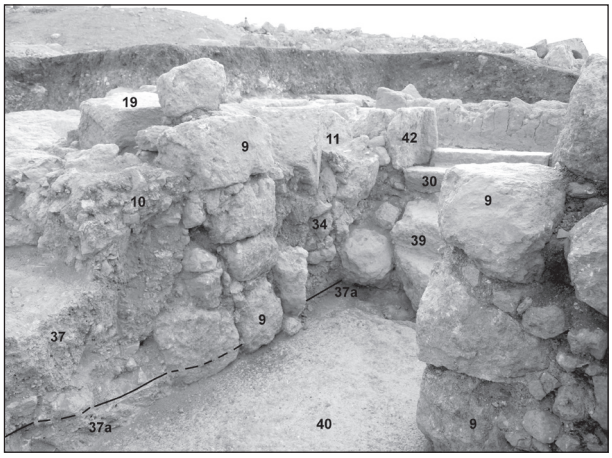
Building Phase 3b (Late Byzantine/Early Umayyad)

In this subphase only minor alterations took place, and the floor levels were raised in both parts of the East House (see **Fig. 19**). Floors of compressed soil were laid in the entrance corridor (ev. 33) as well as in the main room (ev. 37a). Although not physically connected, it is most likely that both floors were contemporary, because both floors were the last walk-on levels. In this subphase the cleaning basin fell out of use and was backfilled with reddish soil (ev. 35) and covered by the new floor ev. 37a (**Fig. 20**).

Since the top of the main-room floor (ev. 37a) was destroyed and backfilled in the following period, it is hardly possible to trace its surface. This implies that finds from the floor surface are lacking. Since mostly only compressed soil was used for the floors, the floor ev. 33 did not contain any pottery or other finds. There are some finds, however, from the basin fill (ev. 35). The youngest finds were produced in the Late Byzantine/Early Umayyad period such as a cooking pot (**Pl. 1.7**). This seems to be the period of this subphase.

Building Phase 4 (Umayyad)

In the last phase the East House, like the buildings west of it, was dismantled and the walls cut down. Most of the debris was dumped

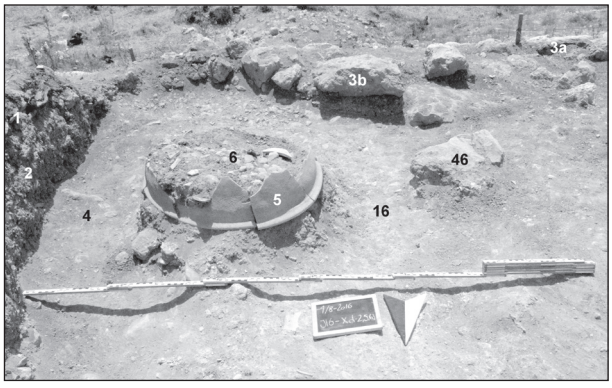


20. Trench X, debris and floor levels (ev. 37a and 40) inside the building, view from the west.

into the house or deposited in the open space east of the entrance corridor (see **Figs. 19-20**). A first layer of debris (ev. 34 and 37) filled the interior of the East House up to the threshold (ev. 30), while in the entrance corridor a thick layer (ev. 32) of ashy soil mixed with pottery and bone was filled in. On top of this layer a shed was installed, which consisted of a short rubble wall (ev. 3b) built above the ruins of the south wall (ev. 3a), the two stones (ev. 46) placed in front of this wall and a large stone (ev. 17) north-east of the stones. The large stone (ev. 17) served as the base of a bread oven (ev. 5). The oven was made of a large Grey Ware basin placed upside down above a fill of small limestones, which were rounded and fractured due to heating (**Fig. 21**). Heated stones were probably used to bake bread on the flat bottom of the vessel [For the features of heated stones used for boiling or baking, see *e.g.* Petraglia *et al*. 2005]. This installation above the former entrance corridor served as the ephemeral place of workmen employed on the destruction and backfilling of the area. In a next stage, the interior of the house was backfilled with additional layers of debris (ev. 10 and 11) and also the ephemeral place was filled in (ev. 16). The remaining walls of the entrance corridor were dismantled and the stones (ev. 27) deposited east of the corridor together with soil (ev. 7), which partly covered the remains of the walls ev. 13 and ev. 26 (see **Fig. 19**). The entire area was then covered by two thick fill layers (ev. 2 and 1).

The dating of the destruction and backfilling relies on the dating of the oven (ev. 5 and 6) used during part of the process. The type as well as the decoration of the Grey Ware basin (ev. 5) are typical of the Umayyad period (**Pl. 7.45**). This also applies to some cooking-pot and coarse-ware sherds (**Pl. 11.61**) found among the heating stones (ev. 6) below the vessel. Two samples taken from the ashes between the stones of ev. 6 do not match with this dating since they are both too old and give a Roman date [Sample no. 25942 (J16-Xd-6-7), Department for Physics and Astronomy, Aarhus University (Denmark), C14 age 1820±31BP, d13C (AMS) -24.00±1.00, calibration curve IntCal13, 1σ 139-235AD (139-199AD, 45.1%; 205-235AD, 23.1%), 2σ 90-321AD (90-101AD, 1.2%; 123-258AD, 90.1%; 296-321AD, 4.0%). Sample no. 25943 (J16-Xd-6) is from an olive, Department for Physics and Astronomy, Aarhus University (Denmark), C14 age 1824±46BP, d13C (AMS) -22.00±1.00, calibration curve IntCal13, 1σ 130-242AD (130-242AD, 68.2%), 2σ 80-327AD (80-261AD, 85.2%; 278-327AD, 10.2%)]. Maybe older building material was burnt in the fire.

The coin finds underline that, although older coins dominate the filling of the house, the levelling of the terrain happened in Umayyad times. In the lowermost debris and fill layers (ev. 32, 34 and 37) eleven coins were found, all of which date to the Late Roman period. The 29 coins found in the covering fills ev. 10, 11 and 16 are also from the Late Roman period. Of 22 coins found in the smaller fill deposits ev. 4 and 7, only a few were of Early Byzantine date. From the covering fill layer (ev. 2) more than 90 coins were collected, which almost all stem from the Late Roman period. Younger coins were only present in the thick layer of topsoil (ev. 1). Although the top of this layer is contaminated by modern material, the lower part belongs to the original deliberate fill. Also in this uppermost fill layer, Late Roman coins predominate, while Byzantine coins are rare, and only two Umayyad post-reform coins from the first half of the 8th century AD attest that the filling activity took place in Early Islamic times [The two post-reform fals are J16-Xd-1-5 and J16-Xf-1-70]. Since the dismantling and levelling is manmade and not the result of an earthquake, it is obvious that it happened some time before the earthquake of 749AD. The situation in this area is remarkable because of the high amount of coins that was found here. This evidence needs further explanation, but it is clear that during the



21. Trench X, Umayyad tabun in fill layers, view from the north.

Umayyad period a substantial amount of older coins were still in circulation in Jarash.

The pottery in ev. 32, 34 and 37 dates from the Byzantine to the Late Byzantine or Early Umayyad period (**Pl. 2.16**). The finds from the covering layers ev. 10, 11 and 16 are chronologically mixed, but in ev. 10 and 11 Umayyad finds are attested (**Pls. 3.25-26** and **4.31**). One Late Byzantine to Early Umayyad lamp mould (**Pl. 17.93**) was identified. In the fills ev. 4 and 7, a diversity of shapes and functional groups is present among the pottery of which the youngest dates to the Umayyad period. In the covering layer ev. 2 large amounts of pottery were found (**Pl. 3.24**), ranging chronologically from Late Roman to Middle Islamic times, as well as a Byzantine stamp (**Pl. 20.116**), several worked bones (**Pls. 22.127** and **22.129-130**) and a bracelet (**Pl. 23.147**). The Middle Islamic finds are intrusive since the southern parts of ev. 2 and also ev. 1 are eroded and partly washed into the cistern.

CATALOGUE

Chronology

Hellenistic	: 332-63BC
Roman	: 63 BC - 250AD
Late Roman	: 250-400AD
Early Byzantine	: 400-450AD
Byzantine	: 450-550AD
Late Byzantine	: 550-640AD
Late Byzantine /Early Umayyad	: 600-700AD
Umayyad	: 640-749AD
Abbasid	: 700-1000AD
Fatimid	: 11th to 12th century AD
Ayyubid	: 12th to mid 13th century AD
Mamluk	: mid 13th to 16th century AD
Ottoman	: 16th century to WWI

Arrangement of the Catalogue

Catalogue number and plate
Inventory number
Short description
Measurements (in cm)
Fabric [The fabric of the wheel-thrown pottery is described by fabric code. As a point of departure mould-made and handmade pottery, as well as other find group entries (*e.g.* tiles), are described using the Munsell Colour Charts as colour codex]
Further description, if necessary

References

Date [The date is given by references and context. Finds without references are dated by context].

Catalogue Abbreviations

AE	: copper-alloy ('bronze')
D.	: depth
Deco.	: decoration
Diam.	: diameter [The max. diam. is given]
ext.	: exterior
FE	: iron
H.	: height
int.	: interior
L.	: length
PB	: lead
T.	: thickness
W.	: width
Wt.	: weight (in g)

Catalogue Authors

Inked drawings by Heike Möller, Line Egelund Nielsen, Mette Pedersen, Alex Peterson and Nicole Pieper **(pls. 20.115** and **21.121)**.
Plate layout: Heike Möller.
Photos of catalogue finds: Philip Ebeling and Steff Elgaard Wiklund.
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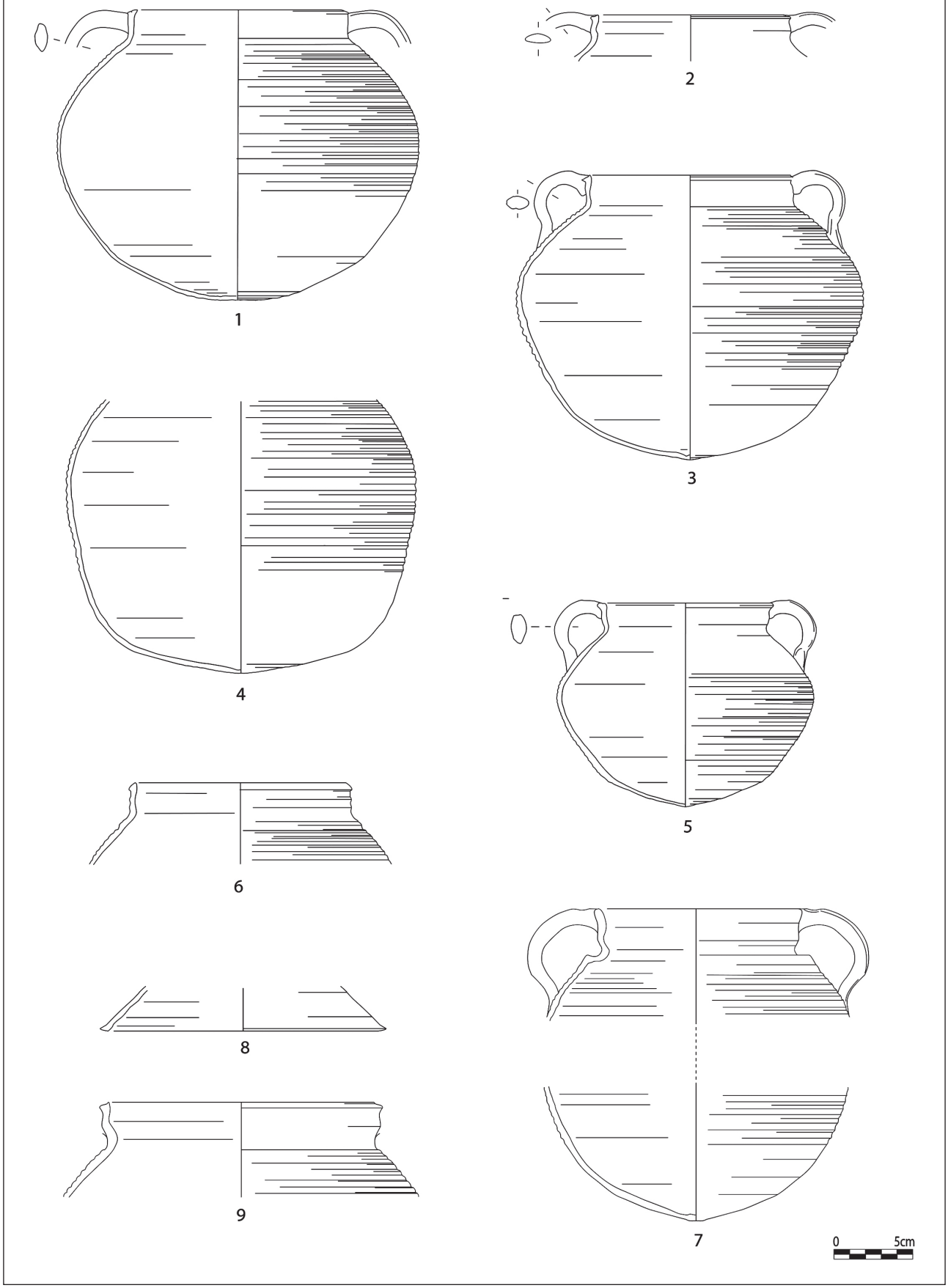
CE : Christoph Eger (metal)
SK : Signe Krag (jewellery)
AL : Achim Lichtenberger (terracotta, marble, limestone)
HM : Heike Möller (pottery)
AP : Alex Peterson (Mamluk and later finds)
RR : Rubina Raja (terracotta, marble, limestone)
SR : Sara Ringsborg (stone objects)

Introduction

The catalogue aims to present a representative spectrum of the finds from the Northwest Quarter in Jarash stemming from the 2016 campaign [Preliminary registration reports for earlier campaigns include: Lichtenberger, Raja and Sørensen 2013; 2017; 2018; Kalaitzoglou *et al*. 2021]. Since Jarash was a large production centre from at least the Late Hellenistic and Early Roman periods to Early Islamic times, most of the material, with special regards to the pottery, is of local origin [On Jarash as production centre, *cf.* Uscatescu 1996; numerous articles in Zayadine (ed.) 1986 (Jarash Archaeological Project 1981-1983); articles concerning the kiln sites of Byzantine and Umayyad date, Pierobon 1984 and more recently Kehrberg 2009: 493-512; 2011; Brizzi, Sepio and Baldoni 2011: 345-69].

Typology by Functional Groups (HM)

The catalogue follows the pottery typology arranged according to functional groups and is structured according to five categories [as described in the last report, Kalaitzoglou *et al*. in press]:


1
2
3
4
5
6
7
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9
0
5cm

- **Cooking ware:** all vessels used on fire to prepare food.
- **Tableware:** vessels used on table.
- **Common ware**: all vessels not used on table or for cooking – in Jarash mainly food preparation and storage jars.
- **Transport vessels:** all vessels used for transporting goods – in Jarash exclusively amphorae.
- **Domestic furnishing** and **other specialized vessels:** *e.g.* lamps and lanterns.

Throughout the catalogue, locally or regionally produced vessels are mentioned first followed by imported finds. The vessels of Roman up to Early Islamic production, presented in the catalogue, are wheel thrown (**Pls. 1-13**). Only a few pieces are mould-made such as the Ottoman pipe and all lamps (**Pls. 16-17**). Handmade pottery only occurs in the Middle Islamic period (**Pls. 14-15**).

Fabric Types[2] *(HM)*

To better understand the local production and its distribution, it is necessary to identify the geochemical fingerprints of the local wares. To characterize the geochemical fingerprint of the local production, the 2015 campaign focused on intensive studies of the local/regional fabric in order to go beyond a simple description of visual fabric and preliminary grouping [Preliminary fabric description and congruence to fabric codes of other excavated areas, *cf.* Lichtenberger, Raja and Sørensen 2013: 14-15; 2017. Earlier fabric studies concerning early pottery production in Jarash have been made by Braemer 1989. For later productions see Watson 1989, concerning 'Jarash Bowls', and Uscatescu 1996. Most recently, Tarboush 2015]. The samples were chosen based on their functional groups and their chronology, making it possible to trace small changes in fabric due to chronological aspects, *e.g.* changes in production techniques, and those changes caused by functional aspects, *e.g.* the use of the vessel as a cooking pot. Representative samples of each local/regional fabric group went through elemental mass spectrometry and petrographical analyses. The results proved that the pottery was made using the same type of clay over centuries (*cf.* Merkel and Prange in press). Only different firing conditions made the pottery appear in different colours: **Orange Ware** (**OW**) and **Grey Ware** (**GW**) [The codes used in the catalogue: GW: Grey Ware; OW: Orange Ware; RW: Red Ware. For descriptions of fabric, see Merkel and Prange in press. These categories are preliminary and further studies have to be undertaken to define subgroups, however, the vessels in the catalogue are generally made of the same main fabric. Since the imported finds have not yet been analysed, a full description of the fabric is given in the catalogue, unless a standardized code can be used, as is the case for African Red Slip Ware, for example]. In Umayyad times a **Red Ware** (**RW**) occurs.

Apart from the abovementioned main fabrics, some other fabric types do exist that differ in colour, but more importantly have different inclusions. These fabric types still require further analyses to clarify, whether they have been imported regionally or are of local origin but from a different clay deposit (Merkel and Prange 2021: Samples 16-18).

Cooking Ware (HM)

Cooking Pots and Lids

Many cooking pots are globular in shape with a ribbed surface, oval-shaped vertical handles and a round, sometimes slightly knobbed, base (**Pl. 1.1-5**). These Roman cooking pots can carry an incised groove on top of the rim or have a wedge-shaped rim while they are extremely variable in size. Some of the cooking pots were found in intentional deposits, as is the case with some of the objects found in Trench S (*cf.* **Figs. 3-4**) (ev. 32) [Concerning intentional cooking-pot deposits at Late Roman Jarash, see Lichtenberger and Raja 2015b].

Almost similar in shape, and also with a wedge-shaped rim, are cooking pots of the Late Byzantine to Early Umayyad production (**Pl. 1.6**). At the same time examples with an S-curved neck occur (**Pl. 1.7** and **1.9**). Lids with slightly cut rim can be associated with cooking pots (**Pl. 1.8**).

A cooking pot from the latest production sequences, during Early Islamic times, was found in a closed context in Trench U (**Pl. 2.10**). It was associated with a bag-shaped amphora (**Pl. 11.65**) and is part of the original content of the room before its collapse. In contrast to the earlier vessels, the pot is not heavily ribbed, and the handles are not as looped as their predecessors.

In general, many of the vessels categorized as cooking ware do not show any traces of burning and could also have been used as storage jars.

Cooking Pots

With Incised Groove on Top of the Rim

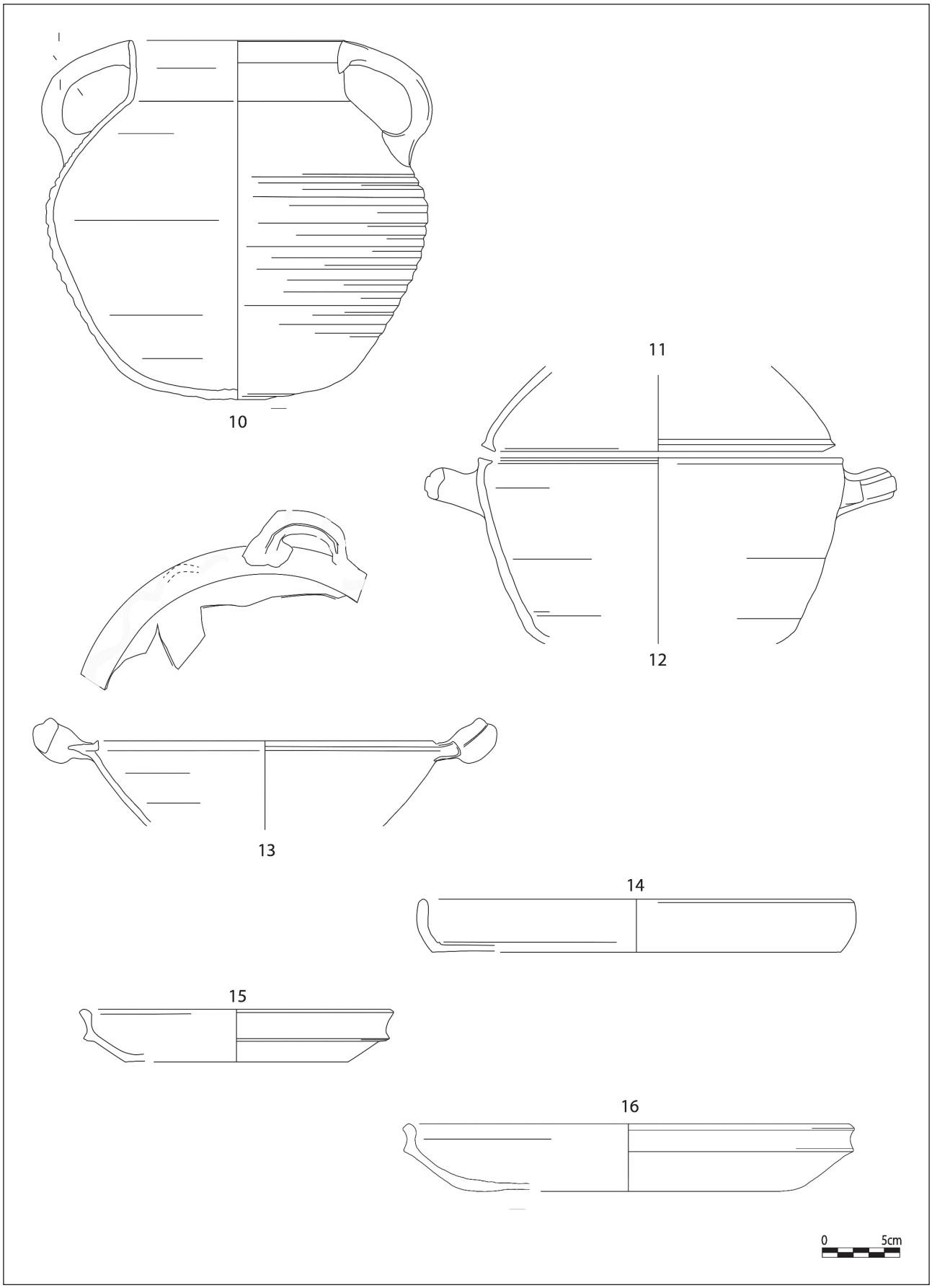
1.
Pl. 1.1
J16-Sbc-48-9
Intact profile
Diam.: 18.8
Fabric: OW
Two oval handles attached vertically at rim. Round base.
References: Uscatescu 1996: 136 (Type XXXIV-5) and pl. 38.31-32, with further references. Date: Late Roman; slightly earlier in date, *cf.* Brizzi, Sepio and Baldoni 2011: 360-362, fig. 10.7 from a context dating to the beginning of the 3rd century AD.
Date: Roman to Late Roman.

2.
Pl. 1.2
J16-Wd-44-16
Rim
Diam.: 12.8
Fabric: OW
Two oval handles attached vertically at rim.
References: Uscatescu 1996: 136 (Type XXXIV-5) and pl. 38.31-32, with further references. Date: Late Roman; slightly earlier in date, *cf.* Brizzi, Sepio and Baldoni 2011: 360-362, fig. 10.7 from a context dating to the beginning of the 3rd century AD.
Date: Roman to Late Roman.

With Wedge-Shaped Rim and Pointed Lip

3.
Pl. 1.3
J16-Sj-106-3
Intact profile
Diam.: 13.1

2. Microscopic analyses of all fragments have been made on site on the fresh break, using magnifying glasses with 10× and up to 20× magnification. A catalogue of all collected fabrics with fabric codes is used as a reference during the campaign.


10
11
12
13
14
15
16
0
5cm

Fabric: OW
Two oval handles attached vertically at rim and shoulder. Round, slightly knobbed base.
References: Clark and Falkner 1986: 248, fig. 20.5-6. Date: 4th to 5th century AD; Lichtenberger, Raja and Sørensen 2013: 36-37, figs. 96-97, with further references.
Date: Late Roman to Early Byzantine.

4.
Pl. 1.4
J16-Sh-67-1
Base
Diam.: 21.8 (broadest part)
Fabric: OW
Round, slightly knobbed base
References: similar to Uscatescu 1996: 136 (Type XXXIV-5) and pl. 38.31-32, with further references. Date: Late Roman; slightly earlier in date, *cf.* Brizzi, Sepio and Baldoni 2011: 360-362, fig. 10.7 from a context dating to the beginning of the 3rd century AD; Clark and Falkner 1986: 248, fig. 20.5-6. Date: 4th to 5th century AD; Lichtenberger, Raja and Sørensen 2013: 36-37, figs. 96-97, with further references.
Date: Late Roman to Early Byzantine?

5.
Pl. 1.5
J16-Sc-53-1
Intact profile
Diam.: 10.9
Fabric: OW
Two oval handles attached vertically at rim and shoulder. Round, slightly knobbed base.
References: similar to Uscatescu 1996: 136 (Type XXXIV-5) and pl. 38.31-32, with further references. Date: Late Roman; slightly earlier in date, *cf.* Brizzi, Sepio and Baldoni 2011: 360-362, fig. 10.7 from a context dating to the beginning of the 3rd century AD; Clark and Falkner 1986: 248, fig. 20.5-6. Date: 4th to 5th century AD; Lichtenberger, Raja and Sørensen 2013: 36-37, figs. 96-97, with further references.
Date: Roman to Early Byzantine?

6.
Pl. 1.6
J16-Wc-31-8
Rim
Diam.: 14.0
Fabric: GW
References: Uscatescu 1996: 118 (Type XXXIV-4) and pl. 78.439-439, with further references; Brizzi, Sepio and Baldoni 2011: 362-365, fig. 11.7 from a context dating to the mid 6th to the beginning of 7th century AD.
Date: Late Byzantine to Early Umayyad (6th to 7th century AD).

With S-Curved Neck

7.
Pl. 1.7
J16-Xc-35-8
Rim and base, reconstructed
Diam.: 13.1
Fabric: GW
References: Lichtenberger, Raja and Sørensen 2017: figs. 86-87 and fig. 95; Kalaitzoglou *et al.* 2021: fig. 9; Uscatescu 1996: 135-136 (Type XXXIV-3, subtype 3D-G) and pls. 83.509-516 and 84.517, 520, with further references.
Date: Late Byzantine to Early Umayyad (6th to 7th century AD).

8.
Pl. 1.8
J16-Tb-66-2
Rim
Diam.: 17.9
Fabric: OW
Lid with slightly cut rim
References: -
Date: Early Umayyad to Umayyad?

9.
Pl. 1.9
J16-Ta-46-2
Rim
Diam.: 17.8
Fabric: GW
Handle attachment visible at the rim
References: Lichtenberger, Raja and Sørensen 2017: figs. 86-87 and 95; Kalaitzoglou *et al.* 2021: fig. 9; Uscatescu 1996: 135-136 (Type XXXIV-3, subtype 3D-G) and pls. 83.509-516 and 84.517, 520, with further references.
Date: Late Byzantine to Early Umayyad (6th to 7th century AD).

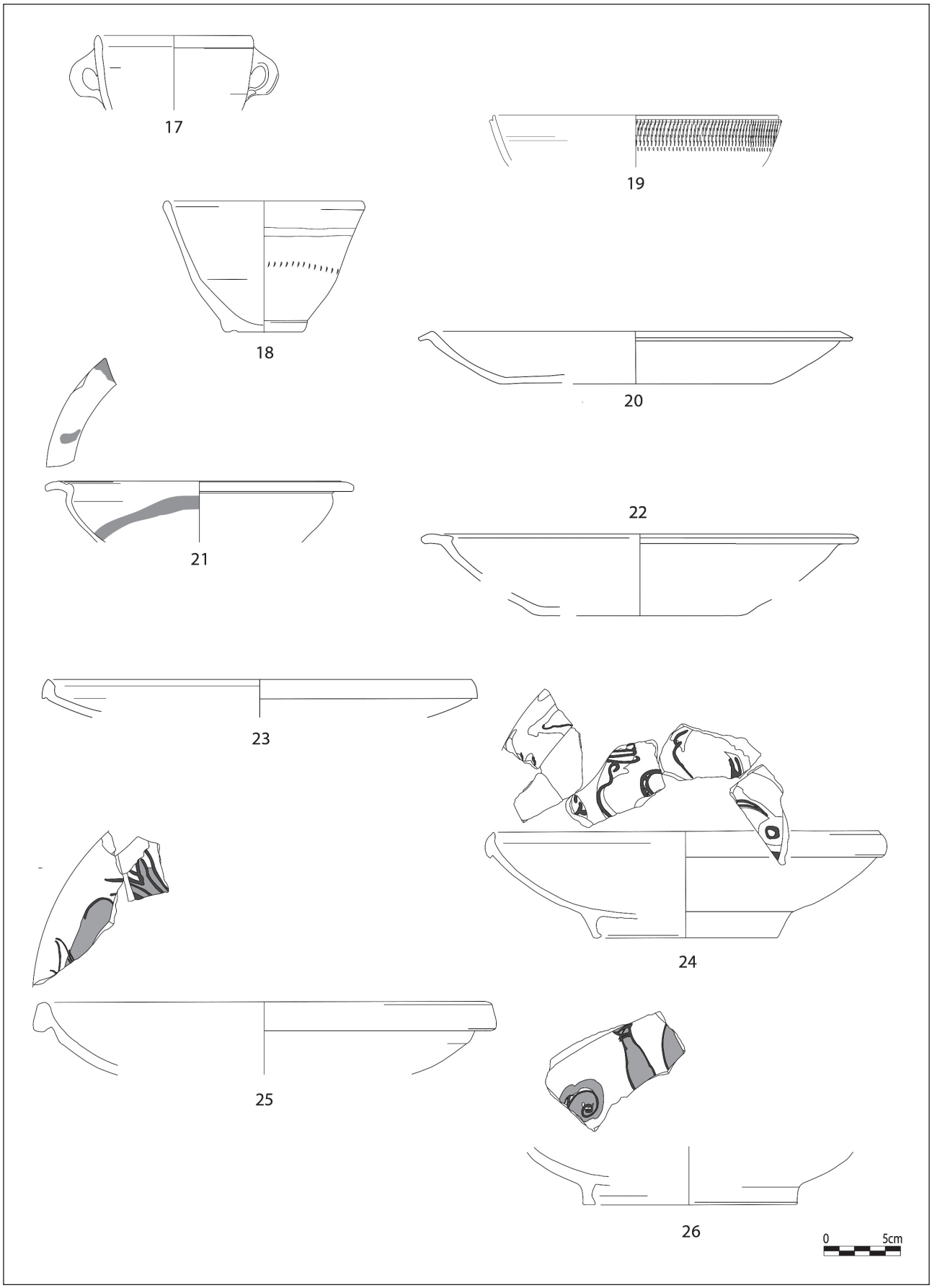
With Straight Neck

10.
Pl. 2.10
J16-Uc-71-2
Intact profile
Diam.: 13.7
Fabric: OW
References: Lichtenberger, Raja and Sørensen 2018: fig. 63, from an Umayyad destruction layer (earthquake 749AD); Uscatescu 1996: 137 (Type XXXIV-6C) and pl. 104.718, with further references.
Date: Umayyad.

Casserole/Pan

The open forms attributed to cooking wares are in general represented by casseroles with a cut rim and horizontal, wide 'double-folded' handles attached slightly below the rim. A few kiln sites in Jarash are known to have produced this type of vessel (*cf.* Schaefer and Falkner 1986: 431-35; Montlivault 1986: 71; Uscatescu 2003: 551-53). The earliest production occurs in Late Roman/Early Byzantine times and continues with slight changes in execution up to Umayyad times (Uscatescu 2003: 551-53, fig. 4.42-45). A lid with a cut rim belongs to this type of vessel [Concerning the production process, *cf.* Uscatescu 1996: 300, fig. 1-13]. The casserole with lid presented in the catalogue stems from an earthquake-destruction layer in Trench V. The production date of this vessel points to a period prior to 749AD (**Pl. 2.11-12**).

Other casseroles with an outward-directed rim and an internal ledge of different widths are also numerous in Jarash, being mostly of local production. Our example has small, horizontal looped handles and irregularly set painted decoration on the rim and handle (**Pl. 2.13**). Other variations occur with elongated handles attached directly to the rim (Kalaitzoglou *et al.* 2021: fig. 16).


17
19
18
20
21
22
23
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25
26
0
5cm

The shape of a pan of Late Roman local production, possibly made in one of the kiln sites in the Hippodrome, is reminiscent of African Cooking Ware, African Red Slip (ARS) [Possibly related to Hayes 1972, ARS Form 181]. The inside of the vessel is covered with a thick slip, a non-stick coating (**Pl. 2.14**). Two other carinated vessels, possibly pans too, differing in diameter, with horizontal rim, and of later date (Byzantine or Early Umayyad) show the same treatment (**Pl. 2.15-16**). Both types also occur as tableware with white circles on the inner base (*cf.* Uscatescu 1996: 337). The slip of later types is much thinner than the one of the pans presented here.

Casserole, Lid
With Cut Rim

11.
Pl. 2.11
J16-Vac-61-20
Rim
Diam.: 22.5
Fabric: OW
References: Uscatescu 1996: 106-107 (Type XVI-1A), pl. 73.381-385, with further references. Montlivault 1986: 71, pl. 19.2, referring to a Byzantine workshop in Jarash producing this type of pottery; Schaefer and Falkner 1986: 431-435, fig. 13.1, referring to an Umayyad workshop in the North Theater in Jarash producing this type of pottery.
Date: Umayyad.

Casserole
With Cut Rim

12.
Pl. 2.12
J16-Vac-61-19
Rim
Diam.: 23.1
Fabric: OW
References: Uscatescu 1996: 106-107 (Type XVI-1A), pl. 73.381-385, with further references; Montlivault 1986: 71, pl. 19.2, referring to a Byzantine workshop in Jarash producing this type of pottery; Schaefer and Falkner 1986: 431-435, fig. 13.1, referring to an Umayyad workshop in the North Theater in Jarash producing this type of pottery.
Date: Umayyad.

Casserole/Pan
With Outward-Turned Rim and Internal Ledge

13.
Pl. 2.13
J16-Tb-66-4
Rim
Diam.: 25.0
Fabric: OW
The looped and double-folded handle is directly attached to the rim. White irregular stripes painted on the handle top and internal side of rim and body.
References: Uscatescu 1996: 109-110 (Type XVI-7), pl. 74.395, with further references; Montlivault 1986: 71, pl. 19.5, referring to a Byzantine workshop in Jarash producing this type of pottery.
Date: Late Byzantine to Early Umayyad (6th to 7th century AD).

Pan
With Rounded Rim

14.
Pl. 2.14
J16-Wd-40-9
Rim
Diam.: 27.8
Fabric: OW
A thick slip is covering the inside of the vessel.
References: Lichtenberger, Raja and Sørensen 2018: figs. 5-6, with further references. Date: Late Roman to Early Byzantine; Montlivault 1986: pl. 17.1. Date: End of the 3rd century AD. Kehrberg 2007: fig. 5.2-7, referring to a Late Roman workshop (E2) in the Hippodrome producing this type of pottery.
Date: Late Roman.

Pan/Plate
Carinated, with Vertical Rim

15.
Pl. 2.15
J16-Wfgh-107-9
Rim
Diam.: 20.0
Fabric: OW
A thick slip is covering the inside of the vessel.
References: Lichtenberger, Raja and Sørensen 2013: 30-31, figs. 65-66. Date: Late Byzantine. Uscatescu 1996: 92-93 (Type XI-2A and 2B), pl. 67.314-322 and pl. 68.323 with further references. Date: Late Byzantine to Early Umayyad (6th to 7th century AD); *cf.* Montlivault 1986: 71, pl. 19.4, referring to a Byzantine workshop in Jarash producing this type of pottery.
Date: Late Byzantine to Early Umayyad (6th to 7th century AD).

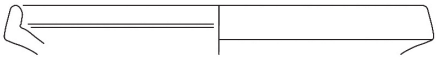
16.
Pl. 2.16
J16-Xh-37-13
Rim
Diam.: 28.4
Fabric: OW
A thick slip is covering the surface of the vessel.
References: Lichtenberger, Raja and Sørensen 2013: 30-31, figs. 65-66. Date: Late Byzantine; Uscatescu 1996: 92-93 (Type XI-2A and 2B), pl. 67.314-322 and pl. 68.323, with further references. Date: Late Byzantine to Early Umayyad (6th to 7th century AD); *cf.* Montlivault 1986: 71, pl. 19.4, referring to a Byzantine workshop in Jarash producing this type of pottery.
Date: Late Byzantine to Early Umayyad (6th to 7th century AD).

Tableware (HM)
Cups, Bowls, Plates and 'Jarash Bowls'

Two cups are presented in the catalogue (**Pl. 3.17-18**). One is of Late Roman date and of local production, probably produced in one of the Late Roman kilns in the Hippodrome (Kehrberg 2007: fig. 3.24). The other, with irregular rouletting on the outside, is an Umayyad production and stems from the earthquake destruction layer in Trench V. The shape in general is not very common in the Northwest Quarter, neither for the earlier nor for the later contexts.



27



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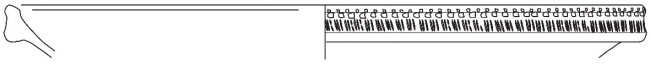

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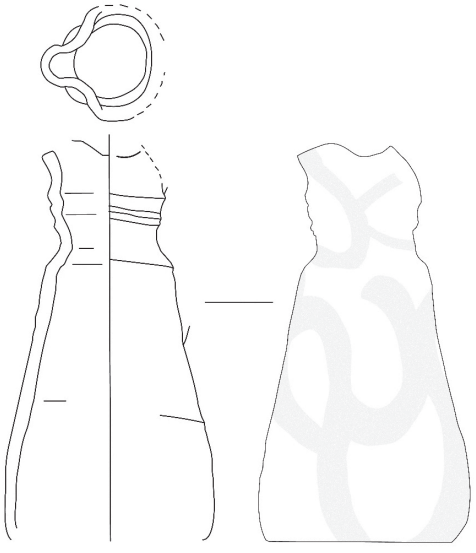

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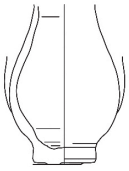


33



In contrast to cups, bowls are very common in Roman and Late Roman contexts, and most of them are of local production (Braemer 1989: 153-167; Kehrberg 2007: fig. 3). The example chosen here is very rare and has a fine rouletting on the exterior, just below the rim and a bifid lip (**Pl. 3.19**).

The largest group of tableware at Jarash comprises the so-called 'Jarash Bowls', a set of locally produced tableware, with typological similarities to African Red Slip Ware (ARS), Late Roman C Ware (LRC) and other widely dispersed tableware produced in the Western and Eastern Mediterranean (Uscatescu 2001; Watson 1989). The name 'Jarash Bowl' is of limited suitability: not all locally produced tableware is included and sometimes it is hard to decide whether one type only relates or actually belongs to that series of production. It is also problematic to decide whether a production is an imitation of imported tableware or whether it is a locally developed shape.

One plate with medium-broad, flat rim could be an imitation of ARS, Hayes form 32/68 (**Pl. 3.20**). It was probably produced at one of the kiln sites in the Hippodrome (Kehrberg 2007: fig. 10). Another plate with a flaring rim and flat base is very common over a wide time span from Roman to Early Umayyad times at Jarash (**Pl. 3.21**). A smaller version with reduced neck and white painting on the inside also exists and is of Late Byzantine to Umayyad date (**Pl. 3.22**).

Clearly defined as 'Jarash Bowls' are three objects with bichrome-painted decoration (**Pl. 3.24-26**) [One misfired bowl was analysed using elemental mass-spectrometry and petrography. It has the same 'fingerprint' as the other locally produced vessels, *cf.* Merkel and Prange 2021]. All stem from Late Byzantine/Early Umayyad contexts. They display a selection of floral/ornamental and anthropomorphic motifs. One undecorated vessel with a slightly overhanging rim is typologically related to the painted ones (**Pl. 3.23**).

Cups
Conical, with Outflaring Rim

17.
Pl. 3.17
J16-Wd-44-5
Rim
Diam.: 19.0
Fabric: OW
The vertical, small handle is attached just below the rim.
References: similar, but without vertical handles, *cf.* Kehrberg 2007: fig. 3.24, referring to a Late Roman workshop (E2) in the Hippodrome producing this type of pottery.
Date: Roman to Late Roman.

18.
Pl. 3.18
J16-Vac-61-91
Intact profile
Diam.: 10.6
Fabric: RW
Very irregular rouletting in one row set on the outside body.
References: Uscatescu 1996: 97 (Type XIII-12B), pl. 68.337, with further references.
Date: Umayyad.

Bowl
With Bifid Rim

19.
Pl. 3.19
J16-Wd-44-3
Rim
Diam.: 12.8
Fabric: OW
Rouletting in seven rows on the exterior just below the rim.
References: similar, but different decoration, *cf.* Kehrberg 2007: fig. 3.26-28, referring to a Late Roman workshop (E2) in the Hippodrome producing this type of pottery.
Date: Roman to Late Roman.

Plate
With Medium-Broad Flat Rim

20.
Pl. 3.20
J16-Ta-45-15
Intact profile
Diam.: 27.8
Fabric: OW
References: type related to Hayes 1972, ARS form 32/58.
Date: Late 3rd/Early 4th century AD. Kehrberg 2007: fig. 10.60-61, referring to a Late Roman workshop (E2) in the Hippodrome producing this type of pottery.
Date: Late Roman.

With Flaring Rim

21.
Pl. 3.21
J16-Sc-13-21
Rim and base, reconstructed
Diam.: 28.1
Fabric: OW
References: Uscatescu 2001: 610 (Form 4A). Date: 4th to 5th century AD, with further references; Kehrberg 2007: fig. 10.56, referring to a Late Roman workshop (E2) in the Hippodrome producing this type of pottery.
Date: Late Roman.

With Flaring Rim, Slightly Convex

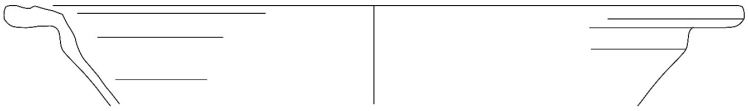
22.
Pl. 3.22
J16-Uc-60-5
Intact profile
Diam.: 20.0
White irregular stripes painted on top of the rim and inside the body.
References: Schaefer and Falkner 1986: 431-435, fig. 11.12. Date: Late Byzantine to Umayyad; Uscatescu 1996: 110 (Type XVII-3E) and pl. 75.402, with further references.
Date: Umayyad.

With Slightly Overhanging Rim

23.
Pl. 3.23
J16-Wd-39-15
Rim



34



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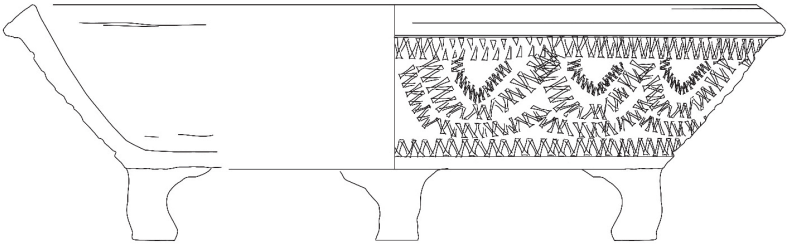

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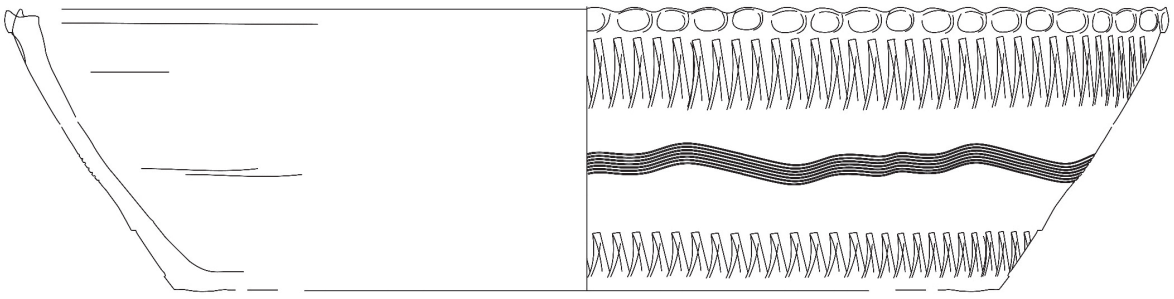


38

0 5cm

Diam.: 27.8
Fabric: OW
References: Lichtenberger, Raja and Sørensen 2013: 22-23, fig. 30, with further references; Watson 1989: fig 1.7g.
Date: Late Byzantine to Early Umayyad.

'Jarash Bowls' with Painted Decoration
With Slightly Overhanging Rim and Hour-Glass-Shaped Ring Base

24.
Pl. 3.24
J16-Xh-2-279
Intact profile
Diam.: 25.9 (rim); 11.9 (base)
Fabric: OW
Bichrome painting on interior; reddish, stylized floral motif and buff, wavy line running across floral pattern.
References: Local production, 'Jarash Bowl': *cf.* Uscatescu 1996: 73, pl. 51.175-176 (Type X-15A and 16A), with further references.
Date: Late Byzantine to Early Umayyad.

25.
Pl. 3.25
J16-Xc-11-38
Rim
Diam.: 29.7
Fabric: OW
Bichrome painting on interior; reddish, stylized floral motif and buff, wavy line running across floral pattern.
References: Local production, 'Jarash Bowl': *cf.* Uscatescu 1996: 72, pl. 50.165 (Type X-10A), with further references; Lichtenberger, Raja and Sørensen 2013: 18-19, fig. 14; Watson 1989: 229, fig. 1.12c and 1.12e.
Date: Late Byzantine to Early Umayyad.

With Hour-Glass-Shaped Ring Base

26.
Pl. 3.26
J16-Xc-11-36
Base
Diam.: 14.0
Fabric: OW
Bichrome painting on interior; reddish, stylized floral motif next to two legs of a human figure.
References: Local production, 'Jarash Bowl': *cf.* Uscatescu 1996: 68-78 (Type X).
Date: Late Byzantine to Early Umayyad.

Tableware Imports (HM)
Western Mediterranean

African Red Slip (ARS) Ware is in general represented by bowls with a plain rim of ARS fabric group C, probably of central Tunisian origin (*cf. e.g.* Bonifay 2004: 50-51; Kalaitzoglou *et al.* in press: fig. 39). Rather rare are the types presented here: one large bowl with a two-part flaring rim, similar to Hayes form 67 (**Pl. 4.27**) and one with a vertical, slightly incurved rim, like Hayes form 61A/B (**Pl. 4.28**). Both are of North Tunisian production, probably made in one of the Late Roman/Byzantine kilns in El Mahrine (*cf.* Hayes 1972).

Outstanding is the find of a cooking-ware lid, made in the same manner as the ARS ware, which is related to Hayes form 195 (**Pl. 4.29**) and was imported from the region of today's Tunisia.

It is the first African cooking ware recorded in Jarash. The low amount of imported cooking ware on a regional and supra-regional level is, in general, most likely due to the high quality of the locally produced cooking ware.

African Red Slip Ware (ARS)
Bowl
With Two-Part Flaring Rim

27.
Pl. 4.27
J16-Sg-21-49
Rim
Diam.: 26.3
Fabric: ARS D1
References: Hayes 1972: 112-116, ARS form 67; Bonifay 2004: 171-173, ARS Type 41B, fig. 92. Date: End of 4th to mid 5th century AD.
Date: Late Roman to Byzantine.

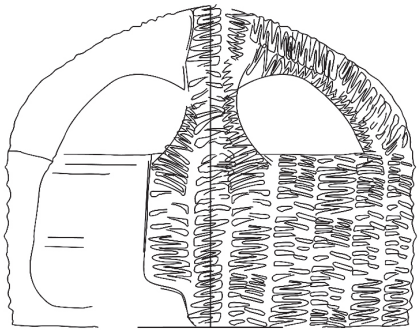
With Vertical, Slightly Incurved Rim

28.
Pl. 4.28
J16-Ta-45-18
Rim
Diam.: 20.0
Fabric: ARS D1
References: Hayes 1972: 100-107, ARS form 61A/B; Bonifay 2004: 167-170, ARS Type 38.B2/B3. Date: 5th century AD.
Date: Byzantine.

29.
Pl. 4.29
J16-Wd-44-2
Rim
Diam.: 24.4
Fabric: similar to Bonifay 2004: 525, culinaire 2?
References: Hayes 1972: 1208, form 195; Bonifay 2004: 227, Type 11 'variante tardive'. Date: Roman/Late Roman.
Date: Late Roman.

Eastern Mediterranean

Late Roman C Ware, also known as Phocaean Red Slip Ware is the eastern counterpart of the western Mediterranean African Red Slip Ware in Jarash. The quantity of imports is slightly lower, but it is one of the types of tableware most imported in Byzantine times. Especially the type with overhanging rims finds similarities in the contemporary local 'Jarash-Bowl' production. The fabric, in general, is light red to reddish brown in colour and well levigated. Small yellowish-white inclusions are frequent. They are covered by a very thin colourless slip, and sometimes, dark discoloration occurs along the vessels' rim due to the firing process [Concerning the fabric of LRC Ware, *cf. e.g.* Ladstätter and Sauer 2005: 146]. Until now, the finds in Jarash cannot be attributed to one production centre. Further analyses are necessary.



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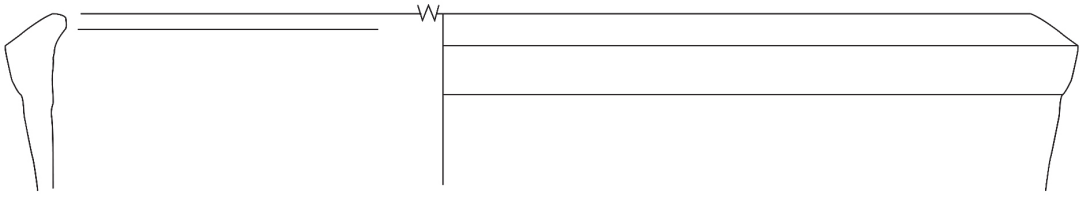

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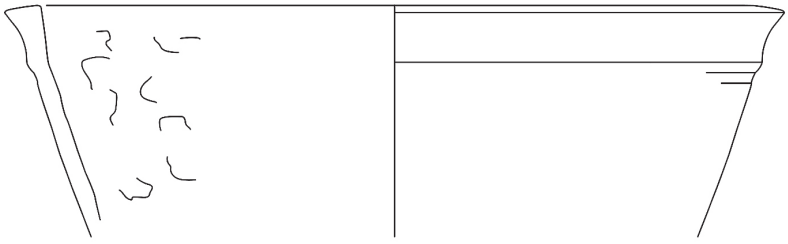

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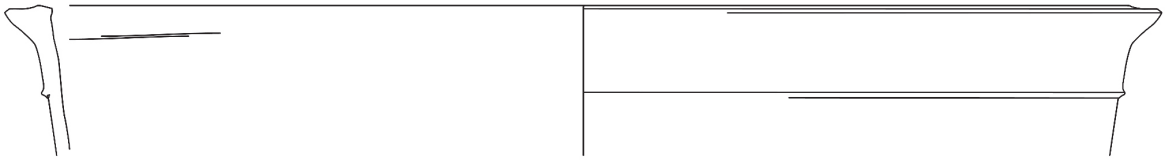


42

0 5cm

Late Roman C Ware (LRC)
Bowl
With Overhanging Rim and Flat Underside, Grooved

30.
Pl. 4.30
J16-Tb-75-7
Rim
Diam.: 25.9
Fabric: Light red-reddish brown in colour and well levigated. Small yellowish-white inclusions are frequent. Thin colourless slip on the inside and outside of the vessel.
References: Hayes 1972: LRC form 3; Ladstätter and Sauer 2005: 171, fig. 3.36-38. Date: 5th century AD.
Date: Byzantine.

31.
Pl. 4.31
J16-Xd-16-15
Rim
Diam.: 29.7
Fabric: Light red-reddish brown in colour and well levigated. Small yellowish-white inclusions are frequent. Thin colourless slip on the inside and outside of the vessel. Rouletting in three rows of different height on the exterior rim.
References: Hayes 1972: LRC form 3; Ladstätter and Sauer 2005: 171, fig. 3.36-38. Date: 5th century AD.
Date: Byzantine.

Tableware (HM)
Trifoiled Jugs, Juglets

Closed-shaped vessels used as tableware are very rare compared to open forms such as plates and bowls, especially in Byzantine and Early Islamic times. Two examples are presented here: one of Umayyad production with a trifoiled rim and white paint (**Pl. 4.32**), the other a small juglet of Byzantine to Umayyad date (**Pl. 4.33**). The latter could have been used as a perfume vessel. It seems that in Late Byzantine/Early Umayyad times the production of smaller jugs diminished, while in Late Roman times especially medium-sized jugs were very common (*cf.* see Kalaitzoglou *et al.* in press: figs. 49-53).

Jug
With Trifoiled Rim

32.
Pl. 4.32
J16-Uc-60-7
Almost intact profile, base is missing
Diam.: 15.2
Fabric: RW
Handle attachments are visible on rim and body, just underneath the shoulder. White, irregular-set, wavy painted patterns cover the whole vessel.
References: related to Uscatescu 1996: 128, pl. 80.482 (Type XXIX-4), with further references;
Date: Late Byzantine/Early Umayyad to Umayyad.

Juglet

33.
Pl. 4.33
J16-Uc-23-25
Almost intact profile, rim is missing
Diam.: 3.1
Fabric: OW
Handle attachments are visible on the lower part of the body.
References: related to Lichtenberger, Raja and Sørensen 2018: fig. 54. Date: Roman to Byzantine; Uscatescu 1996: 128, pl. 40.60-61 (Type XXIV-1 and XXIV-2) and pl. 78. (Type XXIV), with further references.
Date: Late Byzantine to Early Umayyad.

Common Ware/Food Preparation (HM)
Basins, Large Bowls/Pans, Basket

From the Roman period onwards, basins with flaring, slightly profiled rims and a reduced neck are very common (**Pl. 5.35**). Later variants have a steeper rim with an internal flange and some occur as Grey Ware with white stripes on the outside (**Pl. 5.36**). Rather seldom and exclusively of Late Umayyad production are basins with a horizontal, slightly inturned rim, deep red in colour (**Pl. 5.34**).

In Umayyad times a series of new types occur that have no predecessors in earlier Byzantine/Early Umayyad production. One of those types consists of stoves of two different sizes with small legs, a flanged rim and a flat base (**Pl. 5.37**). The vessels' bottoms are covered with small 'grids' and they were used over fire. Further analyses have to show whether the 'grids' functioned as heat conductors or were added for other purposes. All stoves were found in one of the destruction layers of Trench V.

One big bowl or pan has a similar rim profile as the stove, however it is much bigger in size (**Pl. 5.38**). Similar types have been found in the North Theater, where they were produced in one of the kilns (Schaefer and Falkner 1986: fig. 10.7-8). The decoration pattern of these vessels, worked with a triangular tool, occurs already in Late Byzantine/Early Umayyad times, but becomes more common on vessels of later Umayyad date.

Similar decoration patterns cover a basket (**Pl. 6.39**) found in the same Umayyad destruction layer in Trench V. The form of the vessel is unique up to now and confirms a new type-series of local production for some vessel types in Umayyad times.

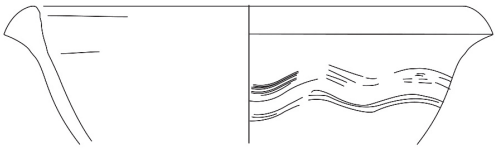
In Byzantine times, large wheel-made basins, carrying traces of irregularly set fingerprints on the interior wall and floor of the vessel, are very common (**Pls. 6.40-42** and **7.43-45**) (*cf.* Kalaitzoglou *et al.* in press, with further discussion). This characteristic treatment occurs on numerous types, all of which are large basins or large storage jars (see below) from the Byzantine period onwards into Umayyad times. Vessels are made mainly of Grey-Ware fabric.

While the large basin with a horizontal rim overlapping the outer rim can be found in contexts of Byzantine and Umayyad times (**Pl. 6.40-42**), the ones with a thickened rim and wavy comb decoration were developed later and were not produced before Umayyad times (**Pl. 7.43-45**). The finds assemblages of the destruction layers in Trench V show both types of large vessel, underlining the continuity of production and furthermore the invention of a new type.

In Trench X one of the large basins was reused as a *tabun* (*cf.* (see **Fig. 21**) ev. 5). It was placed upside down in the ground and filled with small rounded stones that stored the heat (**Pl. 7.45**).

Basins
With Horizontal Rim, Slightly Inturned

34.
Pl. 5.34
J16-Uc-23-2



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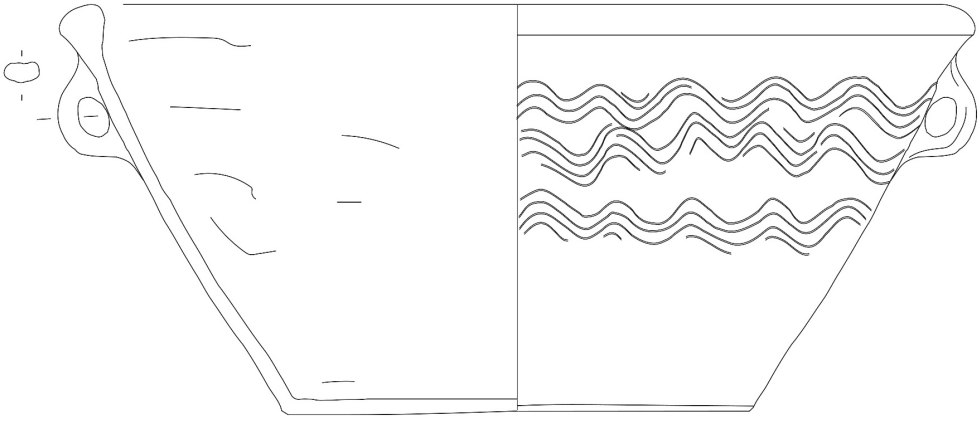

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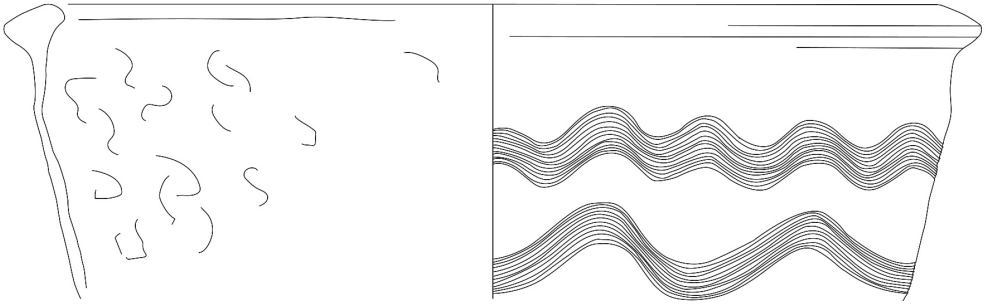


45



0 5cm

Rim
Diam.: 27.5
Fabric: RW
References: similar to Walmsley 1986: 351-353, fig. 1.3.
Date: Umayyad.

With Flaring, Slightly Profiled Rim and Reduced Neck

35.
Pl. 5.35
J16-Tb-30-2
Rim
Diam.: 33.7
Fabric: OW
References: Clark and Falkner 1986: 248-249, fig. 20.17, from a context dating to the 3rd century AD; Kalaitzoglou *et al.* in press: figs. 58-59, from a context dating to the 3rd century AD; Uscatescu 1996: 104 (Type XV-5B) and pl. 72.375, with further references. Date: Late Byzantine (6th century AD).
Date: Byzantine.

With Flaring Rim and Internal Ledge

36.
Pl. 5.36
J16-Tb-75-10
Rim.
Diam.: 35.6
Fabric: GW
White stripes on the exterior body.
References: Kalaitzoglou *et al.* in press: fig. 60; Uscatescu 1996: 105 (Type XV-8) and pl. 72.376-378, with further references; similar to Schaefer and Falkner 1986: fig. 11.3, referring to an Umayyad workshop in the North Theater in Jarash producing this type of pottery; related to Pierobon 1984: 14Je6713.
Date: Late Byzantine to Early Umayyad.

Stove
With Flanged Rim and Flat Base

37.
Pl. 5.37
J16-Vac-61-p1
Intact profile
Diam.: 33.4
Fabric: GW
With zigzag incisions on the exterior underneath the rim and along the base and regular-set, wavy patterns around the body.
References: related to Uscatescu 1996: 154 (Type XXXVI-33) and pl. 112.802, with further references. Date: Umayyad; Clark and Falkner 1986: 250-251, fig. 21.4.
Date: Umayyad.

Large Bowl/Pan
With Flanged Rim and Flat Base

38.
Pl. 5.38
J16-Vac-61-p2
Intact profile
Diam.: 53.1
Fabric: GW
With piecrust finger impression, zigzag incisions on the exterior underneath the rim and along the base, and wavy band combing.
References: Uscatescu 1996: 154 (Type XXXVI-31B) and pl. 112.799, with further references. Date: Umayyad; Clark and Falkner 1986: 250-251, fig. 21.5; Schaefer and Falkner 1986: fig. 10.7-8, referring to an Umayyad workshop in the North Theater in Jarash producing this type of pottery; Pierobon 1984: 5-Je5416; Lichtenberger, Raja and Sørensen 2018: fig. 78 from an Umayyad earthquake-destruction layer.
Date: Umayyad.

Basket

39.
Pl. 6.39
J16-Vac-61-bkt
Intact profile
Diam.: 18.1
Fabric: GW
Zigzag incisions on the exterior in parallel lines.
References: -
Date: Umayyad.

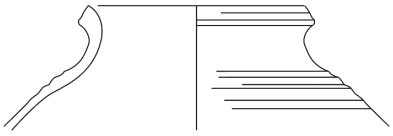
Large Basins
With Incurved Rim and Interior and Exterior Lip

40.
Pl. 6.40
J16-Wc-31-9
Rim
Diam.: 54.4
Fabric: OW/GW
References: Uscatescu 1996: 169 (Type XLII, subtype 6C), pl. 99.668, with further references. Date: 6th century AD; related to Kalaitzoglou *et al.* in press): figs. 66-68, with further references.
Date: Late Byzantine/Early Umayyad.

With Horizontal Rim, Overlapping the Outer Rim

41.
Pl. 6.41
J16-Tb-75-9
Rim
Diam.: 35.6
Fabric: GW
References: Lichtenberger, Raja and Sørensen 2013: 39-40, fig. 105; Uscatescu 1996: 147 (Type XXXVI-4C and 4D), pl. 88.565, with further references; Schaefer and Falkner 1986: fig. 9, referring to an Umayyad workshop in the North Theater in Jarash producing this type of pottery; Brizzi, Sepio and Baldoni 2011: 363-365, fig. 11.14 from a context dating to the mid 6th to the beginning of the 7th century AD; Kehrberg 1989: 91, fig. 1.6.
Date: Late Byzantine to Early Umayyad.

42.
Pl. 6.42
J16-Vac-61-b1
Rim
Diam.: 52.8
Fabric: GW
References: Lichtenberger, Raja and Sørensen 2013: 39-40, fig. 105; Uscatescu 1996: 147 (Type XXXVI-4B), pl. 88.557 and (Type XXXVI-10), pl. 88.573, with further



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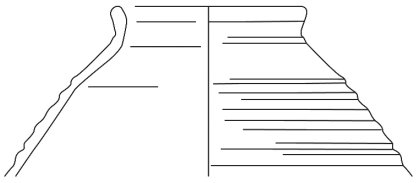

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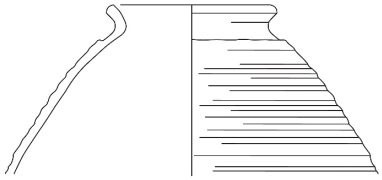

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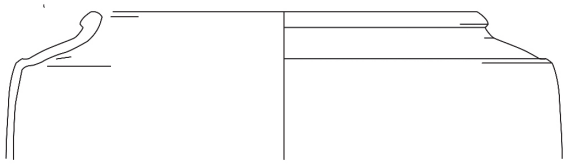

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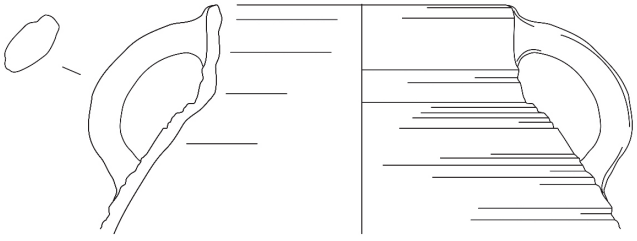

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references. Brizzi, Sepio and Baldoni 2011: 363-365, fig. 11.14 from a context dating to the mid 6th to the beginning of the 7th century AD; Kehrberg 1989: 91, fig. 1.6; Schaefer and Falkner 1986: fig. 9, referring to an Umayyad workshop in the North Theater in Jarash producing this type of pottery.
Date: Umayyad.

With Thickened Rim

43.
Pl. 7.43
J16-Vac-61-b10
Rim
Diam.: 26.6
Fabric: GW
Double line of combed decoration on exterior body.
References: Lichtenberger, Raja and Sørensen 2018: fig 82; Kalaitzoglou *et al.* in press: figs. 72-73; Uscatescu 1996: 151 (Type XXXVI-18), pl. 111.783-784, with further references.
Date: Umayyad.

44.
Pl. 7.44
J16-Uc-74-1
Rim
Diam.: 55.8
Fabric: GW
Triple line of combed decoration on exterior body.
References: Lichtenberger, Raja and Sørensen 2018: fig 82; Kalaitzoglou *et al.* in press: figs. 72-73; Uscatescu 1996: 151 (Type XXXVI-16A), pl. 111.779-781, with further references; Brizzi, Sepio and Baldoni 2011: 365-367, fig. 12.4 from a context dating to the first half of the 8th century AD.
Date: Umayyad.

With Thickened Rim, Overlapping Outside and Inside

45.
Pl. 7.45
J16-Xc-5-1
Rim
Diam.: 54.5
Fabric: GW
Double line of combed decoration on exterior body.
References: similar to Lichtenberger, Raja and Sørensen 2018: fig 82; Kalaitzoglou *et al.* in press: figs. 72-73, similar also figs. 67-68; Uscatescu 1996: 151 (Type XXXVI-16A), pl. 111.779-781 and p. 105 (Type XV-8), pl. 72.380, with further references.
Date: Umayyad.

Common Ware (HM)
Storage Jars

Some small jars without any decoration are very red in color (**Pl. 8.46-49**). The same type also occurs as cooking ware [*cf.* Reynolds 2005: pl. 19.150, where the same type, of slightly earlier date than our type shown in **pl. 8.49**, is part of a cooking-ware production series]. All vessels belong to the inventory of the house in Trench V, just before its destruction in 749AD. It is most likely that in Umayyad times the firing conditions in the production of some of the vessel types changed. This is especially the case for some closed-shape table ware, common ware and cooking ware.

Further analyses are necessary to understand, whether, similar to the Grey and Orange Ware, the differences in color lead back to changing firing conditions, or whether other parameters, such as for example different clay sources, caused the different colouring.

One storage jar with a vertical handle (**Pl. 8.51**) from an Umayyad context is similar to a cooking pot (**Pl. 2.10**) of the same production period. Another jar (**Pl. 8.50**) with an inclined rim is from the Late Roman period and does not occur very often. However, it is of local production and was probably made in one of the kilns in the Hippodrome.

In Byzantine and Umayyad contexts, numerous large storage jars of different types occur (**Pls. 9.52-54** and **10.55-56**), often associated with large basins (see above) and made in the same manner. Fingerprints are visible on the interior side of the vessel, the result of a second layer of clay pressed against the interior wall covering the complete inner surface [This became apparent when looking at the thin section of a basin (sample 2), *cf.* Merkel and Prange 2021]. One vessel (**Pl. 9.54**) with two vertical, oval-shaped handles was reconstructed due to optimal find conditions. The vessel stems from one of the contexts caused by the earthquake in 749AD in Trench V. The body shows combed decoration in two zones made of wavy patterns and circles. Another very common motif of later Umayyad times is combed decorated nets (**Pl. 10.55**). It seems that this type of decoration is typical for the Umayyad production, while earlier productions of Byzantine or Early Umayyad times, have only very reduced combed decoration on the exterior.

A variety of painted storage jars (**Pl. 10.57-59**) are associated with the smaller unpainted ones (*cf.* **Pl. 8.46-49**). Two of them (**Pl. 10.57-58**) belong to the same inventory of the house in Trench V. A third one with a reconstructed base belongs to a sherd concentration of Umayyad date in Trench T (**Pl. 10.59**), and one smaller jar is from an Umayyad context in Trench U (**Pl. 11.60**). All vessels are produced in the same manner and occur in a deep red colour with white-painted, geometrical decoration.

Grey-Ware jars with a cylindrical neck, thickened rim and surrounded by a ledge (**Pl. 11.61**) are very common in Late Byzantine/Early Umayyad to Umayyad times and we find similar types in the cooking ware production of the same period.

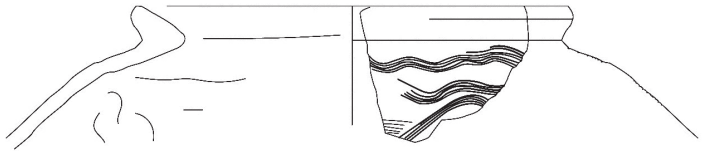
Worthy of mention is an almost complete jug that was found in Trench T outside the house on a Middle Islamic walk-on level (**Pl. 11.62**).

Storage Jars
With Flaring, Inclined Rim

46.
Pl. 8.46
J16-Vac-21-C5
Rim
Diam.: 10.3
Fabric: RW
References: similar to Schaefer and Falkner 1986: 431-435, figs. 11.14 and 12.14; Lichtenberger, Raja and Sørensen 2018: fig. 71 from an Umayyad earthquake-destruction layer; Uscatescu 1996: 134 (Type XXXIV-1F and XXXIV-2A) pl. 82.497 and 82.499 and p. 136 (Type XXXIV-3H) pl. 85.525-526. Date: Late Byzantine to Early Umayyad.
Date: Umayyad.



52



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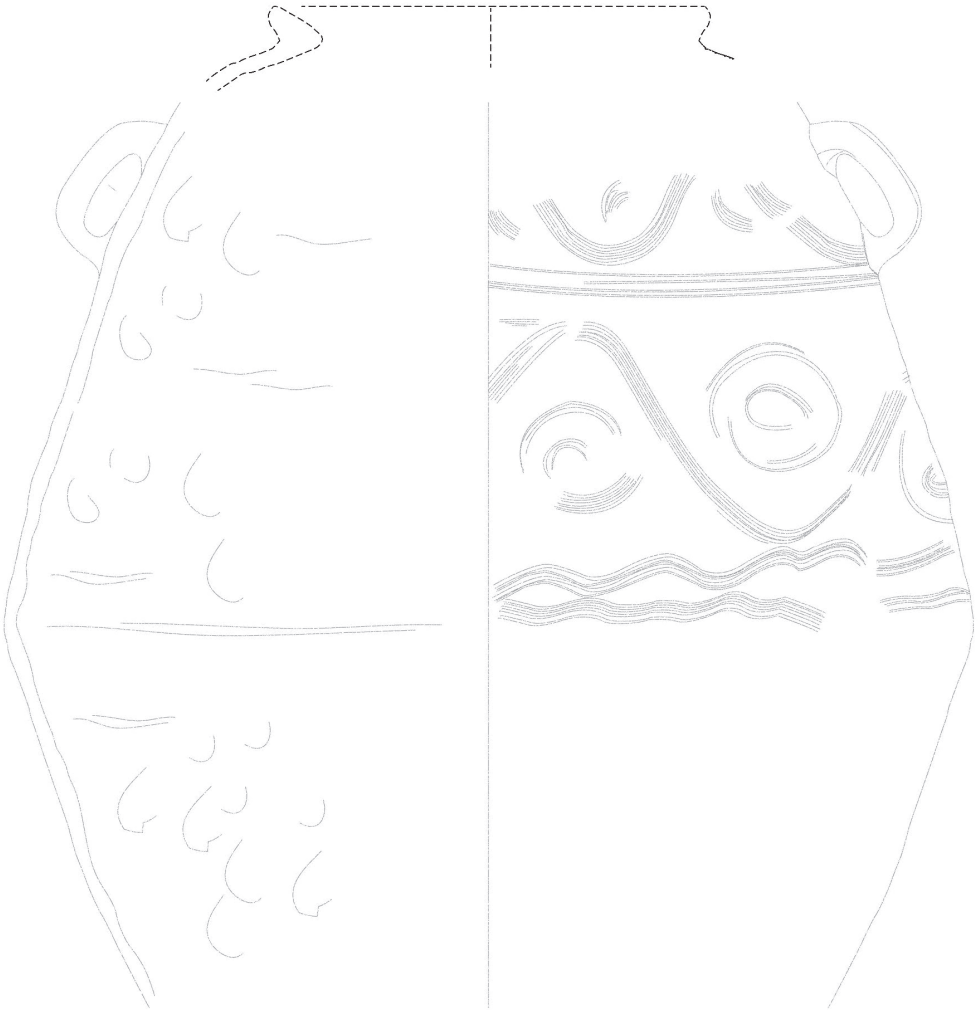


54

0 5cm

47.
Pl. 8.47
J16-Vac-21-C8
Rim
Diam.: 12.2
Fabric: RW
References: similar to Schaefer and Falkner 1986: 431-435, figs. 11.14 and 12.14; Lichtenberger, Raja and Sørensen 2018: fig. 71 from an Umayyad earthquake-destruction layer; Uscatescu 1996: 134 (Type XXXIV-1F and XXXIV-2A) pl. 82.497 and 82.499 and p. 136 (Type XXXIV-3H) pl. 85.525-526. Date: Late Byzantine to Early Umayyad.
Date: Umayyad.

48.
Pl. 8.48
J16-Vac-21-C10
Rim
Diam.: 7.8
Fabric: RW
References: similar to Schaefer and Falkner 1986: 431-435, figs. 11.14 and 12.14; Lichtenberger, Raja and Sørensen 2015 in press: fig. 71 from an Umayyad earthquake-destruction layer; Uscatescu 1996: 134 (Type XXXIV-1F and XXXIV-2A) pl. 82.497 and 82.499 and p. 136 (Type XXXIV-3H) pl. 85.525-526. Date: Late Byzantine to Early Umayyad.
Date: Umayyad.

With Inclined, Horizontal Rim

49.
Pl. 8.49
J16-Vh-1-27
Rim
Diam.: 16.2
Fabric: RW
References: Uscatescu 1996: 132 (Type XXXII-3) and pl. 103.714, with further references.
Date: Late Byzantine/Early Umayyad to Umayyad.

With Inclined, Thickened and Rounded Rim

50.
Pl. 8.50
J16-Ta-45-13
Rim
Diam.: 18.4
Fabric: OW
References: Kehrberg 2007: fig. 5.176, referring to a Late Roman workshop (E2) in the Hippodrome producing this type of pottery.
Date: Late Roman?

With Straight Neck

51.
Pl. 8.51
J16-Uc-60-4
Rim
Diam.: 14.1
Fabric: GW
References: Lichtenberger, Raja and Sørensen 2018: fig. 63 from an Umayyad destruction layer (earthquake 749AD); Uscatescu 1996: 137 (Type XXXIV-6C) and pl. 104.718, with further references; Clark and Falkner 1986: fig. 21.13-14; Walmsley 1986: fig. 2.3 from an Umayyad context.
Date: Umayyad.

Large Storage Jars
With Flaring, Inclined Rim, Slightly Profiled

52.
Pl. 9.52
J16-Tb-30-3
Rim
Diam.: 20.0
Fabric: GW
References: Uscatescu 1996: 165 (Type XLI-3), pl. 97.642, with further references. Date: Late Byzantine to Early Umayyad (6th to 7th century AD); similar to Kalaitzoglou *et al.* in press: fig.77.
Date: Late Byzantine to Early Umayyad.

With Flaring, Inclined Rim

53.
Pl. 9.53
J16-Wc-23-6
Rim
Diam.: 26.7
Fabric: GW
Wavy lines of combed decoration on exterior body.
References: Uscatescu 1996: 166 (Type XLI-9), pl. 97.651, with further references. Date: Late Byzantine to Early Umayyad (6th to 7th century AD); similar to Kalaitzoglou *et al.* in press: fig. 76.
Date: Late Byzantine to Early Umayyad.

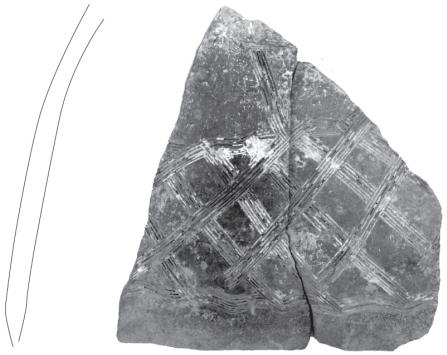
54.
Pl. 9.54
J16-Vac-21-Pi1
Body. Profile partly reconstructed.
Diam.: 59.1
Fabric: GW
At least two zones of wavy lines and circles of combed decoration on exterior body.
References: similar decoration, *cf.* Uscatescu 1996: 165 (Type XLI-2), pl. 97.641, with further references.
Date: Umayyad.

55.
Pl. 10.55
J16-Vac-21-Pi2
Body
Diam.: -
Fabric: GW
Net of combed decoration on exterior body.
References: -
Date: Umayyad.

56.
Pl. 10.56
J16-Tb-66-3
Rim
Diam.: 31.7
Fabric: GW
References: Uscatescu 1996: 166 (Type XLI-9), pl. 97.651, with further references. Date: Late Byzantine to Early Umayyad (6th to 7th century AD); similar to Kalaitzoglou

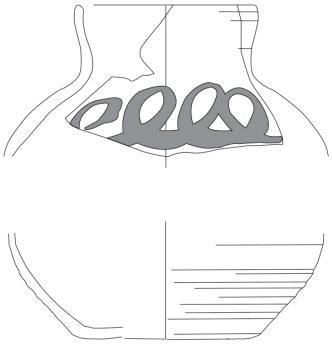


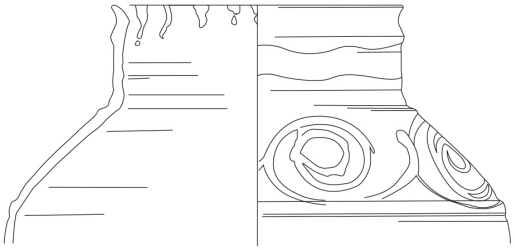
56



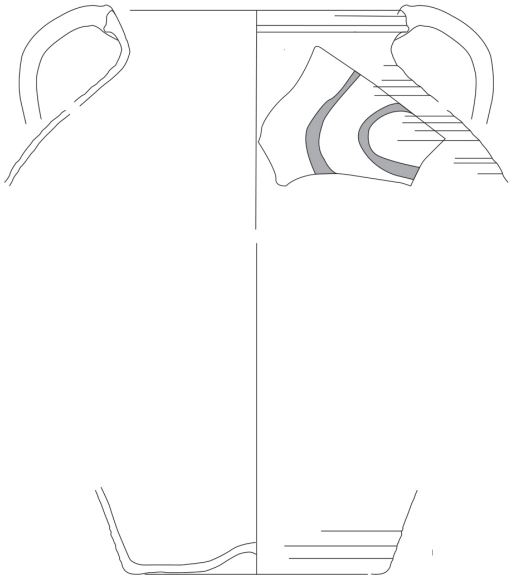
55

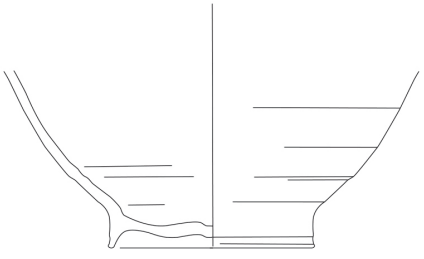
0 5cm





57





58

59

0 5cm

et al. in press: fig. 76.
Date: Late Byzantine/Early Umayyad to Umayyad?

Storage Jars
With Short Cylindrical Neck

57.
Pl. 10.57
J16-Vac-61-17
Rim and base, reconstructed
Diam.: 8.4
Fabric: RW
Looped lines on the exterior neck, just below the rim.
References: Uscatescu 1996: (Type XXVIII-6) pl. 80.477, decoration *cf.* p. 515-b; Ball *et al.* 1986: fig. 2.1.; Kalaitzoglou *et al.* in press: fig. 78.
Date: Umayyad.

With Thickened Rim, Flattened on Top and Profiled Neck

58.
Pl. 10.58
J16-Vac-61-2
Rim and base, reconstructed
Diam.: 13.4
Fabric: RW
Surrounding ledge just underneath the rim. Irregularly-set horizontal circles on neck just below the rim, whitish in colour. Traces of paint also on the interior of the rim.
References: Uscatescu 1996: 141-142 (Type XXXV-3, 5 and 10), pls. 105.725, 109.772 and 110.773; Ball *et al.* 1986: fig. 2.2; Kalaitzoglou *et al.* in press: fig. 79.
Date: Umayyad.

With Flaring, Inclined Rim, Slightly Profiled

59.
Pl. 10.59
J16-Tb-66-1
Rim and base, reconstructed
Diam.: 13.4
Fabric: RW
Traces of circles on neck just below the rim, whitish in colour.
References: similar to Uscatescu 1996: 138 (Type XXXIV-6E), pl. 104.720.
Date: Umayyad.

With Cylindrical Neck and Thickened Rim

60.
Pl. 11.60
J16-Uc-60-6
Rim
Diam.: 8.4
Fabric: RW
Traces of wavy lines on neck just below the rim, whitish in colour. Traces of paint also on the interior of the rim.
References: Uscatescu 1996: 143 (Type XXXV-10) and pl. 105.725, with further references; similar to Clark and Falkner 1986: fig. 21.17; Walmsley 1986: fig. 2.1 from an Umayyad context.
Date: Umayyad.

61.
Pl. 11.61
J16-Xd-6-3
Rim
Diam.: 10.6
Fabric: GW
Surrounding ledge just underneath the rim.
References: Uscatescu 1996: 141 (Type XXXV-1) and pl. 105.539-540, with further references.
Date: Umayyad.

Storage Jars/Jugs
With Hollow, Concave Base

62.
Pl. 11.62
J16-Ta-46-1
Base
Diam.: 7.5
Fabric: OW
References: -
Date: Umayyad or Middle Islamic.

Transport Vessels (HM)
Amphorae

The finds presented in the catalogue refer to the locally or regionally produced bag-shaped amphorae, which have a long tradition in the Levant, especially on both sides of the Jordan. All refer to a prototype with a short cylindrical neck and small looped handles, however it seems that the production is more dependent on several civic production centres than on a standardized regional production, since a lot of variation occurs during the same period of time (see also Reynolds 2005: 573; Uscatescu 2003: 547-549, fig. 1). The production centre of some of the amphorae presented here is not known until now. Further research on the fabrics will show whether they are of local or regional production. One base of a bag-shaped amphora can be attributed to an earlier local production of Late Roman or Early Byzantine date and was found in Trench S (**Pl. 11.63** and **Fig. 3**).

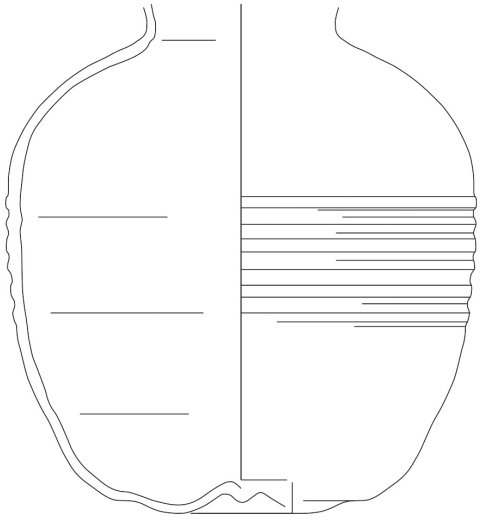
The other two very well-preserved, smaller examples stem from sealed Umayyad contexts. One (**Pl. 11.65**) was found together with a cooking pot (**Pl. 2.10**) and is part of the original inventory of the room in Trench U. The second (**Pl. 11.64**) is part of the inventory found in one of the destruction layers in Trench V, together with a large quantity of other bag-shaped amphorae from different local/regional and supra-regional production sites (see below). One of the two bag-shaped amphorae of bigger dimensions (**Pl. 12.66-67**) belongs to the same inventory.

Storage Jars/Amphorae
With Hollow, Concave Base

63.
Pl. 11.63
J16-Si-104-1
Base
Diam.: 7.0
Fabric: OW
References: -
Date: Late Roman?

LRA 5
With Short, Slightly Out-Turned Rim

64.
Pl. 11.64
J16-Vac-61-Bs1
Rim. Almost intact profile
Diam.: 8.8



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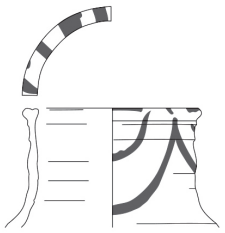


60



62

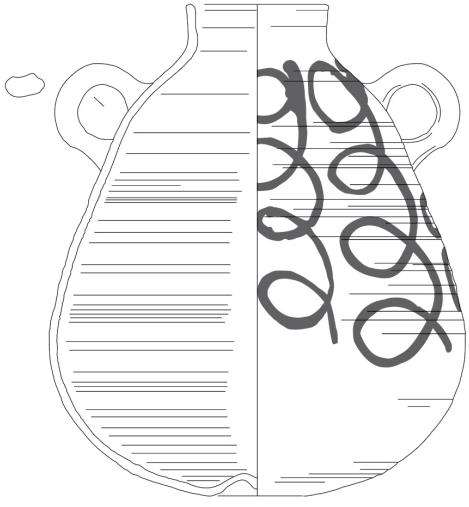




63



65



64



Fabric: GW?
White, vertical, irregular-set stripes on the exterior body.
References: similar to Uscatescu 1996: 164 (Type XXXVIII-3) and pl. 113.811, with further references. Date: 7th to 8th century AD.
Date: Umayyad.

With Short, Cylindrical Neck

65.
Pl. 11.65
J16-Uc-71-1
Intact profile
Diam.: 12.5
Fabric: OW?
White, vertical, parallel-set loops on the exterior body.
References: similar to Uscatescu 1996: 159 (Type XXXVII-1E) and pl. 92.599, with further references. Date: 6th to 7th century AD; *cf.* Uscatescu 2003: fig. 2.9 (Mt. Nebo).
Date: Early Umayyad?

66.
Pl. 12.66
J16-Vac-61-Bs2
Rim and base, reconstructed
Diam.: 10.0
Fabric: GW?
References: Uscatescu 1996: 159 (Type XXXVIII-1) and pl. 112.808, with further references. Date: 8th century AD; *cf.* Uscatescu 2003: fig. 2.11 (El Kursi); Brizzi, Sepio and Baldoni 2011: 365-367, fig. 12.2 from a context dating to the first half of the 8th century AD.
Date: Umayyad.

67.
Pl. 12.67
J16-Uc-23-17
Rim
Diam.: 10.0
Fabric: OW/GW?
White, irregular-set stripes on the exterior body.
References: similar to Uscatescu 1996: 146 (Type XXXVII-2C) and pl. 93.601, with further references. Date: 6th to 7th century AD; *cf.* Uscatescu 2003: fig. 2.10 (Tell Keisan); Schaefer and Falkner 1986: 431-435, fig. 13.1; Lichtenberger, Raja and Sørensen 2018: fig. 72.
Date: Early Umayyad.

Amphorae Imports from the Eastern Mediterranean

The earliest find of an imported amphora is the rim of a Dressel 2–4, probably of Coan production (**Pl. 13.71**).

In Byzantine times, imports of Late Roman Amphorae 1 (LRA; congruent with Ballana 6, Benghazi Late Roman Amphora 1, British B2, Carthage Late Roman Amphora 1, Keay 53, Kuzmanov 13, Peacock and Williams 44, Scorpan 8B) can be identified in a few contexts excavated during this campaign in Jarash. These amphorae (**Pl. 13.72**), in different variations, are in general common and distributed all over the Western and Eastern Mediterranean and are the most frequent imports in Byzantine and Umayyad times at Jarash. The production centres were located in Cyprus and/or Cilicia [Regarding the kiln sites, see Bezeczky 2013: 158-160]. In 2015 content analyses on some sherds found in the Northwest Quarter confirmed that mostly wine was transported in such containers [The content of a similar vessel type was analysed, *cf.* Springer and Polla in press].

Imported bag-shaped amphorae occur in large quantities in Trench V and are all of Egyptian production. Several amphorae found in the destruction layers caused by the earthquake in 749AD in Trench V are made of the typical Egyptian alluvial clay (**Pl. 13.69-70**) and were probably produced at one of the kiln sites along the Nile Valley (Dixneuf 2011: 149). One amphora of buff fabric is of unknown origin (**Pl. 13.68**).

LRA 5
With Short, Cylindrical Neck

68.
Pl.13.68
J16-Vac-61-BsB
Intact profile
Diam.: 10.0
Fabric: Buff
White, vertical, parallel-set loops on the exterior body.
References: similar to Uscatescu 1996: 159 (Type XXXVII-1E) and pl. 92.599, with further references. Date: 6th to 7th century AD.
Date: Early Umayyad? to Umayyad.

AE 5/6–2.1B

69.
Pl.13.69
J16-Vac-61-BsE3
Rim. Almost intact profile
Diam.: 10.4
Fabric: A12 (Dixneuf 2011: 34)
References: Dixneuf 2011: 149, fig. 136, type AE5/6-2.1, variante B. Date: First half of the 7th to the first half of the 8th century AD.
Date: Umayyad.

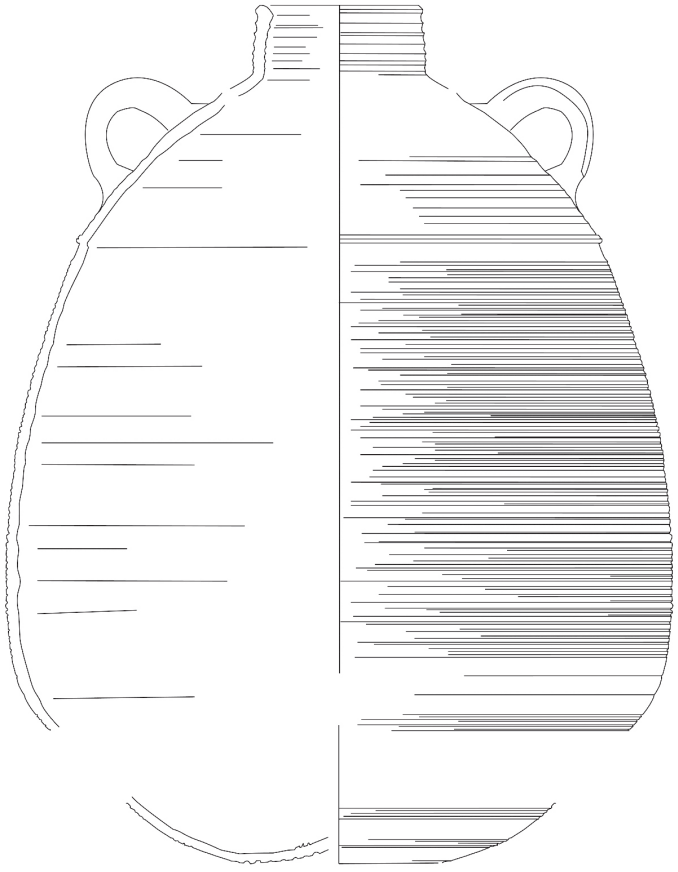
70.
Pl.13.70
J16-Vac-61-BsE6
Rim and base, reconstructed
Diam.: 9.1
Fabric: A12 (Dixneuf 2011: 34)
References: Dixneuf 2011: 149, fig. 136, type AE5/6-2.1, variante B. Date: First half of the 7th to the first half of the 8th century AD.
Date: Umayyad.

Dressel 2-4, Coan

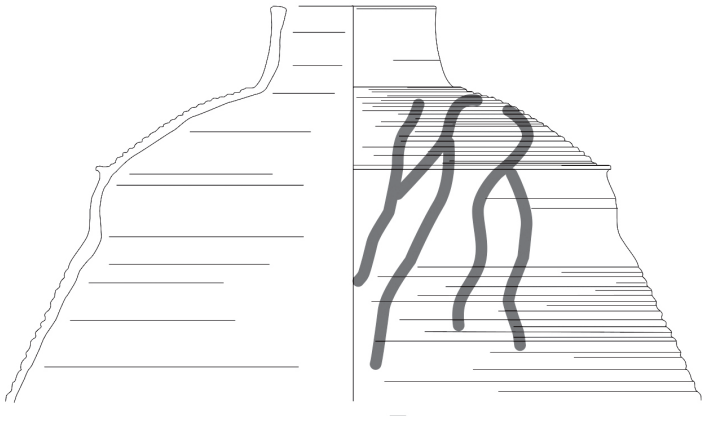
71.
Pl. 13.71
J16-Wd-44-1
Rim
Diam.: 15.8
Fabric: similar to fabric 76 (*cf.* Bezeczky 2013: pl. 62.76)
References: Bezeczky 2013: 56-61, type b.
Date: Roman.

Late Roman Amphora 1

72.
Pl. 13.72
J16-Weh-O-23
Rim



66



67

0 5cm

Diam.: 9.5
Fabric: Hard and compact with quartz and other larger opaque inclusions of different color and size, visible by naked eye
References: Lichtenberger, Raja and Sørensen 2018: fig. 69; Uscatescu 1996: 177 (Type XL-5B, LRA 1), pl. 96.637; Pieri 1998: 98-99 (Type LRA 1B1); Reynolds 2005: 591, fig. 31; Kalaitzoglou *et al.* in press: fig. 93.
Date: Late Byzantine to Early Umayyad.

Middle Islamic Vessels (AP)
Middle Islamic Green Glazed Ware

Wheel-made, green-glazed bowls are an important part of the Mamluk ceramic repertoire and are the most common form of glazed ware found at rural Middle Islamic sites. Appearing in Jordan by the 14th century and in some areas of the Levant as early as the late 13th century, they are widely distributed across the medieval Islamic world. Their variety in terms of slip, glaze and fabric seems to indicate a localized production or regional production networks for this ware, or perhaps both. While scholars typically agree that green-glazed pottery was produced until the 16th century, other sites within Bilad al-Sham have documented these types of ware anywhere between the 14th and 19th centuries. For this reason, reliable stratigraphy is needed for precise dating of green-glaze wares (Milwright 2008: 187-195; Pringle 1986: 147-149; Stern 2014: 84-86; Walker 2009: 41-42). Despite the difficulties involved in dating green-glazed pottery, some characteristics have been identified by researchers which differentiate Ottoman types of ware from Mamluk green-glazed pottery. For example, inverted and more carinated rim forms seem to characterize a Mamluk assemblage, whereas the Ottoman forms tend to have simple upright, everted or T-shaped rims. Furthermore, variations in the shape of the base and in the quality of the glaze have been identified [For more on the characteristics differentiating Ottoman and Mamluk green-glazed ware, see Walker 2009: 42-43]. Further research is needed in order to better understand the diversity of green-glazed pottery types in Jordan and to determine whether they were primarily produced in localized centres or imported from wider regional centres of production.

Plate
With Rounded Rim, Open

73.
Pl. 14.73
J16-Tc-1-5
Rim
Diam.: 23; H.: 2.1; L.: 4.5; W.: 0.9; T.: 1.2
Munsell: core: 2.5YR 6/8; glaze: 10Y 5/4; ext.: 2.5YR 6/8; int.: 2.5YR 6/8
Green-glazed rounded rim, lustrous and transparent with brownish/white slip under glaze. Hard-fired and fine levigation.
References: Avissar and Stern 2005: 13, fig. 4.3; Pringle 1986: fig. 49.50; Stern 2014: 85, fig. 7.2, 7-8; Walker 2005: 82, fig. 9.1.
Date: Middle to Late Islamic (14th century and later).

With Thick Rounded Rim, Carinated Body

74.
Pl. 14.74
J16-Td-13-23
Rim
Diam.: 24; H.: 5.1; L.: 8.4; W.: 7.65
Munsell: core: 2.5YR 6/8 to 5/8; glaze: 5GY 6/4 to 5/4 and 10YR 3/2
Thick rounded rim of a wheel-made, green-glazed Middle Islamic bowl. Glaze also has brown spots along rim and in arears near to it. Glaze is very worn and flaking. Almost half the vessel is preserved. Hard-fired and rather finely levigated with only some lime inclusions.
References: Avissar 1996: fig. 13.37; Avissar and Stern 2005: 12-13, fig. 4; Walker 2005: 82, fig. 9.4.
Date: Middle Islamic (14th to 16th century).

Handmade Geometric-Painted Ware (HMGPW)

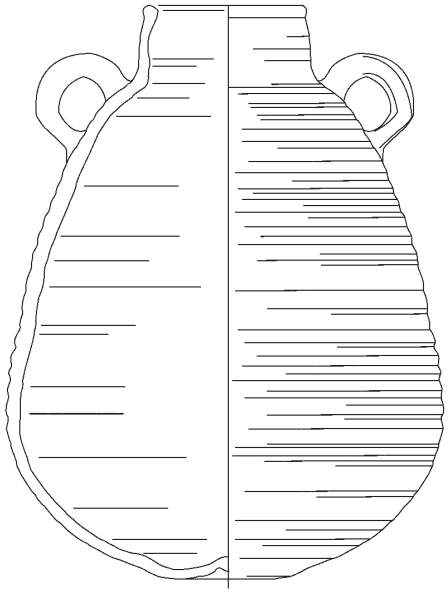
HMGPW is difficult to date but is commonly viewed as originating from the late 11th century and remaining in use until at least the 15th century [For more on HMGPW chronology, see Stern 2014; Milwright 2010: 155-156; Johns 1998: 65-93], and possibly as late as the first half of the 20th century (see Walker 2011: 214-215; 2014: 194). HMGPW finds in Jarash are characterized as a hard- to medium-fired coarse ware of rather sandy clay with many lime inclusions and tiny pebbles as well as quartz and reddish brown inclusions. Decorated with paint that is thick, matt and flaking, the paint on HMGPW vessels is often monochrome (sometimes bichrome), depicting intricate geometric designs in red, brown or black paint (Walker 2014: 200; Johns 1998: 66). Painted designs are applied to the exterior surface, and open forms may be painted on both surfaces. The shapes comprise many open bowls and closed jugs and jars. One notable characteristic found on sherds in 2016 and in previous years is traces of textile impressions visible on the interior, revealing that many of the vessels were formed on sacks filled with wet sand or a bowl covered in fabric, a phenomenon observed also by scholars researching HMGPW in the past (*cf.* Franken and Karlsbeek 1975: 167; Walker 2014: 197-198).

Small Bowl
With Squared Rim

75.
Pl. 14.75
J16-Td-52-8
Rim
Diam.: 18; H.: 2.6; L.: 6.8; T.:1.1
Munsell: core: 10YR 5/1; ext.: 2.5Y 8/2; int.: 10YR 7/4; deco.: 10R 4/4
Squared rim from an HMGP, linear-painted, shallow bowl. Traces of fire on interior and exterior surface, painted decoration is worn and flaking. Fabric crumbles easily and is coarsely levigated.
References: Sauer and Herr 2012: 560, fig. 4.17:9; Tholbecq 1998: 166, fig. 28.
Date: Middle Islamic.

With Rounded Rim

76.
Pl. 14.76
16-Tc-41-3
Rim
Diam.: 22; H.: 3.2; T.: 0.8
Munsell: core: 7.5YR 7/6; slip: 7.5YR 8/3; int.: 7.5YR 8/6 and 7/6; deco.: 10R 4/4 and 4/2



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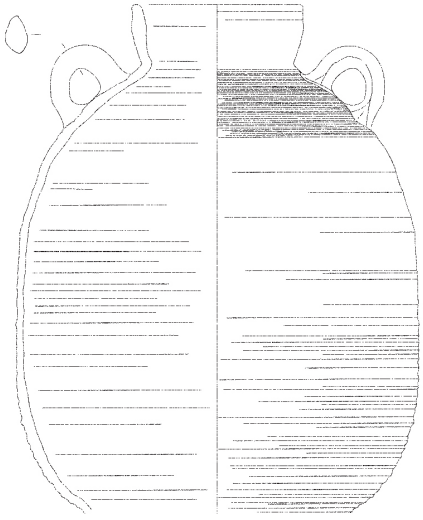

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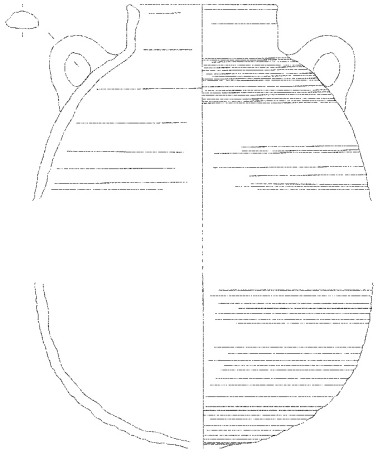


70



71



72

0 5cm

Rounded rim from an open HMGP bowl. Rim is slightly out-turned and resembles almost an exact copy of an older Byzantine type. Painted decoration that is visible is linear and not as dense in geometric designs. Buff slip on both surfaces, medium-fired and medium levigation.
References: decoration: Franken and Karlsbeek 1975: 195; fig. 71.11.
Date: Middle Islamic.

Large Bowls
With Thick, Rounded Rim

77.
Pl. 14.77
J16-Tc-53-1
Rim
Diam.: 36; H.: 8.2; L.: 14.7; W.: 14.0; T.: 1.2
Munsell: core: 2.5YR 5/6; slip: 10YR 8/2; deco.: 10YR 3/3
Thickened and rounded rim from an HMGP shallow bowl. Buff slip on interior and exterior surface and painted with spiral, diamond, triangles, linear and repeating motif of geometric designs. Hard-fired and a rather coarse levigation.
References: Franken and Karlsbeek 1975: 182, fig. 58.12; rim form in following reference is externally bevelled instead, but vessel shape is similar: Sauer and Herr 2012: 581, fig. 4.23:3.
Date: 1300–1400AD.

78.
Pl. 14.78
J16-Tc-60-18 and Tc-67-2-1
Rim
Diam.: 40; H.: 12.2; L.: 55; T.: 1.4
Munsell: core: 7.5YR 6/4 to 6/6; slip: 10YR 8/3 and 10R 6/8; int.: 10R 6/8; deco.: 10R 4/6
Rounded thick rim and almost a whole profile of an HMGP large bowl with four rounded handles around the diameter of the rim. Fragments from two evidences join to make bowl, found within remains of second floor level of Trench T. Reddish interior wash/slip and buff slip on exterior. Geometric, painted decoration includes linear, rectangular, spiral and thick curved lines. Medium-fired and coarse levigation.
References: Franken and Karlsbeek 1975: 180, fig. 56.7, 193, fig. 69.12; Tholbecq 1998: 166, fig. 37.
Date: Middle Islamic.

Jars/Jugs
With Thick, Rounded Rim

79.
Pl. 15.79
J16-Uc-1-14
Rim
Max Diam.: 21; H.: 7.1; T.: 1.2
Munsell: core: 7.5YR 7/6; slip: 7.5YR 8/3; deco.: 10R 4/2
Rounded thick rim from a closed HMGP jug. Geometric, painted design consisting of checker pattern, triangles and linear decoration. Buff slip on exterior and interior surface, medium-fired and coarse levigation.
References: Franken 1975: 191, fig. 67.4-5, 196, fig. 72.21; Harts and Falkner 1985: 266, fig. 5.19, 5.23-25; Tholbecq 1998: 162, fig. 10.
Date: Middle Islamic.

80.
Pl. 15.80
J16-Td-52-13
Base, disc., jug
Base diam.: 7.5; max diam.: 16; H.: 8; L.: 14.7; W.: 10.7; T.: 1
Munsell: core: 7.5YR 6/6; slip: 10YR 8/3; int.: 7.5YR 8/2 to 8/4 and 2.5/1; deco.: 10R 3/2 to 3/3
Almost a whole profile of a small HMGP bowl with a disc base. Buff slip on exterior surface, and interior surface has burning traces. Spirals, triangles, and linear-painted, geometric designs on exterior surface, medium-fired and rather coarse levigation.
References: Avissar 1996: 170, fig. XIII.154:1; Franken and Karlsbeek 1975: 179, fig. 55.41, 194, fig. 70.29; Sauer and Herr 2012: 584, fig. 4.24:15; Tholbecq 1998: 162, fig. 1.
Date: Middle Islamic.

81.
Pl. 15.81
J16-Tb-35-5
Body, Jug
Diam.: H: 10.2; L: 10.3; W: 10.2; T: 0.9
Munsell: core: F2D, strong brown (inner), pale yellow/green (outer); int, and ext. surface: buff slip; deco.: dusky red
HMGP bodysherd with geometric, painted decoration over a buff slip on the exterior surface. Hint of green on slip and in core. Lines visible on vessel, indicating it was produced on a slow wheel perhaps. Medium-fired and medium levigation.
Date: 13th century

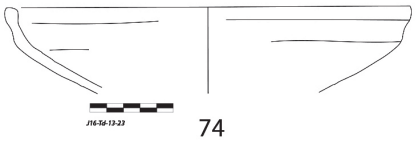
Large Storage Jars

82.
Pl. 15.82
J16-Uc-1-13
Two handles with attached 'mini-bowl'
'Mini-bowl' rim diam.: 8.3; H.: 15.5; T.: 2
Munsell: core: 5YR 7/8; slip: 7.5YR 8/2; deco.: 10R 3/2.
Rounded handle and bodysherd from a jug. Two handle fragments from the same vessel, each sherd with the handle from each side of the jug has a miniature bowl set into the upper part of the handle. Painted decoration consists of swirly lines and circles. Medium-fired and coarse levigation. 'Mini-bowls' appear handmade, and body part of the sherds seem to be made on a slow wheel perhaps.
References: handle shape, Franken and Karlsbeek 1975: 192, fig. 68.26-28; Tholbecq 1998: 164, fig. 12; shape of jug similar to Walker 2009: 151, fig. 5.20:1.
Date: Ottoman?

83.
Pl. 15.83
J16-Td-50-11
Base, disc
Max diam.: 16; H.: 3.3; L.: 12.6; T.: 2.3
Munsell: core: 10YR 7/4; int.: 10YR 8/2; ext.: 10YR 7/3; deco.: 2.5YR 4/3
Base is slightly concave and has painted decoration on both surfaces over a buff slip.
References: shape, Franken and Karlsbeek 1975: 181, fig. 57.28 and 57.30.
Date: Middle Islamic.



73



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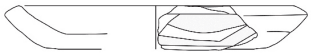

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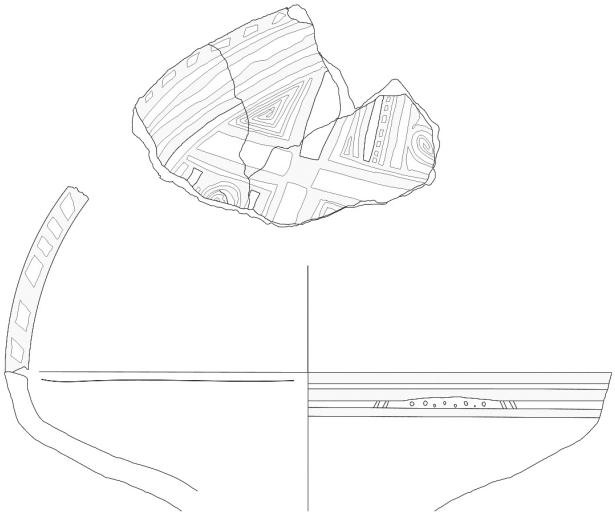

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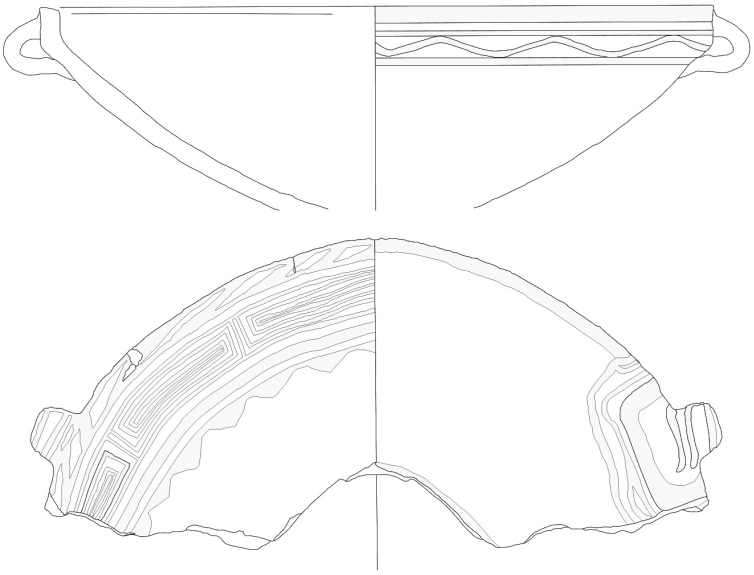
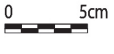




Plain Handmade Ware

Plain handmade vessels, without geometric painting, resemble similar production traditions as the HMGP pottery above. Appearing in the Levant during the 11th century, but mainly popular in the 12th to 14th centuries, handmade ware of the medieval period is often found across rural sites and less frequently in urban areas. In comparison to the HMGP pottery, plain handmade ware is simpler and more crudely made (Stern 2014: 73). Handmade vessels appear in both open and closed shapes, but at Jarash the majority of plain handmade ware consists of closed vessels or storage vessels.

84.
Pl. 15.84
J16-Td-13-13
Base, disc
Base diam.: 11; H: 3.9; T: 2.4
Munsell: core: (inner): 7.5YR 3/1; (outer): 7.5YR 6/6; slip: 7.5YR 8/3; int.: 7.5YR 6/6
Plain handmade disc base with a joining body fragment. Burning traces on interior surface and plaster rubbed on exterior between base and body join, perhaps part of a repair. Coarse levigation and medium-fired.
References: Avissar and Stern 2005: 84-85, fig. 36.5; similar plaster-like slips on handmade vessels have been found, dating to the Ottoman period, Walker 2003: 94-95, fig. 17.6.
Date: Middle Islamic to Ottoman.

Tabun

85.
Pl. 15.85, **Figs. 7** and **9**
J16-Tb-27-1
Rim
Diam.: 44; H.: 7.35; L.: 14.5; W.: 13.2; T.: 2.4
Munsell: core: (inner): 2.5YR 6/4 (outer): 7.5YR 5/1; ext.: 7.5YR 8/3 + 5/1; int.: 2.5YR 6/4
The rim was taken from the older *tabun* (for making bread) situated on the walk-on level outside the Middle Islamic building in Trench T. Medium-fired and coarse levigation. Three joining sherds.
References: -
Date: Middle to Late Islamic.

Domestic Furnishings and Other Specialized Vessels (HM)
'Jarash Lamps'

The Roman lamps presented here all stem from the Late Roman cistern fill in Trench S and are of local production. One lamp, a so-called 'Roman Gerasa Lamp' (**Pl. 16.88**) is of slightly earlier production date than the two others, which can be attributed to type JUTZ (**Pl. 16.86-87**) (Kehrberg 2011).

The later Byzantine and Umayyad pottery presented here can be attributed to the category of 'Jarash Lamps'. Most of them were probably produced at one of the kiln sites in the Hippodrome (Kehrberg 2011: 135-136). Instead of the zoomorphic handle, one example shows just a simple grip (**Pl. 16.89**), but the decoration pattern and size are similar to ones with zoomorphic handles (**Pl. 17.91**). Another example shows in general the same characteristics as the 'Jarash Lamps' but has small triangular edges on both sides of the body that are reminiscent of fins (**Pl. 17.92**).

The single find of a mould for a 'Jarash Lamp' (**Pl. 17.93**) was discovered in Trench X. It was secondarily deposited and found in the lower part of an intentional fill (ev. J16-X-11). It is therefore out of its original context, but relates to a production site in the vicinity. The mould is similar to the moulds found at the production sites in the Hippodrome.

JUTZ

86.
Pl. 16.86
J16-Sc-13-125
Almost intact. Discus and shoulder, fragmented
Diam.: L.:7.9
Fabric: Local production
Mould-made. Decoration consists of small projecting dots around the wick hole and a triangular pattern on the upper shoulder.
References: Local production – 'Roman Jarash Lamp, Type JUTZ'. Lichtenberger, Raja and Sørensen 2018: fig. 32; Kalaitzoglou *et al.* in press: fig. 100; Kehrberg 2011: 131-133 (Type JUTZ), fig. 2, with a typology of the locally produced Late Roman lamps in Jarash. This type was probably produced near the 'Jarash Upper Temple of Zeus'-Complex, Kehrberg 2011: 132.
Date: Roman (late 2nd to 3rd century AD).

87.
Pl. 16.87
J16-Sc-13-127
Intact. Surface destroyed
Diam.: L.: 8.7
Fabric: Local production
Mould-made. Original surface lost. Decoration pattern visible in some places.
References: Local production – 'Roman Jarash Lamp, Type JUTZ'. Lichtenberger, Raja and Sørensen 2018: fig. 32. Kalaitzoglou *et al.* in press: fig. 100; Kehrberg 2011: 131-133 (Type JUTZ), fig. 2, with a typology of the locally produced Late Roman lamps in Jarash. This type was probably produced near the 'Jarash Upper Temple of Zeus'-Complex, Kehrberg 2011: 132.
Date: Roman (late 2nd to 3rd century AD).

Roman Gerasa Lamp

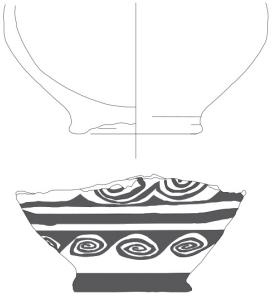
88.
Pl. 16.88
J16-Sc-13-126
Intact
Diam.: L.: 7.5
Fabric: Local production
Mould-made. Decoration consists of small projecting dots placed in four rows around the filling-hole. The wick hole is separated by a fan-shaped decoration made of four lines on both sides of the wick hole. The handle is just a small knob.
References: Local production – Roman Gerasa Lamp. *cf.* Kehrberg 2011: 131-133 (Type Roman Gerasa Lamp), fig. 1.10.
Date: Roman (late 2nd century AD).

'Jarash Lamps'

89.
Pl. 16.89
J16-Tb-75-4x



79



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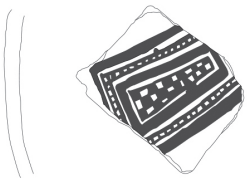

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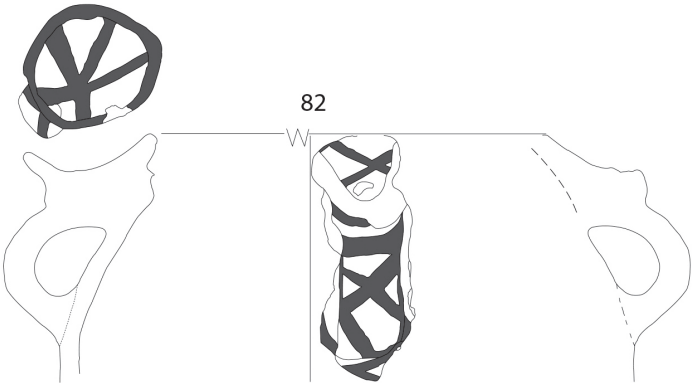

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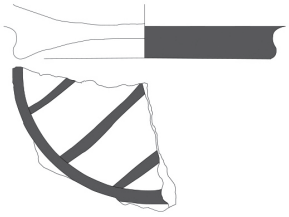

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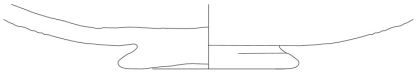


84

0 5cm



85

0 5cm

Intact
Diam.: L.: 8.3
Fabric: Local production
Intact mould-made lamp. Projecting decoration; vertical lines along the sides of the body and towards the wick hole. Two framed circles are separating wick hole and filling-hole.
References: Local production – 'Jarash Lamp': Lichtenberger, Raja, and Sørensen 2013: 27, fig. 53; 2017: fig. 48; 2018: fig. 38; Kalaitzoglou *et al.* 2021: 103; Kehrberg 2009: fig. 7 no. JH7; see also Kehrberg 2011: 135-136, fig. 4.65. Similar lamps, but with a zoomorphic handle are produced in Jarash, Hippodrome workshops.
Date: Late Byzantine to Early Umayyad.

90.
Pl. 16.90
J16-Vac-61-113
Almost intact, handle lost
Diam.: L.: 9.5
Fabric: Local production
Intact mould-made lamp. Projecting decoration; vertical lines and small circles along the sides of the body and towards the wick hole.
References: Local production – 'Jarash Lamp': Lichtenberger, Raja and Sørensen 2018: fig. 35; Kehrberg 2011: fig. 64.
Date: Umayyad.

91.
Pl. 17.91
J16-Vi-26-5x
Intact
Diam.: L.: 10.2
Fabric: Local production
Intact mould-made lamp. Projecting decoration; vertical lines, wavy lines and small circles along the sides of the body and towards the wick hole.
References: Local production – 'Jarash Lamp': Lichtenberger, Raja and Sørensen 2018: fig. 35; Kehrberg 2011: fig. 64.
Date: Umayyad.

92.
Pl. 17.92
J16-Tb-75-3x
Intact
Diam.: L.: 10.0
Fabric: Local production
Intact mould-made lamp. Projecting decoration; vertical lines along the sides of the body and towards the wick hole. Handle pinched with five holes.
References: -
Date: Late Byzantine to Early Umayyad.

Mould

93.
Pl. 17.93
J16-Xc-11-33
Handle and wick hole, fragmented
Fabric: Local production
References: Similar to Kehrberg 2009: 502-504, fig. 7 (Mould B), used in one of the workshops in the Hippodrome.
Date: Late Byzantine to Early Umayyad.

Lantern

94.
Pl. 17.94
J16-Tc-26-1
Base
Max diam.: 3.1 (max.)
Fabric: Local production
Intact mould-made lamp. Incised decoration; vertical lines and small circles along the sides of the body and towards the wick hole.
References: similar to Lichtenberger, Raja and Sørensen 2013: 29-31, figs. 57-63, with further references; Uscatescu 1996: 117-118 (Type XXIII), pl. 101.702.
Date: Late Byzantine to Early Umayyad.

Ottoman Pipe
95.
Pl. 17.95
J16-Sc-1-6
Ottoman pipe, fragmented
Ottoman mould-made pipe. Incised decoration on exterior.
Decoration: incised circular and vertical lines.
References: Walker 2009: 49-50 and 139, fig. 5.10:2 (17th/18th century).
Date: Ottoman.

Architectural Elements (PE)
Tiles, Imbreces, Tubuli and Pilae

The 2016 campaign yielded more ceramic building materials than were found in earlier campaigns. Listed is a selection of objects from well-stratified contexts.

The cistern fill in Trench S brought to light plenty of *tegulae* as well as some *tubuli* types that are, so far, unknown. Most of the pieces are small, and they do not show any remains of plaster.

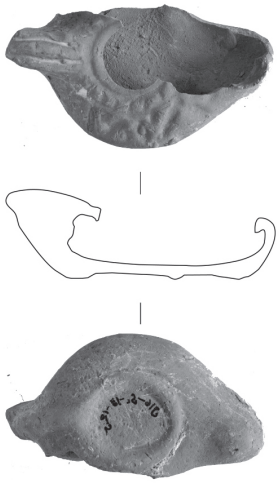
The building material from the cistern in Trench S does not show many similarities to the material found in Byzantine or Umayyad contexts and provides us, therefore, with new types and fabrics of Roman to Late Roman date.

The Umayyad earthquake context in Trench V is similar to that in Trench S. In addition to known *tegulae* types, many new types are present, all of which are, however, just single small fragments – sometimes very worn. As seen in Trenches P and K, excavated in 2015 (Kalaitzoglou *et al.* 2021) and 2014 (Kalaitzoglou *et al.* 2018 respectively, the amount of *tegulae* is not sufficient to reconstruct a tiled roof. It is more likely that all *tegulae* were used within the house as lids and stoppers or as wall fill. The same is the case in Trench V.

The new types and fabrics in Trench V will be further investigated. The other trenches – T, U, W and X – did not contain as much ceramic building material as Trenches S and V. However, a selection of types, not attested until now, is given in this catalogue.

Tiles
Tegulae

96.
Pl. 18.96
J16-Sc-13-27
Rim
Munsell: 2.5YB 6/6
H.: 4.2; L.: 6.2; T.: 1.9 (body), 3.3 (flange)
Tegula flange; medium- to hard-fired and medium- to



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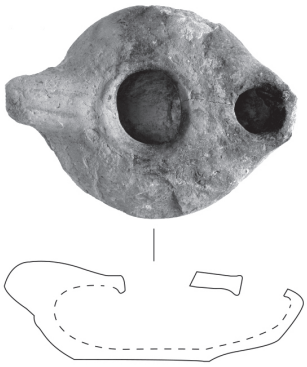

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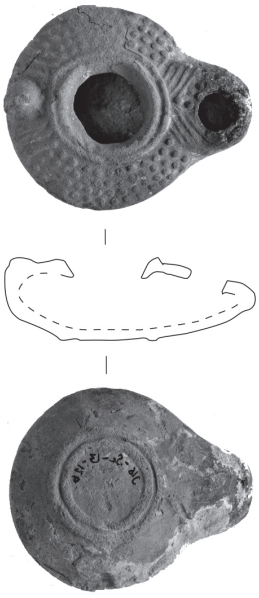

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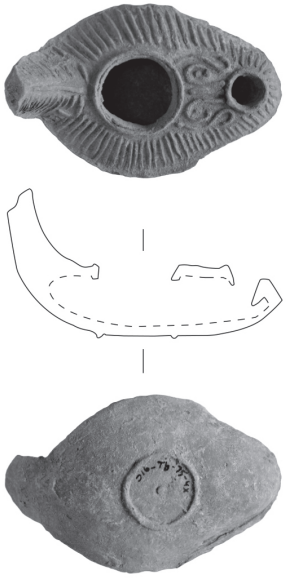


89



90

0 5cm

fine-levigated, including many tiny air pockets and some lime. The flange is folded over, prior to being shaped by a tool. Slightly weathered on the bottom. Remains of production marks visible on flange top.
References: for an example of Roman roof tiles from the Southern Levant, see Kanellopoulos 1994: figs. 28-29.
Date: Roman.

97.
Pl. 18.97
J16-Sc-13-31
Rim.
Munsell: core (int.): 7.5YR-6/4, (ext.): 2.5YR-5/6; surface: 10R-5/6
H.: 5.5; L.: 15.5; T. (body): 2.4-2.7
Tegula, flange; hard-fired and richly levigated with finely grinded materials, such as black inclusions, quartz, lime and rarely chamotte; the body is slightly bent upwards; channel running alongside flange.
References: for an example of Roman roof tiles from the Southern Levant, see Kanellopoulos 1994: figs. 28-29.
Date: Roman.

98.
Pl. 18.98
J16-Sd-13-34
Rim
Munsell: 2.5YR-6/8
H.: 12.2; L.: 14.6; T.:2.2
Tegula, flange broken off; hard-fired and richly levigated with finely grinded materials, such as black inclusions, quartz, lime and rarely chamotte; rip running on top of body against former flange; tool marks running alongside both rip and flange, last tool treatment direction was alongside rip; white-yellowish, chalkish cover (Antique limewash?); bottom is too weathered to trace marks.
Reference: for an example of Roman roof tiles from the Southern Levant, see Kanellopoulos 1994: figs. 28-29 (these examples are without white-yellowish, chalkish cover and rip); for examples with a rip and close resemblance in form and colour, see Adan-Bayewitz 1982: 25, fig. 4, no. 2.
Date: Roman.

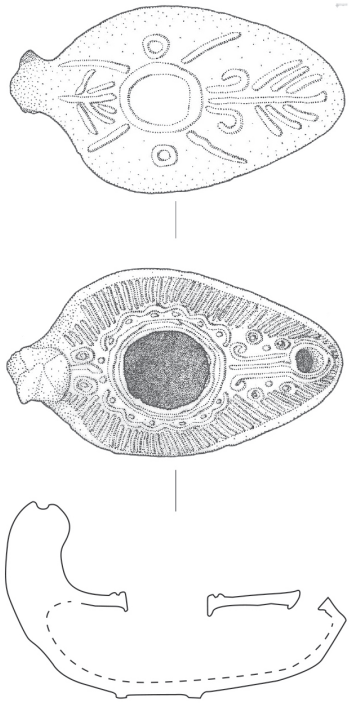
99.
Pl. 18.99
J16-Scd-13-68+69
Rim
Munsell: core (int.): 2.5YR5/11, (ext.): 6YR6/3; surface (int.): 4.5YR7/2, (ext.): 10YR7/3
H.:3.3; L.: 8.4; T.: 1.3
Two pieces. Tegula, flange; soft firing and rather coarse levigation, including lime and some chaff impressions (but no ashy chaff left overs), as well as quartz and small pebbles; deep channel running alongside the flange; folded flange itself is flattened on top; breaks are very regular and were intentionally smoothened. Production and mould marks visible on top and bottom side.
Reference: for an example of Roman roof tiles from the Southern Levant, see Kanellopoulos 1994: figs. 28-29.
Date: Roman.

100.
Pl. 18.100
J16-Tc-41-8
Rim
Munsell: core: 10YR5/1; surface (int.): 10YR5/1, (ext.): 10YR7/3
H.: 2.9; L.: 13.7; T. (body): 1.7, (flange): 2.8
Tegula flange; hard-fired and rather finely levigated, with some lime and quartz inclusions; flange is almost larger in width than in lenght and flattened; three finger-drawn grooves on bottom: two paired running alongside the break, one single line running parallel to the flange; production marks visible.
Reference: Briend and Humbert 1980: fig. 28, no. 4.
Date: Roman.

101.
Pl. 18.101
J16-Uc-45-9
Rim
Munsell: core (int.): 2.5YR5/4, (ext.): 2.5YR5/8; surface (int.): 2.5YR6/8, (ext.): 2.5YR5/8
H.: 4.9; L.: 10.3; T.: 2.2
Tegula flange; hard-fired and finely levigated, including finely grinded quartz and some black material; the flange was hand modelled upwards but reshaped by tool later; the body is slightly bent upwards. Mould marks on bottom and some tool marks on top still visible.
Reference: Hirschfeld 2002: fig. 39, no. 15; Kaptijn 2009: fig. 4.154, bottom right; Schneider 1950: fig. 15, no. 4.
Date: Byzantine.

102.
Pl. 18.102
J16-Ud-56-15
Rim
Munsell: core: 5YR2/4; surface: 5YR8/4
H.: 3.3; L.: 9.2; T.: 2
Tegula flange; medium- to hard-fired and richly levigated with much finely grinded quartz and black material; broken and intentionally smoothened breaks; the irregularly shaped flange, which was smeared up in the mould, and not folded, is pushed more towards the top of the body, forming a very narrow and sharp angle at one end but regularly standing up in a right angle (exterior); very visible mould marks on bottom side.
Reference: Konrad 2001: 119, no. 4, pl. 80.6; Schneider 1950: fig. 15, no. 7.
Date: Byzantine.

103.
Pl. 18.103
J16-Wd-53-13
Rim
Munsell: core: 7.5YR6/3; surface (int.): 7.5YR6/4, (ext.): 10YR7/3
H.: 3.2; L.: 9.1
Tegula flange; hard-fired and rather finely levigated, including partly non-fine-grinded lime, some quartz as well as tiny crumbles of chamotte; rectangular-shaped flange is attached to a very thin body; almost rectangular flange is flattened on top, curving slightly in- and outwards on the exterior, while being straightened on the inside; body is slightly bent upwards - most likely from being laid down on the ground in a dry and hot climate (ground marks on the bottom – perhaps impressions of pebbles and sticks of various sizes); the tegula is covered in a thick white, chalkish/limeish coating, which is likely to be an antique lime wash (*cf.* cat. 98).
Reference: Hischfeld 2002: fig. 39, no. 14.
Date: Byzantine.



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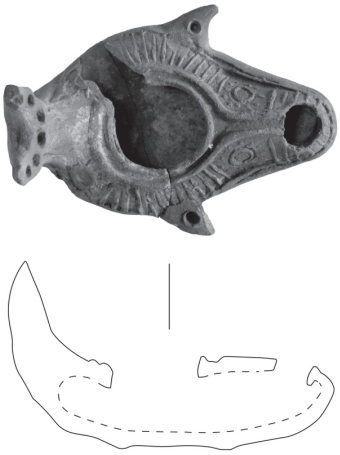


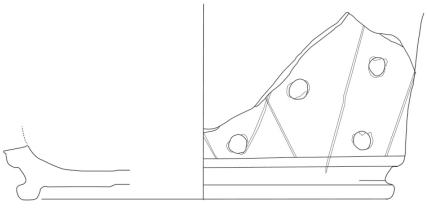
92

0 5cm



93

0 5cm



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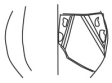


95

0 5cm

0 5cm

Imbrices

104.
Pl. 19.104
J16-Uc-45-10
Rim
Munsell: core (int.): 5YR4/4, (ext.): 5YR4/6; surface (int.): 7.5YR8/4, (ext.): 7.5YR8/4
H.: 3.8; L.: 10.7; W.: 8.7; T.: 0.9-2.3
Imbrex rim, hard-fired and rather finely levigated, including finely grinded black material and some lime as well as older pottery; the rim is remodelled by hand, while the rest was left untreated after the production with a tool (production marks on the exterior body); the interior part of the body is convexly rounded, whereas the exterior is pitched-roof-shaped; plaster remains on the top and probably stem from a phase of reuse.
Reference: for pitched-roof-shaped imbrices, see Kanellopoulos 1994: fig. 30 (date: Roman); Vriezen and Mulder 1997: fig. 10, no. 9 (date: Byzantine).
Date: Roman to Byzantine.

Tubuli

105.
Pl. 19.105
J16-Sc-13-29
Rim
Munsell: GLEY1 4/N
H.: 5.4; L.: 10.3; T.:1.2–3.3
Tubulus rim; medium- to hard-fired and coarsely levigated, including much lime and crumbles of chamotte; chaff impressions all over its surface; hand remodelling of the inner edge; rim is rounded.
Reference: Vriezen and Mulder 1997: fig. 12.
Date: Roman.

106.
Pl. 19.106
J16-Sc-13-59
Rim
Munsell: core (int.): 2.5YR4/1, (ext.): 2.5YR5/8; surface (int.): 10R4/6, (ext.): 7.5YR7/3
H.: 4.7; L.: 11; T.: 1.1-1.4.
Tubulus rim; hard-fired and richly levigated with mainly lime quartz and chamotte; the rim is flattened on top and regularly sloping down, with a clear angle at which the rim meets the tubulus wall, while the outside box-flue tile wall is straight; the edge of the tubulus is sharp on the exterior and concavely curved on the interior; no tool or production marks visible.
Reference: Kolb and Keller 2000: fig. 8; Reeves and Harvey 2016: fig. 10 (bottom right).
Date: Roman.

107.
Pl. 19.107
J16-Uc-60-1
Tubulus/ air exhaust, complete
Munsell: core (int.): 7.5YR5/4; surface (int.): 2.5YR6/6, (ext.): 7.5YR7/4
H.: 27.9; W.: 14.6
Tubulus-like object, broken but complete; soft-fired and coarsely levigated, including much lime, pebbles and chaff; the rims are slightly thickened towards the inside and rounded on top, but – due to the coarse levigation – very uneven and irregular; the inner edges are smeared together by hand, as is the usual production habit seen on many tubuli found in Jarash (see, in this catalogue, nos. 105-106); the openings on both short sides are different: one is more square and slightly wider, while the other is roundish and more narrow; there are finger impressions on both sides, and the exterior is full of plaster remains; the lack of air outlets in the walls, its rather elongated shape and its singular presence within the wider context point to a use of an air exhaust to the roof, which has maybe been connected to the industrial activity in this building, despite the lack of (visible) smoke or ash traces on the interior sides.
Reference: for shaping technique, seeVriezen and Mulder 1997: fig. 12.
Date: Umayyad.

Pilae

108.
Pl. 19.108
J16-Sc-13-25
Rim
Diam.: 19.8; H.: 6.6; L.: 19.8
Almost half a pila; medium- to hard-fired and coarsely levigated, including mainly lime, pebbles and chaff; two parallel-running lines drawn by finger on top of the pila; ground and chaff impressions all over the surface.
Reference: Barnes *et al.* 2006; Reeves and Harvey 2016: fig. 10 (top right).
Date: Roman.

109.
Pl. 19.109
J16-Tc-10-8
Rim
Diam. 20; H.: 3.9
Munsell: core: 7.5YR7/3; surface: 7.5YR8/3
Almost half a pila; hard-fired and coarsely levigated with medium-sized grinded chamotte and black inclusions (this fabric is known so far from non-local pottery only); one side is slightly more weathered; ground and covered with fine chaff impressions all over the surface.
Reference: -
Date: ?

Terracotta (AL and RR)

110.
Pl. 20.110
J16-Wij-68
Figurine of naked female
Terracotta, handmade
Max. H.: 6.9, max W.: 4.6, max. D.: 2.5
Legs, arms, head and neck are missing, surface partly worn, traces of paint on the front.
The torso of the naked female is presented frontally. Her right arm was lifted, pointing slightly downwards. The position of the left arm and of the head cannot be made out. The right leg either would have allowed a reconstruction of a seated figure or a figure with raised right leg. The position of the left leg cannot be determined, and therefore, the statuary motif remains unknown. The backside is well modelled. The breast and the navel are rendered as schematic circles. On her left breast, there is a circle of six incised dots. Red paint is preserved in several places:



96



97



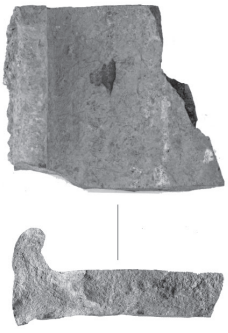
98



99



100



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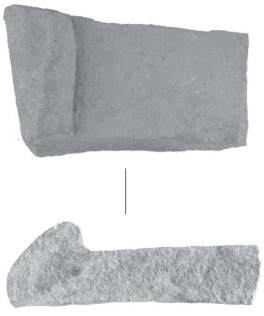


102



103

0 5cm

around the breasts, a patch on the stomach, a line running from under the right arm over her left shoulder and by a loop at her right side. Although an attempt has been made to portray the figurine as moving in a complex way, the figurine technically and stylistically displays little Graeco-Roman influence and, therefore, belongs to a Late Antique production in the region.
References: Lichtenberger 2016: 188-189 (on the stylistic features).
Date: late 3rd-4th century AD, Byzantine or Umayyad.

Sculpture (AL and RR)

111.
Pl. 20.111
J16-Sc-13-130
Paw
White, fine-grained marble with yellow patina
(without orientation) L.: 10.1; W.: 1.9; Diam.: 1.9
The fragment is broken into two pieces. The paw was attached to another part of the sculpture, as can be seen from the straight cut, the well-worked surface and the iron joint. The surface of the marble is highly polished and slightly sintered. The fragment shows the lower part of a raised feline paw. Together with cat. nos. 112-114, it probably belongs to a griffin. It is worked fine and gracile with a vivid surface, and it is well finished with no visible traces of drilling. If the interpretation as a griffin is correct, it might be considered as belonging to a statue of Nemesis.
References: for the iconography of griffins, see Flagge 1975. On Nemesis in Gerasa, see Lichtenberger 2003: 220-221.
Date: Roman.

112.
Pl. 20.112
J16-Sk-105-23
Leg of an animal
White fine-grained marble
H.: 9.0; W.: 3.5; Diam.: 2.9
Middle part of a leg, lower and upper parts broken. Highly polished marble on the front, unpolished at the back, traces of sinter.
The middle part of a gracile leg has marked edges and a central ridge. At the lower end, the surface is rendered bushy in a triangular (fragmented) area. The leg possibly belongs to a griffin and needs to be related to cat. nos. 111 and 113-114.
References: see cat. no. 111.
Date: Roman.

113.
Pl. 20.113
J16-Sk-105-24
Part of an animal
White fine-grained marble
(without orientation) H.: 3.6; W.: 2.0; Diam.: 2.3
The fragment is broken at two sides where it was attached to other parts of the original sculpture. The marble is highly polished. The small fragment is shaped as a protruding knob, and it was attached at the top and the side to other parts of the sculpture. It might belong to the neck of an animal, maybe to a griffin, and needs to be related to cat. nos. 111-112 and 114.
References: see cat. no. 111.
Date: Roman.

114.
Pl. 20.114
J16-Sc-13-129
Marble support
White fine-grained marble
(without orientation) H.: 6.9; W.: 4.7; Diam.: 1.9
The fragment is broken in two places. The fragment is part of a marble support of a sculpture. It is H-shaped, and at one side, the stems were worked for attachment; at the other side, the stems are broken. It is probably part of cat. nos. 111-113.
References: see cat. no. 111.
Date: Roman.

115.
Pl. 20.115
J16-Vi-1-41
Fragment of female head in profile to the right
Limestone
W.: 14; L.: 11; Diam.: 6.5
Only the hair knot and the shape of the back head are preserved; the surface of head is broken away. Also the back side is fragmented. The under life-size head is turned to the right side. Only the rough shape of the head is recognizable. The hair knot on the upper back head is rendered in several strains, which fall down along the head. Under the knot, there is a smaller knot or pendant. The fragment probably belonged to a limestone relief, but its function and the complete motive cannot be determined.
Date: Roman.

116.
Pl. 20.116
J16-Xe-2-228
Square gaming piece
White limestone
L.: 4.7-5.3; W. (differing from side to side): 3.1-3.5
The piece is intact, with only a few modern fragmentations. The top of the piece is rounded with worked, rounded top that is smaller than the piece itself. The bottom of the piece is flat, so that the piece could have been standing. There are elaborate incisions on all four sides. One side carries letters in Greek, dispersed over two lines – vertically incised. Another side carries a pattern of square incisions aligned with the orientation of the piece. Yet another side carries a rhomb with a pattern of square incisions. The last side carries a set of four squares, all of which were incised with diagonally running lines in the squares. The piece is carefully decorated.
References: Gilbert 1965: 72-78 (for tower-shaped gaming pieces); Hübner 1992: 67-85 for board games in general.
Date: Byzantine (?).

117.
Pl. 21.117
J16-Uc-60-42
Sigma table
White marble
Max. L.: 31.4.; Max. W.: 20.4.; T.: 1.5
The fragment belongs to a small marble sigma table with semicircular cavities and a rectangular niche at the lower side. The backside is well smoothed and has a profile suggesting that this table was portable. The type is of Chalkias type B (Chalkia 1991: 34-42). Similar fragments were found at Mt. Nebo and in Jarash. The closest comparison for the arrangement of the cavities is a limestone sigma

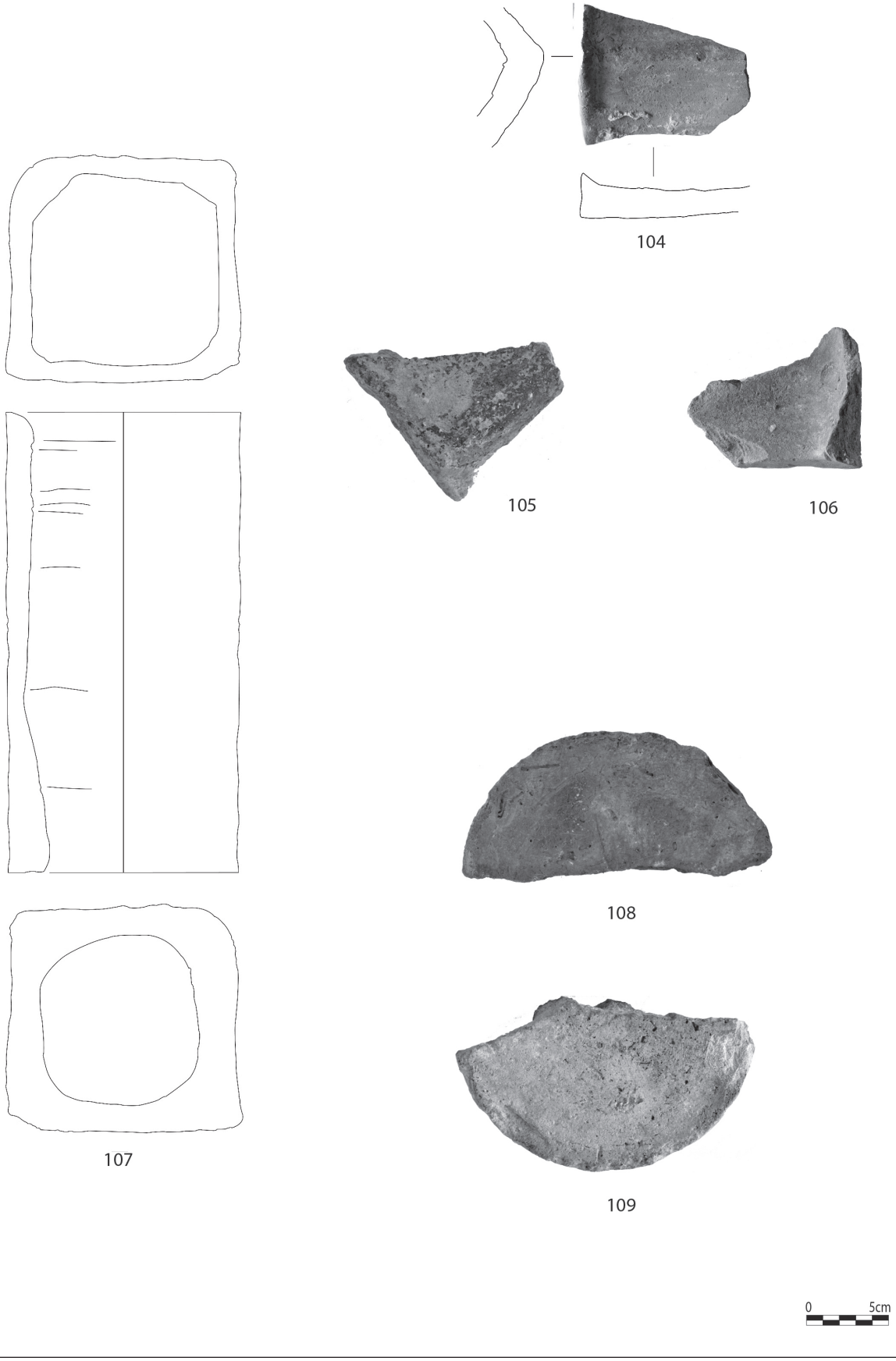

104
105
106
107
108
109
0 5cm

table from Herodium (Piccirillo and Israeli 2000: 74).
References: Saller 1941: plate 126; Chalkia 1991; Piccirillo and Israeli 2000: 74.
Date: Byzantine.

118.
Pl. 21.118
J16-Vdf-73-14
Pilaster capital?
White-greyish marble with veins
Max. L.: 21.1; Max. W.: 16.1; T.: 3.1-4.4
Fragmentary slab decorated with two acanthus leaves. The back is smooth and picked for attachment. This fragment belonged to an architectural revetment plaque, possibly a pilaster capital.
References: House and Megaw 2007.
Date: 5th/6th century AD.

119.
Pl. 21.119
J16-Vf-25-46
Chancel screen
Limestone
Max. L.: 17.5; Max. W.: 17.4; H.: 6.6; T.: 1.9+2.8+1.7
Fragmentary external part of a former closed, rectangular chancel screen with décor of concentric frames. At the side, it has a tongue for inserting it into the furrow of a chancel post. The backside is roughly worked and also decorated with concentric frames.
Date: Byzantine.

120.
Pl. 21.120
J16-Wg-107-3x
Decorated marble relief in champlevé technique
White-greyish marble
Max. H.: 15.2; Max. W.: 14.3; T.: 1.2
Fragment of a marble slab in champlevé technique, showing parts of two acanthus leaves, the left one possibly only a half leaf. The backside is smooth. The fragment of a revetment probably belongs to a small pilaster capital. Two plaques in champlevé technique were found previously in Jarash, none of which have been published yet (Boyd 2007: 300). This kind of architectural decoration is typical (but not exclusive) to churches, and it was also used in the Umayyad period (Ritter 2017: 145-163).
References: Boyd 2007: esp. 250.
Date: 5th/6th century AD.

121.
Pl. 21.121
J16-Tc-26-9
Fragment of shallow basin with lion's head spout
Reddish limestone
Max. L.: 21; W.: 16.8; Diam. (thickness): 7.6
The fragment is triangularly shaped, possibly on purpose. On the inside of the shallow basin (the basin is 2cm lower than the rim), the surface is smooth, and no tool marks are visible. On the outside (bottom of the basin), numerous tool marks are visible. The head of the lion is placed on the outer right side of the fragment, seen from above. A drilled hole runs from the inside of the basin, through the lion's head and through its mouth. The lion's head functioned as a spout.
Date: Roman to Late Byzantine.

Stone Objects (SR)
Loom Weight

122.
Pl. 22.122
J16-Ta-45-2
Max. diam.: 3.0; Max. diam. (hole): 0.4; H.: 0.9.
Black, spherical loom weight in stone with a suspension hole down the middle.
References: Crewe 2002: 220–233, fig. 1–5; Ploug 1985: 211–212.
Date: ?

Bowl

123.
Pl. 22.123
J16-Uc-60-39
H.: 4.3; L.: 7.6; W.: 1.5
Fragment of a white/greyish imported marble bowl with a lug handle.
References: Johnson 2006: 656, no. 2, and 657, fig. 22.2:2.
Date: Byzantine/Umayyad?

Jewellery (SK)

124.
Pl. 22.124
J16-Tc-67-4x
Stone bead, intact
H.: 0.9; W.: 0.45
Oval stone bead; orange; carnelian; smoothened surface; pierced through lengthwise; carnelian.
References: Riis 1948: 159-169, fig. 203; McNicoll, Smith and Hennessy 1982: 148-149, pl. 134, nos. 10-11 and 14-15; Platt 2009: 227-242, fig. 13.2.
Date: ?

125.
Pl. 22.125
J16-Uc-60-20
Stone bead, fragmented
L.: 0.6; W.: 0.75
Circular stone bead; grey; smoothened surface; pierced through lengthwise; carnelian.
References: Riis 1948: 159-169, fig. 203; McNicoll, Smith and Hennessy 1982: 148-149, pl. 134, nos. 10-11 and 14-15; Ploug 1985: 245, fig. 61.n; Platt 2009: 227-242, fig. 13.2; Lichtenberger, Raja and Sørensen 2018: cat. no. 167.
Date: Byzantine/Umayyad?

126.
Pl. 22.126
J16-Vd-25-21
Stone bead, intact
L.: 1.4; W.: 1.9; H.: 0.7-1.1
Ellipse-shaped stone bead; reddish orange; smoothened surface; centrally pierced; carnelian.
References: Riis 1948: 159-169, fig. 203; McNicoll, Smith and Hennessy 1982: 148-149, pl. 134, nos. 10-11 and 14-15; Platt 2009: 227-242, fig. 13.2.
Date: Umayyad.



110



111



116



112



113



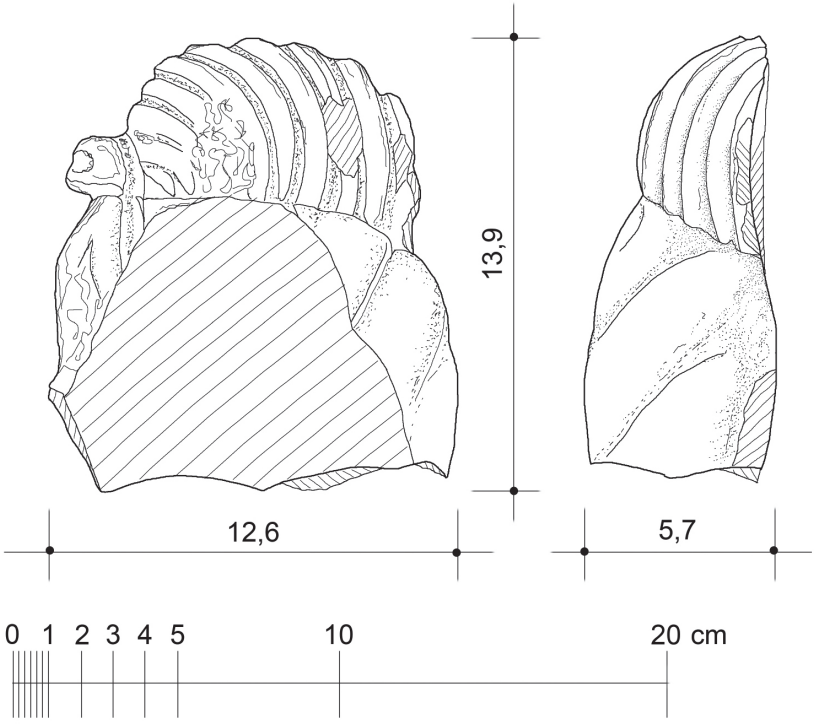
114



0 5cm



0 5cm



115

Worked Bone (SK)

127.
Pl. 22.127
J16-Xc-2-13
Worked bone inlay, intact
H.: 5.7; L.: 1.3-1.8; H.: 0.3-0.45
Rectangular bone plaque; smoothened surfaces; two holes are pierced in the body of the plaque; on the upper side are two incised circles with a central punch-hole; the edges of the plaque each has two notches.
References: Macalister 1912a: 248, fig. 398; 1912b: pl. CXCV, nos. 15-66; Smith 1973: 172, 210, pl. 17C; Riis and Buhl 1990: 240-242, fig. 114, nos. 958 and 962; McNicoll *et al.* 1992: 81, pl. 61.8; Ayalon 2006: 670-671, photo. 23.6; Lichtenberger, Raja and Sørensen 2018: cat. no. 150.
Date: ?

128.
Pl. 22.128
J16-Sb-1-58
Worked bone spindle-whorl, intact
Diam.: 2.9-3; H.: 0.9-1
Circular, worked bone disc; cone-shaped; centrally pierced; smoothened surfaces; incised decoration on upper surface, divided into four panels by an incised cross; each panel carries six incised circles with a central punch-hole.
References: Macalister 1912a: 303, fig. 443; Macalister 1912b: pl. CXXXII, nos. 45, 49 and 54; Ploug *et al.* 1969: 118-128, fig. 45-46; Ayalon 2005: figs. 28 and 29; Kotter and Ray 2009: fig. 9.27, no. 11; fig. 9.28, nos. 1 and 5; Lichtenberger, Raja and Sørensen 2018: cat. nos. 147-149. Function: Ploug 1985: 221, fig. 51g-l; Riis and Buhl 1990: 208-210, fig. 97, nos. 746-747, 750-752, 754-755 and 758.
Date: ?

129.
Pl. 22.129
J16-Xh-2-252
Worked bone spindle whorl, intact
Diam.: 3.6; H.: 0.8
Circular, worked bone disc; cone-shaped; centrally pierced; smoothened surfaces; incised decoration on upper surface; four circles with a central punch-hole are divided on four corners, and between these are four-times-four incised circles with a central punch-hole
References: Macalister 1912a: 303, fig. 443; Macalister 1912b: pl. CXXXII, nos. 45, 49 and 54; Ploug *et al.* 1969: 118-128, fig. 45-46; Ayalon 2005: figs. 28 and 29; Kotter and Ray 2009: fig. 9.27, no. 11; fig. 9.28, nos. 1 and 5; Lichtenberger, Raja and Sørensen 2018: cat. nos. 147-149. Function: Ploug 1985: 221, fig. 51g-l; Riis and Buhl 1990: 208-210, fig. 97, nos. 746-747, 750-752, 754-755 and 758.
Date: ?

130.
Pl. 22.130
J16-Xh-2-253
Worked bone spindle, fragmented
L.: 3.8; H.: 0.5-0.7
Worked bone pen; oblong and circular; one end has a smoothened surface, and the other end has incised lines running around the stem; this might have been the shaft of a spindle belonging together with items such as catalogue nos. 3-4
References: Macalister 1912a: 89, fig. 278, nos. 10-12; Riis 1948: 173, fig. 217; Ploug 1985: 269, fig. 61e; Riis and Buhl 1990: 207-208, fig. 96, nos. 736-738, fig. 97, nos. 740, 744, and 215-217, fig. 99, no. 810; Lichtenberger, Raja and Sørensen 2017: figs. 129-130; Kalaitzoglou *et al.* 2017: cat. no. 144.
Date: ?

Selected Metal Objects from the 2016 Campaign
Christoph Eger

In 2016, the excavations produced approximately 190 metal objects. Around two-thirds of the metal objects were made of iron, while only a quarter were made of copper alloy. Additionally, a few lead objects were identified. The metal composition of a dozen objects has not yet been determined with certainty (**Fig. 22**)

As usual in the Northwest Quarter of Jarash (see the 2014 and 2015 reports), the iron objects are badly corroded. Therefore, it is often difficult to determine the exact shape and, thus, the original function of a number of items.

In 2016, the following types of metal object are represented:
- Constructional fittings
- Household appliances
- Tools
- Weapons
- Cosmetic implement
- Jewellery
- Musical instruments (?)
- Metalworking

To illustrate this spectrum of objects, eighteen items are presented in this preliminary report.

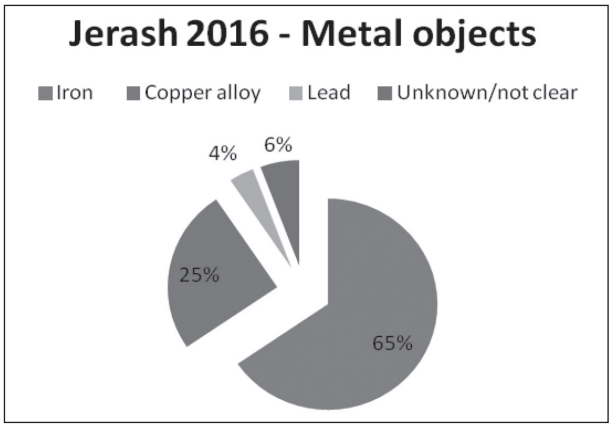
Constructional Fittings

As in previous campaigns, iron nails comprise the majority of findings from 2016. The overall percentage of iron nails is somewhat smaller than in the 2015 campaign. The different sizes and shapes indicate usage in construction – especially for wooden roofs – but also for mounting movable goods.

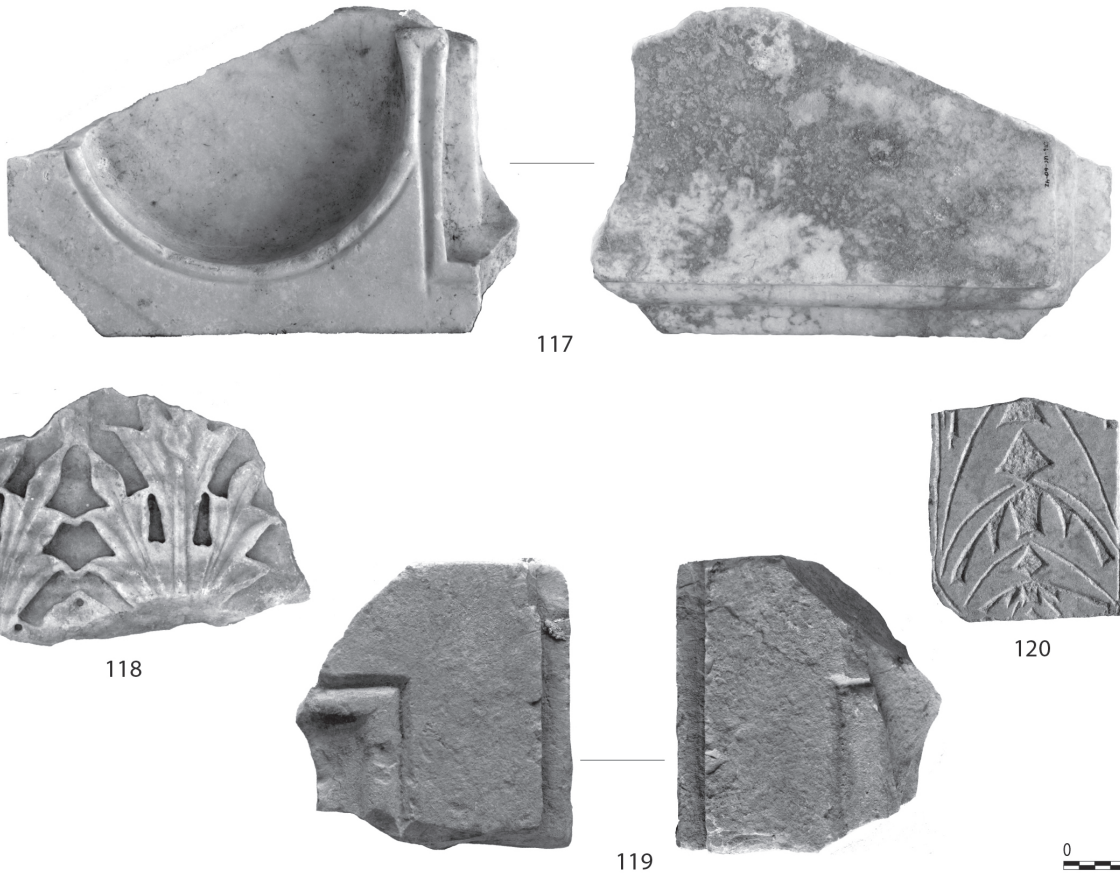
Household Appliances

A hook with the remains of a chain (**Pl. 23.140**) belongs to the large group of long suspension hooks, which were an essential element of lamp-holders. Usually, three hooks with chains were pulled together at the top and held by a loop, which was attached to another suspension hook. This kind of lamp-holder was common in Byzantine times and was used for both polycandela and simple glass lamps.

The two round plaques with a hinge (**Pls. 23.135** and **23.136**) fit together. They were the metal fittings of a wooden casket. The square hole of J16-Vh-26-1x (**Pl. 23.135**) might be the keyhole of a lost lock, which would



22. Metal objects.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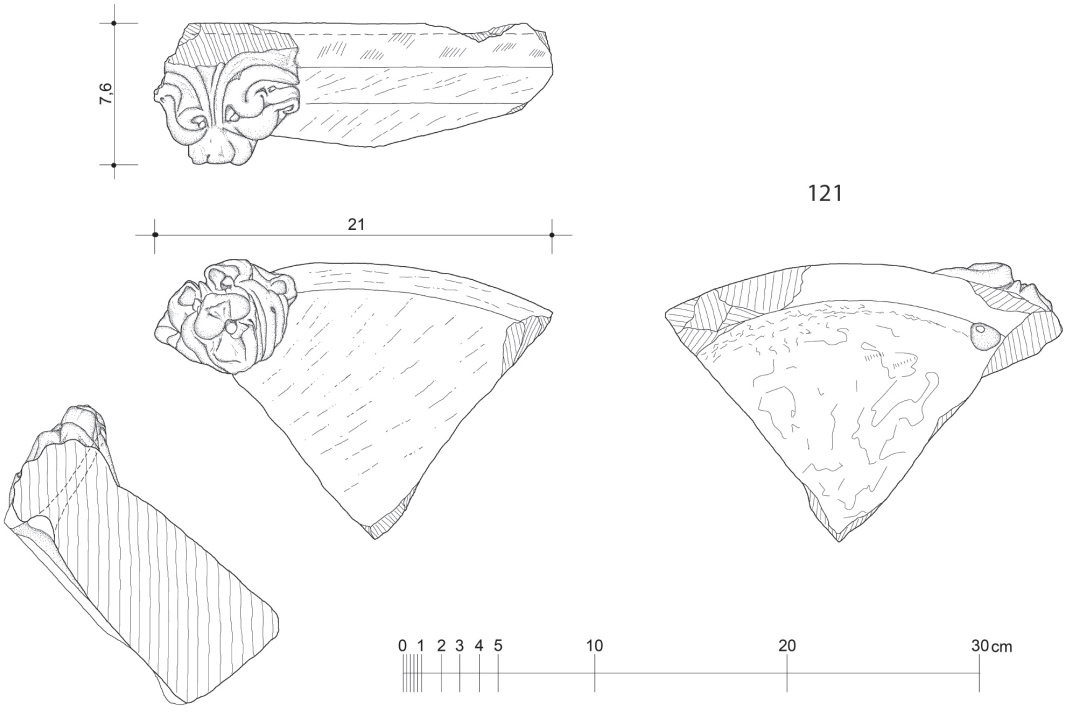

7,6
21
121
0 1 2 3 4 5 10 20 30 cm

have been attached to the inside of the casket.

A small key with a movable iron ring (**Pl. 22.134**) is another example of a household appliance, and it matches a casket´s lock. This kind of key is typical of the Byzantine period, but normally both parts – the key and the ring – would have been made of copper alloy. The ring ends are shaped as dolphin or duck heads. A complete item was among the Byzantine material of the Eupalinos tunnel on the island of Samos [Jantzen 2004].

The iron object (**Pl. 23.141**) was certainly the handle of a large wooden appliance, perhaps a chest. Imprints of mineralized wood are visible on the clamps.

Tools

A large knife (**Pl. 22.131**) was excavated in Trench V. It differs from the small ordinary knives with a straight back and curved edge, which were common in every household, since it has a symmetrical, oblong, triangular blade of at least 15cm in length. This has the typical shape of a dagger, but the blunt point and single-edged blade clearly contradict such an interpretation. It is unknown whether this type of large knife served a special function within the household, or if it was used for some special handicraft or both.

The shape of the other tool (**Pl. 22.132**), which was found in 2016, can be identified by ethnographic parallels as an adze or a hoe. Adzes were a typical carpenter´s tool for smoothing or carving wood. Characteristic is the angled, horizontal blade, the vertical shaft hole and a short opposite end. It is not unusual that this part is formed (and used) like a hammer. A hammer-adze was found in a Byzantine context in one of the shops in Sardis, Turkey [Crawford 1990]. Of an almost identical shape are some types of hoes, which were used as an agricultural hand tool to clear soils (*e.g.* removing of weeds and stones) before ploughing. We might suggest different uses for the Jarash tool, *e.g.* that the tool was an adze that was used during construction work on the house undergoing restoration, in which it was found, or that it was a hoe that could perhaps indicate intra-urban (agricultural) gardening. It is also possible that the tool was used for cutting tesserae, since evidence for tesserae production was found in the house.

Weapons

The small number of weapons found in the Northwest Quarter of Jarash has increased by two arrowheads found during the 2016 campaign (**Pl. 22.133** and **23.146**). Both are of a similar type, characterized by a pyramidal point and a tang with a round section. They only differ in the length of the point and the thickness and length of the tang. However, all variants are arrowheads that would have been shot with a bow. The slim shape of the point is believed to have penetrated armour. Contra Gaitzsch (Gaitzsch 2005), the dating of the Pergamene findings cannot be limited to the Hellenistic and Early to Middle Roman period, as a few pieces were found in Byzantine layers. This indicates a wider chronological span for this type of projectile. In the Near East, arrowheads with an oblong, pyramidal point are still known from Crusader times and Mamluk contexts (12th and 13th centuries).

More recent is the modern bullet found in Trench V (**Pl. 23.137**) and the probably corresponding cartridge case found in Trench T (**Pl. 23.138**). Military forces do not use the rimless cartridges of this size, *i.e.* 7.62 by 65mm, but there are a few sporting guns with this caliber.

Cosmetic Implement

A spatula fragment (**Pl. 23.148**) is the only cosmetic implement from the 2016 campaign. Only the end-piece of the oblong bowl is preserved. Spatulae could have been used both as cosmetic and medical implements. In the context of a regular household, however, cosmetic use seems to be more probable. One would have been able to extract cosmetic substances from a vessel with a narrow opening, such as a balsamarium. The opposite, thickened end of the spatula would then have been used to pound this substance or to mix it with other substances.

Jewellery

As in 2015, very few pieces of jewellery were found in 2016. Remarkable is the fragment of a bracelet made of twisted wires (**Pl. 23.147**). Several variants of this kind are known, differing in the number of twisted wires and the way in which it would have been fastened, but all were very common in Late Roman times, dating mostly to the 3rd and 4th centuries AD. Evidence for twisted bracelets comes mainly from burials in the north-western provinces of the Roman Empire. In the Near East, one cannot exclude that the rings were used alternatively as anklets.

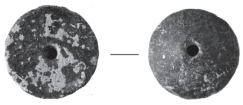
Another piece of jewellery is a well-preserved hair- or dress-pin (**Pl. 23.139**). Unfortunately, the piece was found in topsoil. Although no direct parallels come to mind, an Islamic date for this pin is suggested; a common element of decoration is the rectangular section with rounded openings, which appears similarly on kohl sticks and pins of medieval Islamic times.

Musical Instruments (?)

Three round plaques with a convex central section, made of iron (**Pl. 23.142-144**), deserve special attention. Similar objects are sometimes supposed to be iron lids (Raubitschek 1998: 113, no. 366). However, the three Jarash plaques, found in an Umayyad context, have a little hole in the centre. Their typical shape and the hole underline a possible function as musical instruments. Although they are made of iron, they are probably the remains of cymbals. This would be the first evidence of musical instruments from the Northwest Quarter of Jarash and would constitute rare archaeological evidence for such instruments in Late Antique and Early Islamic Jordan. Cymbals are already mentioned in the Bible and are connected with religious ceremonies. East of the Jordan River, the excavations at Tall al-´Umayri yielded a pair of cymbals found in an Iron-Age context. In Roman times, cymbals were distributed throughout the Roman Empire. Examples of Late Roman and Byzantine date are known, *e.g.* in Nijmegen, The Netherlands and in Corinth, Greece. The Dutch find is of special importance for reconstruction of the complete instrument. The sarcophagus with a 4th-century AD burial of a woman contained fragments of probably four tambourine sticks made of wood. Each stick had two rectangular apertures, in which two pairs of cymbals were fixed on an iron rod. Alternatively, pairs of cymbals could be fastened together just with a chain, as known from an example stored in the Musée National de Carthage in Tunisia. Archaeological evidence for cymbals of Early-Islamic date is missing up to now. However, we know from written sources that they were used even for military purposes. In his Tactica, the Byzantine emperor Leo VI mentions that the Muslims used drums and cymbals in battle to confuse the enemy (Kaegi 1992: 125, 130).

Metalworking

The excavation of Trench U yielded a drop fragment of cast lead (cat. no. 145). Despite its small size, the piece unmistakably indicates some kind of metalworking (lead smelting and casting) in this area. Pollution from lead



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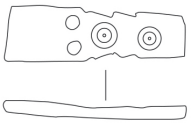
124



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125



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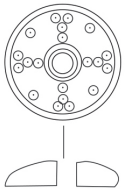

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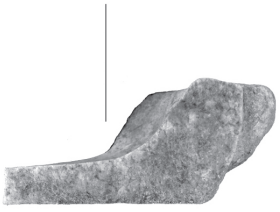

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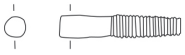
126



130



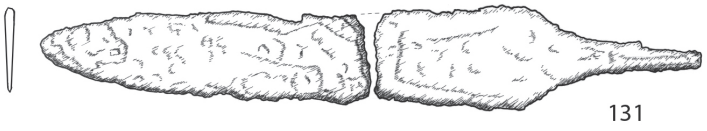
0 5cm



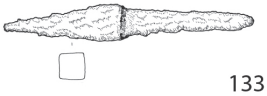
0 5cm



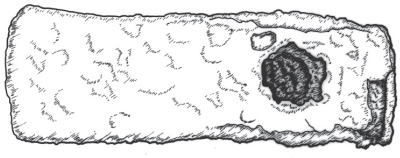
0 5cm

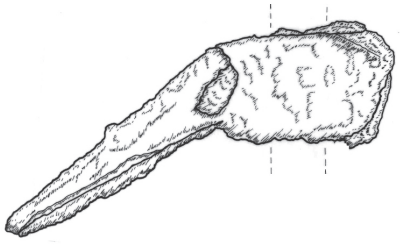


131

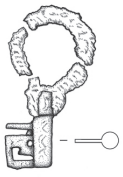


133





132



134



0 5cm

production could be proven. Ian Simpson (University of Stirling), who is responsible for soil chemistry within the project, reported in January 2017:

"Inductively Coupled Plasma (ICP-AES) analyses of Red Mediterranean Soils from within the Northwest Quarter demonstrated enhanced lead (Pb) levels relative to background, ranging from 9-27ppm. Enhanced lead levels (XRF analyses) of up to 50 ppm have also been identified in limestone mortars from the Northwest Quarter. Together, this evidence suggests background pollution within the city associated with smelting activities" (personal communication).

Owing to the stratigraphic layers and archaeological contexts, the majority of the presented objects belong to the Early Islamic (Umayyad) period. The spectrum of the metal objects from the 2016 campaign reflects a pattern that is similar to that of previous years. Most items belong to constructional elements, household appliances and tools. They were made of iron and copper alloy. Precious metals are lacking. However, the arrowheads and possible cymbals highlight functional groups of metal objects which have been almost absent up to now, namely weaponry and musical instruments. Therefore, they deserve special attention. Nevertheless, the number of weapons is quite small, and their presence might be accidental. Nothing seems to indicate war-like operations in the Northwest Quarter, nor do the few weapons substantiate a strong presence of troops.

Catalogue of Selected Metal Objects from the 2016 Campaign

131.
Pl. 22.131
J16-Vdf-25-45
Knife
Iron
L.: 19.6; W.: 3.1
Two fragments of a large knife with single-edged blade; the end of the centred haft is broken off.
References: Davidson 1952: 203, pl. 93.1573; Jantzen 2004: 111, pl. 16.671-673.
Date: ?

132.
Pl. 22.132
J16-Vi-60-3x
Adze
Iron
L.: 12.2; W.: 4.3
Almost rectangular blade with a horizontal cutting edge, which is slightly curved; the blade is set at a 45-degree angle to the tool's rectangular shaft and its cylindrical hole; the blunt end of the shaft makes it look like a hammer. Complete, but badly corroded.
References: Gaitzsch 2005: 78-81, 107-109, pl. 18.HA11, 19.HA2, 61.X7; Baitinger and Völling 2007: pl. 5.31-32; Waldbaum 1983: 48-49, pl. 11.136.
Date: Roman and later.

133.
Pl. 22.133
J16-Td-1-22
Arrow head
Iron
L.: 7.9; W.: 1.2
Oblong pyramidal point, solid tang of round section.
References: Davidson 1952: 202; pl. 92.1557 ('spearhead'); Gaitzsch 2005: 143, pl. 39.P36-37.59-60, 40.P75; Raphael and Tepper 2005: 91, fig.1; Kazanski 2003: 80, pl. 6.16.19.21-24. and 100, pl. 26.16-26.
Date: Hellenistic and later.

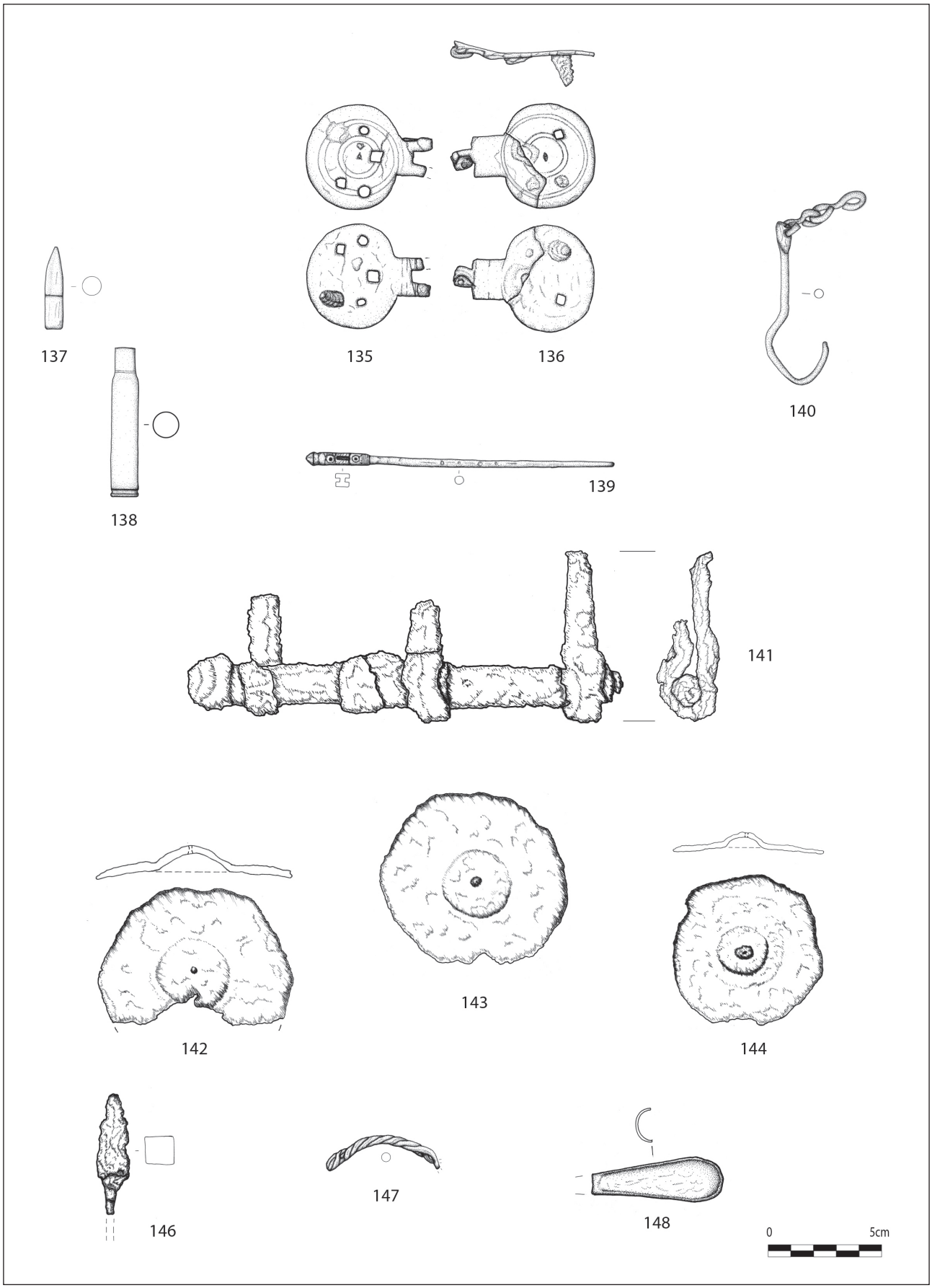
134.
Pl. 22.134
J16-Uc-29-3
Key ring
Copper alloy and iron
L.: c. 4.5.; Diam. ring: 2.5
Three fragments of a movable ring handle made of iron and a key made of copper alloy. The key has a short shaft with a round section and a rectangular, perforated ward.
References: Davidson 1952: 137-140, pl. 70.984-997 (most made of copper, few of iron; however, no. 986 is a 'mixed' key with copper-alloy handle and iron shaft); Waldbaum 1983: 75, pl. 25.399 (iron); Jantzen 2004: 177, pl. 33.1189.
Date: Byzantine and Islamic.

135.
Pl. 23.135
J16-Vh-26-1x
Fitting with hinge
Copper alloy
L.: 5.7; Diam. fitting: 4.2-4.6
Roundish plaque with a small rectangular extension. Originally, two loops were attached to the extension, one is now broken off. On the plaque's front, concentric circles are engraved. The metal sheet is perforated by three circular holes and one square hole.
References: Patrich 2008: 440, no. 92, and 456; Jantzen 2004: 174, pl. 31.1167 (iron).
Date: Roman and later.

136.
Pl. 23.136
J16-Vh-26-54
Fitting with hinge
Copper alloy
L.: 6.3; Diam. fitting: 4.6
Two fragments of a roundish plaque with a small rectangular extension. One centred and slightly deformed loop is attached to the extension. On the front, concentric circles are engraved. A small square hole was cut between the inner and outer circles. The fitting is the exact complement to the above-mentioned item, cat. 135 (J16-Vh-26-1x).
References: Patrich 2008: 440, no. 92, 456; Jantzen 2004: 174, pl. 31.1167 (iron).
Date: Roman and later.

137.
Pl. 23.137
J16-Va-1-38
Bullet
Copper alloy
L.: 3.6; W.: 0.7
Solid bullet with blunt end, calibre 7.62mm.
References: https://en.wikipedia.org/wiki/7.62_mm_caliber.
Date: Modern (second half of the 20th century).

138.
Pl. 23.138
J16-Td-1-63
Cartridge case
Copper alloy
L.: 6.5; W.: 1.3
Rimless cartridge case, probably belonging to the bullet, cat. 136 (J16-Va-1-38).


137
135
136
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138
139
141
142
143
144
146
147
148
0
5cm

References: https://en.wikipedia.org/wiki/7.62_mm_caliber.
Date: Modern (second half of the 20th century).

139.
Pl. 23.139
J16-Vfg-1-72
Needle / hairpin
Copper alloy
L.: 13.7; W.: 0.6
Long, slightly narrowed shaft with blunt lower end. A rectangular, perforated element and a small biconical head shape the upper end of the needle.
References: Shalem 2002: 174, fig. 20.2; kohl stick with similar decoration: fig. 20.4.
Date: ?

140.
Pl. 23.140
J16-Td-52-2x
Hook with the remains of a chain
Copper alloy
L. as preserved: 8.5; W. hook: 2.6
Straight shaft with a loop at its end, the hook with a blunt end; a part of a chain with eight-shaped links attached to the loop.
References: Davidson 1952: 194, pl. 88.1450; Gaitzsch 2005: pl. 19.HAK1; Waldbaum 1983: pls. 38.591-592.600 and 39.601; Jantzen 2004: pl. 1.1; parallel from Jarash: Clark 1986: 299; pl. 29.2I-J.
Date: Byzantine and later.

141.
Pl. 23.141
J16-Uc-60-2x
Handle
Iron
L.: 18.8; W.: 7.5
Solid, movable axis with thickened ends, one broken off. Three clamps with loop are attached in regular intervals to the axis. Wooden remains preserved on the clamps. Badly corroded, small parts are broken off.
References: --
Date: ?

142.
Pl. 23.142
J16-Vg-69-1xa
Cymbal
Iron
Diam.: 8.3
Fragment (two thirds) of a cymbal. Almost circular plaque with a convex central portion. Badly corroded, one third broke off.
References: Davidson 1952: 152; pl. 90.1504; Steures 2011: 358-360; Patrich 2008: 449, nos. 240 and 467.
Date: Hellenistic/Roman and later.

143.
Pl. 23.143
J16-Vg-69-1xb
Cymbal
Iron
Diam.: 7.9
Almost complete cymbal, made of a round plaque (some parts of the rim broken off) with a convex central section and a very little hole in the middle. Badly corroded and partially cleaned.
References: Davidson 1952: 152; pl. 90.1504; Steures 2011: 358-360; Patrich 2008: 449, nos. 240 and 467.
Date: Hellenistic/Roman and later.

144.
Pl. 23.144
J16-Vg-69-1xc
Cymbal
Iron
Diam.: 6.9
Almost complete cymbal, made of a round plaque (some parts of the rim broken off) with a convex central section and a very little hole in the middle. Badly corroded and partially cleaned.
References: Davidson 1952: 152; pl. 90.1504; Steures 2011: 358-360; Patrich 2008: 449, nos. 240 and 467.
Date: Hellenistic/Roman and later.

145.
J16-Ud-39-4x
Drop of cast lead
Lead
L.: 4.9; W.: 3.7
Unformed, flat drop of cast lead.
References: Context Umayyad, prior to the 749AD earthquake destruction.
Date: ?

146.
Pl. 23.146
J16-Vi-44-7
Arrowhead
Iron
L.: 5.4; W.: 1.5
Pyramidal point, thin tang, the end broken off.
References: Davidson 1952: 201, pl. 93.1532; Gaitzsch 2005: 143, pl. 39.P38-40; Raphael and Tepper 2005: 91, fig.1; Kazanski 2003: 80, pls. 6.16 and19.21-24, and 100, pl. 26.16-26.
Date: Hellenistic and later.

147.
Pl. 23.147
J16-Xb-2-42
Bracelet
Copper alloy.
L. still: 4.9; W.: 0.55
Fragment of a bracelet made of three twisted wires. Badly corroded.
References: Davidson 1952: 263, pl. 112.2136-2137; Riha 1990: 59-62, pls. 20.561-568 and 21.569-586; Platt 2009, 253-255; fig. 13.10-11.
Date: Late Roman.

148.
Pl. 23.148
J16-Vd-1-21
Spatula
Copper alloy
L. still: 2.9; W.: 1
Fragment of a spatula. Just a part of the oblong, shallow bowl is preserved, while the handle is lost. Rounded end.
References: Riha 1986: 64-65, pl. 48.520-522; Patrich 2008: 466, nos. 194-195; Platt 2009: 201-203; fig. 12.2.1-2 (variant with flat bowl with pointed end); parallel from Jarash: Clark 1986: 296, pl. 26.2 left.
Date: Roman/Byzantine.

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HLC PROJECT 2017: PRELIMINARY REPORT ON THE JAGIELLONIAN UNIVERSITY EXCAVATIONS IN SOUTHERN JORDAN

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Introduction

In September 2014 a new Polish research project dedicated to the Early Bronze Age (EB) began. Archaeologists and students from the Institute of Archeology of the Jagiellonian University started exploratory work in southern Jordan. This Heritage-Landscape-Community (HLC) project is headed by Piotr Kołodziejczyk. In cooperation with the Jordanian Department of Antiquities, an area located in the vicinity of the city of aṭ-Ṭafīlah was selected for detailed survey (**Fig. 1**). In the years 2014-16, the project entailed surface survey (Kołodziejczyk *et al*. 2018), while in 2017 excavations at two sites were started. In the years to come new locations will be added to the project. The work is being carried out as part of research project UMO-2016/22/E/HS3/00141, financed by the National Science Center (Poland).

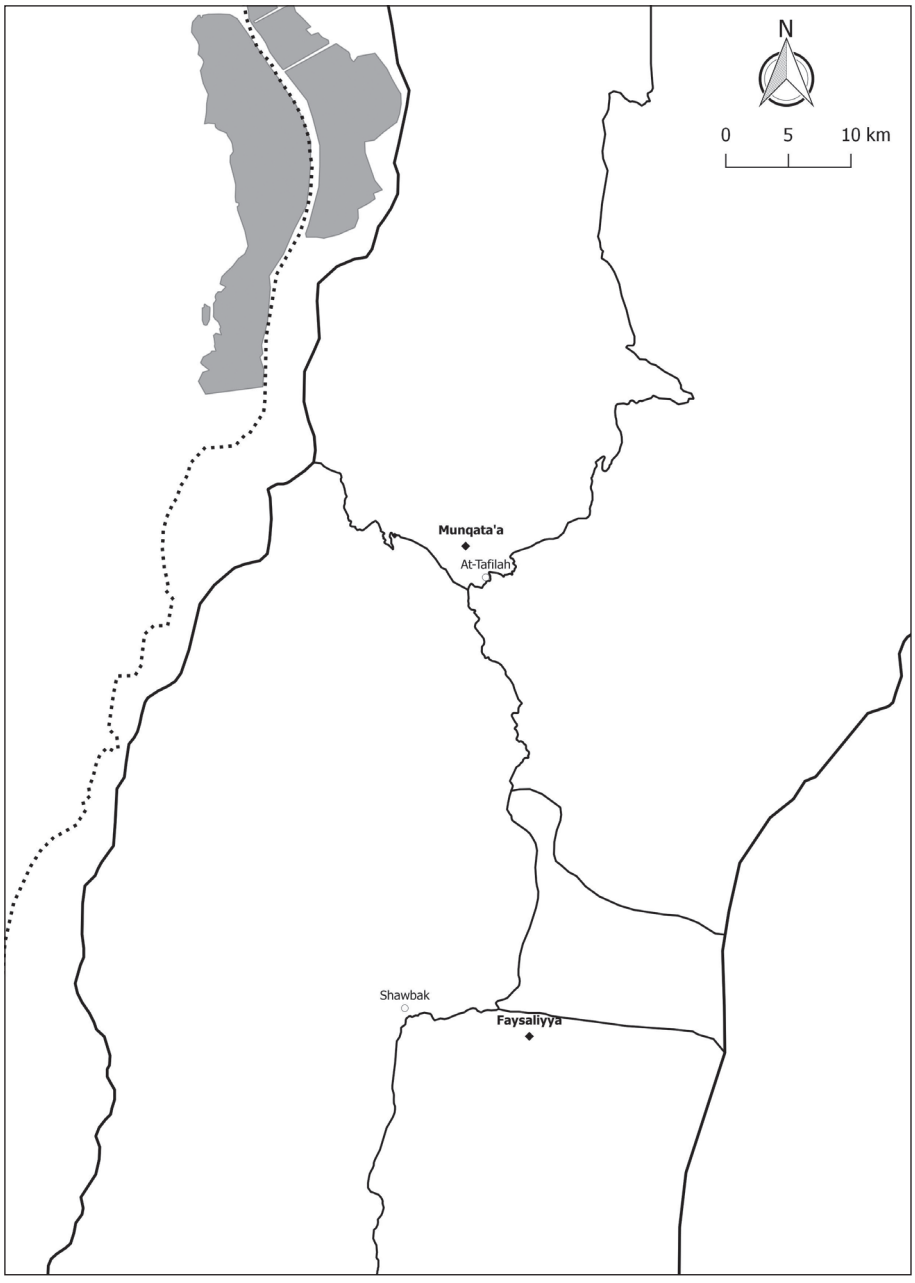
The project represents a comprehensive attempt to establish the functioning and significance of southern Jordan during the EB. Project research focuses on determining the stages and kinds of human activity within the study area at this time, with a case study -the micro-region of aṭ-Ṭafīlah- serving as the source of information. An important role in the project is also played by the neighbouring ash-Shawbak micro-region, which is used as an area of reference.

The key research problems include settlement network and **s**tructure, external relations and influences (including Egypt and the rest of the Levant, both of which witnessed important events at this time), and architectural and funerary traditions visible in the archaeological record. The surface surveys carried out by the project in the vicinity of aṭ-Ṭafīlah since 2014 has demonstrated that this area has great potential for a more complex study. Further excavations, combined with laboratory research and supplementary surface survey, will generate a coherent image of the period of interest and determine the dynamics of change that occurred here at the time. These will be projected against a backdrop of earlier cultural units and phases (Palaeolithic to Chalcolithic) to elucidate the trajectory of prehistoric and early-historic community development in the region.

Fieldwork of the Polish research project in southern Jordan was conducted in August and September 2017. Archaeologists and a geologist from the Institute of Archaeology of the Jagiellonian University in Cracow (Poland) carried out surface survey and test excavation in a desert area in the vicinity of the al-Fayṣaliyyah village (ash-Shawbak directorate), as well as in a mountainous area - al-Munqaṭi‘ah - in the vicinity of aṭ-Ṭafīlah city (at-Tafilah directorate). All work was conducted in co-operation with the Department of Antiquities of the Ministry of Tourism and Antiquities of the Hashemite Kingdom of Jordan [DoA representatives in 2017: Mr. Mohammad Dabain; Mr. Sami Salem al-Rofoa’a].

Location of Excavated Sites and Objectives of the Season

The investigated al-Fayṣaliyyah site is located about 5km south-east of ash-Shawbak city, on a plateau situated *ca* 1,200-1,300m asl in the northern part of the historic and geographical region of Edom, that is to say the Edom Highlands. To the east begins the Arabian desert, to the west the Dead Sea rift and to the north - from Wādī al-Ḥasā - the Moab Highlands. The area is also known as the Eastern Highlands or



1. Map of southern Jordan with sites excavated by HLC Project during 2017 season.

Jabal al-Adhiriyāt. It is actually a complex of prehistoric sites identified in 2016 by the DoA during surface works conducted in connection with the planned construction of a wind farm. During this survey, the DoA team recorded at least two archaeological sites, possibly dating from the Stone Age to the Bronze Age, which were clearly visible on account of a huge amount of chipped stone on the ground surface and some probable architectural remains. These important discoveries by the DoA team are worthy of further investigation. Nonetheless, as archaeological sites in the region are in danger, this needs to be carried out before construction works begin, thereby destroying the heritage of Jordanian history.

The al-Munqaṭi'ah archaeological site is located about 3km north-west of aṭ-Ṭafīlah city, on the northern slope of the canyon directly beneath the city. Branches of the canyon begin in the city itself and head west towards the Dead Sea rift just below the site. The quantity of surface artefacts found in several places during the surveys conducted by the Polish team between 2014 and 2016 was suggestive of developed settlement activities. One such location was an area commonly called 'al-Munqaṭi'ah' by local farmers; it is very difficult to reach as there is

no road leading there. The only way to get to the lower part of the valley is along a small path on the steep slope. The difficulty of accessing the site presents a major logistical problem. Research can be conducted only by setting up a camp. Unfortunately, the activity of robbers is clearly visible on the site in the form of many pits, with the destruction being marked by an abundance of stone and ceramic artefacts from various periods lying on the surface.

The main objective of the work conducted during the 2017 season was to determine the phases and nature of human activity on and around the sites and to prepare a detailed plan for subsequent research, bearing in mind the extant threats to these manifestations of Jordanian heritage.

Geology, Hydrology, Geomorphology and Pedology

al-Fayṣaliyyah

Within the study area, low rolling hills are the dominant element of the landscape. Formed on the Nubo-Arabian Shield tableland (Bandel and Salameh 2013; Bender 1975; Migoń 2009: 250-254), these are cut by episodic river beds forming near-parallel V-shaped valleys. All of them head eastwards - to the desert - and are up to 50km in length. The area under investigation is located in the upper and middle parts of these valleys.

The river channels are 5-10m wide and 1-5m deep. The youngest - Holocene - banks consist of boulder-gravel-sand-silt material. The boulders are up to 1m in diameter, with an average of 0.5-0.6m. The contemporary dynamics of the rivers have caused intensive downward erosion. The river's incision is pronounced and erodes Holocene sediments, Tertiary conglomerates and even Cretaceous marls.

The al-Fayṣaliyyah archaeological site lies on Quaternary sediments which form flat geomorphology. A detailed study of their formation was initiated during the 2017 season. However, in several locations (mostly in the river beds), small outcrops in the form of rock walls (up to 20m) and valley steps allow older geological layers to be described. Beneath the Holocene sediments lie Tertiary and Cretaceous age rocks. They form the upper part of the horizontal, parallel layers of the Nubo-Arabian Shield. The Tertiary sediments are known as the Ḍānā Conglomerate (DC - Oligocene/Pliocene) and the Umm ar-Rijām Chert-Limestone (URC - Paleocene/Eocene). The lowermost formations visible in the outcrops are the Cretaceous rocks of al-Muwaqqar Chalk Marl (MCM - Maastrichtian [see also Barjous 1988; Bandel and Salameh 2013]).

The MCM formation is interbedded with numerous (at least six) chert levels. They form widely extended nodular and tabular deposits of 10-30cm thickness. Several chert outcrops are located in the vicinity of the explored archaeological site. What is most important for their archaeological interpretation is that they are of good to excellent mechanical quality, allowing *in-situ* tool production during human occupation of the area. Large quantities of these cherts are very easily accessible, in both primary and secondary deposits.

The Tertiary URC and DC formations are preserved only partially. The small occurences of URC/DC conglomerate appear in the river-valley slopes as the relics of old (Tertiary) river terraces. They were cut and severely eroded during the Quaternary and form rock walls or steps. These rocks contain several sorts of boulders (up to 60cm in diameter but usually not more than 40cm), sand and silt. The dominant types of primary rock are chert and limestone, with minor admixture of sandstone (the sandstone source area lies further to the west, in the ash-Shawbak area - that is to say the river headwater).

Seasonal rivers are today active between October and March/April, but precipitation does not usually exceed 50mm per month. However, as stated by numerous authors (*e.g.* Rahn 1967 [for a summary see Thomas 2011]) even this low precipitation significantly affects the geomorphology. The region is frequently soaked by torrential rains; these have gained in frequency since the 1990s, but earlier episodes are known too. The sheet floods thus caused have significant influence on the slope morphology and on the character of sediments and soils. Other than rainfall, the area is deprived of permanent water flow or water sources. Contemporary agricultural activity is based on deep-drilled wells.

A second factor affecting soil formation is intensive aeolian activity. The study area is

covered with a desert pavement consisting mostly of cherts with an admixture of limestones. Intensive aeolian erosion is caused by June-August winds of 20-30km/h (50-80%) and February-June winds of 30-50km/h (10-15%). In this context, the scarcity or absence of varnish and high degree of roundness is interesting. It could be explained by the intensive rains and resultant sheet floods. The factor has a significant erosion-transportation potential.

al-Munqaṭi'ah

The contemporary geomorphology of the site area is very steep and erosional processes are intensive. This is mostly a consequence of winter-spring precipitation and the influence of pastoral activity on the vegetation cover. The V-shaped stream beds are extremely deep and cut through older colluvia. Several rocky shelves formed on harder geological strata are visible in the canyon geomorphology, alternating with cliffs and steep slopes. In the flatter parts of the canyon, screes and alluvial fans have formed. Not only is the local morphology marked by animal paths, it was in fact the paths that determined its formation. To this day, the area is crossed several times a day by herds of sheep and goats. Although potentially insignificant, this influence also produces visible changes in geomorphology.

The upper parts of the canyon (Bandel and Salameh 2013; Tarawneh 1987; Tarawneh 1988) are formed of Cretaceous limestones, sandstones, marls and clays (ASL - 'Ammān Silicified Limestone formation of Campanian age; WUG - Wādī Umm al-Ghudrān of Campanian-Santonian age; WAS - Wādī as-Sīr of Turonian age). There are chert levels in these formations. Beneath the ASL/WUG/WAS, the canyon cuts through limestones and marls of the Cenomanian Shu'ayb-al-Ḥummar-al-Fuḥayṣ and Nā'ūr formations (SHF/N). The profile continues downwards with Early Cretaceous-Late Palaeozoic sandstones (of Kurnub formation). The rock shelves and boulders on the canyon slopes originate from basaltic magma that formed a Pleistocene intrusion cutting across the ASL/WUG/WAS. All the geological layers described above are part of the Nubo-Arabian Shield, with a slight incline to the west in the area analysed. They form a typical cuesta morphology (*e.g.* Migoń 2009: 252) on the eastern border of the Dead Sea rift.

The al-Munqaṭi'ah archaeological site was established on one of the rock shelves around 80-100m above the contemporary river bed, in Kurnub sandstone layers. The shelf is flat or slightly inclined and 200-400m wide. The bedrock is covered with a very thin (0.3-3m) colluvium layer. Today, the location is completely devoid of water (streams or springs). The main water-bearing layer should be identified with the WAS rocks. The water sources in the whole aṭ-Ṭafīlah region are located within the WAS/SHF geological contact zone, with their presence having been documented 100-200m upstream in the canyon. However, water from these sources does not reach the al-Munqaṭi'ah site, at least in summer.

The Holocene stratigraphy of the al-Munqaṭi'ah archaeological site starts with a 0.3-0.5m thick layer of contemporary colluvium. It consists of rock fragments, gravels, sand and silt. Beneath, the archaeological deposits are mixed with colluvial material. The sequence ends with a thick (at least 1.5m) layer of sand with scarce admixture of limestone blocks. The last layer seems to be the regolith level, but solid rock was not reached this excavation season. The soil in the area of excavations is very primitive and could be classified as Lithosols, Regosols and Calcaric Regosols (Mocek 2014: 311).

Excavations in 2017

al-Fayṣaliyyah

During the fieldwork, we divided our team into two groups, each led by a supervisor responsible for documentation of the excavation process. The process of gridding out the al-Fayṣaliyyah site was challenging owing to its impressive size. Archaeological artefacts are visible all over the desert surface, for kilometres. Therefore, before deciding on our 2017 activity area and limiting it to *ca* 3ha, it was necessary to create a virtual grid that could be extended in the event that we were forced to work in other locations. Based on pedestrian-survey observations and a map of potential architectural features that we created beforehand using GPS devices, it was decided to lay out a grid over 50ha. This was divided into two equal

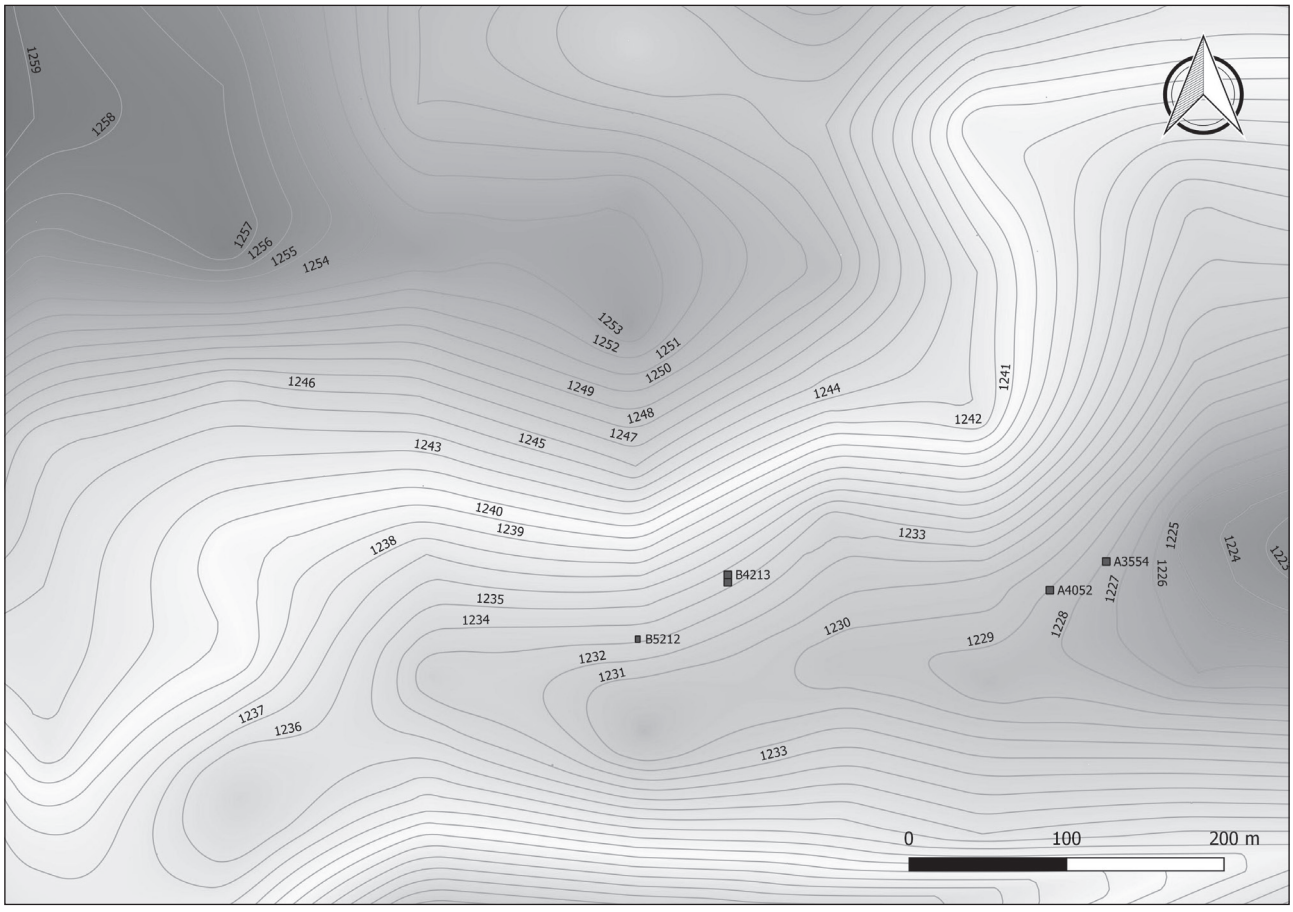
areas: A and B. Area A, located to the east, is characterised by a dense concentration of stone cairns (out of a total of 229 stone cairns identified in the study area during pedestrian survey, 145 were in Area A). Area B, located to the west, is characterised by occasional concentrations of stone architecture, including the remains of walls visible on the ground surface and aggregations of rocks, probably representing rubble from the walls.

During 2017, the team managed to excavate in five squares located in different parts of Areas A and B **(Fig. 2)**. The reason behind choosing trenches located apart from one another was to obtain as much information about the different structures visible on the surface as was possible in the 14 days devoted to field research this season. Two of the squares (A4052; A3554) were located in Area A and were chosen by us for their potential to shed light on the character of the cairns. The remaining three, located in Area B (squares B4213; B4314; B5212), were set up over the stone clusters, as this allowed us to investigate the possible architectural remains located there. As mentioned above, the activity area was limited to *ca* 3ha, with the distance between the two outermost squares excavated in Areas A and B being 300m.

Area A

In Area A, the team excavated two squares 36m apart: A4052 and A3554. Each contained a stone cairn selected for excavation on the basis on previous field observations.

The first and smaller of the two cairns was located in square A4052. In order to investigate the archaeological context of the cairn and thickness of the possible cultural layer located in its vicinity, the collection of surface material was followed by the removal of 15cm of topsoil (L1). Unfortunately, the material revealed no archaeological features and showed no traces of human activity around the cairn. The cairn itself (L2) consisted of medium-sized field stones with average dimensions of 15×10cm; the biggest stone measured *ca* 30×20cm with the smallest being just 2-4cm in diameter. The cairn was of an irregular, oval shape. It



2. Distribiution of trenches on al-Fayṣaliyyah site.

measured 1.56m on its longer axis and 1.31m on its shorter, with a height of 36cm from base to centre top. Although several chert artefacts were found within the cairn mound, the stones were loose and exposed to external factors like erosion, wherefore the structure cannot be said with certainty to have served as their original depositional context. Unfortunately, no archaeological features - specifically the remains of substructures that might have been marked by the cairn - were found beneath the stones either. After archaeological work in square A4052 came to an end, it was chosen for a geological test trench.

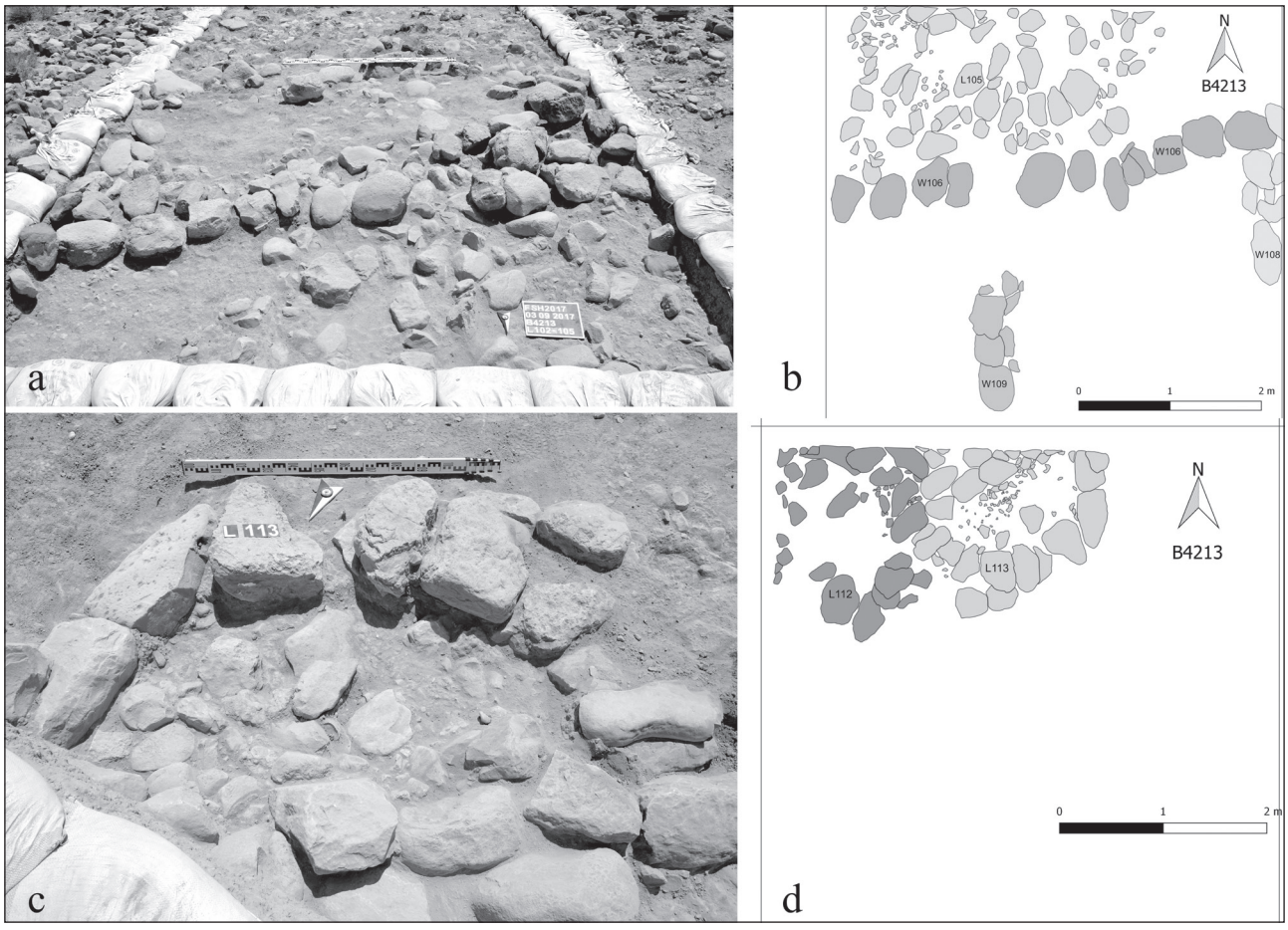
The second cairn (L4) excavated during 2017 was located in square A3554. It was also of irregular oval shape, but bigger in size, measuring 4.90m on the longer axis and 2.48m on the shorter. The height of the structure, measured from centre bottom to top, was 59cm. Both cairns were built mostly of medium-sized field stones (average 15×10cm), with some larger ones (average *ca* 30×20cm; the biggest *ca* 45×30cm). Because of the cairn's dimensions and in order to maintain stratigraphic control, it was decided to divide the stone structure in four and to explore only the south-west quadrant. Once again, this revealed no archaeological features under the excavated quadrant. Some chert artefacts were found amongst the stones of the larger cairn. As work under the stones of the cairn and below the ground surface (L7; L8; L10) continued, the number of chert artefacts declined, thus proving the absence of anthropogenic features.

Area B

In Area B, where several concentrations of rocks -possibly the remains of stone architecture- were located, the team set up three squares selected for excavation: squares B4213 and B4314, which adjoined each other along their southern and northern edges, and square B5212, located 64m to the south-west.

In squares B4213/B4314, located on a slope dipping from north to south (~1m height difference between the northern and southern ends of the trench), a concentration of unevenly spread stones of different sizes was located (L102). Because their original arrangement was unclear, it was decided to remove 5cm of topsoil (L101) around them in order to expose their outlines. It turned out that one of the stones was actually a grinding stone (special find no. 110). Subsequently, the work continued primarily in square B4213, where several walls and different soil compositions were described as different loci. The deepest level (northern part of the trench) was 35cm below the ground surface. As the cairns, loose stones and walls in the aforementioned trenches had been exposed to water and wind erosion, the artefacts found (mainly in the top levels) are most unlikely to constitute a primary archaeological context. The most interesting features were walls W106, W108 and W109, found under the first layer of loose rocks (**Fig. 3a, b**), and two stone circles (L111; L114), found beneath the level of the walls.

Although located at different levels (top elevation W106 = 1234.70; W108 = 1234.50; W109 = 1234.30m asl), the three walls seem to be contemporary with the gradual drop in elevation reflecting the slope on which they were erected (W108 is located northernmost, W109 southernmost). W106 was built of large stones (**Fig. 3a**)**.** It consisted of 11 big rocks of which seven were placed on the eastern and four on the western side of a 60cm wide empty space, possibly an entrance. The stones were of different sizes, with the smallest measuring 23×30×7cm and the biggest 35×47×19cm. Generally speaking the wall ran from east to west, with a slight south-east to south-west curvature, and was 5.12m long. Below the wall there were no further courses of stones, but just randomly distributed rocks of different sizes (L105). All of the exposed wall remnants consisted of just one course of stones. Another wall (W108), running from north to south, abutted W106 from the south at its easternmost side. Its length was 1.54m. W108 consisted of irregularly laid stones of different sizes, with the smallest measuring 30×12×15cm and the biggest 67×28×9cm. The latter, located at the southern end of the wall, was partly covered with compacted soil - which may have been used as mortar (L107). The last wall, W109, was discovered 0.95m south of the empty space between the western and eastern parts of W106. Its length was 1.26m. The wall consisted of three aligned stones measuring respectively 42×36×6cm (the northern one), 27×32×12cm (the central

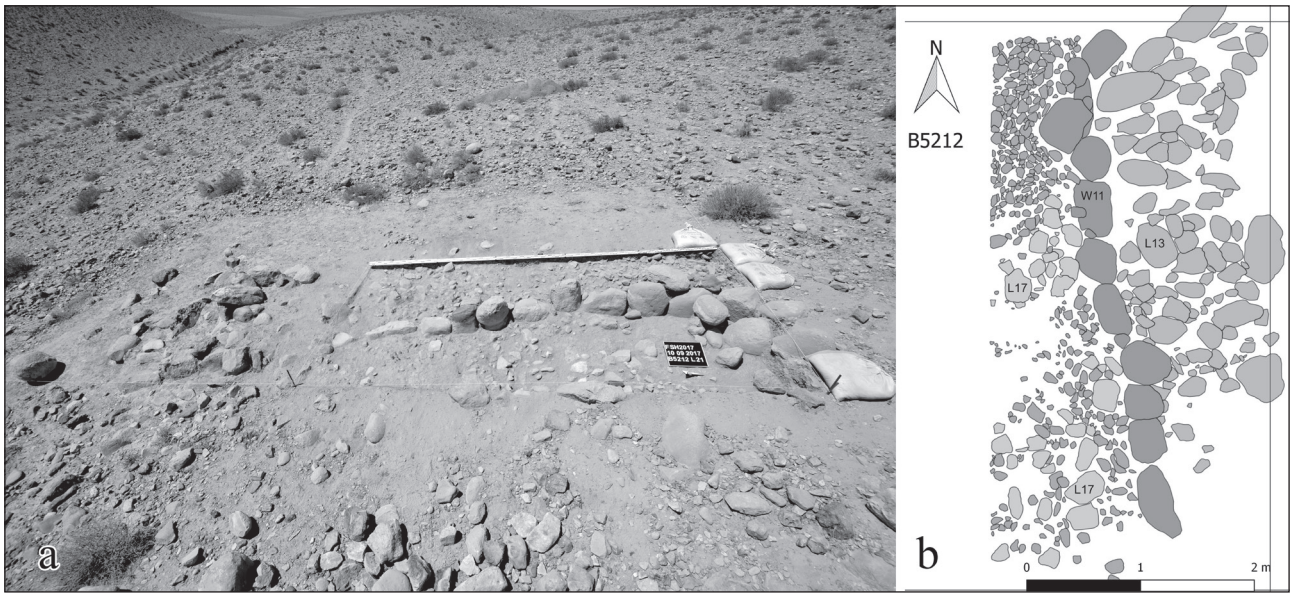


3. |a-d: al-Fayṣaliyyah. Partly excavated stone structure in trench E (Squares 4213 and 4112) (Drawing: B. Witkowska, J. Karmowski).

one) and 45×34×13cm (the southern one). The aforementioned densely compacted soil (L107) was found here and there underneath the walls (or around the rocks). Its texture was significantly harder than the soil around it, although both had a similar pale yellow colour. It might have been used as mortar; *i.e.* dirt mixed with water to stabilise the stones and increase their resistance.

An interesting set of features from the level beneath the walls is represented by two stone circles (L112; L113) in the north-eastern corner of square B4213 and two small pits to their south (**Fig. 3c, d**). The inside of the circles (1234.25m asl) seem contemporary with the pits (1234.19m asl). As in the case of the walls, the slight difference in top elevations can be attributed to the slope. These features seem not to have been disturbed by external factors such as erosion (which probably affected the previously described upper structures). Loci 112 and 113 closely abutted each other, with L112 to the west and L113 to the east. Although both were constructed of medium-sized stones and were of similar ovoid shapes, it's probable that only L113 was exposed in its entireity (axis = 1.88×1.45m). Their internal surfaces measured 0.8m^2 (L112) and 0.7m^2 (L113). The two pits located to the south, *viz.* L114 close to the western circle and L111 close to the eastern, were both of oval shape and had sizes of 0.10m^2 (L111) and 0.11m^2 (L114), with depths of 6cm (L111) and 5cm (L114). Both had a dark (almost grey), comparatively loose fill.

The last trench excavated in 2017, square B5212, revealed an interesting wall construction **(**W11, **Fig. 4**). It separated a concentration of medium- and large-sized stones (L13; L22) in the east,from a gravel layer (L16; L17; L20) in the west (**Fig. 4a, b**). The construction had been partially visible on the surface even before excavation. The bigger stones on the eastern side could be rubble from the wall, but the function of the gravel located to the west needs further investigation. The wall ran from north to south with a slight curve to north-west / south-east.



4. |a, b: al-Fayṣaliyyah. Partly excavated stone structure in trench W (Drawing: B. Witkowska, J. Karmowski).

During season, the team managed to expose *ca* 4.70m of its length, but the possibility cannot be excluded that the wall continues further to the north and/or south. The exposed portion consisted of 13 stones of different sizes, with the biggest measuring 64×25×8cm and the smallest 21×23×16cm. It is not yet known if the wall has more courses than the one exposed thus far. It appears that one of the stones reflects cultural modification in the form of a notch, giving it an 8-shaped appearance. Comparison with other sites in the region (Fujii *et al.* 2017: 571, 572, 575-6) suggests that it may functioned as an anchor for tent guy ropes. Should this be true, we cannot exclude the possibility that the stone was repurposed as a wall stone in W11.

al-Munqaṭi'ah

Based on a reconnaissance visit made in 2015, combined with a survey of hilltops and wadis around aṭ-Ṭafīlah (Karmowski 2017; Kołodziejczyk *et al.* 2018), as well as on observations made before the start of work in 2017, it was decided to set up a trench that would encompass one of the numerous looters' pits found at the site. Unfortunately, despite the fact that site's location is far from accessible, it is frequently visited and damaged by people in search of 'treasures'. One pile of backdirt and a nearby hole in the ground contained significant amounts of ash and pottery fragments, which led us to believe that certain archaeological features could have been distrubed. This observation led to it being chosen as a starting point.

During the 2017 season, the team conducted excavations in the north-eastern part of the site, 10m south of one of the straight edges of the wadi that bound the area to the north. After extension (*i.e.* in its final iteration), the trench located within squares A and B measured 2.5×3.5m. The mountainous area of the site was divided into various sub-areas located on slopes. The test trench was set up on a slope running from north-east to south-west with *ca* 75cm difference in the initial elevations of its north-east and south-west corners. As already noted, square A was laid out to include the looters' pit in its south-east corner. During excavation, while following the boundaries between loci, six different levels were created for better control of stratigraphy, in the form of steps at different elevations. Twelve loci and a wall fragment were discovered altogether within the four stratigraphic units described below.

Stratum 1

The first stratum, located directly below the surface (L1; L2), was most likely formed naturally. It was composed of layers of sand with a dust fraction of sandstone. The stratum contained some archaeological material - mostly chert artefacts - and several limestone rocks. Limestone is not characteristic for this geological level of the valley. It could either have

tumbled from the upper parts of the valley or have been carried down by someone. Later on it transpired that some of the rocks were rubble from the subsequently discovered wall.

Stratum 2

The second stratum to be exposed can be definitely linked to human activity at the site. The main feature visible here was a stone wall (W11) located in the eastern part of the trench (**Fig. 5a**). The need to uncover the eastern face of the wall was the reason why we extended into square B. The wall was quite regular. In 2017 the team managed to uncover 1.52m of its length. Its width varied from 75cm in the north, through 61cm in the centre, to 44cm in the south. Its width in the north is however probably the result of collapse. It looks as though the wall - as exposed - toppled to the west; the stones visible in the north section of the trench may have fallen during this process. The stones used in the construction of the wall were arranged into two faces (each having an additional course beneath). The wall has a central fill of small rocks between its two faces. None of the stones seems to have been worked, but their predominantly rectilinear shape suggests that they were carefully selected. The size of the stones on both faces varies from 24×11×15cm to 41×28×24cm. To the south, the wall is truncated by the looters' pit. Judging by the stones visible in the south section of the trench, the wall probably continues in this direction -as it does to the north- into the unexcavated area. The whole construction was founded on a thin layer of brown soil, spread under the wall in a foundation trench that cut an earlier feature (L8). The height of the uncovered part of W11 is *ca* 40cm.

On both sides of the wall, layers with a significant amount of artefacts were found. L3, a brown and light-brown coloured layer located to the west, contained, in addition to pottery and flint fragments, a grinding stone (special find no. 12) found right next to the wall. On the western side of the wall, there was a clearly visible pit cut (L4) with a dark grey fill of loose soil (perhaps ash). It contained burned sandstone (small-sized rocks) but no artefacts. The size of L4 was 0.044 m^2, with a depth of 15cm.

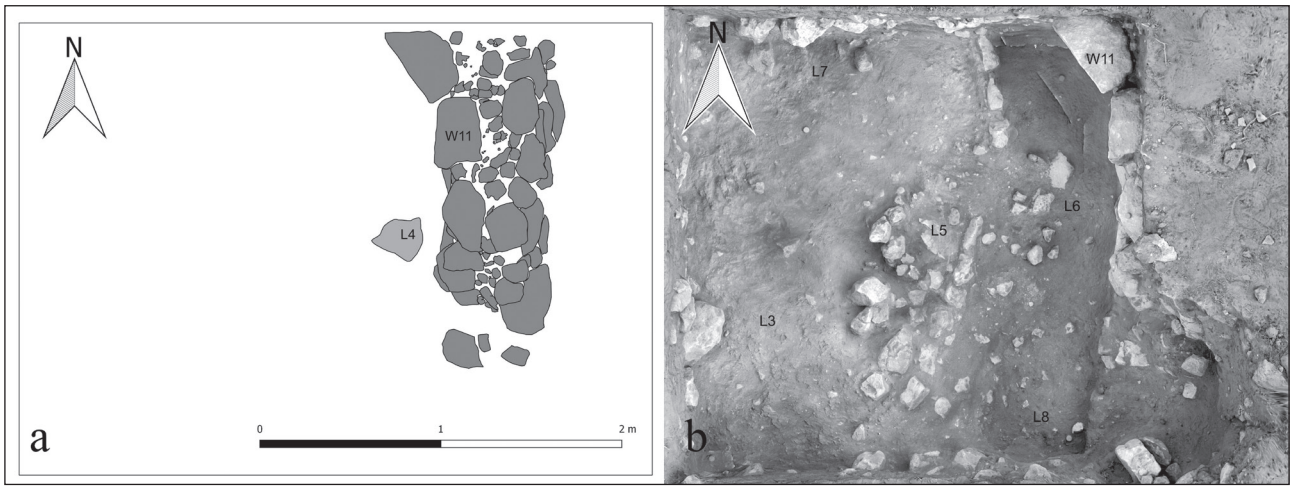
The eastern side of the wall yielded further pottery and chert, found in L12 and L13. The brown colour of these loci was similar to L3, but without the lighter tones of the former.

Stratum 3

The third stratum was exposed only on the western side of the trench (L5; L6; L7; L8; L9) (**Fig. 5b, 6a-b**). In general, these loci can be described as cultural layers with traces of burning (L5; L7) and pits with extremely dark (almost black) fills of ash.

L6, located in the eastern part of square A, was a layer of loose, brown soil with significant amounts of pottery and an *in-situ* spindle whorl (special find no. 19). A lot of the sherds found there fell apart during excavation (as if they were made from poorly fired or unfired clay). L6 also contained charcoal, although the matrix itself did not show traces of burning.

The same cannot, however, be said of L5 and L7. L5, located west of L6, was of almost



5. |a, b: al-Munqaṭi'ah. Neolithic stone wall and associated features in trench E (Drawing: B. Witkowska, J. Karmowski).

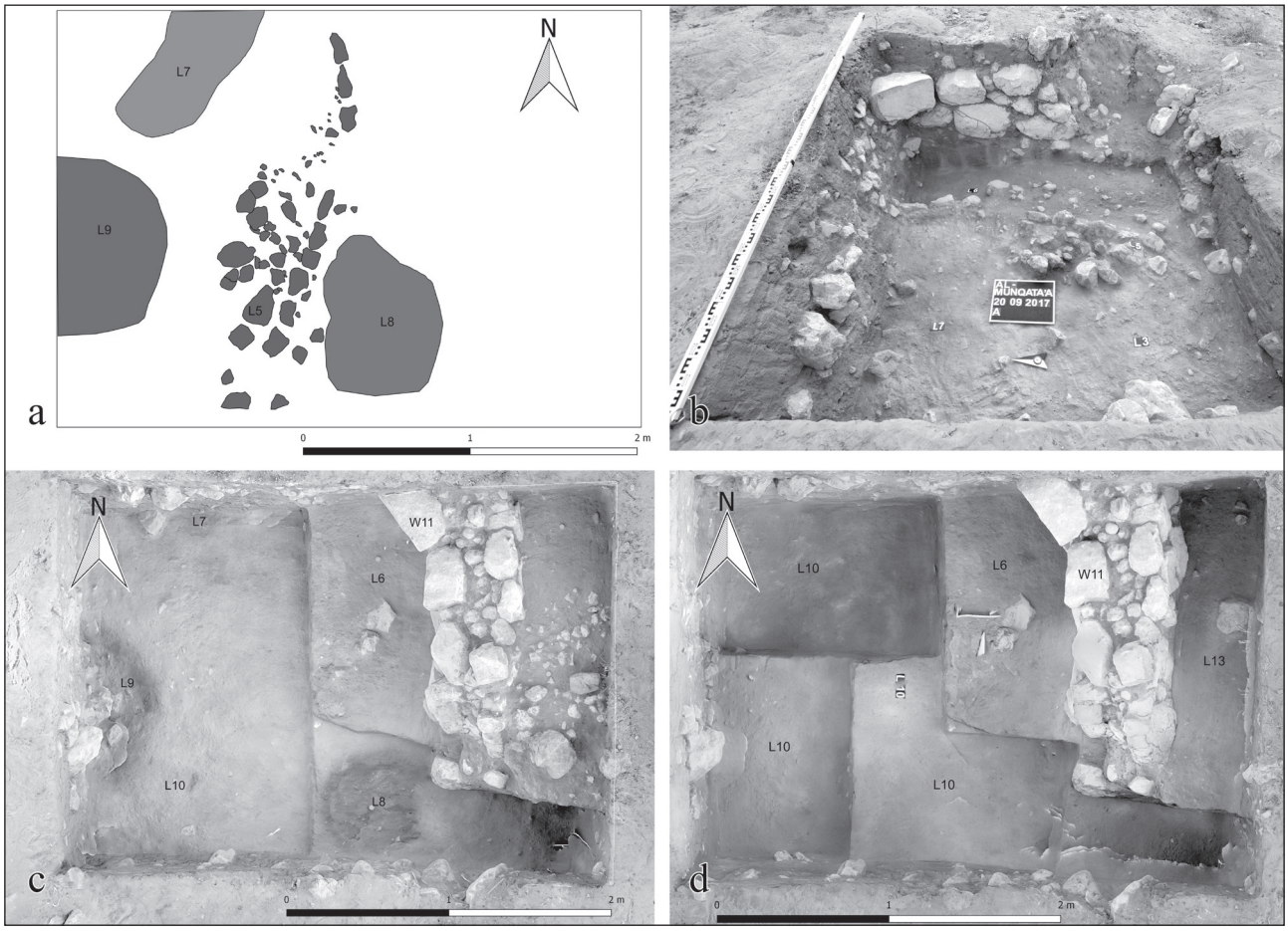
black / dark-grey colour with significant traces of burning. It contained a lot of small- and medium-sized rocks in its middle part and was separated from L6 by an alignment of medium-sized rocks placed in a row. This locus was clearly visible in the north section of the trench. The rocks found here were burned. L5 also contained some pottery fragments and a smaller quantity of chert artefacts.

L7, a layer similar to and located west of L5, might be equivalent thereto, although there was no stratigraphic link between the two within the exposed area. Like L5, L7 was clearly visible in the north section of the trench and contained dark soil with traces of burning, pottery and chert artefacts.

L8 and L9 were pits filled with ash (**Fig. 6c**). The former, located in the south-east corner of square A, was partly destroyed by the aforementioned looters' pit, with some of its fill having found its way on to the looters' backdirt pile. The fill of L8 was of mixed grey, brown and dark-grey colour and contained chert and pottery artefacts. The size of the locus was 0.53m^2, while its depth reached 31cm. The second pit, L9, was located on the westernmost side of the trench. Its fill of very dark (almost black) soil made it clearly visible (both on the surface and in section). This feature could be a hearth or a fire pit. It contained a lot of pottery and chert, as well as burned rocks. During excavation it appeared that in the upper part of the locus, pottery and chert material were more frequent than rocks, which were found mostly in the bottom part. L9 was not fully excavated during the 2017 season, as a large part of it runs into the west section of the trench. The visible, semicircular part was 22cm deep at its central point.

Stratum 4

Only one locus, L10, can be assigned to this stratum (**Fig. 6d**). The layer was characterised by its bright yellow colour and sandy texture, which made it look almost natural.



6. |a-d: al-Munqaṭi'ah. Neolithic layers of stone feature related to Jericho IX horizon in trench W (Drawing: B. Witkowska, J. Karmowski).

Nevertheless, it did contain archaeological artefacts (including chert arrowheads). The locus occurred in the western part of square A, *ca* 1m below the square's initial surface (531.75m asl). The deepest level of L10 reached in 2017 was 1.52m below the surface (531.23m asl). At this depth, there was no archaeological material present. L10 might be the last layer containing traces of human activity between stratum 3 and bedrock, but further investigation is needed to confirm this.

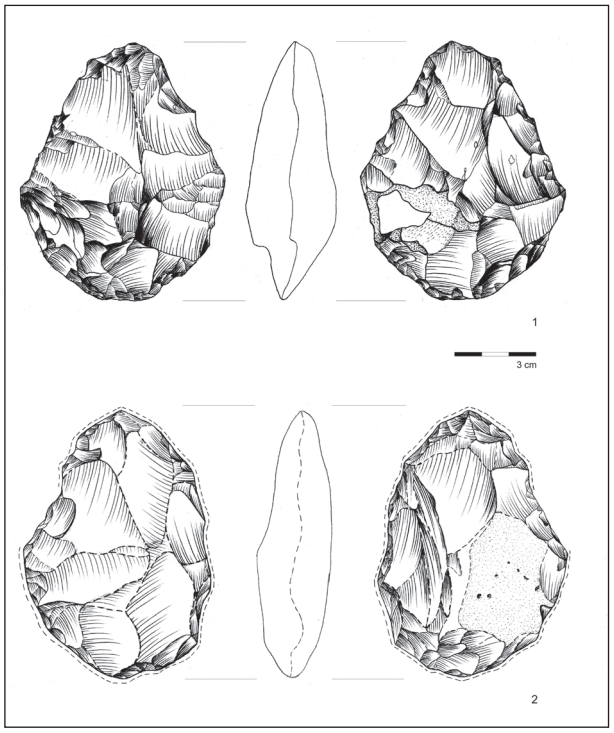
Chert Artefacts

al-Fayṣaliyyah

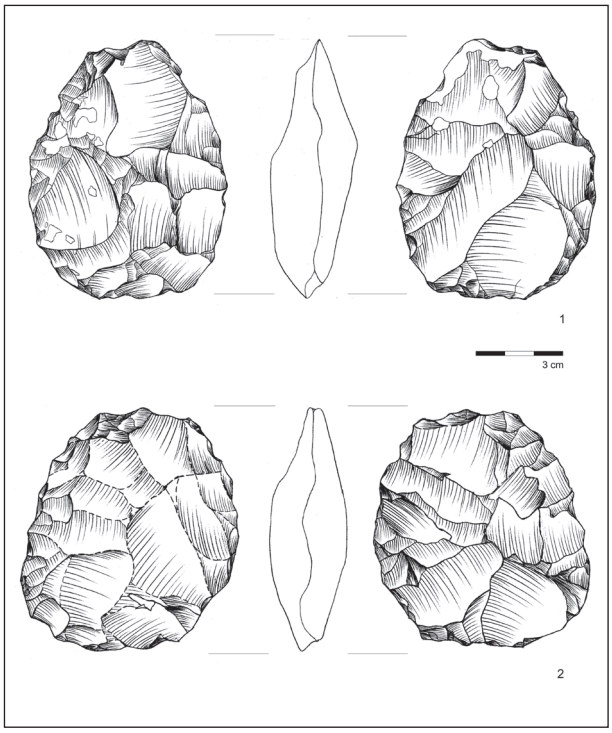
During the 2017 season, a total of over 5,000 stone artefacts were recovered. Approximately 60% of these come from the five excavation units described above, with the remainder having been collected from the ground surface in various parts of the site. The artefacts are made of local raw material, mainly brown-beige coloured chert, but some of a better quality steely grey material. Many have a pronounced white-grey patina. Furthermore, they are characterised by post-depositional battering and edge damage, and also display traces of aeolian abrasion. Initial analysis of the al-Fayṣaliyyah assemblage shows that it contains many pieces that are not very distinctive chronologically and culturally. Amongst them, however, are diagnostic forms that can be attributed to several different chronological horizons.

The earliest finds are Acheulian handaxes (21 pcs). Almost all were collected from the ground surface in the western part of the site. They were classified according to the typology of F. Bordes (1961). Several types were distinguished, *viz*. cordiforms, subcordiforms, amygdaloids (**Fig. 7**:1-2), ovetes (**Fig. 8**:1), discoidal (**Fig. 8**:2) and ficrons (**Fig. 9**:1). They are quite diverse in terms of size, but most don't exceed 10cm in length. Some display traces of the edges having been finished with a soft hammer. In two instances, handaxes were used secondarily as flake cores. It is not possible to determine the exact date of this assemblage, but morphological features indicate that it can be most likely be attributed to either the Middle and Late Acheulean or to the Late Acheulean exclusively (Shea 2013: 73-76). The handaxes from al-Fayṣaliyyah appear similar to collections from other sites in south-western Jordan, such as al-Fujājī and Wādī Kalkhah (al-Nahar and Clark 2009).

The next chronological horizon at the site should be associated with the Middle



7. al-Fayṣaliyyah. Acheulian handaxes (1-2) (Drawing: B. Witkowska).



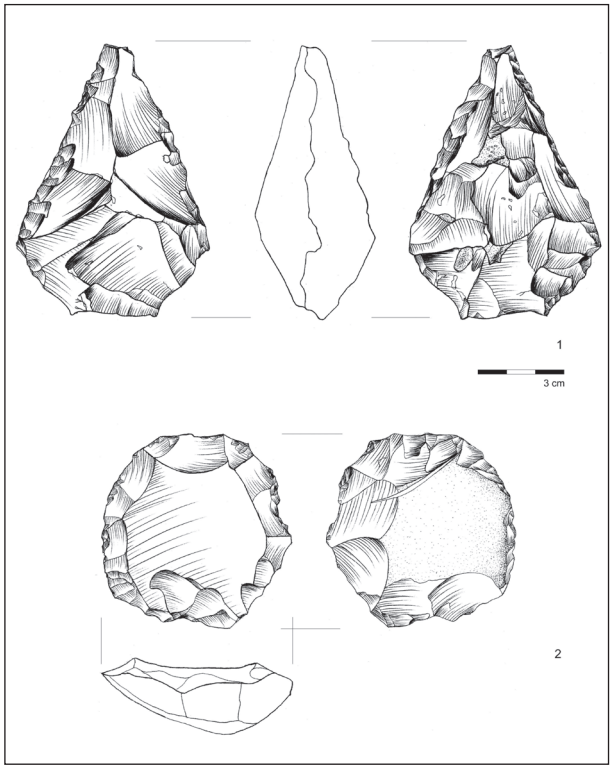
8. al-Fayṣaliyyah. Acheulian handaxes (1-2) (Drawing: B. Witkowska).

Palaeolithic. Across the whole area of the site - but especially in square A4052 - and beyond, numerous artefacts occurred which can be attributed to this period on the basis of characteristic typological or technological features. A distinctive group are the specimens associated with the Levallois technique. The Levallois cores deserve particular attention. Among them are both preferential and recurrent specimens, single-platform and multi-platform ones (**Figs. 9**:2**, 10**). Most of the Levallois cores should be considered flake specimens, although irregular blade examples were also recorded. Levallois debitage is quite abundant, being represented by flakes (**Fig. 11**:1), points (**Fig. 11**:2-3) and trimming elements. The majority of discoidal cores and some flake, single-platform cores should also be dated to the Middle Palaeolithic. In addition, a large number of scrapers were present on the site. These are diverse, but most often they occur as sidescrapers, canted scrapers and convergent scrapers (**Fig. 12**:4-5). Some of the latter may be considered points. Very numerous notched and denticulated tools (**Fig. 11**:4-8) can be attributed to the Middle Palaeolithic component. The co-occurrence of the Levallois technique and discoidal core technique, as well as the presence of tools such as scrapers, points and notched/denticulated specimens, suggests that remains of the Palaeolithic in al-Fayṣaliyyah are associated with the Levantine Mousterian.

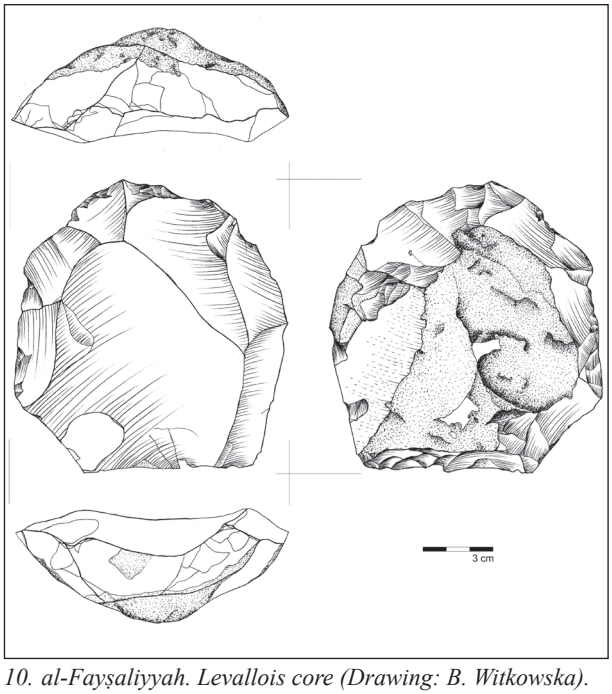
There is also another category of artefact that could be linked to the Middle Palaeolithic (**Fig. 12**:1-3). These were mostly discovered in square A4052 and correspond to the typological characteristics of Tayac points (Debenath and Dibble 1993). It cannot be ruled out, however, that they are older and come from the late phase of the Lower Palaeolithic (Shea 2013: 76).

On the site, lithics were also discovered that can fairly convincingly be dated to the Epipalaeolithic, although at the moment it is difficult to clearly determine their cultural affiliation. They occurred mainly in the western part of the site, on the surface and in squares B4212/4314 and B5212. Among them, single-platform bladelet cores were registered (**Fig. 13**:1-2), some conical, very slender and with careful preparation, and others pyramidal, stocky and with preparation limited only to the striking platform. In addition, a few fragmentary microliths - probably backed bladelets or rectangles - formed with very fine, high, abrupt retouch (**Fig. 14**:11-15), as well as very regular bladelets whose width does not exceed 1cm (**Fig. 14**:9-10), should be mentioned.

The youngest chert artefacts discovered in



9. al-Fayṣaliyyah. Acheulian handaxe (1), Levallois core (2) (Drawing: B. Witkowska).



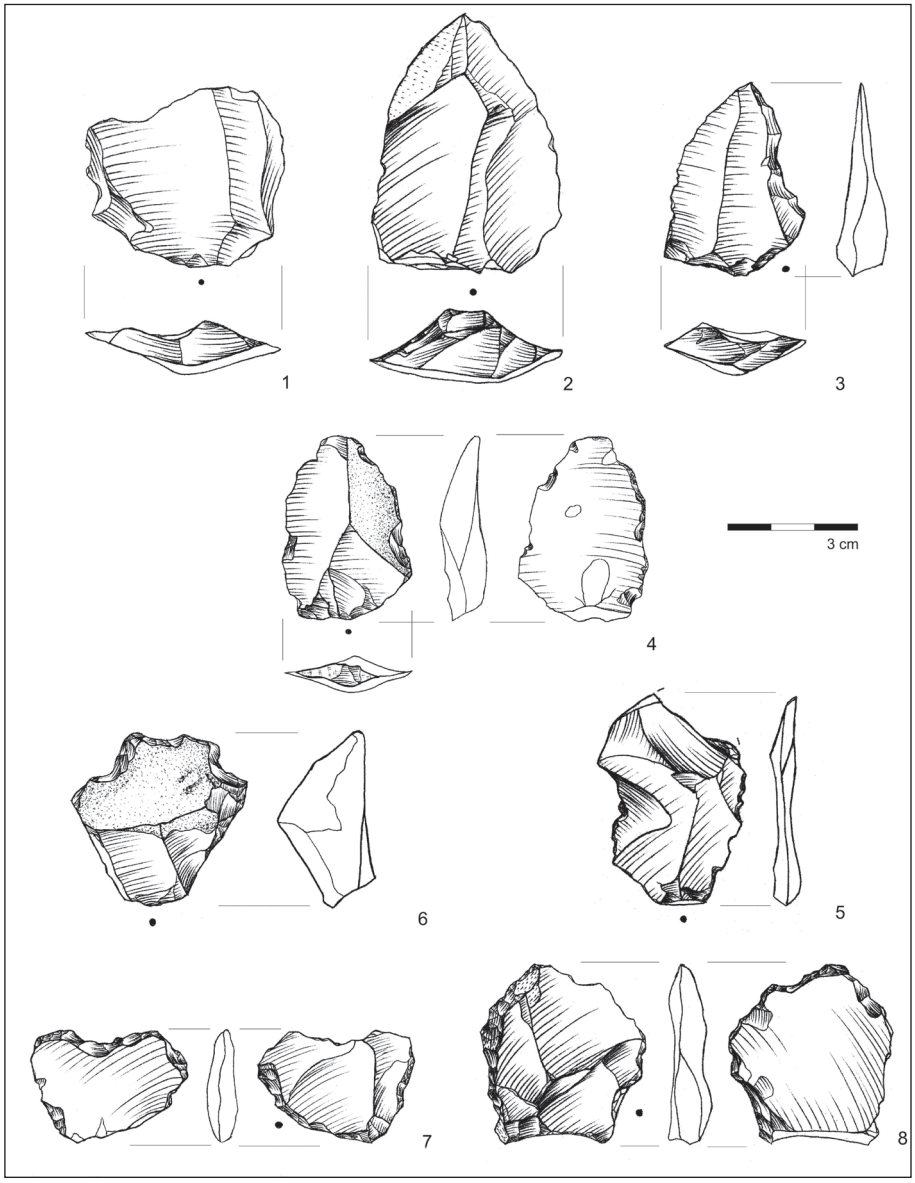
10. al-Fayṣaliyyah. Levallois core (Drawing: B. Witkowska).

2017 are related to the Neolithic and Bronze Age. In comparison with Palaeolithic materials, they are much less numerous. Like the Epipalaeolitic items, they were concentrated in the western part of the site. It seems feasible to attribute part of the tang of blade point to the Neolithic; it was found in square B5212 (**Fig. 14**:8) and was perhaps a part of an irregular blade of medium size. A dozen or so tabular scrapers made of flat cortical flakes (**Fig. 14**:1-3) and a group of standardised flake perforators (**Fig. 14**:4-7) probably date to the Bronze Age (Rosen 1997: 68-69, 71-79).

al-Munqaṭi'ah

During investigations at the al-Munqaṭi'ah site in 2017, a total of 554 chipped lithics were found. About half (282 pcs) were collected on the ground surface, including 18 pcs within the excavation unit and 264 pcs in the neighbouring area. Within L1 and L2, which on the basis of their stratigraphic placement represent the latest stage of the site's development, 81 artefacts were recorded. Their status in terms of homogeneity is analogous to finds from the surface. Loci related to earlier phases yielded a total of 49 artefacts for stratum 2 and 76 for stratum 3. Within the lowest stratigraphic unit investigated in 2017, designated stratum 4 (L10), 66 chipped lithics were discovered.

An important observation that may facilitate interpretation is the lack of pottery in the excavated part of L10, which stands in contrast to higher layers. Thus, the chert assemblage from



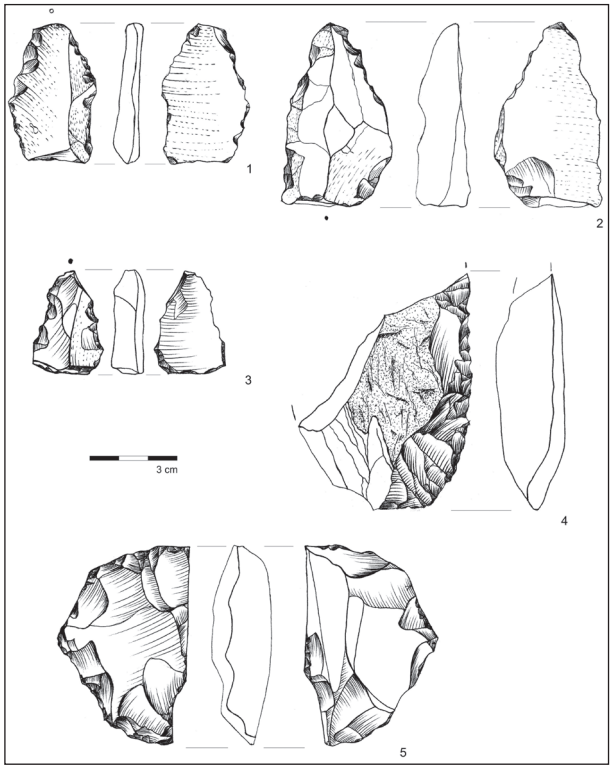
11. al-Fayṣaliyyah. Levallois flake (1), Levallois points (2-4), notches and denticulates (6-8) (Drawing: B. Witkowska).

stratum 4 ought to predate the Pottery Neolithic (PN), making it earlier than the mid 7th millennium BC. Indeed, within this stratum there are artefacts characteristic of the PPNB or PPNC, or - using the terminology proposed by J. Shea (2013) - the Middle Neolithic. These include fragments of two projectile points (**Fig. 15**:2-3; **Fig. 16**) which are considered a subtype of Helwan point (Shea 2013: 244, Figs. 7.12, 7.27). We may add that an intact triangular point with almost identical features was found on the surface of the excavation square (**Fig. 15**:1).

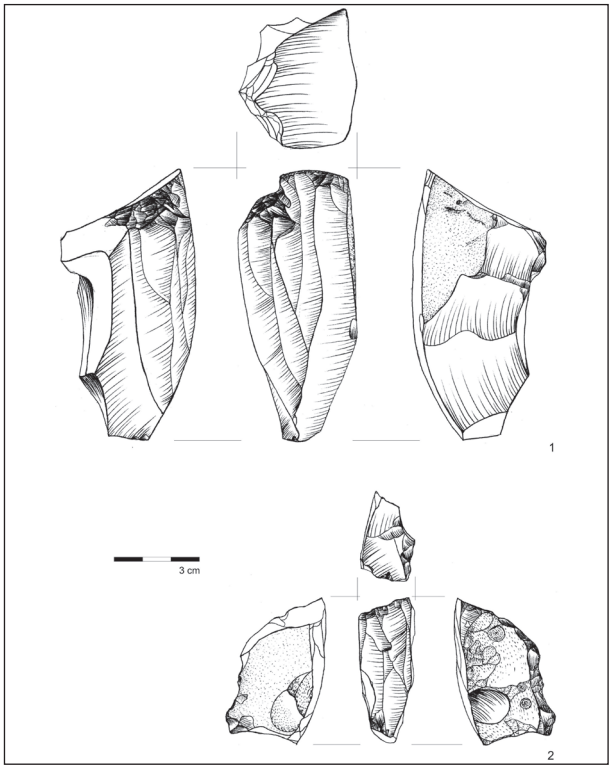
Fragments of regular blades and bladelets, often - presumably - long and narrow, are an important component (30 pcs) of the stratum 4 (L10) assemblage. These have characteristics that are considered typical of the Middle Neolithic (Shea 2013: 223-228).

As discussed, the sediments denoted as L5, L6 and L7 and the pit holes designated L8 and L9 were combined into a single stratigraphic complex called stratum 3. This complex is obviously younger than the underlying one. Consequently, the 76 chert artefacts from stratum 3 should likewise be considered younger than those from stratum 4. Of course, it cannot be ruled out that some artefacts may have moved secondarily from stratum 4 (L10) to stratum 3. In all stratum 3 loci, there is a significant quantity (140 pcs) of ceramic fragments associated with the Late Neolithic Jericho IX culture. This certainly colours our view of the stratum's date and probably that of most of the chert assemblage. Alas, it should be emphasised that - from a chipped-stone perspective - the Jericho IX culture is loosely defined. As J. Shea says "our picture of Jericho IX lithic technology is informed mainly by the Jericho excavations and surface collections/test excavations at sites with Jericho IX pottery" (Shea 2013: 283).

The aforementioned group of 76 lithic artefacts from stratum 3 consists of not-very-regular blades and bladelets, obtained from single-platform cores and irregular flakes, as well as from double-platform and multi-platform flake cores. The material is highly fragmented, hence it is difficult to be precise about the numerical ratio of blades/bladelets to flakes. The former, however, remain a minority; 16 specimens can be clearly classified in this category. Approximately one-third of all artefacts have retouched edges, but in most cases it seems to be the result of utilisation. Perhaps in just one case is there a typological awl, made on a flake (**Fig. 15**:5).



12. al-Fayṣaliyyah. Points (1-3), scrapers (4-5) (Drawing: B. Witkowska).

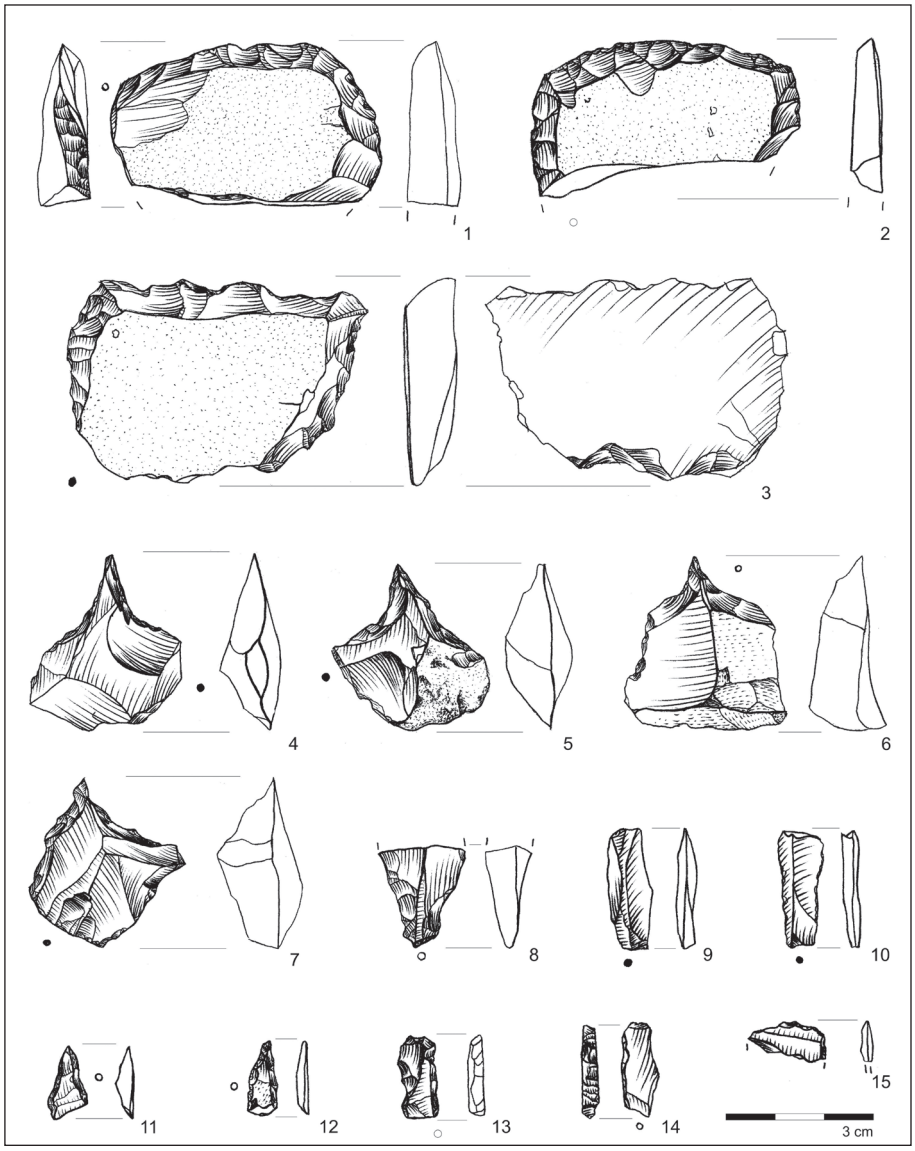


13. al-Fayṣaliyyah. Single-platform bladelet cores (1-2) (Drawing: B. Witkowska).

In addition, there are styloid burin negatives on two flakes and two blades. L7 is the only location where a fragment of a more regular prismatic blade, from a single-platform core, was found. It has a lateral cortical surface, as exploitation of the core led to widening of the flake-release surface. One might wonder if this blade is intrusive or residual from the lower layer (L10). In the same locus, three fragments of more regular bladelets were also found. We might add that the frequency of blades here is highest (nine items out of 21). In the stratum 3 assemblage, there are no extensively retouched projectile points or sickle inserts, which are considered determinants of the Late Neolithic. However, we should note that the further one moves south within the Levant, the fewer such points are found; in complexes such as Qatifian or Besorian - known from Sinai, the Negev and southern Jordan - they are extremely rare. One way or another, an increasingly prominent flake-based industry is a Late Neolithic trait, including excavated assemblages of the Jericho IX culture (Shea 2013: 280-283).

In the sediments belonging to stratum 2, fragments of ceramics characteristic of the Jericho IX culture (81 items) were also discovered. The findings affect the chronology of these layers as well as the chronological and cultural affiliation of the 49 associated chert items, which occurred here in L3, L12 and L13. As before, it is a mixed inventory, consisting of a blade/bladelet group (**Fig. 15**:8) and a group of not-very-regular flakes (**Fig. 15**:6-7,11).

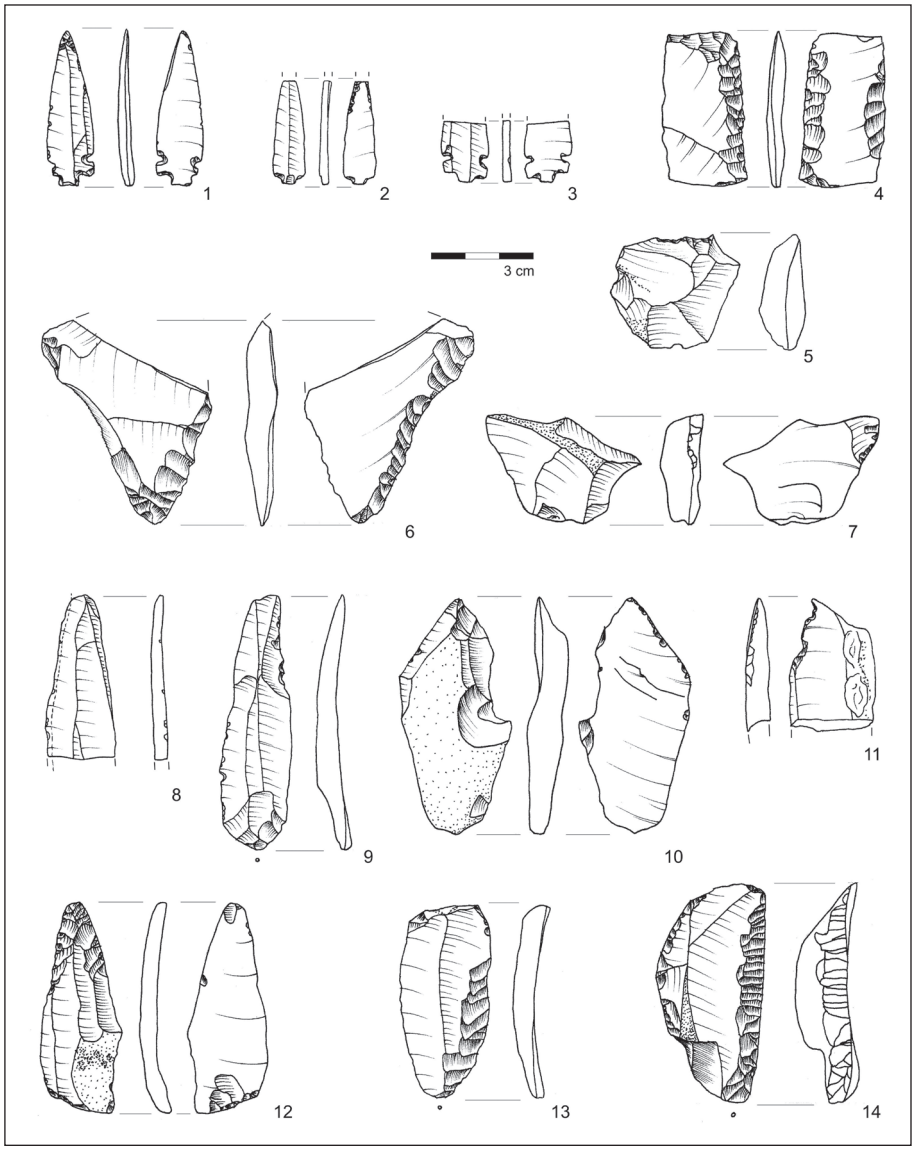
Stratum 1 comprises near-surface sediments, probably non-anthropogenic, associated with



14. al-Fayṣaliyyah. Tabular scrapers (1-3), perforators (4-7), tanged point? (8), bladelets (9-10), microlithics (11-15) (Drawing: B. Witkowska).

local erosion processes. This means that the 81 chipped lithics recorded there most probably constitute a secondary mix-up. This assemblage consists of irregular flakes and chunks, alongside a few not-very-regular blades. Only one specimen is a more regular bladelet (**Fig. 15**:9). One of the cortical flakes can be formally classified as a notched tool (**Fig. 15**:10).

Surface finds constitute the largest group. Their preliminary analysis allows us to distinguish only a few characteristic specimens, in addition to the already mentioned projectile point of Abu Salem type (**Figs. 15**:1**, 16**), which may possibly be associated with specific cultural and chronological units. Several specimens with regular, 'laminar', invasive retouch on the dorsal face should be mentioned in the first instance. The parallel scars of this retouch presumably result from pressure flaking. These specimens may be described as knives (**Fig. 15**:13-14) or perforators (**Fig. 15**:12). The retouch, in turn, although it may have originated in the beginning of the Middle Neolithic, is considered a distinctive feature of the PPNC. The high frequency of such retouch in the Late Neolithic period, including the Jericho IX culture (Shea 2013: 278, 280, 283), represents a continuation of this trend. Several of the specimens are fragments of regular blades -unifacial or bifacial with backed or invasive retouch (**Fig. 15**:4)- that resemble geometric sickle inserts, although no sign of silica gloss was found. One of them is characterised by flat invasive retouch, which may suggest a Late Neolithic provenance (Shea 2013: tab. 7.7, fig. 7.28). However, owing to the specimen's geometrical



15. al-Munqaṭi'ah. Projectile points (1-3), blade with invasive retouch (4), awl? (5), retouched flakes (6, 7, 11), retouched bladelets (8, 9), notched tool (10), perforator (12), knives (13-14) (Drawing: J. Kościuk).

outline (*cf.* Rosen 1997: 55, figs. 3.15-16), a much later chronology cannot be ruled out, perhaps extending from the Middle Bronze Age to the beginning of the Iron Age (Rosen 1997: fig 3.19). Two small, carefully made borers could in turn have Neolithic provenance (Shea 2013: fig. 7.20. k-l). Generally speaking, it seems that the surface material contains components associated with the Neolithic and Bronze Age.

Pottery

al-Fayṣaliyyah

From a chronological point of view, the pottery assemblage can be divided into two separate groups. The first consists of sherds found in the upper layers, *i.e.* on the surface and in topsoil.

Some specimens that can be added to this group, *viz*. very small sherds, were found in lower strata. Their presence can be explained by the phenomenon of bioturbation. The pottery was made from well-developed clay using a potter's wheel. This horizon is associated with later periods, most probably Nabataean/Roman (*cf.* Hendrix 1997: 227-250). However, more precise attributions are impossible owing to a lack of diagnostic fragments.

The other group consists of poorly fired, handmade pottery, with the remains of coiling visible on various fragments. The pottery-surface colours range from dark brown and red-brown to dark grey, very often with dark grey sections. Clay was mixed with fine to coarse mineral temper. No traces of surface treatment were observed. Unfortunately, only one diagnostic sherd was found, *viz*. a rim fragment of a holemouth jar, which substantially limits the scope of our interpretation. Such pottery occurred from the Neolithic onwards, to become a hallmark of the EB. Vessels of this type were used as cooking pots or for storage (Amiran 1969: 55). Although one generic rim is not enough for us to date the whole assemblage, judging by the production technology, temper and absence of surface treatment, the pottery is likely to date back to late prehistoric periods, presumably the EB. This pottery belongs to several (probably four) holemouth cooking pots used for food preparation or storage. This is clear evidence of the settlement practices that probably developed at the site during the EB. The limited range of pottery types may be indicative of temporary occupation of the site (*cf.* Saidel 2011: 67-79), perhaps by a nomadic tribe that used to spend a part of the year in an area that was likely connected with economic or agricultural activities.



16. al-Munqaṭi'ah. Projectile points (1-3) (Photo: P. Kołodziejczyk).

al-Munqaṭi'ah

The pottery at the al-Munqaṭi'ah site was collected from the surface and from two other stratigraphical units. A total of 297 sherds were found. All of them, except for three surface finds, represent the same chronological horizon. The three surface finds are Roman-style pottery fragments that probably washed out from elsewhere, most likely the top of the wadi banks.

During the excavations at al-Munqaṭi'ah, pottery was found in stratum 2 and stratum 3. In the first case, its presence was associated with a stone construction, most probably part of a house or a surrounding stone wall. Part of the structure's western side (W11) was excavated in the eastern part of the probe. During the work, the probe was extended to the east, whereby the posited internal part of the structure (L13) was reached. Pottery was present on both sides of the construction. There is no chronological difference between sherds from the hypothetical inside and outside of the building, but it should be noted that the assemblage is relatively small.

In stratum 3, pottery was found in layers

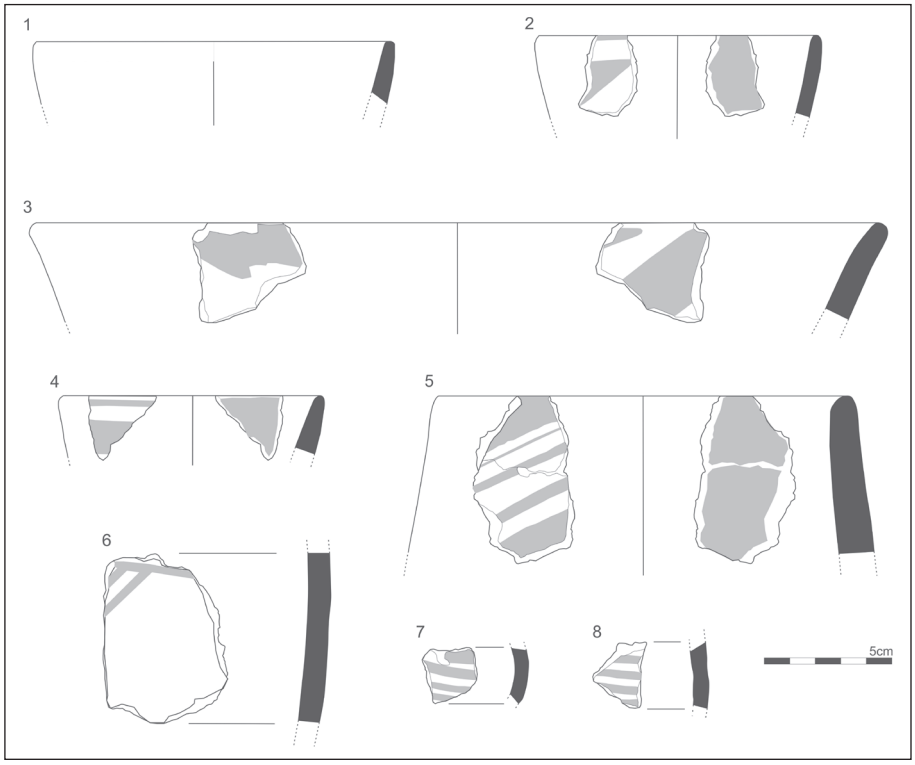
connected with the fire pits (L7; L8; L9) and in the ashy layer covering the area (L6). Pottery from stratum 3 bears the same type of decoration as that from stratum 2.

The most distinctive features of the al-Munqaṭi'ah pottery are poor firing, colour ranging from buff-orange to reddish, mineral temper of different sizes, and smoothed surfaces achieved by using grass or straw. A large number of sherds bear distinctive geometric decoration executed over a light coloured slip. No traces of plastic decoration or incisions were observed in the assemblage (**Fig. 17**).

The quality of production, decoration and surface treatment suggest a rather early origin of the finds (**Fig. 18**). Similar decoration, that is to say thin lines of reddish-brown paint over a pale background, is known from EB1B sites with basketry or Line Group Painted Ware (LGPW) (*cf.* Braun 2012: 13-15, figs. 5-6). A closer examination of the painting shows that the surface covered with colour was later burnished, which is atypical for EB1. Beyond doubt, the pottery excavated at al-Munqaṭi'ah belongs to the PN period, bearing decoration typical of the Jericho IX horizon (*cf.* Garfinkel 1999: 68).

The number of diagnostic fragments is too small to permit the reconstruction of specific types of vessel. There are two main types of pottery in the assemblage. The first group consists of wide, large- or medium-sized bowls with straight walls and a simple rim. Most of the fragments belonging to this category are decorated with painting. In Garfinkel's terminology, they represent Types C1 (*cf.* Garfinkel 1999: fig. 45) and C6 (*cf.* Garfinkel 1999: fig. 48). Additionally, the presence of Type C7 (*cf.* Garfinkel 1999: fig. 49), *viz*. hemispherical bowls, was also noted. We were able to fully reconstruct one of the bowls. It was decorated with thick lines starting a little below the rim and going diagonally towards the base of the vessel. Close analogies are to be found, for example, at Jericho (Kenyon and Holland 1983: fig 5:4). In addition to bowls with thick lines, there are various examples decorated with series of thin parallel lines. Less frequent is geometric, triangular decoration, similar to the example from Ghrubba (Mellaart 1956: fig 5:89).

The second group comprises decorated and undecorated closed vessels. Amongst the sherds, fragments of Jericho IX jars were noted. Other fragments represent necked pithoi (group F4 [*cf.* Garfinkel 1999: fig. 61]) and, probably, holemouth pithoi (group E4 [*cf.* Garfinkel 1999: fig. 52]). Aproximately 20% of sherds were decorated.



17. al-Munqaṭi'ah. Pottery of Jericho IX Horizon (Drawing: B. Klose, J. Ledwoń, B. Witkowska).

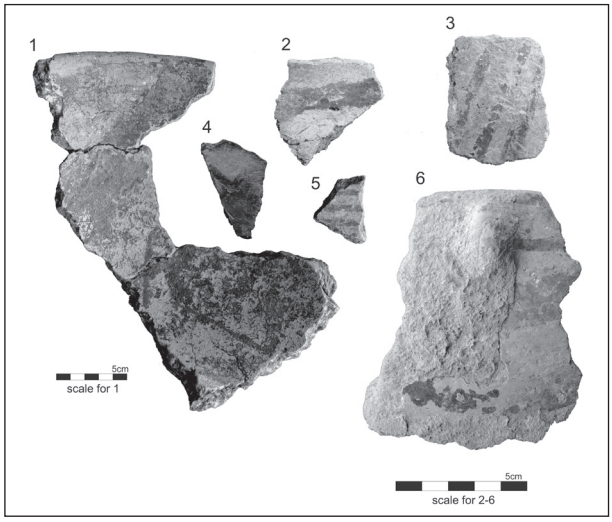
The clay used in production was mixed with mineral inclusions. Medium-sized grits of raw calcite were also observed. The grits have visible fresh breaks and sharp edges. On larger vessels, the clay was tempered with mineral inclusions of different sizes. Between the medium-sized grits, large pieces of calcite are also visible.

The pottery from al-Munqaṭi'ah is representative of the Jericho IX horizon. There is no doubt that the sherds recovered from the probe bear features typical of that culture. The vessels have good analogies at other Jericho IX sites, such as Jericho (*cf.* Kenyon and Holland 1982, 1983), al-Lud (Brink *et al*. 2015: 174-177, figs. 30-31) and Tulaylāt Baṭash (Kaplan 1958). The nearest sites with similar pottery are Khirbat adh-Dharīḥ (Bossut *et al.* 1988) and adh-Dhirā', where it was discovered in the 1970s during testing of the surveyed area (Bennett 1980). In the opinion of the excavators, work carried in the area in the 1990s resulted in the identification of EB1 pottery, but closer examination of published material (*e.g.* Kuijt and Mahasneh 1998: fig. 3) reveals the presence of decorated Jericho IX sherds amongst possible EB forms.

Preliminary Conclusions

During the 2017 prospection on the al-Fayṣaliyyah site, two zones with traces of prehistoric human activity were distinguished. Judging by the distribution of artefacts, and based on comparison of the archaeological evidence with geological observations, it may be concluded that the area was probably used for settlement and farming activities. In several places, traces of stone structures were observed. These were mostly stone walls, stone circles and cairns. Regarding the objects recovered in 2017, it's worth emphasising that the huge number of chert tools detected in the area of investigation - the amount of pottery was less - suggests that the terrain was intensively utilised during prehistory, specifically during the Palaeolithic - Neolithic periods. Other artefacts may be attributed to the Early Bronze Age. The most interesting objects probably relate to the Stone Age (Palaeolithic and Neolithic), which is very commonly represented in the area. Some may be linked to pastoral PPNB - PN cultures represented in the Jafr area (*e.g.* Fujii *et al*. 2017). We are planning wide-ranging studies on this issue in future years. A significantly smaller number of chert tools and pottery fragments can be related to later periods. A number of small finds also indicate the presence of later layers (**Fig. 19**).

As mentioned above, two areas with stone architecture were cleared and partially excavated within the al-Fayṣaliyyah site. The main aim of this activity was to determine the type and purpose of the stone structures discovered there. One of them is particularly interesting, as it contains a carved stone object of a type known from pastoral Neolithic sites (Fujii *et al.* 2017: 571, 572, 575-6). It was used here as part of a wall construction, probably to ensure protection against water activity. This assumption is based



18. al-Munqaṭi'ah. Pottery of Jerycho IX Horizon (Photo: P. Kołodziejczyk).



19. al-Fayṣaliyyah. Stone pendant from trench E.

on analogies to other very similar constructions (*e.g*. Fujii *et al.* 2012: 143, fig. 20) known from Jafr basin sites located about 100km east of al-Fayṣaliyyah. These are often described as barrages, securing important pastoral areas or directing water to other areas (Fujii *et al*. 2012, 2017). The structure may be the harbinger of a whole system of similar structures in this place, because they usually occur in clusters covering a significant area.

Another research question relates to the stone mounds found at the site. Two of these cairns were tested in 2017, but neither yielded information that would allow them to be attributed – even hypothetically - to a specific activity or date. However, similar mounds are present in many places in southern Jordan and wider studies on the phenomenon are necessary.

On the al-Munqaṭi'ah site, two zones with traces of prehistoric human activity were identified and preliminarily investigated in 2017. However, it is necessary to emphasise that the entire valley is distinguished by archaeological material lying on the surface. In the first zone, a small trench was laid out and excavated. It seems very clear that within this trench we encountered the remains of settlement structures that should be examined in future seasons. The artefacts found within these structures indicate that we are dealing with a sequence of Middle to Late Neolithic utilisation of the area. However, other artefacts suggests that the site also includes Chalcolithic, EB and perhaps even later elements. These will require much more work in subsequent seasons. The second zone (S1) was the area within the al-Munqaṭi'ah site where the surface survey was conducted. This yielded around 300 chert artefacts, representing Palaeolithic, Neolithic and later periods. The aforementioned survey area was located 95m north-west of the excavation trench and covered 1,120m². This zone was isolated as an area of reference against which to perform comparative analyses using material recovered from the excavations.

As for the objects recovered at al-Munqaṭi'ah during the 2017 season, both from excavation and survey, it is worth emphasising that the huge quantity of chert tools detected in the survey area and relatively high frequency of pottery (some with traces of decoration), suggest that the landscape was intensively exploited in later prehistory, specifically during the Neolithic period. The most interesting objects (*e.g.* arrowheads; pottery fragments) are probably related to the PN, which is very commonly represented in this area and - in our preliminary opinion - may be linked to the Jericho IX culture. This would make al-Munqaṭi'ah the southernmost known site of this chronological horizon. We are planning broad studies on this issue in future years. There is also no doubt that work on the site should continue in order to protect the area against looting, the traces of which are very clearly visible on the ground surface.

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EASTERN BĀDIYAH ARCHAEOLOGICAL PROJECT: PRELIMINARY REPORT ON THE 2018 EXCAVATION SEASON AT LATE NEOLITHIC STRUCTURE W-80, WISĀD POOLS

Alexander Wasse, Gary Rollefson, Yorke Rowan, Greg Braun, Blair Heidkamp, Austin Hill, Morag Kersel, Brita Lorentzen and Jennifer Ramsay

1. Introduction

For four weeks between 25 May and 22 June 2018, the Eastern Bādiyah Archaeological Project was once again camped by Wisād Pools in Jordan's Black Desert (**Fig. 1**). The primary objective of the season was to continue excavation of structure W-80, previously investigated in 2013 and 2014 (Rollefson *et al*. 2013; Rowan *et al*. 2015a; Rollefson *et al*. 2018a). Radiometric dates indicate that W-80 was repeatedly occupied between at least the mid 7th and mid 6th millennia cal BC, represented in the southern Levant by PPNC / Yarmoukian and Wādī Rabāḥ cultural entities and in the northern Levant and upper Mesopotamia by the Final PPNB / Early Pottery Neolithic and Halaf. Elsewhere in Mesopotamia, the Hassuna, Samarra and earlier 'Ubaid cultural entities held sway, while adjacent areas of the Arabian peninsula were characterised by the Northern Arabian Early Neolithic and Arabian Middle Neolithic. Evincing its geographical location, cultural reflections from all of these areas are manifest in the archaeological record of Wisād Pools.

Additionally, we wished to investigate a representative example of the Timnian-type (Rosen 2017: ch. 8) hut-and-enclosure compounds that cluster around the margins of the core area of Black Desert Neolithic (BDN [Wasse *et al*. in press]) structures surrounding the pools. This was done to test the hypothesis advanced by Betts *et al*. (2013: 189) that hut-and-enclosure compounds appear relatively late in the local Late Neolithic (LN) sequence. To that end, we conducted limited test excavations at structure W-400, located approximately 650m north of W-80.

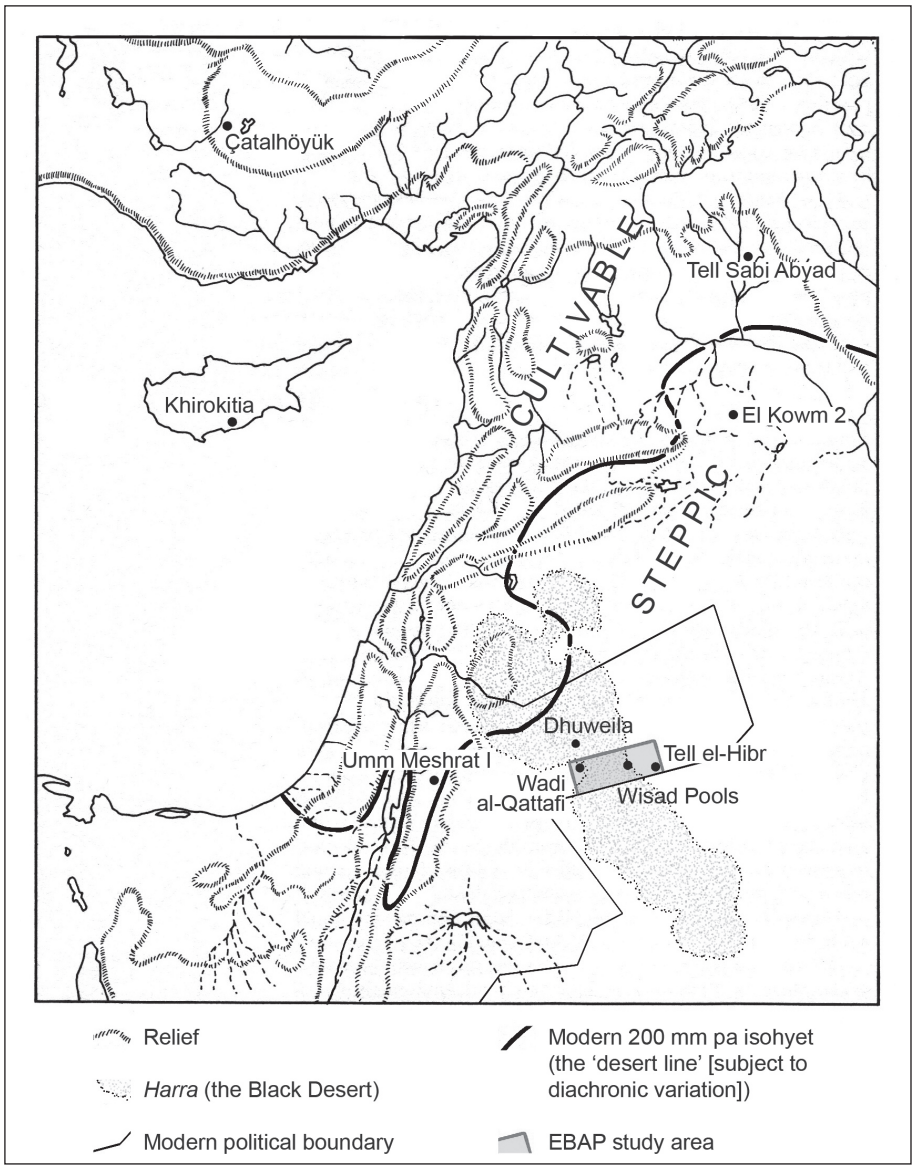
2. Structure W-80

2.1. Methods

In 2018, the single-context recording system utilised at W-80 in previous seasons was refined with the aim of improving spatial and chronological resolution. A 1×1m grid was dropped into the structure and excavation proceeded by subdividing the single-context record into 1×1m squares excavated in 5-cm spits. As has been the case since 2013, almost 100% of cultural deposits were dry-sieved through a 5-mm mesh; substantial flotation samples were also taken (see 5.1 below).

2.2. Stratigraphy and Phasing

As excavation and analyses of W-80 are still ongoing, it would be premature to offer a definitive interpretation of our results. It is clear that this substantial, somewhat rambling structure was repeatedly occupied, abandoned, modified and rebuilt over prolonged periods. Indeed, no two sections of walling are exactly alike. In the later stages of its use, W-80 saw increasingly segmented use of internal space that was manifest in repeated subdivision. On at least one occasion, deep cuts were made into earlier deposits for the purpose of erecting or underpinning internal dividing walls of substantial upright basalt slabs. The mixing of deposits that resulted has made it difficult to reconstruct the architectural sequence with certainty across all parts of the structure. Notwithstanding these challenges, after three seasons of excavation some general observations regarding the prehistoric stratigraphy and phasing can be made with a reasonable degree of confidence. These are summarised below, from earlier to later.



1. Map showing the EBAP study area and location of sites mentioned in text (excepting al-Shabah located almost 500km south of Wisād Pools [base map after Mellaart 1975: fig. 21]).

2.2.1. (?) Early LN

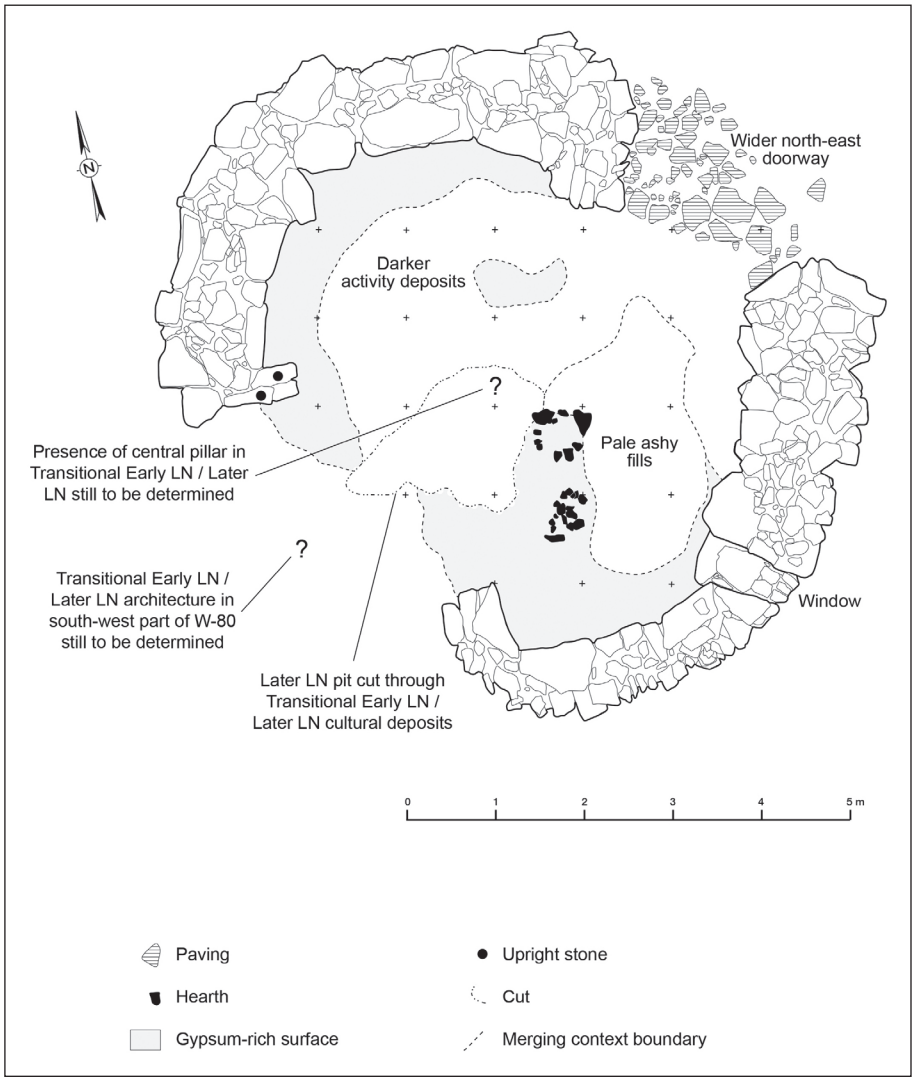
In the closing days of the 2018 season, confirmation of our suspicions (Rollefson *et al*. 2018a: 537) that W-80 might predate the Later LN (Baird's [1993: 77-78] steppe-specific, projectile-point-based periodisation used henceforth) was discovered. Separated from the overlying Transitional Early LN / Later LN (see 2.2.2 below) deposits in the south-eastern part of the interior by 5 - 10cm of extremely compact, reddish brown sand-silt with gypsum streaks, likely the remnants of a Transitional Early LN / Later LN gypsum-rich surface laid over a thickness of natural sediment, was an underlying paved surface. This consisted of smooth basalt slabs, some up to 1m in length, which were distinctive on account of their olivinitic hue. To date this has not been seen elsewhere in W-80, nor in the immediate vicinity of the structure. Some of these pavers underlie the base of the vertical interior slabs of the south-east wall of W-80 by almost 20cm and, indeed, continue beneath them. The relationship of this paved surface to the structural components of W-80 exposed so far thus remains to be determined, as does its ultimate extent. What is significant is that the radiometric date associated with the Transitional Early LN / Later LN (Beta 366676 [see 2.2.2 below]) provides a *terminus ante quem* for this phase of activity, in all probability pushing it back into the Early LN if not earlier. In this respect it might be reiterated that quite substantial Late PPNB cultural deposits are known from the area immediately west of Pool 1 (Wasse and

Rollefson 2005: 17 [for location see Rowan and Hill 2014: fig. 1]). As a substantial hearth between two of the pavers associated with the (?) Early LN yielded multiple radiometric samples, we are hopeful that this phase will be directly dated in due course.

2.2.2. Transitional Early LN / Later LN

This phase of activity (**Fig. 2**) is associated with an earlier, 2.3-m-wide iteration (Rowan *et al*. 2015a: 6, fig. 12) of the main doorway in the north-east wall of W-80, which has a roughly paved threshold extending across its full width. The phase is characterised by the degraded remnants of a gypsum-rich surface (see also 2.2.1 above) over which cultural deposits accumulated. The surface was thickest and best preserved around the northern and southern perimeter of W-80's interior, but in all probability originally extended across its full extent as indicated by preserved patches elsewhere. There is good evidence to suggest that the centre of the structure was more heavily disturbed in this and subsequent phases than its periphery, which doubtless contributed to the differential preservation of the surface. One previously reported radiometric date has thus far been obtained from these deposits. This yielded a range of 6,590 - 6,440 cal BC (Beta 366676 [Rollefson *et al*. 2018a: tab. 2]), straddling the Early LN / Later LN transition. In general terms, the cultural deposits associated with this phase consisted of pale ashy fills covering small, short-lived, stone-lined hearths (**Fig. 3**) and a high proportion of fire-cracked rock in the south-eastern part of the structure, with darker activity deposits elsewhere that seemed superficially associated with small grinding stones and heavily-worked cores.

No evidence for subdivision of the interior



2. Schematic plan of W-80 during the Transitional Early LN / Later LN phase (±6,590 - 6,440 cal BC).

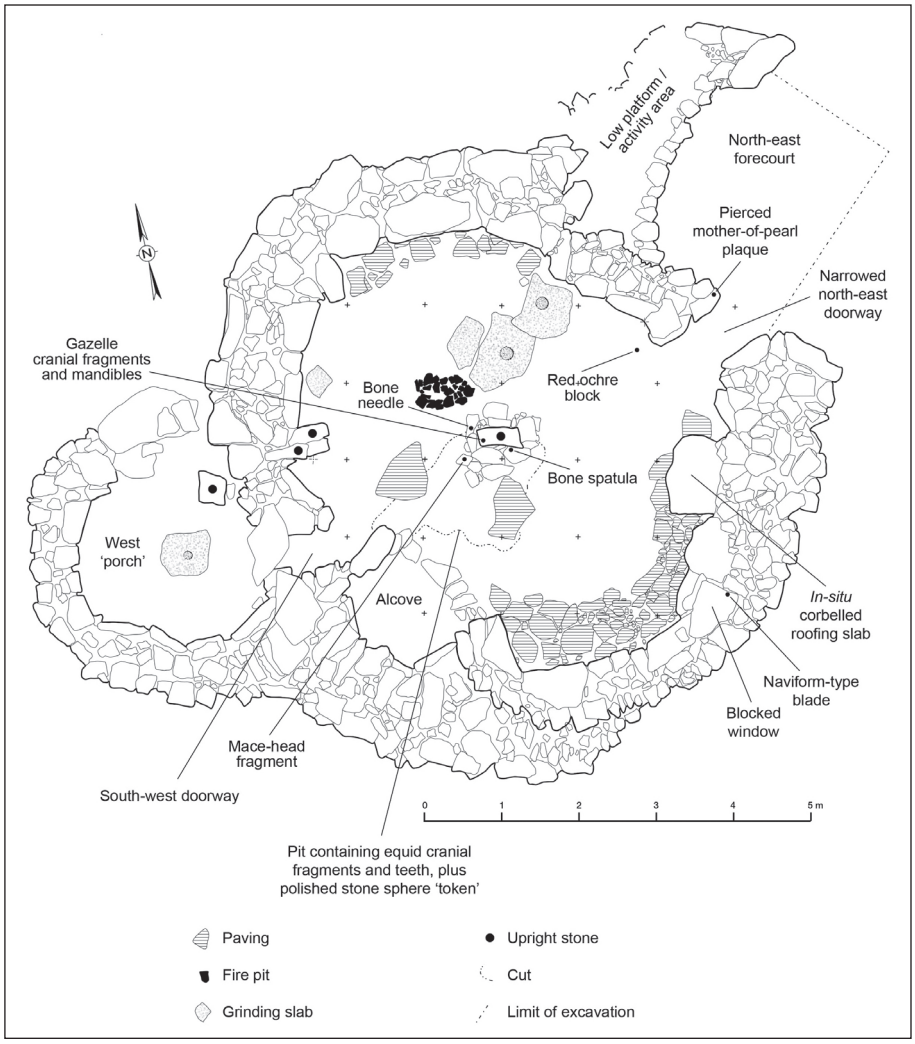


3. Small, short-lived, stone-lined hearth of the Transitional Early LN / Later LN phase; note disturbance by Polyphylla sp. beetle larvae.

during the Transitional Early LN / Later LN was found and none of the stone-built installations and large, *in-situ* grinding slabs with central mortars so characteristic of the subsequent Later LN phase (see 2.2.3 and 2.4 below) have been discovered to date. The abundance of ashy deposits in the interior hints that refuse disposal may not have been a priority, which is in turn suggestive (Hardy-Smith and Edwards 2004: 255-257 and references therein) of relatively intermittent use and concomitantly low site-occupation intensity (Munro 2004: S7). A major deficiency in our current understanding of the Transitional Early LN / Later LN phase is that, owing to disturbance associated with later remodelling (see 2.2.3 below), we have so far been unable to reconstruct the architecture of the south-western part of W-80 during this phase, nor have we ascertained whether a central pillar was a feature of the structure at that time.

2.2.3. Later LN

It is currently not known whether the Later LN phase of activity (**Fig. 4**) segued directly out its precursor or if there was an intervening break in occupation. Similarly, it is not certain for how long it endured, nor if occupation was



4. Schematic plan of W-80 during the Later LN phase (±5,765-5,570 cal BC); internal installations represent earliest sub-phase.

continuous or intermittent. Two previously reported radiometric dates can confidently be attributed to this phase: one of 5,765 - 5,670 cal BC (Beta 395440 [Rollefson *et al*. 2018a: tab. 2]) from a fire pit immediately south-west of the central pillar and the other of 5,710-5,570 cal BC (Beta 366675 [Rollefson *et al*. 2018a: tab. 2]) from a slightly later sub-phase within the main structure.

The Later LN phase began with a far-reaching remodelling of W-80. This included the narrowing of the main north-east doorway to *ca.* 0.6m (Rowan *et al*. 2015a: 4, 6, fig. 12) and the construction of the even narrower subsidiary south-west doorway. The latter gave access to the so-called west porch with its *in-situ* grinding slab with central mortar (Rollefson *et al*. 2013: 12, figs. 6, 9b) and thence to the west forecourt enclosure (*ibid*.: 12, fig. 6). A clear shift to incorporating external space within the bounds of the structure seems thus to have occurred. Establishing whether this was correlated with an increased focus on herding at W-80 is a goal of ongoing faunal analysis.

Within W-80, a substantial irregular pit (see also 2.6 below) containing a large number of equid cranial fragments and teeth (*cf.* Wasse 2019: 274-275) was cut through the Transitional Early LN / Later LN deposits in the area between the south-west doorway and central pillar. This pit was at least secondarily associated with the erection or underpinning of the central pillar and north wall of the alcove (Rollefson *et al*. 2013: 12, figs. 6, 7a [see also **Fig. 4**]) and is one reason for our imperfect understanding of whether or not these architectural elements were part of the Transitional Early LN / Later LN structure. It is hoped that the forthcoming processing of extant additional radiometric samples will shed light on the matter.

There is good evidence (Rowan *et al*. 2015a: fig. 5) to suggest that a corbelled basalt-slab roof existed over at least part of the south-eastern quadrant of the structure during this phase, likely utilising the central pillar as a support. It's unclear if this extended over the entire structure; the lower volume of potential roofing slabs in the north half suggests otherwise. Nevertheless, it does seem probable that - at the very least - a cantilevered overhang of large basalt slabs existed around the internal perimeter in this area. Such a construction would have provided shelter from the elements for stored items or perhaps even young animals. The possibility that there was an organic component to any superstructure, perhaps including tamarisk beams, reeds or woven bulrush leaves (see 5 below), must also be considered.

As at aḍ-Ḍuwaylah (Betts *et al*. 1998: 48, figs. 3.16-17), a general focus on paving at least part of the individual spaces within the newly expanded bounds of W-80 characterised the Later LN. This included the alcove and so-called west porch, as well as the vestibule inside the south-west doorway (Rollefson *et al*. 2013: 13, fig. 6; Rowan *et al*. 2015a: 4, fig. 7a). Additionally, paved areas or perhaps low benches were installed around the northern and south-eastern internal perimeters (Rollefson *et al*. 2013: 12, figs. 6, 7b) of the main structure. A marked contrast with the previous phase can be seen in the installation of superimposed sequences of large grinding slabs with central mortars in the northern half of the structure (Rowan *et al*. 2015a: 5-6, fig. 9). Substantial fire pits lay in the spaces between these slabs, representing a migration of the focus of burning from the southern (see 2.2.2 above) to the northern part of the structure. Slightly later, a rectangular bin (*ibid*.: 6, fig. 10) was constructed along the inner face of the west wall of the northern area. The general impression gained is of a shift from short-lived, expedient hearths in the lee of the high walls around the south-eastern quadrant of the structure, perhaps with shelter from the wind being foremost in mind, to the establishment of a more formalised and heavily invested cooking and food-preparation area in the north. This may also have freed up sheltered sleeping space in the south-eastern quadrant. Interestingly, the Transitional Early LN / Later LN gypsum-rich surface was comparatively better preserved under the heavy grinding slabs and paving of this phase. This is further evidence - if any were needed - that disturbance of accessible earlier deposits is endemic within W-80, whether by *Polyphylla* sp. beetle larvae (*cf.* Betts *et al*. 2013: 54 [see also **Figs. 3 and 18**]), other burrowing animals or indeed the human occupants of the structure. This has serious and as yet unquantified implications for the integrity of our stratigraphic analyses, which must at this stage be regarded as broad brush.

Some of the most far-reaching changes associated with the onset of Later LN phase relate to the aforementioned narrowing of the main north-east doorway. This was achieved by inserting a blocking wall within the northern part of the much wider Transitional Early LN / Later LN entrance, creating the back wall of a north-east forecourt. The latter was flanked by a low, curving wall to the north-west, above which lay a raised, partially paved activity area or low platform. Vast quantities of chipped stone and bone refuse were found on and around this platform, raising the possibility that it served as a focus for some combination of primary processing outside the main structure and secondary disposal of waste from the interior. Either might be taken as indicative of a higher degree of sedentism than hitherto (Hardy-Smith and Edwards 2014: 255-257). At the same time, evidence for internal partitioning of the main structure increased (Rollefson *et al*. 2013: 11-13, fig. 5; Rowan *et al*. 2015a: 4, fig. 7a).

The reason for these changes at W-80 remains a matter for speculation. A straightforward functional interpretation of the narrowing of the doorway, perhaps linked to the desirability of reducing its width in response to climatic change, or to prevent uncontrolled encroachment of the interior by livestock, is possible. At the same time, it's undeniable that the newly constructed north-east forecourt would have imposed a degree of separation between the now-private interior and public outside world. Many of the observations noted above bring to mind Hardy-Smith and Edwards' (2014: 256) proposal that "[i]ncreased formalization in the use and maintenance of space for separate activities is correlated with increased efforts in keeping the house clear of accumulated materials". Indeed, the restricted access, increased investment in exclusive installations and storage, internal compartmentalisation and an increasing emphasis on privacy generally that has been documented at W-80 might serve as a textbook example of increasing household autonomy.

2.2.4 Final LN

It's clear that at least part of the Later LN roof and possible cantilevered overhang (see 2.2.3 above) had collapsed into W-80 prior to the Final LN phase. This possibly intentional act would have significantly reduced the space within the structure and was likely accompanied by a deliberate blocking of the south-west doorway and vestibule. The remaining useable space in the eastern two-thirds of W-80's interior was patched up with areas of rough paving, as well as some roughly corbelled roofing. The southern part of the Final LN structure saw several episodes of subdivision, representing a continuation of the trend first seen in the previous phase, whilst the northern part seems to have remained open plan. It's possible that the uppermost of the large grinding slabs with central mortars were reutilised in this phase. The platform on the north-west side of the north-east forecourt remained in use, but by this stage had spilled into the forecourt itself, covering most of its area with the result that access to W-80 was now via a narrow, curving 'corridor', partially paved, that snaked past the slumped platform (**Fig. 5**). As refuse and stone accumulated atop the platform, it was tidied up with areas of rough paving on more than one occasion.

During the Final LN phase, it seems that the by now ancient main structure of W-80 functioned less as a heavily invested place of primary residence than as an expedient and likely intermittently utilised "windbreak with numerous renovations for a variety of tasks, including butchering, grinding stone activity, lithic production, and bead manufacture" (Rowan *et al*. 2015a: 4). Although the nature of the cultural deposits hints at repeated intermittent visits over many years, in the absence of any radiometric dates for this phase it's imprudent to speculate as to its temporal extent or the intensity of occupation it represents. The latest



5. Final LN phase entrance 'corridor' to W-80, curving past the platform to left which now fills the north-east forecourt.

Table 1: Tool types and classes from W-80, 2018.

Tool type	n	%	Class	n	%
Projectile point	141	17.4	Points	141	17.4
Burin	32	4.0	Burins	32	4.0
Truncation	19	2.3	Truncations	19	2.3
Endscraper	15	1.9	Scrapers	71	8.8
Sidescraper	52	6.4	Notches	64	7.9
Tabular/fan scraper	4	0.5	Denticulates	124	15.3
Notch	64	7.9	Knives	64	7.9
Denticulate	124	15.3	Drilling tools	61	7.5
Unifacial knife	38	4.7	Bifaces	9	1.1
Bifacial knife	16	2.0	Wedges	118	14.6
Seam knife	10	1.2	Polyhedrons	67	8.3
Backed element	11	1.4	Pecking stones	4	0.5
Tanged blade	1	0.1	Other	36	4.4
Perforator	3	0.4	**Total**	**810**	**100.0**
Borer	28	3.5			
Drill	30	3.7			
Biface	9	1.1			
Wedge	118	14.6			
Polyhedron	67	8.3			
Pecking stone	4	0.5			
Microliths	7	0.9			
Other	17	2.1			
Subtotal	**810**	**100.0**			
Retouched flake	51	(4.9)			
Retouched blade	33	(3.2)			
Utilized piece	53	(5.1)			
Unclassifiable	96	(9.2)			
Total	**1043**	**(100.0)**			

In addition, there were six bone awls, three bone needle fragments and a bone spatula. More bone tools will be identified as faunal analysis continues.

radiometric date associated with the Later LN (Beta 366675 [see 2.2.3 above]) provides a *terminus post quem* for the Final LN phase of the mid 6th millennium cal BC. This sits well with Baird's (1993: 78) caveated attribution of arrowhead assemblages containing an absolute predominance of transverse points (see 2.3 below [also **Tables 3 and 4**]) to the 6th and 5th millennia cal BC.

2.3. Chipped Stone

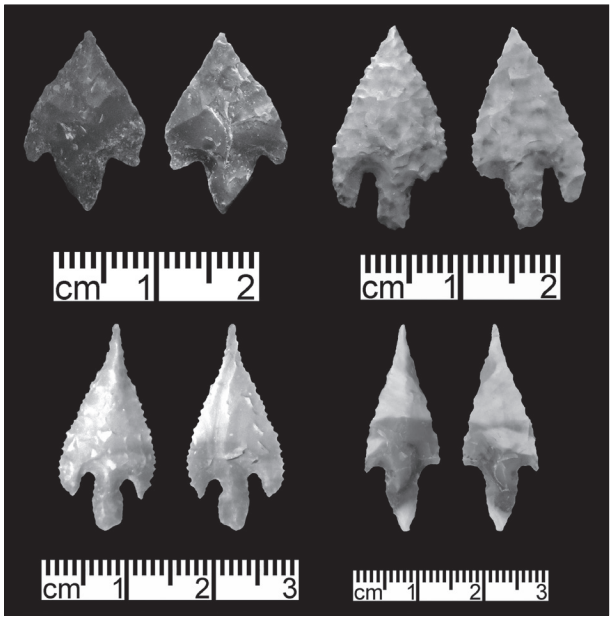
A total of 810 formal tools was recovered during the 2018 season from W-80 (**Table 1**). Blanks for formal tools relied heavily (62.4%) on blades and bladelets (**Table 2**). A variety of flake types made up the bulk of the other blanks, and 13 formal tools were made on recycled older flakes and cores (including one Levallois flake).

Although projectile points played a significant role in the tool inventory at 17.4%, this is only about half of the rate for the upper layers of the structure excavated in 2013 and 2014

Table 2: Debitage blanks for formal tools from W-80, 2018.

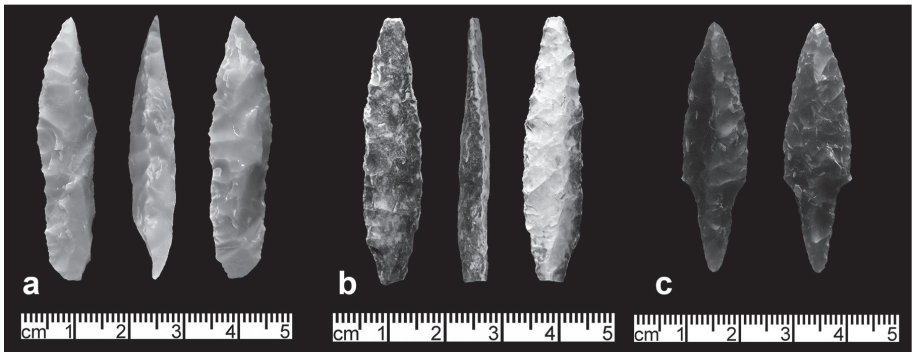
Debitage type	n	%
Ordinary blade	308	54.7
Naviform blade	1	0.2
Bladelet	42	7.5
Flake	166	29.4
CTE	7	1.2
Burin spall	10	1.8
Microflake	1	0.2
Core, nodular	11	2.0
Core, tabular	4	0.7
Other	13	2.3
Subtotal	**563**	**100.0**
Unclassifiable	249	(30.7)
Total	**812**	**(100.0)**

(Rollefson *et al*. 2018a). Of the 132 classifiable arrowheads (*cf.* **Table 3**), 88 (66.7%) were versions of transverse types, which contrasts considerably with the 87.3% level seen in the upper levels from earlier excavation seasons (*ibid*.: tab. 5). Haparsa points (**Fig. 6**) dominated the non-transverse types at 70.6% (24 of 34). A 'new' projectile point type called the 'bolt' (**Fig. 7**) was collected in 2018, although other bolt types were found on the surface at Wisād 1 (Wasse and Rollefson 2005: 17) in 2011. Bolts bear bifacial covering retouch, have thick lenticular cross-sections, and weigh *ca* 3gm. Because of their weight, bolts were probably dart points propelled by spear-throwers (*cf.* Eighmey 1992: 165-167). Credible comparanda from the Arabian peninsula have been presented by Drechsler (2009: Appendix 1).



6. Haparsa points from W-80 (photographer G.O. Rollefson).

Tables 3 and 4 show the distribution of classifiable arrowhead types by phase of occupation. The (?) ELN phase remains incompletely excavated and yielded no arrowheads in 2018. **Table 4** is especially informative, since it shows a continuous increase in the relative importance of transverse arrowheads between the Transitional Early LN / Later LN and Final LN. The data in **Table 4,** coupled with the aforementioned radiometric dates (see 2.2 above), lend support to the assertion of Garrard *et al*. (1994: 87-88 [see



7. (a), (b) 'Bolts' from W-80; (c) Byblos point from W-80 (photographer G.O. Rollefson).

Table 3: W-80 projectile point types by phase, 2018 (upper table: absolute frequency; lower table: relative frequency).

	T1 (n)	T2 (n)	T3 (n)	T4 (n)	Hap (n)	Niz (n)	Hrz (n)	Byb (n)	Oth (n)	Unc (n)	Total (n)
FLN	12	7	6	2	1	0	0	0	1	0	29
LLN	17	3	6	0	9	4	0	1	2	2	44
ELN/LLN	17	10	8	0	14	6	1	2	3	6	67
Total	**46**	**20**	**20**	**2**	**24**	**10**	**1**	**3**	**6**	**8**	**140**

	T1 (%)	T2 (%)	T3 (%)	T4 (%)	Hap (%)	Niz (%)	Hrz (%)	Byb (%)	Oth (%)	Unc (%)	Total (%)
FLN	41.4	24.1	20.7	6.9	3.4	0.0	0.0	0.0	3.4	0.0	100.0
LLN	38.6	6.8	13.6	0.0	20.5	9.1	0.0	2.3	4.5	4.5	100.0
ELN/LLN	25.4	14.9	11.9	0.0	20.9	9.0	1.5	3.0	4.5	9.0	100.0

There was also one arrowhead ('Other' type) collected from the surface and not included in the table.

T1 Stemmed Transverse T2 Unstemmed transverse T3 Rectilinear/ trapezoidal
T4 Unclassifiable transverse Hap Haparsa Niz Nizzanim Hrz Herzliya
Byb Byblos Oth Other Unc Unclassifiable

also Baird 1993: 77]) that transverse arrowheads were introduced to the *bādiyah* sometime during the earlier 7th millennium cal BC.

Burins (**Table 5**), drills (**Fig. 8; Table 6)** and scrapers were all represented at low to medium levels of importance among formal tools, a pattern that is consistent with the analysis of earlier excavation samples. Burins were scattered across several classes and are relatively poor in truncation burins, the class that normally characterises LN burins in the *bādiyah*. Drills are absolutely rare in the 2018 sample, suggesting a lack of focus on such activities in the earlier levels of W-80; bladelet blanks for drills are more numerous than burin spalls, challenging widely held views of the purpose of truncation burins. Among the 'Other' tools found in 2018 is a pedunculated and serrated knife, possibly attached to a cord hung around the neck (**Fig. 9b**); there is a virtual twin illustrated from LN aḍ-Ḍuwaylah (Betts *et al*. 1998: fig. 4.32-4). Another pedunculated tool in the shape of a miniature fan scraper was recovered from structure W-66 (Rollefson *et al*. 2011; Rowan *et al*. 2015b) at Wisād Pools in 2011 (**Fig. 9a**).

Two types that appeared in higher levels were wedges (**Fig. 10**) and polyhedrons (**Figs. 11 and**

Table 4: Stratified comparison of classifiable transverse and other arrowheads from W-80, 2018.

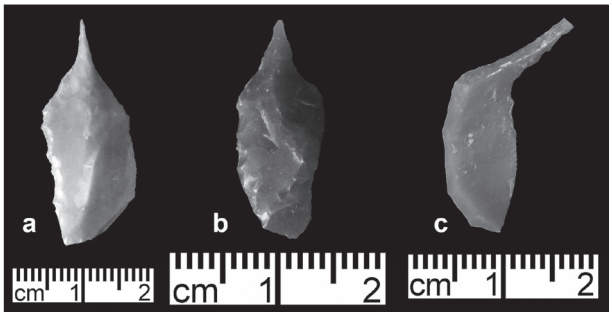
	Trans		Non-Trans		Ratio
	(n)	(%)	(n)	(%)	(T : NT)
FLN	27	93.1	2	6.9	13.5 : 1
LLN	26	61.9	16	38.1	1.6 : 1
ELN/LLN	35	57.4	26	42.6	1.3 : 1

Table 5: Burin types and classes from W80, 2018.

Type	n	%
Simple	2	7.1
On break	6	21.4
Angle	1	3.6
Double simple	1	3.6
Double on break	1	3.6
Opposed simple-simple	3	10.7
Simple transverse	1	3.6
Transverse from lateral retouch	1	3.6
Straight dihedral	2	7.1
Canted dihedral	1	3.6
Opposed simple-dihedral	1	3.6
Concave truncation	5	17.9
Double concave truncation	2	7.1
Opposed concave-convex truncation	1	3.6
Subtotal	**28**	**100.0**
Indeterminate	3	(9.7)
Total	**31**	**(100.0)**
Class	**n**	**%**
Simple	14	50.0
Transverse	2	7.1
Dihedral	4	14.3
Truncation	8	28.6
Total	**28**	**100.0**

Table 6: Drill types from W-80, 2018.

Type	n	%
Bladelet, symmetrical	11	44.0
Bladelet, asymmetrical	1	4.0
Burin spall, symmetrical	3	12.0
Burin spall, asymmetrical	6	24.0
Mèche de forêt	4	16.0
Subtotal	**25**	**100.0**
Bit only	5	(16.7)
Total	**30**	**(100.0)**

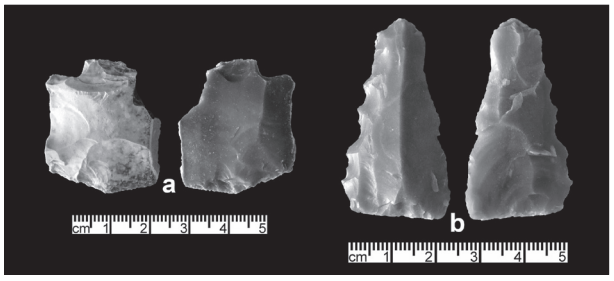


8. (a), (b) Needle-sharp drills from W-80; (c) skewed drill from W-400 (photographer G.O. Rollefson).



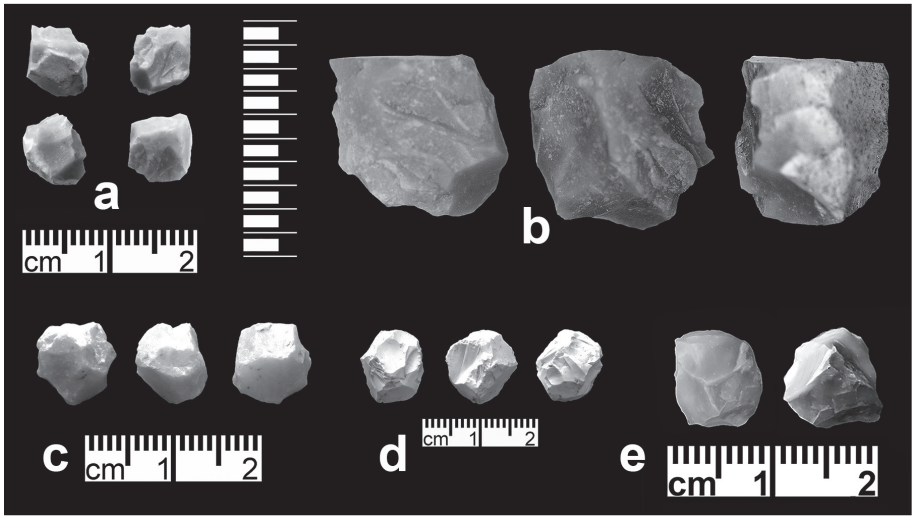
9. (a) Pedunculated seam knife from W-66; (b) pedunculated serrated knife from W-80 (photographer G.O. Rollefson).

12). More frequent than any other tool type except points and denticulates, wedges (or *pièces esquillées* / splintered pieces) are generally small flakes or blades that bear opposed battering on the ends of the piece (bipolar wedges) or on the lateral edges (lateral wedges), or both. In view of the marshy environs around Wisād Pools (see 5 below), wedges would have been useful for splitting wood and reeds.

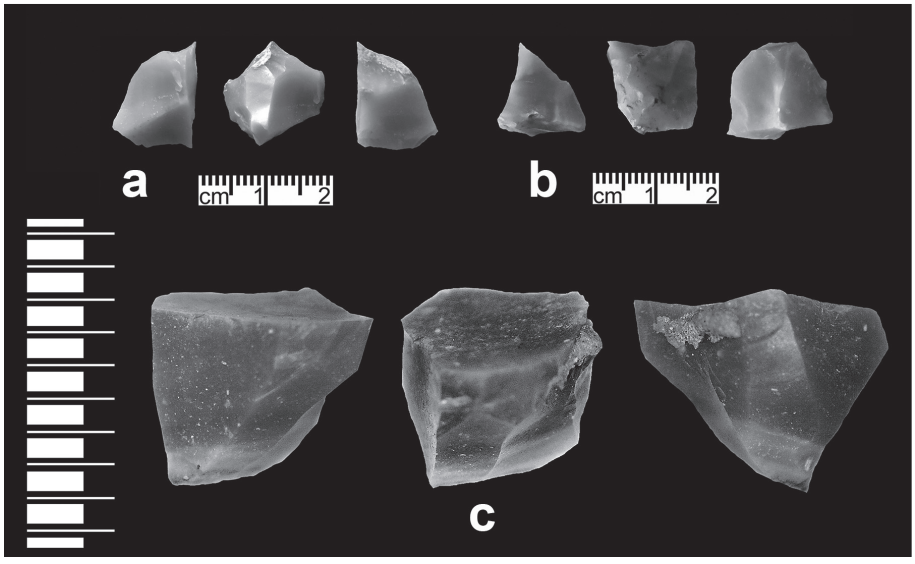


10. (a) Wedge with heavy patination on one surface from W-80; (b) denticulated wedge from W-80 (photographer G.O. Rollefson).

Polyhedrons are small flaked artefacts that occur in shapes such as spheroids, cuboids, or pyramids (although the separation into such categories is not always easy). Polyhedrons were first recognized by Cropper (2011) in her analysis of the Yarmoukian artefacts from Umm Mashraṭ I, near Mādabā in the highlands of western Jordan. Resembling tiny cores, their dimensions are so small that they and the flakes they produced do not have any apparent utilitarian function. As the maximum dimension of polyhedrons is consistently less than 20mm, "it is possible that polyhedrons exist at other sites but have been overlooked" (*ibid*.: 84). Cropper's proposal that they may have been gaming pieces is plausible, although the possibility that they were part of a simple system of quantification or record keeping cannot be excluded. There is a total of 162 polyhedrons from W-80 (including the 2013-14 and 2018 seasons),



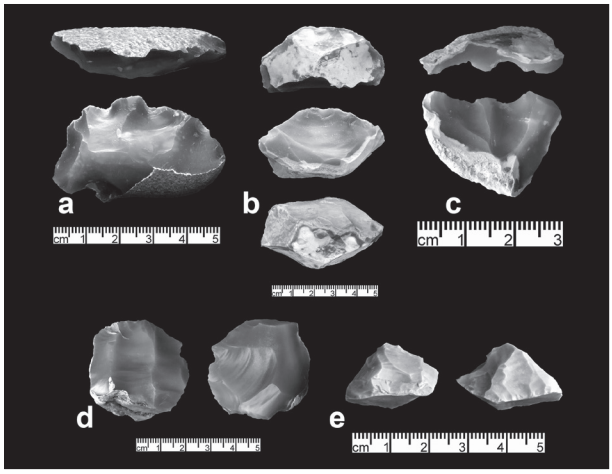
11. (a), (b) Cuboid polyhedrons from W-80; (c), (d), (e) spheroid polyhedrons from W-80 (photographer G.O. Rollefson [note scale in (b) is 10 mm]).



12. Pyramidal polyhedrons from W-80 (photographer G.O. Rollefson [note scale in (c) is 10mm]).

accounting for 5.5% of all formal tools; another 41 polyhedrons (5.1% of formal tools) come from nearby contemporaneous W-66 (Rollefson 2019). 'Tools' is perhaps a misnomer for polyhedrons, but it is important to note their popularity compared to utilitarian pieces. Notably, only six polyhedrons were recovered from M7 SS-1, a result that adds to the distinction of chipped stone tool differences between W-80 and M7 in such areas as burins and transverse arrowheads (*ibid*.).

The cores from the 2018 season (**Fig. 13**) are presented in **Table 7**. With the word 'blade' in the name, there are 61 blade cores (28.9%), although this is misleading. Pyramidal, semi-pyramidal, 90° change-of-orientation and core on flake could also have produced blades. Furthermore, in view of the intensive core reduction, a mistake in blade removal may have eliminated all indications of the core's original technological status. One aspect of the cores from W-80 is the high degree of reduction (**Fig. 13a, c**), indicating a practice of coping with the scarcity of good quality flint in the immediate vicinity of the site (the closest known source is 19km to the south-east at Tall al-Ḥibr. Another example of parsimony is the reuse of earlier cores, some Palaeolithic (*e.g.* **Fig. 13b**), in addition to the scavenging of discarded older flakes and blades. Microflake cores, which have maximum dimensions of 30mm (but larger than 20mm), are rare and may simply be the continuation of the metric array of polyhedrons.



13. Cores from W-80: (a), (c) Exhausted single platform single face flake cores; (b) Palaeolithic core or biface re-purposed as a Late Neolithic single platform single face flake core; (d) 90° change-of-orientation blade / flake core; (e) pyramidal core (photographer G.O. Rollefson).

2.4. Ground Stone

As in past seasons, handstones dominate the ground-stone assemblage excavated in 2018 (see **Table 9**). Virtually all of the ground-stone artefacts excavated at W-400 are handstones; all are made of basalt. At W-80, the highest relative frequency of ground-stone items (44%) is also handstones made of basalt. Grinding slabs and grinding slabs with a central mortar, also of basalt, are next in terms of frequency. As already noted (see 2.2.2 above), the very large, *in-situ* grinding slabs with a central mortar seem on current evidence to be particularly associated with the Later LN phase of occupation. Not all ground-stone artefacts from W-80 are basalt. Smaller, thin-worked pieces of sandstone, about 14% of the ground stone assemblage from 2018, appear to be palettes or small ground-stone fragments.

2.5. Special Finds

The list of special finds (**Table 8**) contains the general variety of artefacts commonly found at LN sites in the *bādiyah*. Two particular pieces associated with the Later LN phase

Table 7: Absolute and relative frequencies of all cores from W80, 2018.

Core Type	n	%
Bladelet core	8	3.8
Blade + bladelet core	2	0.9
Naviform blade core	2	0.9
Opposed platform non-naviform core	6	2.8
Single platform single face blade core	36	17.1
Single platform multiface blade core	6	2.8
Multiple platform multiface blade core	1	0.5
Single platform single face flake core	22	10.4
Single platform multiface flake core	12	5.7
Multiplatform single face flake core	14	6.6
Multiplatform multiface flake core	35	16.6
Single face radial core	3	1.4
Pyramidal core	6	2.8
Semi-pyramidal core	4	1.9
90° change-of-orientation core	13	6.2
Microflake core	7	3.3
Core on flake	32	15.2
Other	2	0.9
Subtotal	**211**	**100.0**
Tested piece	10	(3.3)
Unclassifiable	39	(12.8)
Manuports	45	(14.8)
Total	**305**	**(100.0)**

Table 8: Special finds from W-80, 2018.

Material	n	Material	n
Ceramic sherds[1]	13	Clinopyroxene spheres	1
Stone beads[2]	32	Pounders[4]	3
Shell beads	21	Quartzite fragment	1
Bone beads	2	Shaped white stone	1
Dabba marble pendants	3	Polished stone	1
Sandstone palettes	6	Polished stone sphere 'token'	1
Sandstone rubbers[3]	6	Red ochre stained flake	1
Sandstone fragments	4	Stone bracelet fragments	7
Sandstone cylinder	1	Chalk ring	1
Flint cylinder	1	Mica fragments	4
'Mace-head' fragments	3	Red ochre pieces[5]	3
Mother-of-pearl plaque	1	Carnelian chunks	5
Mother-of-pearl fragments	5	Gaming piece?	1

1. All Yarmoukian; six from a single pot-break?
2. Nine are of Dabba marble, two of carnelian.
3. One stained with red ochre.
4. One stained with red ochre.
5. One is a core measuring 106×90×45mm; weight 580gm.

demand special comment, however, for they are indeed special.

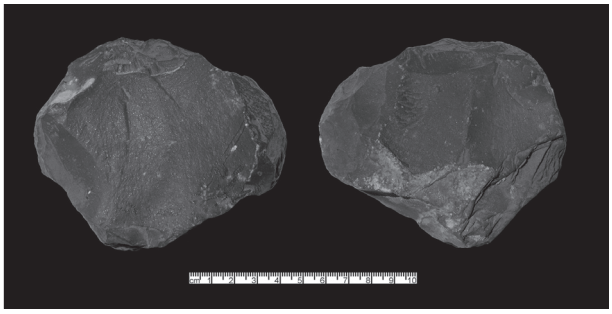
The first is a large block of red ochre (**Fig. 14**) weighing 580gm. It might be considered to be a 'core' of red ochre in view of the numerous broad negative flake scars on both surfaces; its mass indicates that it may have been associated with industrial use (but see 2.6 below). In addition to its popular association with symbolism (Hovers *et al*. 2003), ochre's decay-impeding properties also make it useful in hide tanning (Rifkin 2011). In this regard, there may be a connection with a possible gazelle-hide industry in the eastern *bādiyah* (Bar-Yosef 2016; Martin *et al*. 2016: 216; Wasse 2019: 272-274). Ochre has also been shown to be effective for developing a mastic for hafting stone tools (Wadly 2005).

Table 9: Ground stone from W-80 and W-400, 2018.

Type	W-80		W-400	
	n	%	n	%
Grinding slab	4	8.0	1	11.1
Grinding slab with central mortar	2	4.0		
Handstone	22	44.0	7	77.8
Rubber	3	6.0		
Pebble	4	8.0		
Pestle	1	2.0		
Palette	4	8.0		
Pounder	1	2.0		
Multi-functional	4	8.0	1	11.1
Groove or incised	2	4.0		
Fragment	3	6.0		
Total	**50**	**100.0**	**9**	**100.0**

Red ochre is also known as 'jeweller's rouge' and is used to achieve high polish on decorative objects, potentially including the stone sphere, likely a so-called 'token' (*cf.* Schmandt-Besserat 1992; note also a possible incised, conical stone 'token' fragment from structure M7 SS-1 at Wādī al-Qaṭṭāfī [Rollefson *et al*. 2017: fig. 16a]), and 'mace-head' fragment at **Fig. 15a-b**. In this context, it's worth noting that polished stone 'tokens', including spheres, have been particularly associated with the Mesopotamian Hassuna and Samarra cultures of the later 7th and earlier 6th millennia cal BC (Schmandt-Besserat 1992: 46-47), as well as with the later 'Ubaid culture (Carter 2018: 54-63).

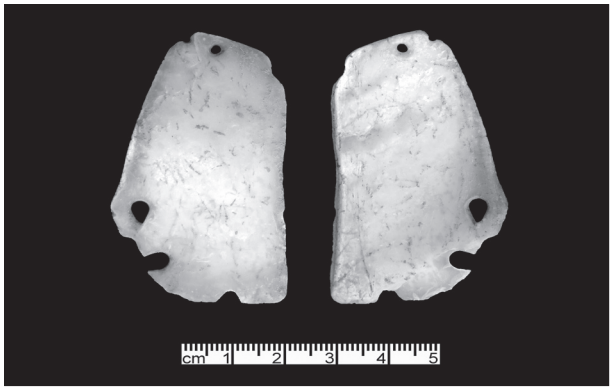
The second special find of significant interest is a perforated plaque - or 'link' - of mother-of-pearl (**Fig. 16**). Mother-of pearl fragments have been relatively numerous at Wisād Pools, but the size of the plaque seems imbued with particular importance, either for the person who wore it, or for the building where it was



14. Red ochre block found just inside W-80 Later LN phase north-east doorway (photographer G.O. Rollefson).



15. (a) Polished stone sphere 'token' from W-80 Later LN phase pit between central pillar and south-west doorway; (b) 'mace-head' fragment from foundation deposit around base of W-80 central pillar; (c) bone spatula from foundation deposit around base of W-80 central pillar (photographer G.O. Rollefson).



16. Perforated mother-of-pearl plaque from behind north-west jamb of W-80 north-east doorway (photographer G.O. Rollefson).

recovered. A very similar object, identified as *Unio* sp. freshwater mussel and similarly dated to *ca* 6,400 - 5,700 cal BC, was recovered from Level AV at el-Kowm 2 in the Syrian steppe (Stordeur [ed.] 2000: 210-211, fig. 2a, 304, fig. 1). This hints at the probable existence of extensive pan-*bādiyah* hunting and herding networks at this time (*cf.* Wasse 2019).

2.6. Structured Placement of Objects

A phenomenon that has been recorded at W-80 since excavation began in 2013, though not necessarily recognised for what it was, concerns the structured placement of objects in areas of the structure that were of particular interest to those who used it. Foremost amongst these were the north-east doorway in its narrowed, Later LN iteration and the central pillar.

The substantial worked block of red ochre already noted (see 2.5 above; also **Figs. 4 and 14**) was found pressed vertically into the ground just inside the north-east doorway (**Fig. 17**). In this regard, it may be noted that at Çatalhöyük red ochre was found "sprinkled on burials, and on *thresholds between rooms especially*" (Hodder 2006: 190 [our emphasis]). The large, perforated mother-of-pearl plaque (see 2.5 above; also **Figs. 4 and 16)** was secreted in the wall adjacent to and slightly above the same threshold, placed vertically immediately behind the north-western upright of the doorway (**Fig. 17**). Additionally, a naviform-type blade was discovered in the blocking of a window in the well-preserved south-east wall of the main structure (see **Fig. 4**). It may be significant that all of these finds were located at physical and potentially conceptual vulnerabilities in the structure that gave access to its interior ('domus' [*sensu* Hodder 1990]) from the outside world ('agrios' [*ibid.*]). It's therefore conceivable that they may have served some apotropaic function (*cf.* Gebel 2002). A distal lion phalanx found under a paving slab in the south-eastern quadrant of W-80's interior may have performed a related 'strengthening' function, perhaps being "placed [there] during... construction... to act as a delegate of humans against threatening external forces" (Hodder 2006: 189). The substantial Later LN irregular pit containing equid cranial fragments and teeth in the area between the south-west doorway and central pillar has already been mentioned (see



17. Red ochre block in situ (circled) just inside W-80 Later LN phase north-east doorway; location of perforated mother-of-pearl plaque in wall behind north-western jamb of doorway also shown (cross [see also **Fig. 4***]).*

2.2.3 above). Of particular interest here is the fact that it also yielded the aforementioned polished stone sphere 'token' (**Fig. 15a**).

Considerable careful work was done in 2018 around the central pillar in the interior of W-80. Buttressing stones seem to have been placed around its base at the start of the Later LN phase, but sadly it proved impossible to ascertain whether the pillar itself was a Later LN or earlier erection. What was discovered, however, were intriguing foundation deposits directly under the buttressing stones (see **Fig. 4**), atop but not within the abovementioned pit fill. These consisted of gazelle cranial fragments and at least five mandibles placed carefully at the base of the pillar (**Fig. 18**), as well as a fine bone spatula (**Fig. 15c**) and the aforementioned polished 'mace-head' fragment (**Fig. 15b**). In a subsequent sub-phase of the Later LN, a previously reported cache of gazelle / caprine astragalae (Rowan *et al*. 2015a: 6, fig. 11b) was deposited at the base of the same pillar, with another (*ibid*.: fig. 11a) just inside the main northeast doorway, close to but 18cm higher than the abovementioned red ochre block.

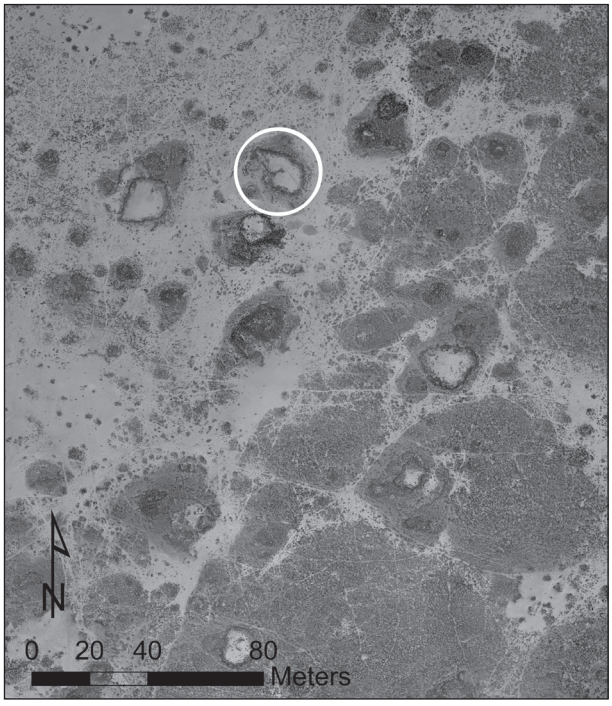
These observations suggest, first, that a fully functionalist interpretation of the central pillar may be inadequate and, second, that the structured placement of objects around the main doorway was relatively enduring behaviour at W-80, at least during the Later LN. Furthermore, it seems clear that when the structure was remodelled at the start of that phase, every effort - both physical and symbolic, if indeed these can or even ought to be separated in the LN context - was made to ensure its prosperity and protection. As a concluding aside, it can be noted that the recurring structured deposition of mace-head fragments, the vertical placement of objects in the ground and the utilisation of red ochre or other such pigment has been documented in closure deposits at distant though near-contemporary Khirokitia on Cyprus (Le Brun 2017: 233-235, figs. 6, 9). The potential significance of this is discussed in detail elsewhere (Wasse and Clarke 2020).

3. W-400

Owing to the primary focus of work at W-80, our 2018 excavations at W-400 **(Fig. 19)** were limited in scope. This complex was selected for investigation because it was an unlooted, relatively small, Timnian-type (Rosen 2017: ch. 8) hut-and-enclosure compound of a type we were already familiar with from previous research along Wādī al-Qaṭṭāfī (Wasse *et al*. 2012).



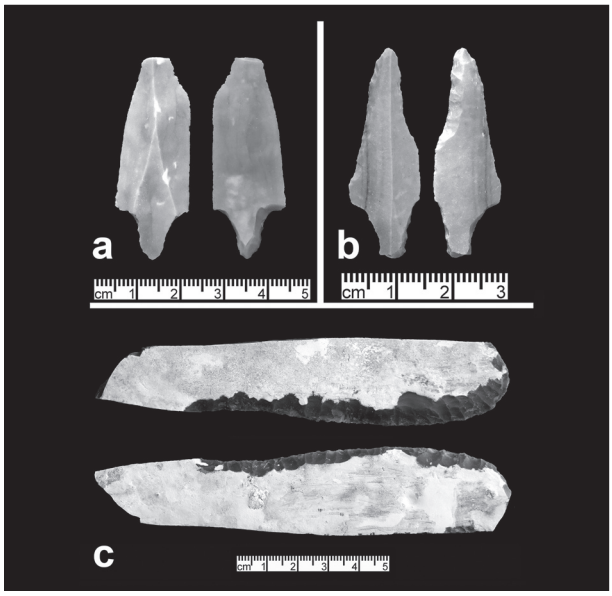
18. Later LN phase foundation deposit of gazelle cranial elements and mandibles at base of central pillar; note disturbance by Polyphylla sp. beetle larvae.



19. Aerial view of hut-and-enclosure compounds, including W-400 (circled), on the north-west margin of the LN core area at Wisād Pools.

As only a relatively small amount of sediment was excavated, the number of recovered chipped stone artefacts was low. They included two *bādiyah* points and a bifacial seam knife (**Fig. 20**). The seam knife has a close parallel with one from LN aḍ-Ḍuwaylah (Betts 1998: fig. 4.28-1). A highly skewed small drill was also unearthed **(Fig. 8c)**, as well as a blade core on a blade. Small finds from W-400 were also limited in number. They included seven clinopyroxene spheres ('false obsidian' [*cf*. Betts 1985: 51-52]), seven carnelian chunks, three Dabba marble fragments, a small fragment of red ochre and two stone beads.

Although the material recovered from W-400 is suggestive of a LN date for this structure, it's too early to speculate as to whether it may have been contemporary with all or part of the occupation at W-80 and W-66. The attached enclosure suggests that it may have been occupied by herders, while the two Badiyah points hint at a closer cultural affiliation with sites such as M7 SS-1 in Wādī al-Qaṭṭāfī (Rollefson *et al*. 2016: table 2, fig. 7, 2017: tab. 5, fig. 7c-d [see also Nishiaki 2019: 184-185, 187 re. Badiyah points in the Syrian and Iraqi steppe]) than with W-80 and W-66 less than a kilometre to the south. The location of W-400 some distance from the pools on the margins of the LN core of the site is intriguing, raising the possibility that prime locations closer to the water may already have been taken by more established users of the locality. If supported by future research, the implication that multiple social groups may concurrently have exploited the resources of Wisād Pools would present an exciting opportunity to explore notions of territoriality, exclusivity and access during the LN.



20. (a), (b) Badiyah points from W-400; (c) bifacial seam knife from W-400 (photographer G.O. Rollefson).

4. Ceramic Petrography

Ceramic petrography was conducted on 18 pottery samples recovered from W-66 and W-80 during the 2013 and 2014 seasons. All of the diagnostic decorated sherds could be attributed to the Yarmoukian cultural entity; most of the plain body sherds displayed the remnants of red slip. Of particular interest was the provenance of the raw materials used to manufacture this pottery, given the paucity of known clay resources in the vicinity of Wisād Pools and the high probability that this pottery was made elsewhere and carried in. Petrographic analysis was undertaken using methods adapted from those proposed by Quinn (2013) and Whitbread (1995).

Petrographic analysis revealed that all pottery samples were made using calcareous clays, tempered with grog and / or chaff. Six distinct clay sources were identified, based on the mineralogy of their silt-sized (<60μm) inclusions. This constitutes a much higher degree of clay variation when compared to other LN sites with petrographic data available, especially when the small assemblage size at Wisād Pools is taken into account (Goren 1991; Cohen-Weinburger 2002: 139; Gibbs 2008: 257-258; Braun and Kafafi 2019). The clay sources identified at Wisād Pools fall into two main groups: those with silt-sized, rounded basalt grains and related minerals (olivine; pyroxenes; plagioclase) and those without basalt grains.

Whilst the precise sources of the clays used to manufacture the W-66 and W-80 pottery cannot be determined at this stage, the three clay fabrics containing silt-sized basalt grains could plausibly have originated from the Black Desert region. It should once again be emphasised, however, that clay deposits have not been identified to date in the vicinity of Wisād Pools. Fabrics containing basalt inclusions are known from LN 'Ayn Ghazāl (Braun and Kafafi 2019), which suggests that pottery was circulating between the basaltic regions of the southern Levant - potentially including the Black

Desert, but perhaps more likely the Jaulan and Hauran - and the Jordanian highlands. Owing to the ubiquity of basalt in the Black Desert, the three clay fabrics lacking basalt grains almost certainly originated outside that region. It therefore seems likely, owing to these factors as well as the infrequency of pottery at the site generally, that ceramics were made elsewhere and brought to the Wisād Pools area. At W-80 in particular, the wide variation evident in clay fabric mineralogy and the fact that the majority of analysed sherds can be attributed to a single phase, the Later LN, suggests the presence of several contemporary yet distinct ceramic communities of practice. Overall, the petrographic evidence supports the notion that a number of networks, at least some of which extended beyond the Black Desert, may have converged at Wisād Pools during the LN. The apparent absence of diagnostic, post-Yarmoukian sherds remains puzzling, however, in view of radiometric and stratigraphic evidence for the utilisation of W-80 during the second quarter of the 6th millennium cal BC and thereafter.

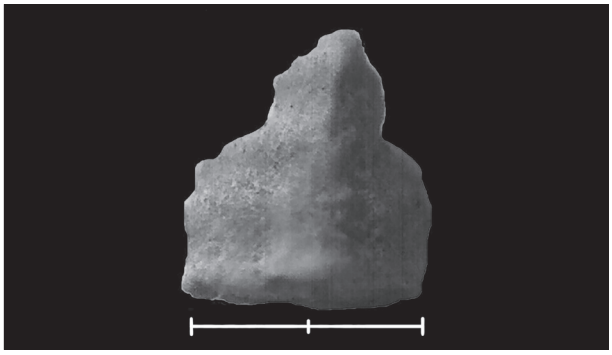
5. Climate, Vegetation and Subsistence

In recent years, it has become abundantly clear that the landscape and vegetation around Wisād Pools would have been significantly more verdant and better resourced during the LN than the grimly arid conditions that characterise the locality today (Rowan *et al*. 2017, 109-110 and references therein). Regional isotopic data have suggested that "[t]he time interval between 8.5 and 7ky [was] characterized by a... deluge period when annual precipitation was extremely high" (Bar-Matthews *et al*. 1999: 91 [see also Bar-Matthews and Ayalon 2004: 385; Rosen 2017: 83-84]). At Wisād Pools, this is manifested by the documented presence of oak stands, marsh plants and perhaps willow in their respective environmental niches (Rowan *et al*. 2017, 109-110 [see also 5.1 and 5.2 below]).

A priority for future research will be to try to build up a picture of diachronic change in the climate and environment of the EBAP study area (see **Fig. 1**) during the LN, paying particular attention to the interplay between anthropogenic factors and the potential impact of the longer 8.2ka climate event of *ca* 6,300 - 6,000 cal BC (Mottram 2016: 40) in shaping resource availability and site-occupation intensity. In this regard, it's worth reiterating that evidence for a possible episode of soil erosion or deflation dated by OSL to 7.9±0.7ka (Ikram 2016: 27, 31-32) has been recovered from a mudpan at the southern edge of Wisād Pools.

5.1. Botanical Remains

Sediment samples recovered in 2018 from hearths and fire pits yielded, through the flotation process, an interesting assortment of plant remains that contribute to our understanding of environment and seasonality at Wisād Pools. From the 11 samples that were analysed (nine from W-80; two from W-400), 15 different genera, as well as specimens from five families that could not be more specifically identified, were documented. All taxa are wild, although a large Gramineae (cereal-sized but poorly preserved) and legume warrant further investigation. As in previous seasons (Rollefson *et al*. 2018: tab. 1), the most abundant seed was from the genus *Arnebia* (Arnebia) **(Fig. 21)**, which were not charred and were a whitish yellow colour. Species in this genus are commonly desert annuals or perennials and have roots that can produce a red or violet dye (Feinbrun-Dothan 1978: 68-70; Betts *et al*. 1998: 188); they are also known to havea many medicinal properties (Rollefson *et al*. 2018: 537 and references therein). It may be noted in passing that sparse charred remains of Arnebia were found in both Late PPNB and LN contexts at aḍ-Ḍuwaylah (Betts *et al*. 1998: 188, tab. 9.2). *Aizoon* (stonecrop) is the next most common genus in the 2018 samples from Wisād Pools; it has many species that are generally herbs or low shrubs. These plants can be found in dry watercourses and oases in hot deserts (Zohary 1966: 74-75).



21. Arnebia nutlet from W-80 (scale is 2mm; photographer Jen Ramsay).

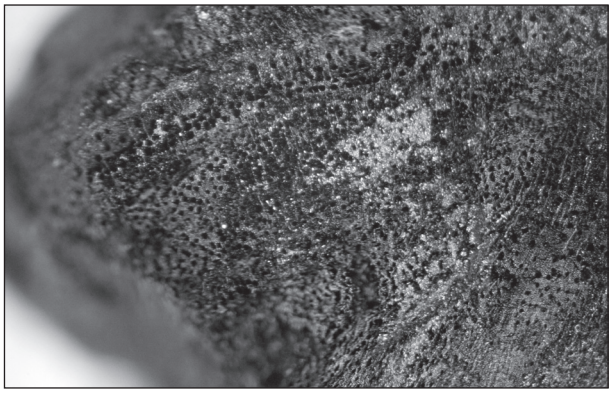
The remaining genera recovered in 2018, though sparse in number, provide evidence of a local desert environment as well as indications of at least seasonal precipitation and, in some presumably nearby locations, more verdant conditions than today. Species in genera such as *Melilotus* and *Cladium*, which are generally found in more hydrophilic environments including moist soil, marsh or in proximity to riverbeds, were identified. Genera that have species more commonly associated with desertic environments include *Aizoon*, *Astragulus*, *Erodium*, *Malva* and *Phalaris*. Interestingly, these genera also have species that are commonly found in fields and in more lush environments. All species identified flower between January and June, except *Cladium* sp., which flowers between April and September and *Phalarus*, which flowers between March and August. Consequently, it seems likely that at least some hearths and fire pits were utilised - through perhaps not exclusively - in the spring, likely the months of April and May.

Fragments of parenchymateous tissues were recovered and are likely *Ficus* sp. (fig); there are also achenes, that is to say seeds, of fig in two samples. Similar fig remains were identified in samples recovered from structure M7 SS-1 at Wādī al-Qaṭṭāfī in 2015 (Rollefson *et al*. 2016: 6). It should once again be emphasised that this need not imply that fig trees were growing locally, although that possibility cannot be excluded, as the fruits have excellent storage properties and can be transported over long distances. Also found in the samples under discussion here was evidence of wild grasses (Gramineae) in the form of carbonised grains and a culm node. Three samples of seed recovered from charcoal samples were identified as indeterminate nutshell, perhaps wild almond (*cf. Prunus fenzliana*) or other *Prunus* sp. pits; this would correspond with charcoal identifications. The sediment samples also contained possible eggshell, bone fragments and snail shells, the analysis of which will commence shortly.

5.2. Charcoal

Anthracological analyses of charcoal samples recovered at Wisād Pools in 2018 yielded evidence for wood being collected from a variety of ecological zones. Amongst the identified samples, deciduous oak and *Prunus* are representative of open park woodland, whilst *Anabasis*, other Chenopdioideae, *Zygophyllum* and tamarisk are more indicative of arid and / or steppic environments, including the banks of brackish watercourses or ephemeral pools. Regarding the *Prunus* specimens, there are a few different species in this genus that have similar anatomy, including apricot, almond, plum and sour cherry; wild almond is perhaps the most likely candidate here. Of particular interest is the identification of Salicaceae (*cf. Salix* sp. [willow]) charcoal **(Fig. 22)** from a hearth provisionally attributed to the Later LN phase, as this taxon requires perennial fresh water. As with fig, this need not imply that willow trees were growing in the vicinity of the site, although that would be in concordance with other lines of evidence suggesting that conditions were distinctly better watered during at least part of the LN than today. A degree of caution is warranted, however, as the identified specimen came from a twisted epicormic shoot. This raises the possibility that the specimen was derived from a basket or similar (*cf*. Hurcombe 2014), which may of course have been carried in from elsewhere.

Regarding diachronic change, park woodland taxa are present throughout the long W-80 sequence and, if anything, are more abundant during the Later LN. It should be emphasised that deciduous oak is fairly sensitive to browsing. This implies the presence of locations within the site catchment that had sufficient water to support park woodland that weren't at the same time exposed to the depredations of domestic stock.



22. Salicaceae (cf. Salix sp. [willow]) charcoal from W-80 hearth provisionally attributed to the Later LN phase (25× magnification; photographer Brita Lorentzen).

5.3. Faunal Remains

Once again, abundant faunal remains were recovered in 2018, especially from structure W-80. The assemblage is currently under analysis.

6. Conclusion

In the ten years since the establishment of the EBAP in 2008, our understanding of what we have recently defined as the BDN (Wasse *et al.* in press) has been transformed. It seems increasingly probable that the multi-faceted and far-reaching changes documented at Wisād Pools and Wādī al-Qaṭṭāfī (*inter alia* Wasse and Rollefson 2005; Rollefson *et al*. 2011, 2013, 2016, 2017, 2018a, 2018b; Wasse *et al*. 2012; Rowan *et al*. 2015a, 2015b, 2017) during the later 7th and earlier 6th millennia cal BC were not 'some subtleties o' the desert', but were part of much wider regional transformative processes (*e.g*. Daune-Le Brun and Le Brun 2016 [Khirokitia]; Nieuwenhuyse *et al*. 2016 [Tall Sabi Abyad]) playing out concurrently along the entire arc of the upper Mesopotamian and Levantine 'desert line' (*sensu* Lewis 1987) (Wasse and Clarke 2020).

If that breathtaking geographical scope weren't enough, recent data suggest that parts of south-central Anatolia may have witnessed many of the same changes, at the same time and likely for similar reasons. "[A]rchitectural and spatial changes at… Çatalhöyük provide evidence for deeper economic and social changes taking place at *ca*. 8.2kyBP and in subsequent centuries. Smaller, more independent, and more self-sufficient households emerged, replacing the previously dominant communal organisation" (Roffet-Salque *et al*. 2018: 4). In the opposite direction, the recent discovery of a Levantine-type mace head at al-Shabah in the Great Nefud desert (Scerri *et al*. 2018: fig. 5a) hints at a formative role for steppic Levantine cultural entities such as the BDN in the long-posited movement of mobile herders into Arabian peninsula during the later 7th and 6th millennia cal BC (*e.g.* Uerpmann *et al*. 2000: 233). This supposition is supported by the close alignment of extant radiometric dates from Wisād Pools with Drechsler's (2009: 161-163, fig. 1) schema for the Neolithisation of Arabia. This posits peaks of 'extensification' (*sensu* Shennan 2018) between 6,700 and 6,400 cal BC and after 6,000 cal BC, separated by a climate-influenced retreat to environmental refugia during the later 7th millennium.

In sum, emerging evidence suggests that sites such as Wisād Pools and Wādī al-Qaṭṭāfī, crossroads on the steppe, may have been important hubs of cultural exchange between disparate regions for at least some of the period in question. As "[f]undamental transitions... must have required a strong impetus" (van der Plicht 2011: 237), a shaping role for the 8.2ka climate event in these events may reasonably be assumed. However, to attribute sole causality to climate change is to deny agency to human factors that may have been as influential, if not more so, in shaping the path of events. As the EBAP moves into its second decade, investigation of these issues will be a priority, balancing supraregional interpretative frameworks against the elucidation of detail at the local level.

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FROM THE JORDAN VALLEY LOWLANDS TO THE TRANSJORDANIAN HIGHLANDS: PRELIMINARY REPORT OF THE WĀDĪ SHU'AYB ARCHAEOLOGICAL SURVEY PROJECT 2017

Alexander Ahrens

Introduction

The Wādī Shu'ayb Archaeological Survey (WSAS) project was initiated in 2016 and focuses on a thorough survey and re-evaluation of all archaeological and historical sites in Wādī Shu'ayb, ranging from the Neolithic period to the Ottoman period. The study area runs from immediately south of the city of as-Salṭ down to the city of South Shūnah (ash-Shūnah al-Janūbiyyah), located at the mouth of the *wadi* in the Jordan Valley. The second season in 2017 continued the ongoing survey of the *wadi* system. A further goal of the 2017 season was to conduct a thorough survey of the site of Tall Bulaybil (WS-007), which had been preliminarily surveyed in 2016 (Ahrens 2016b). This time, however, the focus was on extensive soil sampling for botanical analyses and radiocarbon dating. Thus, at five different locations on the northern flank of the *tall*, which features a (modern) collapsed section with stratified remains exposed *in situ*, soil samples were taken at different elevations. Additionally, many of these *loci* yielded charcoal remains that were also collected for analysis. Three samples submitted for radiocarbon dating give precise dates for the site, which has never been the focus of archaeological excavations. Aside from the work at Tall Bulaybil, the project also surveyed new areas of the *wadi* that hadn't been examined in 2016. This led to the discovery of an additional 13 archaeological sites, nine of which were unknown hitherto. Altogether, the number of sites surveyed in the *wadi* has been raised to 27.

Wādī Shu'ayb - Location and Previous Research

Wādī Shu'ayb is one of the major routes connecting the southern part of the Jordan Valley (Jericho and South Shūnah) with the central Jordanian highlands (as-Salṭ), covering an altitudinal difference of approximately 1,000m over its length of 16km. While the upper reaches of Wādī Shu'ayb consist of fertile soils watered by the perennial waters of the *wadi* and annual rainfall, its southern parts flow through dry terrain, finally merging with the Jordan River.

Given the importance of this *wadi*, it is surprising that only a few archaeological investigations have hitherto been conducted in the region. The area immediately south of as-Salṭ was preliminarily surveyed by R. de Vaux in 1937 (de Vaux 1938). At around the same time, N. Glueck surveyed several sites at the southernmost point of the *wadi*, here also referred to as "Wādī Nimrīn" (Glueck 1951: 366-371 [see also Sauer 1986]). In 1965, several sites in Wādī Shu'ayb were briefly visited by R. Raikes (Raikes 1965). However, it wasn't until 1988 that the region of Wādī Shu'ayb between South Shūnah and as-Salṭ was subjected to preliminary archaeological survey, which was apparently not extended into further and more detailed surveys (Wright *et al.* 1989). Apart from these surveys, excavations were conducted in 1988-89 at the Neolithic site of "Wādī Shu'ayb" about halfway between as-Salṭ and South Shūnah (summarized in Simmons *et al.* 2001), as well as at the site of

"Tall Nimrīn" in 1989-95, that site being located at the southern end of the *wadi*,within the limits of modern South Shūnah (summarized in Flanagan *et al*. 1996). In 2000, Ji and Lee surveyed several known sites in the region of the Wādī Shu'ayb / Wādī Nimrīn (including Tall Bulaybil and Tall Musṭaḥ) as part of their survey of Wādī al-Kafrayn (Ji and Lee 2002). Additionally, construction work for a sewage plant led to the discovery of Roman tombs in the *wadi* just south of as-Salṭ (Khirbat as-Sūq) in 1978 (Hadidi 1979).

The WSAS project was initiated in 2016 to document all archaeological remains in the *wadi* system, from the earliest periods attested until the Ottoman period, and from south of as-Salṭ to the Jordan Valley (for preliminary results see Ahrens 2016a, 2016b, 2018a, 2018b, 2018c; Ahrens and Rokitta-Krumnow 2017).

The Wādī Shu'ayb Archaeological Survey Project - Methodology

The aim of the project is to survey all archaeological sites within the aforementioned part of Wādī Shu'ayb in order to create a comprehensive dataset of *loci* of human activity. This is done with a non-invasive approach to on-site data acquisition: The project used a combination of architecture and landscape documentation using satellite and aerial imagery, as well as traditional survey methods (including a systematic description of all monuments and material assemblages and collections found) and detailed photographic documentation. Surface pottery and other finds were collected and recorded.

The traditional method for establishing such a dataset is by means of pedestrian survey during which extant traces of human activity are identified. Dating is done on the basis of chronologically diagnostic ceramic material, with the extent of activity being determined by its distribution. In order to achieve an up-to-date and comprehensive picture for the Wādī Shu'ayb region, archaeological sites known through survey or excavation were revisited to reassess their current state of preservation (damage assessment and monitoring). In so doing, a comprehensive list of Global Positioning System (GPS) coordinates for all sites surveyed - which was lacking so far - was also established.

The survey generally follows the course of Wādī Shu'ayb from directly south of the city of as-Salṭ (the northermost point) to the city of South Shūnah (the southernmost point). The *wadi* is scheduled to be surveyed out to 1,000 meters on each side, depending on geography as well as feasibility.

The project combines survey with small-scale, targeted excavation and soundings. With regard to this aim, especially at the site of Tall Bulaybil in the southern part of the *wadi*, the project focused on the implementation of a comprehensive soil-sampling programme for macro-botanical analyses and radiocarbon dating.

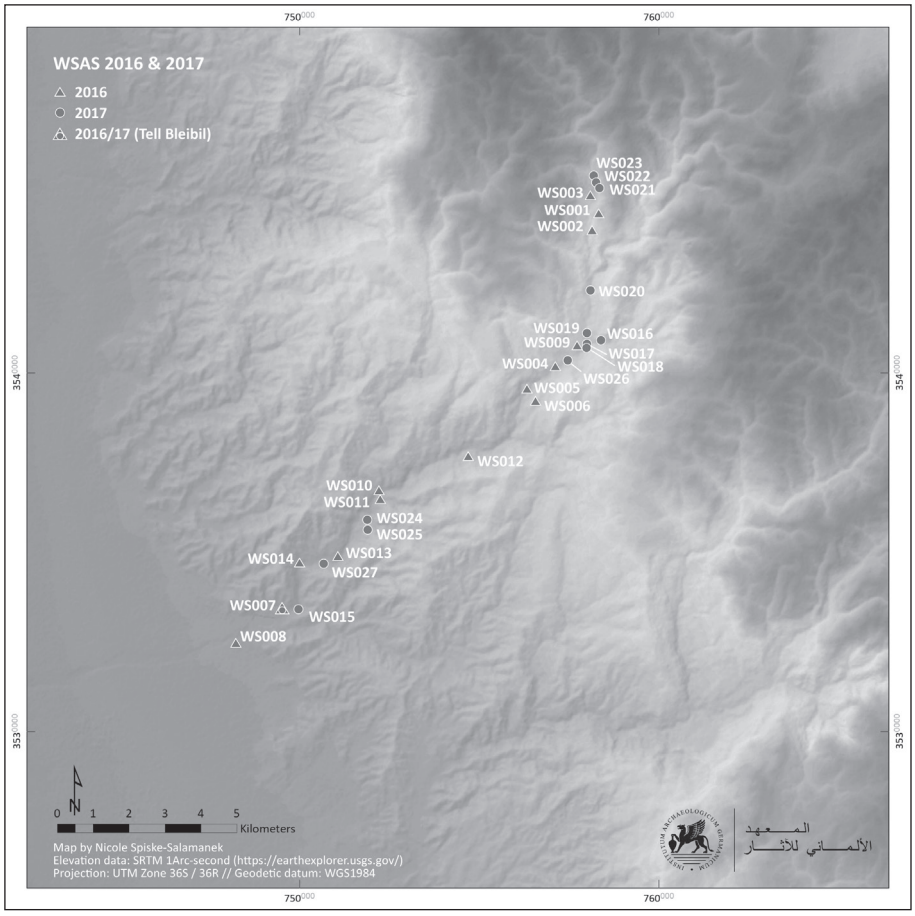
Results of the 2017 Survey Season

In total, 13 new sites - WS-015 to WS-027 - were surveyed during the project´s second survey season (**Fig. 1** and **Appendix 1** [for a list of sites surveyed in 2016 see Ahrens 2016b]), in addition to the archaeological work conducted at Tall Bulaybil (WS-007). The season lasted from 15 October to 12 November 2017. Detailed photographic documentation and damage assessment of these sites was carried out, as well as technical descriptions of specific archaeological features and the recording of correct GPS coordinates. Where present, diagnostic pottery was collected, recorded and drawn. A description of each site surveyed in 2017 is given below (WS =Wādī Shu'ayb + Site No. [the local name of the site, if extant and known, is given in brackets]).

In what follows, a preliminary description of each 2017 survey site is presented, along with additional information on diagnostic pottery and other details. As has been noted, soil samples for botanical and radiocarbon analyses were taken at Tall Bulaybil / WS-007 in 2017. The results of the radiocarbon analyses are presented below (**Appendix 2**).

WS-007 (Tall Bulaybil): Soil Samples and Radiocarbon Dating

Tall Bulaybil is a well-known site, located at the mouth of Wādī Shu'ayb (called "Wādī Nimrīn" in its southernmost part) on its northern bank. It overlooks the Jordan Valley and Wādī Juray'ah, which was surveyed by N. Glueck (visited by him in January 1943 [see Glueck

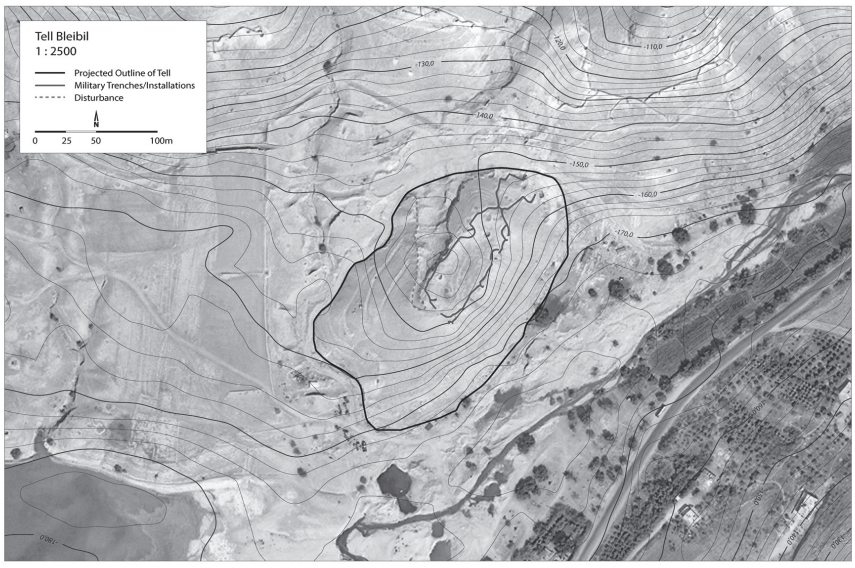


1. Map showing sites surveyed in 2016 and 2017 by the Wādī Shu'ayb Archaeological Survey project (map created by N. Spiske-Salamanek; map compiled by A. Ahrens, DAI, Orient Department, Damascus Branch).

1951]) as part of his survey of the Jordan Valley. Subsequent surveys in this part of the southern Jordan Valley have always included the site as well (*e.g.* Wright *et al.* 1989; recently Ji and Lee 2002), although excavations have thus far never been conducted. Tall Bulaybil was surveyed by the WSAS in 2016, and once again in 2017 (**Fig. 2**).

The site, which seems at least partly to rest on top of a rock outcrop, was occupied by an army outpost until the 1990s. Tall Bulaybil is to be identified with Wright's "Site No. 1" (Wright *et al.* 1989). The summit was completely bulldozed by military activities and thus does not display any archaeological remains today. However, military activity and the subsequent abandonment of these installations have led to the partial collapse of the northern flank of the *tell*, which was in turn apparently the focus of illegal bulldozing. This exposed a large section of the older periods of the site, which feature a massive mudbrick wall - partially burned secondarily - resting on a stone foundation (**Figs. 3 and 4**). Several floor levels and ashy layers are clearly visible in this section.

An important find of the 2016 season was the discovery at Tall Bulaybil of a fragment of distinctive Cypriote White Slip II Ware. The area around the site has hitherto been thought to be almost devoid of Late Bronze Age occupation, except for a short-lived settlement at Tall as-Sultan / Jericho during the 14th century BC and a few Late Bronze Age remains exposed recently at nearby Tall al-Ḥammām (Sauer 1986; Langgut *et al.* 2014; Collins *et al.* 2015). This may close the apparent gap in occupation of the region, since Tall Nimrīn / WS-008 (located *ca* 1,500m south-west of Tall Bulaybil [see below]) features Middle Bronze Age IIB occupation, followed by Iron Age remains with a hiatus between these two periods. Tall Bulaybil itself was thought to feature Early Bronze Age remains, followed directly by those of the Iron Age. The discovery of White Slip II Ware may alter this picture to some degree (see Ahrens 2016a: 140, fig. 10, 2016b: fig. 20), although it remains unclear whether or not an actual settlement existed during this period



2. Tall Bulaybil / WS-007 located north of alluvial fan of Wādī Shu'ayb (site map created by N. Spiske-Salamanek; map information compiled by A. Ahrens, DAI, Orient Department, Damascus Branch).

(see below). During the 2017 survey season, a fragment of a pinched ledge handle belonging to an Early Bronze Age II–III vessel was found (for parallels from sites in the vicinity, see Collins *et al.* 2015: 68, pl. 39 [EB II], 98, pl. 66 [EB III] re. Tall al-Ḥammām; Kenyon and Holland 1983: figs. 96-98 [EB II] re. Tall as-Sultan / Jericho), thus attesting to utilisation of the site at this time (**Fig. 5**). Diagnostic Early Bronze Age sherds were apparently also found by Ji and Lee during their visit to the site (Ji and Lee 2002: 187). In the immediate vicinity, the Early Bronze Age is apparently also at Tall al-Musṭaḥ, just south of Tall Bulaybil (see Yassine *et al.* 1988: 195 [EB I-III]; Ji and Lee 2002: 191-192), while at Tall Nimrīn the earliest levels seem to date to the Early Bronze Age IV (Dornemann 1990: 164; Flanagan *et al.* 1992: 90).

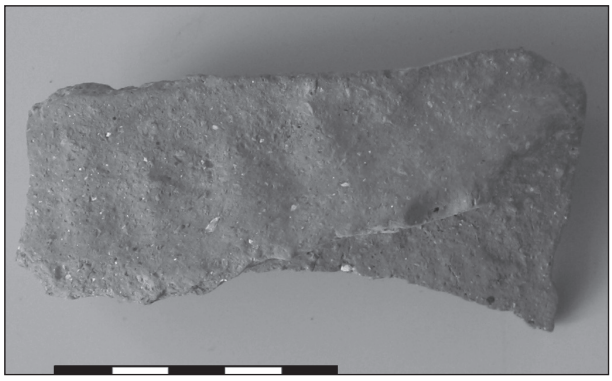
A primary goal of the project during its second season was thus to conduct a thorough survey of the site, especially its northern flank, with a focus on extensive soil sampling for botanical analyses and radiocarbon dating. Thus, at five locations along the northern side



3. Collapsed northern flank of Tall Bulaybil (photo: A. Ahrens).



4. Mudbrick wall with stone foundation protruding from collapsed northern section at Tall Bulaybil (photo: A. Ahrens).



5. Early Bronze Age II-III ledge-handle fragment from Tall Bulaybil (photo: A. Ahrens).

of the *tell*, where the aforementioned stratified remains were exposed *in situ*, soil samples were taken at different elevations (**Figs. 6 and 7**). As noted, many of these *loci* also featured charcoal remains that were also collected. These samples give, for the first time, good dates for the main occupational levels at the site, which has never been the focus of archaeological excavation.

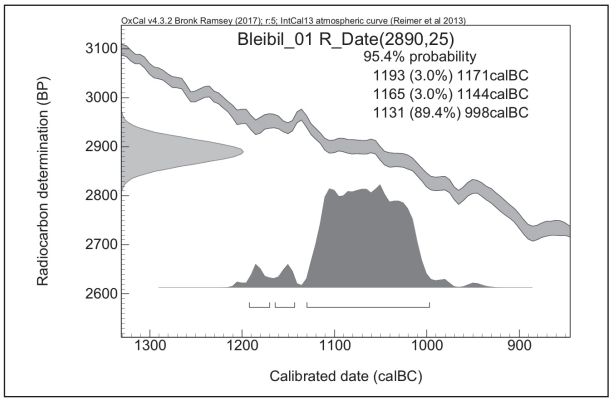
Radiocarbon analysis of three of these samples, all based on short-lived botanical remains (barley [*Hordeum vulgare*]), show that the main occupational levels date to the Iron Age (Iron Age IIA/B [these designations here understood and used only as general chronological designations and estimations]). The oldest layers are accessible in the area of the northern flank - where they rest directly upon *wadi*-worn rocks and cobbles - and date from the late Iron Age I (Iron Age IB-C) to early Iron Age IIA transitional period (**Fig. 8**). The second sample comes from the area of the mudbrick wall, which dates to the Iron Age IIA period (**Fig. 9**). The third sample, taken from a layer above the mudbrick wall, unfortunately falls into the so-called 'Hallstatt Plateau'. which refers to a consistently flat area on the calibration charts. This hampers accurate dating of the sample, although one might argue for a date range within the Iron Age IIB/C for the levels above the mudbrick wall (**Fig. 10**). Radiocarbon dates of around 2,450BP always calibrate to *ca* 800-400BC, regardless of their precision (see Manning *et al.* 2018 for problems inherent in the dataset used for the



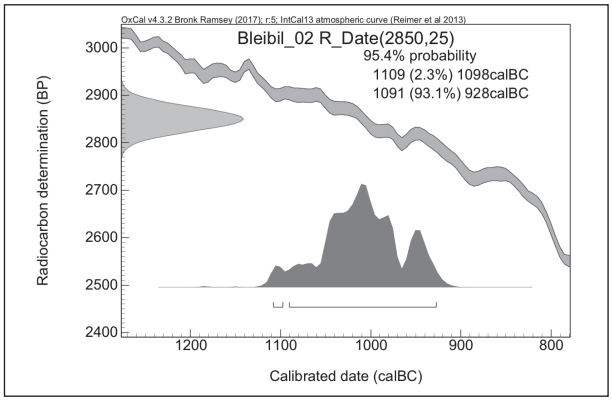
6. Taking botanical samples from northern section at Tall Bulaybil (photo: A. Ahrens).



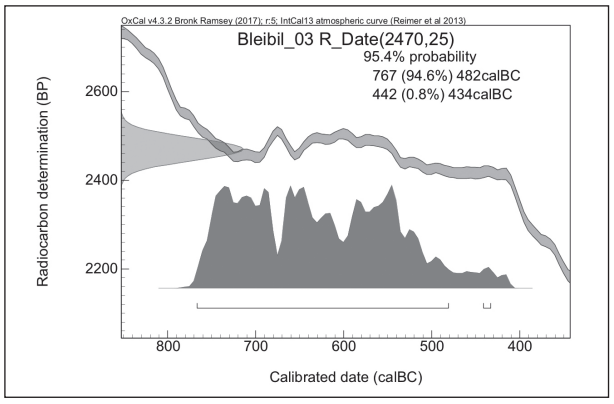
7. Various soil and ash layers in earliest levels in northern section at Tall Bulaybil, sample Bulaybil_01 (photo: A. Ahrens).



8. Calibrated date of sample Bulaybil _01 from lowest level of collapsed northern section at Tall Bulaybil.



9. Calibrated date of sample Bulaybil _02 from level of mudbrick wall.



10. Calibrated date of sample Bulaybil _03 from above mudbrick wall.

southern Levant). In general, these radiocarbon samples seem to demonstrate that Tall Bulaybil was inhabited concurrently with nearby Tall Nimrīn for much of the Iron Age (Flanagan *et al.* 1996: 277-281), but not with Tall al-Muṣṭaḥ which was apparently unoccupied at this time (Yassine *et al.* 1988: 197-198; Ji and Lee 2002: 191-192).

As is evident from the calibrated dates of these samples, Early and Late Bronze Age layers were not encountered, contrary to the pottery evidence. This could, however, reflect the possibility that any settlement dating to these periods was significantly smaller and may thus be covered by the remains of later periods. Alternatively, squatter occupation - especially in the Late Bronze Age - could also be possible (but see Sauer 1986; Ji 1997). The southern Jordan Valley seems to have experienced an extremely dry period during the end of the Late Bronze Age - Iron Age I transition, perhaps explaining the dearth of settlement activity in this region (Langgut *et al.* 2014).

Additionally, several architectural features visible along the southern slope of the *tell*, previously noted by Glueck (1951: 370-371) and Ji and Lee (2002: 187), were recorded in greater detail than previously. These apparently belong to one (or more?) massive fortification system(s) attested over the entire flanks of the *tell* (**Fig. 11**). Since no diagnostic pottery was found in secure association with these fortifications, they cannot as yet be attributed to a specific period. Additionally, given the various modifications and alterations visible on the ground surface, the fortification system could have been in use over a long period of time.

At the bottom of the western flank of the *tell* - and apparently not related to the fortifications - stone foundations were found which seem to date to an even later period. It is not clear whether these stone foundations date to the last occupational period of the site or to even later, *i.e.* Ottoman, times, since no diagnostic pottery found in association with them. There is no immediate threat to Tall Bulaybil at the moment, but several small looting pits were visible when the site was visited by the WSAS in 2016 and 2017. The large section on the northern flank of the *tell* may however continue to collapse. This flank would therefore seem to justify more detailed archaeological exploration, a task that is planned for the coming years.

WS-015

This findspot consists of two sockets (so-called 'cupmarks') chiseled out of a flat rock outcrop *ca* 15 meters high, immediately south of the modern road leading to the Jordan Valley (**Fig. 12**). Such installations are commonly



11. Fortification system along southern flank of Tall Bulaybil (photo: A. Ahrens).



12. Site WS-015, two sockets (cupmarks) carved into bedrock; probably used for oil- or wine-press installations (photo: A. Ahrens).

associated with wine or olive-oil presses, but other installations related to such activities or industries were not found at the site (see Zerbini 2015 for further literature on this topic). However, a group of natural rock crevices and caves is situated in the immediate vicinity of the sockets, so it may be postulated that these were used in conjunction with them (**Fig. 13**). The caves are used as modern animal shelters. No pottery was found at the site.

WS-016

This site consists of an Ottoman building complex. According to a local resident living nearby, it was built *ca* 150 years ago and abandoned *ca* 40 years ago when the last inhabitant died. The building complex consists of a main building with five rooms, with an adjacent courtyard and separate row of at least three rooms. These may have served as storerooms, magazines *etc.*, and perhaps also as a toilet (**Figs. 14 and 15**).

Located immediately next to this complex is a modern concrete building built in the 1980s. This belonged to the son of the last inhabitant, who left the site when his father passed away. The roof of the Ottoman house complex has collapsed in the meantime, having consisted of wooden beams. Many rooms of the main building exhibit large looting pits. No finds were recovered at the site.

WS-017

WS-017 is located on top of a flat rock outcrop towering over the confluence of Wādī al-Azraq with Wādī Shu'ayb. The entire site has been flattened and cleared of larger stones by heavy machinery. Today it is used as an agricultural field; such archaeological remains that may once have existed here appear to have been largely destroyed (**Figs. 16-18**). Pottery, however, is found scattered within the field and several looting pits are visible along the sides of the plateau, where larger stone walls are still visible (**Fig. 19**). The pottery assemblage dates primarily to the Roman-Byzantine periods, but there are also a small number of Iron Age II sherds within this corpus, likely attesting to an earlier occupation. It's interesting to note that the site has direct line-of-sight intervisibility with Khirbat Shu'ayb / WS-006 to the south



13. Site WS-015, natural caves near press installations (photo: A. Ahrens).



14. Site WS-016, Ottoman building complex (photo: A. Ahrens).



15. Site WS-016, door inside Ottoman building complex (photo: A. Ahrens).

(see Ahrens 2016a, 2016b; also below). It remains unclear, however, whether WS-017 was connected to WS-019 or should be considered a separate site (see below).

WS-018

Just south of WS-017, located directly at the confluence of Wādī al-Azraq with Wādī Shu'ayb, are the remains of a disused Ottoman water mill (**Figs. 20 and 21**). The fragmented substructures stand as high as 6m in some parts, with some structural elements being secondarily used for modern agricultural activities. No pottery was recovered at the site.

WS-019

Located to the north-east of sites WS-017 and WS-018, further up the aforementioned



16. Site WS-017, seen from the west, during spring; WS-016 can be seen in the background (photo: A. Ahrens [taken in March 2016]).



17. Site WS-017, flattened summit used for agriculture (photo: A. Ahrens).



19. Site WS-017, looting pit next to stone wall south of summit (photo: A. Ahrens).



18. Site WS-017, confluence of Wādī al-Azraq and Wādī Shu'ayb just south of the site (photo: A. Ahrens).



20. Site WS-018, Ottoman water mill (photo: A. Ahrens).

rock outcrop, is yet another site: WS-019. This may have been connected to WS-017 in some way or was perhaps even part of the same settlement. Having said that, a direct connection is not attested, despite a similar and partially overlapping pottery assemblage.

At WS-019, the remains of several rock-cut wine- or oil-press installations are located within what appears to be a production area (**Figs. 22 and 23**). This is separated from a single house complex to the north by a stone wall (Zerbini 2015). The building complex measures *ca* 10×10m and originally consisted of approximately four rooms (**Fig. 24**). The internal layout of this building or exact number of rooms cannot be determined, since the interior is almost completely destroyed by looting pits. The entire site has been encroached upon by agricultural activity from all sides and has been thoroughly looted. Several cisterns are visible, albeit partly collapsed or destroyed by looters. Diagnostic pottery seems to date to the (late) Roman, Byzantine and Mediaeval Islamic (Mamluk) periods.

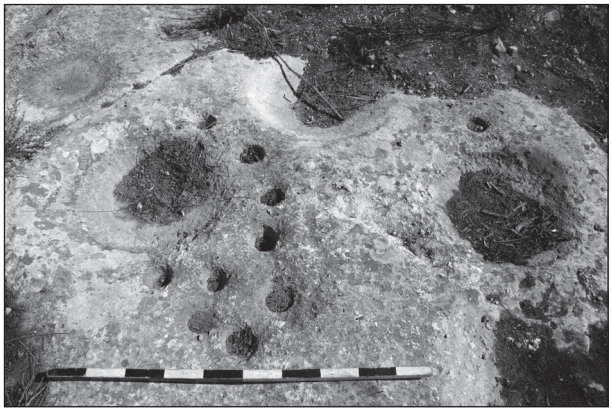
It is interesting to note that sites WS-001 and WS-002 to the north, as well as WS-006 to the south (surveyed in 2016 [see Ahrens 2016a, 2016b]), all have direct line-of-sight intervisibility with WS-019. The latter site may have functioned as a production complex for wine or oil (as a rural farmstead) - just like site WS-001 - but may also have functioned as a watchtower owing to its strategic location.



21. Site WS-018, detail of Ottoman water mill (photo: A. Ahrens).



22. Site WS-019, oil- or wine-press installations (photo: A. Ahrens).



23. Site WS-019, oil- or wine-press installations (photo: A. Ahrens).



24. Site WS-019, building complex (photo: A. Ahrens).

WS-020

Located directly at the spring of ʻAyn al-Buqūriyyah within Wādī Shuʻayb are the remains of another Ottoman water mill, which is no longer in use (**Figs. 25 and 26**). Its fragmented structures, comparable in construction technique to WS-018 (see above) and WS-022 (see below), stand as high as 6m with a length of *ca* 12m. In general, this water mill is much better preserved than WS-018, since it is today located within fenced-off private property next to a guarded water facility. For now, it would appear to face no serious threat. No pottery could be recovered.



25. Site WS-020, Ottoman water mill (photo: A. Ahrens).



26. Site WS-020, stone walls of Ottoman water mill (photo: A. Ahrens).

WS-021

This site represents the remains of a multiple rock tomb (probably Roman-Byzantine in date) on the left bank of Wādī Shuʻayb, just opposite the large archaeological site of Khirbat as-Sūq which dates to the same period (WS-003 [surveyed in 2016; see Ahrens 2016b]). The tomb has been partly used as an animal shelter, with modern concrete walls erected within it, but faces no immediate threat (**Fig. 27**). No pottery could be recovered. The tomb is probably that designated "Site No. 9" by Wright *et al.* (1989).

WS-022

Located north of Khirbat as-Sūq, at the right bank of Wādī Shuʻayb, are the remains of another Ottoman water mill, likewise disused (**Fig. 28**). The structures, comparable in construction technique to WS-018 and WS-020, stand as high as 5m. The location is a favourite picnic spot for the local community, so no pottery could be recovered. The site is probably that designated "Site No. 10" by Wright *et al.* (1989).

WS-023

This site represents the ruins of an Ottoman house, of which only the northern part - the *iwan* - is still standing (**Fig. 29**). The rest of the complex was apparently entirely destroyed and is now part of an olive tree plantation. No pottery could be recovered. The site is probably that designated "Site No. 7" by Wright *et al.* (1989).



27. Site WS-021, Roman-Byzantine tomb (photo: A. Ahrens).

WS-024

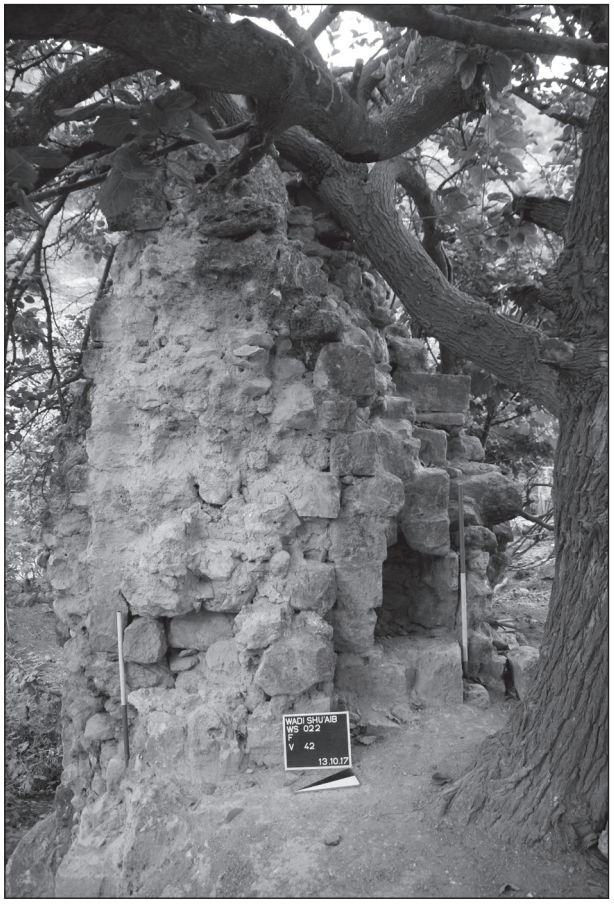
Roman-Byzantine watchtower built on an isolated rock outcrop. The site features good views into the *wadi* and clear line-of-sight intervisibility with sites WS-011 (surveyed in 2016 [see Ahrens 2016b]) to the north and site WS-027 to the south (see below). The tower itself measures *ca* 7×7m (**Fig. 30**).

WS-025

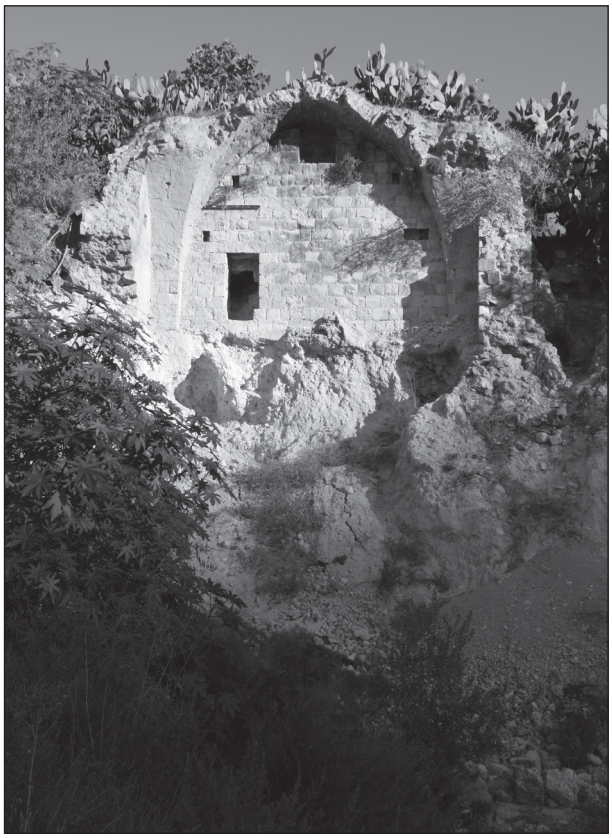
WS-025 is a structure of unclear function and date, which has also been re-used in recent times. The pottery collected around the site may however be older, possibly Roman-Byzantine, although it is not clear whether it was originally associated with this structure or was brought there from elsewhere (**Fig. 31**).

WS-026

Ruin of Roman-Byzantine, and perhaps also Islamic, date, with unknown extent. The site has been completely destroyed by a modern house and surrounding olive tree plantations.



28. Site WS-022, Ottoman water mill (photo: A. Ahrens).



29. Site WS-023, remains of Ottoman building (photo: A. Ahrens).



30. Site WS-024, remains of watchtower (photo: A. Ahrens).



31. Site WS-025, remains of stone structure of unknown date (photo: A. Ahrens).

Only pottery could be retrieved. A large number of worked and unworked stones found in the vicinity of the house may originate from older buildings which stood where the modern house is now located (**Figs. 32 and 33**).

WS-027

Remains of a Roman-Byzantine watchtower built on a rock outcrop; the site offers a direct line-of-sight intervisibility with site WS-024 to the north (**Figs. 34 and 35**). The watchtower was largely destroyed and covered by the foundations of an Ottoman house complex, which was (later?) used as a military complex. Since the watchtower exhibits a slightly different orientation and is also different in building technique, it can be clearly differentiated from the more recent Ottoman complex.

Addendum to Site WS-010 (Khirbat Jisr al-'Irāqiyyīn)

WS-010, which was examined in the first survey season (see Ahrens 2016b [also Ahrens and Rokitta-Krumnow 2017: 39-41]), was identified with the site referred to by Raikes as a '*tell* site' (Raikes 1965: 165, fig. 1). While WS-010 clearly resembles a '*tell* site' in general appearance, and clearly features multiple chronological and stratigraphic phases, it is not clear whether or not it may actually be considered a *tell* in the true sense of the word. As well as according with the approximate position of the site given by Raikes on his sketch map, the lithic material retrieved by him resembles that found at the site during the 2016 survey. An identification of the site visited by Raikes and WS-010 thus seems highly likely. In 2017, the APAAME project directed by D.L. Kennedy and R. Bewley took aerial photos of the site, one of which is reproduced here courtesy of that project (**Fig. 36**).

Addendum to Site WS-006 (Khirbat Shu'ayb)

WS-006, also surveyed in the first season (see Ahrens 2016b), was revisited in 2017. As noted in the first survey report, the site has yielded number of diagnostic Iron Age diagnostic sherds, along with later material. Several wall structures were recorded (**Figs. 37 and 38**). In 2017, the APAAME project took aerial photos



32. Site WS-026, remains of destroyed site (photo: A. Ahrens).



33. Site WS-026, removed stones probably belonging to structures at the site (photo: A. Ahrens).

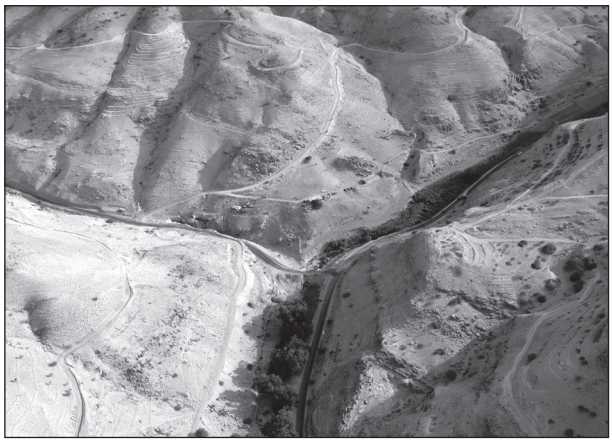


34. Site WS-027, remains of watchtower (photo: A. Ahrens).



35. Site WS-027, watchtower seen from the north (photo: A. Ahrens).

of the site, two of which are reproduced here courtesy of that project (**Figs. 39 and 40**). These photos clearly show how the site offers striking views, both into the Jordan Valley to the south and up to the Transjordanian plateau in the direction of as-Salṭ to the north. Its situation in the middle of Wādī Shu'ayb, atop a flat rock



36. Site WS-010 in center of aerial photo, with site WS-011 on rock summit south-east of WS-010 (photo: M. Dalton, APAAME).



37. Site WS-006 / Khirbat Shu'ayb, stone foundations (photo: A. Ahrens).



38. Site WS-006 / Khirbat Shu'ayb, stone foundations (photo: A. Ahrens).



39. Site WS-006 / Khirbat Shu'ayb, seen from the north-west (photo: R. Bewley, APAAME).



40. Site WS-006 / Khirbat Shu'ayb, seen from the south towards as-Salṭ and the Transjordanian highlands (photo: R. Bewley, APAAME).

outcrop overlooking the course of the *wadi*, is suggestive of probable defensive use.

Conclusions and Future Prospects

The second, 2017 season of the WSAS project has continued to show that its study area offers great potential for the investigation of nearly all periods of Jordanian history, from the Neolithic to the Ottoman.

In future survey seasons, it is planned to study the region in more detail and to add additional archaeological sites to the list of those surveyed in 2016 and 2017. To complement the picture, southern parts of Wādī al-Azraq and Wādī al-Kafrāt, which flow into Wādī Shu'ayb south of as-Salṭ, will also need to be examined.

Additionally, the radiocarbon dates obtained from the collapsed northern flank of Tall Bulaybil (WS-007) would seem to justify more detailed archaeological exploration of this site in particular, which is planned for forthcoming seasons.

Acknowledgments

The Wādī Shu'ayb Archaeological Survey (WSAS) project conducted its second survey season in autumn 2017 (2 October - 16 November) on behalf of the Damascus Branch of the Orient Department of the German Archaeological Institute. The survey was directed by the author, assisted in the field by B. Briewig (Berlin), while A. as-Saket (Archaeological Museum of as-Salṭ) once again served as representative of the Department of Antiquities for the entire season. The WSAS project team members are grateful for the full support of the Director-General of the Department of Antiquities, Dr. M.D. Jamhawi, and his staff at the Department of Antiquities in Amman. Special thanks are due to A. Oweidi and A. Lash of the Department of Antiquities for their help concerning the inception and realization of the project. Lodging, as well as practical and technical assistance in Amman, was kindly provided by K. Schmidt and C. Hamarneh of the German Protestant Institute of Archaeology at Amman (GPIA). D. Rokitta-Krumnow (Berlin) again provided detailed comments on the dating of the lithic finds. C. Lelek Tvetmarken (Berlin) kindly proofread the manuscript. Maps were produced by N. Spiske-Salamanek (Berlin), A. Gubisch (Berlin) compiled the pottery plates. Additionally, H. Genz (Beirut), M. Kennedy (Sydney) and M. D'Andrea (Rome) are to be thanked for their help and comments regarding the pottery. The aerial photos are reproduced courtesy of the APAAME project and its directors D.L. Kennedy (Perth) and R. Bewley (Oxford). The project also kindly acknowledges the support of K. Bartl, former Director of the Damascus Branch of the Orient Department of the German Archaeological Institute, and C. Bührig, current acting Director of the Damascus Branch of the Orient Department of the German Archaeological Institute. The Center for Applied Isotope Studies (CAIS) at Athens, Georgia (USA) carried out the radiocarbon analyses of the samples from Tall Bulaybil. Prior identification of the botanical remains recovered from these samples was done by R. Neef (Natural Sciences Department of the DAI, Berlin). The Wādī Shu'ayb Archaeological Survey project wishes to thank all persons mentioned above for their help.

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Appendix 1: Gazetteer of Sites Surveyed in 2017

Site Number	Local Site Name	Altitude (MSL)
WS-015	Name unknown	-137 m
WS-016	Name unknown	+369 m
WS-017	Name unknown	+368 m
WS-018	Name unknown	+342 m
WS-019	Name unknown	+414 m
WS-020	Name unknown	+404 m
WS-021	Name unknown	+621 m
WS-022	Name unknown	+615 m
WS-023	Name unknown	+630 m
WS-024	Name unknown	+18 m
WS-025	Name unknown	-9 m
WS-026	Name unknown	+344 m
WS-027	Name unknown	-73 m

Appendix 2: Radiocarbon Analysis; Uncalibrated AMS Dates from Tall Bulaybil

UGAMS#	Sample ID	Material	δ13C, ‰	14C Age Years, BP	±	pMC	±
33914	Bulaybil_01 (WSAS_17_S_02_A)	plant frag.	-23.00	2890	25	69.75	0.20
33913	Bulaybil _02 (WSAS_17_S_01_F)	plant frag.	-24.13	2850	25	70.13	0.21
33915	Bulaybil _03 (WSAS_17_S_06_D)	plant frag.	-22.22	2470	25	73.49	0.22

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EXCAVATIONS AT THE PRE-POTTERY NEOLITHIC A AND B SITE OF KHURAYSĀN (AZ-ZARQĀ', JORDAN) 2015 AND 2016 FIELDWORK

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Abstract

Khuraysān is a Pre-Pottery Neolithic A (PPNA) and Pre-Pottery Neolithic B (PPNB) site, dated to between the end of the 10th millennium and first half of the 8th millennium cal. BC. Located in the village of al-Qunayyah, by the az-Zarqā' river, it is 25ha in extent. To date, four occupation phases have been discovered, two corresponding to the PPNA and two to the PPNB. In Zone A, in H100, an oval sunken dwelling without internal subdivisions and with earth floors, has been dated to the end of the 10th millennium cal. BC. In IJ100, another sunken dwelling, in transition between an oval and rectangular shape, contains two rooms divided by a mud wall; one of the rooms has a lime-plaster floor displaying the remains of red pigment. It is dated to the beginning of the 9th millennium cal. BC, during the last phase of the PPNA. Towards the south, in Zone B, is an agglomerated ensemble of square houses that are semi-sunken into the slope of the site. These have rounded corners, stone walls and lime-plaster floors, and have been dated to the second half of the 9th millennium BC, during the Early PPNB. The most recent occupation phase has been documented in Zone C and dates to the beginning of the 8th millennium cal. BC, during the Middle PPNB. It is represented by rectangular houses with stone walls and lime-plaster floors (one of them painted), which are arranged parallel to one another. The abundant implements, human, animal and botanical remains, figurines and other objects recovered at Khuraysān make this a key site for understanding the first sedentary villages and the development of arable and livestock farming in northern Jordan.

Keywords

Neolithic Jordan; agriculture; livestock; first villages.

Introduction and Methodology

The site of Khuraysān (al-Qunayyah, az-Zarqā') was discovered in 1984 by the Hanbury-Tenison team whilst surveying in the Jarash region (Hanbury-Tenison, 1989; Edwards and Thorpe 1986). It was catalogued as a large Pre-Pottery Neolithic B site, about 36ha in size (**Fig. 1**). The present team test-pitted the site in 2014, and carried out a first fieldwork season in 2015 with a second in 2016. This paper presents the results of the two excavation seasons, which have demonstrated that Pre-Pottery Neolithic A and B occupations cover an area of at least 25ha (**Fig. 2**).

The excavation area was divided into 5×5m squares, which were sub-divided internally into 1x1m squares. The excavation followed the natural and constructed strata, which were generally of variable cohesion and composition. All structures were located in three dimensions with a total station (Leica TCRM 1205) and photogrammetric techniques. The 3D models were generated using n4ce (Applications in CADD) and PhotoModeler Scanner 2015. The 3D models of each stratigraphic unit were assembled in a CAD environment (MicroStation). The illustrations of the structures were produced with Adobe Suite. The burials were documented by a physical anthropologist



1. Map showing the location of Khuraysān and some other important Neolithic sites.

following the methodology of archaeothanatology (Duday 2009). Electrical-resistivity-tomography (ERT) geophysical surveying was carried out to identify buried structures.

The Excavated Areas

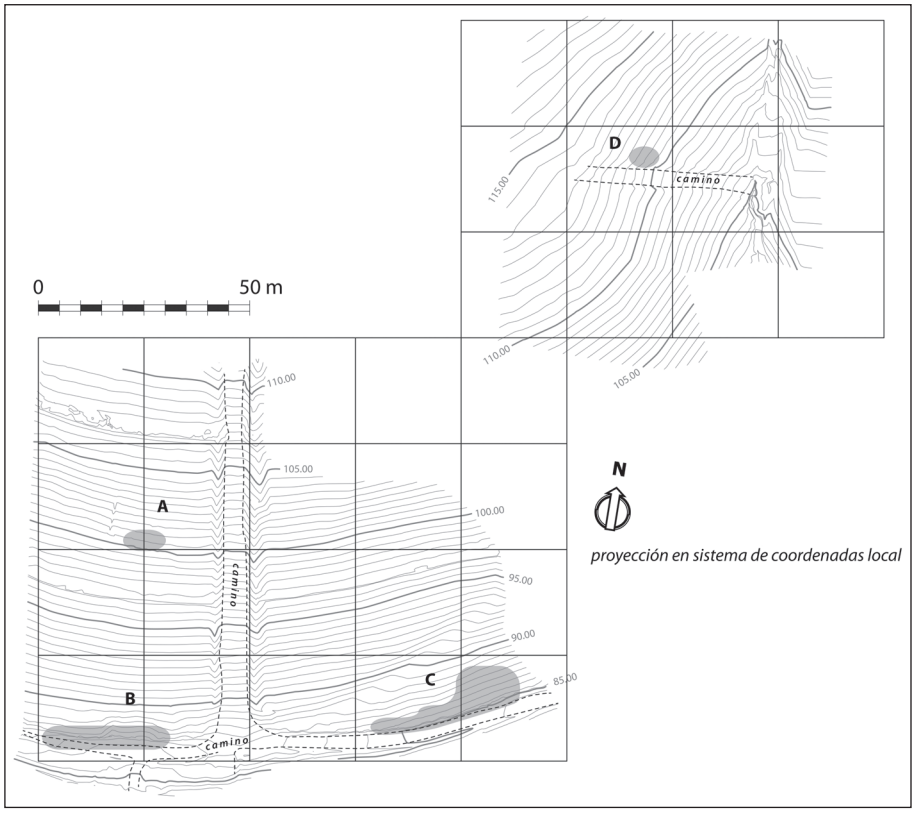
Four zones were excavated in 2015 and 2016: A (Squares H-I-J/95-100-105), B (Squares C-D-E-F-G/55-60-65), C (Squares T-U-V-W-X/60-65) and D (Squares BE-BF/190) (**Fig. 3**).

*ZONE A (H-I-J/95-100-105) (***Fig. 4***)*

In this area, the remains of three huts dated to the Pre-Pottery Neolithic A were documented (**Fig. 4**). The northern part of the huts is formed by low, stone walls which support the sides of the pits in which the huts were built; the southern side has largely been lost to slope erosion. Two of the huts are superimposed in H100 and are affected by two later round pits, dated to the PPNB (**Fig. 5**).



2. View of the site from the opposite hillside.

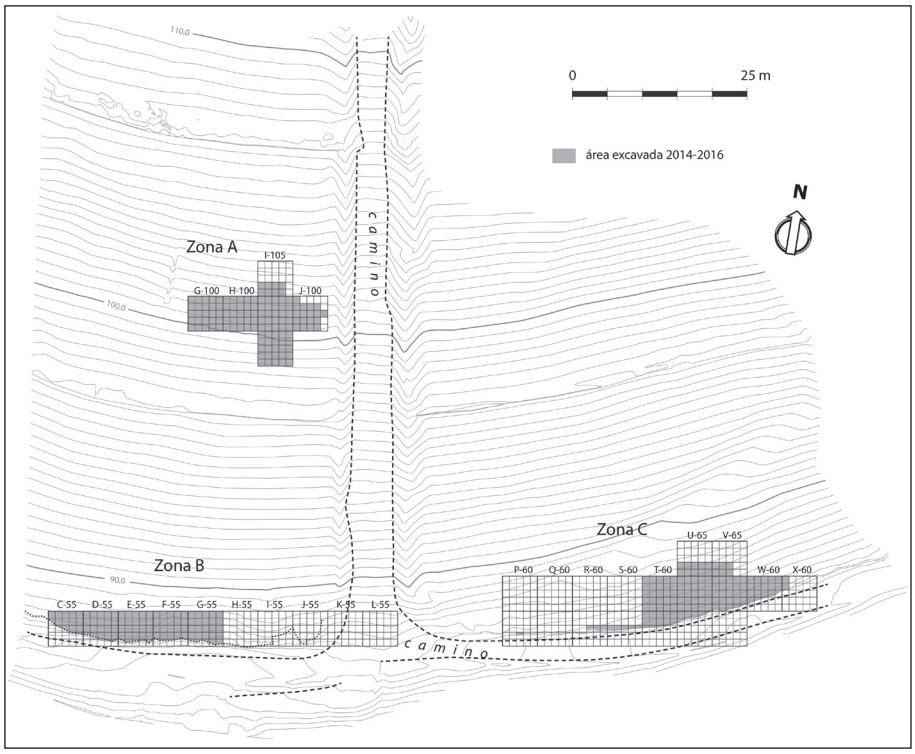


3. Plan of Zones A, B and C as excavated at Khuraysān up to 2016.

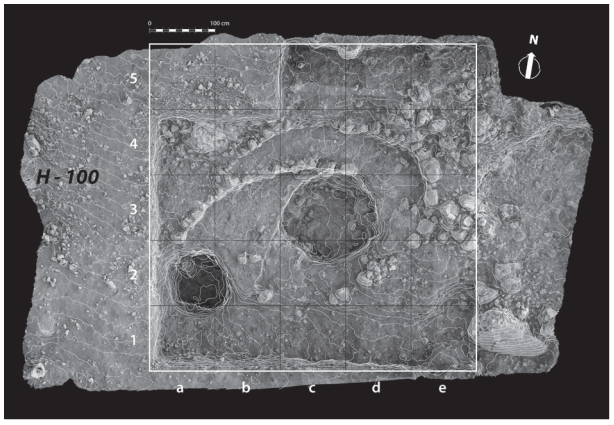
With regard to Hut 1, the most recent example, only the curved wall on its northern side has been preserved owing to disturbance by the two PPNB pits. Some remains of its lime plaster floor were documented, corresponding to its last occupation phase.

Hut 2 is located in H100, beneath Hut 1. It preserves its perimeter walls on the north, east and south-east sides (**Figs. 5 and 6**). This hut has been dated to the late 10th millennium cal. BC, corresponding to the oldest levels known at the site so far.

Hut 3 (**Fig. 7**) was found in IJ100. Most of its perimeter wall has been preserved, with only the south-west side being missing. Its floor plan is oval - almost rectangular - in shape. It is divided into two rooms by a narrow mud wall. The east room has a lime plaster floor that still maintains some red colouring in its southern part. This lime plaster floor connects to the plaster on the northern wall. To the south, the lime plaster floor delimits a circular pit and the lime slightly overlaps its northern side, forming a kind of lip. The floor of the smaller west room



4. Zone A 3D model created with photogrammetry.



5. Huts 1 and 2, affected by two PPNB pits.



6. Another view of the two huts. The supporting wall of the older hut, which is cut by the more recent one, was built with smaller stones.

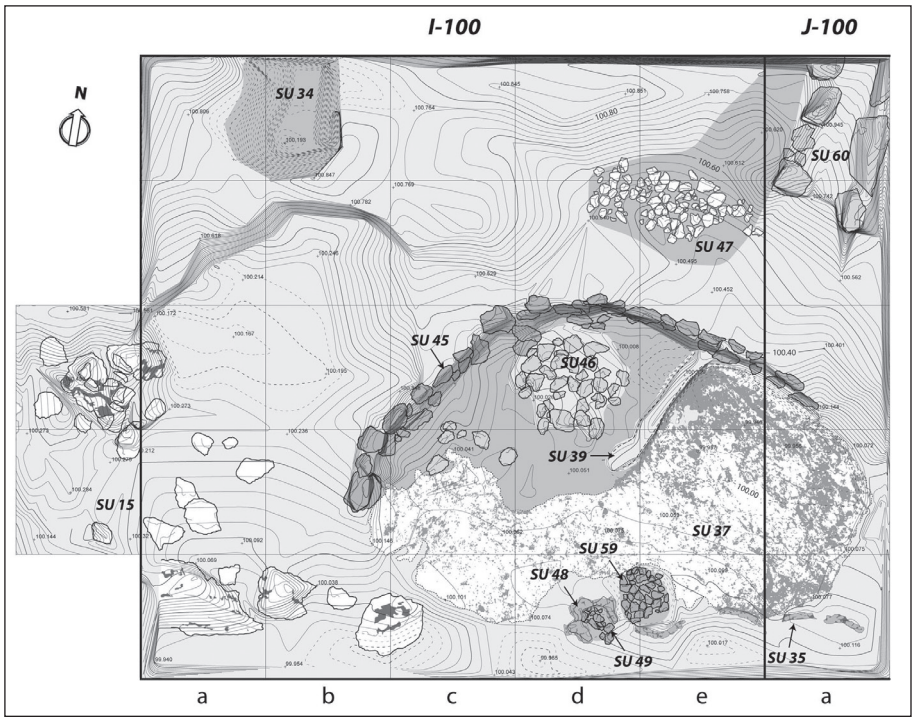
is covered with pebbles. This room was used for fires, as both charcoal and burnt sediment testify. Two radiocarbon dates were obtained from fragments of charred *Quercus* (oak) wood. These came from the level directly covering the lime plaster floor, and indicate that this structure should belong to the late Pre-Pottery Neolithic A, in the early 9th millennium cal. BC.

*Zone B (C-D-E-F-G/55-60-65) (***Fig. 8***)*

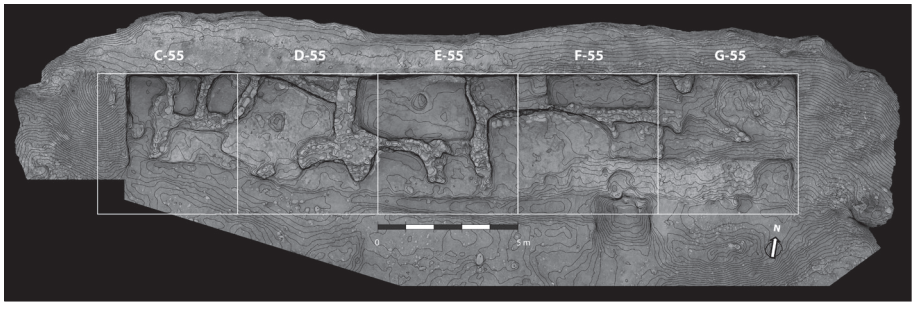
This area was first excavated in 2015 to clean up a section left by a bulldozer when making a track. Several walls associated with lime plaster floors were observed in the cleaned section.

In 2016, the excavated area was extended towards the north, in Squares CDEFG55. This revealed an area of architecture semi-sunken into the hillside. It consisted of several dwellings with rectangular rooms and rounded corners, most of which had lime plaster floors and circular hearths (**Fig. 8**). This level has been dated to the second half of the 9th millennium cal. BC, during the Early Pre-Pottery Neolithic B.

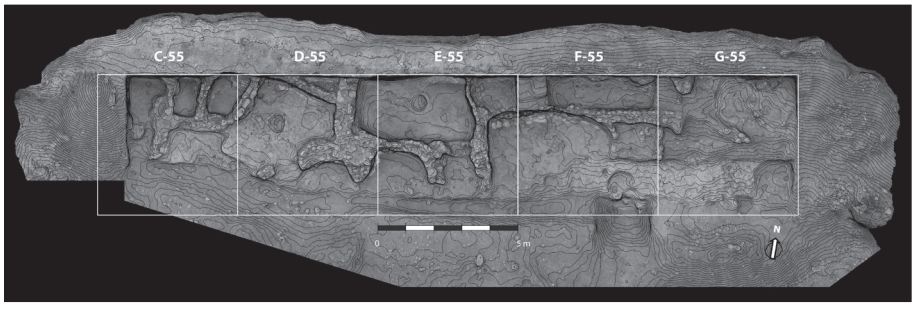
Several lime furnaces were found in Square G55. These take the form of pits with evidence of thermo-alteration and fragments of semi-calcined limestone. These furnaces belong to times both before and after the levels of architecture in this zone.



7. Hut in IJ100.



8. Architecture in Zone B dated to the Pre-Pottery Neolithic B.

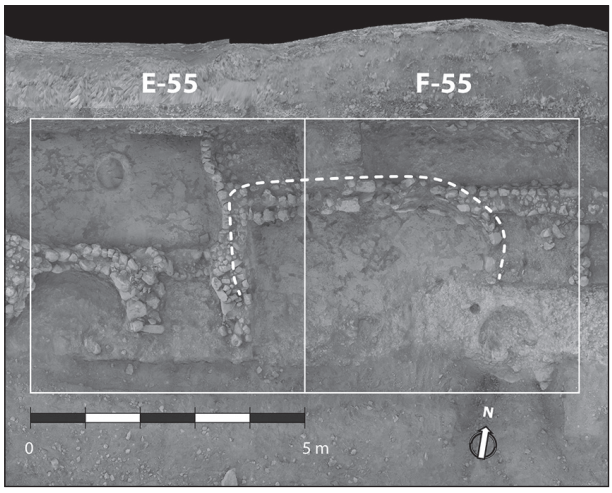


9. Room 1 in Squares EF55.

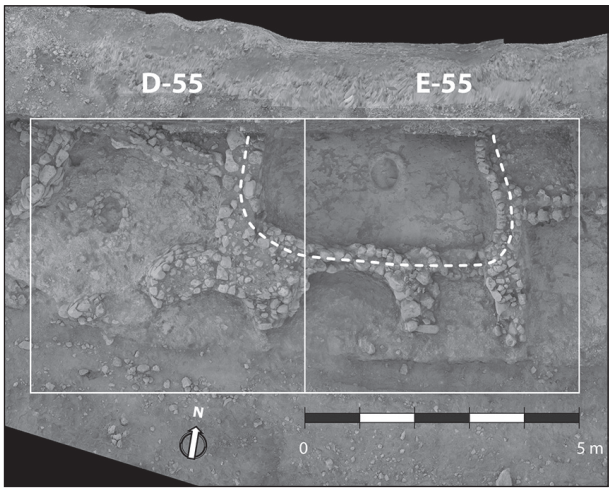
Room 1 was documented in Squares EF55 (**Fig. 9**). This is a rectangular space with rounded corners, a lime plaster floor and circular hearth pit. It was destroyed by slope erosion in its southern and south-eastern parts, and is delimited to the north by a terrace wall cut into the hillside.

The remains of Room 2, also with a lime plaster floor and circular hearth, were found to the west in Squares DE55 (**Fig. 10**). On its southern side, the room is delimited by a stone wall and the door threshold, which is reached along a short corridor. It is delimited to the east and west by other walls, while to the north it continues into the unexcavated section.

Room 3, again with a lime plaster floor and circular hearth pit, was documented in Squares CD55 (**Fig. 11**). Its floor plan was approximately rectangular; it preserves all of its perimeter walls except the part in the south-west. The door was on the southern side and was accessed by a high step. The remains of another room that is still mostly unexcavated can be seen to the north-west of this room. Two



10. Room 2 in Squares DE55.



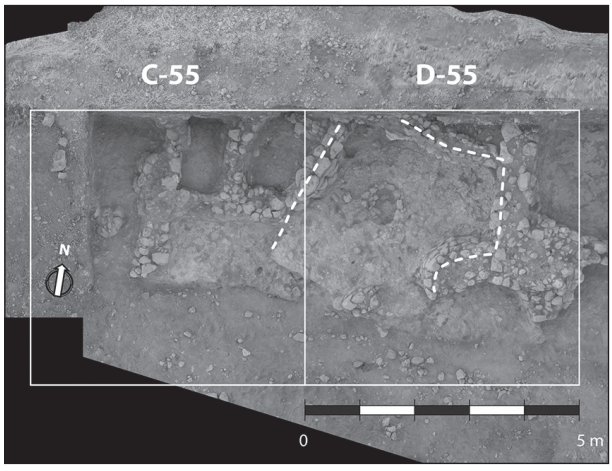
11. Room 3 in Squares CD55.

smaller spaces with oval floor plans and beaten earth floors were excavated in Square C55. The northern sides of both structures were left for future fieldwork seasons.

ZONE C (T-U-V-W-X-/55-60-65)

Several architectonic structures were excavated in Squares TUVWX55-60 in 2014 (**Fig. 12**). These include a long terrace wall in Squares TU55, and in Squares VW60 a square dwelling with stone walls built on the ground surface, and lime plaster floors and burials inside it. The dwelling had been cut through on its southern side by the track-making bulldozer; its section was therefore visible at the side of the track.

The 2015 excavation in Square U60 uncovered the remains of a building that was also rectangular and parallel to the previous one. Red paintings were documented on the floor of this house.



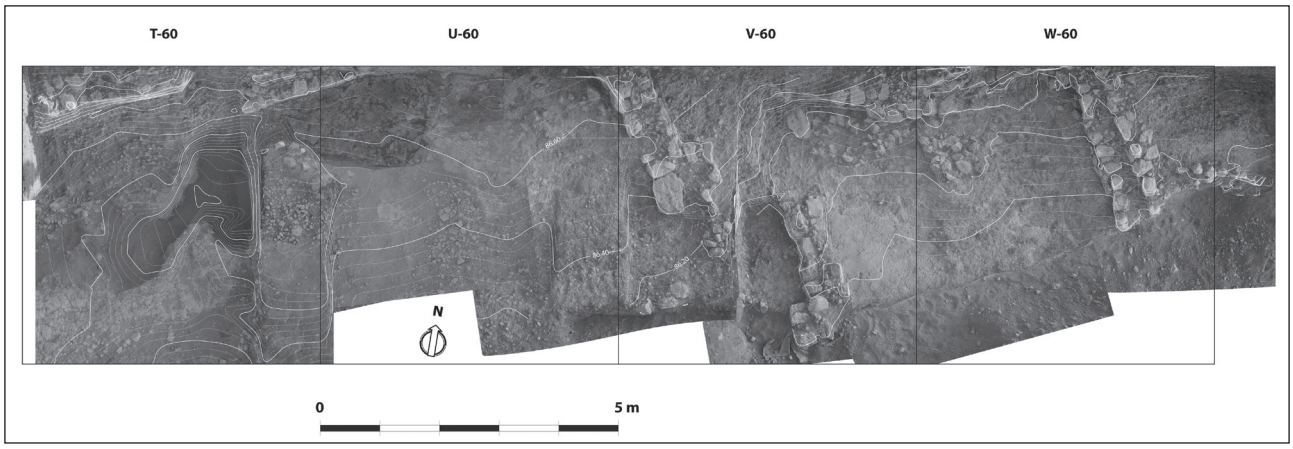
12. Zone TUVX60 in 2015.

In 2016, the excavation of Square U60 was extended to the north in order to complete the excavation of the house and fully reveal the painted lime plaster floor. This work documented the terrace wall associated with the northern wall of the house. Thus, the house with the painted floor is delimited by its north and east walls, while its south and west walls are not preserved. The 2016 fieldwork revealed the full extent of the painted lime plaster floor (**Fig. 13**). The paintings were limited to the western room of the house, which was separated from the eastern room by an internal mud wall. This eastern wall had a lime plaster floor that was not painted. The painted floor was consolidated *in situ* and then removed and transported to the excavation headquarters in Amman, where it was conserved. The painted floor is now part of the permanent exposition at the Jordan Archaeological Museum, in the ʻAmmān Citadel.

This level of construction - consisting of rectangular houses semi-sunken into the hillside, parallel to one another and with lime plaster floors - has been dated to the early 8th millennium cal. BC, in the Middle Pre-Pottery Neolithic B.

Zone BE 190

A 25m^2 test pit was excavated in Zone BE 190. A large terrace wall and beaten earth floors were found. One burial with indications of bone cremation is dated in the beginning of the 7th millennium cal BC (Iriarte *et al.* 2020; Santana *et al.*, 2020).



13. Remains of the house with the painted floor.

Geophysical Surveying

Geophysical surveying was carried out in the areas around the excavated zones in 2015 and 2016 (**Fig. 14**) (Monik *et al.* 2018). The ERT method was used, following the ARES system (GF Instruments, Czech Republic) which had proved to be the most effective for the type of soil and surface being surveyed. The Schlumberger deployment of electrodes, spaced every 0.5m, was used. Individual profiles were drawn, first parallel to one another and then perpendicular to these, to produce a pseudo-3D model of the ground. In this way, two areas of 19.5×15.5m were surveyed in the south-east of the site and a further two (19.5×15.5m and 15.5×7.5m) in the north-east.

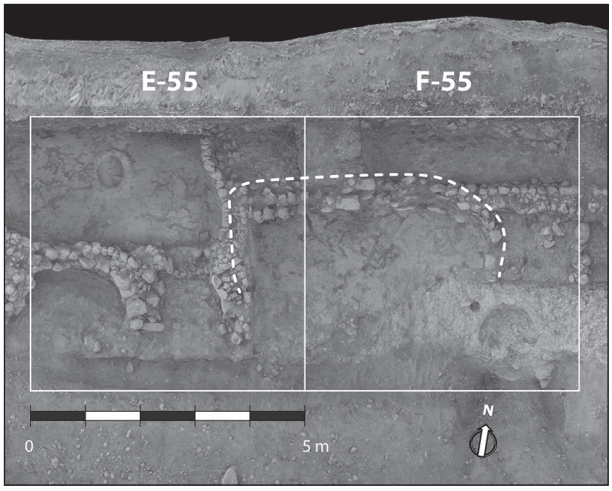
The results show that in Zone C the houses extend 10m further uphill from the excavated area, as indicated by the greater electrical resistivity (reddish colours in **Fig. 14**) of over 150Ωm, which is characteristic of stone buildings. The whole area of the hillside was not built on, however, as shown by the areas of lesser resistivity (bluish colours in **Fig. 14**). These indicate areas of hillside in which the sediment is intact. In Zone B, the built-up area extends for 20m to the north of the excavated zone. This area is delimited to the north by an area of low resistivity, demonstrating an absence of constructions. On the strength of these results, the settlement appears to have consisted of several groups of houses with spaces between them. The houses were on an east-west alignment, following strips of land with a similar alignment. These were retained by terrace walls in the slope of the hillside.

In the north-east part of the site (Zone D), where the hillside faces south-east, the surveying revealed anomalies of high resistivity. It is probably higher here than in other parts of the site because of a larger proportion of rock in the sediment. The resistivity pattern demonstrates straight and curved structures, which may correspond to terrace walls and oval constructions.

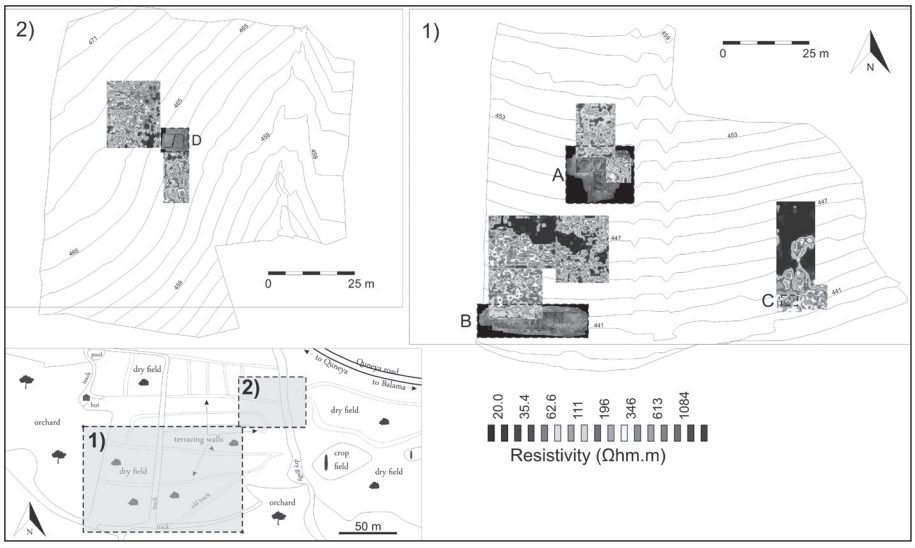
In conclusion, geophysical surveying has shown that stone constructions are probably distributed across most of the surveyed areas, and that therefore the settlement will extend over large areas of the south-west and north-east of the hill.

Chipped Stone Assemblages

A wide range of flint types has been recorded at the site, especially a high-quality violet type (**Fig. 15**). This is similar to the flint used for



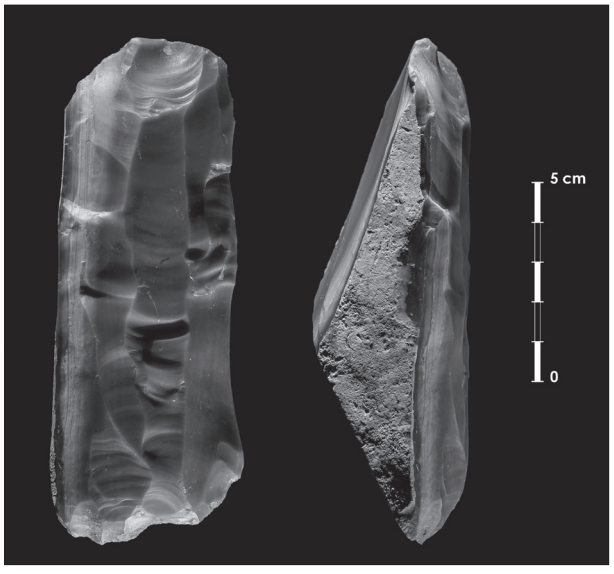
14. Results of geophysical surveying (ERT) at Khuraysān in 2015 and 2016. Probable stone constructions are indicated by greater resistivity (orange and red colours). The profiles indicate depths of 0.25-0.54m.



15. Bipolar core with a cortical back.

the best-quality products at the site of 'Ayn Ghazāl (Rollefson *et al.* 1992), which was procured in the Wādī Ḥuwayjir formation near that site (Quintero 1996). The same type was used for bipolar products at Qālūnyā (Motza) (Level VI) in Palestine (Khalaily *et al.* 2007). The excavators of that site propose that the flint was obtained from a local outcrop of the same Wādī Ḥuwayjir geological formation. The same may equally apply to the raw material used at Khuraysān, as the abundance of cortical flakes suggests that the source was not too far from the site - although it has not yet been located.

The production of lithic implements in the Pre-Pottery Neolithic A levels is still not well documented. It will therefore be necessary to await new fieldwork to be able to provide reliable data about that period.



16. Projectile points; the point on the right was reused as a sickle element to reap cereals.

Laminar reduction in the Pre-Pottery Neolithic B levels was aimed at the production of bipolar blades. This reduction took place on-site, as shown by the accumulations of knapping waste that have been found.

The retouched implements consist of notches, denticulates, endscrapers, sidescrapers and more formal tools, the latter including sickle elements, borers, burins and points (**Fig. 16**). Most of the points are of Jericho type, while some Byblos and Amuq points have also been found. Some of the Jericho points were pressure retouched. The sickle elements are usually quite long (about 10cm) and display a slightly denticulate active edge. A series of flint objects in the form of schematic human figurines are in the course of being studied (Ibáñez *et al.* 2020)

Twenty-four obsidian artefacts have been recorded. These are fragments of bladelets, small flakes and splinters. They are light grey in colour, which is indicative of an origin in the volcanoes of central Anatolia, although this remains to be confirmed by geochemical analysis.

Preliminary Study of the Faunal Remains

Faunal remains from the Pre-Pottery Neolithic B levels have been studied. Nearly 50% of these remains were identified to family or species level. On the basis of these 1,010 identified specimens, the assemblage so far consists of eleven species. Goat remains predominate in all stratigraphic units. The characteristics of the horns and size of the

bones suggest that they are of *Capra aegagrus* type. The Nubian ibex, which is smaller and currently lives in more arid regions, cannot be excluded. No sheep bones have been identified, although some remains are not sufficiently diagnostic to be attributed with certainty to a particular species and have thus been classified as ovicaprids.

The bovids (*cf. Bos primigenius*) and gazelles (*Gazella* spp.) are the next most frequent taxa. The study of these remains suggests that three types of gazelle were probably hunted: mountain gazelle (*G. gazella*), goitered gazelle (*G. subgutturosa*) and Dorcas gazelle (*G. dorcas*). Habitats suited to the three species, *viz*. hill country, steppe and arid areas, would have existed around the site.

Some remains of pig/boar (*Sus* sp.) have been found in all the stratigraphic units, although in small numbers. The carnivore group includes at least four taxa: a large canid (*Canis* sp.), fox (*Vulpes* sp.), badger (*Meles meles*) and wildcat (*Felis silvestris*). Cape hare (*Lepus capensis*), common tortoise (*Testudo graeca*) and a large bird (possibly a crane) have also been identified.

In sum, goats were the most-consumed animals at Khuraysān, followed by bovids and gazelles, while few small animals were hunted. The question of the wild or domestic status of the goats, sheep (?) and swine is still undetermined.

Use of Plants

Over one hundred archaeobotanical samples with macro-remains (charcoal; seeds), phytoliths and pollen have been collected at Khuraysān. The samples are in the course of being studied, but two key characteristics define the site.

A preliminary analysis of the charcoal at Khuraysān indicates the presence of evergreen (*cf. Q. calliprinos*) and deciduous oak (*cf. Q. ithaburensis*), and *Pistacia* sp. These taxa suggest that at the time the site was occupied, the vegetation in the area was typically Mediterranean with mixed evergreen and deciduous woodland. At present, such woodland is found in regions with a mean annual precipitation of about 300-400mm, which permits the non-irrigated cultivation of cereals and legumes. The use of similar plant resources to those found at Khuraysān has been documented at Pre-Pottery Neolithic sites in Palestine, where the cultivation and domestication of several legumes is attested (Caracuta *et al*. 2015). This is significant, as legume growing has also been documented at Khuraysān. In particular, hundreds of seeds belonging to the *Vicia* genus have been preserved, including species like broad bean (*Vicia faber*) and bitter vetch (*Vicia ervilia*). To date, most attention in the Near East has been focused on the process of wild-cereal cultivation and domestication, especially involving einkorn (*Triticum boeoticum*), emmer (*T. dicoccoides*) and barley (*Hordeum spontaneum*). In contrast, the domestication of legumes has received less interest. Together with contemporary sites including al-Birwah (Ahihud), Ṣaffūriah (Nahal Zippori) and Khallat al-Khallidiyyah (Yiftahel) (Caracuta *et al*. 2015), preliminary data from Khuraysān suggest that the consumption of legumes was very likely an integral part of PPNA and PPNB subsistence in the Mediterranean zone.

A full study of the archaeobotanical remains from Khuraysān will doubtless contribute significant information for the reconstruction of natural vegetation and the use of plant resources during the process of crop domestication in the Near East.

The Paintings in U60

In 2015, a series of monochrome paintings were discovered on the lime plaster floor within the building discovered in Square U60 (**Fig. 17**). The paintings had been drawn with a red pigment. The lime plaster floor and the remains of the building associated with it were completely exposed in 2016. The remains of the floor were then consolidated, both chemically (with an acrylic resin) and structurally (with lime mortar) (**Fig. 18**). After that, it was protected using several layers of hydrophilic cotton gauze and acrylic resin in a 20% acetone dilution. When this had dried, the floor was divided into two pieces to make it easier to lift, and was separated from the ground with steel spades. The two pieces were turned on to a rigid support and transported to the excavation headquarters in Amman for conservation.

As the pieces lay upside down on the support,



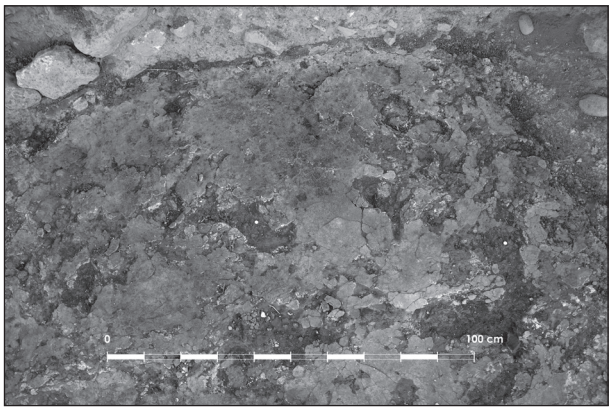
17. Remains of the painted floors.

the mortar on their undersides was visible. Adhered stones, sediment and loose pieces of mortar were removed, and samples taken for future analysis. After the thickness of the floor had been reduced, several layers of lime mortar were applied to level up and unify the surface. It was then glued with an epoxy resin to a stratified inert PGA© support formed by an aluminium beehive structure between two sheets of glass fibre.

When this had dried, the two pieces were turned over so that the top surface could be restored. The protective layers were removed with hydrophilic cotton gauze soaked in acetone and the surface was cleaned with a solution of acetone, water and alcohol (1:1:1). Cracks and missing parts were filled with sediment from the site agglutinated with polyvinyl acetate. Finally, a protective layer was applied, consisting of acrylic resin (Paraloid B72) in a 5% solution in acetone.

Burials and Human Remains

The excavations succeeded in documenting several burials and displaced human remains. In 2015, four primary graves - three individual and one double - were discovered. The minimum number of individuals found was eight, five in the graves and three in a secondary position. In 2016, seven primary graves were found, as were two secondary burials, a skull cache and an indeterminate deposit with human remains.



18. Restoration process of the painted floors.

Several other human remains were found in a secondary position. The minimum number of individuals was 14. In the primary graves, the individuals were in a flexed position against the side of the grave, and some of these burials are double. Secondary burials were carried out after the total or partial decomposition of the bodies. The dispersed human bones are the consequence of intentional (secondary mortuary practices) and unintentional actions (disturbance of graves, recent alterations *etc.*). Some of these burials are described below.

Burial SU 34

This is a primary inhumation in a grave containing two individuals who were buried together on a north-south alignment. This burial was found in Square I100. On top of the burial, in the upper part of the grave, a secondary deposit consisted of bones with post-mortem fractures. Individual 1 is an adult buried in a seated position with the body lying on its right side. The cranium and jaw of this individual had been removed when the grave was reopened. According to the characteristics of the pubic symphysis of the left pelvis and the appearance of the other bones, this was an adult of about 30-40 years of age.

Individual 2 was lying on the left side in the bottom of the grave. The cranium was also absent, but the jaw was preserved. Dental wear corresponded to a person about 25-30 years old at death.

Reconstruction of the mortuary practices indicates that Individual 2 was first deposited in the bottom of the grave. Individual 1 was then deposited, partly on top of Individual 2. Contact between the bones of the two individuals

suggests that the bodies were deposited on the same occasion and were then covered by sediment. Later, when the decomposition of the bodies was complete or very advanced, the grave was opened to remove the cranium of Individual 2 and the cranium and jaw of Individual 1. The grave was then recovered with sediment and, later, a third individual was buried in the same location.

Burial SU 75

This grave was found in Square H100 and contained the incomplete remains of an adult in a secondary position, together with the primary burial of a perinatal individual. The secondary burial consisted mainly of an intentional grouping of several long bones aligned north-south, without anatomical or articular connection - indicating that when they were placed in the grave they were in at least an advanced state of skeletisation. The remains belong to a young adult, of whom the cranium, mandible, arms and vertebrae are missing. Other anatomical regions, such as the ribs, hands, feet and pelvis are also poorly represented. The characteristics of the sciatic notch indicate that the individual was female.

The perinatal individual (age <1 month) was in a primary position, but the remains were badly affected by post-depositional factors.

Burial SU 79

This is the primary burial of a young male found in Square I105 (**Fig. 19**). The body was placed in a flexed decubitus position on his left side, on a north-south alignment with the head towards the south. The upper limbs were folded, with the right arm crossed over the left. The connections at the elbow are in their anatomical position, but the carpal bones and hands of both arms had lost their anatomical connection and were displaced towards the bottom of the grave. This was equally the case with the right ankle and foot, the bones of which had lost their anatomical position and fallen to the south owing to the slope of the grave. In contrast, most of the articular connections of the left foot were in their primary position, as the foot was between two stones at the side of the grave. The anatomical representation of the individual is incomplete, with the particular absence of the cranium and mandible, as well as most of the vertebrae and ribs. It is likely that the cranium and mandible were intentionally removed after burial.



19. Photograph of Burial SU 79, with some remains in primary position and others displaced

Burial SU 101

This is the double burial of a perinatal individual and an immature goat. It was found in Square I95, near the southern wall of a structure associated with PPNB levels. The child was buried shortly after death as the bones are in a primary position. This individual would have been 40±2 weeks old at death, according to the maximum length of the right femur, and was therefore a foetus at term. The goat was deposited simultaneously with or shortly after the child. The remains of this animal are also in a primary position. This type of burial with an animal is very unusual in the PPNB.

Burial SU 815

This is a secondary, collective burial with the remains of three individuals in Square BE190. The remains correspond to a male, a female and a person of indeterminate sex. It was possible to estimate the age of two individuals, *viz*. the male (17-25 years) and the indeterminate person (30-39 years).

This burial is unusual because the remains of at least two individuals were affected by fire. The ensemble consists of 324 bone fragments, of which 234 (72%) could be identified: 27 cranial remains; three mandibular remains; one tooth and 203 post-cranial fragments. Of these remains, 127 (54%) display evident signs (colour change; fragmentation; longitudinal fissures) of having being in contact with fire.

Some faunal remains were also identified. Another surprising aspect of this deposit is that the bones were burnt intentionally, which is a practice that has rarely been documented in the Pre-Pottery Neolithic in the Near East. The nearest examples known to date come from PPNC levels at the Palestinian site of Baysamūn, the site with the oldest known Neolithic cremations (Bocquentin, 2020). Several deposits with burnt bone were found there, both *in-situ* cremations and concentrations of burnt remains. This shows that cremation was a practice known to some communities in the Levant. At Khuraysān, no evidence of fire associated with cremation structures (pyres) has been found, and the bones were probably altered by fire when they were deposited.

In sum, the burials at Khuraysān follow patterns observed at other Pre-Pottery Neolithic sites, with abundant primary and secondary burials in the vicinity of dwellings. The intentional removal of skulls has been identified, in accordance with the mortuary practice of that time. Burial SU 101, involving a perinatal child and young goat, is exceptional for this period and likely reflects the proximity of such animals and humans at a time when goats were being domesticated. Burial SU 815 contained some burnt bones, which might indicate the intentional manipulation of human remains by the action of fire, as has been documented elsewhere for later periods.

Conclusions

Khuraysān is a large archaeological site with levels dated to the Pre-Pottery Neolithic A and B. Located in the az-Zarqā' river basin, 30km north of 'Ayn Ghazāl (Rollefson *et al.* 1992), it is a key site for understanding the human sedentarisation process and the development of arable and pastoral farming in northern Jordan.

The remains of three sunken oval huts have been dated to the Pre-Pottery Neolithic A, that is to say the late 10th and early 9th millennia cal. BC. The lime plaster floors of these huts, and the fact that one of the floors was painted with red pigment, were previously unknown in the Near East at such an early date.

In the Early Pre-Pottery Neolithic B - the second half of the 9th millennium cal. BC - new forms of architecture appear, rectangular in shape with rounded corners and rooms joined together. These structures were built at ground level, although they were semi-sunken into the slope on their north sides, and had stone walls and lime plaster floors. This type of architecture is similar to that documented at the Syrian site of Tall al-Kharsa (Qarassa) North, Suwayda (Ibáñez *et al.* 2010; Santana *et al.* 2015). It is an architectural style that had not been documented in the region previously.

The Middle Pre-Pottery Neolithic B remains date to the early 8th millennium cal. BC. Structures consist of square, ground-level buildings (albeit ones with their north walls semi-sunken into the hillside) with stone walls and lime plaster floors. Burials were found beneath the floors, inside the houses. The lithic industry (bipolar reduction, Jericho and Amuq points, curved sickles, figurines *etc.*) is characteristic of this period.

Geophysical surveying has revealed large areas with architecture, whilst other areas lack any structures. The faunal study shows that in the Pre-Pottery Neolithic B, goat - rather than gazelle or bovids - was the most-consumed animal. The wild or domestic status of goats, bovids and swine remains to be determined. Another aspect of the diet is evidenced by the large quantity of charred legumes found in the Early Pre-Pottery Neolithic B dwellings. Mortuary practices were very complex, with some burials inside the houses and other graves outside them. Skull removal has been documented and, possibly, the earliest cremation of human remains.

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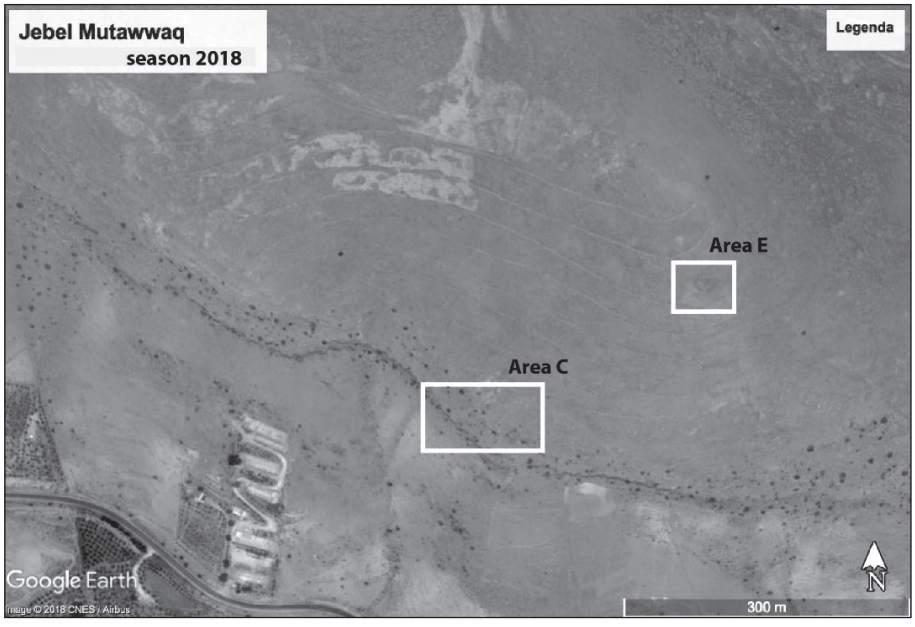
PRELIMINARY REPORT ON THE SEVENTH SEASON (2018) OF SPANISH-ITALIAN EXCAVATIONS AT JABAL AL-MUṬAWWAQ, WĀDĪ AZ-ZARQĀ', JORDAN

Andrea Polcaro and Juan Muniz

Introduction

Jabal al-Muṭawwaq is an Early Bronze Age site and necropolis located atop a mountain in the middle Wādī az-Zarqā'. Following many years of research by a Spanish team led by Juan Antonio Tresguerres-Velasco [For a reassessment of the previous Spanish expeditions see Muniz *et al.* 2014], since 2012 the area has been investigated by Spanish and Italian teams led by Juan Muniz and Andrea Polcaro[1] respectively.

The September 2018 excavation season continued the work carried out in 2016 in two areas, both focused on the Eastern Sector of Jabal al-Muṭawwaq village (**Fig. 1**). The first area, Area C East, was centered on the Great Enclosure (Muniz and Polcaro 2017), a large semi-circular structure already investigated on its western and northern limits. In 2018 we expanded the excavation on the western side of the structure to investigate a possible entrance, previously identified on the strength of two stone jambs and an *in-situ* megalithic lintel. The second area, Area C South, was centered on Dolmen 535. This was distinguished by its huge size, one of the largest so far identified at Jabal al-Muṭawwaq, and its location close to the southern limit of the village, not far from another dolmen (Dolmen 534). The latter was excavated during the 2014-15 seasons and dated to a later phase of the site, Early Bronze (EB) Age II, by which time the EB I village was



1. Location of the 2018 excavation areas at Jabal al-Muṭawwaq.

1. The Italian team included Alessandra Caselli as archaeological supervisor of Area C South and Eloisa Casadei as supervisor of Area C East. The Spanish team included Valentin Alvarez Martinez as archaeologist for Area E. The expedition was funded and supported by the Italian Ministry of Foreign Affairs, the Spanish Ministerio de Education, Cultura y Deportes, the CSIC of Barcelona, the Spanish Embassy in Jordan and the Italian Embassy in Jordan.

already abandoned (Polcaro and Muniz 2018). Finally, a third new area, Area E, was opened to the north, close to the north-eastern limit of the EB I village of Jabal al-Muṭawwaq. This targeted a substantial black ashy layer on and around a small mound.

Area C East

Area C East was a southwards expansion of trenches excavated on the west side of the Great Enclosure in 2014-16. Measuring 3×5m, the new trench centered on a megalithic structure comprising two stone jambs and a stone lintel. This structure, designated D.1110, is located along W.102, the delimiting wall of the enclosure. It was excavated with the aim of understanding if it functioned as the main entrance to this substantial semi-circular structure, which measures more than 50m in diameter and was distinguished by a central standing stone **(Fig. 2)**. Previous excavations of the Great Enclosure had established how W.102 was constructed. It is a dry-stone wall, of which three lines of huge megalithic blocks were preserved on its western and northern sides. The wall was founded on bedrock, with differences in height being levelled with small stones and rubble.

D.1110 was surrounded by a considerable quantity of large, fallen stones; these were removed during excavation. After an initial clearance of fallen stone on the inner and outer sides of D.1110, it was decided to concentrate this season's work on the north-western - or outer - side of this possible megalithic entrance to the Great Enclosure. Here, after the removal of layers of tumble (SU714; SU715; SU717), another alignment of stones appeared immediately beneath the surface. This was recognized as a second outer wall (W.1108), running parallel to W.102 and located 60cm west of D.1110. W.1108 was made of large stones (~50×70cm), preserved to a height of two lines. These were well cut on the outer face (looking to north-west), but apparently not on the inner. As in the case of the main delimiting wall of the enclosure (W.102), the stones of W.1108 were placed directly on bedrock, with differences in height being made up by a layer of small stones (20-30×15-20cm) and loose soil (SU723).

Continuing the excavation in front of D.1110 between W.102 and W.1108, it became clear that the space between the walls was filled with a layer of stones, loose rubble and compact earth (SU728). This suggests that W.1108 was a blocking wall of D.1110. The SU728 deposit was excavated between the stone jambs of D.1110, testifying to its function as the original entrance of the Great Enclosure, one that was blocked at the end of its use by this complex system involving an outer frontal wall (W.1108) and an inner fill of stones and compact earth **(Fig. 3)**. Moreover, the entrance was also blocked in the inner side to the height of the lintel by another wall made of huge stone blocks (W.1122). This will be investigated during the next season of excavations. After the partial removal of SU728, the height of the megalithic door was confirmed as being at least 0.80m, to which another 30-40cm most likely needs to be added to reach bedrock, which would give a total height of around 1.20m. If so, the entrance to the Great Enclosure would be of similar height to the entrances of domestic structures in the EB IA village of Jabal al-Muṭawwaq



2. General view of the Great Enclosure, from north.



3. Entrance to the Great Enclosure (D.1110), from north-west.

(Tresguerres-Velasco 2006), *viz*. 1.10-1.40m, but more excavation is needed to verify this point. The pottery from Area C East is a perfect match with the general EB IA assemblage of the Jabal al-Muṭawwaq village, being characterized by handmade, medium- or medium-low-fired sherds, mostly buff but ranging in colour from light yellow or pink to dark reddish brown. All sherds are mineral tempered, with a high frequency of limestone, flint and small grits. Sometimes vegetal temper and grog clay are also present in the fabric. Only two diagnostic sherds were found: a flat base from a medium-sized jar and a body sherd decorated with a line of dots. Both came from the collapse layers, and both dated to the EB IA.

The complex blocking of entrance D.1110 testifies to the great importance of the Great Enclosure, which was apparently closed with considerable effort by the community of Jabal al-Muṭawwaq at the end of its use. While its original function still needs more investigation to be finally understood (Muniz and Polcaro 2017), the effort exerted by the population of the EB IA village in sealing the main entrance to the enclosure, together with its prominent location within the topography of the settlement and the presence of a central standing stone, all point to the structure having great social and political importance.

Area C South

Area C South was first opened in 2016. It was centered on a large dolmen identified on the southern slope of Jabal al-Muṭawwaq, close to the Great Enclosure and southern settlement wall of the EB IA village. The 2016 trench was expanded in 2018 with the excavation in front of the dolmen of an area measuring 5×5m.

Dolmen 535: location and architecture

Located just 4.50m south of the natural bedrock of the cliff, Dolmen 535 has been recognized as one of the largest dolmens on this part of the mountain. Its location is very important, not only because of its proximity to the southern settlement wall of the EB IA village, but also because of its proximity to Dolmen 534 (about 30m to the south). This was excavated in 2014-15 and dates probably to the EB IB. The excavations in this area aimed to ascertain if Dolmen 535 has the same chronology.

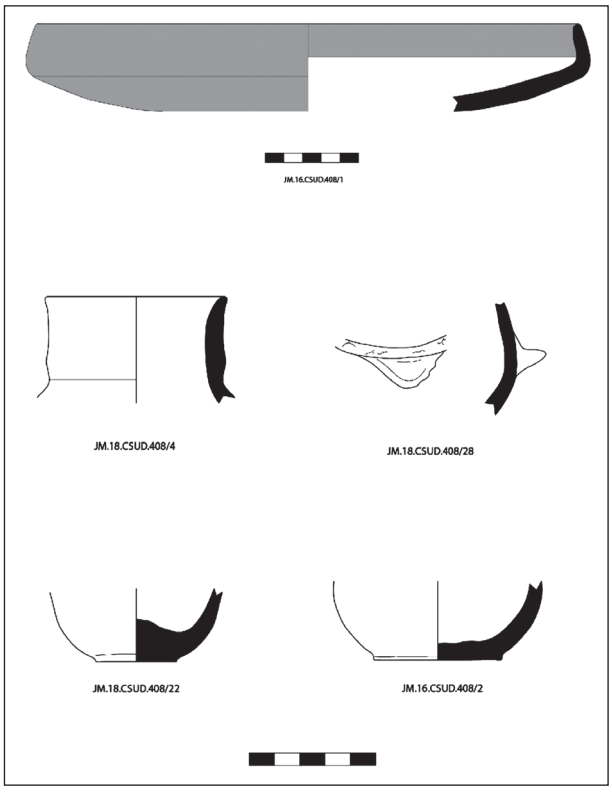
Dolmen 535 was clearly looted from behind. The back slab was not in place and the inner chamber of the megalithic structure had been almost completely emptied. Nevertheless, it was possible to examine the architecture of the dolmen, which was surrounded by a huge stone platform (4.40m wide, 5.50m long) of apsidal shape, preserved to a height of three lines of squared stone blocks. The typology of the large stones used for the platform more closely resembles Dolmen 534 than the older EB IA dolmens of the extramural necropolis excavated in Area B (Alvarez *et al.* 2013; Polcaro *et al.* 2014; Muniz *et al.* 2016). The inner chamber of the dolmen is the largest discovered to date on Jabal al-Muṭawwaq, with a height of 2.27m, length of 2.33m and width of 0.80m. Moreover, two parallel lines are carved on the two lateral slabs in the middle of their height (**Fig. 4**). These are known from other dolmens in Transjordan, such as those of Tall al-ʻUmayrī or some of those at Dāmyah [For the dolmens of Tall al-ʻUmayrī see Dubis and Dabrowski 2002; for Dāmyah see Yassine 1985; this is called Type E by Kafafi and Scheltema 2005]. They are usually interpreted as mountings for a second floor of a perishable material such as wood, which would divide the vertical space of the burial chamber in two.

Dolmen 535 had two high stone steps in front of the entrance, leading from the outside to the inner chamber. In front of the dolmen a beaten-earth floor (L.1007) was discovered in 2016, after the removal of an accumulation of stones and soft earth (SU406). Associated with the floor, on the left side of the dolmen's



4. Inner chamber of Dolmen 535, from south.

entrance, a small circular installation was also recognized (I.1006) **(Fig. 5)**. I.1006 was built of medium-sized stones and measured about 1.18m in diameter. It was filled with a compact layer of earth and rubble. On the floor, some EB IB-II sherds were recovered, including an inverted rim platter and a small bowl with a disc base [For the platter see comparison with Tall al-Mutasallim (Megiddo), Eastern Slope, dated to EB II (Braun 2013: pl. 66a). For the bowl with disc base see comparison with Jericho, Tomb K2, phase II, dated to EB IB (Kenyon 1965: fig. 8:11)], both with red-burnished decoration on the inner and outer sides (**Fig. 6**) [Re. this topic see Philip and Baird 2000: 8]. These sherds were characterized by black-basalt and white-limestone grits in the red-orange coloured fabric, this being very different to the EB IA pottery fabric of Jabal al-Muṭawwaq village. These findings, together with other sherds discovered within the inner chamber of the dolmen, date at least its last use to the EB IB-II, as at Dolmen 534.



6. EB IB-II pottery from floor L.1007.

Burial Cave C.1012: Findings and Stratigraphy

In the 2018 season, L.1007 and I.1006 were removed after documentation in order to understand if an older phase of use of the dolmen entrance could be recognized. After their removal, the excavations reached natural bedrock that was clearly cut in an artificial oval shape (**Fig. 7**). The cut was filled with a layer of soft earth (SU412). After latter's removal it was clear that the cut formed the entrance of a cave (C.1012) approximately 2×2m in area, located just in front of the entrance of Dolmen 535. In fact, the rock was deliberately shaped in order to gain easy access to the entrance of the cave, which in turn extended northwards toward the mountain cliff. After the removal of this first layer (SU412), a layer of compact earth and medium-sized stones was recognized (SU415). During its excavation a stone wall (W.1014) appeared to the north, completely sealing the entrance of the cave. Within SU415, in front of the wall that sealed the cave, a complete hemispherical bowl of red fabric with basalt and limestone grits was discovered **(Fig. 8)**. The bowl can be dated to the EB IB-II[2], testifying



5. General view of Dolmen 535, floor L.1007 and circular installation I.1006, from north-east.



7. Artificial cut of the bedrock in front of Dolmen 535, from north.

perhaps to a rite associated with the final closure of the cave, before the construction of the upper floor.

After documentation, W.1014 was removed; several secondary burials were discovered inside cave C.1012. The northern part of the cave, with its limestone roof still in place, was filled with a layer of soft earth (SU417), with some limestone blocks testifying to the partial collapse in ancient times of the roof. After the removal of SU417, three main burials were exposed (B.1020; B.1023; B.1024). The inhumations were clearly in secondary deposition, with long bones arranged in piles and a few vertebrae and other small bones scattered on the floor of the cave **(Figs. 9 and 10**). At the back of the cave, against its northern wall and mostly at the corner of the chamber, a minimum of six skulls were discovered **(Fig. 11)**. Unfortunately, the collapse of the limestone roof had crushed most of the skulls and scattered parts of the bone piles. Only after anthropological analysis will it be possible to state the exact number of inhumations in the cave, but in the meantime it may be said that at least 10 individuals were buried there. Among the bone piles, a miniature cup and miniature anphoriskos was discovered, giving a total of six vessels; two more miniature jars were discovered amongst the skulls **(Fig. 12)**. All of these vessels could be dated to the EB IB[3]. The exclusive presence of miniature vessels - without any other pottery types - might suggest that, rather than being funerary assemblages for the dead, the pottery from the C.1012 burial layer was associated with funerary rites connected with the secondary deposition of the dead.



9. General view of burial B.1020 with bone pile scattered in cave, from south.



10. Detail of burial B.1023, with pile of long bones in place, from south.

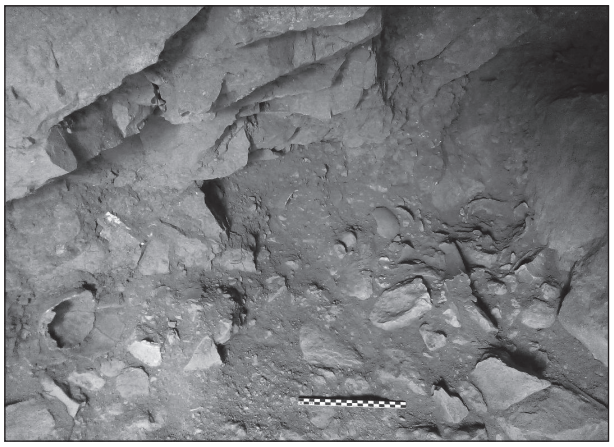


8. Bowl discovered under floor L.1007 in the upper layer of cave C.1012.

After documentation, the secondary inhumations were removed, exposing another layer

2. This shape of bowl is present in burial assemblages in the southern Levant and Transjordan from EB IA. See for example Bab adh-Dhirā‘ cemetery (Schaub and Rast 1989: fig. 87: 5-9) or the burial cave close to Sh'ar Efraym (van den Brink 2011: fig. 18:1). However, the type of fabric and nature of the grits are perfectly comparable with pottery discovered on upper floor L.1007 in front of Dolmen 535 and are completely absent in the pottery assemblage of the EB IA village of Jabal al-Mutawwaq.

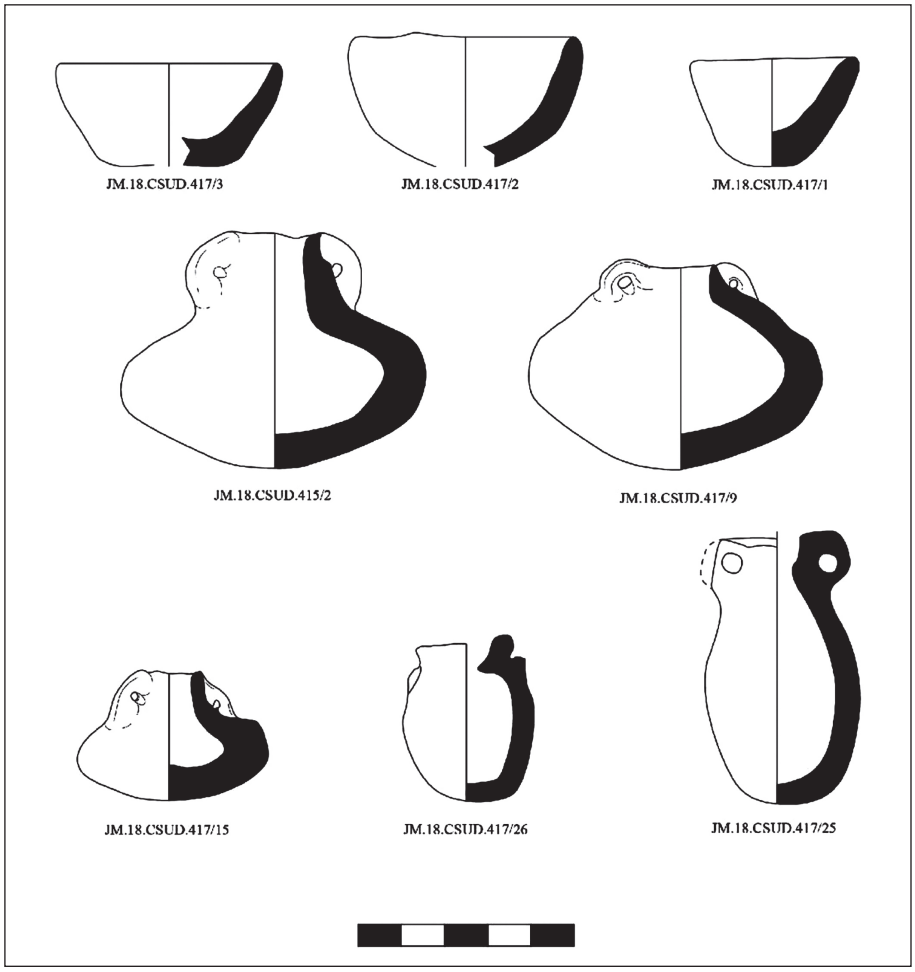
3. Anphoriskoi tend to appear regularly in burials of the southern Levant from the EB IB-II (Ilan 2002), even if the oval shape discovered in Cave C.1012 has no significant comparisons with the burials discovered until now in Transjordan region. A similar shape, even if different at the neck and with a much more everted rim, was discovered at Tall al-Mutasallim (Megiddo), Tomb 903 upper layer, dated to the final EBIA (Braun 2013: pl. 55a) and ‘Ayn al-Asāwir (‘En Esur) (Yannai 1996: pl. 7:6), dated to the EB IB. Other similar types, from the end of the EB I or early EB II, come from ‘Ayy, Tomb G (Callaway 1964: pl. XI:936, XVI:673); see also a similar type from Tall ‘Arād (Arad) (Amiran 1978: pl. 10:2). Concerning the two miniature jars discovered amongst the skulls in C.1012, see comparisons with Jericho, Garstang's Northeastern Trench, Level V (Garstang *et al.* 1935: pl. XXXI:16), corresponding to Sultan IIIB1, dated to the early EB II (Nigro 2010: 77).



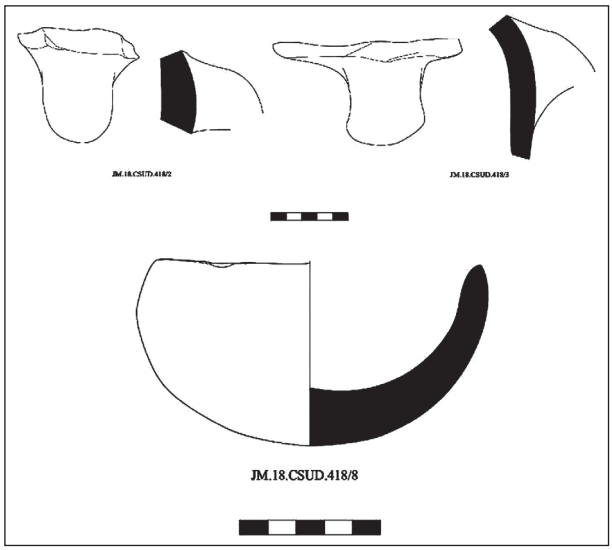
11. Rows of skulls at back of burial chamber of the cave, from south.

of large limestone blocks and rubble (SU 414); this was clearly associated with an earlier collapse of the cave roof. SU414 extended all over the cave, including the area south of blocking wall W.1014. This suggests that, before its use as a burial chamber, the cave was much larger - around 2×3m - and extended towards the base of the dolmen. After the removal of this layer, a deposit of soft earth and stones (SU418) was discovered. In the northern part of the cave, this deposit of abandonment and natural accumulation covered another layer (SU420). SU420 was characterized by dense ash lenses, testifying to a hearth in the back of the cave that, owing to evident signs of burning on the adjacent rock, enjoyed long use. Close to the ash lenses a complete EB IA bowl was recovered, together with several ledge handles **(Fig. 13)** and, in the southern part of the cave, a stone disk - probably a circular chopper **(Fig. 14)**. Both the pottery and lithic discovered in SU420 have good parallels amongst the EB IA material from the domestic structures of the EB IA village of Jabal al-Muṭawwaq. SU420 lay directly over an artificial levelling layer of bedrock chunks (L.1022), corresponding to the floor of the cave in this phase of use.

After the removal of these layers from the cave, the original floor (L.1018) of natural bedrock was reached **(Fig. 15)**. The rock was artificially cut in a roughly circular shape. On



12. Miniature pottery associated with the burials in cave C.1012.



13. EB IA pottery from the lower layer (SU418) of cave C.1012.



14. Stone disk discovered in the lower layer (SU418) of cave C.1012.

the bedrock, remnants of white plaster that probably originally covered the full extent of the cave in its first phase of use, were recognized. This, together with a carved hole and channel on the western side of the cave, might indicate that C.1012 was initially used as a water cistern.



15. General view of cave C.1012 after excavation, from south-west.

Summarizing, the data gathered thus far from cave C.1012 allow us to identify six phases of use (from earliest to latest):

Phase I: The cave was carved into bedrock with a circular shape and may originally have functioned as a water cistern. This is suggested by the presence of plaster on surface L.1018, by the gradual slope of the bedrock towards the back wall of the cave, and by the hole in the rock with a carved channel going through the cave.

Phase II: A new occupational phase occurred. A floor was constructed by levelling the bedrock (L.1022) and a hearth was utilised together with pottery and lithic material of the EB IA.

Phase III: Abandonment of the cave; part of the roof collapsed.

Phase IV: The cave started to be used for funerary purposes. The entrance of the cave was remodelled in direct association with Dolmen 535. Disarticulated human skulls and piles of long bones were arranged on several occasions in the northern part of the cave. Dolmen 535 was built and used together with the cave for funerary and cultic purposes.

Phase V: When funerary use ended, the burials were protected by wall W.1014 and the central part of the cave was filled by SU415 and SU412. That this was probably a ritual sealing is suggested by the deposition of a hemispherical bowl. Floor L.1007 was built on the top of the sealing deposits concealing the entrance of the cave.

Phase VI: Use of floor L.1007 and circular installation I.1006 in front of Dolmen 535 and on top of the deposits sealing cave C.1012. This suggests continuity of religious practice above the burial cave during what was probably the last phase of use of Dolmen 535.

Area E

The third area (Area E) opened in the 2018 season was located on the upper part of the mountain **(Fig. 16)**. The site was selected after surveys in previous years had identified a tumulus associated with a large quantity of ash. This formed an artificial mound, initially interpreted as a large furnace, of a type not detected in the village hitherto.



16. General view of Area E.

The excavation area was 5×2m, with the aim of the excavation being to understand the constructional phases of the tumulus by investigating the structure from the western limit of the excavation area to the central part of the mound. The start of excavation quickly resulted in the furnace hypothesis being dismissed in favour of the structure's possible function as a funerary tumulus. In fact, on Jabal al-Muṭawwaq megalithic tumuli of circular plan are attested, but these are usually built of large stone blocks. This mound, in contrast, appeared at first glance to be very different in shape and construction.

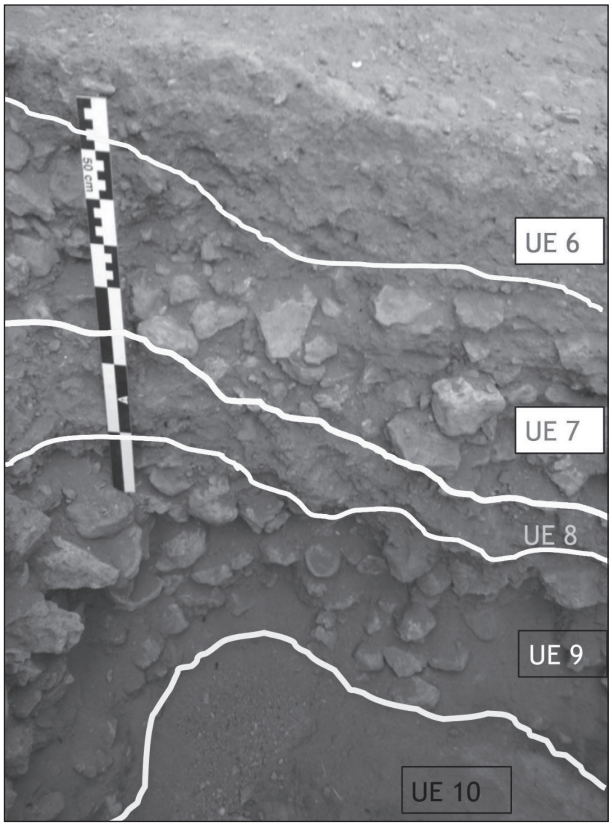
The surface layers were removed (SU1; SU2), exposing a third layer (SU3) of rubble (average size 7cm) mixed with dark earth. SU3 yielded a large number of sherds dating from the EB IA to EB II. This layer followed the contours of the tumulus, with a maximum height of 1m. Below it were natural accumulation layers (SU4; SU5) of small stones and soft earth. Removal of these exposed an artificial layer (SU6) consisting of compacted earth containing sherds and bones.. This layer was characterized by the presence of ash lenses with an average thickness of 20 cm. As already attested in other areas of the site, a levelling layer of medium-sized stones and earth (SU7) was identified. Under this was a 10cm thick deposit of earth (SU8) following the natural slope of the mountain, below which another accumulation layer (SU9) was identified. This consisted of mixed stones and rubble, without the presence of archaeological material.

The trench reached a maximum depth of 2.20m below the current ground surface. No walls or structures were identified within the tumulus / mound, although the trench did not investigate its central part, which remains intact.

Our general analysis of the area **(Fig. 17)** is suggestive of the existence of a geological base (SU10; SU 9) upon which some activities were performed. These involved the deposition and levelling of earth layers (SU8; SU7; SU6), within which archaeological material accumulated. In the absence of a more detailed study, it seems that these activities should be dated to the EB I. Later, this surface was used as the foundation for an accumulation of stones and dark earth that gives the tumulus its current appearance (SU5; SU4; SU3). Finally, the upper part of the tumulus presents a stratum that has suffered episodes of erosion (SU2), affecting also the current surface (SU1).

Conclusions

The 2018 excavation season has led us to a better understanding of the two main phases of occupation at the site: the first dated to the EB IA and the second to the EB IB-II. The exploration of the Great Enclosure has finally identified its original entrance to the west, opening on to Area



17. Eastern section of Area E.

C - already identified as an area of production and processing activities. The investigation at Dolmen 535 testifies to the use of the Jabal al-Muṭawwaq site as a large megalithic cemetery during its later, EB IB-II phase. This seems to have involved dolmens, burial caves and possibly tumuli, the latter being hinted at by the results from Area E - even if more investigation is needed in this northern area of the site.

Furthermore, the discovery of an association between Dolmen 535 and burial cave C.1012 opens the door to exciting new possibilities regarding the exploration of dolmens in Jordan. The possibility that dolmen burials were neither removed at the end of these structures' utilisation nor were completely looted in later times, but - on the contrary - are still preserved in concealed underground chambers, will continue to be explored in future excavation seasons at Jabal al-Muṭawwaq.

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MADABA PLAINS PROJECT: EXCAVATIONS AT TALL AL-'UMAYRĪ, 2014

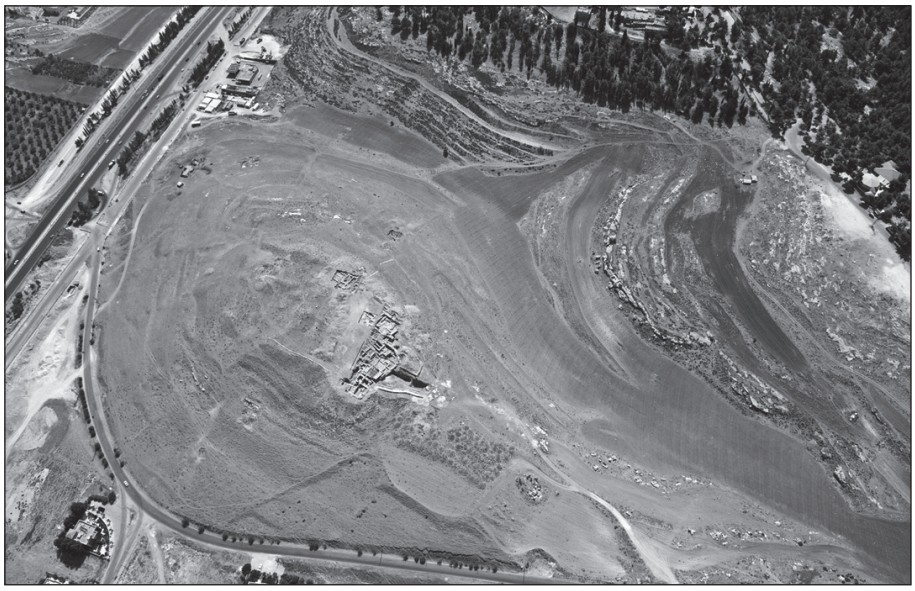
Douglas R. Clark and Kent Bramlett

Introduction

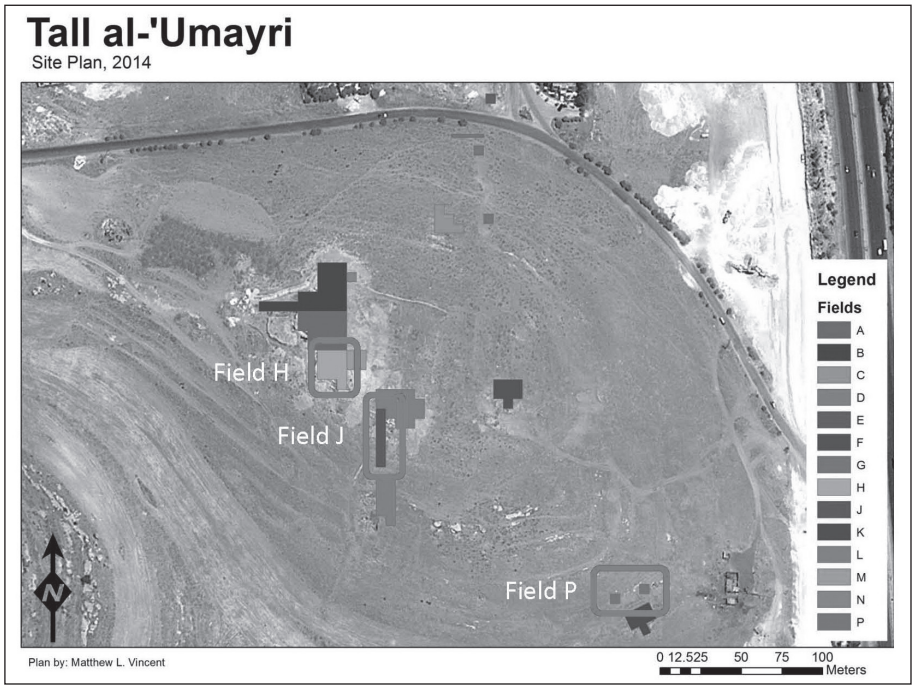
A sixteenth season of excavation by the Madaba Plains Project at Tall al-'Umayrī occurred between 25 June and 30 July 2014. It was sponsored by La Sierra University in consortium with Andrews University School of Architecture (Michigan, USA), Burman University (Alberta, Canada), Pacific Union College (California, USA), Mount Royal University (Alberta, Canada) and Walla Walla University (Washington State, USA). Full reports have already been published for the first six seasons (first season [1984]: Geraty *et al.* (eds.) 1989; second season [1987]: Herr *et al.* (eds.) 1991; third season [1989]: Herr *et al.* (eds.) 1997; fourth season [1992]: Herr *et al.* (eds.) 2000; fifth season [1994]: Herr *et al.* (eds.) 2002; and sixth and seventh [combined 1996 and 1998]: Herr *et al*. (eds.) 2014). The eighth [2000] is ready for submission for publication. Preliminary reports have also been published (first season [1984]: Geraty 1985; Geraty *et al.* 1986, 1987; second season [1987]: Geraty *et al.* 1988, 1989, 1990; third season [1989]: Younker *et al.* 1990; Herr *et al.* 1991; LaBianca *et al.* 1995; fourth season [1992]: Younker *et al.* 1993; Herr *et al.* 1994; fifth season [1994]: Younker *et al.* 1996; Herr *et al.* 1996; sixth season [1996]: Younker *et al.* 1997; Herr *et al.* 1997; seventh season [1998]: Herr *et al.* 1999, 2000; eighth season [2000]: Herr *et al.* 2001, 2002; ninth season [2002]: Herr and Clark 2003, 2004; tenth season [2004]: Herr and Clark 2005a, 2005b; eleventh season [2006]: Herr and Clark 2008a, 2008b; twelfth season [2008]: Herr and Clark 2010, 2013; thirteenth season [2010]: Clark and Bramlett 2011, 2012a, 2012b; and fourteenth [2011] and fifteenth [2012] seasons: combined reports are in press). For a summary report of the first 12 seasons (1984-2008), see Herr and Clark 2009; Clark 2011; Herr 2011 in Clark *et al*. 2011.

In the 2014 season, a team of 13 Jordanians and 35 foreigners participated in the fieldwork and camp activities of the interdisciplinary project at al-'Umayrī, located 12km south of Amman's Seventh Circle on the Queen Alia Airport Highway, at the turnoff for Amman National Park (**Fig. 1**).

In the first season (1984) four fields of excavation were opened (Fields A, B, C and D) (**Fig. 2**). During the second season (1987) three of the four were expanded (Fields A, B and D), one was completed to bedrock (Field C), and two new fields were opened (Fields E and F). In the third season (1989) one field expanded (Field A), three fields reopened old squares and expanded slightly (Fields B, D and F), another reduced excavation from two squares to one (Field E), and a new field was opened on the northern slope as a series of three soundings (Field G). In the fourth season (1992) three fields deepened previously opened squares (Fields A, D and F), one deepened existing squares while expanding by one square (Field B), and two fields were discontinued (Fields E and G). During the fifth season (1994) one field deepened (Field A), another expanded and deepened (Field B), and one was added (Field H). In the sixth season (1996) three fields expanded (Fields A, B and H). The tomb excavations on the southeastern slopes of the *tall*, already begun under the hinterland survey in 1994, became part of the al-'Umayrī *tall* excavations as Field K. During the seventh season (1998) two fields deepened their squares (Fields



1. Aerial view of al-ʻUmayrī (courtesy APAAME, David Kennedy).



2. Tall with fields indicated.

A and B), two expanded (Fields H and K), and a new field was opened on the southern lip of the site (Field L). In the eighth season (2000) we deepened three fields (Fields A, B and H) and expanded and deepened in two fields (Fields K and L). During the ninth season (2002) Field A was not worked, while Field B expanded to the north and continued in two other squares; Field H limited itself to the large plastered and cobbled courtyard near the northern extent of the field (next to Field A); in Field L we exposed more of the Hellenistic structure by opening two new squares and reopening one other. During the tenth season (2004) Field A deepened squares begun during the 1980s; Field B deepened three earlier squares and expanded to the north to intersect the northern edge of the site; Field H deepened earlier squares in its northern part; and Field L deepened three previous squares and opened one new square. During the eleventh season (2006) Field A concentrated on removing balks and small areas between walls to deepen the western part of the field to late Iron I levels; one square was opened at the southwest corner of the field to examine the possible existence of a gateway. In Field B excavation concentrated on uncovering the floors of the northern extent of the remarkably well-

preserved Late Bronze (LB) building. Excavation in Field H concentrated on bringing the southern part of the open-air sanctuary down to late Iron I levels. Field L, on the southern lip of the site, expanded to the east and north with three new squares.

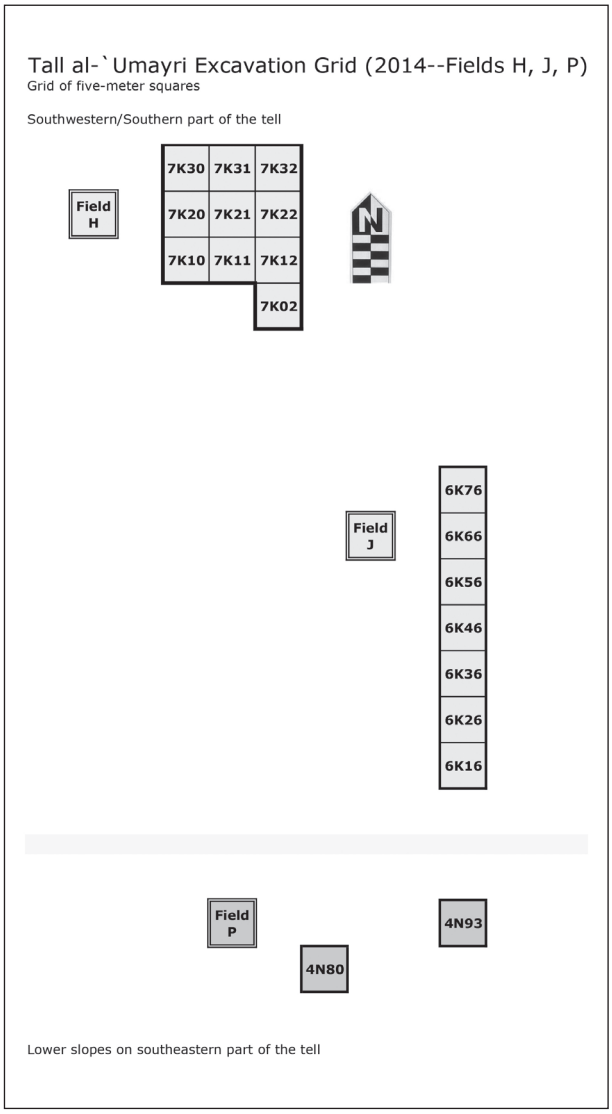
The 2008 season saw Field A expose the third LB/Iron I building in the southern part of the field by going deeper in most squares. Field B completed the excavation of the LB building and added a square to the east with a new field designation, Field N. Field H went deeper in four squares, exposing the top of the LB/Iron I levels and locating the bottom of the southern portion of the perimeter wall. Field L went lower in three squares and added two more squares to the west. Additionally, a new field was opened, Field M, east of Field H in our overall goal of connecting Fields H and L. This season also marked the initiation of the use of high-resolution GPS for the location of fields, squares and architecture. It forced a slight change of orientation to align all our squares with true north and we chose to locate squares on primary grid lines, causing some squares to be smaller in their east-west measurements.

The thirteenth field season (2010) continued work in four fields (Fields A, H, L and M) (**Fig. 3**). Field A extended the exposure of LB/Iron I domestic structures, clearing the third building and uncovering the major portion of a fourth. Clearance of the Late Iron I sacred precinct in Field H brought the team to domestic structures post-dating the Early Iron I buildings in Field A, but preceding the precinct. Field L cleared Hellenistic remains in several balks, clarifying in the process the function of an Iron II oil press and exposing the tops of several Iron II walls. Field M cleared late Iron II paved-plaza levels surrounding what appear to be domestic buildings.

In 2011, the small team focused on Field H (continued clearance of post-Early Iron I debris in order to expose the remaining components of Early Iron Age Building M, and Field L (removal of all Hellenistic architecture in order to expose Iron Age remains). The 2012 season saw the return of a full team, but progress was limited due to land-owner disputes. Fields excavated included A (exposing the fourth of five Early Iron I joined houses), H (completion of the clearance of Building M, a 'four-room' building), L (Late Iron II and Persian domestic remains), al-'Umayrī Survey Site 84 (excavation of a cistern), and cleaning in Field K (for the purpose of more complete photographic recording).

In 2013 a very small team recorded ground-penetrating radar (GPR) and electromagnetic imaging data in Field K, in search of other dolmen burials.

Following 16 seasons, the team felt a good deal of confidence in talking about final stratum numbers for the site. We think, reasonably, that no new significant settlements will be discovered beyond those we have already found, even if - as happened in 2012 - we have isolated an important sub-phase in the Early Iron I period. We thus include a stratigraphic chart (**Fig. 4**).



3. 'Umayrī Grid.

Stratum Chart				
Tall al-`Umayri--April 2016				
Larry G. Herr				
Stratum	*Period*	*Date*	*Fields*	*Finds from Specific Fields of Excavation*
	Neolithic		E&W slopes	Flint scatters
	Chalcolithic?		East valley	Sherds on surface
Hiatus	EB IA			No remains so far
21	EB IB	c 3000-2700 BC	K	K: Dolmen and associated surfaces
20	EB II	c 2700-2500 BC	(C?)D	D: Wall fragments above bedrock; C: bedrock carvings?
19	EB III	c 2500-2200 BC	CDG	CDG: Houses & streets on terraces on S & N slopes
18	EB IV	c 2200-2150 BC	D	D: Ephemeral one-room houses widely separated
17	EB IV	c 2150-2100 BC	D	D: Small walls of cobbles, perhaps animal pens
Hiatus	EB IV-MB IIA-B			No remains so far; cemetery east of the airport highway
16	MB IIC	c 1700-1650 BC	BC	B: Sherds in rampart;C: wall frags & floors
15	MB IIC	c 1650-1550 BC	BCFGK	B: Moat, rampart & wall frags; C: wall frags & floors;FG: sherds; K: cave tomb
Hiatus?	LB I			No clear remains so far
14	LB II	c 1400-1250 BC	ABFN	BN: Palace/temple; F: terrace wall; AH: wall frags
13	LB/Iron I	c 1230-1200 BC	B	B: Sherds in rampart and in the Stratum 12 bricks; destroyed by earthquake
12	LB/Iron I	c 1200-1150 BC	ABEFHN	ABHN: Perimeter wall & houses destroyed militarily, 4-room house; E: sherds; F: wall frags
11	Iron 1A	c 1150-1100 BC	AH(M?)	A: Wall frags above Str 12 destruction; H: wall frags; M: sherds
10	Iron 1B	c 1050-1000 BC	ABH	A: House; B: storeroom; H: lowest courtyard sanctuary with model shrine
9	Iron IB-IIA	c 1000-850 BC	ABH	AB: Few red-slipped, hand-burnished sherds; H: poss continuation of courtyard sanctuary
8	Iron IIB	c 850-700 BC	AHLM	A:House; H: sanctuary surfaces; L: large stone walls & terrace wall; M: Cobble surface
7	L Iron 2Iron IIC	c 600-550 BC	ABCEFHLMN	ABCFLMN: Administrative complex & houses; E: watersource; H:sanctuary in Field H
6	Iron IIC/Per	c 550-475 BC	AHL(M?)	AM: Changes to administrative complex; B: houses;H: subterranean room; L: walls
5	E Persian	c 475-400 BC	AHM	AM: Prob domestic wall frags; H: poss cont of sanctuary; AH: Persian provincial seals
Hiatus	L Persian			No remains so far; poss also very early Hel
4	Helenistic	c 300- 50 BC	HLKM	H: Pits; L: farmstead; K: tomb with Greek inscription at SE slope of site; M: wall frags
3	E Roman	c 50 BC-AD 135	ABH	AB: Ritual pool from a prob farmstead/villa; H: one small cooking pot
Hiatus	L Roman			No remains so far
2	Byzantine	c AD 330-650	FL	F: Farmstead wall fragments and pottery; L: field wall & sherds similar to Field F
1	Islamic	c AD 650-Pres	ABCDEFHLMN	All: Few topsoil sherds from all the Islamic periods; FHM: 3 shallow burials

4. ʻUmayrī Stratum Chart.

Field H: The Southwestern Acropolis

Monique D. Vincent, University of Chicago
Assisted by Mary Boyd, Langley, Washington

During the 2014 season we returned to Field H to continue excavation in Square 7K02, not excavated since 1998. Unable to excavate in the main area of Field H due to unresolved land-ownership issues, we turned instead to the area available to us in order to explore the unanswered question of the southern perimeter wall of the LB/Early Iron Age settlement. During the 2012 season, excavation in several key probes revealed evidence of the site-wide LB/Early Iron I Stratum 12 destruction layer (Vincent in Clark and Bramlett 2017). Wall 7K30:046, explored during the 2008 season, was the southern continuation into Field H of the western perimeter wall of Stratum 12 (Vincent in Herr and Clark 2010). The search for a southern perimeter wall turned to Wall 7K10:004 during the 2012 season, although excavation proved that Wall 4 was founded later in the Iron I period and could not have served as the southern perimeter wall for Stratum 12 (Vincent in Clark and Bramlett 2017). A second candidate is Wall 7K02:002, discovered in Square 7K02 during the 1998 season. The top of Wall 2 was rebuilt in the Late Iron II/Persian period, the only part of the wall visible in 1998, but the alignment seemed promising as a southern perimeter wall (see Berge and Willis in Herr *et al*. (eds.) 2014). With this in mind, we returned to Square 7K02 and resumed excavation north of Wall 2 [Mary Boyd supervised the excavation of Square 7K02, with the assistance of Laura Conley, Maria Alvarez Folgado, Ruth Kent and Amjad Omar Abd Al-Nahdi Almarai Al-Ajarmah]. While this season's work did not provide a definitive answer to the question of the southern perimeter wall, we did prove that Wall 2 predates the Late Iron II/Persian period. Hopefully future excavations can return to this area and continue the investigation.

With regard to field phases, the situation in Field H has changed considerably since the 1998 excavations, especially for the Late Iron II/Persian-period phases which have not been well correlated over time and across multiple changes of field supervisors. With two main Late Iron II/Persian-period phases already represented in 7K02 in the 1998 excavations, two more discovered this season, but only two Late Iron II/Persian-period phases known field-wide, it is difficult to know how to correlate phases in this peripheral area with the rest of the field. There is also a conflict with pottery dates, as previously the earliest phases were assigned to a Late Iron II or Early Iron II date.

However, the earth layers excavated this season contained Late Iron II/Persian-period pottery to an additional depth in excess of 1.5m, indicating that previous phase assignments to Early Iron II must be incorrect. The previous phasing therefore needs to be adjusted to take this into consideration.

The current solution offered is that the previous architectural phases were of a more subordinate nature than realized, and should be lumped closer together in the Late Iron II/Persian or Early Persian-period phases of Field H. Future excavation of Square 7K02 should help better to connect 7K02's stratigraphy with better to the rest of the field. Until then, we treat the two Late Iron II/Persian-period phases as roughly fitting in with 2012 Field Phases 5 and 6. Here they will simply be described as Late Iron II/Persian-period Sub-Phases 1 and 2. The single phase pre-dating these will be referred to as a Late Iron II-period phase until further excavation provides better pottery dates.

Field Phase 7: Late Iron II Period

Two surfaces and an earth layer were revealed in small probes against the faces of Walls 7K02:004 and 2 that are best dated before the Late Iron II/Persian-period phases. They are all stratigraphically below the central Wall 3, which was founded after this phase. The earliest surface is a cobble surface that seals against Wall 2. Over this, an earth-and-plaster surface was laid 0.26m deep, though only a small part of it was excavated this season (**Fig. 5**). North of Wall 3, a small probe at the juncture of Walls 3 and 4 reached Earth Layer 7K02:041, which also ran just under Wall 3. The probes against Walls 2 and 4 indicate that they continue from an earlier phase, pre-dating the Late Iron II/Persian period.

Earth Layers 40 and 41, respectively south and north of Wall 3, may represent the last pre-Late Iron II/Persian-period use of this area, or may have been used as fill layers for the founding of Wall 3 in the following phase. Only Surface 42 was certainly used in a pre-Wall 3 phase, in association with Wall 2. Too small an exposure was made to guess at the function of this area. One pail of pottery from where Surface 40 was excavated over Surface 42 contained Late Iron II sherds, providing the only date at this point for the phase.

Field Phase 6: Late Iron II/Persian Period - Sub-Phase 2

It is at the beginning of this phase that Wall 7K02:003 was founded on top of Earth Layers 7K02:040 and 41, these being either from an earlier phase or intentionally laid down to support Wall 3. On the north side of Wall 3, Beaten-Earth Surface 7K02:039 was laid and, by the end of its use, it was covered in large, broken pottery sherds dating to the Late Iron II/Persian period (**Fig. 6**). Surface 39 was only excavated in a small probe against Walls 3 and 4, but the pottery conforms to that of a typical domestic assemblage. A fragment of a basalt milling stone (A140194) was also wedged into the top of the surface, further suggesting domestic use of this area.

South of Wall 3, Surface 7K02:040 may have continued to serve as a surface in this phase, although there was little buildup from use. Wall 3 may have served as the southern boundary for activity during this phase, with little activity taking place between Walls 2



5. Plaster Surfaces 40 and 42 between Walls 2 and 3.



6. Surface 29 with pottery sherds.

and 3. Alternatively, the activity we describe in the following phase could have taken place here in this phase, and the activity described in 1998 in association with Surfaces 7K02:018 and 28 could have followed in Late Iron II/Persian-period Sub-Phase 1. With the homogenous pottery assemblage and slope at the lip of the *tall* to take into consideration, it is difficult to correlate activities across Wall 3.

Field Phase 6: Late Iron II/Persian Period - Sub-Phase 1

This phase is marked by the construction of a large stone bench abutting the north face of Wall 7K02:003. Bench 7K02:033 measures 2.3m long, 0.72m wide and nearly 0.60m high (**Fig. 7**). The bench was built of small and medium boulders on top of hard-packed Earth Layer 7K02:038, which must have served as a surface in conjunction with Bench 33 and Walls 3 and 4. Earth Layer 38 could represent build-up on top of earlier Surface 39, and was simply used as the foundation of Bench 33 in this phase.

Two similar stone features have been excavated in Field H in earlier seasons. The first (7K22:035) was interpreted as the foundation for an awning or a use stage in a courtyard sanctuary dating to the Late Iron I period (Cormack in Herr and Clark 2003). The second (7K11:078) was interpreted as a possible cultic presentation bench outside a building of the Iron II period (Vincent in Clark and Bramlett 2017). Artifacts found in the mudbrick and earth debris (7K02:032, 37) after the abandonment of the space around Bench 33 included a large basalt weight fragment (A140194), a bone weaving spatula fragment (A140074) and a faience bead fragment (B140004), none of which are indicative of cultic activity. This bench may have been used instead for food preparation or other domestic activities. Large pockets of ash were excavated around the bench throughout Layers 32 and 37. The ash may have resulted from further domestic activities such as cooking, or might have been part of the abandonment of this space.

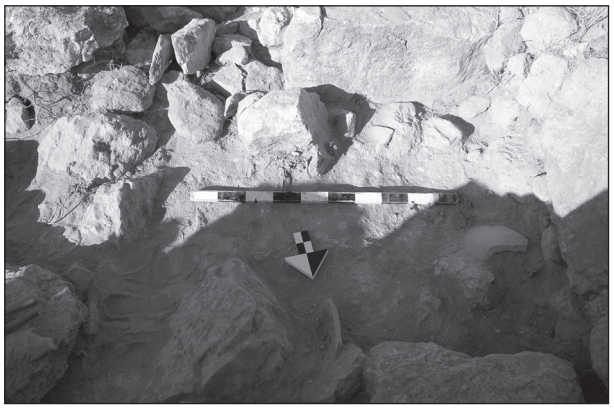


7. Bench 33.

South of Wall 3, the space between Walls 2 and 3 was filled in with medium and large boulders and loose earth: 7K02:036. The large size and random placement of the boulders - and scarcity of pottery - could be indicative of an intentional fill used to bring this space to a higher level. A thin mud-plaster surface, 7K02:035, was found in the western part of the small space on top of Rock Tumble 36, sealing against Walls 2, 4 and 3; it was disturbed by later Flagstone Pavement 7K02:028. Pavement 28 possibly represents a succeeding phase of occupation, the foundation of which involved large, flat boulders that considerably disturbed Surface 35 from this phase. On the other hand, the many pieces of pottery from Surface 28 were mendable Late Iron II/Persian-period vessels, found under, among and on top of the stones and plaster from Surface 28, suggesting that Surface 28 was built up over time on top of Surface 35 and thus represents a continuation of this phase, rather than being a separate phase (**Fig. 8**). The pottery found on and under Surface 28 included mendable kraters and jars - evidence of domestic use of the space.

Conclusion (Fig. 9)

Excavation in Square 7K02 this season continues the illustration of Iron-Age activities



8. One of the plaster layers of Surface 28.



9. Overhead drone photo of Square 7K02.

on the southwestern corner of the acropolis of al-'Umayrī. Though separated from the rest of Field H by the large N-S Wall 4, the areas excavated this season north and south of Wall 3 fit in with the general picture of domestic activities involving food storage and preparation. The fine faience bead and weaving spatula are small windows into the daily life of the people living in this space, working on and around the stone bench at the very southern edge of the *tall* and storing jars of their foodstuffs in a small room next door.

Field J: The Southern Slope

Monique D. Vincent, University of Chicago

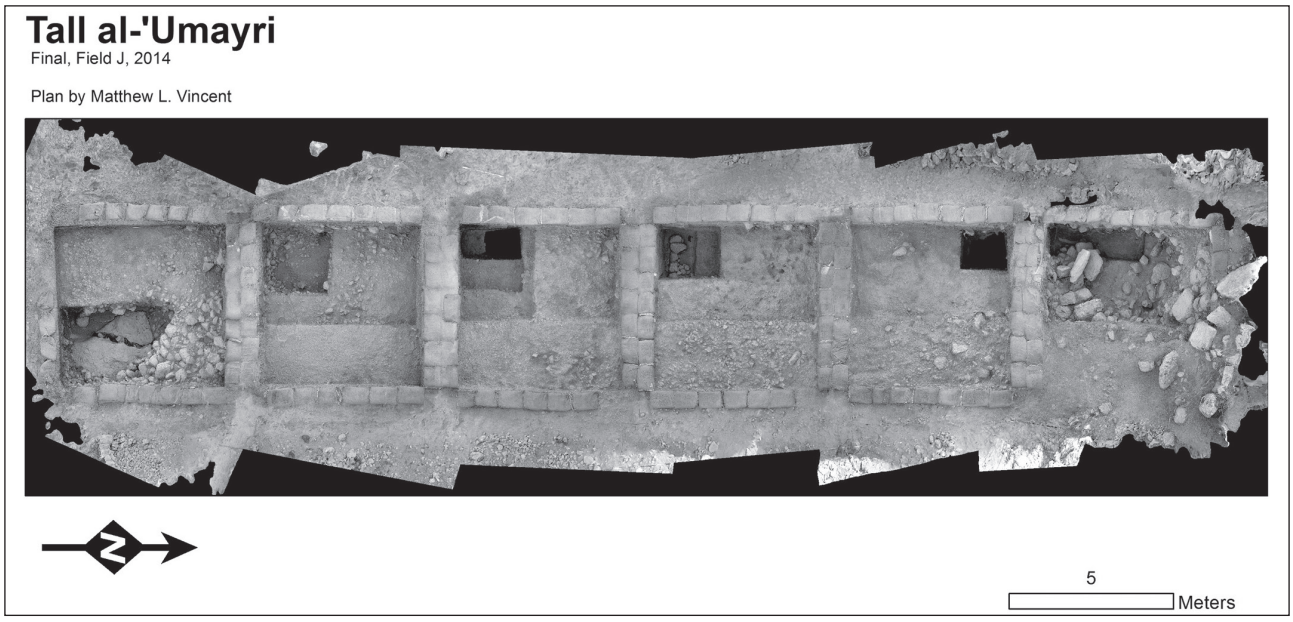
This season we marked out a new area of excavation, Field J, on the southern slope of Tall al-'Umayrī. Field J consists of seven consecutive squares that directly connect Field L in the north with Field D in the south. These previously excavated fields represent both ends of the main occupational history at the *tall*, with Hellenistic remains at the top of the *tall* (Field L) and Early Bronze Age remains at the bottom (Field D). The north-to-south sequence of the squares provides a full exposure of the southern slope, from the upper lip of the *tall* to the lower bedrock shelves.

The goal of opening Field J this season was to connect these fields stratigraphically and explore the nature of occupation and fortification on the southern slope. While most of the season was spent excavating topsoil and debris tumbled from settlements at the top of the *tall*, two key features did appear. The first was a large stone structure at the base of the *tall*, founded just above bedrock late in the history of occupation at al-'Umayrī. The bedrock confirms the existence of another shelf above that upon which Field D's Early Bronze Age buildings were built. The second feature is a possible earthen rampart similar to the LB/Early Iron Age rampart built on the western slope of al-'Umayrī. This is an important discovery, indicating that fortification was a concern of the inhabitants not only on the vulnerable western slope, but on the sharper southern slope as well. These discoveries made the season's work worthwhile, and suggest promising results from future seasons.

Field J comprises Squares 6K76, 6K66, 6K56, 6K46, 6K36, 6K26 and 6K16. All of the squares except 6K16 were excavated during the 2014 season (**Fig. 10**).

Field Phase 5: Iron I Period

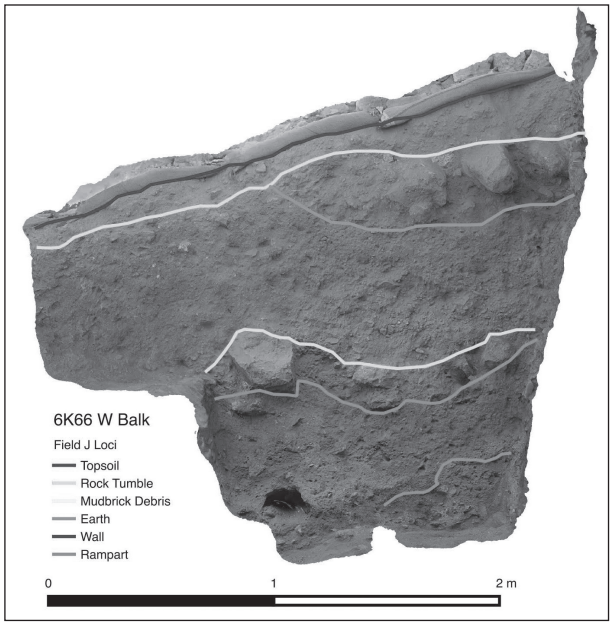
Small probes in Squares 6K66 and 6K76 revealed a homogenous dark-brown earth layer full of *nari*, yellow clay and charcoal fragments. Characterized by loamy or loam-with-sand-or-clay texture with slightly worn particles, this earth layer has been tentatively identified as an earthen rampart. In Square 6K76, two main layers are identifiable in a section of Rampart 6K66:7 (=Rampart 6K76:7): a gray earth layer topped by a thin plaster line, and below that a dark charcoal lens with the darker-brown earth layer filled with the *nari*, clay and charcoal inclusions. In Square 6K66, Rampart layers 6 and 7 were both dark-brown earth filled with the same inclusions, but Locus 7 was established as a new locus based on a 4 to 5cm-thick charcoal lens separating it from Locus 6 (**Fig. 11**). However, further excavation of Locus 7 established that it was the same consistency and color as



10. Orthographic view of Field J.

Locus 6, and these two *loci* represent lenses of a larger rampart layer. There was considerable disturbance of both *loci* in ancient times, with numerous large bioturbation tunnels throughout the earth in 6K66. In 6K76, later rock tumble cut into the plaster and mudbrick line of the top layer, making the top of the rampart nearly impossible to trace outside of the West Balk. The slope of the rampart is 18 degrees in a southwesterly direction, when calculated between the two squares.

Earlier work on the western slope of al-'Umayrī identified an earthen rampart system, of which the majority dated to the LB/Early Iron Age transitional period (site-wide Stratum 12). This earthen rampart system utilized supporting walls and natural bedrock as a foundation, sealing against the settlement's perimeter wall at the top of the *tall*. The slope of this earthen rampart was 35 degrees, and its layers consisted of dark, yellowish-brown earth with *nari* inclusions (Clark 1997: 75-76, 2000: 66). The similarity of the earthen layers of Squares 6K66 and 6K76 to those of the Stratum-12 rampart system encourages the conclusion that we are here encountering a similar rampart system on the southern slope. However, the pottery found in the Field J earthen rampart dated to the Iron I period, with the cooking pots being clearly later than those found in the Stratum 12 dwellings. A few Late Iron II/Persian sherds were found in the layers as well, but these are most likely contamination from the bioturbation tunnels as the majority of the pottery predated the Iron II period.



11. Digital Western Balk 6K66.

In conclusion, these small probes provide tentative evidence that an earthen rampart was in use on the southern slope of the *tall*. These layers of the rampart appear to postdate the Stratum 12 rampart on the western slope, but that rampart did see later activity in the Late Iron II period (Clark 2000: 90-91). It is possible these layers represent a later Iron I addition to an earlier rampart system below that will be discovered by future excavation.

Field Phase 4: Late Iron II/Persian Period

The beginning of this phase was marked by the discovery of bedrock, designated Locus 6K26:005, near the base of the slope. Bedrock 6K26:5 consists of a shelf running roughly northwest to southeast, with a break where the bedrock dropped 0.23m to the west of a 0.25m-wide fissure (**Fig. 12**). When probed, this fissure continued to a depth past the reach of our 5m steel tapes. In this phase, a firm, yellowish earth layer, 6K26:004, was laid 0.15-0.29m thick on top of Bedrock 5. The fissure in the bedrock was not filled with Earth Layer 4, so may have occurred as the result of an earthquake after this phase. However, the inhabitants might also have found it impossible to fill such a deep fissure completely and thus laid Earth Layer 4 over the bedrock to provide a stable and flat surface for the founding of a large stone structure, 6K26:003. Possible Wall 6K26:003 also ran from northwest to southeast, and was built primarily with medium-size, hard and soft, reused limestone boulders. Only the southern face of the wall is visible, but four courses appear to have been laid in a two-row-with-rubble pattern. The boulders of the entire southern face are precariously and randomly positioned, making the definition of an actual face difficult. An outer layer of boulders was removed in an attempt to find the face of the wall. However, these boulders were likely part of the original structure, whose south face would have then sloped at an approximate angle of 65 degrees. The top of the wall sloped at a 22-degree angle southward, giving the wall an overall unstable appearance. The greatest height of the wall on the southern face is 2.03m.

The pottery from Earth Layer 4 dated at latest to the Late Iron II/Persian period, giving a probable date for the building activity of this phase. All of the earth layers over and against Wall 3 contained pottery dating to the Hellenistic period, but these layers were the result of erosion and tumble down the *tall*, not from a specific use phase in Field J. The main question that remains, then, is how was Wall 3 used? Having only excavated the southern face of the wall, we may find that excavation along the north face will help clear up this question. From comparison with the earthen rampart from Field Phase 5, it is possible that this was a revetment wall added on to the earlier rampart system in the Late Iron II/Persian period. The western slope rampart system did contain at its base a large, irregularly built wall from the Late Iron II period, leaning at 70 degrees against an earlier Stratum 12 wall (Clark 2000: 90-91). We may have a similar situation here on the southern slope, where earlier fortifications were reused and rebuilt in an uncharacteristically irregular fashion in the Late Iron II/Persian period.

Field Phase 3: Late Iron II/Persian Period

Field Phases 3 and 2 do not represent true field phases in the sense of having clear architectural remains with stratigraphic relationships to each other. Instead they represent the decay and abandonment of the later acropolis settlements at al-'Umayrī. The earth layers excavated from these two 'phases' contained a complete collection of pottery from all periods of settled occupation at the *tall*, but broken into two main 'phases' by the predominant latest pottery and the existence of two phases of field walls in Square 6K66. Field Phase 3 is demarcated by



12. Bedrock 5 with Wall 3.

debris and tumble layers that contained at latest Iron II/Persian-period pottery, while Field Phase 2 is characterized by Hellenistic-period pottery. Although both phases contained ephemeral field walls, it was difficult to identify any surfaces in use with the walls as they were buried in later rock tumble. There is probably considerable overlap between the two phases in representing the demise of the settlements at the top of the *tall*. These layers might not even be restricted to the Late Iron and Hellenistic periods but - on the strength of unworn pottery sherds - could represent wash coming from Middle and Late Bronze Age settlements as well.

In Field Phase 3, the erosion - or wash - layers consisted of mudbrick detritus with patches of softer earth washed down from the acropolis into one or two thick, hard, homogenous earth layers. The mudbrick layers found in the bottom of probes in Squares 6K46 and 6K56 in particular were part of the same mudbrick debris wash when viewed across the West Balks. Earth layer 6K66:004 was particularly rich in organic residue, coating several pails of pottery sherds with the infamous yellow-green color that usually results from pit deposits. At the top of the slope, the lowest layer of the rock tumble discussed in Field Phase 2, 6K76:006, produced clean Iron II/Persian-period pottery and so may belong here. Two small, two- or three-course, single-row walls - 6K76:004 and 6K66:005 - ran horizontally along the slope and may have been small retaining or terrace walls (**Fig. 13**).

Artifacts from these layers included a figurine fragment portraying two hands and a round object (B140022), a tiny tuff bowl (A140171), three Canaanean blades, a tabular scraper, and numerous broken basalt and limestone ground-stone objects and ceramic stoppers and spindle whorls.



13. 'Field' Wall.

Field Phase 2: Hellenistic Period

Following on from the above discussion of Field Phase 3, this phase is characterized by rock tumble and loose earth, with some mudbrick debris. The pattern of rock fall can be interpreted as collapse, with large boulders having toppled off enormous walls at the top of the *tall*, tumbling down to cover the top of the slope (6K76:002, 4, 5; 6K66:002). When viewed in the West Balk, the rock tumble layers of Square 6K76 appear as one, or possibly two, large rock and earth tumble layers. However, when excavated, the rock-tumble layers were clearly resting on top of earth layers which, when excavated, revealed another rock layer. These sub-layers may have represented seasonal washes of debris not separated by much time. Smaller boulders and cobbles rolled a bit further downslope (6K56:002), while a heavy concentration of pebbles and pottery sherds washed down to rest on the lower slope where it levels into a terrace (6K46:002; 6K36:002, 3). South of the large Wall 6K26:003 from Field Phase 4, two distinct layers of cobbles with earth and large voids were washed over the top of the wall but were excavated as one locus, 6K26:002. They were only distinguishable when viewed in the East Balk after excavation: one layer with air pockets just south of the wall, and the other with earth flowing over the top of the wall and the earlier wash layer. This rock-tumble layer, mixed with mudbrick debris in some of the squares and loose earth in the others, and exhibiting a natural grading in the size of rocks from top of slope to bottom, is visible as a single earth layer down the field when viewing the balk sections (see **Fig. 11** for the West Balk section, although in some places this earth layer was clearer in an eastern subsidiary balk section maintained 3m from the West Balk in nearly all of the squares this season). Mudbrick-debris layers are also assigned to this phase on the strength of pottery dates (6K36:004; 6K56:003), although further excavation of 6K36:004 may lead to its reassignment in future seasons as the pottery sample was small. These layers of debris lacked any characteristic marks of destruction or burning,

and probably represent simple weathering over the side of the *tall* from abandoned buildings on the acropolis.

Two single-course, single-row walls are assigned to this phase, probably having served as retaining or terrace walls: 6K66:003 and 6K76:003 (see **Fig. 11**).

Artifacts from these layers include a stone mace-head fragment (A140119), a bronze needle with intact eye (B140032), a bronze ring/earring (B140031), a sherd incised with a walking figure (B140010), a female figurine fragment (B140009), an incised plaque (B140030), a lithic projectile point and tabular scraper, and numerous basalt and limestone groundstone fragments as well as ceramic stoppers and spindle whorls.

Field Phase 1: Modern

Before the excavation season began, a large front-end loader was used to remove decades of sift piles from the area where Field J was planned. In the process, it may have removed some topsoil as well, especially from the squares higher up the slope. Square 6K26 was, however, mostly untouched by the machinery, and provided enough comparison for topsoil depth and characteristics to know that the topsoil was mostly undisturbed.

Topsoil was loose, windblown earth of fairly standard color (10YR5/3 and 5/4) and texture (sandy loam/clay) across the squares. Depth ranged from 0.01-1.05m, with the deposit consisting of a thin, easily swept-up earth layer in Squares 6K56 and 6K46; it was deeper in the other squares. Again, this may have been altered somewhat by the machinery. In Square 6K46, where the slope levels out on a small terrace, roots had taken concentrated hold to a depth of up to half a meter in places. The roots caused the earth to be more crumbly in the southern part of the square, where they loosened up the mudbrick debris of 6K46:002 to a depth of 0.32m in some places, compared to the 0.06-0.09m depth in others. No visible plow lines were detected on this small plateau, although the loader may have removed evidence of agricultural use in modern times.

The topsoil pottery ranged from Byzantine to Early Bronze Age sherds, representing every period of settlement occupation at the site, whose wash after abandonment made its way down the southern slope. Artifacts included a glass bracelet fragment (B140023), a possible Horus figurine fragment (B140001), a fine metal chisel (B140007), a possible model shrine fragment (B140006), a tuff pendant (B140003), many fragments of basalt and limestone groundstone objects, ceramic stoppers and spindle whorls, and a flint geometric sickle.

Conclusion

The excavations in Field J this season provide insight into natural and anthropogenic formation processes at al-'Umayrī. The earth and rock tumble layers from the southern slope allow the reconstruction of a story of decay and abandonment of the later settlements at al-'Umayrī. The diverse range of pottery mixed in with windblown earth, rock tumble and mudbrick debris point to the collapse of thousands of years of habitation on the acropolis. The demise of large Late Iron II/Persian- and Hellenistic-period structures contributed to the easing of the southern slope over time, filling in its curve and disturbing the earlier rampart layers. While some of the Bronze Age sherds found in the debris most likely originated from mudbricks, there was a significant number of Middle and Late Bronze Age sherds (including a couple of brightly painted Mycenaean sherds) that were unworn and thus give a good indication of there being Bronze-Age settlement nearby. While excavation this season did not reach below these naturally deposited earth layers, future seasons should continue to complete the picture of use and habitation on the southern slope.

Field P: The Southeast Shelf

Nikki Oakden, Mount Royal University
Assisted by Jillian Logee, Calgary, Alberta and Monique Vincent, University of Chicago

Field P was opened during the 2014 season on the southeastern shelf of the *tall*. The location was selected for work this season for several reasons: (1) proximity to the Field K dolmen and associated features from the Early Bronze Age; (2) GPR work performed by Bilal Khrisat of Hashemite University in July 2013 which produced data showing subsurface anomalies in this area, perhaps tombs; and (3) evidence suggesting more than one dolmen located on the southeast-

ern shelf. This came about through a photogrammetric image of the Field K dolmen showing the possible outlines of the foundation of another dolmen immediately west of the first one.

Two squares, 4N80 and 4N93, were opened in areas where subsurface anomalies were indicated by the GPR data. Square 4N93 is located directly north of the Field K dolmen and associated features, separated from it by only a few meters. Square 4N80 lies just to the west of 4N93. Designation of a new field for these excavation areas was predicated on the move to a new geo-referenced grid system in 2010 (Clark and Bramlett 2011) that adjusted the orientation of the Field K grid in this area, which was originally part of the al-ʻUmayrī Survey and thus not tied to the *tall* grid. While no tombs emerged during the 2014 season, plastered surfaces and postholes cut into bedrock attest to further features likely in use with those around the Field K dolmen. The topsoil was very thin in some areas of the squares, revealing large expanses of bedrock just below the surface. A wide range of dated pottery from the topsoil and sub-topsoil layers probably originated from the surface and slopes of the *tall*, washed down to the rock outcroppings over millennia, this constituting Field Phases 1 and 2. However, the pottery sherds associated with stratigraphic features indicate the presence of predominantly Early Bronze Age activities, represented by Field Phase 4. Possible later activity in the Middle Bronze Age (Field Phase 3) is limited in exposure. The suggestion of tombs in this area, while not proven, is perhaps still to be confirmed in view of the discovery of a human mandible protruding from the balk of Square 4N93.

One of the main goals of the season was to discover and explore the anomalies shown during GPR-data analysis. With the proximity of the EB IB dolmen burial and an MB IIC chamber burial further to the south, there was the possibility that more tomb structures might be located in the area. Following excavation along the southern face of the bedrock shelf in 4N93, no tomb entrance was found although chiseling marks were evident. It is possible an entrance may be located in an adjacent area outside the excavated area. Continued work in 4N80 is necessary to establish probable cause of the anomaly registered there.

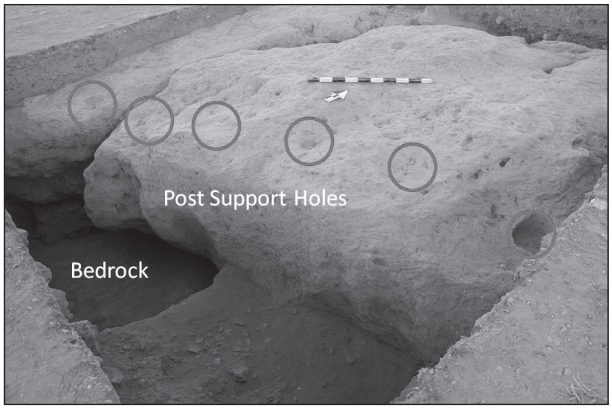
Field Phase 4: Early Bronze

The bedrock shelf above and north of the southern escarpment face where ancient chiseling had made what looked like an aborted preparation for a tomb entrance had numerous postholes carved into its surface (**Fig. 14**). These postholes were associated with a plaster surface that smoothed and leveled portions of the exposed rock into which the postholes were cut. A second plaster surface was constructed on top of fill layers below the shelf and abutted the vertical escarpment face from the south. This second surface was possibly a continuation of a surface traced in Field K; it was associated with the dolmen and hypothesized to function in ritual ceremonies at the dolmen. This intentional construction of leveled surfaces near the postholes may be evidence for a raised structure or shelter related to the events associated with the Field K dolmen, which is directly south of this feature.

Square 4N80 showed no coherent architecture or stratigraphy dated to the Early Bronze Age. However, parts of two fragmentary walls and poorly preserved clay- and mortar-like layers are perhaps intentional fill layers on the bedrock, laid to support the walls. A layer of mudbrick collapse produced only EB pottery sherds and may be part of the post-use abandonment phase.

Field Phase 3: Middle Bronze?

The top courses of two small field walls, tentatively assigned to this phase, were uncovered directly beneath the topsoil in Square 4N80. These two walls run parallel to each other from SW to NE, with Wall 5 located in the NW corner and Wall 3 bisecting the square on the west side (**Fig. 15**). The placement and difference in



14. Field P bedrock with postholes.

elevation of these field walls might suggest possible agricultural terracing. However, the exact relationship between them was not explored this season. Only the eastern face of Wall 3 was exposed; the rest remains obscured by rubble and will have to be excavated in a future season (see Phase 1).

Wall 3 consisted of two courses: a lower course of boulders ranging from 30-50cm long with an upper course of smaller cobbles. Wall 3 was buried by Rubble Layer 4N80:2 to its lowest course and appeared to have been constructed directly on top of Clay Lens 4N80:7, which covered all of the square east of Wall 3. Upon excavation of a 1m x 2.5m probe along the north balk, it was determined that Layer 7 ran underneath the lowest course of Wall 3 with no sign of a foundation trench. The ceramic dates recovered from Layer 7 appear to be Middle to Early Bronze. If Layer 7 is an earlier deposit of sheet wash, then Wall 3 was most likely constructed post-Early Bronze, making it either Middle Bronze or later. There appears to be significant rodent disturbance throughout Layer 7, however, but without more specific dates it is unclear if the presence of Middle Bronze pottery is a result of bioturbation or a genuine representation of Phase 3. Fortunately there is a chance to obtain clearer results in future, as only the area of Layer 7 excavated this season was within the probe.

Field Phase 2: Late Iron II/Persian Period

A layer in Square 4N893 containing Early Bronze to Late Iron 2/Persian pottery sherds represents part of the destruction/post-abandonment history of that phase on the *tall*, and not its use phase. It represents sheet wash of materials off the *tall* from that time period.

Field Phase 1: Modern

The topsoil *loci* are a mix of hill-slide and sheet-wash debris that included modern bullets as well as Byzantine through Early Bronze ceramic remains. In Square 4N80, a rubble layer of small cobbles lay directly beneath the topsoil. This rubble layer was bisected by Wall 3 which separated it into two different *loci*: Earth Layer 4N80:2 east of Wall 3 and Earth Layer 4N80:4 west of it. Only Earth Layer 2 east of Wall 3 was excavated this season. A second rubble layer consisting of larger cobbles/boulders and sandier earth lay beneath Earth Layer 2, but did not abut Wall 3. Both Earth Layers 2 and 6 contained pottery dating from Early Bronze through Byzantine periods and were also likely deposited by sheet wash and hillside erosion sometime during or after the Byzantine era.

Since Earth Layer 4 was not excavated this season, the only part of Wall 4N80:5 uncovered so far was the uppermost course of cobbles which lay directly below the topsoil surface. Until further excavation can determine the full context of Wall 5 and whether it is in any way associated with the parallel field Wall 3, the actual phasing of this wall is unknown aside from its association with the topsoil/sheet wash.

'Umayrī Survey Site 84

David and Amanda Hopkins, Wesley Theological Seminary

The ancient workers on the hill-slope site of 'Umayrī Survey Site 84 created a dense mélange of rock-cut features. Their activity has been surveyed often (1989, 1992, 1994 and 2014), with their prominent rectilinear structure (9.8m x 9.8m) most likely managing intensive agricultural production. The remnants of this impressive activity lay partially exposed and partially hidden beneath a mantle of agricultural activity dominated by thistle, thorny burnet and cotoneaster.

Excavators in the 2014 dig season concentrated on thorough documentation of the features that constitute Site 84. Documentation included newly identified rock-cut features, a curvilinear pressing surface and those features that required significant clearing, *viz*. a set of cup holes/postholes, a pressing surface, two large basins and one small basin.



15. Walls 3 and 5 in Square 4N80.

Due to the discovery and clearing of numerous features, excavators were unable to return to a natural rock-hewn cave with plaster on the walls and ceilings, partially cleared in 2012. However, based on the evidence of chisel work and plaster, excavators continue to believe that it probably functioned as a cistern.

Plans for the 2014 season also included mapping features of the site on a GIS map in order better to understand the possible relationships of various features of the site with one another. Structure-from-motion imaging and aerial photography created detailed documentation of the site.

Pressing Installations of Site 84

The deeply eroded and degraded exposed bedrock landscape presented extraordinary difficulty in identifying the presence and condition of rock-cut features. Even given this difficulty, most features seem to have a pressing surface with all or some of these other attributes: associated cup holes, basin and/or channel. This suggests that the facilities for the initial stages of wine production occur within close proximity to each other. Absence of one of these attributes raises the level of uncertainty about the identification of the relationship between and amongst features.

One of the features, a curvilinear pressing surface, is located adjacent to a large, rock-hewn ledge **(Fig. 16)**. It is east of the farmstead. This feature is exemplary for its workmanship and preservation apart from one section that has been dislocated.

Even though the above associations are visually absent, excavators believe that the surface was used for pressing grapes. Its uniformly dimpled floor and sloping circular raised edges would have made possible its function of pressing and containing the liquid. The absence of an associated basin may be the result of earthquake damage.

Basins of Site 84 not Immediately Associated with a Pressing Surface

The previously noted deterioration of the bedrock produced seemingly natural features that appeared to be possible basins. As excavators investigated these depressions, signs of human labor (primarily chiseling) began to appear. Further clearing around these features showed that they were indeed basins and some of them had associated cup holes. Lists of these basins with their associations show their substantial number.

Mortars and Grinders

Mortars and grinders were identified during the 1994 excavation of the rectilinear farmstead. Two of these features were cleared during the 2014 season. These are approximately twice the size of those found within the farmstead; they lack associated features.

Quarry Marks

Quarry marks constitute a ubiquitous feature of the exposed bedrock of Site 84. This quarrying often produces a remarkably well-carved bedrock face.

Water-Management Devices

Site 84 offers three types of water-management device: reservoirs, cisterns and wells, along with a nearby trough. The incidence of modern capped wells still in use deepens appreciation for the richness of this site as a major agricultural resource both past and present. One of these features is a large reservoir, measuring 5m x 4.3m **(Fig. 17)**. Stone steps found in the northeast corner lead from the surface to the yet-to-be unearthed floor. The walls of the reservoir show chiseling. They and the steps also show signs of dissolution where the topsoil fill rested against them. The northwest wall was cracked along its face.

Wall Lines of Site 84

During the 1992 and 1994 seasons, four wall lines were noted. One, a perimeter wall, is still visible. Two phases of this wall are possible. Some are wholly or partially orthogonal and/or curvilinear.

While there are many unexcavated features to be found at Site 84, a good sample has been achieved. From this we can begin to see some associations among the features (*e.g.* pressing surfaces to basins and cup holes, and basins with cup holes). One is amazed by the sheer size of this agricultural installation. The facilities of Site 84 have yet to yield features associated with olive oil production (*i.e.* crushing facilities and separation vats).

Technology

Tall al-'Umayrī is currently the subject of negotiations connected to land-ownership issues. This has left the future of long-term excavations at the site in something of a state of flux, even if there is some promise of a resolution in favor of the cultural heritage preserved at the site.



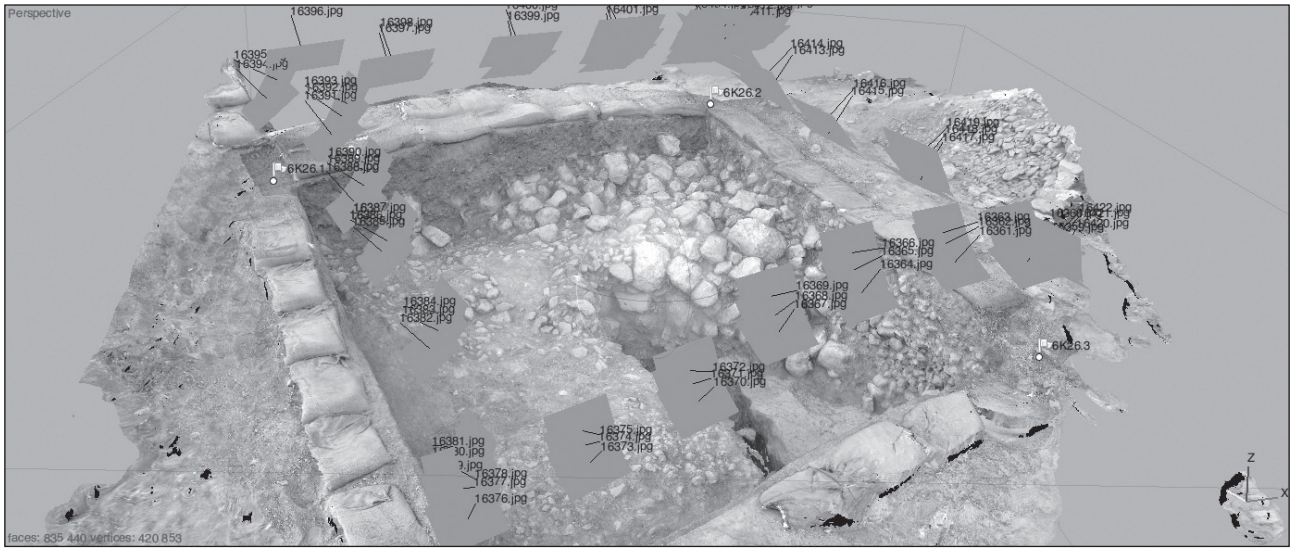
16. Site 84 curved pressing installation.



17. Site 84 rectangular reservoir.

The 2014 season was intentionally arranged to permit the testing of new technologies for the precise and accurate recording of archaeological features and discoveries. Of major significance were the use of a 3DR X8 drone (UAV) capable of supporting multiple GoPro cameras to produce 3D video and still photographs, a Steadicam for recording 3D videos, and implementation of structure-from-motion photogrammetry in order to produce 3D models of squares, features and large portions of the site. With these new technologies, provided in large part by a grant from the Versacare Foundation, the team was able to document everything from small objects to the entire *tall* site with fully manipulable images for a wide range of research applications.

A systematic approach to excavation documentation was employed this season to produce a photogrammetric rendering of each excavation square every morning. A series of high-resolution photos was taken from each side of every square and processed with Agisoft's Photoscan Pro to produce a structure-from-motion 3D model showing the daily excavation progress **(Fig. 18)**. It is anticipated that these models can be digitally stacked so that future researchers will be able to examine the daily progress, and closely examine and manipulate in 3D the emergence of archaeological features to evaluate the interpretations made with improved levels of information than have hitherto been preserved. Use of this type of photography also allowed us, for the first time, to create digital balk drawings which were geo-rectified.



18. Structure-from-Motion in square.

Restoration and Preservation

Following excavation in 2014, all newly exposed architecture was consolidated and conserved, as happens at the end of each excavation season. This has resulted in the complete preservation of virtually all extant architecture at the site, making research easier for archaeologists and visualization of the remains more meaningful for visitors.

The greater threat to the survival of cultural heritage at al-'Umayrī is a dispute between land owners and the government (referenced above), which may leave vulnerable all exposed surfaces and architecture, and could force an end to excavation. All parties are of good will and are searching for a solution that respects both the cultural heritage of Jordan represented at the site and the rights of those who have invested in the land.

Plans for 2016

While uncertainties continue to plague the process of future planning due to land-ownership issues, the project is planning tentatively to continue excavations at 'Umayrī in 2016.

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MADABA PLAINS PROJECT: EXCAVATIONS AT TALL AL-'UMAYRĪ, 2016

Douglas R. Clark and Kent V. Bramlett

Introduction

An eighteenth season of excavation by the Madaba Plains Project at Tall al-'Umayrī occurred between 22 June and 27 July 2016. It was sponsored by La Sierra University in consortium with Burman University (Alberta, Canada), Pacific Union College (California, USA), Mount Royal University (Alberta, Canada), and Walla Walla University (Washington State, USA). Full reports have already been published for the first ten seasons in nine volumes (first season [1984]: Geraty *et al.* 1989; second season [1987]: Herr *et al.* 1991; third season [1989]: Herr *et al.* 1997; fourth season [1992]: Herr *et al.* 2000; fifth season [1994]: Herr *et al.* 2002; sixth and seventh [combined 1996 and 1998]: Herr *et al*. 2015; eighth season [2000]: Herr *et al*. 2017; ninth season [2002]: Herr *et al*. 2019; and tenth [2004]: Herr *et al*. 2020).

Preliminary reports have also been published (first season [1984]: Geraty 1985; Geraty *et al.* 1986, 1987; second season [1987]: Geraty *et al.* 1988, 1989, 1990; third season [1989]: Younker *et al.* 1990; Herr *et al.* 1991; LaBianca *et al.* 1995; fourth season [1992]: Younker *et al.* 1993; Herr *et al.* 1994; fifth season [1994]: Younker *et al* 1996; Herr *et al.* 1996; sixth season [1996]: Younker *et al.* 1997; Herr *et al.* 1997; seventh season [1998]: Herr *et al.* 1999, 2000; eighth season [2000]: Herr, Clark and Trenchard 2001, 2002; ninth season [2002]: Herr and Clark 2003, 2004; tenth season [2004]: Herr and Clark 2005a, 2005b; eleventh season [2006]: Herr and Clark 2008a, 2008b; twelfth season [2008]: Herr and Clark 2010, 2013; thirteenth season [2010]: Clark and Bramlett 2011, 2012a, 2012b; fourteenth season [2011] and fifteenth season [2012] combined reports: Clark and Bramlett 2017; sixteenth season [2013 (week-long geophysical research season)] and seventeenth season [2014] combined reports: Bramlett and Clark [in press]). For a summary report of the first 12 seasons (1984-2008), see Herr and Clark 2009; Clark 2011; and Herr 2011 in Clark *et al*. 2011.

In the 2016 season, a team of 15 Jordanians and 35 foreigners participated in the fieldwork and camp activities of the interdisciplinary project at al-'Umayrī, located 12km south of 'Ammān's Seventh Circle on the Queen Alia Airport Highway, at the turnoff for Amman National Park (**Fig. 1**).

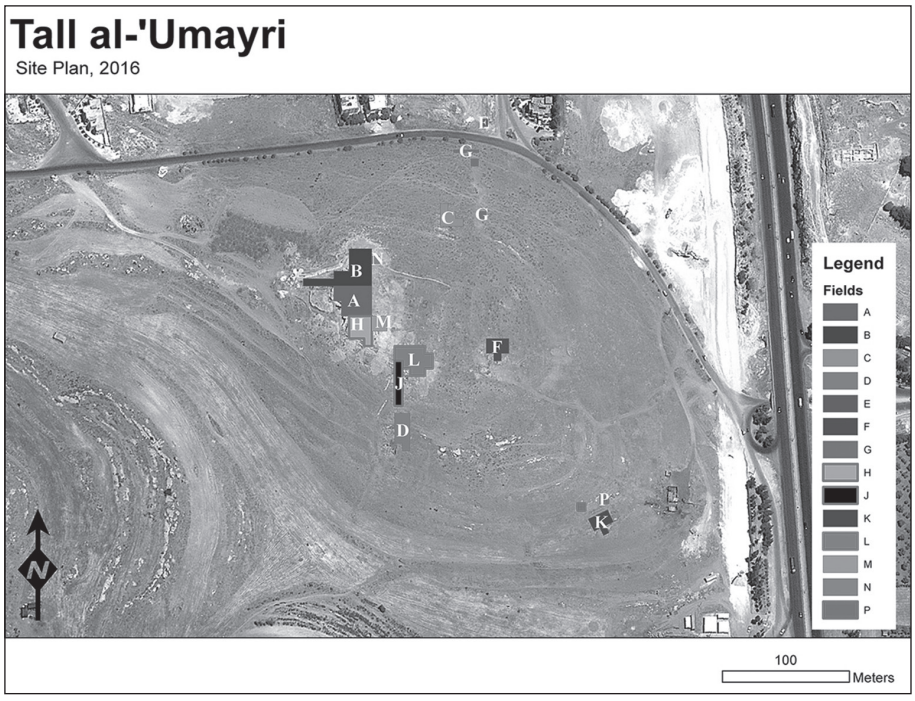
In the first season (1984) four fields of excavation were opened (Fields A, B, C and D) (**Fig. 2**). During the second season (1987) three of the four were expanded (Fields A, B and D), one was completed to bedrock (Field C), and two new fields were opened (Fields E and F). In the third season (1989) one field expanded (Field A), three fields reopened old squares and expanded slightly (Fields B, D and F), another reduced excavation from two squares to one (Field E), and a new field was opened on the northern slope as a series of three soundings (Field G). In the fourth season (1992) three fields deepened previously opened squares (Fields A, D and F), one deepened existing squares while expanding by one square (Field B), and two fields were discontinued (Fields E and G). During the fifth season (1994) one field deepened (Field A), another expanded and deepened (Field B), and one was added (Field H). In the sixth season (1996) three fields expanded (Fields A, B and H). The tomb excavations on the southeastern slopes of the *tall*, already begun under the hinterland survey in



1. Aerial View of al-'Umayrī.

1994, became part of the al-'Umayrī *tall* excavations as Field K. During the seventh season (1998) two fields deepened their squares (Fields A and B), two expanded (Fields H and K), and a new field was opened on the southern lip of the site (Field L). In the eighth season (2000) we deepened three fields (Fields A, B and H) and expanded and deepened in two fields (Fields K and L). During the ninth season (2002) Field A was not worked, while Field B expanded to the north and continued in two other squares; Field H limited itself to the large plastered and cobbled courtyard near the northern extent of the field (next to Field A); in Field L we exposed more of the Hellenistic structure by opening two new squares and reopening one other. During the tenth season (2004) Field A deepened squares begun during the 1980s; Field B deepened three earlier squares and expanded to the north to intersect the northern edge of the site; Field H deepened earlier squares in its northern part; and Field L deepened three previous squares and opened one new square. During the eleventh season (2006) Field A concentrated on removing balks and small areas between walls to deepen the western part of the field to late Iron I levels; one square was opened at the southwest corner of the field to examine the possible existence of a gateway. In Field B excavation concentrated on uncovering the floors of the northern extent of the remarkably well-preserved Late Bronze (LB) building. Excavation in Field H concentrated on bringing the southern part of the open-air sanctuary down to late Iron I levels. Field L, on the southern lip of the site, expanded to the east and north with three new squares.

The 2008 season saw Field A expose the third LB/Iron I building in the southern part of the field by going deeper in most squares. Field B completed the excavation of the LB building and added a square to the east with a new field designation, Field N. Field H went deeper in four squares, exposing the top of the LB/Iron I levels and locating the bottom of the southern portion of the perimeter wall. Field L went



2. Tall with fields indicated.

lower in three squares and added two more squares to the west. Additionally, a new field was opened, Field M, east of Field H in our overall goal of connecting Fields H and L. This season also marked the initiation of the use of high-resolution GPS for the location of fields, squares and architecture. It forced a slight change of orientation to align all our squares with true north and we chose to locate squares on primary grid lines, causing some squares to be smaller in their east-west measurements.

The thirteenth field season (2010) continued work in four fields (Fields A, H, L and M). Field A extended the exposure of LB/Iron I domestic structures, clearing the third building and uncovering the major portion of a fourth. Clearance of the Late Iron I sacred precinct in Field H brought the team to domestic structures post-dating the Early Iron I buildings in Field A, but preceding the precinct. Field L cleared Hellenistic remains in several balks, clarifying in the process the function of an Iron II oil press and exposing the tops of several Iron II walls. Field M cleared late Iron II paved-plaza levels surrounding what appear to be domestic buildings.

In 2011, the small team focused on Field H (continued clearance of post-Early Iron I debris in order to expose the remaining components of Early Iron Age Building M, and Field L (removal of all Hellenistic architecture in order to expose Iron Age remains). The 2012 season saw the return of a full team, but progress was limited due to land-owner disputes. Fields excavated included A (exposing the fourth of five Early Iron I joined houses), H (completion of the clearance of Building M, a 'four-room' building), L (Late Iron II and Persian domestic remains), al-'Umayrī Survey Site 84 (excavation of a cistern), and cleaning in Field K (for the purpose of more complete photographic recording).

In 2013 a very small team recorded ground-penetrating radar (GPR) and electromagnetic imaging data in and around Field K in search of other dolmen burials. While useful, the collected data were of limited value in this quest as determined by ground-truthing in 2014. The excavated anomalies unfortunately did not lead us to more burials. The 2014 season saw the return of a full complement of staff, volunteers and laborers and resulted in the excavation of the following fields: Field H (Square 7K02 only) yielded material finds only from the Late Iron II period through Late Iron II/Persian, illustrating typical Iron Age domestic occupation; Field J, new this season, formed a step trench down the southern slope of the *tall*, connecting Field L on the acropolis and Field D down the slope and exposing in at least fragmentary fashion rampart layers forming the Late Iron Age (and possibly Late Bronze Age/Early Iron

Age) defenses on the southern perimeter of the site; Field P, also newly established this season, was located in close proximity to the Field K dolmen and associated finds from previous seasons, and provided limited ground-truthing of the 2013 GPR data and revealed bedrock with Early Bronze Age post-hole placements carved into it, but without further definition; and al-'Umayrī Survey Site 84 saw treatment and integration of several agricultural features including pressing installations, basins, mortars and grinders, quarry marks, water-management devices and wall lines.

Following 18 seasons, including 2016, the team feels confident in talking about final stratum numbers for the site. We think, reasonably, that no new significant settlements will be discovered beyond those we have already identified (**Fig. 3**).

MPP-`Umayri Chronology

Stratum	*Period*	*Date*
	Neolithic	
	Chalcolithic?	
Hiatus	EB IA	c 4500-3000 BC
21	EB IB	c 3000-2700 BC
20	EB II	c 2700-2500 BC
19	EB III	c 2500-2200 BC
18	EB IV	c 2200-2150 BC
17	EB IV	c 2150-2100 BC
Hiatus	EB IV-MB IIA-B	c 2100-1700 BC
16	MB IIC	c 1700-1650 BC
15	MB IIC	c 1650-1550 BC
Hiatus	LB I	c 1550-1400 BC
14	LB II	c 1400-1250 BC
Hiatus?	Late LB II	c 1250-1230 BC
13	LB/Iron I	c 1230-1200 BC
12	LB/Iron I	c 1200-1150 BC
11	Iron IA	c 1150-1100 BC
10	Iron IB	c 1050-1000 BC
9	Iron IB-IIA	c 1000-850 BC
8	Iron IIB	c 850-680 BC
Hiatus	Iron IIB/C	c 680-620 BC
7	Iron IIC	c 620-550 BC
6	Iron IIC/Per	c 550-475 BC
5	E Persian	c 475-400 BC
Hiatus	L Per- E Hel	c 400-300 BC
4	L Hellenistic	c 300- 50 BC
3	E Roman	c 50 BC-AD 135
3	L Roman	c AD 135-330
2	Byzantine	c AD 330-650
1	Islamic	c AD 650-Pres

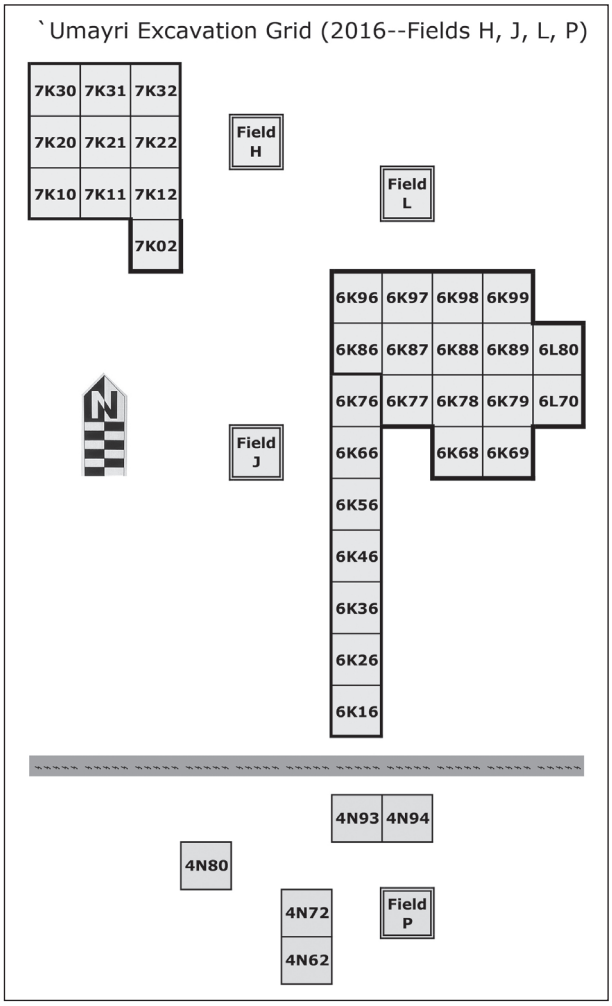
3. al-'Umayrī Strata Chart.

Field H: The Southwestern Acropolis

Monique D. Vincent, Walla Walla University
Assisted by Craig Tyson, D'Youville College

Introduction

The goal of this season's excavation in Square 7K02 (**Fig. 4**) was to locate the southern perimeter wall of the LB/Early Iron I settlement, suspected to lie under Wall 2. While the 2014 season demonstrated that Wall 2 predated the



4. 2016 al-'Umayrī Grid – Fields H, J, L and P.

Late Iron II/Persian period, the probes were not deep enough to demonstrate an earlier date. The results of a small probe north of Wall 2 exposed an occupation phase equivalent to site-wide Stratum 12, as well as a contemporary wall that likely served as the settlement's perimeter wall, Wall 46. The discovery of Stratum 12 occupation adds to our knowledge of the extent and nature of the habitation and destruction of this stratum, while continued excavation along the southwestern edge of the *tall* contributes to our understanding and refinement of the Iron Age occupational sequence at al-ʻUmayrī.

Field Phase 15: Late Bronze/Early Iron I (Transitional Period? Site-wide Stratum 13?)

This new field phase was exposed in a small probe below the FP14 surfaces. A hard-packed earth layer provided a firm foundation for the later FP14 features. When excavated, this earth layer was composed of dark clay filled with small bits of *nari* (calcrete) and charcoal, well-preserved animal bones, and cobble-sized rocks. This layer may have resulted from an earlier destruction, though the contrast with the ultra-burnt FP14 destruction debris indicates less burning.

The FP15 earth layer sealed against a row of large boulders that are possibly part of a large wall. While the foundation date of this wall cannot be determined at this time, it is the earliest in a sequence of walls that demarcated the southern boundary of habitation on the acropolis.

Field Phase 14: Late Bronze/Early Iron I (Transitional Period; site-wide Stratum 12)

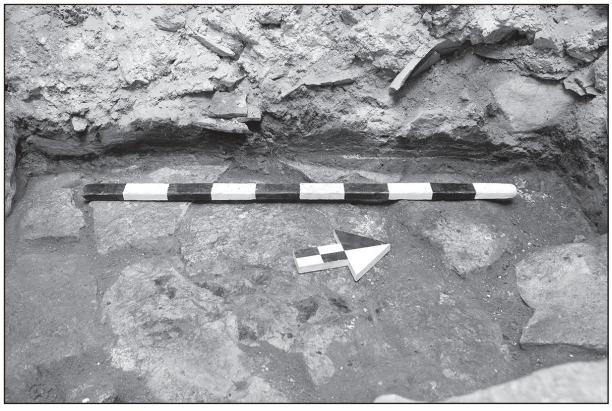
A 1.03m deep destruction layer, consisting largely of burnt mudbricks and plaster, along with stones and large pithos sherds, was instantly recognized as the same dynamic destruction previously identified in Fields B and A, and dated to site-wide Stratum 12, the LB/Early Iron I transitional period.

The beginning of FP14 in Square 7K02 occurred presumably with the construction of a large wall (E-W Wall 46) (**Fig. 5**). Three courses high and constructed of small and medium boulders, this wall was likely the perimeter wall of the settlement along the southern edge. Wall 47 was built perpendicular to Wall 46.

A well-constructed flagstone pavement, Surface 52 was likely built at the same time as Wall 47. The flagstones were remarkably well selected for their flatness and their fit to produce a smooth, even surface west of Wall 47 (**Fig. 6**). Flagstone Pavement 52 is comparable to that found in Building B in Field B as a later phase of a surface in Room B2C (Surface B7K80: 074, 75, 76; Clark 2002: 96-97). Above Surface 52 a thin clay layer sealed in the stones, forming the base layer of Earth Surface 50, with several



5. Wall Phases in Field H.



6. Flagstone Surface Sealing against Perimeter Wall.

fine laminations of clay, ash and charcoal.

East of Wall 47, Earth Surface 51 sealed against both Walls 47 and 46. A beautifully intact basalt tripod quern (B160035) was wedged deep into Surface 51 below the pottery sherds and a small hand grinder (B160038) (**Fig. 7a, b**). Another basalt hand grinder (B160034) and a faience spacer bead (B160018) were found in the upper parts of the destruction debris above the FP14 surfaces. The artifacts from this phase, related to food storage and preparation and textile production, allow me to suggest that this small exposed area was once part of a larger domestic structure.

At the end of the use phase of this area, the mudbricks that crowned the stone walls collapsed inward along with all of the large storage jars that must have been secured on an upper floor, in so doing completely filling the meter of destruction debris that covered this area.

Field Phase 13/12(?): Early Iron I Period(?)

In this Early Iron I phase, Surfaces 40 and 42 sealed against Wall 2. Cobble Surface 42 in particular was sealed against the base of the wall, with some of the cobbles wedged firmly between the wall stones. Surface 42, therefore, was likely constructed shortly after the foundation of Wall 2 and both were used in conjunction here on the very southern edge of the *tall*. Whether or not these surfaces are best matched with Field Phase 13 or 12 is difficult to tell without a direct stratigraphic connection to the main part of Field H, but the early date of the pottery makes this time period likely.

Conclusion

While the excavated probe in Field H was extremely limited in size this season, it produced results that exceeded expectations. The discovery of the LB/Early Iron I perimeter wall, Wall 46, answered questions about the exact location of the southern boundary of this settlement at the beginning of the Iron Age. Though questions about its antecedents could not yet be answered, its presence with Wall 2 does establish the nature of continual reconstruction throughout the entirety of the Iron Age in this location.

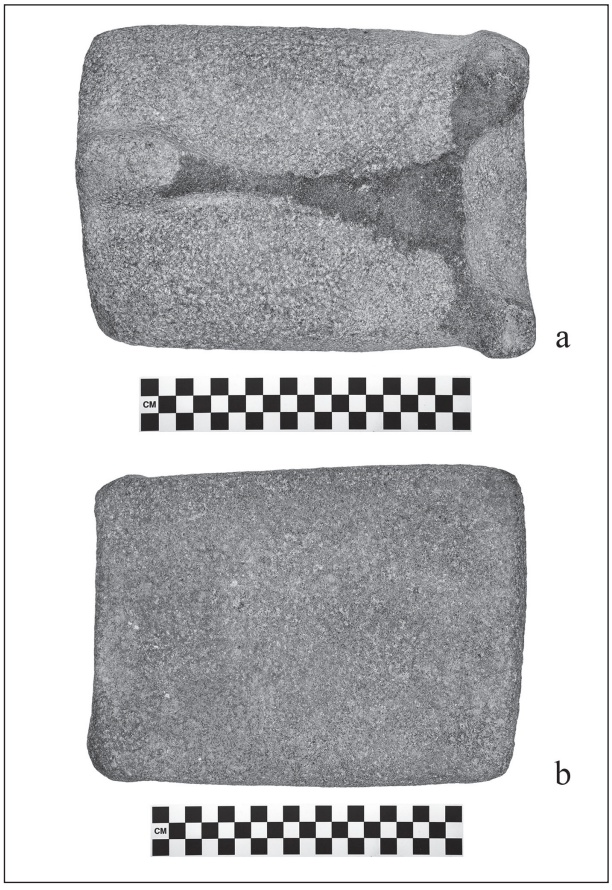
This small window into another domestic structure belonging to site-wide Stratum 12 adds to the collection of structures with similar construction styles and artifact remains known from this period, the focus of the first author's dissertation research (Vincent 2016). Within the context of this larger research design, it is noteworthy that construction efforts in this part of the settlement maintained the same pattern observed in Fields B and A, using simple boulder walls and mudbricks with which to construct houses, with paved and unpaved surfaces. Parallels also appeared among groundstone implements.

Field J: The Southern Slope

Monique D. Vincent, Walla Walla University

Introduction

This season we continued excavations on the site's southern slope, reopening the top four squares of Field J. The field comprises, from top/north to bottom/south, Squares 6K76, 6K66, 6K56, 6K46, 6K36, 6K26 and 6K16; only Squares 6K76, 6K66, 6K56 and 6K46 were excavated during the 2016 season. Our goals were to continue exploring the potential fortifications



7. |a, b: Rectangular Tripod Lower Grindstone Bottom and Top.

identified at the end of the 2014 season. The discovery of bedrock in three of the squares this season provided a clear sequence of use and wash phases on the southern slope (**Fig. 8**).

The earliest use phase in Field J dates to the LB/Early Iron I transitional period, likely associated with site-wide Stratum 12. This phase, detected in 2014 and assigned preliminarily to the Iron I period as Field Phase 5, can now be dated with better accuracy to the transitional phase after probes established the entire sequence of rampart construction. This rampart adds to our knowledge of the fortification system at Tall al-'Umayrī during Stratum 12, confirming that such a time-intensive and materials-expensive project was worthwhile to the inhabitants.

The next use phase with identifiable structures occurred in the Late Iron II/Persian period, when two battered walls reminiscent of a similar structure in Field B were constructed to shore up the rampart system (Herr *et al*. 2000: 90-91). This was likely part of the same later reconstruction and reuse of the earlier rampart that is mirrored on the western rampart.

It is surprising that no earlier rampart system dating to the Middle Bronze Age was discovered on the southern slope to match that found on the western slope. If it did exist, it was thoroughly disturbed by the inhabitants of the LB/Early Iron I period, whose pottery was found in all layers of the rampart down to bedrock. A second surprise this season was the absence of a perimeter wall dating to the LB/Early Iron I period at the top of the slope, similar to that found in Field B and now also in Field H (see Field H report in this article). The discovery this season of the rampart in Field L Square 6K86 provided the suggestion that the perimeter wall could be located further inward on the *tall*, and was no longer following the modern edge of the acropolis (see Field L report in this article). It is possible that later Iron Age construction extended occupation out over the earlier rampart layers, leveling them off with fill layers to do so. The only large walls found in Field J were those tipped onto the top of the slope from Field L's Late Iron II/Persian constructions.

Field Phase 6: Early Bronze Age

While not representative of a true occupational field phase, the discovery of an ovoid cupule, 6K46:007, carved into the bedrock halfway down the slope requires the recognition of possible Early Bronze Age activity on the southern slope. Early Bronze Age pottery sherds were found mixed into the lower levels of *loci* excavated above bedrock throughout Field J, especially in 6K56. The Early Bronze Age occupation in Field D at the base of the slope would have made this area easily accessible to the inhabitants. Parallel phenomena in the bedrock in Field B support this scenario.

Field Phase 5: Late Bronze/Early Iron I Period

Continued excavation in the two uppermost squares of Field J revealed a series of earth layers used to construct a defensive rampart on the southern slope. This phase and the uppermost rampart layer were already detected in 2014 and assigned preliminarily to the Iron I period as Field Phase 5 (Vincent 2014 report). However, the pottery found in these layers is primarily dated to the transitional LB/Early Iron I period, likely associated with site-wide Stratum 12. The



8. Squares in Field J.

rampart on the southern slope ended much further up the slope than it did on the western slope.

It is remarkable that the inhabitants constructed over two meters of earth and stone fill layers to support an inclined rampart surface on the southern slope, showing a strong commitment to the settlement's fortifications. Unfortunately for them, their careful preparations did not prevent the eventual - and fiery - destruction of their settlement.

Field Phase 4: Late Iron II/Persian Period

The only other occupational phase identified during the 2014 season was one associated with a large stone structure at the base of the Field J slope, 6K26:003 (Vincent 2014 report). This wall was possibly intended as a means of shoring up the base of a later rampart extension, for which further evidence was discovered this season. Walls 6K56:008 and 014 were both single-row, several-course, east-west walls constructed midway down the slope. They appear to have been battered against earth layers at a slight angle upslope, possibly part of a reconstruction and reuse of the earlier rampart by the inhabitants of a late Iron Age settlement.

Wall 14 was at the southern edge of the probe, so it was not possible to explore construction on the other side of the wall. Alternatively, this wall and earth layer could be the southern extent of the LB/Early Iron Age rampart, if the earthquake can explain the ceramic contamination, as Locus 12 contained mostly LB/Early Iron Age and earlier pottery, with a few Iron I and Iron II sherds. Wall 8 was constructed in six courses to a height of 0.60m above Wall 14 and slightly offset to the north, also with a southern face (**Fig. 9**). This coarse wall could not have stood without being battered against Earth Layers 6K56:007, 009, 010 and 011 sealing against its northern side, as it was nearly impossible to keep the stones in position after excavating each course. Continued stratigraphic and typological research is required to determine similarities between these walls and those forming part of the western rampart system.

Field Phase 3: Late Iron II/Persian Period

Two sheet-wash or debris layers, 6K46:005 and 006, are difficult to place without accompanying architecture, and are thus assigned to the general wash-layer phase designated as Field Phase 3 in 2014 (Vincent 2014 report). The pottery in these layers dated at the latest to the Late Iron II/Persian period. These layers were probably general wash and tumble from this period of occupation on the *tall*.

Conclusion

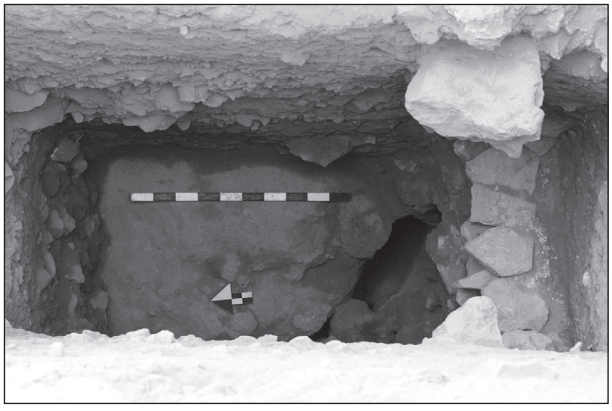
Excavation in Field J this season filled in the story of southern slope activity that we began uncovering in 2014. The identification of two main phases of fortification construction on the slope, one at the beginning of the Iron Age and one at the end, aids our understanding of the inhabitants' priorities and concerns. Fortifications were necessary to them not only on the shallow western ridge of the *tall*, but on the naturally steep southern slope as well. The effort required for hauling earth and rocks into position, and for the later construction of retaining walls, would have been considerable. While the southern slope itself was not inhabited during the lifespan of the *tall*, the fortifications constructed on its shelves represent a focal point of community organization and energy.

Field L: The Southern Escarpment

Owen Chesnut, Andrews University

Introduction

The initial purpose of the work in Field L was to explore the various architectural features visible in the transition from the top of the *tall* to the southern slope. Excavators posited a continuation in Field L of the Early Bronze Age remains found in Field D, located lower on the southern side of the *tall* and now joined by Field J. Additionally, GPR surveys conducted in the early 1990s indicated the possibility that



9. Two Battered Rampart Walls (right) in Field J 7K56.

Field L was the location of the city's main gate, which has yet to be found.

Work in Field L during the 2016 season focused on areas on the southern perimeter of the *tall*. Square 6K86 is located on the crest of the site, adjacent to the stepped squares being excavated in Field J. Specific objectives for this season included: (1) attempting to locate and date a presumed perimeter wall in the southern portion of Square 6K86 based on the existence of megalithic stones positioned askew in the north balk of 6K76; (2) gaining insight into the Iron Age I stratigraphy in Square 6K88, expanding a probe begun during the 2012 season along Wall 14 in order to confirm the founding date in the Iron Age I, suggested during that season.

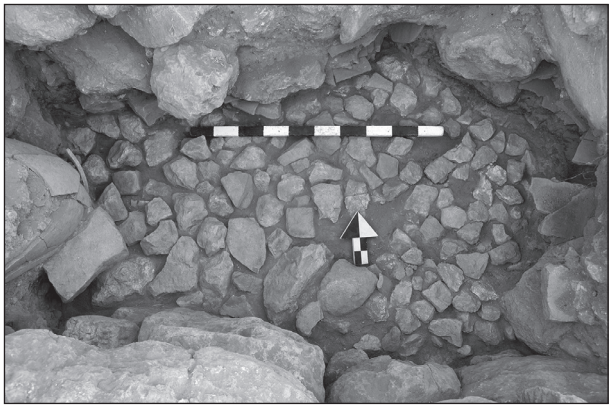
Field Phase 10 (Late Bronze/Early Iron I Transition)

This phase was newly designated in the 2016 season, as these early levels had not been previously reached in Field L. The pottery from possible Surface 6K88:052 was somewhat mixed with LB, LB/Early Iron I transition, and Early Iron I pottery present. However, there was only a small number of diagnostics and most dated to the transitional period. This locus was called a possible surface because a large pithos was lying broken at the same level as the base of Wall 6K88:053. Around and under the pithos was a large amount of burnt grain; samples of the charred material were taken for flotation and radiocarbon dating. Hopefully results from these analyses will help tighten the date for the layer. A north-south wall was preserved seven courses high and seemed at first to be rather ephemeral, but as the probe was excavated, course upon course emerged. It appears as if the collapse and fill around it (6K88:051) shifted the upper courses, but the base level rested soundly on Surface 52. The purpose of the wall is unclear as it ended abruptly in the probe with the majority of it continuing into the balk to the north.

Field Phase 9 (Early Iron Age I)

The primary goal in 2016 in Square 6K88 was to clarify the Iron Age I sequence that had been revealed in a small probe in the northeast corner of a larger probe in 2012. Fill 6K88:031 and Surface 6K88:032 were still intact in most of the larger probe, allowing easy excavation. However, excavations in the smaller probe in 2012 (6K88:036) had missed several surfaces, so as excavations continued under Surface 32 in the rest of the probe, new *loci* identifications were assigned. These *loci* consisted of a series of surfaces with inter-surface fill and tumble between. The tight sequence of surfaces with ash lenses is paralleled by those found in the Early Iron Age I phase in Field H, where a number of ovens were found in a courtyard. The pottery from each of these surfaces and fill layers in 6K88 was overwhelmingly Early Iron Age I with a few LB/Iron Age I transitional forms and LB forms mixed in the fill layers. All of the surfaces mentioned in this section sealed against Wall 14. This factor, along with the dating of Surface 50 to the Early Iron Age I, requires the date of Wall 14 to be changed from Iron Age I to Early Iron Age I.

The corresponding phase in Square 6K86 was found on the north side of east-west Wall 6K86:015, which divides the probe in half; two surfaces were excavated (6K86:024 and 026). Wall 15 sits on Surface 24, a beaten-earth surface dating to the Early Iron Age I. Surface 26 is located 0.10-0.15m below Surface 24 and has a similar matrix. To the north of Wall 15 there are two *loci* dating to this phase (**Fig. 10**). The first, 6K86:027, is the sub-surface for the cobble floor (6K86:023) and dates to the Early Iron Age I. The second locus (6K86:028) is located below Sub-Surface 27 and slopes sharply to the south under Wall 15. The slope angle of this locus suggests that at least Surface 24 and perhaps also Surface 26 were leveling layers created in order to place Wall 15 on stable ground. Surface 26 also seems to correspond with 6K76:009 in



10. Cobble Surface and Standing Pithos (left) in Field L 7K86.

Field J, owing to its similar elevation and make-up, and because it is the last locus before the top rampart layer. These factors suggest that during the Early Iron Age I Wall 15 might have acted as a perimeter wall for the site.

Field Phase 8 (Iron Age I)

In Square 6K88 Wall 14 continued in use throughout the Iron Age I and into the Iron Age II, possibly in conjunction with a pillar base to create a partially roofed courtyard. This function may have begun in the Early Iron Age I, but the stratigraphy was insufficiently clear to be definitive.

Between Walls 15 and 16 was located Fill Layer 6K86:019 which sealed against Wall 15 and ran under Wall 16, indicating that Wall 16 should be dated to the Iron Age I. Locus 19 has a different makeup to the collapse or tumble *loci* above it or to the north of Wall 15. There were almost no small or large stones, and very few bones and pottery, along with a large amount of ash and charred material mixed throughout. These factors seem to indicate that Locus 19 was exposed to the elements for a period of time and was perhaps located outside of the city, further strengthening the possibility that Wall 15 might have served as the perimeter wall in the Early Iron Age I.

Field Phase 7A and 7B (Late Iron I)

Located between fill dating to the Iron Age I and collapse dating to the Iron Age II is a series of *loci* dating to the Late Iron I. A storage room was discovered with the remains of at least four smashed pithoi. Wall 15 bounds the room on the south, but the destruction continues into the west and north balks, and under Wall 5. Collapse Locus 17 appears to have been the remains of a second storey or roof, as a large, burned, wooden beam was identified in the balk, along with chunks of mudbrick and stones. Objects from this locus included a very nice pestle and several grinding stone fragments. Underneath Locus 17 was a debris layer, Locus 18, consisting of several restorable vessels including three or four pithoi and a jug**.**

Field Phase 6 (Iron II)

The first few fill *loci* in 6K86 contained a majority of Iron Age II pottery, with very little Late Iron Age/Persian mixed in. Loci 6K86:008, 012, 013 and 014 were all fills located between Wall 6K86:005 and Wall 6K86:015. Wall 5 likely dates to the Hellenistic period based on its curvilinear design and location close to the large Hellenistic farmstead to the east in Field L. As mentioned above, Wall 16 was likely built during the Iron Age I and continued in use through the Iron Age II when a wall with megalithic stones (6K86:007) was constructed on top of it. The most significant find from the Iron Age II is a stone-lined bin (6K86:009), likely used for grain storage (**Fig. 11**) although this interpretation will be dependent on the future flotation of soil samples.

Conclusion

The main goals of excavation in Area L during the 2016 season were largely met. Two walls (15 and 16) were identified in Square 6K86, with Wall 16 possibly being a perimeter wall dating to the Iron Age I. Wall 15 was constructed on two leveling surfaces dating to the Early Iron Age I, suggesting that this wall might have also been used to defend the perimeter of the site. We also identified a storage room, likely dating to the Iron IB, in the northern section of the probe in Square 6K86. In Square 6K88 five consecutive surfaces dating to the Early Iron Age I were identified and the bottom of Wall 14 was located. Based on the founding of this wall on Surface 50, it can now be securely dated to the Early Iron Age I, slightly changing the previous dating from the Iron Age I.

Field P: The Southeast Shelf

Friedbert Ninow, La Sierra University

Introduction

Field P was opened during the 2014 season on the southeastern shelf of the *tall*. Several reasons led excavators to choose this location for excavation:

1) Field P is in close proximity to the Field K dolmen that was initially excavated in 1994 as part of the hinterland survey and which has been dated to the Early Bronze IB period, site Stratum 21. Other features on the southern and southeastern slopes of the *tall* led to further excavations in Field K. Among the finds was a probable Early Bronze IB dolmen foundation and a partly filled cave

containing several burials from the Middle Bronze II period with multiple burials (see Herr *et al*. 2002:171ff.).

2) GPR data collected in 2013 suggested some interesting anomalies (such as possible caves, depressions, cavities or openings in the bedrock beneath the surface) in the area. This led to the opening of two squares during the 2014 season, one (4N93) directly north of the Field K dolmen and associated features and a second one (4N80) to the west. In both the 2014 and 2016 seasons, squares in Field P were separated from each other in order to ground-truth specific GPR data, leading to a stratigraphically disconnected set of excavation units. Thus, this report will focus on the squares and not the field phases, which depend to a large degree on contiguous units.

During the 2016 season, excavations continued in Square 4N80 within a probe located in the northeast corner of the square in search of the anomaly suggested by the GPR data in this area. Since the 2014 season had reached part of the bedrock, the goal was to trace further the bedrock in search of the anomaly. The 2014 excavation of Square 4N93 discovered a sharp cut of the bedrock shelf on the eastern side of the square running almost parallel to the eastern balk. Therefore, during this season Square 4N94 immediately east of Square 4N93 was opened. The goal was to explore possible openings and mortuary features cut into the bedrock. Two more probes in two different squares (4N62 and 4N72) were also opened to explore possible mortuary features.

Square 4N80

The objective was to extend a probe from the previous season, but bedrock appeared quickly in the southeast corner of the square (**Fig. 12**) and then everywhere in the square. Only layers of compact clay/mudbrick and a fragmentary east-west wall (4N80:012) were revealed. No indication of man-made alterations to the bedrock (such as carvings, openings, entrances to caves *etc.*) could be traced.

Square 4N93

Although there were stratigraphic connections between this square and newly opened Square 4N94 to the east, bedrock was reached quickly. However, on the surface of a small bedrock shelf excavators found an installation of set stones (0.2-0.4m in length) framed with plaster for stabilization (**Fig. 13**). It is unclear what purpose this installation served, except to level a void in the bedrock. However, no surface was found to indicate how these stones related to it. As in other squares of this field, no mortuary features were found. The anomalies indicated by the GPR data can most probably be attributed to the fissures and crevices found on the surface of the bedrock.



11. Stone-lined Bin in Field L 7K86.



12. Bedrock in Probe in Field P 4N80.



13. Bedrock and Fissures in Field P 4N93 and 4N94.

Square 4N94

Below the topsoil of Square 4N94, the same soil-layer accumulation was apparent as in 4N93: locus 4N93:026 corresponds to locus 4N94:002; and locus 4N93:027 corresponds to locus 4N94:003 (with the same soil colors). But a larger goal in opening this square was to investigate a cut in the bedrock that had appeared during the 2014 season at the eastern edge of Square 4N93, just west of the eastern balk. This cut indicated possible human activity and possible mortuary features. Once excavated to bedrock, however, it was clear that, as in the other squares of this field, the accumulation of soil layers was formed by sheet wash originating from the upper parts of the *tall*. No occupational stratum could be identified.

Square 4N62

In search of other mortuary features, the excavators turned to the location of the Field K dolmen. The topography of the surface in this area suggested a possible additional dolmen in line towards the west. Two large boulders (possibly part of another suspected dolmen) led the excavators to open another square to the south of these boulders in line with the previously discovered dolmens. Unfortunately, it became clear that the boulders were not connected to any stones, walls or installations beneath them. The probe exposed an earth layer with mostly Early Bronze Age pottery just above bedrock.

Square 4N72

Since Square 4N62 produced no indication of an additional dolmen or dolmen foundation, the adjacent square (4N72) was opened with a 2x5m probe along the southern side of the square. This area is in line with the dolmen foundation to the east of this square. Sheet wash formed the upper earth layers, but the layer immediately above bedrock contained mostly Early Bronze Age pottery. Again, this square did not produce any traces of mortuary features such as cave tombs, shaft tombs or megalithic dolmens.

al-‘Umayrī Survey Site 84

David and Amanda Hopkins, Falls Church, Virginia

Introduction

During the 2016 season excavators again returned to al-‘Umayrī Survey Site 84, following the mapping in 2014 at the site of as many as thirty agricultural features. These features included wine presses, a small storage area, cisterns, a trough, cup holes, basins, a reservoir, a rectilinear building and an orthogonal wall. In the interlude between the 2014 and 2016 field seasons an uncontrolled fire razed much of the survey area of its wheat crop and led to the discovery of another probable rectilinear structure, a small stepped cistern, quarry marks and two possible pressing surfaces.

While this site has often been surveyed (1989; 1992; 1994; 2014), the goal of the 2016 excavation season was to document and clear as many new features as possible and to prepare exemplary features for structure-from-motion photogrammetry. Features chosen for this type of preservation include a three-part press, a reservoir, a smaller three-part press and nearby quarry marks, along with a pressing surface including basins, a possible small cistern, cup holes and post holes.

Mapping of Site 84 - Predominant Features

Feature 4-Pressing Surface with Associated Features

Documentation beginning in the 2014 season included Feature 4: a constellation of cup holes/postholes, a pressing surface, two large possible basins and one small probable basin. Still visible is the outline of a carved pressing surface. The maximum width of the surface was 2.06m. At its greatest depth and greatest inclination, the pressing surface measured 0.1m. Feature 4A was a pressing surface with associated postholes and a cup hole; four probable postholes surrounding the pressing surface formed a rectilinear pattern above the pressing surface which may have been used to support some kind of canopy to shade the pressing process. Feature 4B was a possible basin with channel and associated cup hole. The basin itself was nearly semicircular, measuring 1.69m deep and 2.9m wide. Perhaps a pithos or similar jar was placed under the channel to capture any liquid pressed into it from above. Feature 4C was a small nearly semicircular basin with evidence of chisel marks, measuring 0.62×0.60m across. Given the beveled edges and bottom of the basin, one can theorize it was used for mashing or grinding agricultural products. Feature 4D was a large possible basin with marked limestone degradation and may, because of a lack of chisel marks, actually have only been a limestone dissolution feature.

Feature 5-Possible Basin

The basin measured 1.2×1.7m and had a depth of 0.6m, showing evidence of chisel marks on its surface.

Feature 6-Trough

Feature 6 was a trough with a nearly circular sump, built on a small limestone plateau. The sump within the trough suggests that it was used to separate solid matter from liquid and therefore refined liquid by allowing the removal of sediment.

Feature 10-Three-part Press

Feature 10 was a well-preserved three-part press, resting on the northern limestone shelf and boasting a large, almost perfectly circular basin 1.60m across and 0.40-0.50m deep. A smaller collecting vat that was nearly circular had a diameter of 0.70-0.65m and a depth of 0.48m. The basins were connected by a broad channel measuring 0.15×0.25m.

Feature 15-Press with Associated Cup Holes and Basin

Feature 15 was a two-part press composed of a nearly square pressing surface and nearly cylindrical vat connected by a deep channel (**Fig. 14**). The depth of the walls of the pressing basin varied from 0.0-0.22m and the side walls are all nearly 2m in length. The cylindrical vat measured 1.30×1.39m and is 0.48m deep. Surrounding the press were three cup holes and one basin.

Feature 20-Rectilinear Building

A prominent square structure (9.8×9.8m), sitting atop an outcropping of bedrock, likely served an administrative function for this very impressive wine production enterprise. It dated from to the 6th century BC and was constructed from very large limestone boulders most likely quarried near the site of the building itself. Earlier excavation uncovered a wealth of pottery and cultural materials (seals, a faience bead and other types of jewelry).

Feature 22-The Limestone Reservoir

Feature 22 constituted a large rectilinear reservoir measuring 4.9m in length by 4.3m in width, with a minimum depth of 3.1m which brings potential capacity to at least 65 cubic meters. During the 2014 season, excavators tackled the earth and debris that filled the rock-carved feature without reaching its bottom. This season, diggers were able to clear completely a 2×2m probe in the northeast quadrant of the feature. Chisel marks were found on all limestone faces of the reservoir, but no plaster. Some probable channels for water were found on the eastern face of the reservoir where the limestone is degraded. Another water channel may have existed where the stairs were located in the southeastern corner of the reservoir.

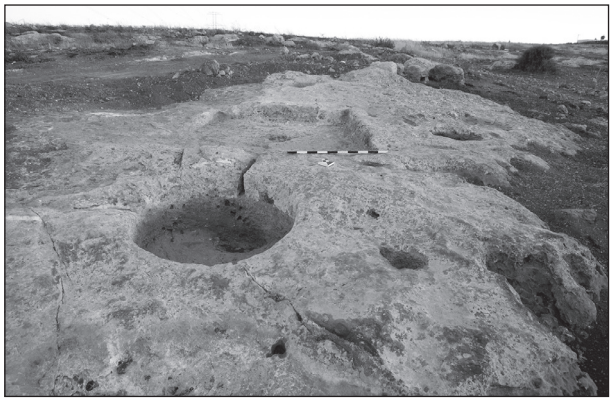
Mapping of Site 84 - Recently Discovered Features

Feature 31-Evidences of Quarrying

Evidence of quarrying shows the intentional shaping and removal of stone from the bedrock, leaving remnants of chisel marks. Also visible were the remains of a cut stone intended for removal.

Feature 32-Rectilinear Building with Threshold

This building, founded on bedrock, most likely measured 5.22×4.50m. However, the southeast corner has been lost (**Fig. 15**). A well-preserved and chiseled threshold with door socket emerged, as did large boulders of the



14. Pressing Feature 15.



15. Rectilinear Building 32.

other walls, some of them quite disrupted. All pottery found within the walls of the building and on the outside of the walls dated to the late Roman period.

Feature 33-Circular Pressing Surface with Other Features

Feature 33 included a pressing surface with associated basin and was clearly visible, although it remains uncleared. A conical basin lay 1.20m to the south-southeast.

Feature 34-Cylindrical Stepped Cistern

Feature 34 was a deep cylindrical cistern with steps on the north side. It is 1.1-1.16m in diameter across its mouth. The upper layer of bedrock effectively shields the water from the sun.

Feature 34-Evidence of Quarrying

A long horizontal surface (8.9m) showed evidence of quarrying and stone removal. The channel on this bedrock surface was very degraded.

Feature 35-Possible Pressing Installation

Above Feature 22, the reservoir, lay Feature 35. This possible pressing installation remains uncleared. Still visible is the curvilinear edge of a possible pressing surface.

Preliminary Conclusions

Excavators were greatly impressed by the fullness and multiplicity of features that dominated the landscape of Site 84. There was a ubiquity of water-related, rock-cut features such as cisterns, reservoirs and basins. These extended from minor dissolution features that may have been used on an episodic basis to the massive water devices such as the reservoir that inhabitants utilized to capture everything available. This entire constellation of features leads one to believe that Iron Age viticulture depended on a significant investment in the use of water for the refinement of its grapes into wine. Later, in the Roman period, Site 84 experienced a repopulation and perhaps extenuation of its agricultural facilities. Still, they relied heavily on the capture and use of water for viticulture.

Technology

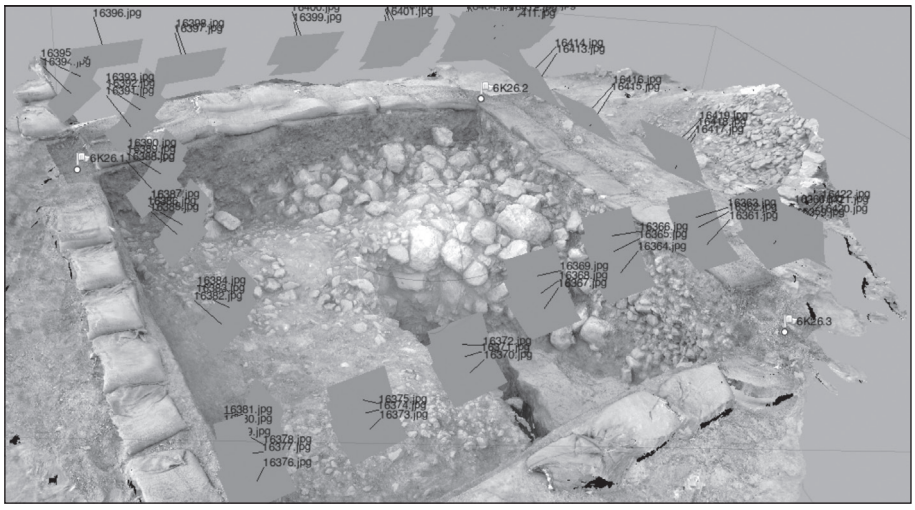
Tall al-ʻUmayrī is currently undergoing negotiations connected to land-ownership issues. This has left the future of long-term excavations at the site in something of a state of flux, a situation absolutely demanding our best efforts to document and record everything possible with the best technologies available to us.

The 2016 season saw the continued use of technology intended and developed for maximum extraction of data from the excavation process, especially should the opportunity to continue research at the site become unavailable. While UAVs are no longer allowed into Jordan from outside the country, the project maintained its digital-data-driven research methods with the use of GPS, iPods and iPads for data harvesting, hand-held XRF analyses, structure-from-motion photogrammetry and further development of the online database, OpenDig, which stores and makes accessible data from the al-ʻUmayrī excavations dating back to its beginning in 1984.

A systematic approach to excavation documentation was employed this season to produce a photogrammetric rendering of each excavation square every morning. A series of high-resolution photos was taken from each side of every square and processed with Agisoft's Photoscan Pro to produce a structure-from-motion 3D model showing the daily excavation progress (see **Fig. 16**). It is anticipated that these models can be digitally stacked so that future researchers will be able to examine the daily progress and closely examine and manipulate in 3D the emergence of archaeological features to evaluate the interpretations made with improved levels of information than have hitherto been preserved. Use of this type of photography also allowed us, for the first time, to create digital balk drawings which were geo-rectified.

Restoration and Preservation

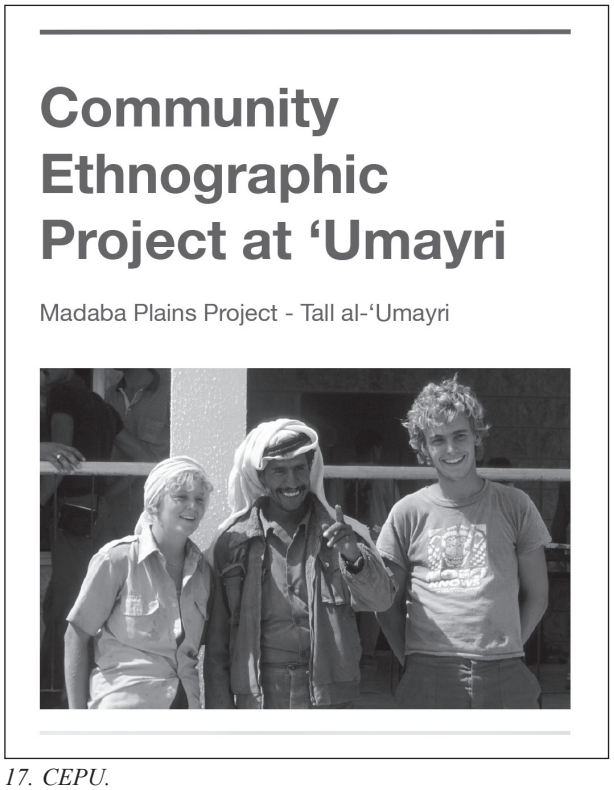
Given the nature and location of our excavation operations in 2016, there were no new architectural elements exposed which were in need of consolidation. Historically, the project has hired professional masons to assist in the complete preservation of virtually all extant architecture at the site, making research easier for archaeologists and visualization of the remains more meaningful for visitors, to say nothing



16. S-F-M.

of preserving walls, surfaces and installations from interseasonal degradation, due mostly to natural threats.

The greater challenge to the survival of cultural heritage at al-'Umayrī is the ongoing dispute between landowners and the government (referenced above), which may leave vulnerable all exposed surfaces and architecture, and could force an end to excavation. All parties seem to be of good will and are searching for a solution that respects both the cultural heritage of Jordan represented at the site and the rights of those who have invested in the land.



17. CEPU.

CEPU

A new initiative, partially begun in 2014 but more intensely undertaken in 2016, involved an ethnographic study of our laborers and their families in the village of al-Bunayyāt, not more than a couple of kilometers from Tall al-'Umayrī. Carolyn Waldron and Monique Vincent in particular envisioned a process, approved by the Institutional Review Board (IRB) committee at La Sierra University, by which we could hear and record stories from our workers, many of whom over the past three-plus decades had become like family to us, they and their children who constituted the second generation of laborers. Team members engaged with the *Community Ethnographic Project at al-'Umayrī* (**Fig. 17**) succeeded to some degree in collecting and collating survey information and family stories, but more work remains to complete the project.

Plans for the Future

Land-ownership issues continue to plague the project at Tall al-'Umayrī, leaving the future entirely uncertain. The worst-case scenario would be to see nothing happen on behalf of the Department of Antiquities and the land abandoned to potential development. This site deserves a century of study and permanent preservation and protection, but all of the effort put into the project to this point will be lost if al-'Umayrī is not purchased for the people of Jordan.

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THE SPATIAL ORGANIZATION MOUNTAIN COMPLEX OF PETRA

Anna K. Kudriasheva

Abstract

The natural-urban morphology of the landscape complex of Petra is characterized by material homogeneity and maximum use for the purposes of town planning and engineering support of natural geomorphology and hydrography, the regime of underground and surface waters, as well as the properties of natural geometry for its external and internal architectural processing.

The three-dimensional scheme of the landscape complex of Petra, the key of which is its the location, marked by the sacred heights of the mountain massifs peak, fits into the shapeof a diamond, where itssides coincide with the outer boundaries of the city, and the diagonal intersection t fix the main axis and the entrance to the city center.

The dynamics of specific fragments of the landscape complex of Petra on the main route and within the central part of the city, is based on a gradual increase in the angle of perception from a series of specific views,landscape and wide-angle panoramas - and a sharp narrowing of views into specific shots with a deep perspective; characterized by a constant presence in the field of view succeeding one another the most significant architectural objects of Petra. The article publishes materials of the author's graphical diagrams, photos and technical drawings of architectural graphic reconstruction of the Nabatean tombs of Petra.

Key Words

landscape complex, landscape structure, city-forming concept, landscape species fragments, Rock city of Petra

Introduction

Physical Nature and Morphology of the Urban Space of Petra

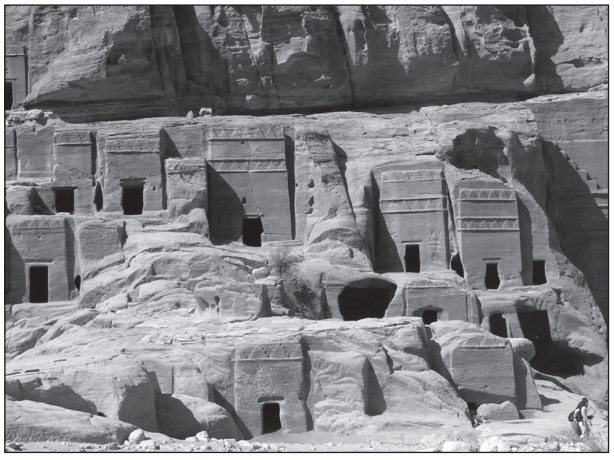
The capital of the Nabatean kingdom was hidden deep in the mountains, stretching along the red-pink ridges of the valley of Wādī ʻArabah, in the area between the Dead Sea and the Gulf of al-ʻAqabah in the Red Sea. In the naturally protected, water-rich valley of Wādī Mūsā where the city center was located, leads a narrow corridor of successively connected canyons. The gorge or commonly named as as-Sīq is winding of 1.5km in length, deep camber between the overhanging cliffs almost closing at a height of more than 90m, outer gorge or outer as-Sīq, which leads towards the exit to the city center.

According to its geological nature, the mountains of Petra are sandstone - a sedimentary rock of compacted sand. The ridge of such mountains, stretching along the entire eastern side of Jordan, the Dead Sea, and Wādī ʻArabah, transformed into a system of mountain massifs that have a granite formation at the base which gives their unusual red and pink color. Sandstone is formed mainly by mechanical movement of sand layers under the influence of natural forces - water and wind. A consequence of this geology was the characteristic pattern of mountains with sharp stepped stepsthat led towards the valley to the west and a more gentle slope and that lead towards the east. The western winds in this region are predominant, with clouds of dust coming from the desert, called *Khamasɪn*, which means fifty days a year. The unique natural specifics of the mountain rock, which is the main medium-forming the landscape of Petra, is present in

rock carved cavities, caverns, which allowed to "colonize" these cavities and caverns,,and use them tombs and palaces, houses and temples. This unique characteristic had a major role in in the processing of external facades (**Fig. 1**).

The main common space of the of Petra forms a number of structure mountain ranges, the main of which are *al-Khubthah*, *al-Madhbaḥ* and *al-Ḥabīs*, with a plateau between them, cut by a network of valleys, which arms diverging from the main water and communication artery, Wādī Mūsā. Mountain massifs close the city space with their slopes and creates, due to the outline and internal structure, the presence of voids, which form the basis of most of its infra infrastructure (**Fig. 2**).

According to its city-forming morphology, the mountain ensemble of Petra consists of two fundamentally opposite systems. The first system is the central flat area, which is a complex of urban center architecture, mainly built on a plateau made of sandstone using horizontal planning coordinates the central. The second system is the rock part which consists of the architecture built inside the rock, with external facades, terraces streets, platforms, ascents and descents towardsthem, chosen from the whole breed of natural slopes of mountains at different levels and vertical coordinates of space, the rock part. In general, Petra has about eight hundred unique monuments, carved into stone and erected in an open space, belonging to Edom and Nabataean-Roman times. In their appearance, the influence of two cultures was fundamentally affected: Eastern, Mesopotamian and Western, Ancient, and also combinations based on them.



1. Street of facades in Petra.

As mentioned before, Petra is located in the valley of Wādī Mūsā , which crosses the plateau from east to west. The center was formed entirely in the period that followed the annexation of Petra Rome (**Figs. 3, 6**). Modern excavations show that the only main street of the Roman center - *Decumanus-maximus*, is laid on the site of the gravel road that existed before, the main thoroughfare of the Early Nabataean center of the 3rd century BC. Decumanus, or Colonnaded Street, is the main compositional axis of the center (**Fig. 4**).

It runs along the valley of Wādī Mūsā and across the mountain corridor of the Petra basin, connecting the northern and southern parts of the caravan route into a single artery. City walls, 2m thick, serving defensive purposes in the period of greatest period of Petra, were it was still the capital of the independent Nabataean Kingdom in 1st century BC-1st century AD only fragmentarily defended the most vulnerable northern and southern directions, while from the west and east the city was impregnable. The large round, 25m in diameter, on a hill in the north-western part of the city wall and two small, rectangular, supposedly sentinel, in the south-west and south-east parts of the wall are preserved. A similar system of protective screens with rectangular bastions was typical of the Hellenistic military architecture (**Fig. 5**).

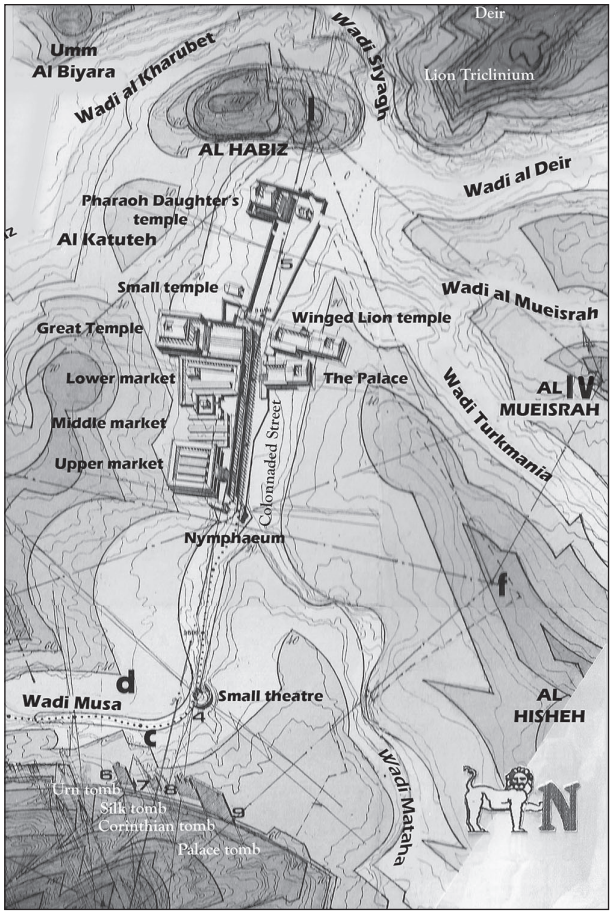
In 1904 Karl J. Trubner Publishing has issued a full research and documentation of Petra region. He documentation is included the contour and geographical site maps of Petra is included, along with location of all tombs and drawings of facades, plans and it details. The archaeological documentations were investigated by Brünnov R.E. and von Domaszewski, A. This unique book exists as main archaeological reference (**Fig. 6**).

The entire complex of monuments of the Roman center in Petra is located on both sides of the 6 meters wide Colonnade Street, , and is compositionally oriented to it. The carriageway was separated from the pedestrian by two steps and a colonnade. In one section of the paving was laid an inscription dedicated to the visit of the Emperor Diocletian to Petra in 283.

The first construction at the entrance to the city was the Nymphaeum complex, which was the link between the organized Roman center



2. Landscpe structure of Petra.



3. Petra city center plan.

and its picturesque surroundings. The complex consisted of the city drinking fountain, located on the north side of the street in the shadow of a huge tree, and southern Nymphaeum, erected on the opposite south side. The fountain consisted of three semicircular niches facing Decumanus. The southern Nymphaeum is a rectangular building with two columns at the entrance. Further, along the southern side of Decumanus, the Upper, Middle and Lower markets, which appeared on it, were connected in turn to each other. In the upper market, a staircase led from the street. Two monumental blocks indicate that the entrance was opened by



4. Decumanus-Maximum of Petra.

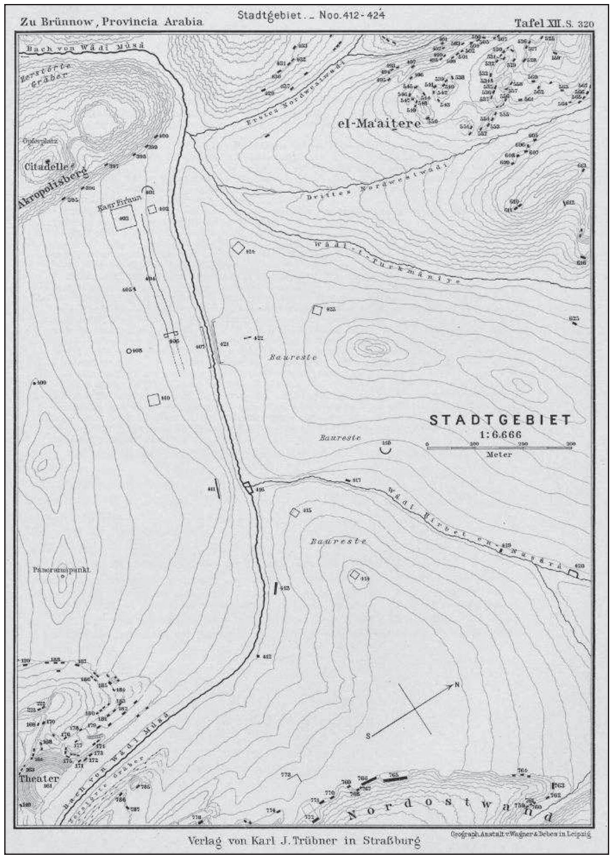


5. Ruins of city walls of Petra.

a separate arch. The inscription on the blocks is devoted to the visit of Emperor Trajan to Petra in 114BC. On the upper step of the stairs are the bases of two columns. On the opposite side of the street of the Procession, along the axis of the Lower Market was the so-called Royal Palace. This is one of the few structures of Petra, where archaeological excavations have not been conducted. The palace appeared in the form of a peripteros , with a square in front of it and a staircase descending to the Decumanus-maximus.

The next monument to the north of the central axis was, facing the Colonnaded Street, laid the Temple of the Winged Lion, built in 27BC. The temple, dedicated to the goddess Atargatis, was repeatedly rebuilt and was decorated from the inside with paintings and stucco decorations.

Its name was given to the temple thanks to the sculptures of winged lions crowning the pediment. The altar of the temple was surrounded by twelve columns with Corinthian capitals. The open Sanctuary in front of the temple was connected with the Street of the Procession by



6. The site mup of Wādī Mūsā (Brünnov, R.E. and von Domaszewski, A. 1904).

two symmetrical lateral ladders. In the middle of 4th century AD. the temple was rebuilt. Within this period, workshops: picturesque, marble processing, metal processing, located in several basements adjacent to the temple have emerged. In the beginning of the 2nd century AD. the temple lost its cult significance and was rebuilt into a residence that existed for the next 250 years.

Immediately after the Great Temple and the Temple of the Winged Lion, the Procession Street ended with the Monumental Gates leading to the open Temple Sanctuary of Qaṣr al-Bint. Triple arch arches were erected from pink limestone at the beginning of 4th century AD. in the end of the building Streets - the Colonnade. The width of the central passage of the gate coincided with the width of the street. Symmetrically located narrower side passages on one level rose above the pedestrian sidewalks. On the eastern side of the gate were four detached columns with zoomorphic capitals.

Opposite the Temple of the Winged Lion, adjacent to the Lower Market, was a Great Temple with an open Sanctuary and Propylaeum. The staircase led to the Sanctuary on the hill located at the side of the Procession Street. The unusual sculptural zoomorphic capitals of the Sanctuary columns in the form of the heads of African elephants were found in the excavations of 2002. Excavations show that during the period of the Roman legions in Petra, this complex served as a forum or agora. Due to its size and location, it was the center of the commercial and administrative life of the city. The same capitals depicting animals also found in pilasters of the central arch. The Monumental gates represent an outstanding example of the mixing of imported Greco-Roman ideas with local Arab practices (**Figs. 7, 8**).

On either side of the city center Gate were the North and South Towers. To the southern tower adjoined "Thermae", conventionally named because of the construction and ceramic pipes inside. In the immediate vicinity was the Small Temple. Unfortunately, these monuments have not yet been excavated and almost not studied. Only their general location and dimensions of plans are known.

The Open Temple Sanctuary of Qaṣr al-Bint

is 73m long and continued with a slight deviation from the direction of the Colonnaded Street and the Monumental Gate (**Fig. 9**). The northern front of the Sanctuary was turned the valley of Wādī Mūsā. it was fenced with a wall along which two levels of benches from fitted limestone blocks and a series of statues on pedestals stretched from inside. The wall approached the Temple of Qaṣr al-Bint, and surrounded it from all sides, forming an open square in front of the entrance with an altar. Monumental gate of the wall, located 20m from the temple, opened the way out from the Sanctuary to the southern part of the city. The complex of the temple with an open altar in front of it and further into the valley outside the city closes the general composition of the center of Petra, intersecting its longitudinal axis at right angles to the extended Sanctuary. In this case, the point of intersection is fixed by the location of the altar, and the completion of the central highway as a whole creates a semicircular niche in the western wall surrounding the temple (**Fig. 10**).

as-Sīq

Narrow and deep, with steep walls more than 90m high, and a broken line leading to Outer as-Sīq from the east entrance to Petra. The total length of this corridor is 1500m. The width in different places is from 4 to 12 meters. One of the most significant facades, cut out in the rock of al-Madhbaḥ mountain range, on Bāb as-Sīq left side, are the facade of the Obelisk Tomb and the facade of Bāb as-Sīq Triclinium (**Fig. 11**).

The first is a composition of four pyramidal volumes above the entrance and is a reflection of the strong influence of Egyptian architecture. The second monument was built some time later just under the Obelisk Tomb.

The axis of its doorway coincides with the axis of the middle right obelisk. Triclinium, means a room with two benches at the walls (*lat.*) was intended for special funeral ceremonies, above the entrance to as-Sīq at an altitude of 20m (**Figs. 12, 13**).

The arch of Bāb as-Sīq was abandoned. In the



7, 8. Monumentl gates from front and rear sides.



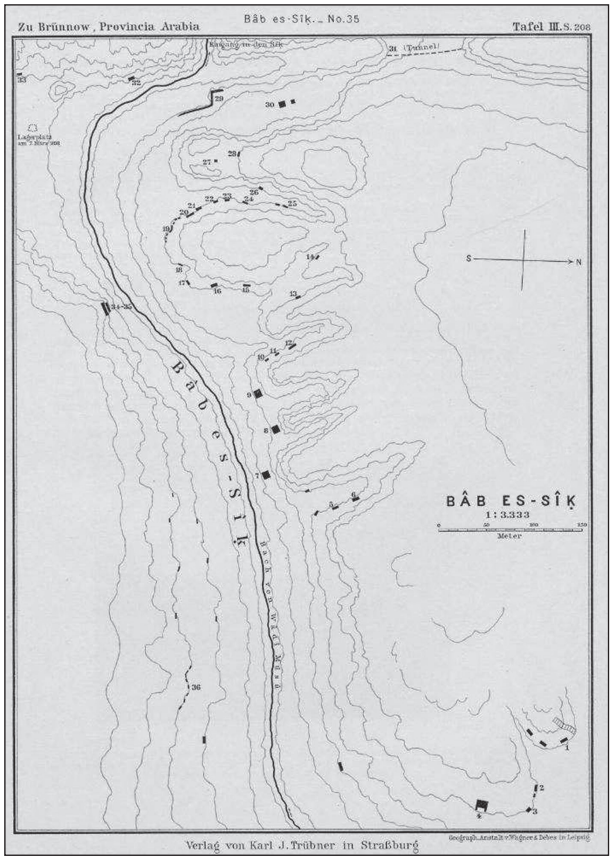
9. The ruins on the left side of the colonnaded street.



10. Qaṣr al-Bint Temple.

niches of the surviving pilasters, which served as its bases, statues could be placed. Proceeding further, the path to Petra began (**Figs. 14-16**).

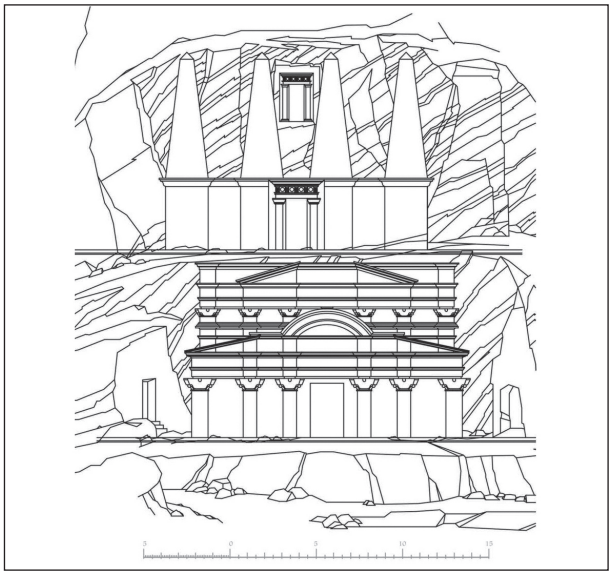
After 1400m from the outer eastern entrance to as-Sīq gorge, the mountains of both massifs almost symmetrically break apart, and then again close, forming asquare across the gorge to which the famous façade of al-Khaznah (the Treasury) (**Fig. 17**). The facade of al-Khaznah down in the steep slope of the al-Madhbaḥ massif is the most outstanding rock facade of Petra, recognized in 2006 as one of the Wonders of the World (**Figs. 18, 19**). Until now, there is a legend state that in the urn, crowning the central half-ruble of al-Khaznah, the treasures of the pharaoh were hidden during its construction in the 2nd century. As for the dating of the monuments of Petra, is uncertain; only the estimated dates of the construction of al-Khaznah exist in twenty-five versions. The monumental tomb was built in honor of the Nabataean king, probably Aretas IV, and later was a temple for religious ceremonies, where the royal entitywas worshiped as a deity. The



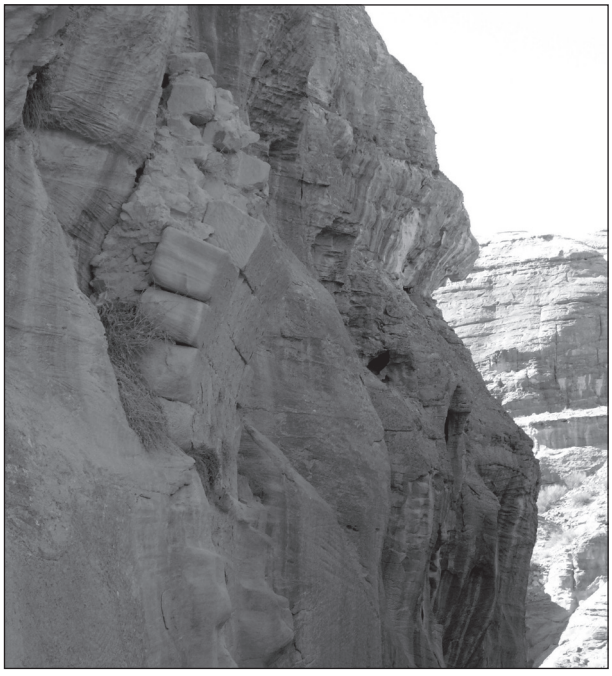
11. Bāb as-Sīq map (Brünnov, R.E. and von Domaszewski, A).



12. Obelisk Tomb, Bāb as-Sīq Triclinium.



13. Obelisk Tomb, Bāb as-Sīq Triclinium. Architectural gra phic reconstruction 1904.



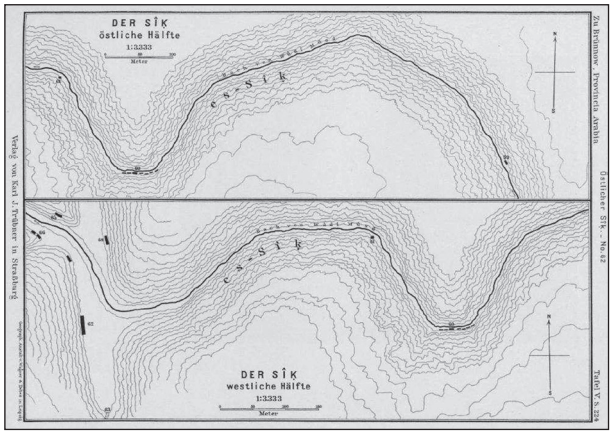
14. Bāb as-Sīq arch, left side.



15. Bāb as-Sīq arch (Brünnov, R.E. and von Domaszewski, A. 1904).



16. Bāb as-Sīq arch ,right side.

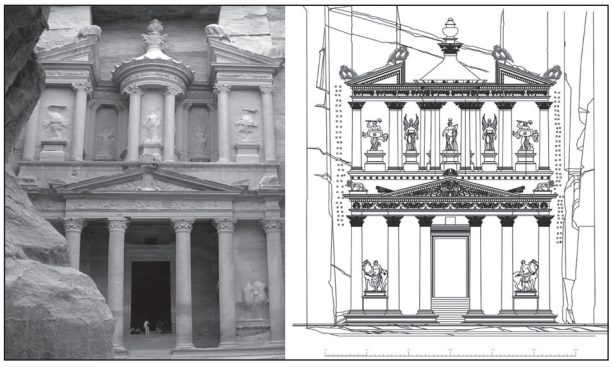


17. as-Sīq map (Brünnov, R.E. and von Domaszewski, A. 1904).

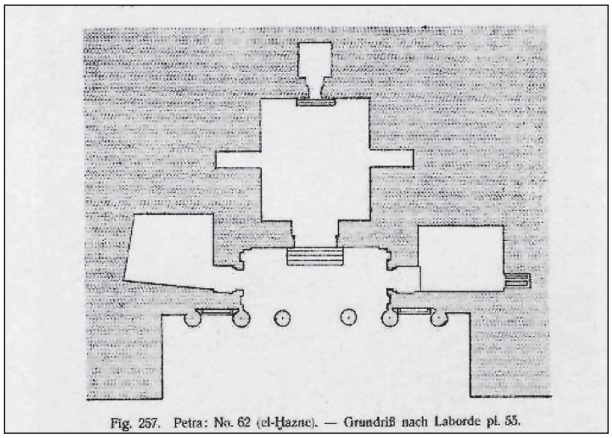
internal space of al-Khaznah includes a central rectangular hall 12×12m with three tombs adjoining it (**Fig. 20**).

In the slopes of al-Madhbaḥ, in addition to the above mentioned monuments, the order fronts of a number of tombs are located south of the exit from outer as-Sīq canyon. Together with the facades of al-Khubthah mountain massif, they form a changing panorama of the eastern wall of the mountain passage with caravan transit towards the north-south direction. The facade of Broken Pediment Tomb (**Figs. 21, 22**), followed by the facade of the Renaissance Tomb after 50m (**Figs. 23, 24**) and beyond that the facade of Roman Soldier Tomb, 50m to the south (**Figs. 25, 26**).

al-Madhbaḥ Heights, down Wādī Farasah, forms the southern part of the gorges from the rock part of Petra, al-Khubthah forms the northern gorge (**Figs. 27, 28**). Royal Tombs in the form four rock carvings adjoining almost closely to each other and forming a single front of order facades in the steep wall of al-Khubthah mountain range. From their entrance, the facades



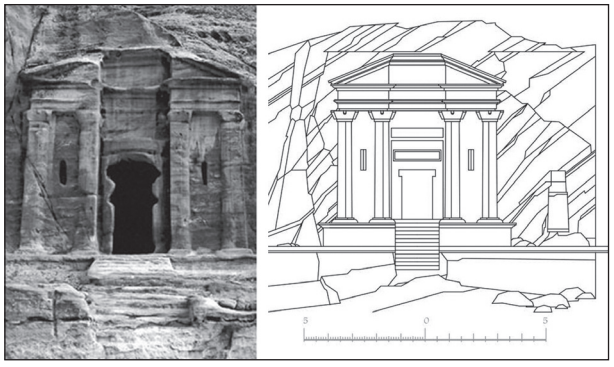
18, 19. al-Khaznah. Architectural graphic reconstruction.



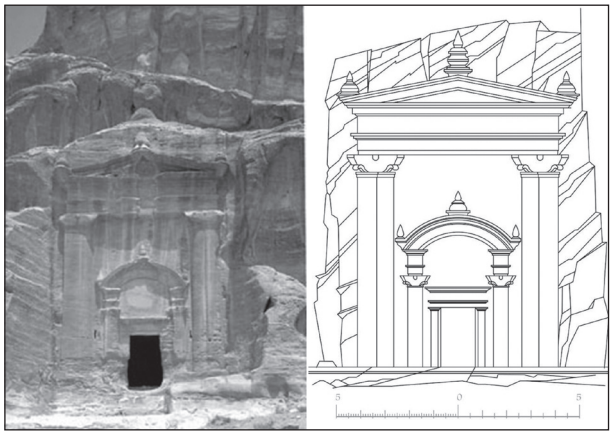
20. al-Khaznah plan (Brünnov, R.E. and von Domaszewski, A. 1904).

of the Royal Tombs turn from the east to the city center at a distance of 500m. Their panorama,. Their panorama, exactly perpendicular to the Decumanus of Petra, opens an unusual theatrical decoration and an arched gate in the form of a wings (**Figs. 29, 30**).

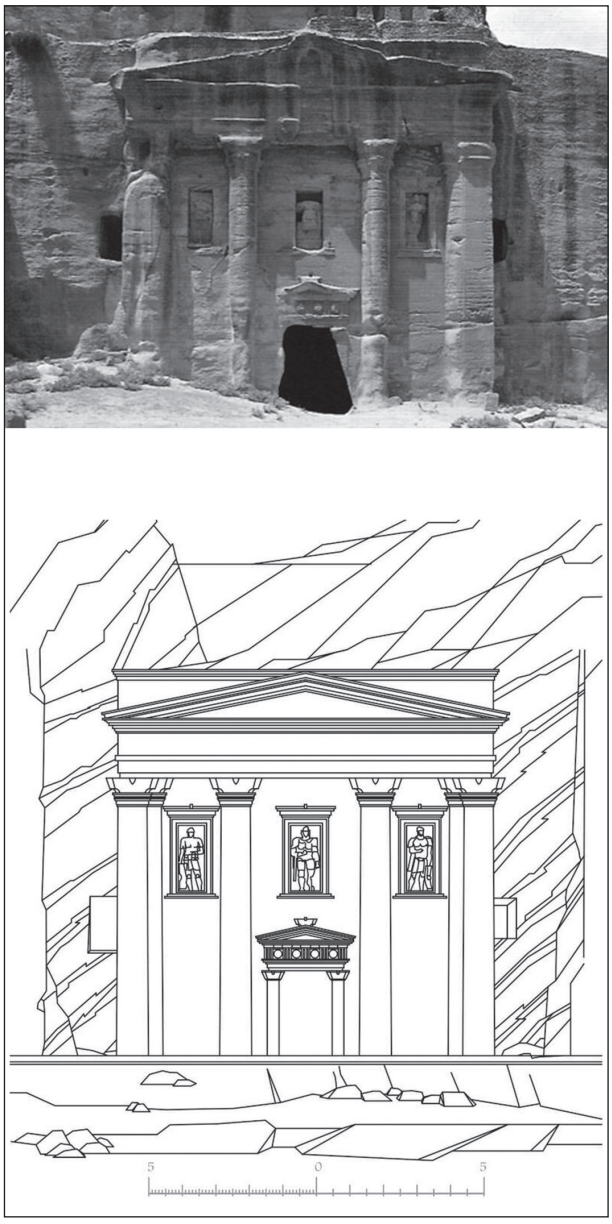
The southernmost facade of this front is the facade of Urn Tomb the tombs of one of the Nabataean kings who ruled in the 4th century AD. The monument, which got its name from



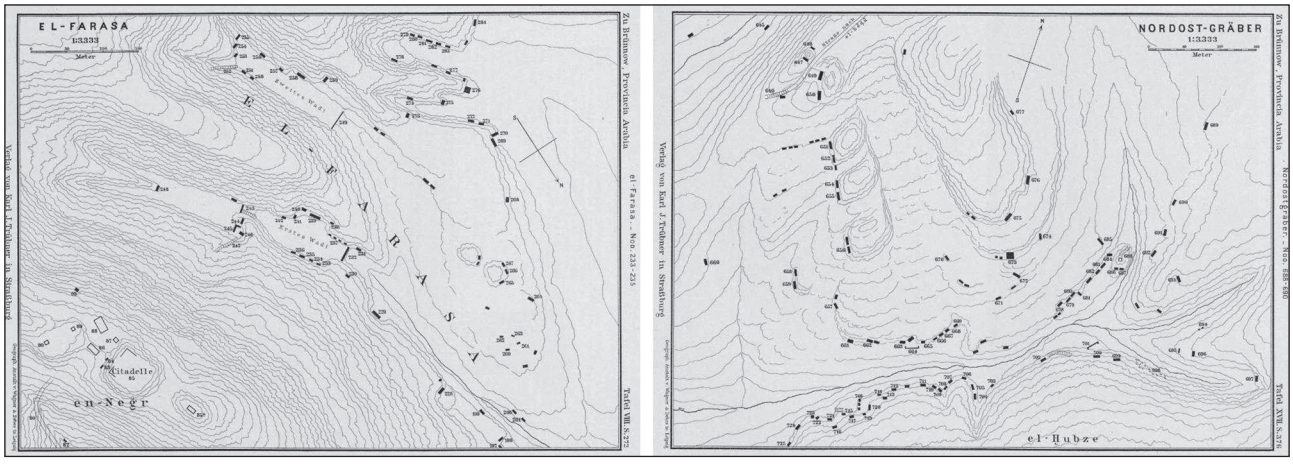
21, 22. Broken Pediment Tomb. Architectural graphic reconstruction.



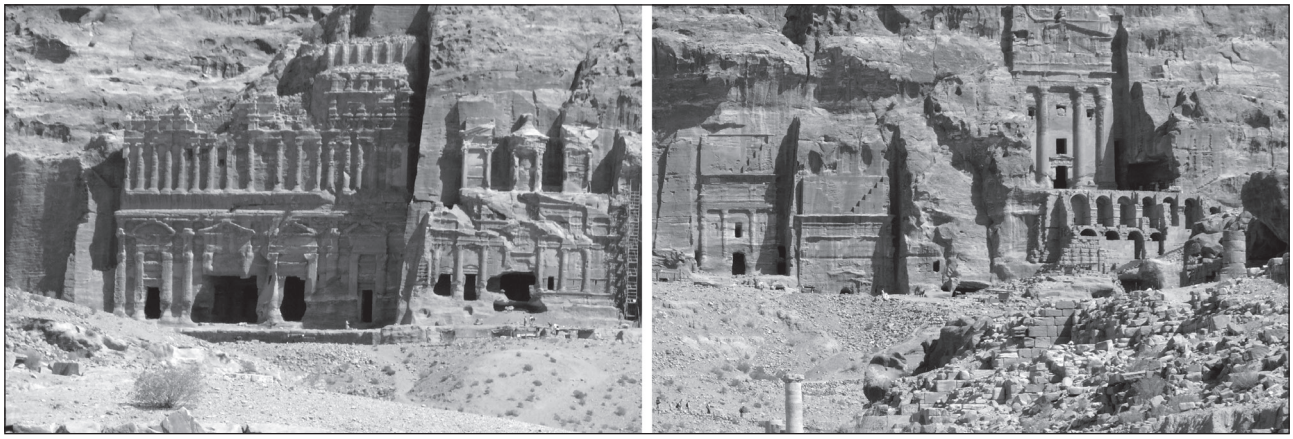
23, 24. Renaissance Tomb. Architectural graphic reconstruction.



25, 26. Roman Soldier Tomb. Architectural graphic reconstruction.



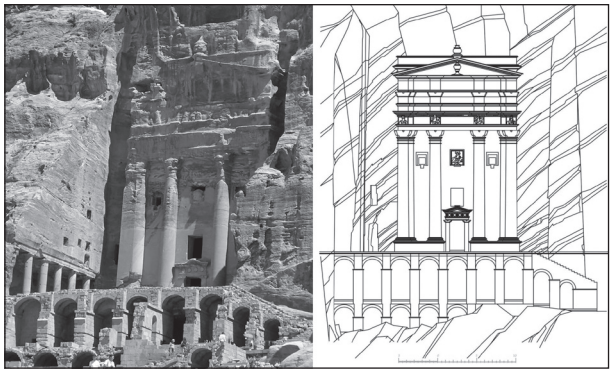
27,28. al-Madhbaḥ and al-Khubthah (Brünnov, R.E. and von Domaszewski, A. 1904).



29, 30. Royal Tombs.

two urns located along the axis on a tympanum and an attic, could also be a triclinium facade, as indicated by three niches inside. In the central niche there still , stands a statue of an unknown person dressed in toga. A large open courtyard in front of the entrance, at a later time intended for court hearings, has five sides, supporting the overhanging rocks and forming open galleries. The yard rests on a two-tiered arcade with a staircase leading to it (**Figs. 31, 32**).

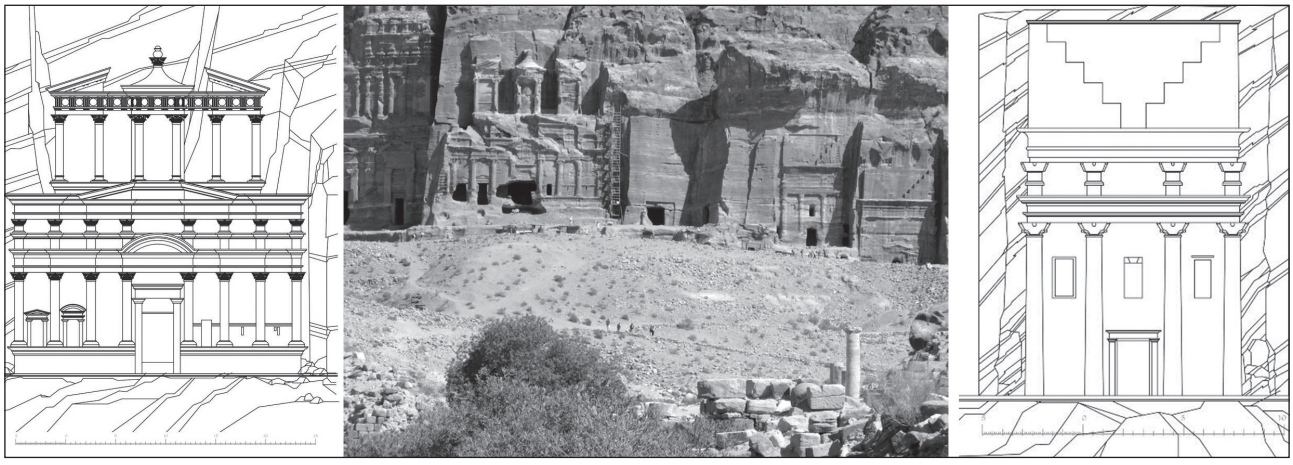
The next façade, behind several almost worn out facades, is the facade of the Silk Tomb, which shimmers with orange-red shades and named afterthe natural color of the rock layers from which it was cut. To the north of the Silk Tomb, is the facade of Corinthian Tomb, a ceremonial, rich in details, combining various Nabatean and classical architectural styles (**Figs.33-35**).



31, 32. Urn Tomb. Architectural graphic reconstruction.

The facade of the Palace Tomb located north, was erected in the 1st century BC. or 1st century AD. It was named after its analogy with the architectural scheme of the palaces of ancient Rome. In the immediate vicinity of the Palace, a little to the north, was a huge pool cut in the rock, where the water collected from the sources of Wādī Mūsā flows into a stone tank outside the entrance to as-Sīq canyon (**Figs. 36, 37**).

At a considerable distance to the north-east of the Royal tombs, the front of al-Khubthah massif continues to the facade of Sextius Florentinus Tomb. This volume was constructed parallel with a section of early Nabataean city



33-35. Silk and Corinthian Tombs. Architectural graphic reconstruction.

walls. This Tomb was built around 130AD (**Figs. 38, 39**).

Communication Arteries and the Water Supply System of Petra

The network of valleys crossing the plateau part of Petra and disappearing in deep mountain gorges converge to its main channel - the valley of Wādī Mūsā. The direction of the valley, as already mentioned, coincides with the axis of the urban center west-east. At al-Khubthah massif, Wādī Mūsā abruptly turns to the south, and then again follows the eastern direction to as-Sīq. The western direction of Wādī Mūsā continues to the valley of Wādī aṣ-Ṣuyyagh leaving the mountains. North, the valley of Wādī ad-Dayr, one of the four branches of which already lays deep in the mountains makes a turn to the west towards ad-Dayr Tomb. In the same bundle, the valleys of Wādī al-Mu'aysirah and Wādī at-Turkumāniyyah, which runs in the northeastern direction, coincide with the site of the city wall in the north of Petra. The southern part of the wall that passed along the valley of Wādī Farasah, runs southeast into the gorge of the massive al-Madhbaḥ. From the north, exactly to the location of Nymphaeum near the entrance to the city center, situated in the valley of Wādī Mūsā , adjoined another valley of al-Maṭāḥah, which is divided in the northern part of the plateau into several branches, one of which leaves for al-Khubthah array.

In the autumn-winter season the river valleys were filled with water, which was preserved in special stone water wells. Traces of them are found throughout the central plateau of Petra. The non-permeating springs of 'Ayn Mūsā outside the eastern entrance sent fresh water through as-Sīq to the city all year round through two canals: an open, carved out groove along the road, and a closed one consisting of flexibly connected ceramic sections.

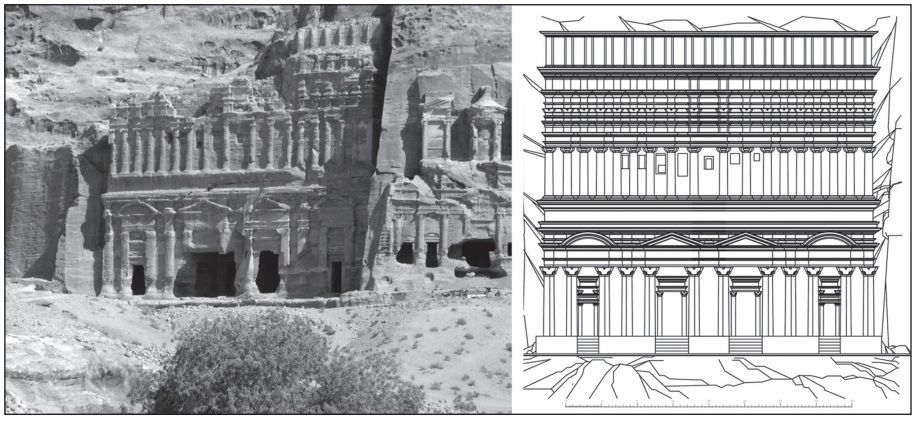
From these same sources, an external reservoir was filled, with a volume of 2500m^3. The water flowed from it in the north-western direction through a canal cut into al-Khubthah massif leading towards a vast pool in the center of the central area of the Palace Tomb.

At the end of it a dam was built to the north side of as-Sīq, entrance which contained Wādī Mūsā water in winter and protected the gorge from flooding. Stormy streams were directed through the tunnel of al-Maṭlab, which was cut down in the mountains of al-Khubthah, and spread through one of the branches of al-Maṭāḥah valley along all the riverbeds of central Petra, as in communicating vessels. One can only imagine the spring oasis of Petra, blossoming, fragrant, filled with the singing of birds, drowning in the giant bushes of azaleas and rhododendrons.

Mountain Peaks and the City-Forming Concept of Petra

The summit of the mountains surrounding the central plateau of Petra are marked by sacred heights, High Places (the places of main religious ceremonies dedicated to the ancient Nabatean deities; the god Dhushara and the goddess al-'Uzza).

One of the heights; al-Ḥabīs in the west, crowns one of the two peaks close to the city center of mountain al-Ḥabīs at 64m above the level of the city. This mountain is separated from the common mass by the two arms of Haroubet valley and Wādī aṣ-Ṣuyyagh (**Fig. 40**), which merge into one channel in the long western gorge. The sacred site of al-Ḥabīs



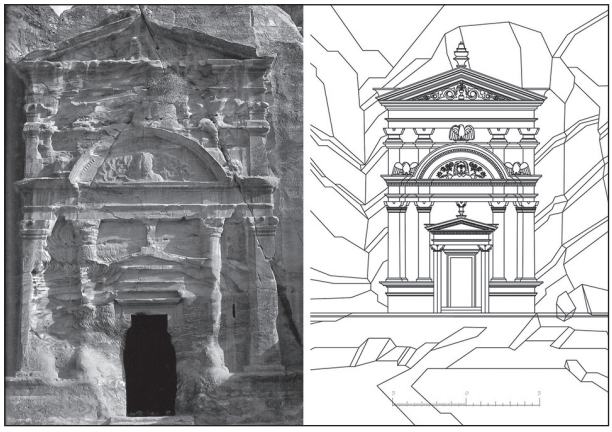
36, 37. Palace Tomb. Architectural graphic reconstruction.

is a sanctuary site of 4×5m with benches, platform of the altar and three steps leading to it. The altar of sacrifices was equipped with a drained pool with running water. This provision is characteristic of the religious ceremonies of the ancient Nabateans. The main sanctuary was associated with a whole complex of sites at different levels, connected by stone paths and steps that encircled the northern ledge of Mount al-Ḥabīs over aṣ-Ṣuyyagh valley (**Fig. 41**).

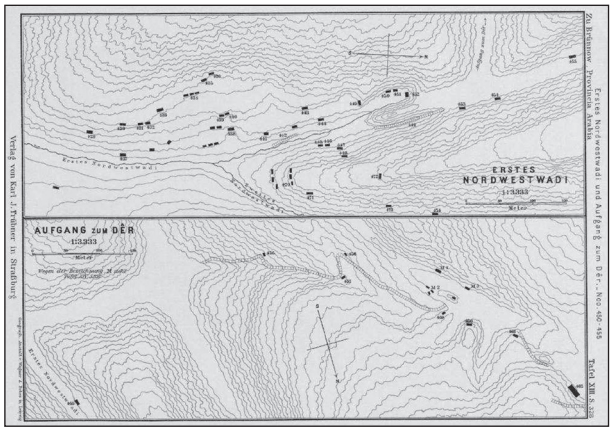
Directly opposite, in the direction exactly along the line coinciding with the longitudinal axis of the city center, at a level exceeding it by 250m, peak the Eastern Heights al-Khubthah. The group of heights of al-Khubthah mountain range, first discovered in May 1904, was known as a single complex of Three Heights.

In fact, five separate buildings can be considered as separate places for conducting religious ceremonies. There are four different approaches to al-Khubthah Heights: two from Sextius Florentinus Tomb from the north, the third from the steps going up to the Tomb Urn and the fourth from the valley to the north of al-Khaznah. The heights of al-Khubthah are the courtyards or sanctuaries taken out of the rock formation with three steps leading to them, and an altar, about 1m in height and 0.5m in width. Among other constructions of al-Khubthah closed courtyards, as well as an open area with an obelisk, about 1m high, also cut down from a solid massif.

The main height of the sacrifices is the southeast al-Madhbaḥ. It is located on the ridge of aṭ-Ṭaff mountain massif al-Madhbaḥ, towering above Petra at 214m. Two small plateaus, separated by a gorge, together form the main religious center of the ancient Nabataeans. On the southern plateau are two obelisks, about 6m height, at a distance of 30m along the line east to west. Cutting them, the Nabataeans had to level the whole mountain top a titanic work, almost definitely undertaken for the sake of the greatest deities; the god Dhushara and the goddess al-'Uzza. On the northern plateau, with a large massif that was lined up to an open courtyard with a low table in the middle and a high altar rising at its end the Nabataean Top of the sacrifices. Here, ritual sacrifices were made to the living blood



38, 39. Palace Tomb. Architectural graphic reconstruction.



40. Wādī Ṣiyaghah (Brünnov, R.E. and von Domaszewski, A. 1904).



41. City-forming concept of Petra.

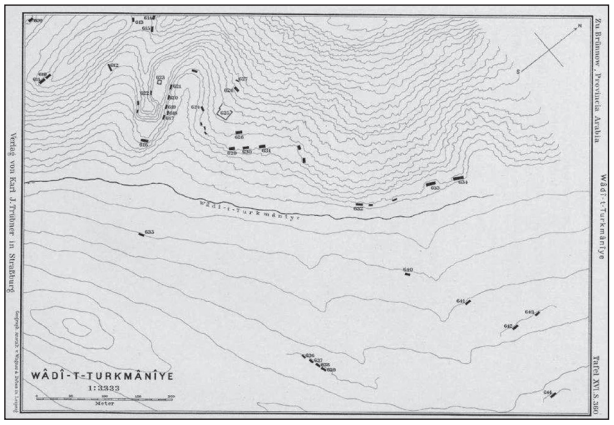
(presumably animals) in honor of Dhushara and al-ʻUzza, with a view of obelisks high above the breathtaking view of Petra in the valley and endless mountains around. The main height of the sacrifices may have been inherited from the Edomites who inhabited these places in the earlier Nabataean times and represents one of the best preserved religious places of this kind in the Ancient World. Following further north, the remaining walls and corner towers - are the fort of the sacred altitude al-Madhbaḥ. There is also a version that it was Propylaea, the main entrance to the sacred height of sacrifices.

The Height al-Muʻaysirah the fourth height of sacrifices, is at a level of 60m above the city center on one of the al-Muʻaysirah mountains in the north-western part of Petra (**Fig. 42**). Its altar with a staircase leading to it from the north is built on top of a lonely rock. The path of religious processions, carved in stone, passed along the eastern slope of the western ridge of al-Muʻaysirah mountains, crossed the valley of Wādī al-Muʻaysirah passing the catchment well, and connected to a common system with three communicating pools, rose to the sacred height along the western slope of eastern al-Muʻaysirah. On the way of the processions is a whole series of tombs, a small Triclinium that opens onto an open terrace with a solitary grave in its eastern part, and a quarry with a carved block of the god Dhushara.

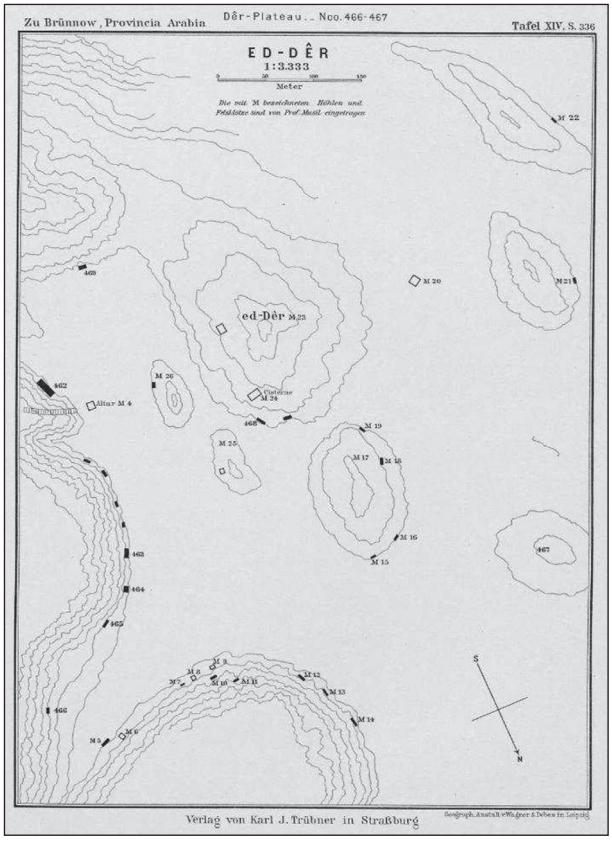
In addition to the four key groups of heights that fix the central Petra, there is one more height, deep in the mountains, ad-Dayr (**Fig. 43**). Religious processions to mountain ad-Dayr began from the Temple of Qaṣr al-Bint, descended to the valley of ad-Dayr, and then climbed a mountain path, passing the Lion Triclynium (**Figs. 44-45**), to a height of 220m above the center level (**Figs. 46-47**).

Thus, it remains to be assumed that the first four groups of Heights: al-Ḥabīs, al-Khubthah, al-Madhbaḥ and al-Muʻaysirah, together formed a virtual contour. The microcosm of Petra, its protection from external forces, while the fifth ad-Dayr demonstrated a macro-cosmic picture of the outside world. Already the ascent to the sacred Height forms the pictures of the conquered world to the stunning ad-Dayr and the view revealing new horizons could not but be a world view model of the interconnection and integrity of this world with its boundless surroundings.

The natural forms of mountains and valleys, the architectural volumes that make up the three-dimensional components of the natural-architectural complex of Petra, together represent a strictly defined formal system, the key of which was the location of the sacred heights. The prerequisite for reading the system was the plastic generalization of the terrain in the form of conditionally graphic “isophotes”,



42. Wādī at-Turkumāniyyah (Brünnov, R.E. and von Domaszewski, A. 1904).

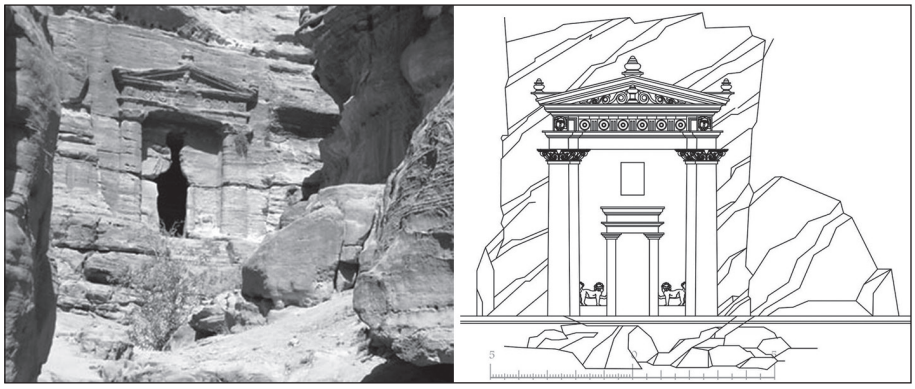


43. ad-Dayr mountain (Brünnov, R.E. and von Domaszewski, A. 1904).

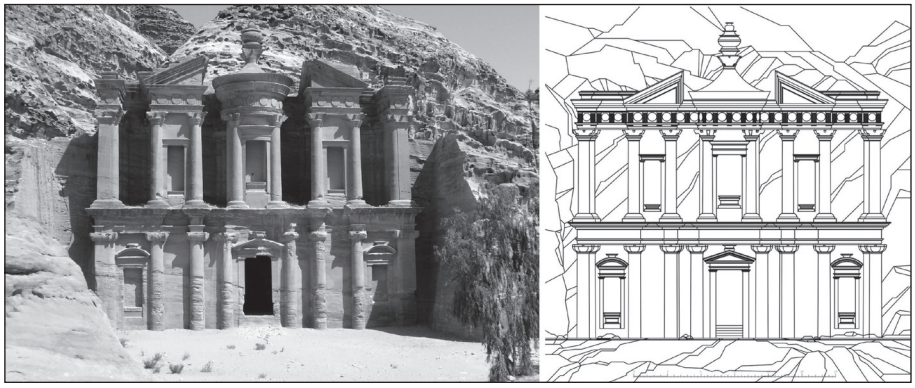
showing the general pattern, the preferred direction and steepness of the characteristically sections of the relief and, in addition, the conditional graphic reproduction of the volumes of the city center.

Straight lines connecting all four Heights consistently form a contour, coinciding with the boundaries of the central Petra. The straight line I-II, horizontally linking the Heights al-Ḥabīs and the al-Madhbaḥ sacrificial altitude, is superimposed on the line of the southern city wall, straight II-IV, al-Khubthah-al-Mu'aysirah on the north line. The height of the sacrifices visually connects with al-Khubthah heights of straight II-III, passing exactly across the Outer as-Sīq canyon in the area of its passage to as-Sīq, thus denoting the eastern boundary of the city. Direct I-IV, Heights al-Ḥabīs al-Mu'aysirah, limits Petra to the west. Moreover, the line I-III, connecting the heights of al-Ḥabīs and al-Khubthah along the diagonal, exactly coincides with the axis of the city center, and its intersection with the other diagonal of the quadrilateral II-IV, which connects al-Madhbaḥ High Altitude height with al-Mu'aysirah Height, and thus marks the entrance to City center with a near-by Nymphaeum.

Therefore, the sacred Heights al-Ḥabīs, al-Madhbaḥ, al-Khubthah and al-Mu'aysirah will fixes the western, southeastern, east and north-western coordinates of central Petra, the entrance to the city center and its main axis. One can reasonably assume the presence of a certain "Protective, security circuit" of the city. This version is confirmed by strong electromagnetic radiation in the area of Sacrificial Heights, which made it impossible before the advent of digital photography equipment and video shooting. Developing this idea, one can conclude in the assumptions that all the rock structures that are in the field of action of the "contour", almost literally within its borders, had a civil purpose: temples, residences (Palace Tomb, court), Urn Tomb, theater, residential quarters. This is also indicated by their appearance and size. The same is known about the appointment of a free-standing center: the city fountain, markets, thermae, temples, and palaces. As already mentioned, the forerunner of this, later Roman city center, was the early Nabataean city center of the 3rd century BC. It is obvious that the tombs were located outside the symbolic quadrangle and it was probably not by chance that their location was somehow connected with the ways of following religious processions to the sacred Heights of the city.



44, 45. Lion Triclinum. Architectural graphic reconstruction.



46,47. ad-Dayr. Architectural graphic reconstruction.

Landscapes and Dynamics of the Review of Architectural Species Fragments of Petra

Along the major base route, a number of Petra landscapes follow each other one by one, strung together on one thread of the pedestrian (horse) path (**Fig. 48**).

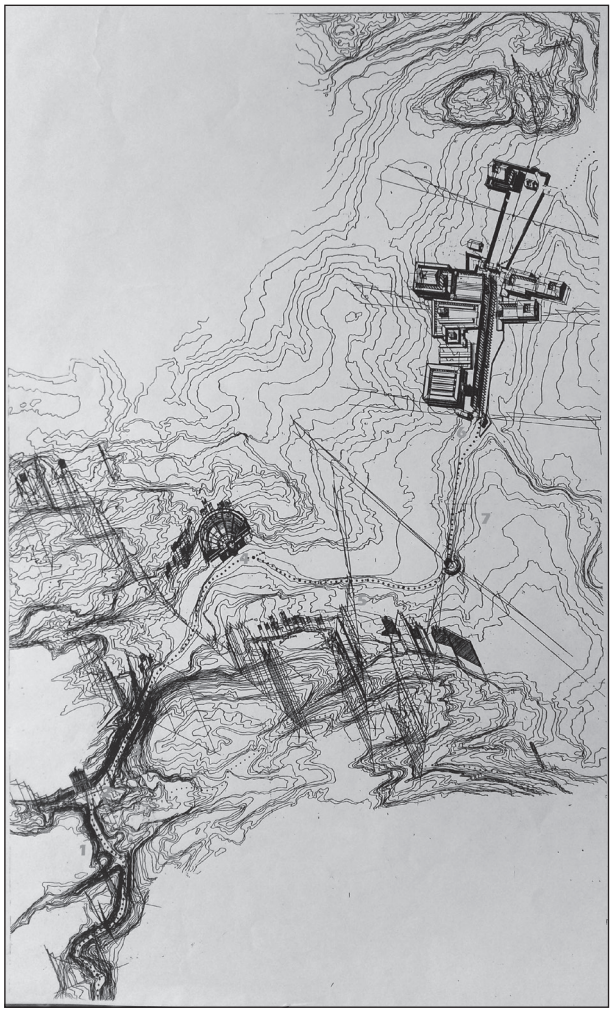
Under the landscape space is meant to be a separately acquired territorial unit of landscape composition, which has a relative integrity and specific volume-spatial characteristics that refer it to a certain type. In mountain Petra such signs are primarily determined by the nature of the relief, its pattern, steepness, and the proximity of the bulk masses (**Fig. 49**).

1. as-Sīq gorge is the first trail along the pathtowards the center of Petra's space, where a man enters, to the site, passing a wide exteriorroad before as-Sīq. Lies complex among the rocks in the slopes of the southern arm of Wādī Mūsā valley. this complex, with impressions precedes the entrance to the gorge: reveals therock carvings of the Obelisks Tomb and Bāb as-Sīq Triclinium are the main elements of the landscape picture, which unexpectedly appears to the left and to the left of the path and as single pylon on the right, leading the way towards to the beginning of the mountain corridor (**Figs. 50, 51**).

Unexpectedly, appearsa frame on theentrance to the gorge (**Fig. 52**). Until the middle of the 19th century. it was fixed by the arch of Bāb as-Sīq thrown over the narrowed entrance from one mountain wall to another. The total length of the line of as-Sīq corridor is 1400m. The width of the gorge in different areas ranges from 4 to 12m. the height exceeds 90m. Numerous bends of the gorge divide it into a series of tribes, representing visually isolated or partially communicating subspaces. The steep walls, which in height exceed its average width in a ratio of 10:1, visually closes above the head, creating the effect of an enclosed space, excluding visual connections with the external environment.

From the beginning of the ravine, walking for 40-45 minutes with a fantastic variety of views, limited in the field of view by closely approaching rocky walls of a narrow corridor. In such gap between the bizarrely protruding forms of rock , are one or several perspectives that are that are moving forward to the right or to the left, sharply breaking with a turn of the gorge.

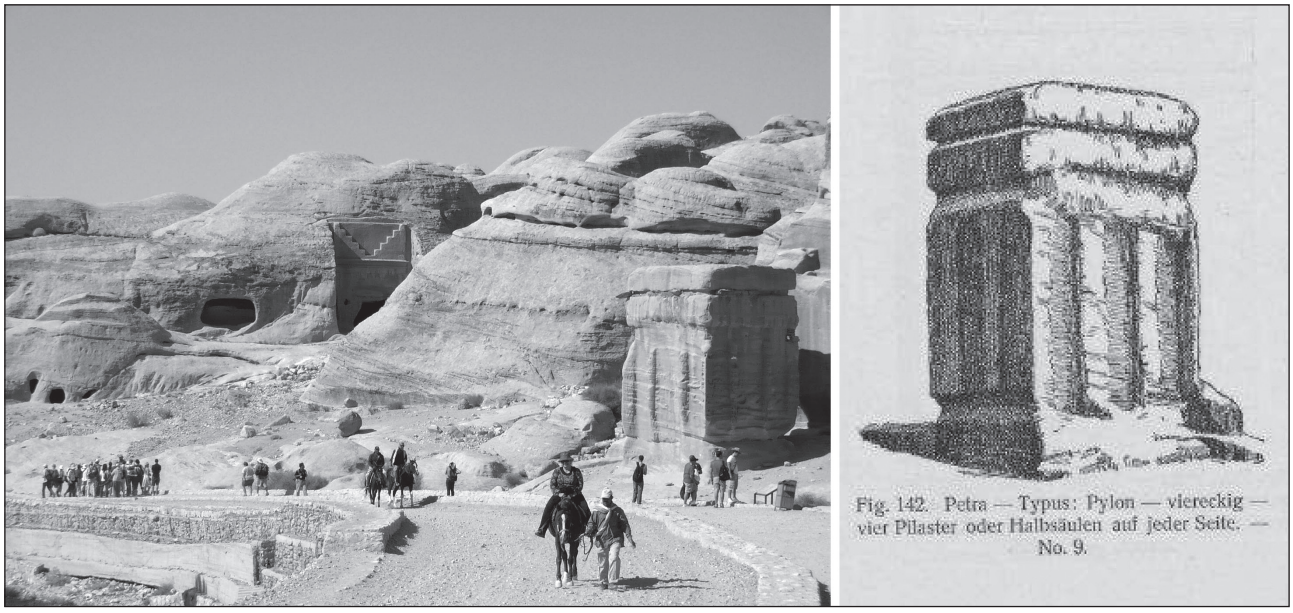
The limited width of the corridor contributes to close consideration of close-up picturesque fragments of rock, and rock paintings of local



48. Dynamics and review of architectural species fragments of Petra.

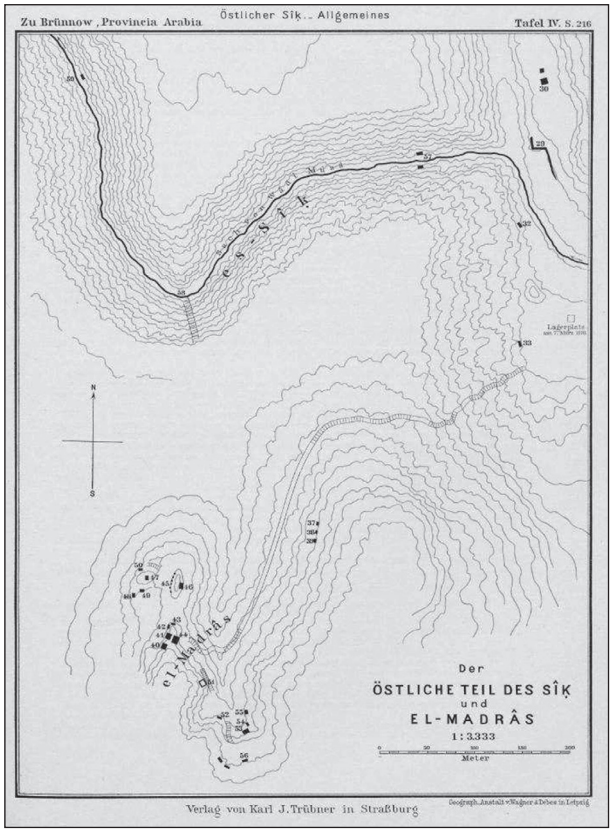


49. Bāb as-Sīq path way.



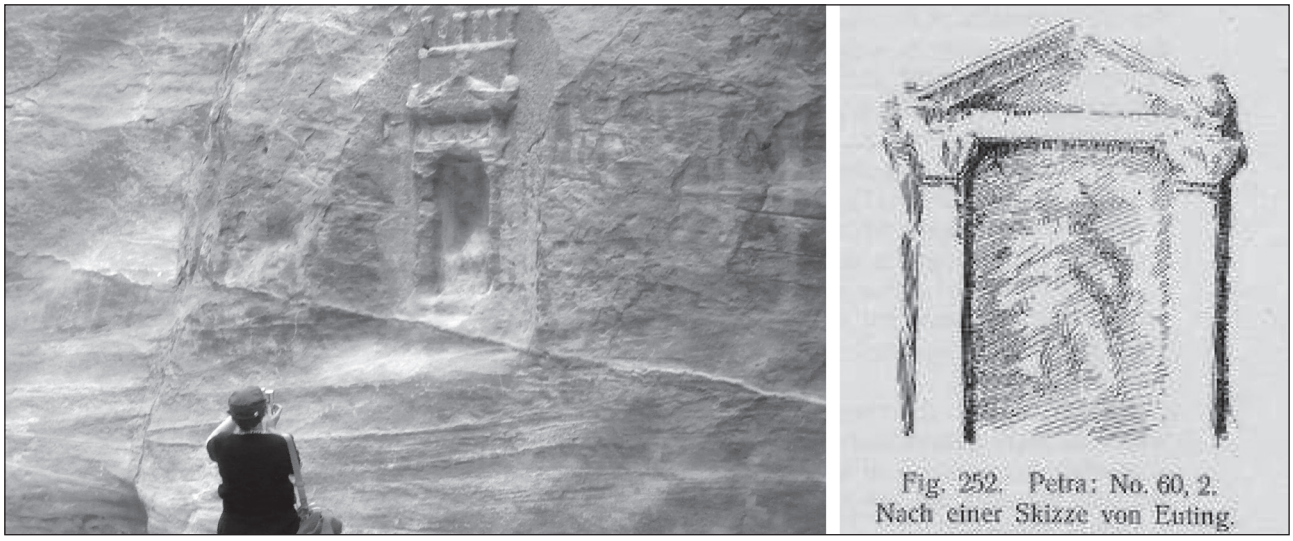
50-51. Pylon on the Bāb as-Sīq path way.

deities (**Figs. 53-58**). The gorge is oriented from east to west, but even its overlapping subspaces, because of their depth, do not receive direct morning and evening light. Direct light falls into the gorge only from the midday sun, which at the latitude of this region shines directly, giving no shadows. At other times of the day, each of the gorge spaces, depending on its orientation, has a different direction of shadows and a different degree of illumination. Consequently, the gorge is a long pulsating space, connecting as links in chains closed communal subspaces, different orientations, proportions, illumination and degrees of visual isolation. A sign of the approaching transition from one subspace to another, following it, is only a gradual or sudden change in illumination or a few flashes of light in individual places of expansion of the corridor. In such beam of bright sunlight, which initially appears as a narrow strip at the end of the gorge, and then wider and wider, appears before the travelers in a sequence of specific frames and then close-up Facade of al-Khaznah (**Figs. 59-60**).



52. as-Sīq (Brünnov, R.E. and von Domaszewski, A. 1904).

2. The square flooded by the sun in front of al-Khaznah is stretched in the direction transverse to the gorge. The area next to this walking space, is 35×100m, Closed along the perimeter, with high steep walls in the east, with the facade of al-Khaznah in the west and the more gentle slopes of the gorges that go north and south.
3. To the right of the facade of al-Khaznah is an exit to a narrow corridor which serves as the beginning of the thorough passage of the Outer as-Sīq gorge. The corridor with steep walls, as in as-Sīq gorge, but with architecturally processed facades of



53, 54. The niche at as-Sīq, and documentation by Brünnov, R.E. and von Domaszewski, A. 1904.

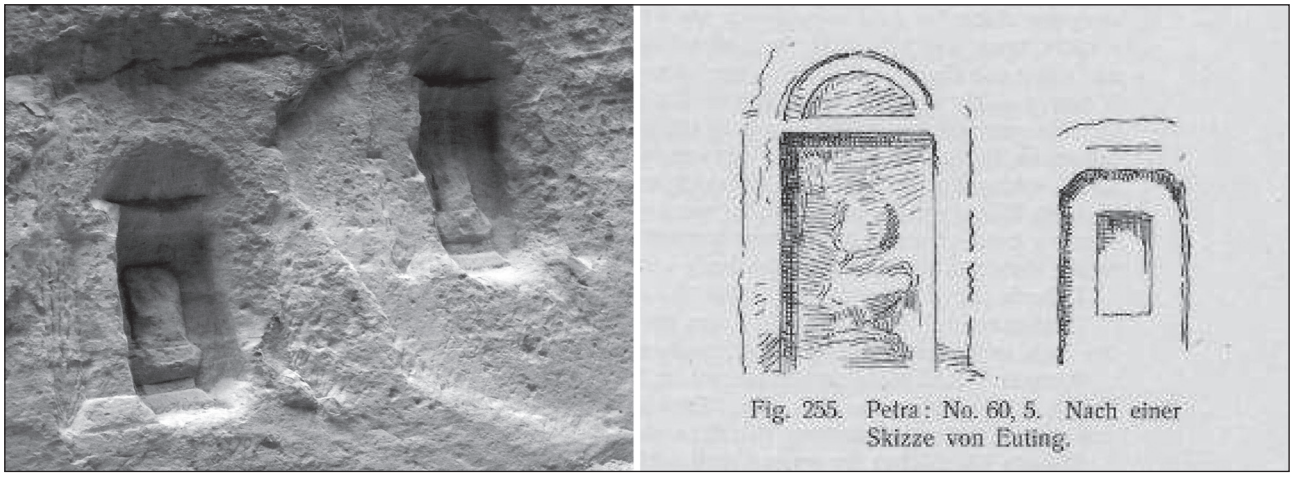
tombs, stretches a series of specific frames strictly in a straight line, oriented precisely to the Amphitheater in the background, in a direction close to the north-west, and then expanding sharply, entering an open wide space with rock scenes left and right. During the 12-15 minut journey to the Amphitheater, the views change, , bringing it closer and including the field of view to the Street of the Facades (**Figs. 61-66**).



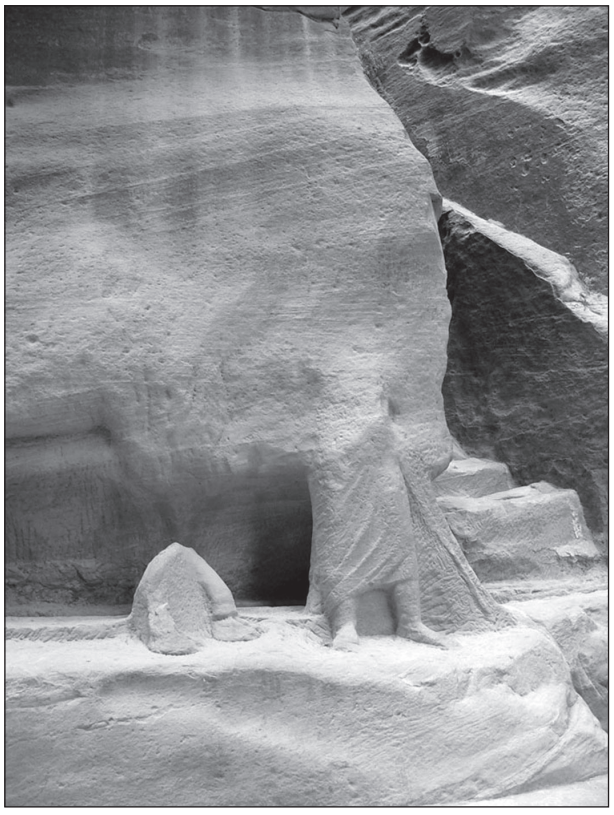
55. The niche at as-Sīq.

4. From the Amphitheater the gorge turns to the north, opening the next 400m long, landscape space that spreads into the central Petra. The western boundary of this space - slopes of al-Madhbaḥ ledges lower their height to 20m. The close-up of the Amphitheater remains to the left of the smoothly turning road. On the right is a view of the opposite stepped slope with the apertures of the tombs on different levels (**Figs. 67, 68**).

   From this place a scene is created; an exit into the open space with a view to the sky, the distant view of the surrounding mountains, and the sharp perspective of the Royal



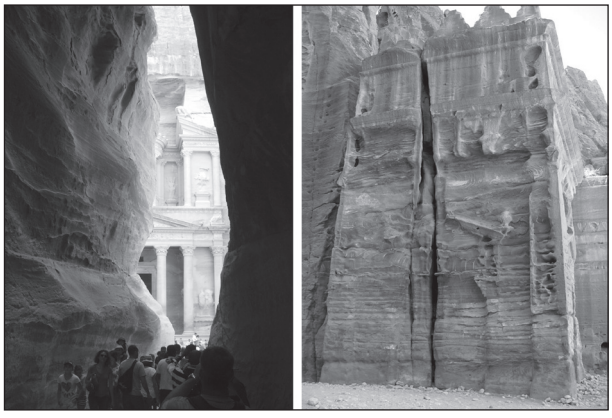
56,57. The deities in the niche at as-Sīq, and the documentation by Brünnov, R.E. and von Domaszewski, A. 1904.



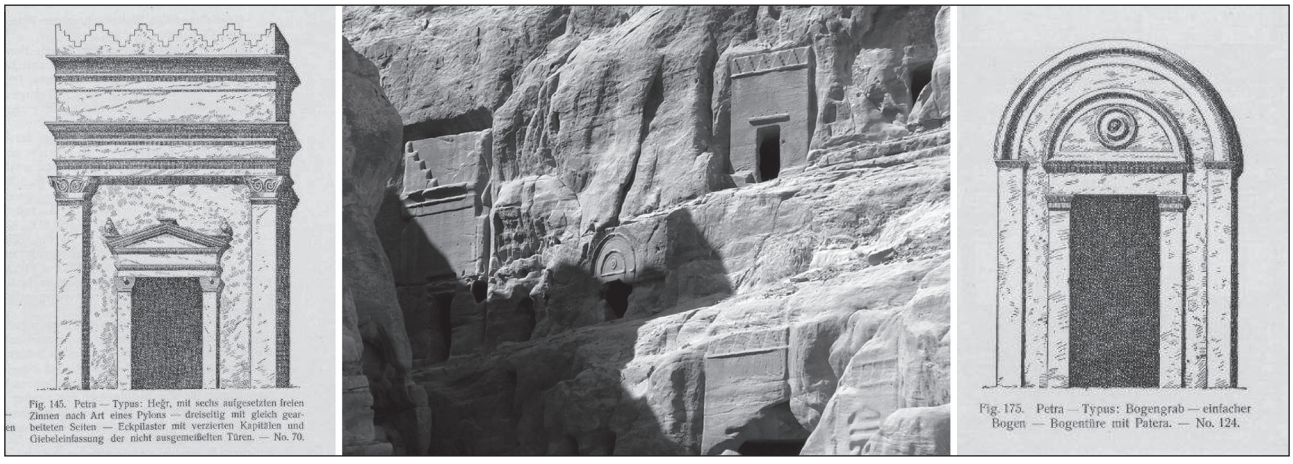
58. Tyche sculpture at as-Sīq.

Tombs on the right. In this scene, there is no doubt of its compositional center, which undoubtedly was in its time the volume of the Small Amphitheater. Now only its ruins testify its previous glory (**Fig. 69**).

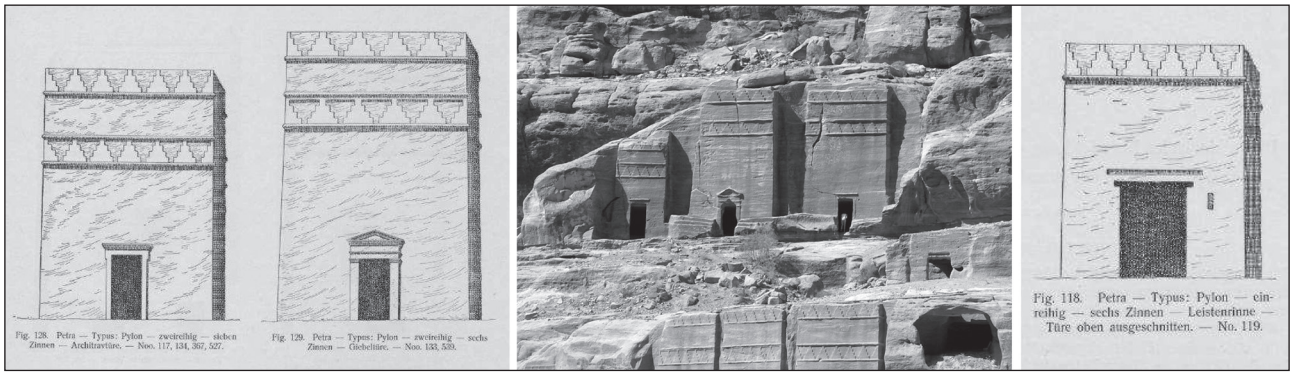
5. Another ten minutes, and the panorama is replaced by a deep central perspective of the thorough space of the Colonnade Street with the Monumental Gate in the background (**Fig. 70**).
6. The next ten minutes of the way brings the



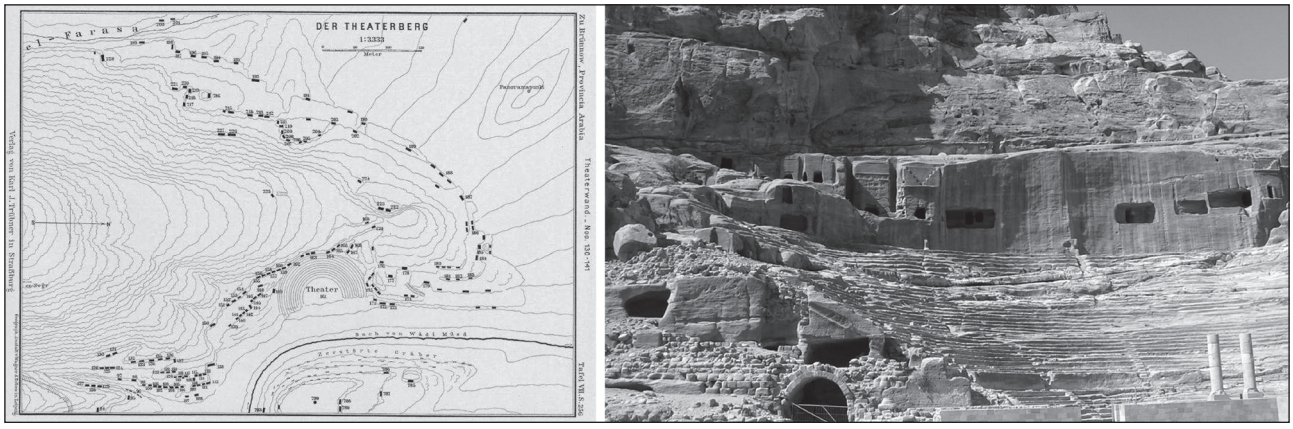
59, 60. as-Sīq, and al-Khaznah from as-Sīq.



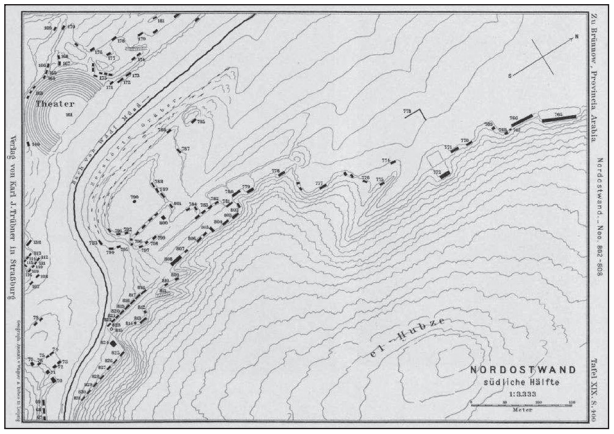
61-63. Outer as-Sīq, Tomb 70 and documentation by Brünnov, R.E. and von Domaszewski, A. 1904.



64-66. Outer as-Sīq, Tombs 124 and 119 and documentation by Brünnov, R.E. and von Domaszewski, A. 1904.



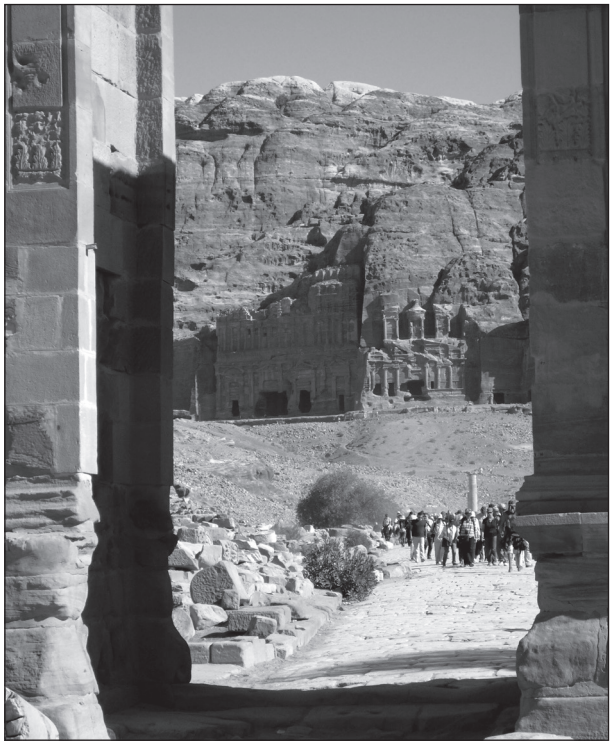
67, 68. *Outer as-Sīq, Tombs 133 and 134 and documentation by Brünnov, R.E. and von Domaszewski, A. 1904.*



69. *Outer as-Sīq (Brünnov, R.E. and von Domaszewski, A. 1904).*



70. *View from Palace tomb to Wādī Mūsā.*



71. *View to the Monumental Gates and Qaṣr al-Bint Temple from the Colonnaded Street.*



72. *View to the Royal Tombs from the Monumental Gates.*



73. The Royal Tombs. Architectural graphic reconstruction.

Monumental Gate closer. Their supports limit the view frame with the perspective of the Open Sanctuary and the Temple of Qaṣr al-Bint in the background of Mount al-Ḥabīs (**Fig. 71**).

7. Looking towards the opposite direction of the opening of the Monumental Gate is an imaginary central perspective of the little-preserved Colonnade Street with the Corinthian tomb along its axis in the background. The next few steps along the Colonnade Street open an extraordinary panorama of the Royal Tombs and their mesmerizing beauty (**Figs. 72, 73**).

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ORNAMENTAL AND PLASTICITY STRUCTURE OF CORNICES OF PETRA ARCHITECTURE AND GRAPHIC RECONSTRUCTION

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Abstract

The plastic expressiveness of the restrictive form synthesizes the aggregate sum of its artistic, structural-tectonic, rhythmic or spatial-deep concepts and is divided into structural and ornamental plasticity, plasticity of volume and surface, and plasticity of the parts of the order system.

Plasticity of volume, surface and shapes with spatial elements are consistent with the concepts of the types of space, frontal and deep-spatial compositions; the plastic expressiveness of a volume is associated with the perception of its parts from all possible directions. Plastic expressiveness of the surface is associated with the perception of the frontal composition, *i.e*. from the front side of the surface. The plastic expressiveness of the form depends on the complexity of deep perception of forms and spaces.

The facades of Petra, carved from solid rock massifs and constituting the processed part of the natural mountain landscape, are called rock carvings in the presented work. Rock carvings in their majority are defined by the concepts of surface plastics, which relate them to the texture level of the landscape structure of Petra.

The individual uniqueness of each rock carvings is different in proportions to the main structural plastic elements and the character of their details cornices, capitals and ornaments of relief images.

Each rock facade is perceived in the context of a general landscape-architectural ensemble, the components of which are facade compositions of neighboring structures and the surrounding array of natural mountain landscapes.

Key Words

Petra rock facades, Nabataean tombs, Nabataeans cornices, Nabataean portals, Nabatean porticoes.

Introduction

Structural Plasticity

Structural plasticity is a concept that denotes a clear separation of boundaries of the various structural elements that are different in function. In architectural order, the entablature consists of horizontal blocks of architrave, frieze and cornice. The cornice lines restrict the plane of the tympanum, the vertical lines delineate the dimensions of antae, pilasters and columns. Structural plastics also include micro Structural plastics, which denote the miniature details of large plastic elements, such as triglyphs and metopes in friezes of the Doric order, echinus and abaca of Doric capitals, echinus, volutes and balusters of Ionic capitals, figured abaca, twin bundles of volutes and tiers of acanthus leaves in Corinthian capitals. The complexity of such details qualitatively enriches the elements of the general structural plasticity.

Ornamental Plasticity

Ornamental plasticity is an architectural decor, which includes cornice details, echinus and balusters, curly details of Ionic and Corinthian capitals, as well as thematic decor such as sculptures of people and animals.

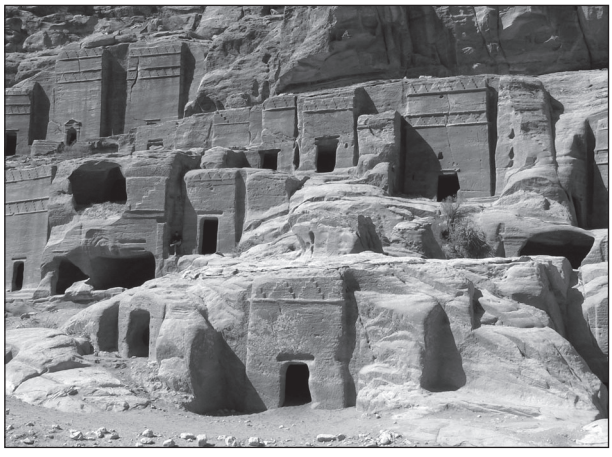
Typology of Petra Rock Carved Facades

The structural and micro-structural plasticity of the facades of Petra varies depending on the

types of cultures of different regions, under the influence of which the Nabataean kingdom was in that period. Many structures of the Facades Street are named tomb-pylons, which researchers refer to during the conquest period of the region of Petra by Assyria. It is quite possible, that the trade relations of the Nabataeans with the Arab states of North Africa, in particular Egypt, led to the fact that on pylon tombs Appears the details of Egyptian plastics. The influence of cultures of ancient Greece and Rome on the Petra region strongly affected the Nabatean architecture; the facades of pylon tombs eventually evolved into whole order compositions. The structures acquired new forms of Nabataean portals and Nabataean classic porticos.

The earlier tomb-pylons of Petra refer to the earliest type of architectural facades of Petra, approximately dating from the 7th-4th centuries BC. These facades have a flat surface, the upper part of which is occupied by a primitive cornice with a torus and an attic with a strip of flat pyramid-stepped ornament or "crow's steps" and an entrance opening to the tomb in the lower part of the facade, with a cornice board above. In later portals of the Assyrian type, the cornice traction becomes more complicated, representing an ovolo and a wide fillet above it. The metric series of stepped pyramids becomes six and seven-part with semi-pyramid at the beginning and end of the series. Structural plasticity of the Assyrian-type facades is built on the contrast between the plane wall and relief edges of cornices and rows of ornaments (**Fig**. **1**).

The "Egyptian" tomb-pylons of Petra is referred back to the period *c*. the 3rd century BC. and 1st century AD, and are characterized by the appearance of a cornice with an Egyptian fillet or the *Cavetto*. The facade has a cornice in the form of a cavetto and a flat fillet while an attic has a relief of two stepped semi-pyramids diverging in the center. The Egyptian cavetto with fillet plays the role of a cornice, which supports the attic with relief of two stepped semi-pyramids. A flat high fillet is part of an architrave beam supported by a pair of pilasters with The Nabataean Reverse-frustum Capital Type I and II. The framing of the entrance apertures mostly has a pair of pilasters with Nabataean Doric Capitals and an entablature with one or two profiled cornices. The Egyptian type of rock facades is characterized not only by the cornice with the cavetto, but primarily by the appearance of the classic order (**Fig**. **2**).



1. The earlier tomb pylons of Petra.

The Nabataean tomb-portals with a double cornice is referred back to the period from the 2nd century BC to the 1st century AD. The order composition of the facades ends as an attic with "crow's steps" pyramids, supported by an entablature consisting of a cornice with a fillet, a smooth strip of frieze, and an architrave. The architrave is divided into one or more complex detailed cornices. The lower cornice with a large number of classical profiled details is supported by two pilasters with Nabataean Reverse-frustum Capital Type I and II. The lower part of the facade between the pilasters has a profiled entrance portal with complex order compositions, pediment with acroteria, and an attic with classical order details (**Fig**. **3**).

Nabataean tomb-portals consist of double entablatures on its surface. The upper one has a cornice with a cavetto, and an attic above it. The lower one has a profiled cornice, resting on two pilasters and other cornices above, which consists of a flat strip of stone and four Nabataean Corinthian capitals. Two external capitals continue the axis of pilasters with Nabataean Corinthian capitals, while the two middle capitals are located at the same distance from the main axis of whole facade. The composition of the two entrance portals occupies almost the whole plane of the facade between the pilasters.

The other composition of facades has an entablature Which is supported by four pilasters with scrolls in between, and an image of Atargatis, the deity of Fertility. The axis of lower

tier pilasters match with capitals of dwarf pilasters on the upper entablature (**Fig**. **4**).

Nabataean classic type of portals and porticos of Petra, which include twelve objects with the most expressive order compositions, can be conditionally divided into three groups:

The first group includes portals built during 1st century BC. and 1st century AD such as the Broken Pediment Tomb, Roman Soldier Tomb, Lion Triclinium (**FIG**. **5**) and Renaissance Tomb.

The second group consists of rock carved façades, erected during 1st century BC. and 1st century AD such as The Sextius Florentinus, Silk and Urn Tombs (**Fig**. **6**).

The third group includes five façades, which magnitude and plastic personality puts them in the most significant rock carved façades of Petra: Bāb as-Sīq Triklinium (**Fig**. **7**), Palace Tomb, Corinthian Tomb (**Fig**. **8**), ad-Dayr (**Fig**. **9**) and al-Khaznah (**Fig**. **10**) These structures date back to 1st century AD (**Fig**. **11**).

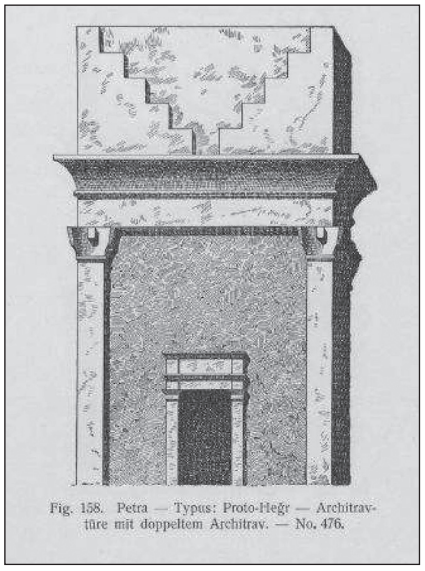


Fig. 158. Petra — Typus: Proto-Heğr — Architravtüre mit doppeltem Architrav. — No. 476.

2. The Tomb No 476 with Cavetto cornice (Brünnow and von Domaszewski I. 1904, fig. 158).

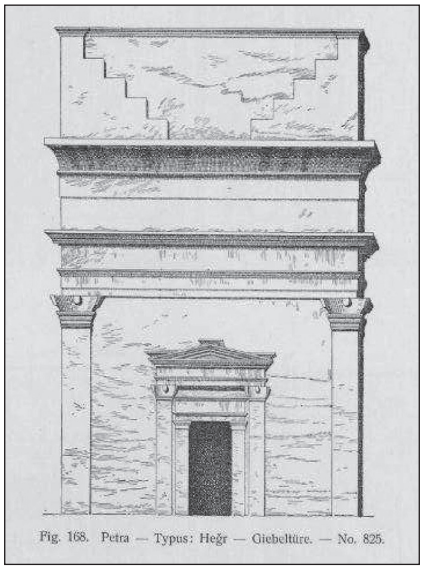


Fig. 168. Petra — Typus: Heğr — Giebeltüre. — No. 825.

3. The Tomb No 825 with Double cornice (Brünnow and von Domaszewski I. 1904, fig. 168).

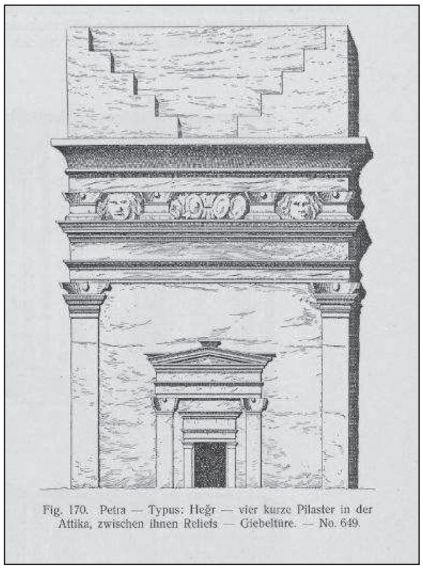


Fig. 170. Petra — Typus: Heğr — vier kurze Pilaster in der Attika, zwischen ihnen Reliefs — Giebeltüre. — No. 649.

4. TheTomb No 649 with Double entablature (Brünnow and von Domaszewski I. 1904, fig. 170).



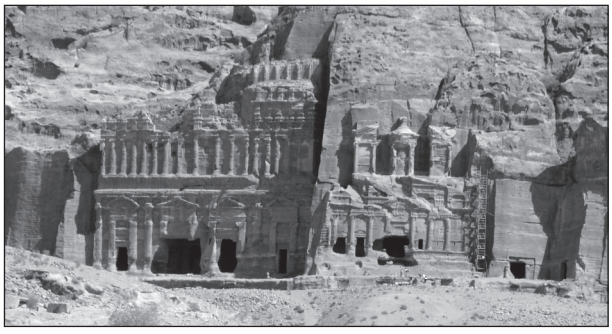
5. The Lion Triclinium.



6. The Urn Tomb and Silk Tomb.



7. Bāb as-Sīq Triclinium.



8. The Palace Tomb and Corinthian Tomb.

The Cornices of Petra Facades

In the architectural order, the cornice is the crowning part of the entablature, located above the frieze and architrave. The ordered cornice sharply comes forward and hangs over the remaining parts of the entablature, protecting them from precipitation. The cornices are the most beautiful and significant detail of the facades of Petra. The cornice in classical architecture is the crown part of the horizontal beam in a structure. On the facades of Petra, the cornice is a horizontal ornamental detail of plastic décor in the rock order system.

The Cornice of the Broken Pediment Tomb

The composition of the facade consists of a flat portal with four pilasters, the entablature and the pediment with a clear division of the central segment and the two entablatures (**Fig**. **12**).

The cornice of the broken pediment itself consists of the following ornamental plastic details starting from top to bottom: Top fillet, cyma recta, fillet and fascia. The Broken Pediment is supported by two leveled cornices and an architrave with the following elements in between: fillet, cyma recta, fascia, architrave, taenia, cyma reversa, fillet and fascia. Nabataean "pyramidal" capitals supports the composition of the cornice (**Figs. 13, 14**).

The Cornice of the Roman Soldier Tomb

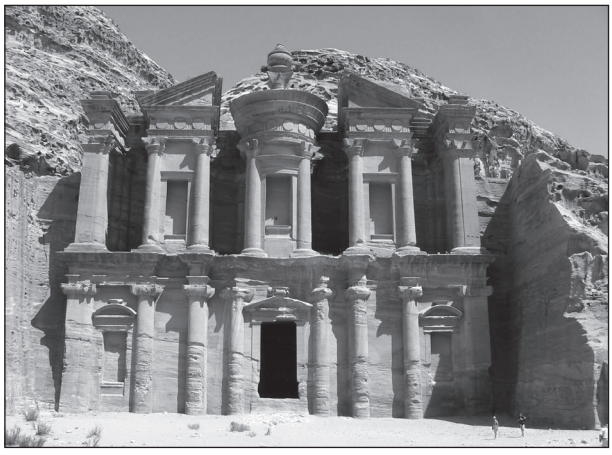
The façade composition consists of two portals, a small portal with an entrance framed by a larger portal. The outer portal represents a composition of four pilasters with an entablature and a pediment based at the attic. Each "double" column with a rectangular section from the outside and a quarter of the circle section from the inside, crowns the Nabataean Reverse-frustum Capital Type II. The upper parts of the Intercolumniation occupy three niches with a high relief figures of Hellenistic armors (**Fig**. **15**).

The cornice of the upper part of the attic consists of four fillets of different heights. The pediment cornice has a fillet, a cavetto and five fillets of different heights in its structure. The lower part of the attic, which is plays the role of the architrave, consists of the following ornamental detail from top to bottom: fillet, cyma recta, two fillets of different heights, cyma recta and a fillet. The height of taenia divides the fascia into two parts (**Fig**. **16a**). The cornice of the entrance portal consists of ornamental details of classical Doric. Five fillets of different heights define the plane tympanum. The cornice has the following details in its structure from top to bottom: three fillets, an entablature with triglyphes and round metopes, three fillets and two fascias (**Fig**. **16b**).

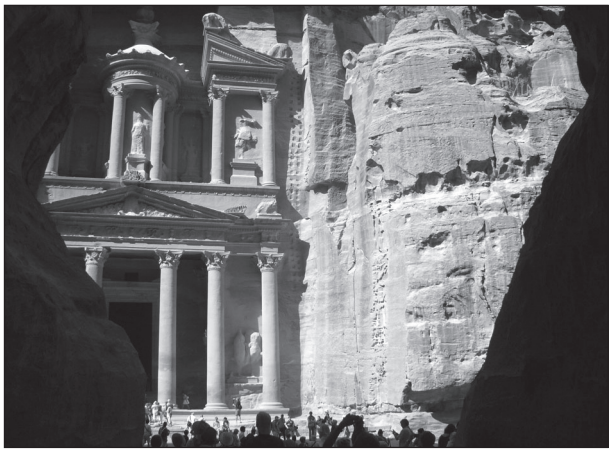
The Cornices of the Lion Triclinium

The facade composition consists of a portal with expressive structural and ornamental plasticity. Two "twin" pilasters with a rectangular cross-section from the outside and a quarter of a circle section on the inside, supports a triangular pediment, and are crowned by Nabataean plant capitals. The entrance portal in the center of the façade composition has a triangular pediment at the top and two reliefs of lions on the sides (**Fig**. **17**).

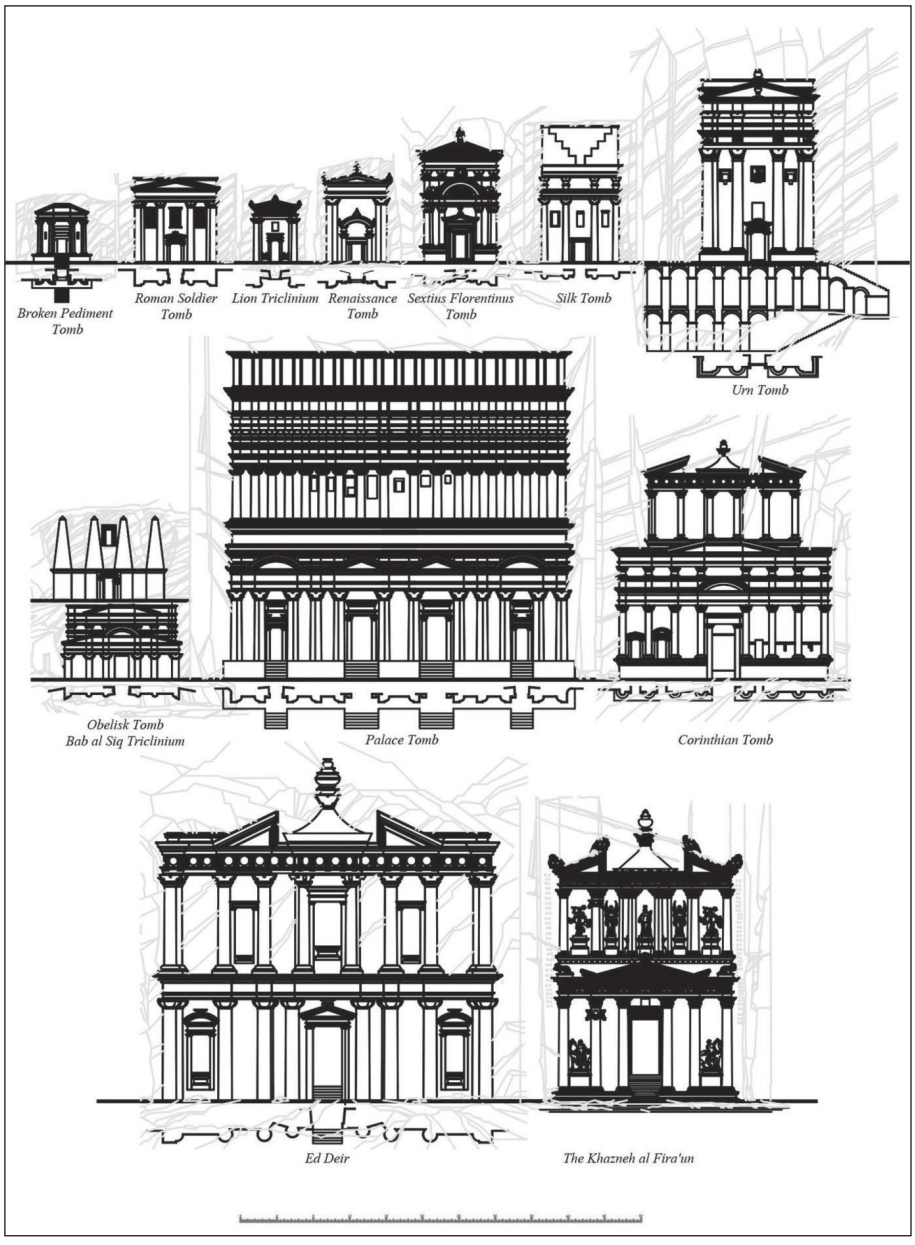
The pediment cornice consists of a fillet, cyma recta, two fillets of different heights and



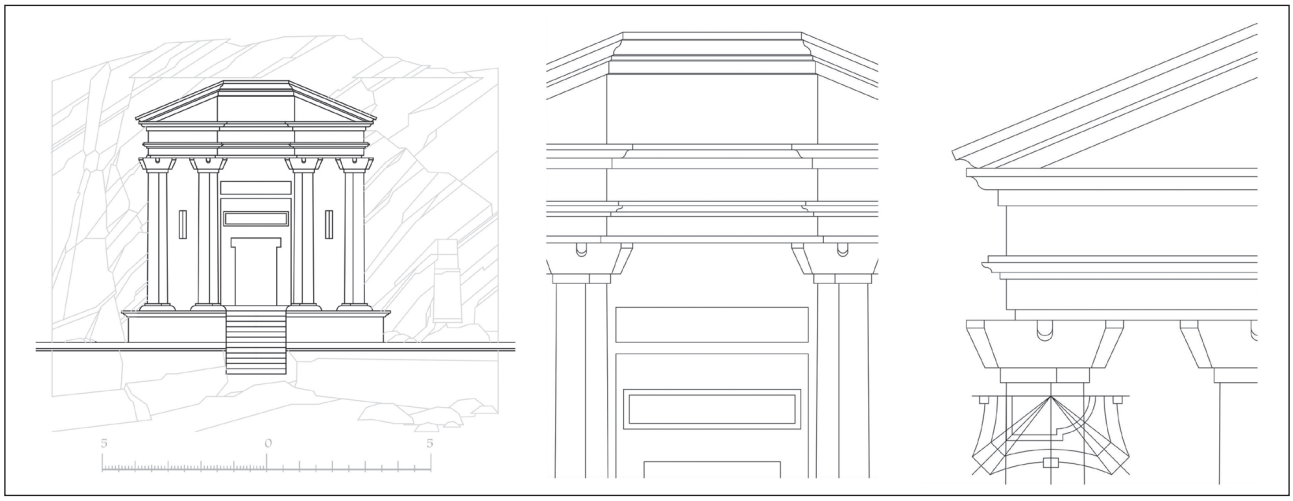
9. ad-Dayr.



10. al-Khaznah.



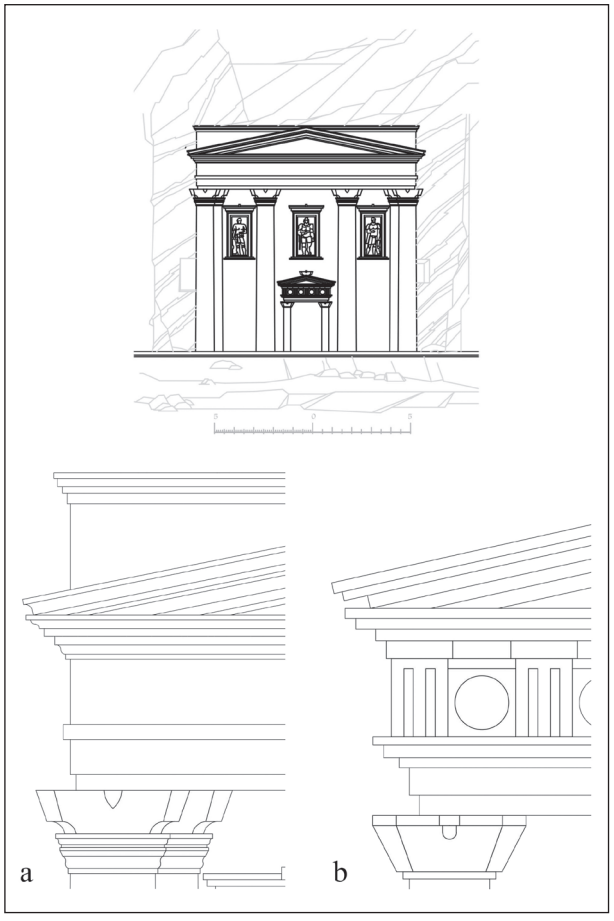
11. The 12 most significant facades of Petra.



12-14. The Broken Peiment Tomb and its details.

a fascia. The tympanum of the pediment is adorned by relief ornaments of local plants. The entablature of the façade has Ornamental details of classical Doric order such as triglyphes, and round shape metopes. Two Theatre masks are based on the entablature directly above the Nabataean Corinthian Capital, Type I, which supports the whole composition above. The upper cornice, which crowns the entablature, consists of fillet, ovolo, fillet, cyma recta, fillet, ovolo and a fillet. The middle cornice, above the architrave, consists of fillet, cyma recta and two fillets of different heights (**Fig**. **18**).

The entrance portal consists of double cornice ornamental structures at the top and includes the following details from top to bottom: fillet, cyma recta, two fillets, upper architrave, fillet, cyma reversa, fillet and a lower architrave. Two pilasters with Nabataean Doric capitals support the whole composition (**Figs**. **19, 20**).



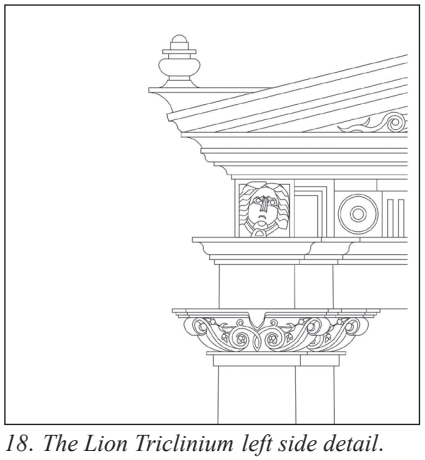
15, 16. The Roman Soldiers Tomb and its details.

The Cornices of the Renaissance Tomb

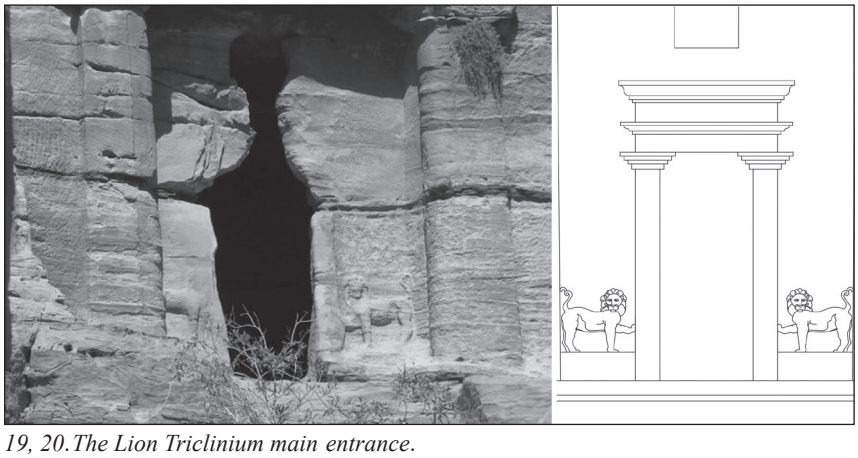
The portal with its massive pilasters and an architrave is completed by a pediment with three acroterias in the corners and reliefs of urns. Each "twin" pilaster is completed by a Nabataean Corinthian Capital, Type III. The central portal of the façade consists of round shape arch with acroterias on the top and sides. The acroterias are adorned by reliefs of urns. The arch is supported by dwarf pilaster with double cornices and a pilaster with the Nabataean Corinthian Capital, Type III. Two cornices



17. The Lion Triclinium pediment and entablature.



18. The Lion Triclinium left side detail.



19, 20. The Lion Triclinium main entrance.

without an architrave and two simple pilasters represent the entrance (**Fig**. **21**).

The main pediment cornice consists of the following: 2 fillets, cavetto, fascia and fillet. The entablature cornice is similar to the cornice of the Broken Pediment Tomb in Structure and has the following details from top to bottom: 2 beveled ovolos, fillet, a beveled ovolo, fascia, architrave, three fillets of different heights and a fascia (**Fig**. **22**).

The round shape arch of the central portal consists of the following ornamental details from top to bottom: 4 fillets of different heights, small cavetto, fascia and a fillet. The cornice of the dwarf pilaster consists of a fillet, cyma reversa, two fillets of different heights, architrave, 2 fillets of different heights and a fascia.

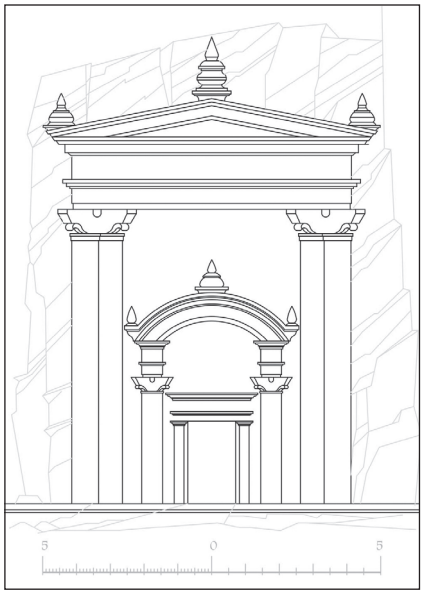
The entrance portal cornice is divided into two parts and it is inserted directly to the wall, without structural details such as architraves and fascia. The upper part of the entrance portal consists of: a fillet, cyma reversa and 2 fillets of different heights. In the lower part are 3 fillets of different heights (**Fig**. **23**).

The Cornices of the Sextius Florentinus Tomb

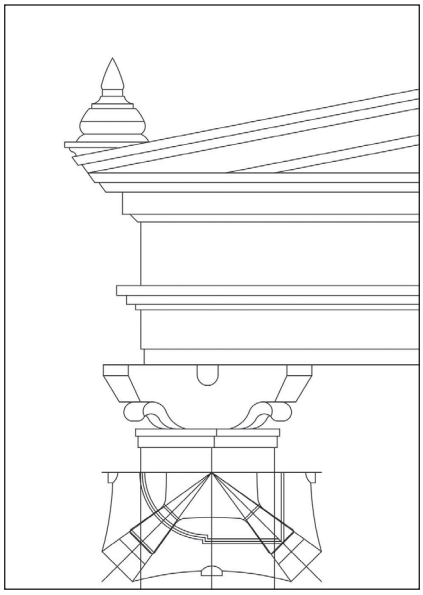
The composition of the facade is a two-level portal, based on a high plinth. The four pilasters at the first level, the last two from each side of which are "twin" pilasters with different section profiles, are crowned by the Nabataean Reverse-frustum Capital Type II. The pilasters are based on a high pedestal with a detailed cornice, and supports the semicircular pediment with Atargatis, the deity of Fertility, with scrolls in the center and a relief plant ornament. Three acroterias with eagles are at the top of the first level façade composition. The central part of the entablature has a semicircular pediment with a tympanum filled with relief plant ornaments. The central portal composition consist of a triangular pediment and Nabataean pyramidal capitals on top, supported by two pilasters with the Nabataean Reverse-frustum Capital Type III and a rectangular entrance portal with a cornice. The upper level of the portal has four dwarf pilasters and an attic, crowned by the Nabataean Reverse-frustum Capital Type I, and a triangular pediment with reliefs of local vegetation inthe tympanum and acroteria, with an urn based at the top (**Fig**. **24**).

The main pediment cornice consists of: a fillet, cyma recta, three fillets of different heights and dentils (**Fig**. **25**). The cornice of the upper entablature consists of The following ornamental plastic details, from top to bottom: a fillet, cyma recta, five fillets of different heights, fascia, fillet, cyma reversa, fillet and a fascia, upper architrave with dwarf pilasters, a fillet, cyma recta, a fillet and a lower architrave with plain pilasters.

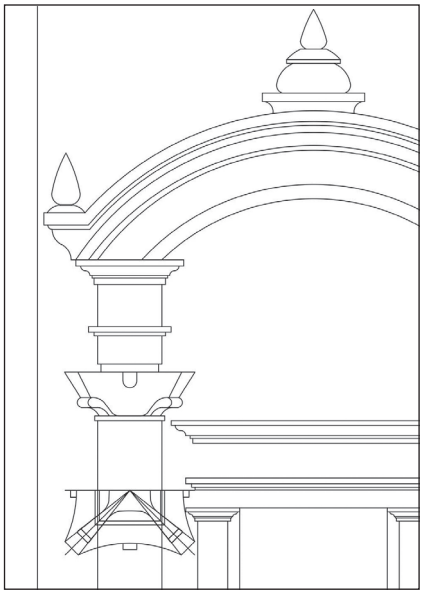
The cornice of the round shape arch consists of: a fillet, cyma reversa, fillet, dentils, fillet, fascia and a fillet.



21. The Renaissance Tomb.



22. The Renaissance Tomb left side detail.

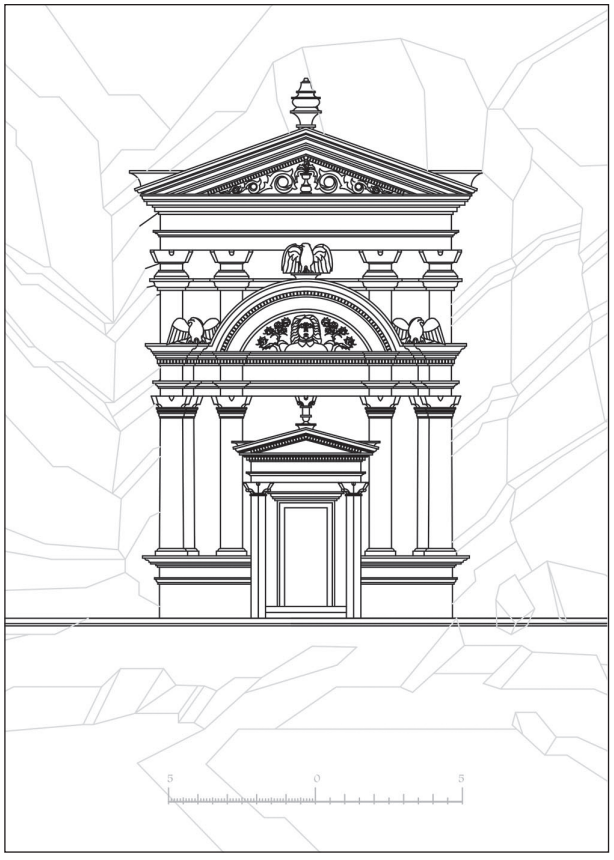


23. The Renaissance Tomb main entrance left side detail.

The cornice of the lower entablature consists of the following details, from top to bottom: a fillet, cyma reversa, three fillets of different heights, cyma recta, dentils, fillet, fascia, fillet, cyma reversa, fillet and a fascia (**Fig**.**26**).

The entrance pediment cornice consists of: a fillet, cyma recta, two fillets of different heights, dentils and a fillet. The plastic structure of the entrance entablature consists of three fillets of different heights, dentils, fillet, fascia, fillet, cyma reversa, fillet and a fascia. The entrance frame consists of a fillet, cyma recta and 2 fillets (**Fig**. **27**).

The cornice of the pedestal has the following details from top to bottom: a fillet, cyma reversa, three fillets of different heights, fascia, fillet, cyma reversa, and a fillet (**Fig**. **28**).

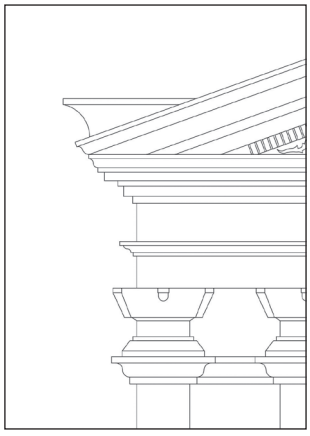


24. Sextius Florentinus Tomb.

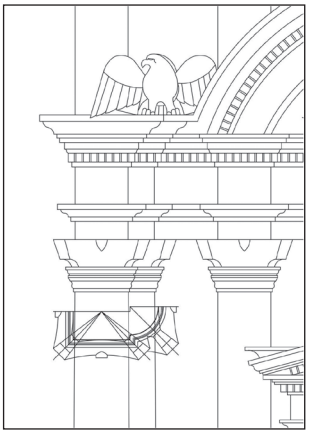
The Cornices of the Silk Tomb

The composition of the facade is typical for portals with a double entablature, but the size and location gives it a special significance in the range of Royal Tombs of Petra (**Fig**. **29**). It is divided into three structural parts. In the first level, four semicircular pilasters with The Nabataean Reverse-frustum Capital Type III support an entablature with a double cornice and an attic. The main entrance has a simple cornice and an architrave, which is supported by two simple pilasters with Nabataean Doric capitals. The second level consists of four dwarf pilaster with the Nabataean Reverse-frustum Capital Type I. The Nabataean Reverse-frustum Capital Type III supports a massive cornice, which refers to the Egyptian style of tombs-pylons. The third upper level consists of a huge attic with Assyrian "crow's steps" and a simple cornice on the top of the portal (**Fig**. **30**).

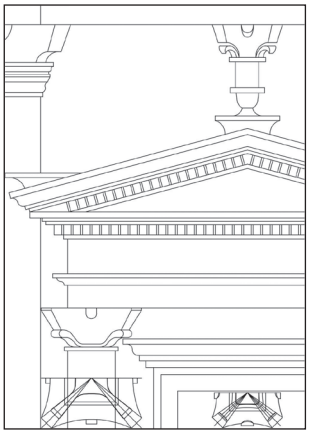
The cornice of the attic consists of the following ornamental details from top to bottom: an ovolo, cavetto, torus, two fascias of different heights, architrave with the dwarf pilaster, fillet, cyma recta, three fillets of different height, fascia, fillet, cyma reversa, fillet and a fascia. (**Figs**. **31, 32**).



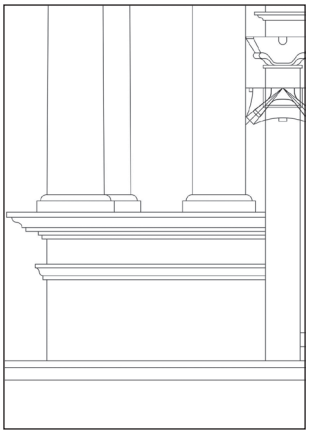
25. Sextius Florentinus Tomb pediment and upper entablature cornices.



26. Sextius Florentinus Tomb lower entablature cornices.



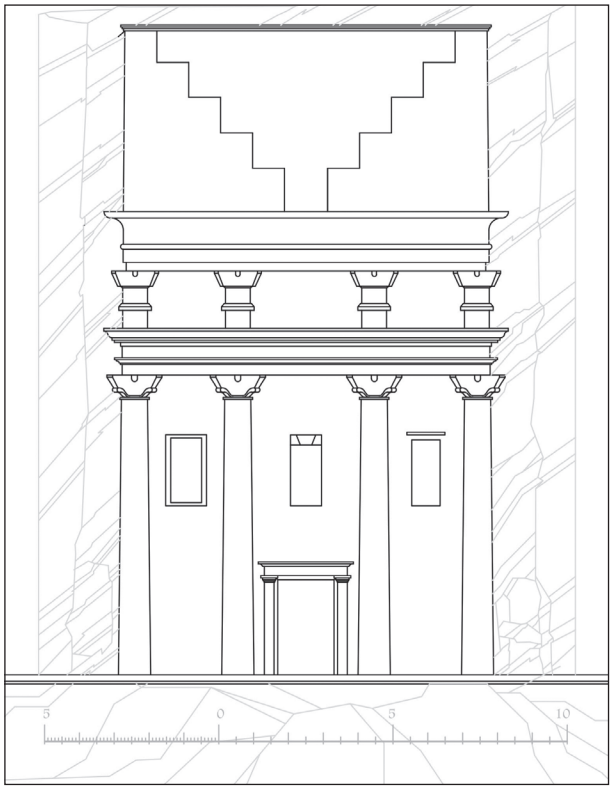
27. Sextius Florentinus Tomb entrance pediment cornices.



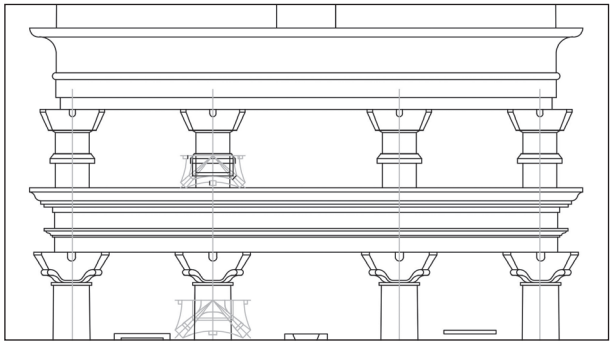
28. Sextius Florentinus Tomb pedestal cornice.

The Cornices of the Urn Tomb

The composition of the facade is a two-level portal on a high plinth. The first order level consists of a pair of "twin" pilasters with a rectangular outer section and a quarter of a circle inner section, with pairs of medium half-columns, crowned by the Nabataean Reverse-frustum Capital Type II, which are supporting the entablature, and divided in four parts by ornamental cornices and an attic with a triangular pediment. Four pilasters are based on a high plinth. The lower frieze of the entablature has, coaxially with the main pilasters, four dwarf pilasters, adorned by reliefs of draped figures. The third level of entablature consists of four dwarf pilasters, crowned by the Nabataean Reverse-frustum Capital Type I. The attic with triangular pediment on top of the portal is adorned by two urns in the center of a tympanum. The main entrance represents a small portal with two pilasters, crowned by the Nabataean Reverse-frustum Capital Type III, an entablature and a triangular pediment. The base of the tomb is located on an arcade construction, according to many scholars, dating to the period of the Byzantine Empire 446-447AD. (**Fig**. **33**).



29. The Silk Tomb. Architectural graphic reconstruction.



30. The Silk Tomb double entablature cornices.



31, 32. The Silk Tomb and Urn Tomb.

The cornice of the attic in the upper level has the following ornamental details in its structure: four fillets of different heights, fascia, three taenias of different heights, fillet, cyma reversa, two fillets and a cavetto. The pediment consists of a fillet, cyma recta and four fillets (**Figs**. **34, 35**).

The cornice of the entablature presents multi leveled ornamental structure. The upper level consists of a fillet, cyma recta, two fillets



33. Urn Tomb. Architectural graphic reconstruction.

and a fascia. The third level consists of three fillets, an attic with dwarf capitals, taenia, fillet, cyma recta, fillet and a fascia. The second level contains a fillet, cyma recta, two fillets, cyma reversa, fillet, dentils fillet and attic with reliefs of draped figures. And the lower level is made up of a fillet, cyma reversa, fillet and a fascia (**Figs**. **36, 37**). The cornice of the pedestal has only five fillets of different heights. The cornice at the entrance pediment has ornamental composition of following details: a fillet, cyma recta, three fillets of different heights, cyma reversa and a fillet. The entablature consist of a fillet, cyma reversa, two fillets of different heights, frieze with triglyphes and round metopes, fillet, cyma recta, fillet and two fascias of different heights (**Fig**. **38**).

The Cornices of the Bāb as-Sīq Triclinium

The composition of the portal has two "broken" pediments. Six pilasters with the Nabataean Reverse-frustum Capital Type III support an entablature, large "broken" pediment and an arch in the first level. The top cornice of the "broken" pediment represents a border between lower and upper parts of the portal. The attic of the upper level could be divided in two parts. The lower entablature with six pilasters, crowned by the Nabataean Reverse-frustum Capital Type III, supports an upper entablature with small "broken" pediment and an attic with two pilasters. Each vertical segment of the façade is divided by ornamental detailed cornices (**Figs**. **39, 40**).

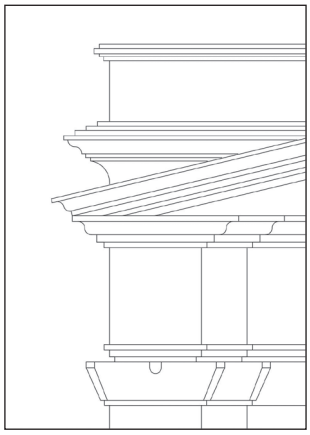
The cornice of an attic consists following ornamental detail from top to bottom: a fillet, ovolo, fillet, fascia and attic with a pilaster, fillet, cyma recta, fillet, fascia, fillet, cyma recta, fillet and two fascias of different heights, attic with the dwarf pilasters, four fillets, beveled ovolo, fascia, fillet, cyma recta, fillet and a fascia (**Fig**. **41**).

The cornice of the arch shape pediment consists of two fillets of different heights, fascia, fillet and a fascia. The cornice of the "broken" pediment at the upper level has four different heights in its structure. The lower "broken" pediment consists of following details: a fillet, cyma recta, two fillets, beveled ovolo, fascia, fillet, cyma recta, fillet and two fascias of different heights (**Fig**. **42**).

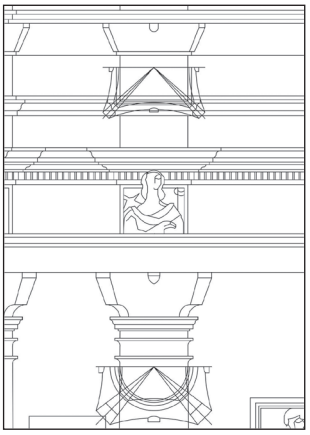
The cornice of the "broken" pediment of the upper level contains two fillets of different heights, cyma reversa, fillet and a fascia (**Fig**. **43**).



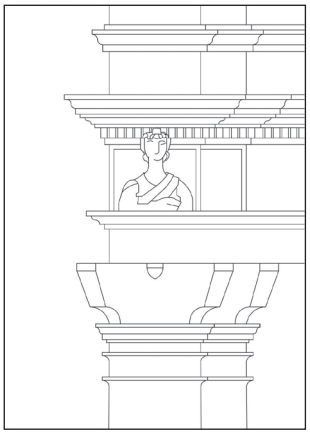
34. Urn Tomb upper tier.



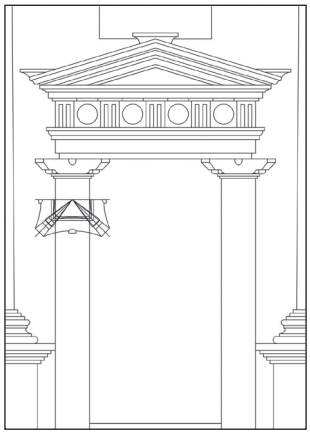
35. Urn Tomb upper storey left detail.



36. Urn Tomb entablature detail.



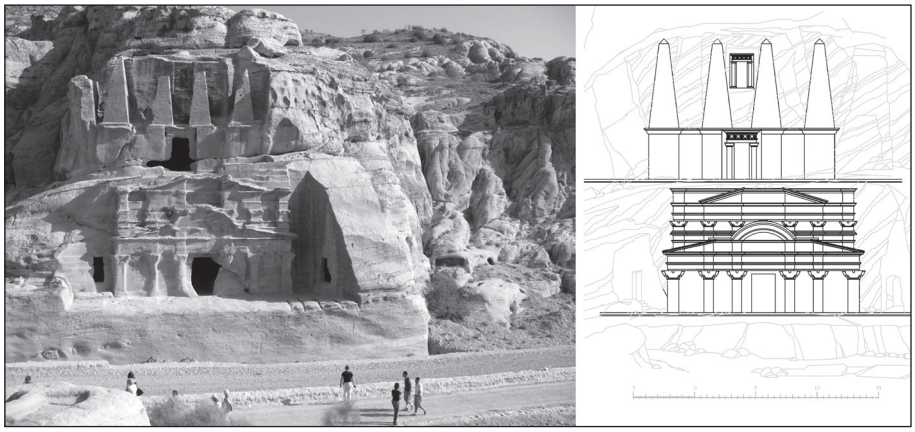
37. Urn Tomb entablature left detail.



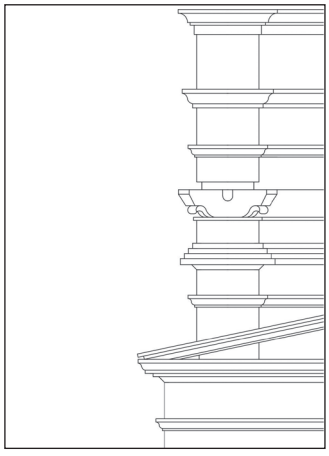
38. Urn Tomb main entrance.

The Cornices of the Palace Tomb

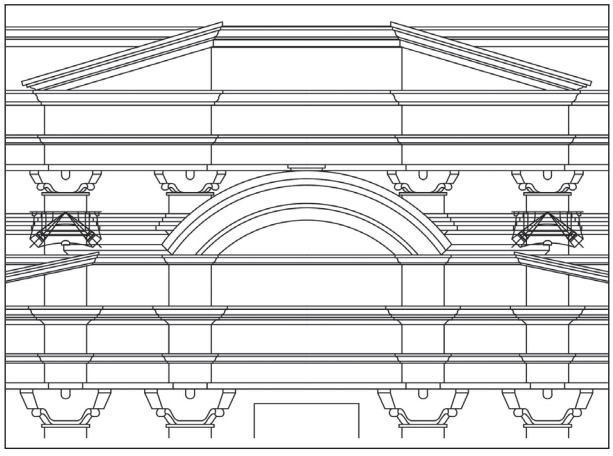
Three-part composition of the Palace Tomb portico consists of two order levels and a huge multi-profile attic (**Fig**. **44**). Twelve pilasters based on high pedestals in the lower level, are crowned by the Nabataean Reverse-frustum Capital Type IV, and support high entablature with triangular pediments in the middle and round shape pediments on the sides. The pediments are on top of the four entrance portals. The entrance portals have their own complex structural and ornamental compositions. The central portals with triangular pediments are broader than the external portals and consist of



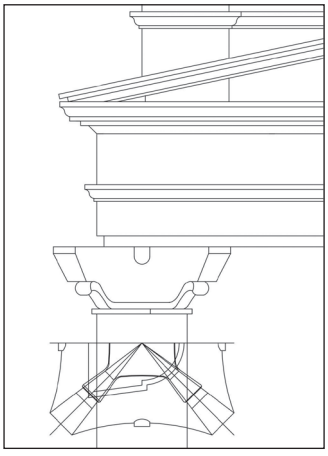
39, 40. Obelisk Tomb (*left*) *and Bāb as-Sīq Triclinium* (*right*).



41. Bāb as-Sīq Triclinium left detail.



42. Bāb as-Sīq Triclinium arch shape pediment.



43. Bāb as-Sīq Triclinium lower storey detail.



44. The Panorama of Royal Tombs from left to right: Palace Tomb, Corinthian Tomb, Silk Tomb, Urn Tomb.

the Nabataean Reverse-frustum Capital Type II. On top of two pilasters with Nabataean pyramidal capitals and an entablature above it. The external round shape portals are narrower than the triangle in the middle, have two pilasters with the Nabataean Reverse-frustum Capital Type I and a double entablature above it. The attic in the middle of the composition is adorned by dwarf pilasters with Nabataean Reverse-frustum Capital Type I.

The second level of the portico has twelve pilasters with half a circle in its cross section, crowned by Nabataean Cupped Capitals, Type I. Each pair of pilasters support one six-leveled entablature with dwarf pilasters on each level. The dwarf pilasters with the Nabataean Reverse-frustum Capital Type I in the attic are coaxial with the higher pilasters. Each horizontal level is bordered by complex ornamentally detailed cornice. The upper third level of the portico consists of seventeen pilasters in the huge attic at the top (**Figs**. **45, 52**).

The top cornice on the third level of the Palace Tomb consists of the following ornamental details from top to bottom: a fillet, cyma reversa, fillet, fascia, two fillets, cyma recta, fillet, and the attic with seventeen plane pilasters.

The composition of the entablature of the upper level consists of four fillets of different heights, cyma recta, four fillets of different height, cyma recta, five fillets of different height, the attic with plain pilasters, taenia, two fillets of different heights, cyma reversa, three fillets, cyma reversa, fillet, fascia, fillet, cyma reversa, fillet and two fascias of different heights.

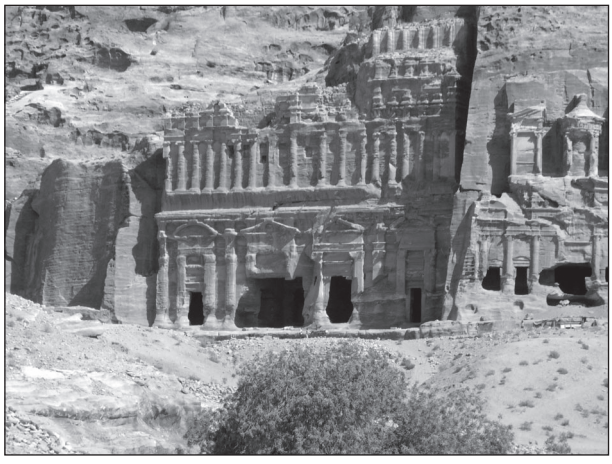
The next lower cornice composition on the third level of the portico has the following details from top to bottom: the attic with dwarf pilasters, crowned by the Nabataean Reverse-frustum Capital Type I, taenia, three fillets, fascia, fillet, cyma recta, two fillets, cyma, reversa, fillet, fascia and the attic with plane pilasters (**Fig**. **46**).

The cornices of the second level entablature consists of the following ornamental details: a fillet, cyma recta, four fillets of different heights, fascia, fillet, cyma recta, two fillets, two fascias and the attic with pilasters, crowned by Nabatean Cupped Capitals (**Fig**. **47**).

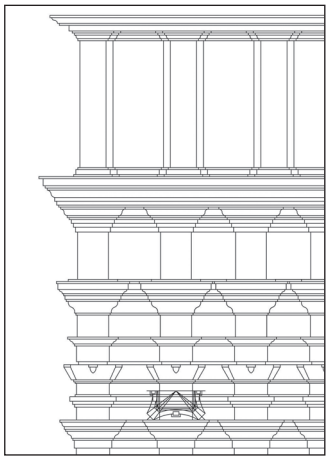
The cornice of the first level entablature consists of a taenia, fillet, cyma recta, fillet, cyma reversa, three fillets of different heights, dentils, fillet, attic, fillet, cyma recta, two fillets, and two fascias. The cornice of the round shape pediment contains the following ornamental details: a fillet, cyma recta, fillet, cyma reversa, fillet, dentils and a fascia (**Fig**. **48**).

The composition of the external entrance portals has a ery complex ornamental structure; fillet, cavetto, cyma recta, four fillets of different heights, beveled ovolo, the upper attic, fillet, cyma recta, fillet, the attic with dwarf pilasters, fillet, cyma recta, three fillets of different heights, beveled ovolo, fascia, fillet, cavetto, cyma reversa and two fascias (**Fig**. **49**).

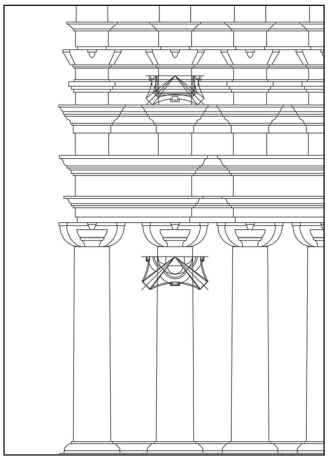
The cornice of the triangular pediment has the following details: a fillet, cyma recta, three fillets, dentils and a fascia (**Fig**. **50**). The portals of central entrances consist of the following details in their structure: a fillet, cavetto,



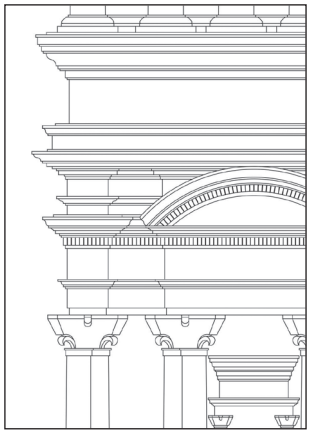
45. Palace Tomb.



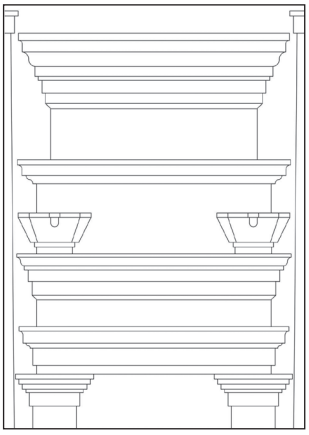
46. Palace Tomb cornices of the attic, upper, third and second entablatures.



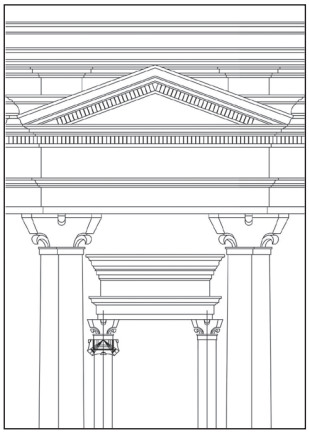
47. Palace Tomb cornices of the third and second entablatures.



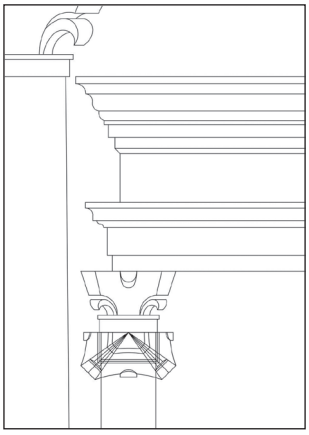
48. Palace Tomb first level cornice.



49. Palace Tomb external left portal cornice.

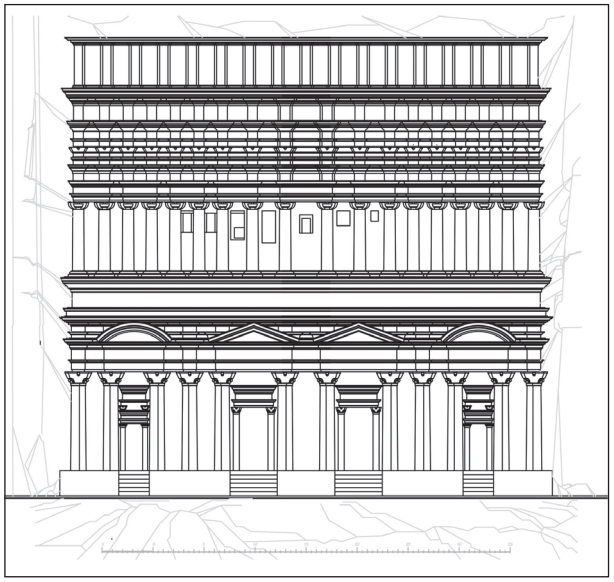


50. Palace Tomb central pediment cornice.

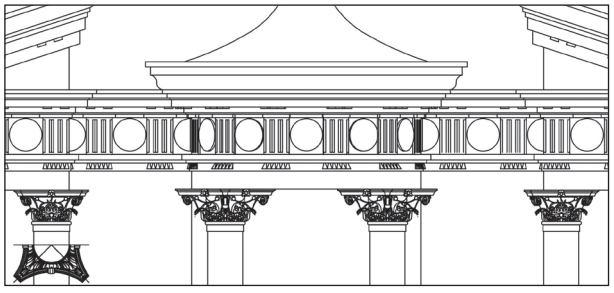


51. Palace Tomb central portal cornice.

cyma recta, ovolo, three fillets of different heights, beveled ovolo, fascia, fillet, cavetto, cyma reversa and two fascias (**Fig**. **51**). The next three porticoes are part of the Corinthian Tomb, ad-Dayr and the Khazneh al Fir'un, and have a unique structural and ornamental composition in their facades that is not only rare in Petra, but in the whole world of rock carved architecture (**Fig**. **54**).



52. Palace Tomb. Architectural and graphic reconstruction.



53. Corinthian Tomb frieze of "broken" pediment and tholos.

The Cornices of the Corinthian Tomb

The portico of the Two-part composition of the Corinthian Tomb consists of a lower order level with six pilasters and an entablature with a "broken" pediment on top, and an upper order level with two pilasters and a "broken" pediment on the sides and around the tholos in the center (**Fig**. **53**). Eight pilasters of the lower level have a cross section of a semicircle, crowned by the Nabataean Corinthian Capitals, Type II, which are based on a high pedestal and support a three-part entablature. The external pilasters have coaxial dwarf pilasters on the upper attic. The two inner pilasters support one entablature and the two central pilasters support another entablature with a round shaped pediment on top. The middle level attic consist of eight dwarf pilasters with the Nabataean Corinthian Capitals, Type I, of which the central four support a "broken" pediment, and external pairs support one attic with an ornamentally detailed cornice. Two niches from the left sides have triangular



54. Palace Tomb and Corinthian Tomb.

and round shaped pediments, based on pilasters with the Nabataean Doric capitals. The main entrance portal has a composition of two pilasters with the Nabataean Doric capitals and an entablature with a cornice in its structure.

The two pilasters with the Nabataean Corinthian Capitals, Type II of the second order level support an entablature with triglyphs and metopes on the frieze and a "broken" pediment



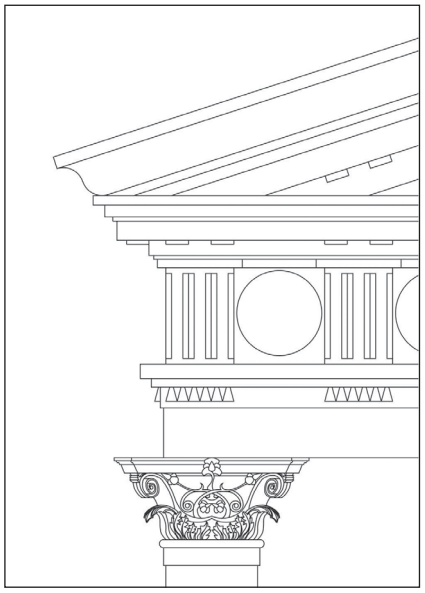
55. Corinthian Tomb. Architectural and graphic reconstruction.

from both sides of the portico. The four pilasters of the round tholos consist of of Nabataean Corinthian Capitals, Type II, Support an entablature, similar to the external ones. The single Nabataean Corinthian Capitals, Type II with the urn on top, crowns the round roof of rotunda (**Figs**. **55, 61**).

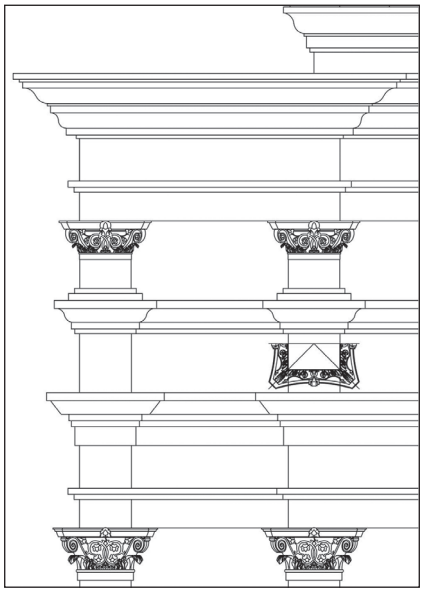
The cornice of the upper "broken" pediment consists of the following details: a fillet, cyma recta, two fillets of different heights, fascia with mutules and a fascia. The composition of the entablature on the upper level has the following ornamental details in its structure: three fillets of different heights, fascia with mutules, fillet, frieze with triglyphes and round metopes, taenia, regula with guttae and a fascia (**Fig**. **56**).

The cornice of the attic on the lower level consists of a fillet, cyma recta and three fillets of different heights. The composition of cornices at the lower level has the following ornamental details from top to bottom: three fillets of different heights, cyma recta, two fillets, cyma recta, two fillets, fascia, two fillets, fascia, an attic, with dwarf pilasters, crowned by Nabataean plant capitals, two taenias, fillet, cyma recta, two fillets, fascia, fillet, beveled ovolo, three fillets of different heights, fascia, two fillets and a fascia (**Fig**. **57**).

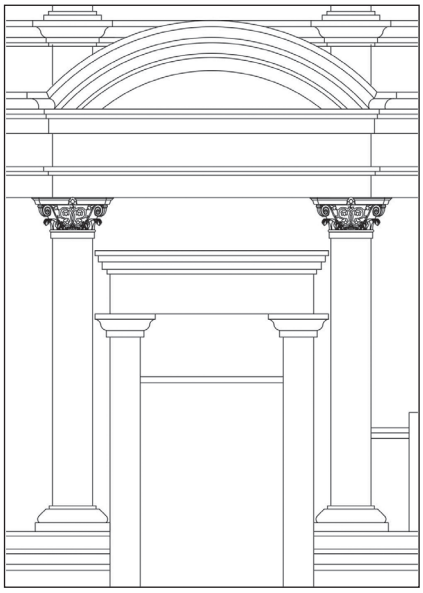
The cornice of the arch shaped pediment is made up of a fillet, cavetto, fillet, cyma reversa, fillet and a fascia. The entablature of the main entrance portal composition consists of four



56. Corinthian Tomb "broken" pediment cornices.



57. Corinthian Tomb lower tier cornices.



58. Corinthian Tomb main entrance.

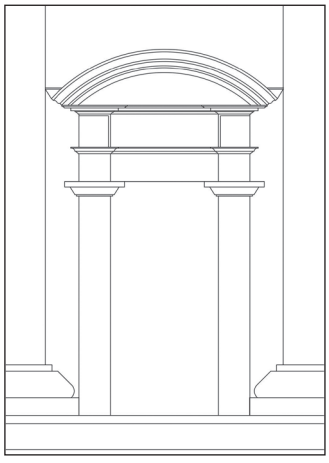
fillets of different heights and an attic (**Fig**. **58**).

The cornice of the pedestal has a fillet, cyma reversa and three fillet of different heights in its structure. The triangular pediment cornice of the external niche portal composition consist of a fillet, cyma recta and four fillets of different heights (**Fig**. **59**).

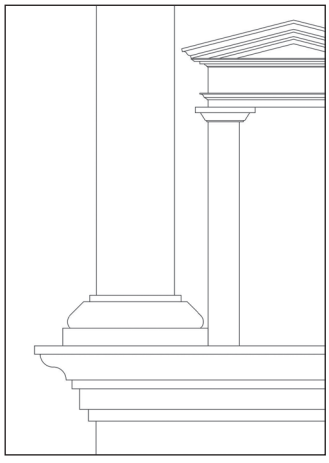
The entablature is divided into the following ornamental details from top to bottom: a fillet, cyma reversa, fillet, syma reversa, fillet, attic, fillet, ovolo, cyma reversa and a fascia (**Fig**. **60**).

The Cornices of ad-Dayr

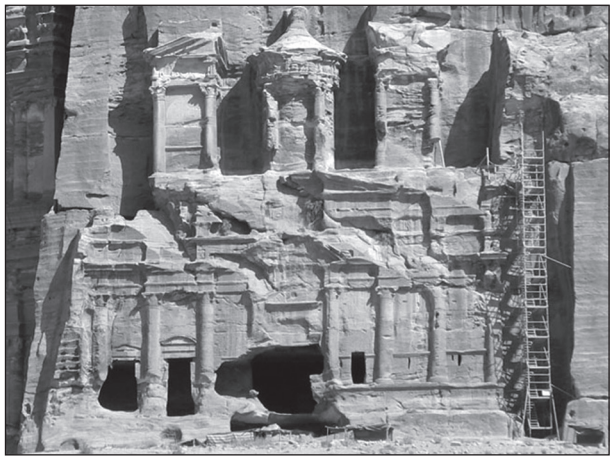
The Two-part composition of ad-Dayr portico is similar to the Corinthian Tomb façade. The lower order level has eight pilasters and an entablature. The upper order level has three pilasters and "broken" pediment on the sides and a round tholos in the center. In the lower level, the first and third pilasters from the sides have a rectangular outer section and an inner section in the form of a quarter of a circle and crowned by Nabataean twin Cupped Capitals, however the second and forth pilasters are semicircular in cross section and crowned by a single Nabataean Cupped Capital (**Figs**. **62, 63**). The external two pilasters and two pilasters in the middle support one entablature. The other two single pilasters have coaxial dwarf pilasters and together with the entablatures are crowned by one detailed cornice. There are niches with pairs of pilasters crowned by Nabataean Doric capitals, which support the round shape pediments between two external pilasters of the first level. The main entrance portal consists of two pilasters with Nabataean Doric capitals, entablature and a triangular pediment with an urn on top.



59. Corinthian Tomb arch pediment entrance.



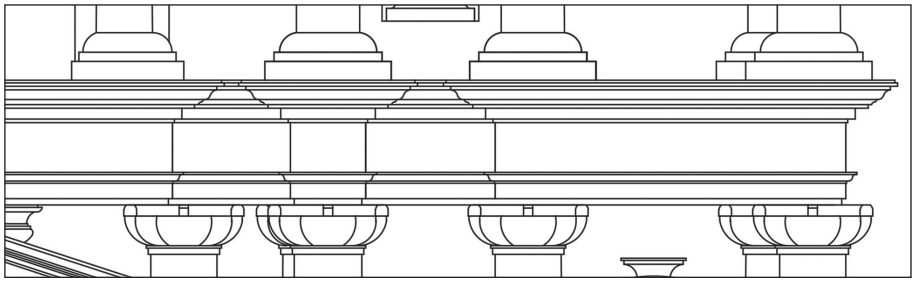
60. Corinthian Tomb pedestal cornice.



61. Corinthian Tomb.



62. ad-Dayr lower tier cornice.



63. ad-Dayr lower tier cornice. Architectural graphic reconstruction.

In the upper level of the external single pilaster, crowned by the Nabataean Reverse-frustum Capital Type II, sits coaxial dwarf pilasters with an attic and a cornice on top. The next two pilasters support an entablature and a "broken" pediment. A round tholos is based in the center of the composition, crowned by single Nabataean Reverse-frustum Capital Type IV with an urn on top. The frieze of the dwarf pilasters, entablature of the "broken" pediments, and the tholos, are adorned by trygliphs and round metopes. The two external niches of the upper level consist of pilasters with Nabataean Doric capitals and a cornice. The two pilasters of the central niche support an entablature with double cornices (**Figs**. **64, 65**).

The cornice of the "broken" pediment of the Deir portico consists of a fillet, cyma recta, three fillets of different heights, fascia and a fillet. The cornice of the attic has the following details: two fillets, cyma recta, three fillets, cavetto and a taenia. The entablature of the upper level consists of the following ornamental details from top to bottom: a fillet, cyma recta, cyma reversa, two fillets of different heights, fascia, frieze with triglyphes and round metopes, fillet, cyma reversa, regula with guttae, an architrave and a fascia (**Figs**. **66, 69**).

The central niche cornice of the upper order contains a fillet, cyma recta, two fillets of different heights, fascia, fillet, cyma recta and a fascia (**Figs**. **67, 70**).

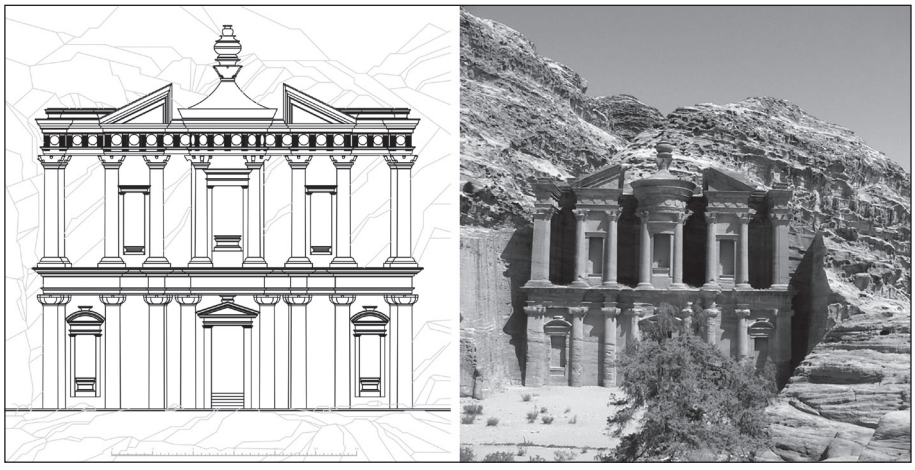
The cornice of the lower level consists of the following ornamental details from top to bottom: three fillets, cyma recta, cyma reversa, three fillets of Different heights, architrave, fillet, cyma recta, fillet and two fascias (**Fig**. **71**).

The external niche cornice of the round shape pediment consists of a fillet, cyma recta and five fillets of different heights. The entablature consists of two fillets, cyma recta, two fillets, architrave, fillet, cyma recta, fillet and two fascias. The cornice of the triangular pediment of the main entrance contains a fillet, cyma recta and five fillets of different heights.

The entablature consists of the following ornamental details: a fillet, cyma recta, two fillets, architrave, fillet, cyma recta, fillet and two fascias (**Figs**. **68, 72**).

The Cornices of al-Khaznah

The lower part of the two-part composition of al-Khaznah portico is similar to the classical Greek order structure of the Hexastyle. The



64, 65. ad-Dayr. Site view and architectural and graphic reconstruction.



66. ad-Dayr upper detail.



67. ad-Dayr upper part.

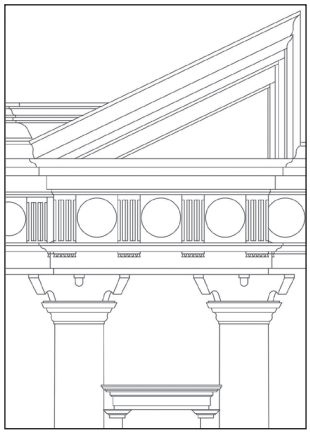


68. ad-Dayr main entrance.

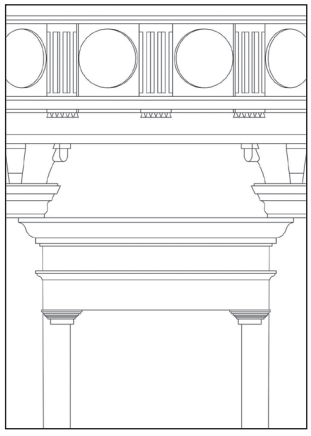
space between the two round external pilasters, crowned by the Nabataean Corinthian Capitals, Type III, is filled bz bridles of horses (Castor and Pollux). The two central columns with the Nabataean Corinthian Capitals, Type III denote the entrance to the tomb. Both, the pilasters and the columns, are based on a pedestal with a cornice and supports an entablature with triangular pediment on top. The frieze of the first level is decorated with sirens, local Fig tree plants and calyxes portrayed as examples of ornamental plastic details. The side pilasters are coaxial to the main pilasters and portrays a head of a Gorgon in the attic, crowned by acroterias with lions. The tympanum of the pediment has a relief of an eagle in the center and Iris flowers around it. The pediment has an acroterias with a plant relief on the sides and the symbol of the Goddess Isis on top.

The upper order level consists of a "broken" pediment on the sides and a tholos in the center, supported by pilasters with Nabataean Corinthian Capitals, Type II. The two external pilasters of the upper level are crowned by Nabataean plant capitals and support an entablature and "broken" pediments. The six round pilasters in the center support the round roof of the tholos with Nabataean Corinthian Capitals, Type II with an urn on top. The frieze of the "broken" pediments and tholos consists of a relief of local oak acorns, grapes and figs. Six sculptures of Amazons between the pilasters and acroterias, with eagles on the "broken" pediment edges, complete the whole ornamental and plasticity composition of the portico (**Figs**. **73, 74**).

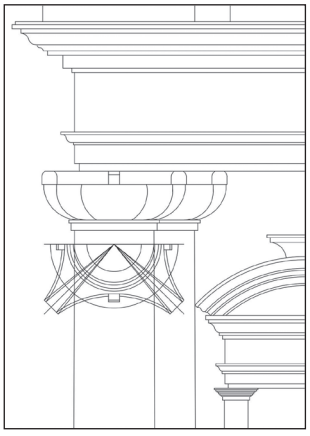
The cornice of the "broken" pediment consists of two fillets, cyma recta, seven fillets of different heights, dentils and a fillet (**Figs**. **75, 76**). The entablature of the "broken" pediment and tholos consists of the following ornamental



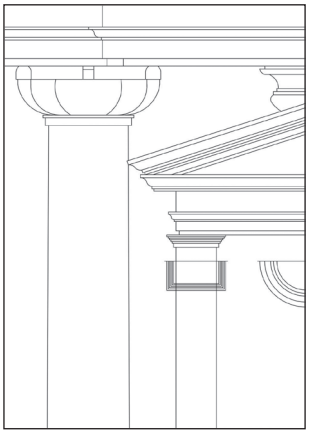
69. ad-Dayr "broken" pediment cornice.



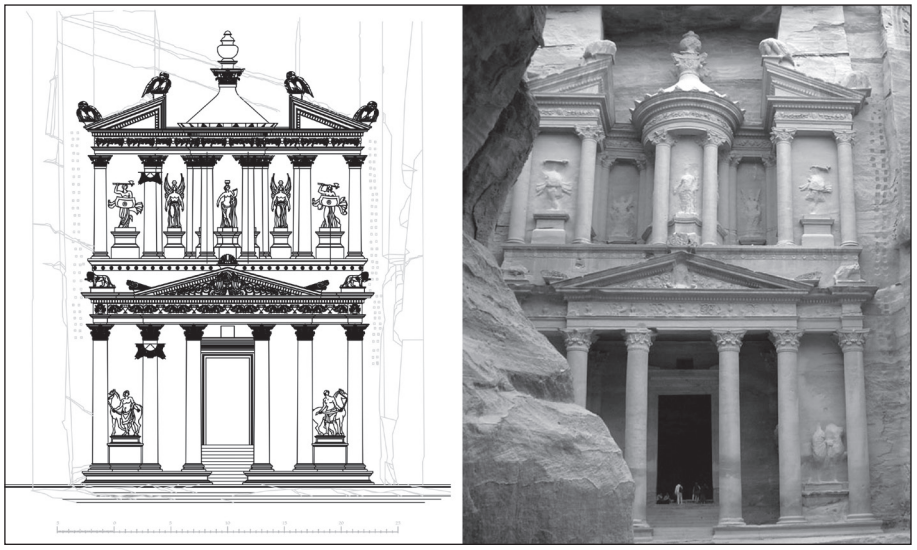
70. ad-Dayr upper tier central niche cornice.



71. ad-Dayr lower tier cornice.



72. ad-Dayr main entrance.

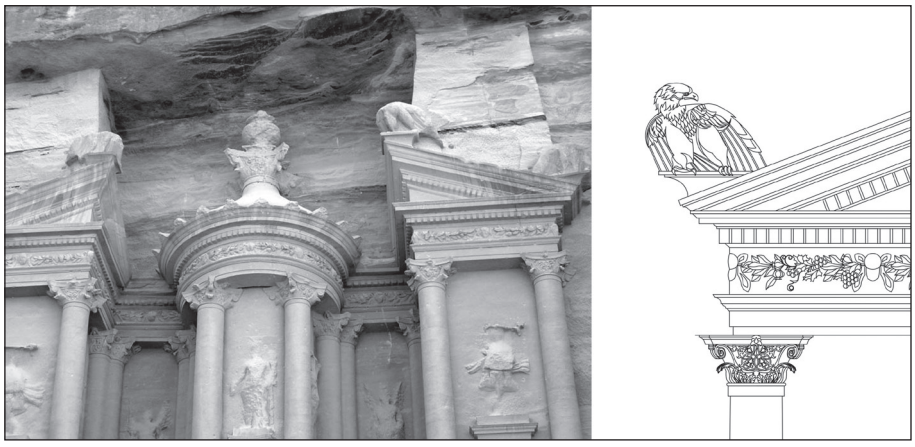


73, 74.al-Khaznah .

details from top to bottom: a Fillet, syma recta, fillet, ovolo, fillet, dentils, beveled ovolo, frieze with local plant ornaments, fillet, cavetto, cyma recta, fillet and two fascias (**Figs**. **77-79**).

The entablature of the lower level has the following ornamental details from top to bottom: a fillet, cyma recta, four fillets of different heights, cyma reversa, fillet, dentils, fillet frieze with Gorgon heads, griffins and figs, fillet, cyma recta, fillet, cyma reversa, an architrave and a fascia.

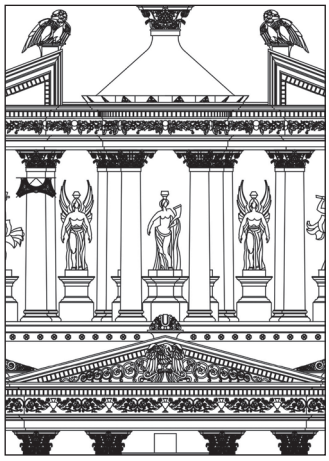
The cornice of the main triangular pediment consists of a fillet, cyma recta, three fillets of different heights, dentils and a fillet (**Figs**. **80, 81**).



75, 76. al-Khaznah. The "broken pediment" cornice and upper level entablature.



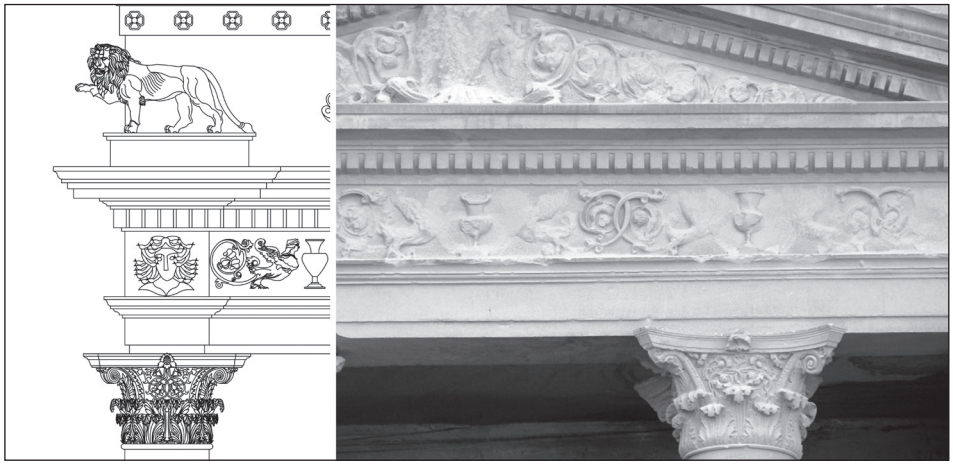
77. al-Khaznah. Upper entablature.



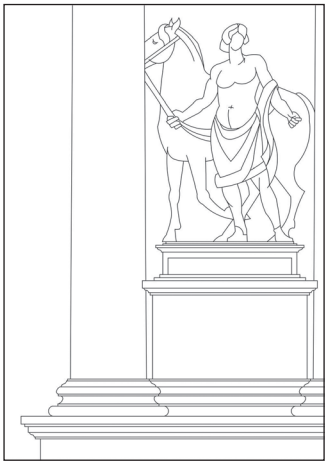
78. al-Khaznah. Upper level detail.



79. al-Khaznah. Tholos and lower pediment cornices.



80, 81. al-Khaznah. Lower tier entablature.



82. al-Khaznah. Pedestal cornice.

The cornice of the pedestal consists of three fillets of different heights, cyma reversa and a fillet (**Fig**. **82**).

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THE CLASSICAL ORDERS IN THE ROCK FAÇADES OF PETRA ARCHITECTURE AND GRAPHIC RECONSTRUCTION

Anna K. Kudriasheva

Abstract

Tomb façades, carved into solid rock massifs, represent an architecturally processed part of the natural mountain landscape of Petra. Its specific composition is accentuated by the scale of the entire Petra ensemble. On the other hand, as an ornamental texture cut into a virgin rock surface, the façades of this monumental gallery provide valuable compositions in plasticity. The present article discusses this subject matter.

Graphic reconstruction was carried out in 1994-95 by the author using existing photogrammetric documentation of monuments. She surveyed façades *in situ* taking new measurements on the spot and included separately preserved architectural fragments.

The architectural graphic reconstruction aims at recreating the original view of the Petra rock carvings, now destroyed by erosion and earthquakes, on large-scale orthogonal drawings. The replenishment of missing fragments in accordance to the theory of the restoration of architectural monuments and the requirement for graphic reconstruction was carried out in analogy to existing material.

Architectural drawings of twelve monuments were made in congruent scale, with all the details of structural and ornamental order plasticity and, for the first time, represent a single series of their dimensional, typological, proportional, and new terminology ratio.

Key Words

Petra, Nabataean classical façades, architectural reconstruction, architectural ornamental plasticity, Nabataean order.

The Typology of Petra Rock Carved Façades.

The plasticity typology of Petra rock carvings varies depending on the cultural influences under which the Nabataean kingdom was at different periods. Their unique pattern as a whole can be generalized into a phenomenon such as the local Nabataean style.

Most of the rock pre-classical order structures are called tomb-pylons, the origin of which researchers refer to the period of conquest of the region of Petra by Assyrians. The earliest pylon tombs dating around the 7th-4th centuries BC are of a smooth surface, the upper part of which is decorated by a primitive cornice with a hemisphere profile and an attic with a strip of flat pyramid-stepped ornament, or "crow's steps". In the lower part of the pylon is an entrance opening into the space.

The trade relations of the Nabataeans with the North states of Africa, in particular Egypt, also left their mark in the plasticity of rock carvings. There was Egyptian type of pylon tombs, which is characterized by a cornice with the Egyptian cavetto fretwork. The period of construction ranges between 3rd century BC and 1st century AD.

The influence of ancient Greek and Roman cultures on the Petra region had an effect on the character of Nabataean architecture. The rock carvings of this time are the most vivid and a perfect phenomenon of the Nabataean style. The following examples of Nabataean portals and Classic Nabataean portals and porticos, more precisely façades, representing varying degrees of rock carving compositions.

Nabataean portals are the frontal compositions with elements based on the classical order,

and marks the only central entrance to the tombs due to the ritual and sacred purposes (**Fig. 1**).

Nabataean portals with a double cornice supposedly dated to the period from the 2nd century BC to the 4th century AD. Portals with an attic supported by an entablature, consists of a cornice with a fillet, and a smooth strip of frieze and an architrave. The lower cornice, being richer in composition due to classical profiles, than the upper one, is supported by two pilasters with Nabataean Reverse-frustum Capitals. As for the processing of the lower part of the façade, due to certain time periods, the main space between the pilasters consists of an entrance composed of a pediment and acroteria on top. There were examples of a second smaller portal inside a portal, where a simple cornice rested on two pilasters framing the doorway with pyramidal capitals. This type of rock carvings is distinguished by the appearance of the pilaster base and the façade attic, decorated with a narrow cornice with classical profile details (**Fig. 2**).

Nabataean Portals with a Double Entablature

In earlier portals of this type, the upper entablature, completed by a cornice with a cavetto, supports the attic, The lower one, with a complex profiled cornice, rests on two pilasters with four capitals, clearly reminiscent of the Doric order, in the form of inverted flat truncated pyramids, and a developed neck. In the next level, the entablature of the lower order tier is supported by four pillars, of which two external ones exist as double pillars, with a rectangular ross-section on the outside and a quarter of a circle on the inner side, and end with double capitals. Unlike the previous types of façades, the period of construction of the portals with a double entablature are known.; 40 to 70 decades AD and coincides with the construction of the Corinthian Tomb and the Bāb as-Sīq Triclinium, which are vivid examples of the discussed type of Petra rock carving façades (**Fig. 3**).

Nabataean classical portals, are the frontal ordered structural compositions, with a single central entrance. A type of rock carving that is witnessed in a large number of order compositions in Petra.

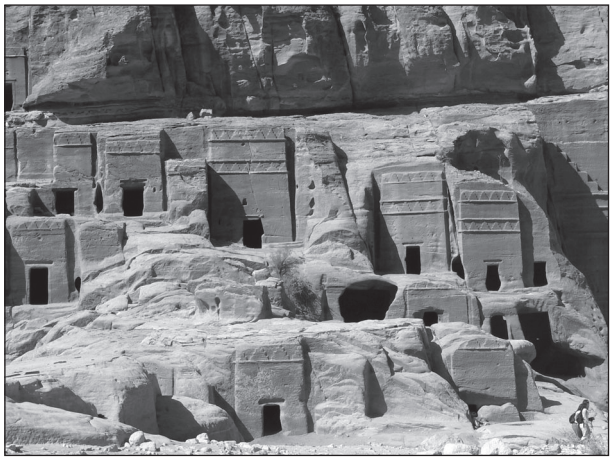
Nabataean classical porticos are the frontal ordered structural compositions with one or several ordered levels topped either with a pediment, or a "broken" pediment and a circular Tholos in the middle. In rare cases, the pediment of the portico is replaced by a multi-leveled ordered attic. In the lower part of the façade is one more entrance to the tombs, related to ritual and sacred purposes.

Nabataean classic type of portals and porticos, which includes twelve objects with the most expressive order compositions, can be conditionally divided into three groups:

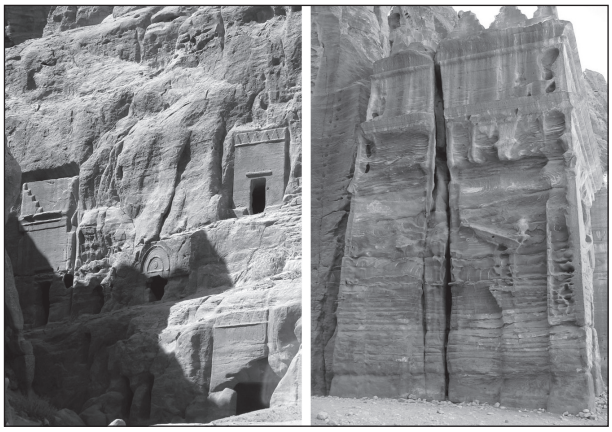
The first group consists of portals with the most expressive order of ordered elements built during the 1st century BC to the 1st century AD. This group includes the Broken Pediment Tomb, Roman Soldier Tomb, Lion Triclinium and Renaissance Tomb.

The second group consists of rock carved façades, erected during the 1st century BC to the 1st century AD and includes The Sextius Florentinus, Silk and Urn Tombs.

The third group consists of five façades, whose magnitude and plastic personality puts



1. Nabataean portals.



2, 3. Nabataean portals with double cornice and double entablature.

them in the most significant rock carved façades of Petra. This group includes Bāb as-Sīq Triklinium, Palace Tomb, Corinthian Tomb, the ad-Dayr and al-Khaznah. These structures date back to 1st century AD.

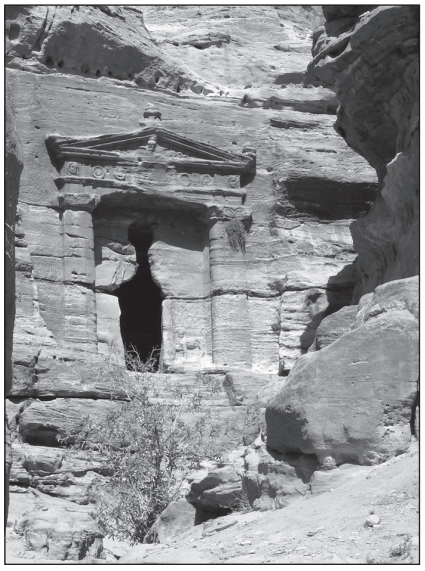
Twelve of the most significant rock order portals and façades of the Petra mountain range according to their distribution along the Wādī Mūsā and its branches are represented by drawings of the author's graphic reconstruction and are analyzed to illustrate the element features of their structural, ornamental plasticity, thematic decoration, and order composition as a whole. These include the Bāb as-Sīq Triklinium, al-Khaznah (al-Khaznah), the Broken Pediment, the Renaissance, the Roman Soldier and the Sextius Florentinus Tombs, the Lion Triclynium (**Fig. 4**), the Urn (**Fig. 5**), Silk, Corinthian (**Fig. 6**), and the Palace Tombs (**Fig. 7**). The ad-Dayr and al-Khaznah are presented through drawings of the author's graphic reconstruction and are analyzed according to the element features of their structural, ornamental plasticity, thematic decoration, and order composition as a whole (**Figs. 8-13**).

The System of Carving Petra Rock Façades

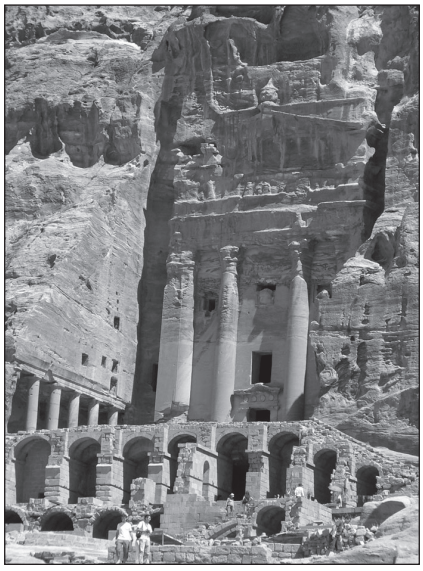
In general, the plasticity features of the order façades of Petra are connected to the technique of their rock carving in the direction starting from top and reaching the bottom. There could not be any analogies to construction machines of the ancient time, Their construction requires a large number of high-altitude forest, which in this region did not exist. The idea of a system for cutting down the rock façades of Petra leads to the examination of several types of unfinished tombs, which facades clearly show two methods for processing rock massifs.

Stepwise Rock Carving

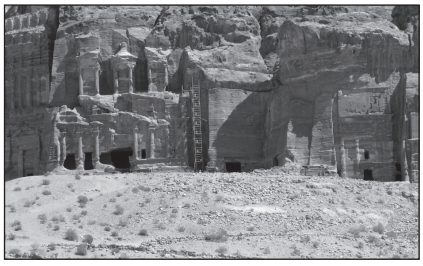
On a selected section of the rock, the surface of the highest horizontal division of the future façade was cleaned and leveled. The lower untreated part of the natural rock massif represented working platform of the levels above.



4. Lion Triclinium.



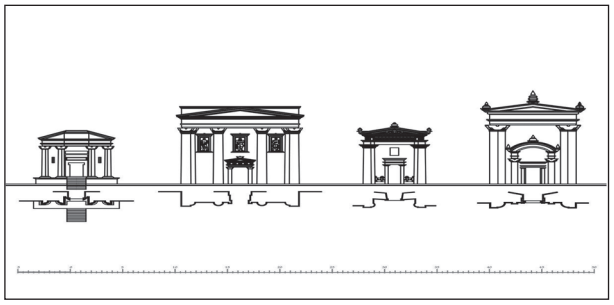
5. Urn Tomb.



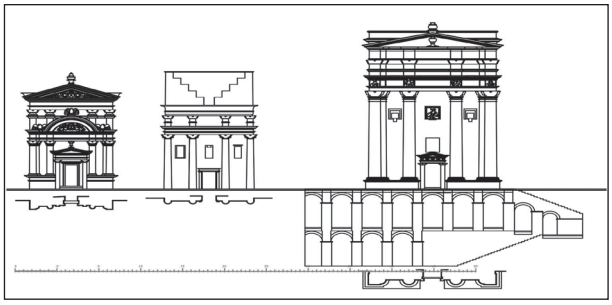
6. Corinthian and Silk Tombs.



7. Palace Tomb.



8. Broken Pediment, Roman Soldier Tombs, Lion Triclinium Renaissance Tomb.

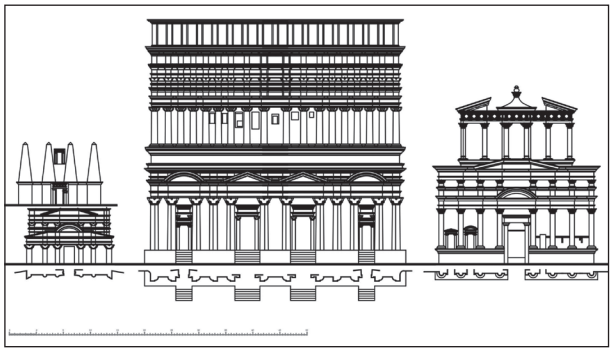


9. Sextius Florentinus, Silk and Urn Tombs.

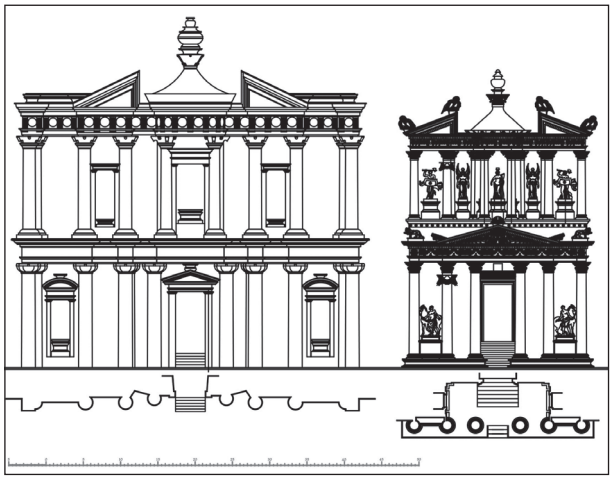
The next stage was the vertical and horizontal marking of parts and elements, presumably with the use of a plumb, and directly stone cutting from top to bottom. The process of "bringing down" of subsequent lower levels, two or several horizontal divisions occurred in reverse to the previously mentioned erection sequence. Presumably, this method was used to create the façades of the Silk, Urn and the Palace tombs. The consequence of such non-simultaneous step-by-step surface treatment was a violation in the alignment of vertical parts, which is especially evident on the façade of the Palace Tomb. The Unfinished Tomb in Petra is a unique example and evidence of stepwise rock carving (**Fig. 14**).

Levels Rock Carving

This technique required a previous cleaning and leveling of the rock geological layer to the height of the future façade or the height of the upper order level in a multi-leveled composition of the façade. On the lower untreated part of the natural mass, a construction platform was built with monolithic masonry work. On the upper levels a vertical and horizontal marking of large elements of the order was made. When the stone-cutting work is finished, abiding by the top to bottom method, the monolithic masonry of the construction platform was disassembled. When building a multi-leveled façade, this operation was repeated as many times as required for processing each tier. This method



10. Bāb as-Sīq Triklinium, Palace and Corinthian Tombs.



11. ad-Dayr and al-Khaznah.



12. ad-Dayr.



13. al-Khaznah (the Treasury).



14. Stepwise rock carving.

of operation is typical for rock carvings with a relatively developed order composition and a complex structural and ornamental plasticity. It can be assumed that the façades of the Sextius Florentinus, Roman Soldier and Broken Pediment tombs, as well as the Lion Triklinium, the multi-tier compositions of al-Khaznah, Corinthian Tomb, the ad-Dayr and Bāb as-Sīq Triclinium, were carved from top to bottom by this method. An example of this method are markings of an unrealized façade in the rock mass opposite to al-Khaznah (**Fig. 15**).

The dimensional proportions of the major parts and the overall dimensions of the Nabataean classical portals and façades of Petra, gives a reason to assume that during their cutting a certain system of proportionality was used. A system that, by unknown means, is integrated in masonry work from top to bottom, only possible with the help of a hemp dimensional rope and nodes. This led to multiplicity in all façade dimensions along the vertical and horizontal directions, based on a single module which is the diameter of a column or a semi column in the lower order level. Unlike the invariable canonical order systems, the system of proportional ordering of Petra's façades was flexible. The composition of each façade was clearly proportioned directly „in place", and was determined by the outline and size of the mountain fragment intended for architectural processing. Such freedom from the proportional ratio of elements established by the canonical orders and the classical system, led to numerous variations in the order allowed for the manipulation of façade compositions, processed on any size of a rock massif. This however, depends on the selected area of a landscape.



15. Levels rock carving.

The methods of non-synchronous processing of the levels of Petra rock carvings inevitably led to the transformation of stylistic and plasticity of their details. When processing the surfaces of a structure, its details were made in parts, from the upper tier of the architectural composition to its lower tier.

At the beginning and middle of the work, most of the dimensions of the future structure were a rough rock massif. For a long period of work on the porticoes of the Urn or the Palace Tomb, the style and plasticity drawing of architectural details inevitably changed from the upper zones of the general composition to the lower ones.

It is possible that during the time of processing one façade, ideas, traditions, masters, and schools changed, which resulted in the distinctive principle of the Nabataean style: the principle of collateral combinations of order elements, free of tectonic logic.

And strangely enough, such logical inconsistency of asynchronous plasticity elements of different levels, a possible disruption of alignment, coarseness of the details as a whole, impart improvisational spontaneity to the rock carved façades of Petra, ornaments inspired by classical orders, and at the same time, the monumentality and timeless character, are all part of the unique Nabataean style.

Elements of Structural and Ornamental Plasticity of the Rock Portals and Porticos of Petra

Structural plasticity of Petra's rock fronts play a major role in their order composition, which in the canonical architectural order exist as an entablature array, horizontal blocks of architrave, frieze and cornices, cornice rods that limit the tympanum, pilasters and columns. The array of concepts of structural plasticity includes order details such as triglyphes and metopes in the friezes of the Doric order, echinus and abacus of Doric capitals, echinus, volutes and balusters of ionic capitals, figured abacus, twin beams of volutes and tiers of acanthus leaves of Corinthian capitals.

Ornamental Plasticity

Ornamental plasticity consists of decorations such as moldings of cornice rods and balusters, echinus and scroll details of Corinthian capitals

The motifs of traditional Greek and Roman ornaments, such as ionics and palmettes, are limited in the ornamental plots of the façades of Petra. Typical plant motifs are images of Arab acanthus, or *Onopordum Anisacanthum*, which differs from the Mediterranean one by more articulated leaf shape, and the symbol of this region, the black iris or *Iris Petrana* in the form of a blossoming flower or bud. The acanthus leaf is present in all types of Corinthian capitals, garlands, as well as stylized branches of trees and fruits such as figs and grapes on the friezes and *tympana* of al-Khaznah, along with large scaly acanthus that takes the place of a flower rosette in the capitals of the lower tier of its portico. The blossoming irises play the role of rosettes on the *abaci of* Corinthian plant capitals and, together with the buds and twirled stems, represent the elements of their relief ornaments.

The Capital

The capital is the most distinct part of an architectural order. The characteristic plasticity forms of the Doric, Ionic and Corinthian capitals of Greece and Rome are the symbols of each order system. The geometric capitals of façade compositions of Petra are generally simple and expressive, reflecting the density and texture of local rocks of loose and coarse-grained sandstone. Their coarsened style, having a specific regional character, was defined as Nabataean.

The Nabataean Doric Capital

The Nabataean Doric capital is the upper plastic element of a pilaster with no base, serves as a major part of the stone frames on entrance apertures and niches of rock portals and porticos of Petra. The *abacus* is a rectangular plate that supports an architrave and the *echinus* represented as a multi-layer of fillets. Examples of this are found at the Lion Triclinium central entrance (**Fig. 16**)**,** at the Renaissance Tomb central entrance (**Fig. 17**)**,** at the Palace Tomb external entrances (**Fig. 18**)**,** and at the ad-Dayr central niches (**Figs. 19, 20**).

The Nabataean Cupped Capitals

There are two other varieties of Nabataean capitals that do not have any analogies with any other order and can only be associated with abstract forms. They are referred to as:

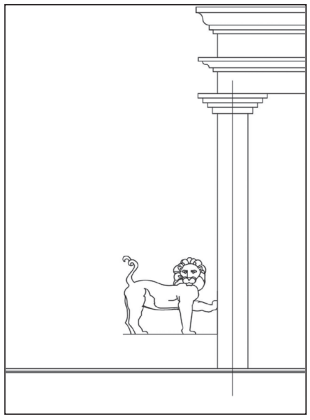
- Nabataean Cupped Capital Type I, which occurs in the lower level of the Palace Tomb (**Fig. 21**)
- Nabataean Cupped Capital Type II, occurs in the first levels of the ad-Dayr façade (**Figs. 22, 23**).

The Nabataean Reverse-Frustum Capital Type I

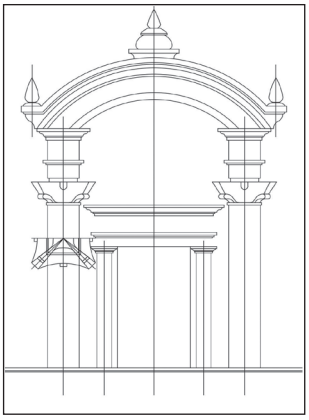
Nabataean Reverse-frustum Capitals appear in the form of a truncated pyramid, or *frustum*, with slightly concave faces, which is flipped upside down. Such pyramidal capitals can be found on the façades of the Broken Pediment Tomb (**Fig. 24**)**,** and the upper tier of the Silk Tomb (**Fig. 25**)

The Nabataean Reverse-frustum Capital Type II

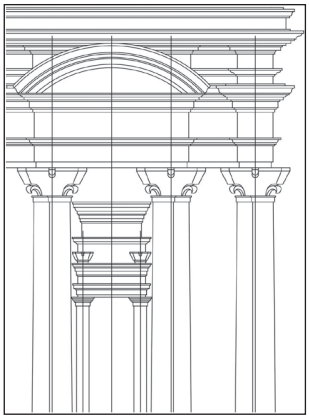
These Capitals can be found in the Sextius Florentinus Tomb (**Fig. 26**), the second level of the ad-Dayr (**Figs. 27, 28**). the Urn Tomb (**Fig. 29**) as well as the Roman Soldier Tomb (**Fig. 30**).



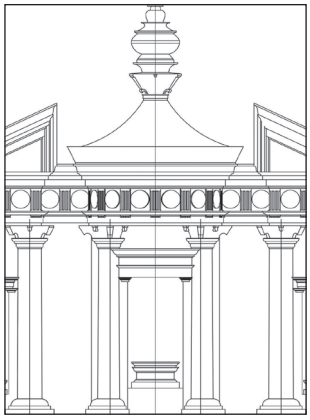
16. The Lion Triclinium central entrance (detail left side).



17. The Renaissance Tomb central entrance.



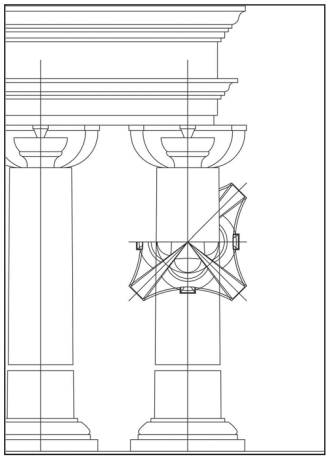
18. The Palace Tomb side entrance.



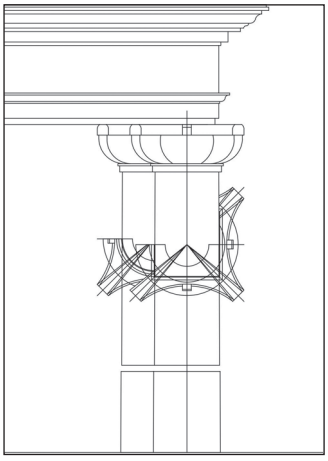
19. Detail of the ad-Dayr central niche of the upper storey.



20. ad-Dayr Nabataean Cupped Capital.



21. The Palace Tomb Nabataean Cupped Capital.



22. ad-Dayr Nabataean Cupped Capital.

The Nabataean Reverse-Frustum Capital Type III

A more slanted variant of the Nabataean Reverse-frustum capital imitates curved plates along the diagonal axes of a pyramid. This gave rise to individual researchers of Petra to draw parallels with the form of the Corinthian capital and call this type *Pseudo-Corinthian*. It seems more correct to keep this type of capital, widespread in the region of Petra, its originality and call this derivation of frustum capital the 'The Nabataean Reverse-frustum Capitals Types III and IV.

This variation can be found in each of the lower tiers of the Bāb as-Sīq Triclinium(**Fig. 31**), The Renaissance Tomb (**Fig. 32**)**,** and the Silk Tomb (**Fig. 33**).



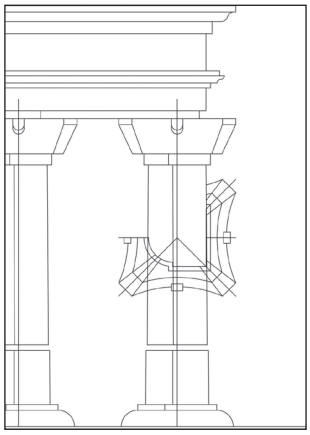
23. ad-Dayr Nabataean Cupped Capital.

The Nabataean Reverse-Frustum Capital Type IV

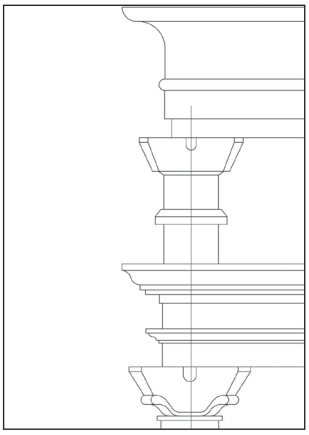
Is Shown in the Details of the Palace Tombs (**Fig. 34**).

The Nabataean Corinthian Capitals

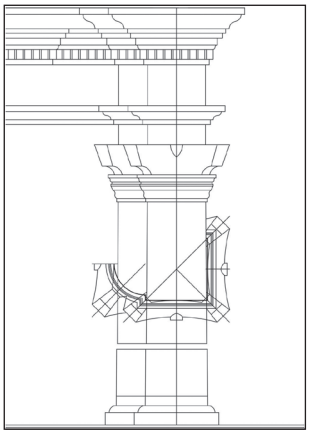
The Nabataean Corinthian capital is the result of a local artistic development originating from Corinthian classical capitals. This quite successful architectural column head decor is assigned as an invention of the 5th century BC by Vitruvius to the Greek architect and artist



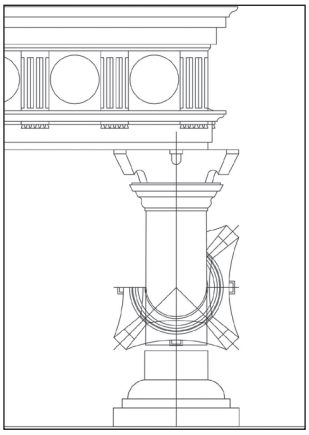
24. The Broken Pediment Tomb Reverse-frustum capital.



25. The Silk Tomb Reverse-frustum capitals.



26. The Sextius Florentinus Tomb Reverse-frustum capital.



27. ad-Dayr Reverse-frustum capital.

Callimachus. It occurs for the first time as an element of interior architecture, found on fluted columns in the cellar rear wall of the peripteral temple of Apollon Parnopius at Basse-Phigaleia in western Arcadia, Greece. It was adopted in Greek architecture, an element of exterior colonnade, later in the 4th century BC, to become the signature of the canonic Corinthian order dominating during Hellenism and Roman imperial times.

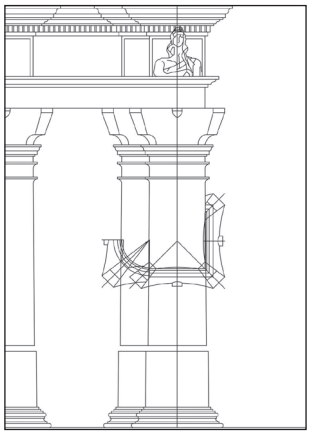


28. ad-Dayr Reverse-frustum capital.

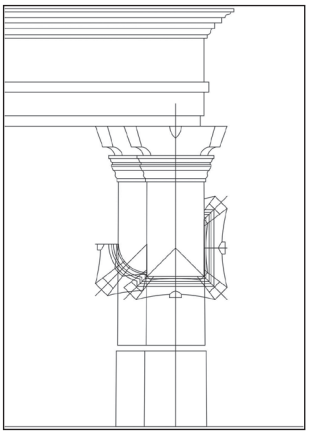
The classical Corinthian capital consists of one or two superimposed acanthus rows, eight leaves in each. Behind the belts of the acanthus leaves are four torches, from which the stems of four double scrolls and four bundles of paired central small volutes (*cauliculi*) rise upward. Above them rests the abacus, which forms a square plate with cut off corners and concave sides to support the horizontal architrave of the entablature. Forms of Greek and Roman capitals differ in the height of their capitals, the proportions of volutes and rosettes, and the pattern of acanthus leaves.

The Nabataean Corinthian Capital, Type I

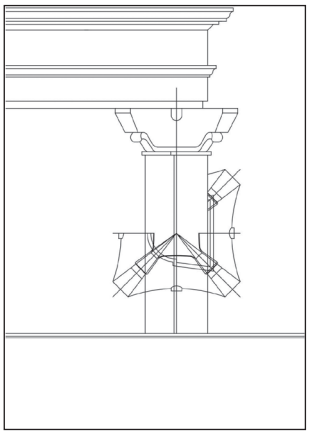
The *abaci* of capitals has a fillet with *cyma reversa* on the top and a large rosette in the form of a blossoming Black iris, or *Iris Petrana,* which is a noble flower of the spring in



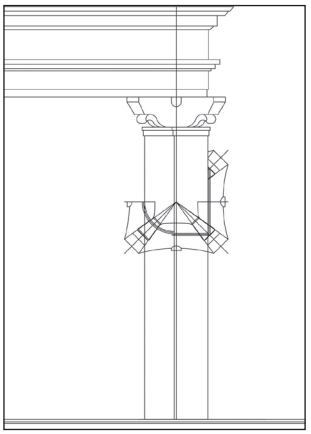
29. The Urn Tomb Reversefrustum capital.



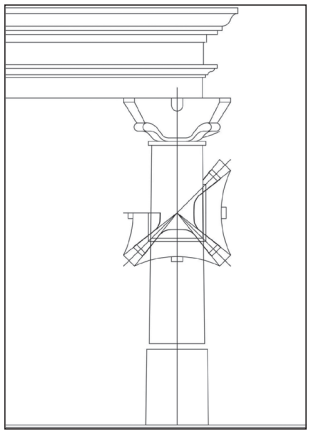
30. The The Roman Soldier Tomb Reverse-frustum capital.



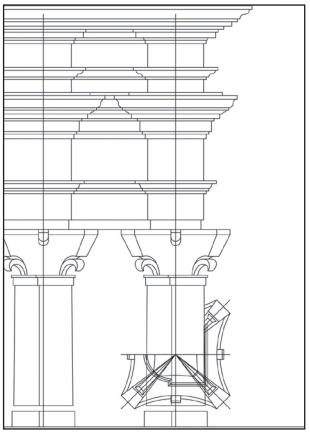
31. Bāb as-Sīq Triclinium Reverse-frustum capital.



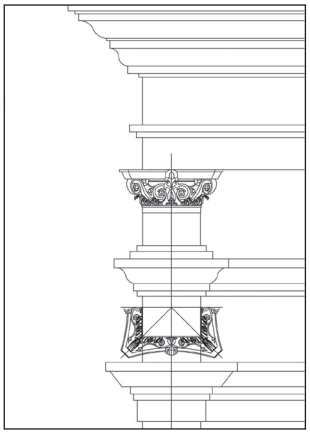
32. The Rainessance Reverse-frustum capital.



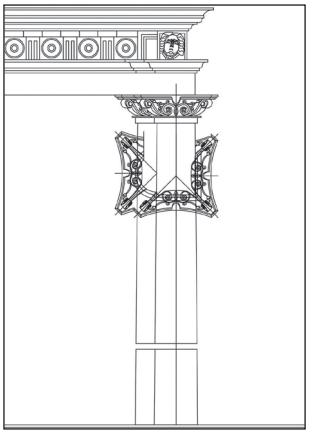
33. The Silk Tomb Reverse-frustum capital.



34. The Palace Tomb Reverse-frustum capital.



35. The Corinthian Tomb Nabataean Corinthian capital, Type II.



36. The Lion Triclinium Nabataean Corinthian capital, Type I.

Nabataean highlands. In the center two large volutes smoothly pass into a pair of *cauliculi*, between which is a composition of vertically standing seven-edged acanthus and two open arrows above it with buds of irises at the ends and a trefoil in the center. Massive angular volutes are supported by leaves of sharp-pointed acanthus. The lower part of the capital is treated in the form of a low astragal and a flat wide band, which acts as the neck of a rectangular pilaster. This is a common detail in two façades, the Corinthian Tomb central capital (**Fig. 35**) and the Lion Triclinium capitals (**Figs. 36, 37**).

The Nabataean Corinthian Capital, Type II

The shape of the round capital is a plastic version of the Alexandrian plant capitals. The lower angular volutes, rounded not in the form of two *cauliculi*, but by a pair of symmetrically intertwined stub rings with two flowers of irises in each. The rosette in the form of a large iris grows from a thin stem, and massive angular volutes, forming the ends of their lower coils in the center of a facet triangle, that are supported by two steeply curled acanthus. It's a common detail in the façades of the Corinthian Tomb lower tier capital (**Fig. 38**), Corinthian Tomb upper tier capital (**Fig. 39**), and al-Khaznah upper tier capital (**Figs. 40, 41**).

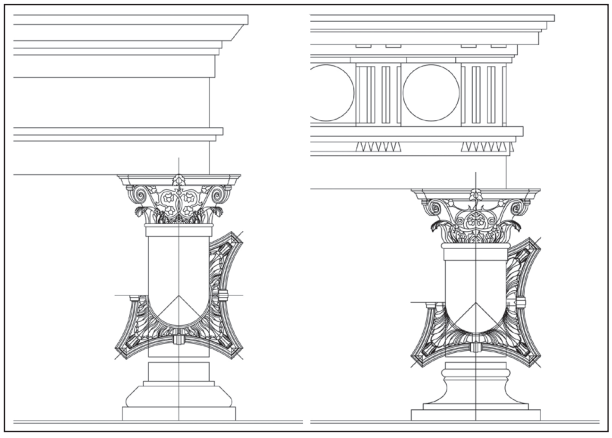
Nabataean Corinthian Capital, Type III

A detail of the upper level of al-Khaznah only shows a composition in detail that is derived from templates of late Republican and Alexandrian plant capitals. The proportions and the plasticity pattern in the double bands of acanthus leaves in the lower part of the capitals, as well as the shape of angular volutes and the supporting acanthus leaves reminds of Greek capitals. The relief of a complex interlacing of stems with iris flowers instead of traditional *cauliculi* bears the features of Alexandrian plant capitals. A large rosette is made in the form of a scaly cone of local oak, bordered by four sharp-toothed leaves. The profile of astragal and abaca resembles the details of Italian capitals. A portico with six of such capitals in the lower order level of al-Khaznah meets every traveler entering Nabataean Petra (**Figs. 42, 43**).

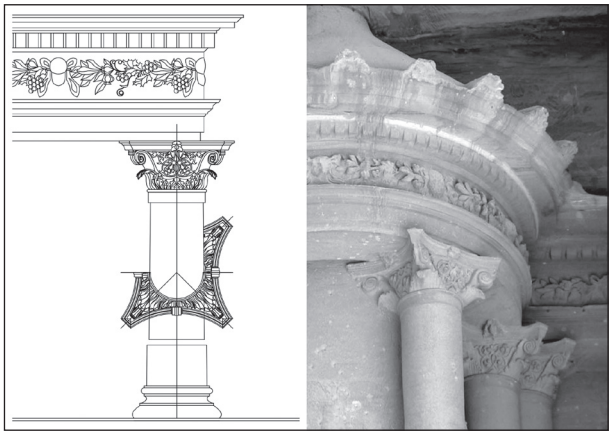
A major feature of Petra rock carvings is the diversity of architectural details within a single order system, where Corinthian capitals are combined with a base, of which the profiling is typical for Tuscan orders. The Capitals and bases are perceived as details of arbitrary style combinations far from a single order in each of the canonical orders. Typical for Petra collage combination of structural details.



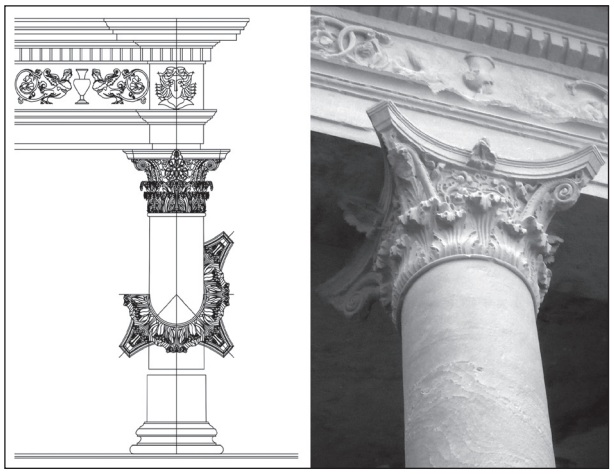
37. The Lion Triclinium Nabataean Corinthian capital, Type I.



38, 39. The Corinthian Tomb Nabataean Corinthian capital, Type II.



40, 41. al-Khaznah, upper storey, tholos, Nabataean Corinthian capital, Type II.



42, 43. al-Khaznah, lower storey, porch, Nabataean Corinthian capital, Type III.

The Figural Decoration of the Rock Portals and Façades of Petra

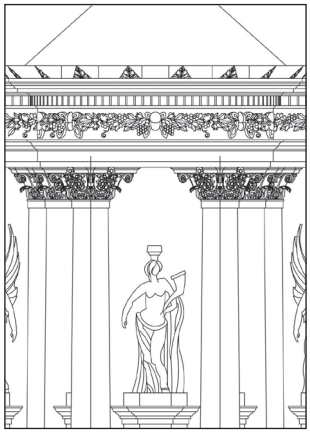
The figural decor means the relief of sculptural images of deities, human figures, birds, animals and plants. In the animalistic motifs of the decorative plasticity of Petra, representations of the local fauna are depicted, and relief images of deities and human figures are borrowed from Greek and Roman subjects. In the rock carved façade structures of Petra, certain definite compositions of thematic decorations were formed.

Ornamental Plasticity Decor of al-Khaznah

The Friezes of both levels of al-Khaznah are richly ornamented. On the frieze of the upper order level, complex garlands of fig tree branches, intertwined with groups of round fruits, such as figs and grapes, are framed by leaves. The center of such composition is indicated by a large acorn of local oak.

In the upper level central *intercolumnium* of the *Tholos*, a standing statue of the half-naked Aphrodite is depicted in her syncretistic aspects of Isis, as the head gear of the *calathos* testifies, and of the tutelary urban patron Tyche, evident by the horn of plenty in her left arm (**Fig. 44**). The remaining spaces between the columns of both the round temple as well as the framed colonnade are filled by statues representing Victories or Amazons, the latter wielding double-axes over their heads.

The *tympanon* of the pediment crowning the tetra-style entrance porch of the lower level is filled with a delicate vegetal scroll on both sides of a ruined object (**Fig. 45**), resting on a narrow base of acanthus leaves. In his famous corpus of lithographs, the artist David Roberts (1849) restituted this detail, totally destroyed today, as a squatting sideward faced eagle, which inspired the presented reconstruction (**Fig. 44**). Many modern scholars, however, recognize a human bust of Atargatis, or fertility diety, as shown in the famous relief from Khirbat at-Tannūr. The same motif also occurs in funeral art of Palestine and Arabia, with relief pattern on the frieze and the plane of the tympanum of the lower level represents large spirals wrapped acanthus stems with a cone in the center. These depictions alternate on the frieze, along with paired images of sirens with a calyx along the axis between them (**Figs**. **46-48**).



44. al-Khaznah, upper storey, tholos, representation of Isis-Aphrodite-Tyche.



45. al-Khaznah, lower storey, pediment with Isis crown and eagle (according to lithography by David Roberts).



46. al-Khaznah, lower storey, pediment with bust in scrolls as most modern scholars understand the theme).



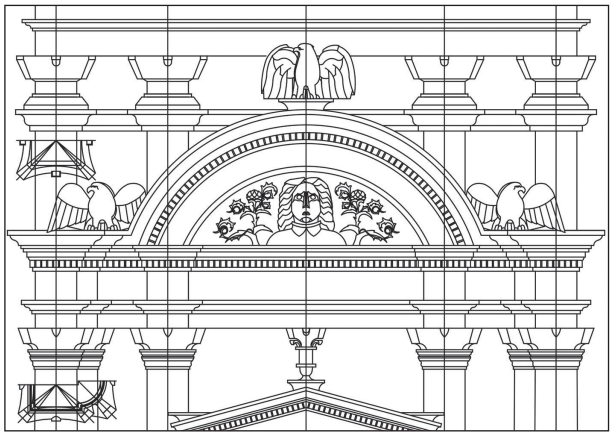
47. al-Khaznah, lower storey, frieze with heraldic sirens with a calyx, framed by vegetal scrolls.



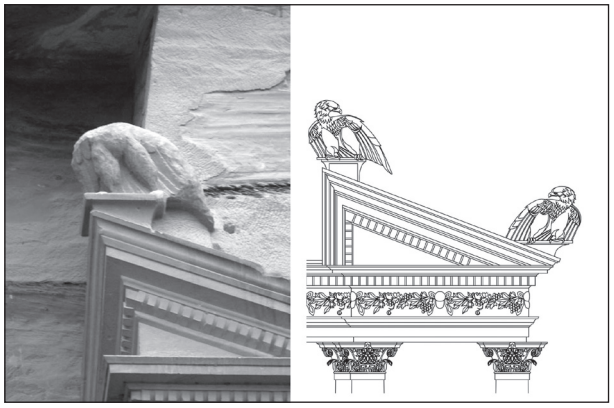
48. al-Khaznah, lower storey, frieze with heraldic sirens with a calyx, framed by vegetal scrolls.

*Acroteria in the Shape of Eagles (***Figs. 49-54***)*

The greatest number of sculptural figures adorn al-Khaznah. In the space between the external columns of the first order level, two compositions with male figures (**Fig. 56b, c**) leading the bridles of horses (Castor and Pollux) are created on a scale of 2.5:1. In the five piers of the upper level of al-Khaznah, are five figures of Amazons holding axes on a scale of 2:1 (**Fig. 55**). In the central *intercolumnium* of the *tholos,* the relief statue of Isis, the goddess of motherhood, is depicted (**Figs. 44**, **56a**) and the planes of the friezes along the axis of the external pilasters adorn the heads of Gorgons.

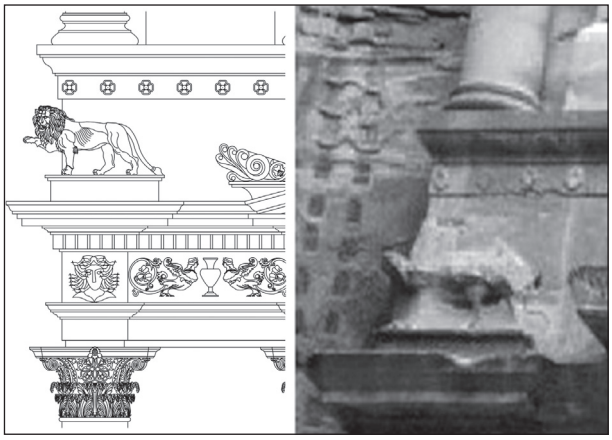


49. The Sextius Florentinus Tomb with acroteria in the shape of eagles on top and both sides of the segmental pediment.



50, 51. al-Khaznah, eagle acroteria on the broken pediment of the framing colonnades in the upper storey.

The lateral pilasters of the Lion Triclinium display Theatre mask (**Fig. 57**). Sculptural images of Hellenistic Armors, occupy the space between the columns in the Roman Soldier Tomb. A drapery bust is located along the axis of the entrance portal of Urn Tomb, and the frieze plane coaxial to the pilasters, is filled with human bust reliefs.(**Fig. 58**). The Atargatis, or fertility deity with scrolls, appear as the central image of the segmental arch in Sextius Florentinus Tomb.



52, 53. al-Khaznah, acroterion of the attic on the left side in the shape of a sculpture of a lion.



54. Lion Triclinium wall decoration.



55. al-Khaznah, representation of Amazon.



56. |a. al-Khaznah, representation of Aphrodite-Isis. |b, c. The two Dioscuri Castor and Pollux, identified by the Nabataeans with the astral gods Azizos and Monimos.

Order Compositions of the Nabataean Classical Rock Carved Façades of Petra

The goal of Architectural and graphical reconstruction is the reconstruction of original species of Petra rock fronts preserved in varying degrees of Fragmentation, and presented in large-scale orthogonal drawings, in order to analyze the plastic patterns of typology and the proportional system.



57. Lion Triclinium frieze with Theatre masks, wreaths and paterae, in the pediment bust with vegetal scrolls.



58. Human draped bust in the window of the central intercolumnium of the Urn tomb.

Bāb as-Sīq Triclinium

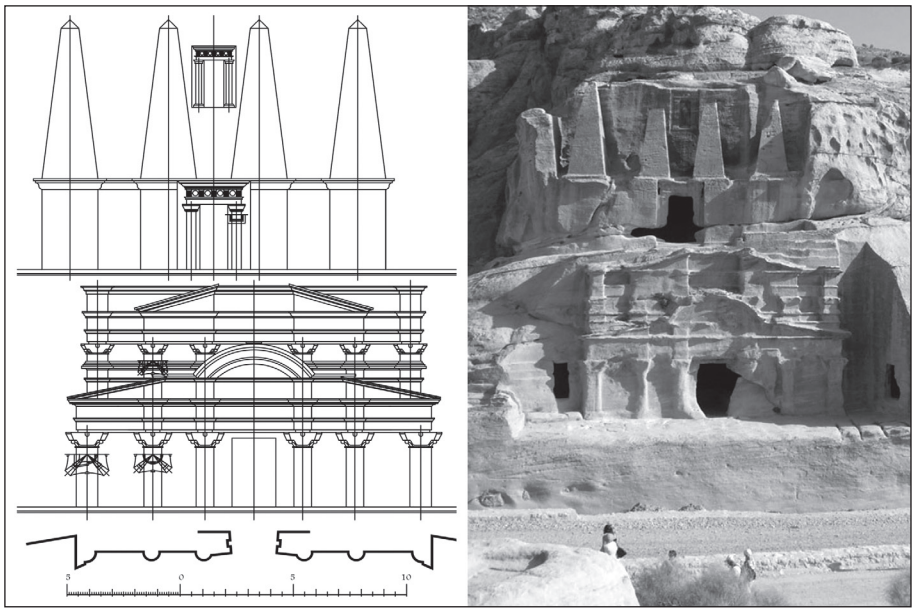
The height of the facade is 12.0m, and has a width of 18.50m. The composition of the façade consists of two levels. The six pilasters of the lower level carry a massive entablature that supports a „broken“ pediment. The second level is perceived as a detailed attic with dwarf pilasters, crowned with the Nabataean Reverse-frustum Capital Type III, multi-molded entablature and a “broken” pediment on the top.

The massive half-columns of the lower level are crowned by the Nabataean Reverse-frustum Capital Type III, between which a rectangular entrance opening with an entablature on a top of the broken pediment is located. Bāb as-Sīq Triclinium has a unique façade in its plasticity detailing and original proportional system. (**Figs. 59, 60**).

al-Khaznah

The height of the façade is 42.0m, and has a width of 28.0m. The façade of al-Khaznah is characteristic to Nabataean two-leveled compositions, Completed with a „broken“ pediment, of which the central part is occupied by a circular rotunda or a *tholos*. The first order level represents a six-columned portico with Nabataean Corinthian Capitals, Type III, and an entablature, a pediment and an attic.

Two middle freestanding columns and four extreme semicircular pilasters are crowned by Nabataean Corinthian Capitals, Type II. These columns have bases with classical moldings. In the depths of the portico between the central columns, there is an entrance with an aperture of 8m in height, to which a staircase with twelve steps leads. The second order level is a three-part portico, with an external “broken” pediment and

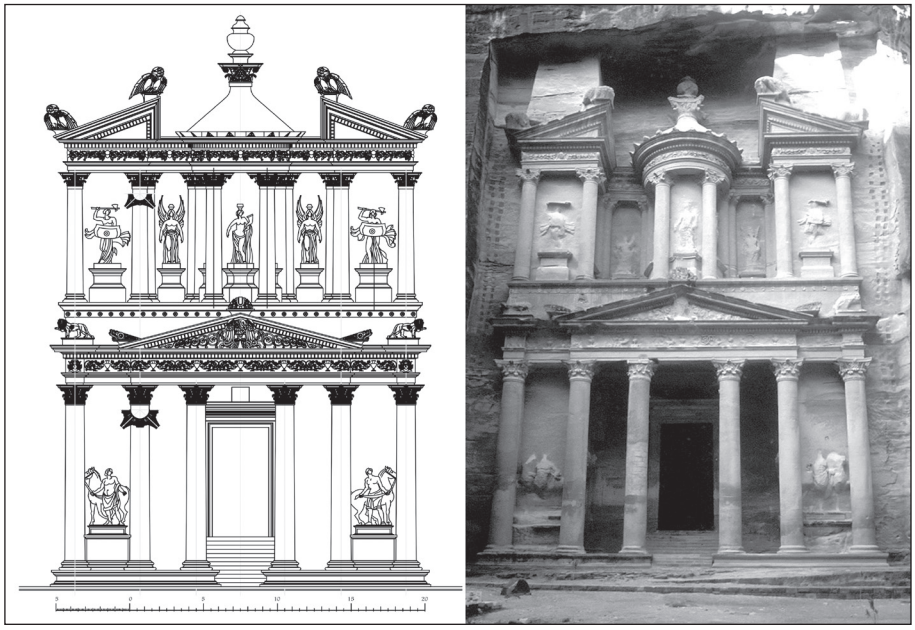


59, 60. Bāb as-Sīq Triclinium architectural and graphic reconstruction.

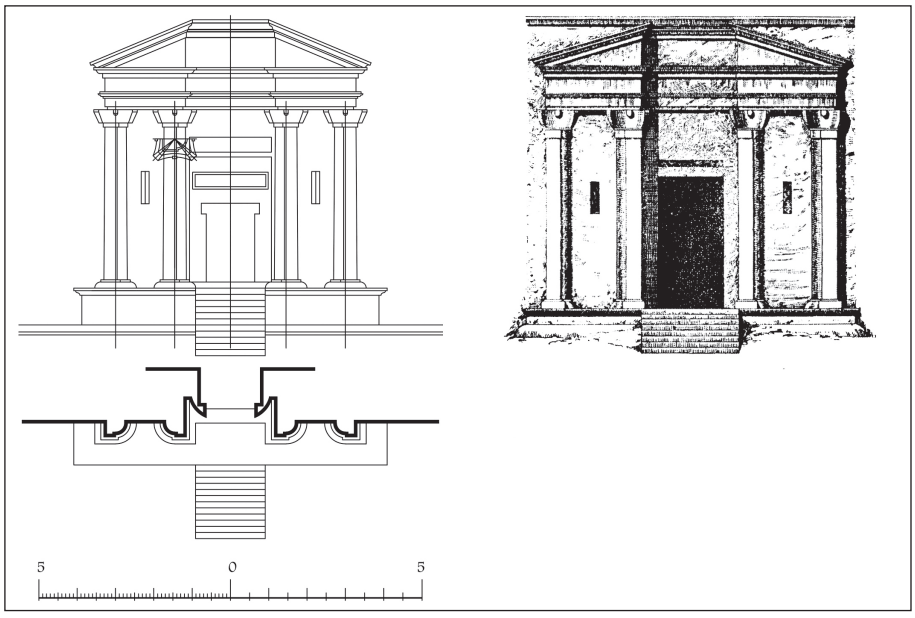
a Tholos in the center. Sculptures depicting male figures and figures of the Amazons are placed on high profiled pedestals. The Treasury is the most famous and significant construction of Petra, meeting travelers at the end of the Siq gorge. A plasticity complex, harmonious composition, with specific beauty of order details, and elements of ornamental décor, makes al-Khaznah the climax of art in the Nabataean architecture front piece, (**Fig. 61a-b**).

The Broken Pediment-Tomb (*BD 228*)

The height of the structure is 8.0m, and a width of 7.0m. The composition is a flat portal with four pilasters, an entablature and a pediment, with a clear division into the central part and two entablatures on the side. Pilasters are complicated in section, rectangular from the outside and semicircular from the inside, and a base without a plinth, and crowned by the Nabataean Reverse-frustum Capital Type I. The central plane of the portal occupies an entrance aperture, above which are three cut horizontal niches, where ornamental plates were apparently mounted. The side planes between the pair of external pilasters, with smaller intercolumnium than the central ones, have narrow slits for windows. The entire structure rests on a plinth, with a staircase in the center consisting of thirteen steps (**Fig. 62 a, b**).



61. |a. al-Khaznah architectural and graphic reconstruction. |b. al-Khaznah.



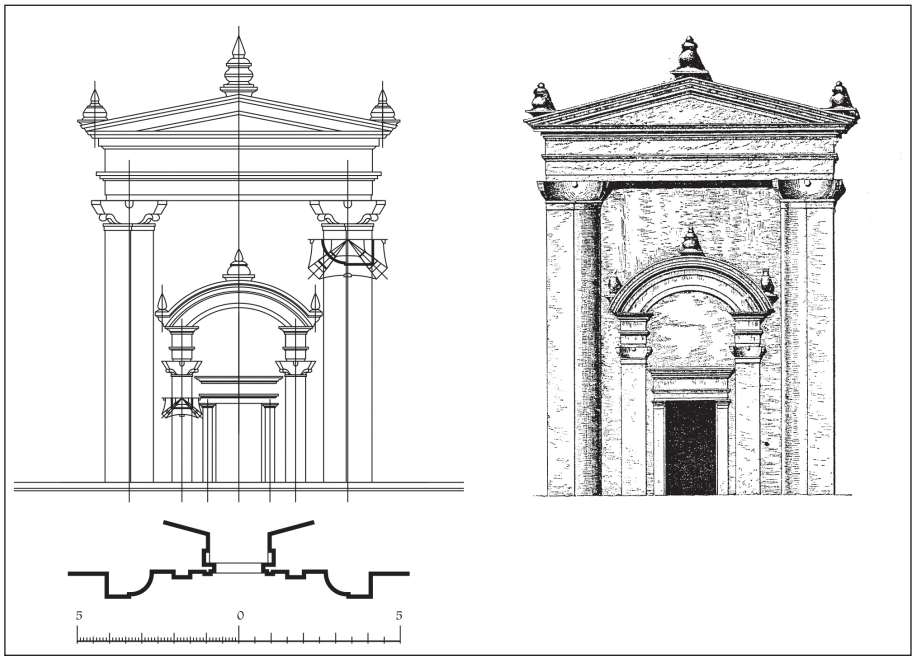
62. |a. The 'broken pediment'-Tomb, architectural and graphic reconstruction. |b. Elevation prospect (Brünnow and von Domaszewski I. 1904: 158, fig. 179 [no. 228]).

The Renaissance-Tomb (*BD 229*)

The height of the structure is 14.0m, and the width is 8.25m. The composition of the façade according to the formal schemes (see **Fig. 18**) is similar to the façade structure of Lion Triclinium, but differs in the order of details. The external double pilaster portal, crowned with the Nabataean Reverse-frustum Capital Type III and an architrave, is completed by a pediment with multi-profiled cornices and three *acroteria* with urns. Its pilasters with the Nabataean Reverse-frustum Capital Type III support two entablatures, With a facetted segmental archivolte. The central and side *acroteria* in the shape of small urns complete the composition. The entrance frame consists of a pair of pilasters with the Nabataean Doric capitals and an entablature (**Figs. 63a, b**).

The 'Roman Soldier' Tomb (*BD 239*)

The so-called Tomb of the Roman soldier is a vast architectural complex consisting of a rock-cut tomb connected with a *triclinium* by a colonnaded piazza. It is located east Wādī Farasa, underneath the so called Garden-triclinium, and accessible via monumentalized gates on both long sides of the enclosed piazza (**Figs. 64a, b**). This funeral complex has been intensively



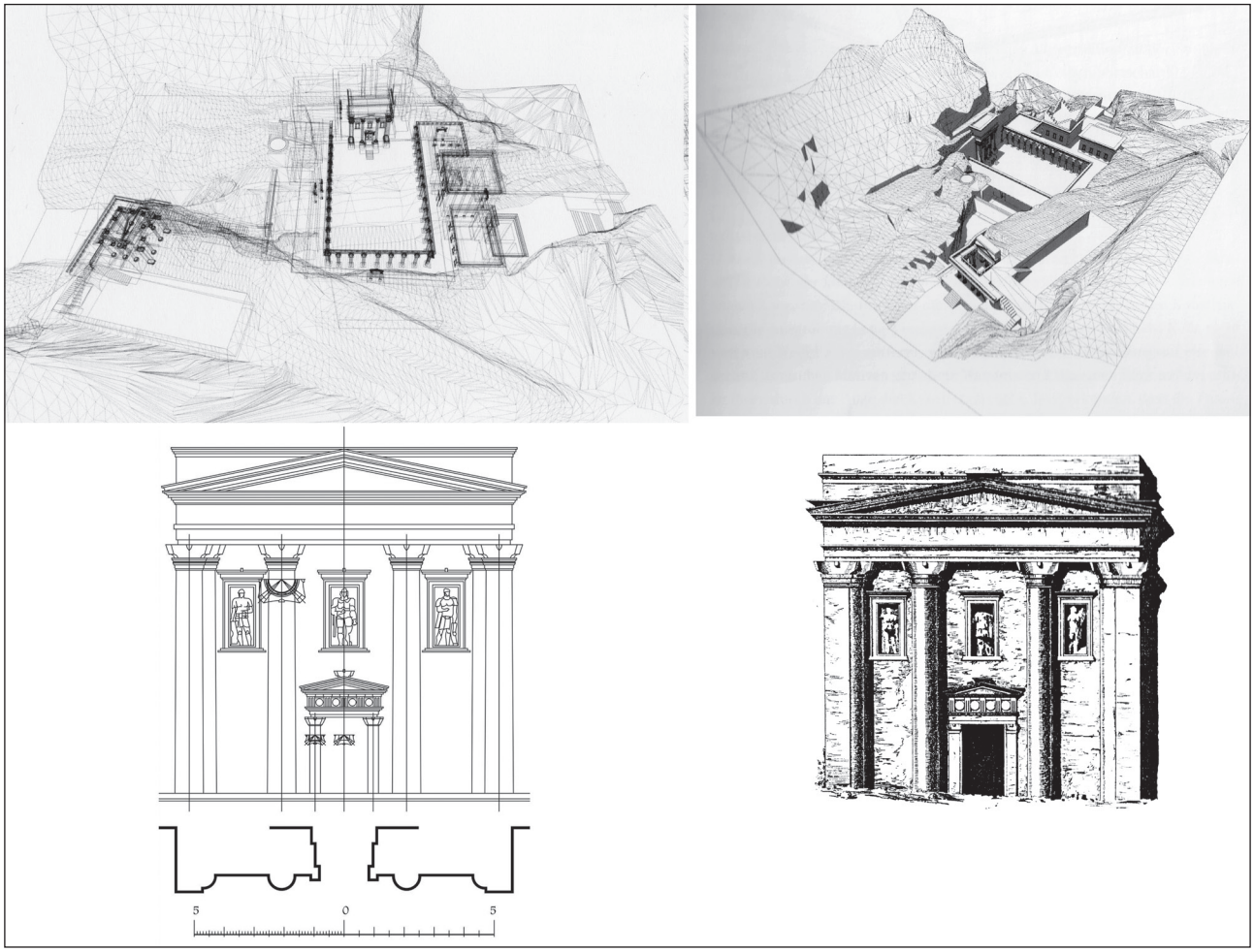
63. |a. The 'Renaissance"-Tomb, architectural and graphic reconstruction. |b. Elevation prospect (Brünnow and von Domaszewski I. 1904: 159, fig. 180 [no. 229]).

explored by an international team (IWPF) directed by Stephan Schmid (Humboldt-University, Berlin) between 2001 and 2010.

The height of the rock-cut tomb façade (**Figs. 64c, d**) is 11.75m, and the width is 11.25m. The outer portal, with a small door inside, represents a composition of four pilasters carrying an entablature and a flat triangular pediment attached to an attic. The external complex cross-section of pilasters and medium semi-columns are completed by the Nabataean Reverse-frustum Capital Type II. The upper segments of the intercolumnium are occupied by three niches with relief figures of Hellenistic Armors. Only one Armor figure is preserved today, meanwhile the IWPF-mission found fragments of the rest during their excavations. The central entrance frame consists of two rectangular pilasters with The Nabataean Reverse-frustum Capital Type III, supporting the entablature decorated with a frieze of *triglyphes* and *metopes*. The front is crowned by the Nabataean Reverse-frustum Capital Type III.

The Sextius Florentinus Tomb (*BD 763*)

Titus Aninius Sextius Florentinus was a Roman official of senatorial rank with a profound military career in different parts of the Empire. In the reign of Hadrian, he was promoted as a governor (*legatus Augusti propraetore*) of *Provincia Arabia*, a position which he held from AD 127 until his death shortly after AD 130. His ownership of the tomb during BD 763 is testified by a Latin inscription, which triggered a long controversy on the date of its architecture. As Klaus Stephan Freyberger demonstrated in a comparative study (*Zur Datierung des Grabmals des Sextius Florentinus in Petra, in: Damaszener Mitteilungen 5, 1991:1-8*), the tomb originated in the days of the Nabataean



64. |a-b. The 'Roman Soldier'-Tomb, volumetric view on the Wadi Farasa East complex (including the so-called garden triclinium) from south and east (Pascal Wirth, Exhib. Cat. Basel 2013: 200 figs. 8-9). |c. Architectural and graphic reconstruction. |d. Elevation prospect (Brünnow and von Domaszewski I. 1904: 160, fig. 182 [no. 239]).

Kingdom and it has been usurped for a secondary burial of the governor after 130AD. The inscription has been incised at this later stage of use. The usurpation of older tomb was obviously a common practice as it is evidenced by various Nabataean inscriptions on the tomb façades at Hegra / Mada'in Salih.

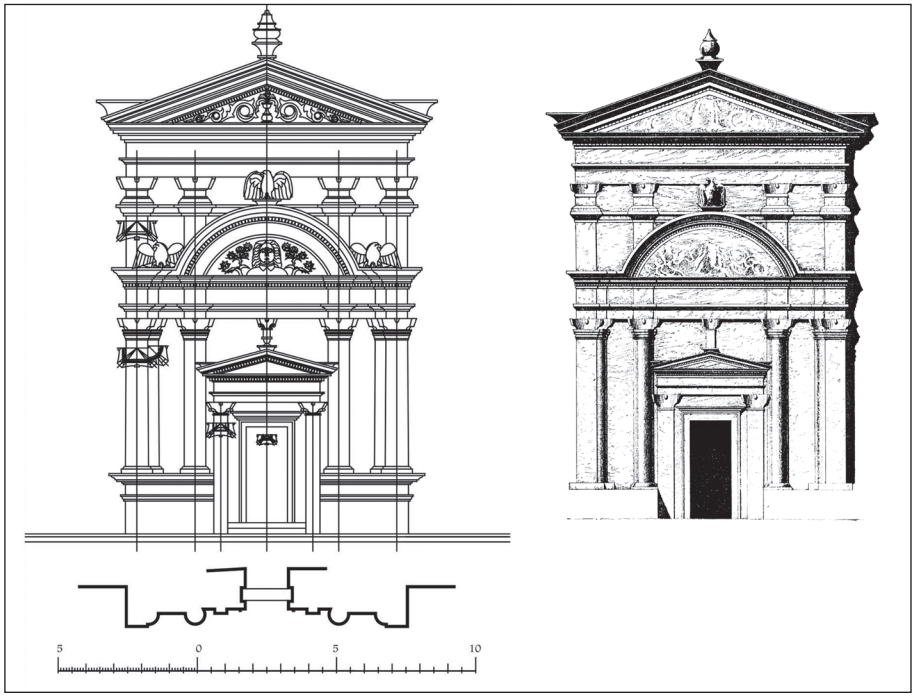
The hight of the façade is 18.5m, and width of10.0m The composition on two-levels consists of a small portal inside of a large portal on a high pediment. Four pilasters of the first level are crowned by the Nabataean Reverse-frustum Capital Type III. A segmental pediment displays the bust of Atargatis, the deity of Fertility, with scrolls in the center and relief plant ornament on the top and side *acroteria* adorned by sculptures of eagles. The latter, however, are not shown on the elevation prospect published by Brünnow and von Domaszewski (**Fig. 64b**). In the second level, dwarf pilasters with The Nabataean Reverse-frustum Capital Type I support a detailed entablature crowned by a triangular pediment, which displays a delicate vegetal scroll in the plane of the *tympanon*. The overall composition of the portal is completed by an *acroterion* in the shape of a massive urn. The inner portal has a pair of pilasters with The Nabataean Doric Capitals, a massive entablature and a flat triangular pediment. An *acroterion* with a capital of the same type completes the composition of the façade (**Figs. 65a, b**).

The Palace Tomb (*BD 765*)

The height of the double-storied façade measures at 45.0m, with a width of 56.0m. It shows four portals in the lower level and a colossal multi-profiled attic on top. The lower level sits on a massive pedestal, which has twelve twin-pilasters terminating in the The Nabataean Reverse-frustum Capital Type III, a detailed entablature and a two-part attic. Four large entablature compositions represents the upper parts of the two-portals, two of which are external ones completed by semicircular pediments, and two central ones completed by pediments of triangular shape. In the center of the portals are entrance openings, with relief frames of a pair of pilasters and multi-leveled attics.

The pilasters of the lower level are crowned by Nabataean Cupped capitals. Vertical divisions of the lower and upper levels do not coincide with their axes, except for the side pairs. The space between the semi-columns occupy a variety of window openings and niches. A massive multi-leveled attic above the entablature of the second façade level has vertical divisions that continues its axis. Its semicircular pilasters are decorated with The Nabataean Reverse-frustum Capital Type I.

The name of this façade is by no means accidental; it is distinguished from all other tombs by its giant dimensions and its exaggerated multiplication of horizontal architectural



65. |a. The Tomb of Sextius Florentinus, architectural and graphic reconstruction. |b. Elevation prospect (Brünnow and von Domaszewski I. 1904: 170, fig. 194 [no. 763]).

bands. Waterfall channels fed by a large basin on top of it frame the architecture on both sides. Recent geological studies and limited excavations directed by Stephan Schmid (Humboldt-University, Berlin) located the urban *basileia*, or the residence of the Nabataean kings in Petra down-town. This fancy setting on the north-western cliff of the al-Khubthah massif testifies the extravagance of its aristocratic and wealthy planner (**Figs. 66a, b**).

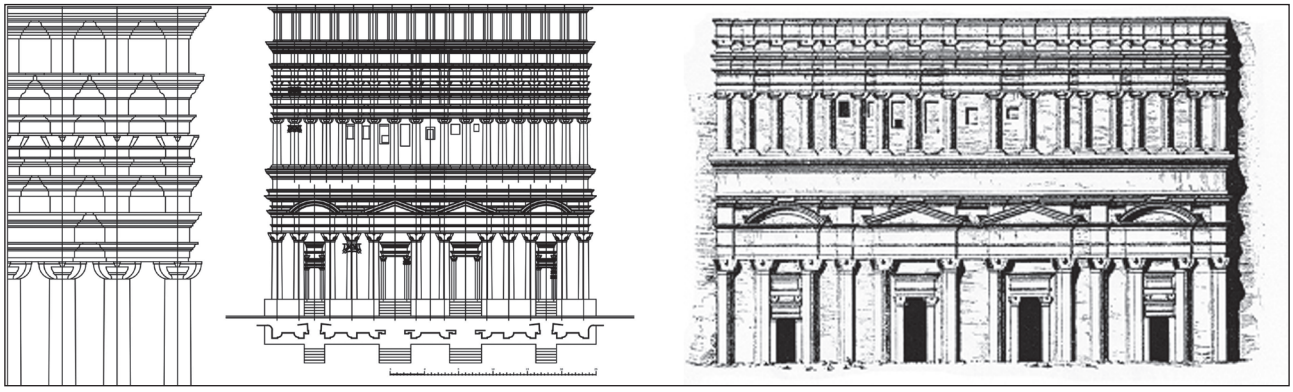
The Corinthian Tomb (*BD 766*)

The height of the building is 32.5m, and the width is 29.0m. The scheme of the façade is similar to al-Khaznah. The two-leveled composition has a "broken" pediment and a central Tholos. Eight semi-columns on a high base are crowned by the Nabataean Corinthian capitals, Type II. They support an entablature in the lower order level. Its center consists of a semicircular pediment. The entrance opening is decorated with two Nabataean Doric pilasters and an entablature with a cornice. The entablature of the first level is vertically divided into two parts; the upper one is completed by the attic with a „broken" pediment and an entablature supported by dwarf pilasters with the Nabataean Corinthian capitals, Type I.

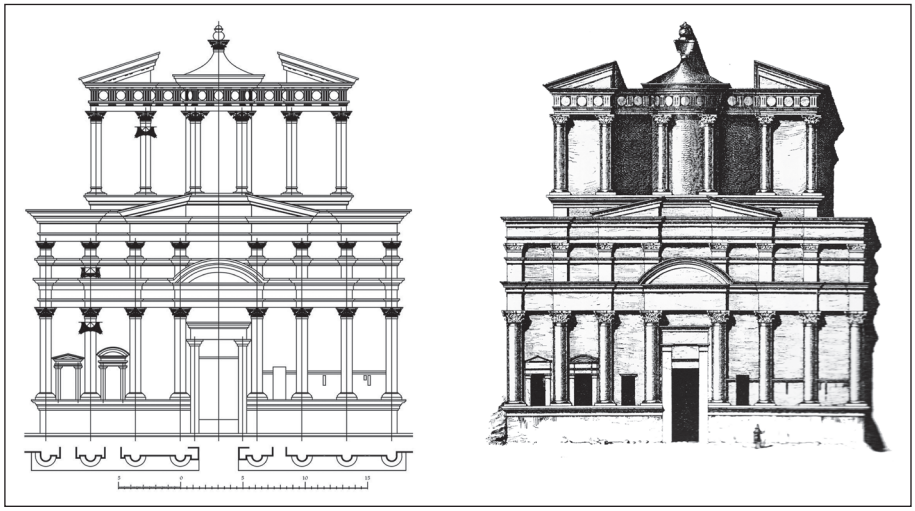
The upper order level consists of a „broken" pediment and six semi-columns which are not coaxial with the lower half columns. They carry the Nabataean Corinthian capitals, Type II. A Doric frieze is adorned by alternating *triglyphs* and *metopes*, the latter being filled with round smooth discs. The central part is occupied by a round rotunda with a crowning of a complex shaped urn. The two-columned segments are the sides of the "broken" gable (**Figs. 67a, b**).

The Silk Tomb (*BD 770*)

The height of the façade is 18.5m. The width is 11.0m. The composition of the façade is typical for portals with a double entablature, but the special natural texture and the silk-tinged color of the rock, from which it is carved, gives it significance in the series of Royal tombs of



66. |a, b. The Palace tomb, architectural and graphic reconstruction (a), prospect of the same tomb limited to the lower two storeys and omitting the high multiplied entablature zones by Brünnow and von Domaszewski (1904) 169 fig. 193 (no. 765).



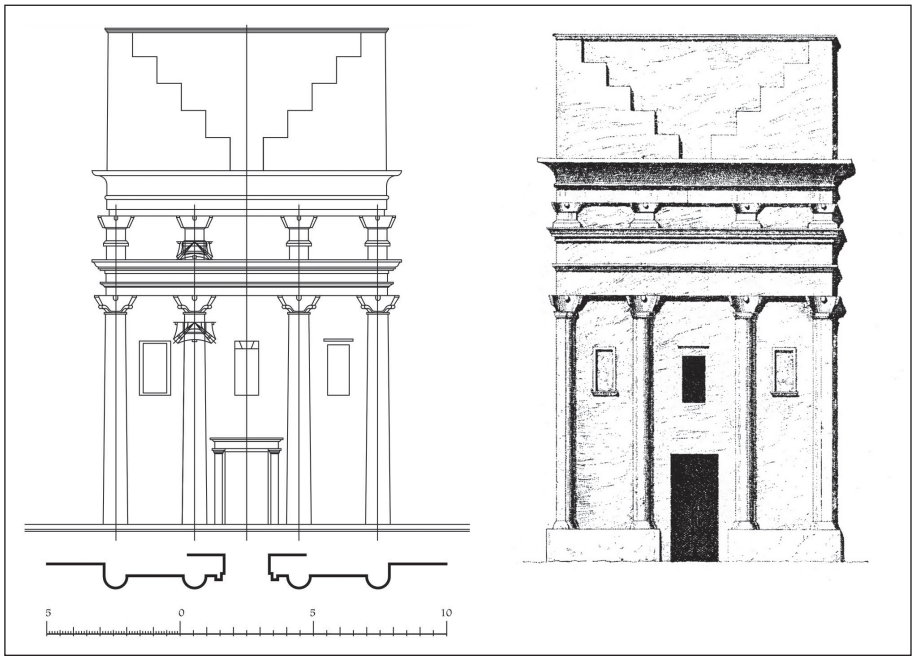
67. |a. The Corinthian Tomb, architectural and graphic reconstruction. |b. Elevation prospect (Brünnow and von Domaszewski I. 1904: 168, fig. 192 [no. 766]).

PetraThe plane of the façade is divided vertically into three structural parts. In the lower order tier are four semicircular pilasters with the Nabataean Reverse-frustum capitals, Type III and a detailed entablature. There are four dwarf rectangular pilasters on the second tier with the Nabataean Reverse-frustum Capital Type I and an attic. The entablature consists of a cornice with Egyptian *cavetto* and fillet. The upper level consists of an attic with „crow's steps", a rectangular niche above the frame of the entrance portal, with two Nabataean Doric pilasters and an entablature (**Fig. 68**).

The Urn Tomb (*BD 772*)

Another important tomb within the royal necropolis along the western cliff of the al-Khubta massive is the Urn tomb, styled by the middle *acroterion* executed in relief and raising from the gable top at the attic tier. Due to its open forecourt lined by porticos, and its monumental appearance on a landscape-dominating terrace, it points out several analogies with the Forum of Augustus in Rome. In consequence, it was hypothetically assigned to Aretas IV Philopatris (ruled *ca*. 9 BC to 40 AD) as the proprietor of the tomb. This king was very well acquainted with the actual building projects in the Roman capital, since he traveled a number of times to Italy to hold audience with his clientele lord, Emperor Augustus, especially in his diplomatic clash with the usurping minister Syllaios.

The height of the building is 28.5m, and has a width of 18.5m. According to Andreas Schmidt-Colinet (*loc*. *cit*.), the Urn tomb was executed by the official mason workshop of 'Abd 'Obodat and Sons from Hegra. The façade is the central part of the deep spatial composition cut down from the massif of the rock slope. Two covered galleries in the sides have five round columns supporting overhanging rocks. The base of the tomb is located on the arcade constructions, according to many scholars, dating to the period of the Byzantine Empire 446-447AD. The façade structure is formally similar to the type of rock Portals with a double entablature. However, the order plasticity of the first level is so monumental that the entire abovementioned part of the building is perceived as a single surface of a detailed attic consisting of reliefs on the upper level and a pediment with a plane of smaller attics. The first order level has a pair of external "twin" pilasters with a rectangular outer section and a quarter of a circle inner section, and a pair of medium half-columns completed by the Nabataean Reverse-frustum Capital Type II. The frieze of the entablature is adorned by sculptural bust reliefs. The entrance structure supports a pediment with a profiled cornice, with a central entrance portal embedded in it. A pair of the Nabataean Reverse-frustum Capital Type II supports an entablature with a Doric frieze and a triangular pediment with *aroteria*. The upper

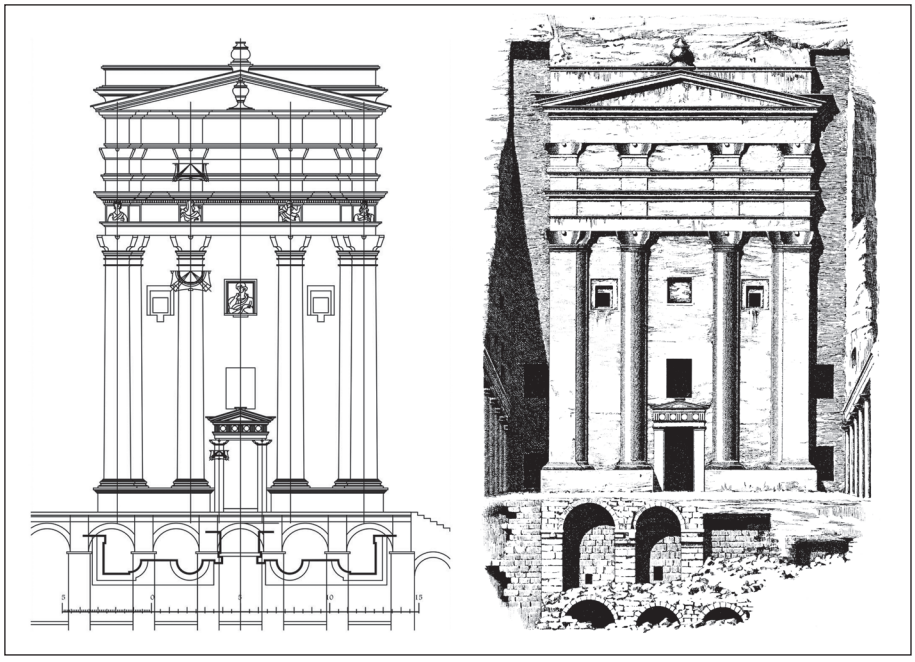


68. |a. The Silk Tomb, architectural and graphic reconstruction. |b. Elevation prospect (Brünnow and von Domaszewski I. 1904: 155, fig. 173 [no. 700]).

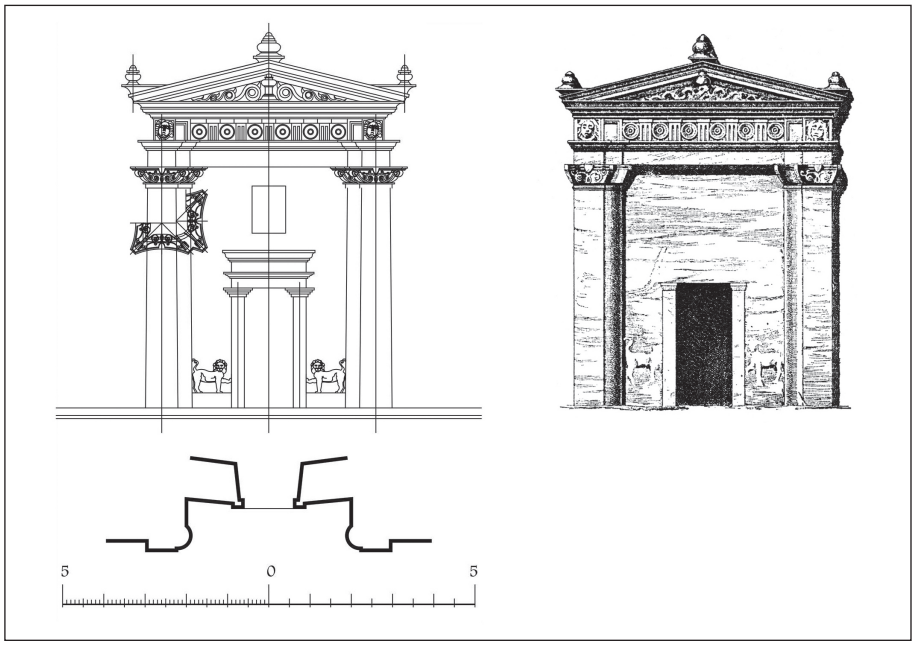
part of the *intercolumnia* is occupied by three profiled niches, of which the central one is a relief bust. The dwarf pilasters of the upper order level are crowned by the Nabataean Reverse-frustum Capital Type I, relief of the urn in the center and a central acroteria with a larger urn on the top (**Figs. 69a, b**).

The Lion Triclinium (*BD 452*)

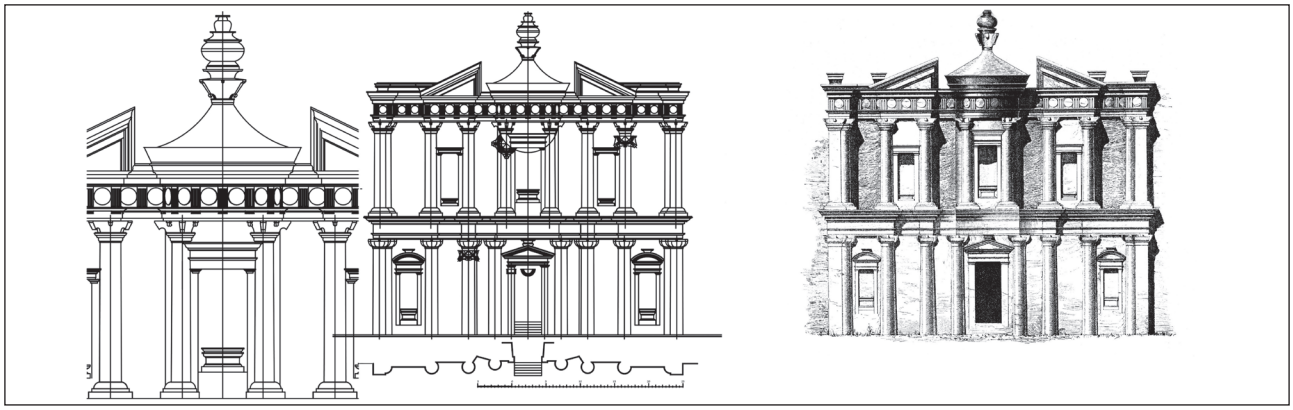
The height is 9.0m, and the width is 6.0m. The portal has an elegant composition of a small portal inside a large portal (see **Fig. 17**). Two twin pilasters of the external portal are completed by „double" Nabataean Corinthian capitals, Type I. Doric frieze is adorned by the heads of Gorgons. Large acroteries with urns are based on each edge of rich ornamented triangular pediment. There are relief images of two lions, the holy animals of the goddess Al 'Uzza, on both sides of the central portal with an entrance opening. An analogue of the plastic structure of this composition is undoubtedly the Doric order, in spite of its incompatible combination with the Corinthian capitals, which is a typical sign of the Nabataean mixing of differently ordered ornamental elements (**Figs. 70a, b**).



69. |a. The Urn Tomb, architectural and graphic reconstruction. |b. Prospect of the same tomb (Brünnow and von Domaszewski I. 1904: 167, fig. 191 [no. 772]).



70. |a. The Lion Triclinum, architectural and graphic reconstruction. |b. Elevation prospect (Brünnow and von Domaszewski I. 1904: 164, fig. 190 [no. 452]).



71. |a. ad-Dayr, architectural and graphic reconstruction. |b. Elevation prospect (Brünnow and von Domaszewski I. 1904: 187, fig. 220 [no. 462]).

ad-Dayr (*BD 462*)

The height of the structure is 47.0m, and the width is 46.0m. The scheme of the façade is similar to the schemes of al-Khaznah and the Corinthian Tomb. Due to its monumental size and its similarity to the named royal tomb, ad-Dayr has been associated with the burial of a Nabataean king Rab'el II, the last king prior to the adoption of the Kingdom by the Roman empire. Two levels consists of a "broken" pediment and a central *Tholos*. The semi-circular pilasters of the lower level are crowned by the Nabataean Cupped capitals, Type II. Two deep niches with segmental pediments are placed in the external *intercolumnia*, along with a central entrance on a triangular pediment. The upper level consists of a Doric frieze and eight half-columns with their axes coinciding the half-columns of the lower level, crowned by Nabatean Reverse-frustum capitals. The i*ntercolumnia* of the half-columns occupy deep niches with pedestals, probably prepared for statues. The round shape rotunda is crowned by the Nabataean Reverse-frustum Capital Type II and a free standing giant urn raised on top of the conical roof. The ad-Dayr is the most monumental building of Petra. The proportions of its elements and impressive plasticity details express the characteristic features of Nabataean architecture (**Figs. 71a, b**).

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THE "COMMODUS GATE" AT UMM AL-JIMĀL, EXCAVATION IN PREPARATION FOR PRESERVATION: UMM AL-JIMĀL PROJECT FIELD SEASON, MAY 28-JUNE 20, 2015

Elizabeth Osinga and Bert de Vries

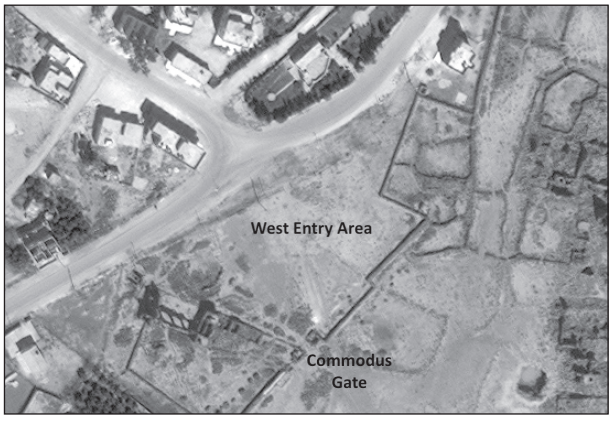
Introduction

The excavation and documentation of the 'Commodus Gate' at Umm al-Jimāl is part of a larger scheme: the development of the West Entry Area, a triangle that comprises the Commodus Gate, West Church and an open piece of land between the ancient Roman-Byzantine wall and the modern community. These three features combined will be developed as a landscaped park that will serve as a two-way gateway: an entrance from the community into the ancient site and from the ancient site into the community. The Commodus Gate itself will serve as the doorway onto an interpretive trail that will lead visitors on a signed tour of the antiquities, with a stop at the Interpretive and Hospitality Center that is being created at House 119 in the SSE sector of the antiquities.

The Commodus Gate excavation and conservation was carried out by the Umm al-Jimāl Project Team (Appendix A) in cooperation with Open Hand Studios and the people of Umm al-Jimāl, with funding from the USAID through the ACOR-SCHEP [The Sustainable Cultural Heritage through Engagement of local communities Project (usaidschep.org)] and Calvin College Archaeology Field School. [The Umm al-Jimāl Project staff is grateful to USAID, ACOR and the SCHEP organization for funding the West Gate Area and Eastern Trail preservation, presentation, and development program as a medium for preparing members of the Umm al-Jimāl community for careers in archaeological site management. We appreciate the helpful cooperation of the Department of Antiquities of Jordan staff in 'Ammān and al-Mafraq. We thank the local staff, their community and the municipality for their warm and secure hosting of our team].

A Purposeful Preservation of the West Entry Area

The West Entry Area includes the open space immediately north of the West Church and east of modern Umm al-Jimāl's main business intersection (*Midan*). On the east this space is bordered by the ancient Roman-Byzantine town wall, in which a 2nd century Roman gate, known as the Commodus Gate, provides entrance into the antiquities (**Fig. 1**). The area serves community members who pass from the *Midan* through the gate to sections of the community that lie on either side of the ancient site. It is therefore a natural location for the development of a formal entrance from the community onto the ancient site. A major goal of the work itself was the training of 15 site managers in the theory and practice of archaeological conservation to qualify them for long-term employment in managing and maintaining the site grounds. These trainees joined seven students enrolled in the Calvin College Field School. Archaeologically, this study of one of the few surviving pieces of Roman imperial architecture at Umm al-Jimāl brings understand-



1. West Entry Area showing the Commodus Gate and Umm al-Jimāl business center.

ing to the radical transition from imperial Roman to Late Antique culture at Umm al-Jimāl.

Previous Exploration: What H.C. Butler Saw

A photograph taken in 1905 (**Fig. 2**) shows the North Tower with walls surviving up to 13 courses high. We, however, found the west façade of this tower preserved only two courses high, with very few of the stones remaining in the collapse debris. The same is true of the piers, of which only the two imposts and two arch springers can presently be located. The West Tower, on the other hand, was already badly collapsed during the Princeton expeditions: the west façade survived only two courses higher than we found it. The *voussoirs* of the collapsed arches visible in the picture were no longer there in 2015.

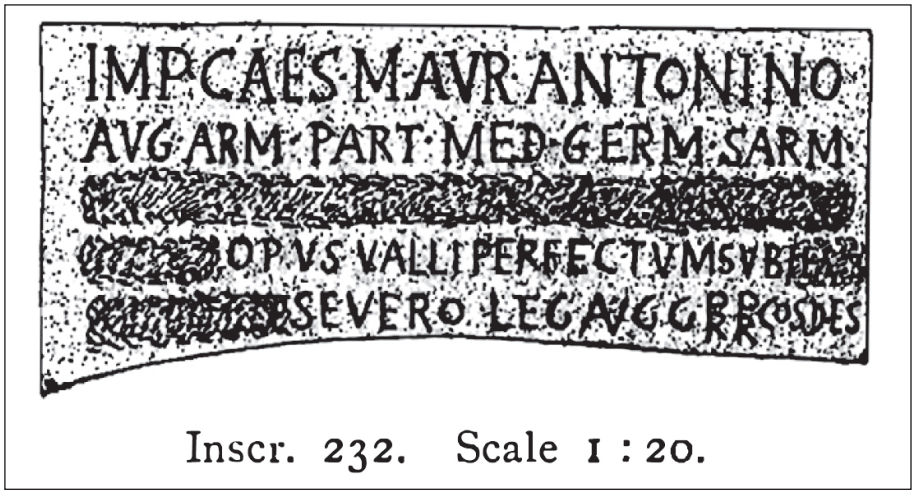
The gate's dedication inscription (**Fig. 3**) was lying among the arch collapse in the middle of the gateway when Butler and his team visited in 1905. Today this basalt stone has also disappeared, and rumors that it has reappeared in the archaeological museum at as-Suwayda, Syria cannot be verified at this time. Littman's transliteration and restoration (Littman *et al*. 1913: 131) of the abbreviations is as follows:

1. Imp(eratore) Caes(are) M(arco) Aur(elio) Antonino
2. Aug(usto) Arm(eniaco) Part(hico) Med(ico) Germ(anico) Sarm(atico)
3. ret Imp(eratore) Caes(are) L(ucio) Aur(elio) Commodo Aug(usto) Germ(anico)
4. Sarm(atico)] Opus valli perfectum sub…
5. …Severo leg(ato) Aug(ustorum) pr(o) pr(aetore) co(n)s(ule) des(ignato)

The text clearly puts the dedication of the gate's construction during the father-son co-regency of Emperors Marcus Aurelius and Lucius



2. View of Commodus Gate from the west, 1905. From the archive of the H.C. Butler led Princeton University Expedition to South Syria in 1905 and 1909 (courtesy of the Princeton University Archive).



3. The Commodus Inscription (Littman et al. 1913: 131).

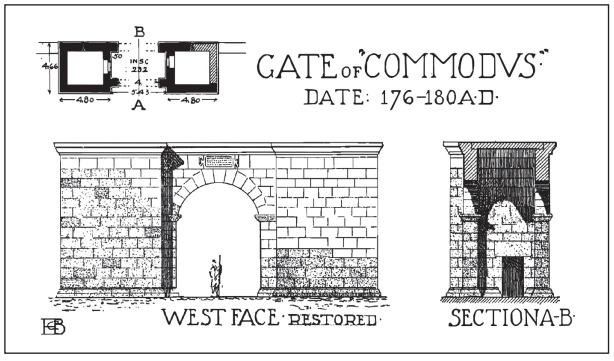
Aurelius Commodus, dated to 176-180AD. From this we derive the popular designation of the structure as "The Gate of Commodus."

Butler's restoration drawing is extremely helpful for our preservation planning, especially because his shading of the surviving masonry matches that of his photograph. Two small corrections result from our documentation. The base molding shown in the elevation drawings is not present, and the perimeter wall Butler shows attached to the east corners of the towers was in fact bonded into the centers of the north wall of the North Tower and the south wall of the South Tower, respectively.

From 1905 to 2015: What Remains after 110 Years of Collapse and Spoilage

The already damaged façade in the North Tower likely collapsed in the earthquake of 1926, turning the entire gate area into a *rujm* of collapsed building materials. A local informant who visited Umm ar-Rumman, located *ca* 20km northeast in Syria, learned from a local there that the beautiful basalt facades on the main street of the village consisted of stone taken from Umm al-Jimāl. The story is that from 1940 to 1942, two caravans commuted regularly between Umm al-Jimāl and Umm ar-Rumman, one going north loaded with stones and the other headed south to pick up more stones. The looted stones were the beautifully finished blocks from the west façade of the Commodus Gate and the exterior face of the north wall of the West Church (**Fig. 5**). This anecdotal evidence 'explains' the fact that the good building blocks from both buildings disappeared from the site, including the famous dedicatory inscription and the *voussoirs* of the arches.

This story punctuates the unfortunate scarcity of original building blocks. There are not enough stones available to complete the extensive rebuilding necessary in order to replace the surviving imposts and springers in their original positions, according to Butler's photograph. Such interesting architectural fragments will therefore have to be displayed on the ground and explained with illustrated signs.



4. H.C. Butler's restoration of the Commodus Gate (Butler 1913: 57, Ill. 133).

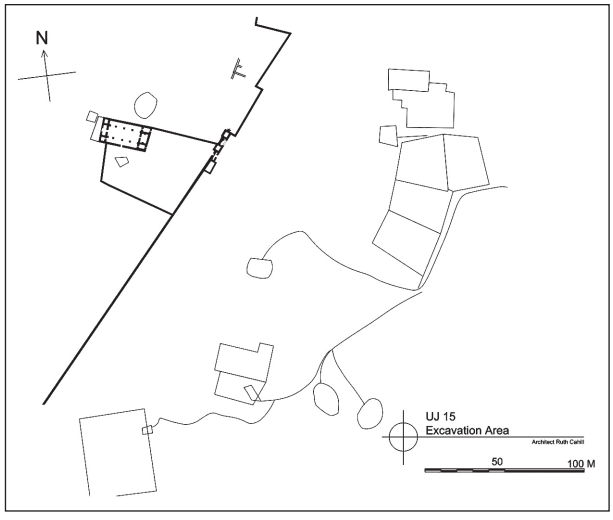


5. West façade of North Tower with only remnants of the lower two courses remaining. 17 June 2015. (photo: Bert de Vries).

Documentation and Excavation of the Commodus Gate and West Entry Area

Mapping of the West Entry Area and Documentation of the Commodus Gate

The Commodus Gate was the central element of a substantial segment of Roman wall shown as the dark line at **Fig. 6**. Later, in the sixth century, the South Tower of the gate became part of a new doorway on the south side, which gave access to the West Church compound - constructed *extra muros* (see also **Figs. 14** and **15**). The structures to the east, shown in outline at **Fig. 6**, include Byzantine houses straight to the east, six reservoirs, and the Cathedral and



6 West Entry Area in relation to structures to the east (map and drawing: R. Linnaea Cahill).

Praetorium to the south.

The Commodus Gate itself (**Fig. 7**) consisted of a central gate chamber flanked by two guard-tower rooms, entered from inside the chamber. The north tower remained intact, but the south tower had its original door blocked and a window added on the west side as part of its incorporation into the West Church Complex entry.

Excavation of the Commodus Gate and Environs (Area EE)

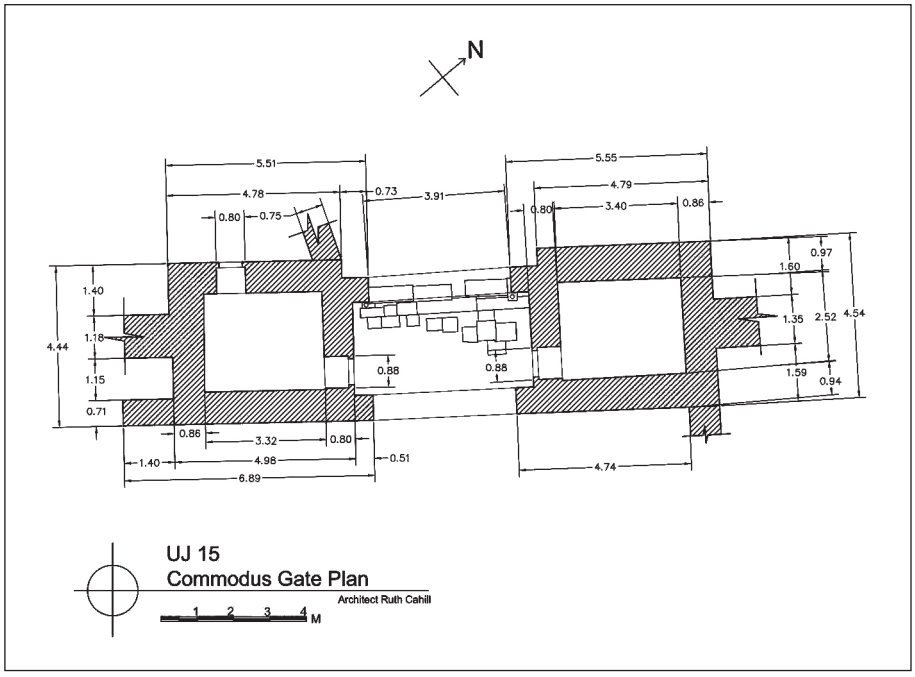
Six trenches were laid out in the Commodus Gate area (**Fig. 8**). The stratigraphic summary of each is presented below.

EE.1. North Half of the Commodus Gate Entry Chamber (**Fig. 9**)

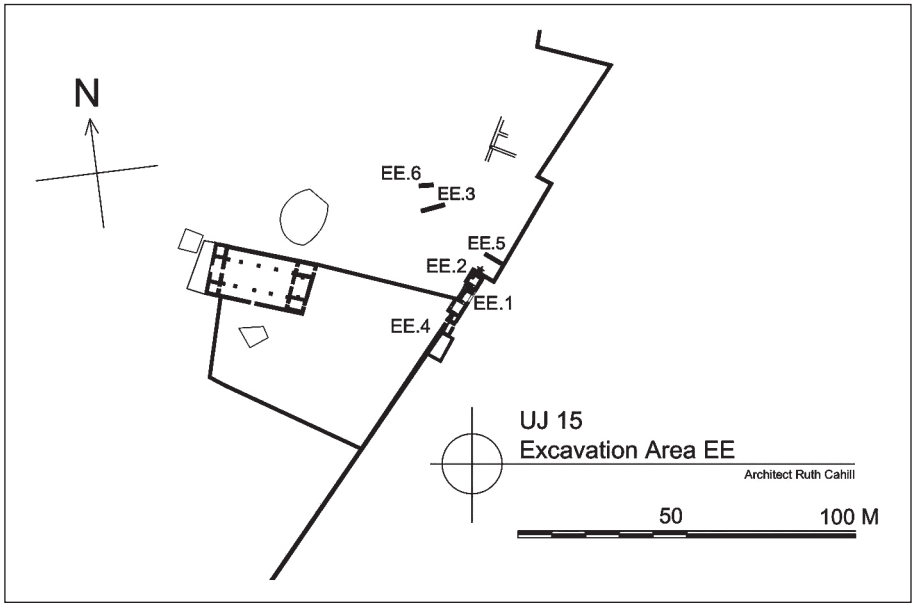
Excavation revealed that the bedrock was near to the surface in the gateway; therefore, no stratified occupation reflecting the traffic through the gate survived.

EE.2. Interior of the North Tower of the Commodus Gate

Beneath the topsoil [L:001] lay a fine cobble floor, constructed on an imported soil layer [L:005] which yielded only six undiagnostic sherds (**Fig. 10**). An ashy levelling layer beneath this soil and floor contained fragments



7. Commodus Gate (map: R. Linnaea Cahill).



8. Excavation Area EE (Commodus Gate), Trenches 1-6 (map: R. Linnaea Cahill).

of plaster and brick, as well as several tesserae [L:006]. The pottery in this layer was sparse and there were no diagnostics; however, none of the wares had a certain post-Early Byzantine date. Beneath was more ashy soil [L:007] and two firepits [L:008, 011]. Fourteen body sherds were associated with this activity, which is probably Late Roman in date. Below was the original cobble floor of the tower [L:009], which lay over a few foundation stones and undisturbed soil.

The later cobble floor cannot be dated by the finds within Locus 005; however, based on similar cobble floors set in soil at the site, such as one in the Praetorium dated to the Umayyad period, an Early Islamic date is possible.

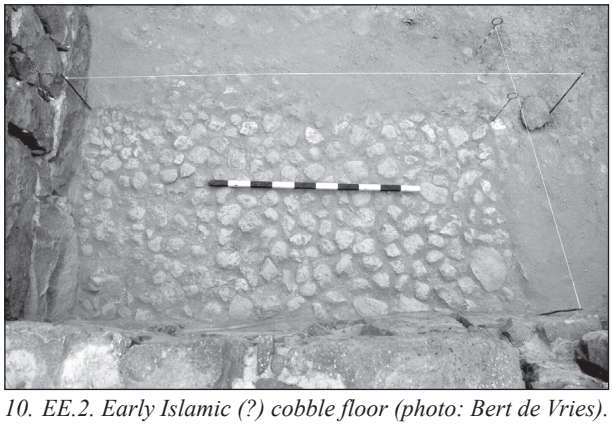
EE.3. Probe Trench to Locate the Roadway Leading West from the Gate

The loose, ashy topsoil ranged 20-27cm thick across the trench [L:002]. Below, a hard-packed sub-pavement was revealed, consisting of basalt chips, soil and pottery fragments [L:005]. Curbstones and a few stones of a cobble pavement survived on the west end of the packed underlayment (**Fig. 11**). This sub-pavement was constructed on top of another loose, ashy layer (20cm thick) containing many small pebbles and pottery fragments [L:007]. The latest date for the ceramic finds in both Locus 005 and 007 was the Late Byzantine period (mid 6th to early 7th century), though given the small number of diagnostics the date could possibly extend into the Early Umayyad period.

A second packed sub-pavement of similar composition [L:008], slightly thinner by 3cm, was found below the ashy deposit. There were fewer ceramics in this layer, and no diagnostic sherds; the wares, however, are Late Roman in date, and include Hauran ware (see Section C below) and Eastern Sigillata A. This sub-pavement was constructed on top of a 72cm-deep dark, ashy layer [L:009] containing Nabataean/Early Roman to Late Roman pottery, the deposit of which is dated to the late 3rd/early 4th century AD (*ca* 300). Hauran ware dominated the finds from this ashy layer by count (58%) and weight (61%). Directly beneath lay undisturbed soil and bedrock.



9. Entry gate paving stone on the left, bedrock under the scale stick (photo: Bert de Vries).



10. EE.2. Early Islamic (?) cobble floor (photo: Bert de Vries).

EE.4. Trench Across the Gate into the West Church Courtyard Immediately South of the Commodus Gate South Tower

The gate was created by dismantling the Roman wall running south from the Commodus Gate down to its founding course, which was used as the foundation for a wide doorstep (**Fig. 12**). Most of the soil layers were topsoil [L:001, 003, 004, 006, 008] and subsoil [L:010,



11. EE.3. Road curb with adjacent paving stones in foreground; clay underlayment in background from paving stones to far (east) balk (photo: Bert de Vries).



12. Fallen lintel from doorway into West Church courtyard. Shown upside down, as it appeared when installed above the door. Note the 'hand-drawn' nature of the Byzantine crosses (photo: Bert de Vries).

011, 013]. The exterior doorstep of the church courtyard gate was founded on a layer containing mostly undiagnostic body sherds of Roman through Byzantine date [L:014]. Therefore, its construction is likely contemporary with that of the West Church itself in the sixth century. Perhaps also at this time the south tower of the Commodus Gate was converted into a guardhouse for the church: the previous main entrance into the tower from the gateway was blocked off and a door was added that opened into the churchyard (**Figs. 13-15**).

EE.5. Trench North of the North Gate to Locate the 'Roman' Wall Running from the Center of the North Wall of the North Tower

The founding course of this perimeter wall was discovered under topsoil [L:002, 003]. The wall itself was laid on undisturbed soil and bedrock. Accumulated soil layers adjacent to the wall contained mostly Roman to Early Byzantine pottery, with few diagnostics [L:005, 006]. Therefore, it is probable that this wall was constructed in the Roman period, perhaps contemporary with the construction of the Commodus Gate. At the east end of the trench there was a heavily reconstructed wall that abuts the east wall of the Commodus Gate's North Tower. The accumulated soil against this later wall [L:004] contained a small number of sherds of Byzantine date (*ca* 5th-6th? century). This later wall was also built on bedrock.

EE.6. Probe Trench Five Meters North of EE.3 to Test the Roadway's Extension

Removal of the topsoil revealed the presence of the packed upper roadway sub-pavement (as seen in Trench EE.3, L:005), whereupon excavation was discontinued. This result confirmed the hypothesis that the Roman-period road continues north towards the modern town and the bridge across Wādī az-Za'tarī.

The Ceramic Corpus

Methodology and Quantification

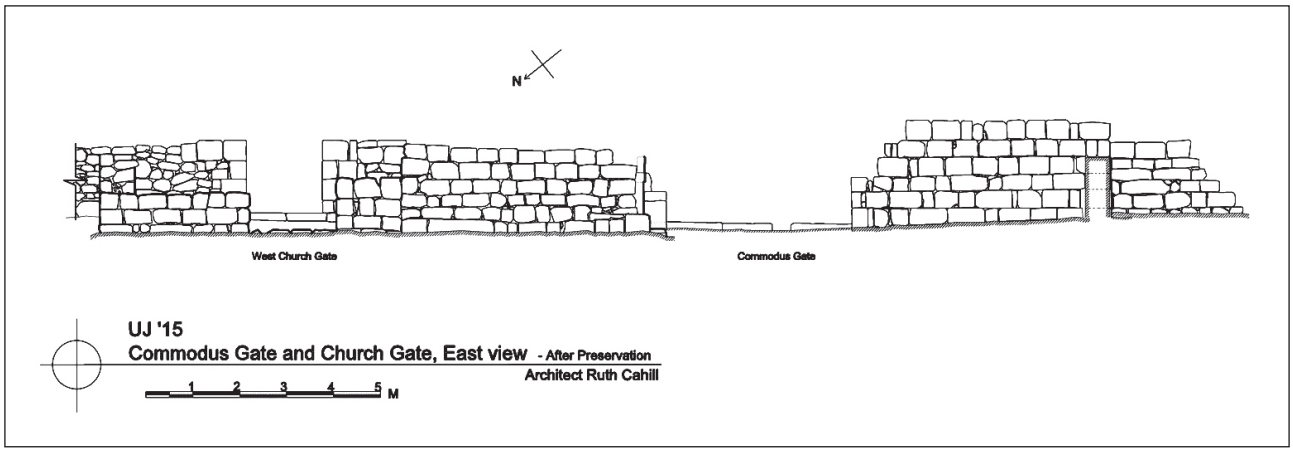
During the excavation season, each sherd - regardless of size - was recorded by ware and fabric and weighed. [The ware and fabric system was developed by Elizabeth Osinga (2017) during doctoral research at the University of Southampton, and is supported by preliminary petrographic analysis by the groups. For the



13. EE.4. Pre-excavation photo showing Byzantine doorway from inside West Church courtyard. Doorway enabled entry to the churchyard from inside the Byzantine town. 28 May 2015, view to the east (photo: Bert de Vries).



14. West façade of the Commodus Gate South Tower before preservation. The wall in the bottom left corner of the photo is the West Church courtyard wall constructed in the 6th century. The doorway to the right of the scale stick was also inserted in the Byzantine remodeling to adapt this tower room as a churchyard outbuilding. 17 June 2015 (photo: Bert de Vries).



15. View of church enclosure gate in relation to the Commodus Gate (drawing: R. Linnaea Cahill).

purpose of this report, only the groups relevant to this publication are briefly presented]. The results show that the corpus is overwhelmingly Nabataean/Roman to Early Islamic in date: only one Middle/Late Islamic sherd was found (**Fig. 16**).

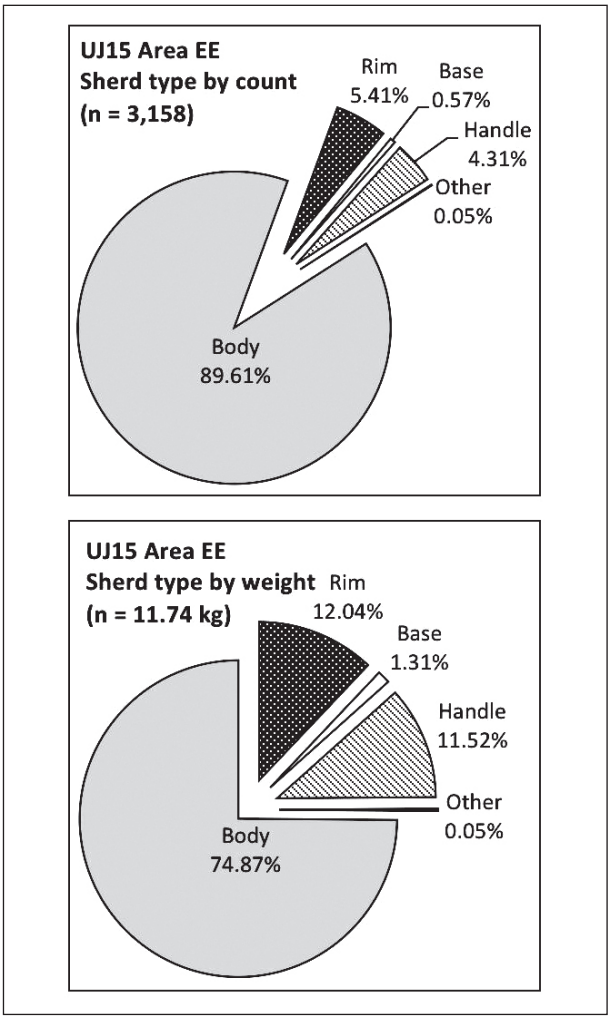
Information about sherd type (rim, base, handle *etc.*) was also included in the database, and the specific form (cooking pot, casserole *etc*.) was recorded when known. By a large margin, the majority of sherds by count and weight were body fragments (**Fig. 17**). Thus, it was not always possible to distinguish between, for example, thinner-walled table and cooking wares in the absence of usewear evidence. The small size of the average sherd further compounded identification; as shown in **Fig. 16**, the average sherd weight for the corpus is less than four grams. Furthermore, of the rims and bases, less than 1% (20 sherds) could be assigned a diameter.

Of the trenches, EE.3 yielded the most pottery by a large margin (**Fig. 18**). However, many of these sherds were in very poor condition, particularly those within the packed sub-surfaces [L:005, 008] and in the ashy layer above bedrock [L:009].

With so many undistinguishable body sherds, owing to size and/or wear, it was not possible to quantify the corpus by specific forms, particularly in terms of the common terracotta wares. Thus, the pottery has been divided into five broader formal groups (**Fig. 19**): (1) cooking, table and thin-walled storage wares; (2) thick-walled storage wares (*e.g.* dolia and basins); (3a) amphorae and (3b) bag-shaped jars; (4) finewares; (5) lamps and lanterns.

Period	Sherds	Weight (g)	% Sherds	% Weight	AVG sherd weight (g)
NAB/R–EIS	3157	11711.75	99.97%	99.76%	3.71
MIS/LIS	1	28	0.03%	0.24%	28
TOTAL	**3158**	**11739.75**	**100%**	**100%**	**3.72**

16. Area EE ceramic periodization.



17. Area EE sherd types by count and weight.

Pottery Production and Trade

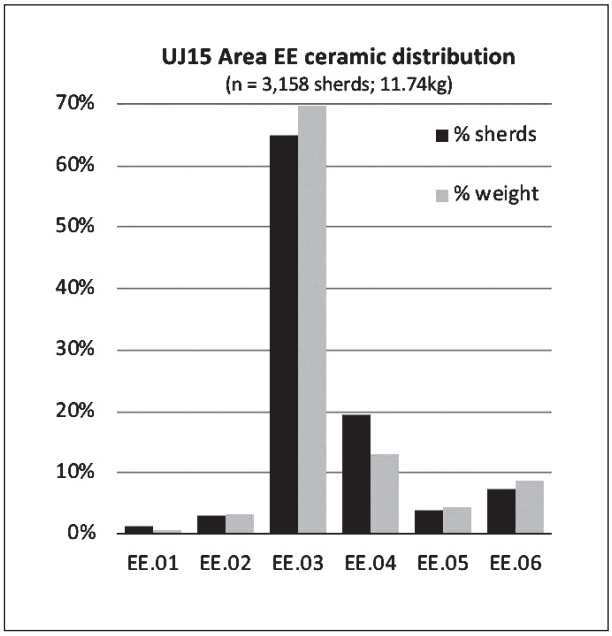
With no evidence of local pottery production at Umm al-Jimāl or at other settlements in northeastern Jordan (particularly for the Nabataean/Roman to Early Islamic period), everyday pottery was imported from production centers in other regions of Jordan, Syria and Palestine, and of course amphorae and finewares could come from more distant production sites.

In terms of a general quantification of pottery import, the corpus can be broken down into three categories: (1) local, in which the ceramics are made from basaltic clay [This group is distinguished from pottery which contains the occasional secondary basalt fragments that are sometimes found, for example, in wadi sand]; (2) regional, where the clay is non-basaltic and the pottery was imported from up to *ca* 150km away, though generally within about 60-100km; (3) supra-regional, which includes all wares imported from distances over 150km. Despite its location on the basaltic plateau, the majority of Umm al-Jimāl's pottery, when considering all periods, is overwhelmingly regional in origin (**Fig. 20**).

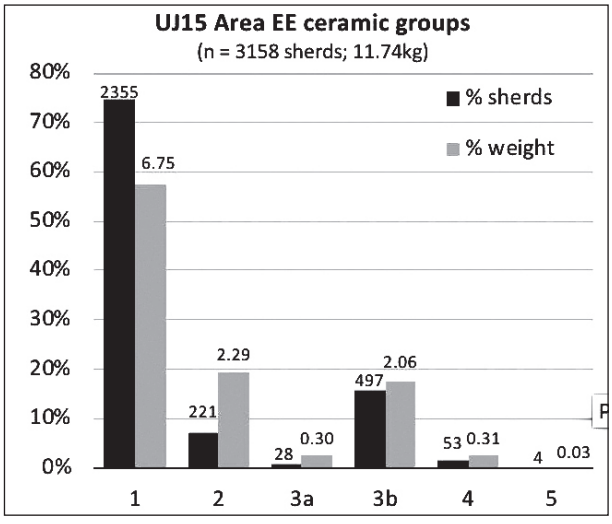
This methodology can also be applied, for example, to each of the pottery groups in **Fig. 19** (broken down into wares and/or smaller periods when possible), or can be used to compare the Nabataean/Roman to Early Islamic and Middle/Late Islamic corpora. [The sole MIS/LIS sherd from Area EE is local in origin. When comparing the two periods in House XVII-XVIII, where more MIS/LIS pottery was available for study, the local pottery dominates the MIS/LIS period by a large margin in count and weight. It was produced in a number of fabrics, and both hand-/mold-made and wheel-made vessels were present (Osinga 2017)].

Pottery Wares

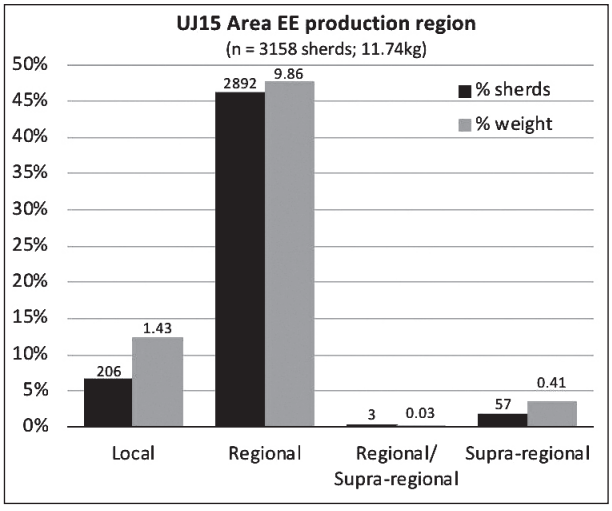
In addition to the well-published finewares and transport vessels, there are several other wares illustrated in the pottery plates that require brief explanation. These are presented here in simplified form, often amalgamated into one ware/fabric for the purpose of this publication. More detailed ware information, including petrological analysis, is available in a recent thesis (Osinga 2017) and article (Osinga, 2020).



18. Distribution of pottery per trench.



19. Distribution of pottery per formal group.



20. Umm al-Jimāl's pottery provenance.

Hauran Ware

[Published parallels come from Si‘: Groupe A (Villeneuve *et al.* 1981: 47-9), Catégorie A (Barret *et al.* 1985b: 224-6), Pâte A (Orssaud *et al.* 2003); Bostra: Pâte 1 (Joly and Blanc 1995: 112); southern Syria: Pâte basaltique claire (Renel 2010: 524); Umm al-Quttayn and environs: Hauran Ware (Kennedy *et al.* 1995: 63)].

This pottery is made of basaltic clay and is commonly reddish, brownish or purplish in color. It is nearly always oxidized, though dark cores are not uncommon. The generally well-sorted fabric ranges from very well-levigated and fine to medium-coarse, depending on the size of the basalt. The grey or black rock fragments are often visible by eye or with a hand lens. In rare cases, there are inclusions of rounded (probably ferrous) red/dark nodules, including probable magnetite. Most sherds are self-slipped.

Several types of decoration occur: most common is line burnishing on the inside of bowls or the outside of jars/jugs, but finger-pinched decoration also appears frequently, particularly along or under the rim of jars and bowls.

One production site, identified by kiln furniture and soil studies, was at Si‘ in southern Syria (Barret *et al.* 1985a: 225; Renel 2010: 524). The ware dates from the Nabataean/Roman to Early Byzantine period at Umm al-Jimāl (*ca* 1st-5th century). Current evidence suggests that it probably declined during or slightly before the Early Byzantine period (Osinga 2020).

Jarash Terracotta

[Principal published parallels are from Jarash: Type C (Clark and Falkner 1986: 251),Type δ (Uscatescu 1996: 46), Reddish/Red brown ware (Lichtenberger *et al.* 2015: 15); Pella: Ware C (Watson 1992: 236-7), Ware 11 and 11A (Walmsley 1995: 661, 664)].

In Jordan, Gerasa/Jarash was the closest urban center and known pottery production site to Umm al-Jimāl at around 60km away via known routes - about the same distance to Sī‘. The presence of pottery from Jarash at sites in the basaltic plateau was first noted by R. Falkner during the Southern Hauran Survey (Kennedy *et al.* 1995: 63, “Metallic Ware” and “Jarash White-on-Red ware”).

This slipped pottery ranges a great deal in color, from red to brown, grey or sometimes orangey hues, depending it seems primarily on firing. Table and cooking wares were typically oxidized, except in the Early Islamic period, where reduced cooking wares become common. The clay is quite distinct in that it is usually well levigated and contains few visible elements, typically only bits of limestone, quartz and sometimes small, rounded clay nodules (most <0.5mm in size). Larger limestone fragments can spall on the exterior surface. Particularly in the Early Islamic period, quartz grains are larger and more abundant and can be easily seen macroscopically. Petrologically, no additional elements were observed in our samples; however, recent analysis of the clay and its components identified feldspar inclusions in a minority of examples (Merkel 2019).

Coarse Reduced Storage Ware

[Selected published parallels come from Jarash: Type ζ (Uscatescu 1996: 46), Grey ware (Lichtenberger *et al.* 2015: 15); Pella: Ware D (Watson 1992: 237); Bostra: Pâte 5, 1-2 (Joly and Blanc 1995: 112)].

These reduction-fired large bowls/basins and dolia were produced at Jarash using the same base clay as described above. [The addition of a grog fragment was found during petrological examination of one of the basins]. The bodies of the vessels were usually coil-made, and the rims were added on the wheel. At Umm al-Jimāl, only one dolia rim and one certain dolia body sherd have been found since 2012, and thus it appears that the open forms were considerably more common at the site.

Pellet Ware

This is a medium-fine to coarse ware that ranges broadly in terms of inclusion size (<0.05-2mm) and sorting (poorly to moderately well). The fabric is striking to the eye due to the common and generally rounded or subrounded clay pellets, either dark or reddish in color. The other primary inclusion is limestone, which can be 1mm or larger. The vessels can be oxidized or reduced, with the latter being more common; in addition, darkened cores and/or interior margins on oxidized sherds are typical. The ware is slipped, typically rather thickly, and the color tends to be pinkish, grey, or brown.

The most common form in this ware is the bag-shaped jar, usually Roman to Early Byzantine in date. Rare cooking and tableware fragments have been found, along with a larger number of thick, coil-made body sherds and a few dolia rims. There is no exact published parallel for this ware, but it is probably a northern Palestinian import. [The forms are consistent with the general corpus of Palestinian-produced bag-shaped jars, and the microscopic composition of the fabric has affinities with that of a Roman fabric from the Galilee, to which nodules of terra rossa soil were added to calcareous clay (Wieder and Adan-Bayewitz 2002: 404-6, Fig. 10)].

Miscellaneous Terracotta

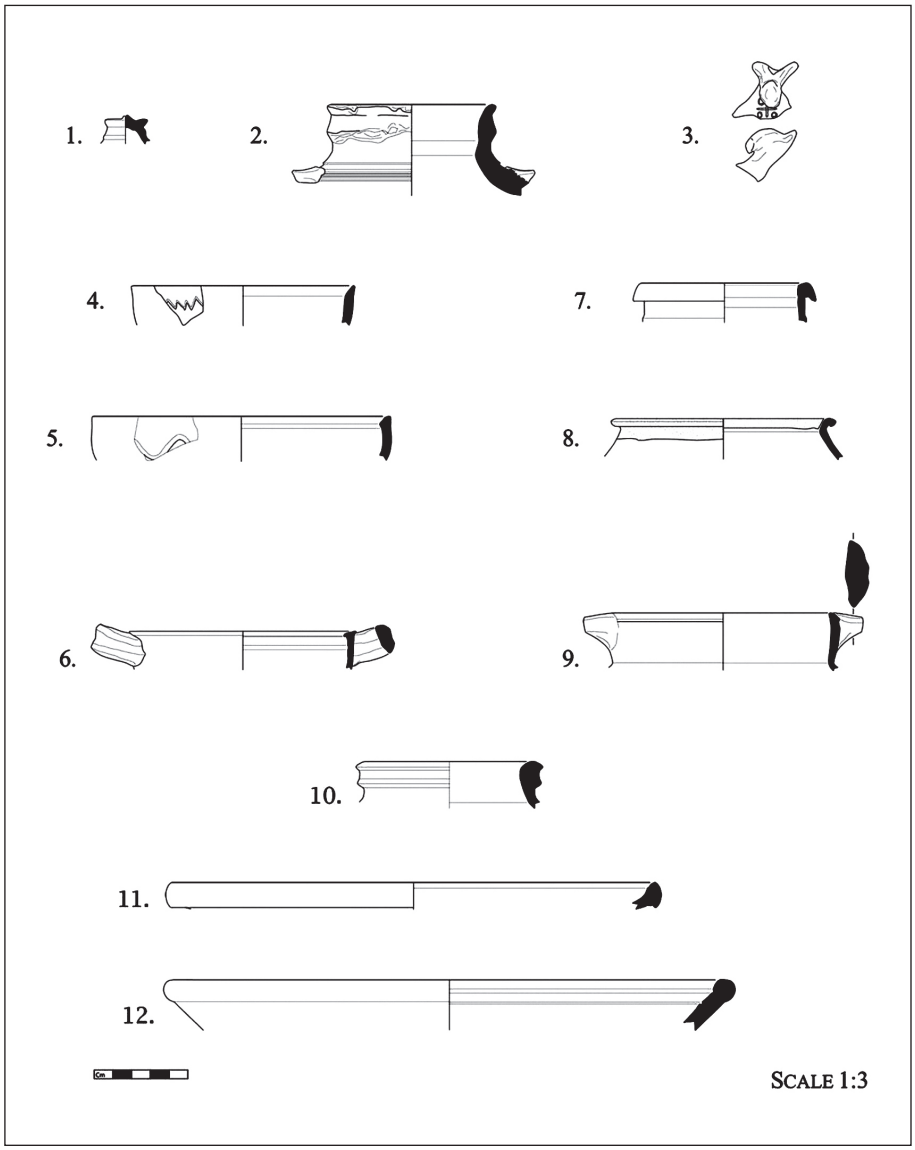
This is a catch-all category for cooking, table and thin-walled storage wares that are not consistent with fabrics from Jarash. The fabrics of this ware are generally, but not always coarser. The typical elements seen microscopically, apart from limestone and quartz, are rock fragments, such as siltstone and sandstone, and in rare cases shell.

*Pottery Drawings (***Figs. 21-23***;* **Tables 1-3***)*

A guide to the pottery tables is available in Appendix B.

Interpretation of the West Gate Area Excavations

The construction date of the Commodus Gate in the late 2nd century was confirmed by the excavations. This gate survived the wider destruction at Roman Umm al-Jimāl in the late 3rd century (at the time of the wars of Zenobia,

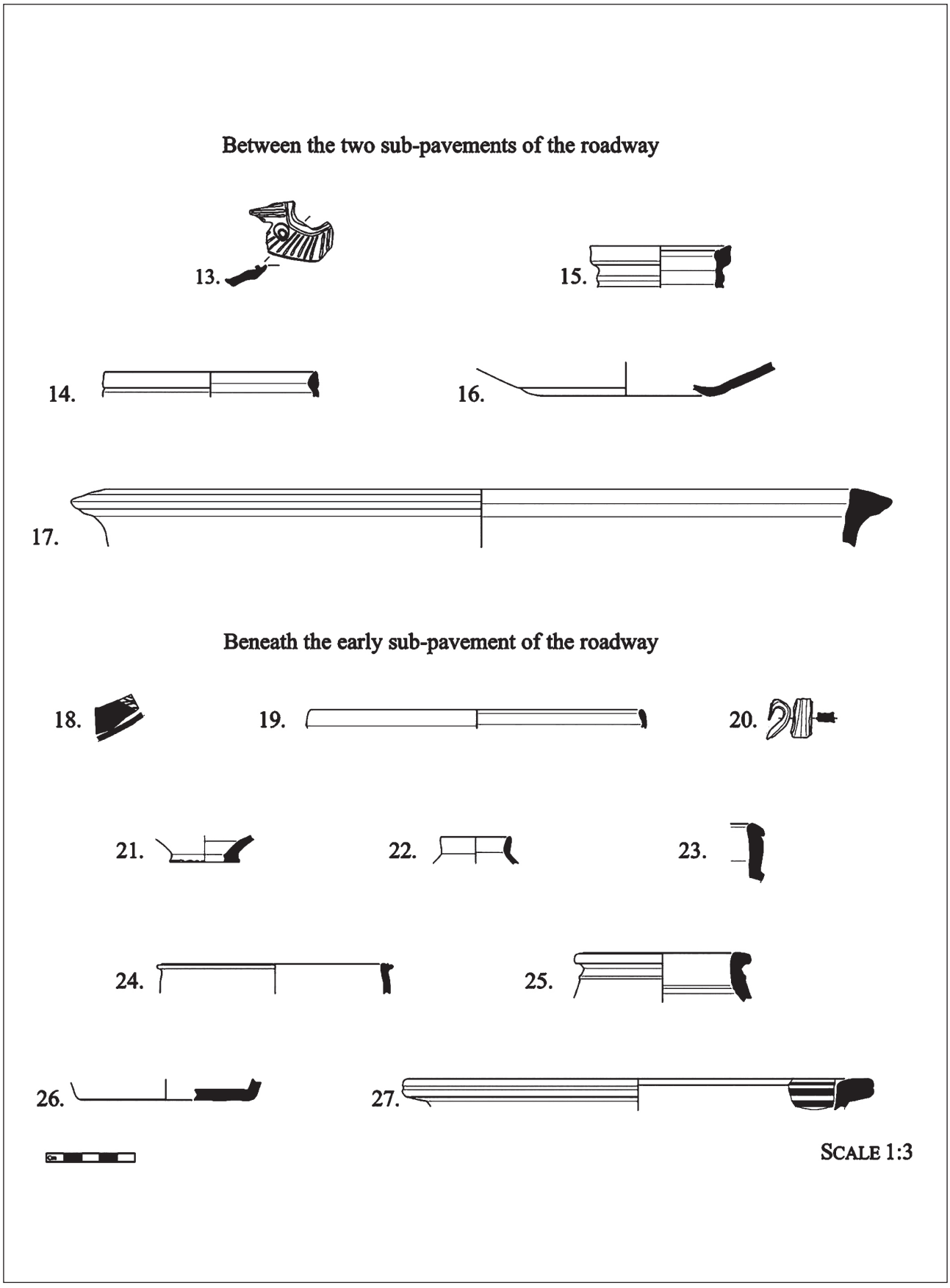


21. Ceramics from the topsoil.

Table 1: Description of ceramics in **Fig. 21**.

No.	Context	Form	Ware	Munsell	Date	Selected parallels
1	EE.2:001.9.1	Lid knob	Jerash tc.	*Ext S*: 2.5YR 6/6 *Int*: 10YR 6/2 *Fab*: 2.5YR 5/4	LBYZ (or later)	**Jerash** (Uscatescu 1996: Fig. 76, nos. 408, 410).
2	EE.2:001.9.2	BSJ	LRA 5	*Ext S*: 10YR 8/3 *Int, Fab*: 7.5YR 7/4	c. 7th–8th cen.	**Piéri Type 4C** (Piéri 2005: Fig. 79); **Pella** (Watson 1992: Fig. 10, no. 83).
3	EE.3:002.4.3	Lamp	Jerash lamp	*Ext/int S:* 5YR 7/4 *Fab*: 7.5YR 5/3	LBYZ–UM	Selected parallels: **Jerash** (Scholl 1986: Fig, 1, no. 4; Kehrberg 1989: Fig. 5, nos. 25–6); **Bostra** (Guidoni 1990: nos. 23–4); **Pella** (da Costa 2010: Fig. 25); **Umm el-Jimal** (Lapp 1995: Figs. 1–2).
4	EE.3:002.4.2	Cup/ bowl	Jerash tc.	*Ext S*: 10R 5/6 *Int S?*: 2.5YR 6/6 *Fab*: 10R 6/6	LBYZ–EUM	**Jerash** (Uscatescu 1996: Fig. 68, no. 338; Fig. 100, no. 687). Form, not fabric, as FBW 1A (below).
5	EE.3:002.4.4	Bowl	FBW	*Ext S/B*: 10YR 5/1, 5/2 *Int S*: 10YR 5/1 *Fab*: 5YR 4/1		**Jerusalem** FBW Form 1A (Magness 1993: 193–4).
6	EE.4:008.10.3	CASS	Misc. tc.	*Ext S*: 5YR 6/3 *Int S*: 5YR 6/6 *Fab*: 5YR 6/4, 6/6	R/BYZ	A long-lived form with numerous variants (discussed by Parker 2006).
7	EE.4:008.10.4	BSJ	Jerash tc.	*Ext, Int*: 2.5Y 5/1 *Fab*: GLEY N5	LBYZ	Probably a variant of **Jerash** (Uscatescu 1996: Fig. 94, no. 612). Several examples were found in House XVII-XVIII, and one at the "Barracks" (Parker 1998: Fig. 16)
8	EE.4:006.7.3	Jar	Jerash tc.	*Burned and worn* *Ext S*: 10YR 5/1 *P*: 5Y 8/2 *Fab*: 5YR 6/6, 7.5YR 6/1		**Jerash** (Uscatescu 1996: Fig. 84, no. 522).
9	EE.4:008.10.2	CP	Misc. tc.	*Ext S*: 5YR 6/6 *Int*: 5YR 7/6 *Fab*: 5YR 5,6/6	EBYZ–early LBYZ	**Jerash** (Falkner 1985: no. 355).
10	EE3:010.21.4	Jar	Hauran ware	*Ext S*: 2.5YR 4/1,2; 5/2 *Int*: 2.5YR 4,5/2 *Fab*: 2.5YR 4/4	NAB/R/ EBYZ	**Sī'** (Orssaud and Blanc 2003: Pl. 147, no. 20).
11	EE:001.5.3	Bowl	Jerash bowl	*Ext S*: 2.5YR 6/4 *Int S*: 2.5YR 6/4, 6 *Fab*: 2.5YR 6/6	LBYZ	**Jerash** (Watson 1989: Form 7b; Uscatescu 1993: Form 11B).
12	EE6:001.5.2	Bowl	ARS	*Ext S*: 2.5YR 5/6, 8 *Int S*: 2.5YR 5/8 *Fab*: 2.5YR 5/6	mid-6th to mid-/late 7th cen.	**Form 104C** (Hayes 1972: Fig. 30, no. 23; Reynolds et al. 2011).

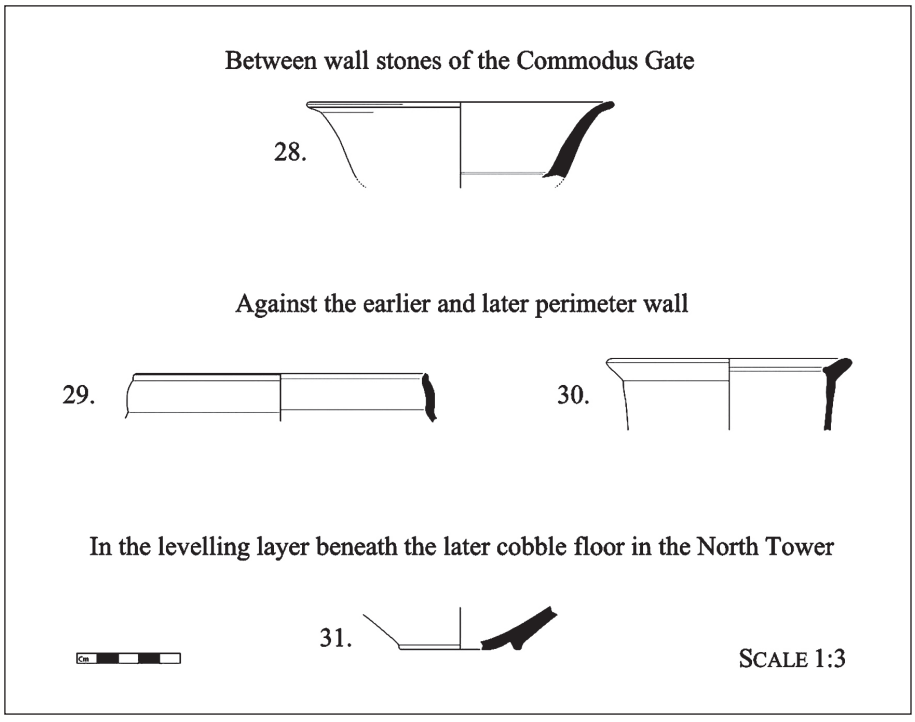
Ghadima and Aurelian), which is hinted at by the deep ashy layer of EE.3. During the Tetrarchic recovery, the road leading from the gate toward the Via Nova was reconstructed as part of the Roman defensive buildup, which also included the construction of a fort: the Roman castellum on the east side of Umm al-Jimāl. After the degeneration of the Roman military frontier in the 4th century, the roadway was resurfaced and paved again in the Late Byzantine or Early Umayyad period (*ca* late 6th-7th century). Perhaps also at this time, the North Tower of the Commodus Gate was repaved with cobble stones. This may represent a general remodeling of the site in the Late Byzantine/Umayyad period, also evident in the Praetorium and House XVII-XVIII Complex.



22. Ceramics from the roadway.

Table 2: Description of ceramics in **Fig. 22**.

No.	Context	Form	Ware	Munsell	Date	Selected parallels
13	EE.3:007.16.4	Lamp	Jerash lamp	*Ext/int S*: 5YR 6/4 *Fab*: 5YR 5/4	LBYZ–EUM	Nozzle end, perhaps with half-volutes, e.g. **Jerash** (Kehrberg 1989: Fig. 5, no. 25).
14	EE.3:007.14.1	CP/jar	Jerash tc.	*Ext/int S*: Burning, 5YR 5/3 *Fab*: 5YR 5/4	LBYZ	**Jerash** (Uscatescu 1996: Fig. 86, no. 540–41).
15	EE.3:007.16.2	BSJ	Jerash tc.	*Discoloured* *Ex, int S?*: 10YR 5/1, 6/2 *Fab*: 10YR 5/1		**Jerash** (Uscatescu 1996: Fig. 94, no. 609).
16	EE.3:007.14.6	BSJ	Jerash tc.	*Ext*: 10YR 5/1, 6/2 *Int*: 7.5YR 5/3, 5/4 *Fab*: GLEY N4		An omphalos base is typical of these bag-shaped jars, e.g. **Jerash** (Uscatescu 1996: Figs. 93–94, nos. 594, 598, 599, 600, 618).
17	EE.3:007.16.5	Basin	Coarse redu st. ware	*Ext, int*: 10YR 5/1 *Fab*: 10YR 5/1, 5/2		**Jerash** (Uscatescu 1996: Fig. 87, no. 557).
18	EE.3:009.18.12	Bowl	NPFW	*Ext*: 10R 5/4 *Int S, Fab*: 2.5YR 6/6 *P:* 10R 5/3	NAB (c. AD 70/80–100)	**NPFW Phase 3b** (Schmid 2000: Abb. 91, Farbtafels 3–4, nos. 7–11)
19	EE.3:009.18.4	Bowl	NP?FW	*Burned through, post-deposit*		Probably also **N(P)FW Phase 3b** (e.g. Schmid 2000: Abb. 91, no. 89).
20	EE.3:009.18.8	Cup	ESA	*Ext S*: 10R 4/8 *Fab*: 7.5YR 7/4	NAB/R (early 2nd cen.)	**Form 61** (Hayes 1985: Pl. VII, no. 15).
21	EE.3:009.19.4	Bottle?	Misc. tc.	*Ext S, Fab*: *Burned* *Int*: 5YR 5/4	NAB/R	String-cut base, e.g. **Lejjûn** (Parker 2006: Figs. 51, 144). Possibly the same vessel as no. 22.
22	EE.3:009.19.12	Bottle?	Misc. tc.	*Ext S*: 2.5YR 6/4 *Int S?*: 5YR 6/4 *Fab*: 7.5YR 5/4		No certain parallels. Possibly the same vessel as no. 21.
23	EE.3:009.18.6	BSJ	Misc. BSJs	*Ext/int:* 7.5YR 8/2 *Fab margins*: 10YR 7/2; *core* 5YR 7/4	LR	**Capernaum** (Loffreda 2008: DG75, no. 17; DG 79, nos. 34, 48); similar to: **Jerash** (Falkner 1985: Fig. 31, no. 253) and **Bostra** (Wilson and Sa'd 1984: Fig. 162).
24	EE.3:009.18.16	CP	Hauran ware	*Ext S*: 2.5YR 5/4 *Int*: 10R 5/4 *Fab*: 2.5R 5/6	NAB/R	**Sī'** (Orssaud and Blanc 2003: Pl. 151, nos. 52–63); form, not fabric, as **Kefar Hananya** (Adan-Bayewitz 1993: Pl./Form 4B).
25	EE.3:009.18.11	Jar	Hauran ware	*Ext/int S*: 2.5YR 5/6 *Fab*: 2.5R 4/6		**Sī'** (Orssaud and Blanc 2003: Pl. 147, nos. 30–31).
26	EE.3:009.19.7	Dish?	Hauran ware	*Ext/int S*: 2.5YR 5/3 *Fab margins:* 2.5YR 5/4; *core* 5YR 4/2		Similar to **Sī'** (Orssaud and Blanc 2003: Pl. 129, no. 26).
27	EE.3:009.19.11	Bowl	Hauran ware	*Ext/int S*: 2.5YR 5/4 *B:* 2.5YR 4/4 *Fab*: 2.5R 5/6		**Sī'** (Orssaud and Blanc 2003: Pl. 139, nos. 55–57).



23. Ceramics from foundation contexts.

Table 3: Description of ceramics in **Fig. 23**.

No.	Context	Form	Ware	Munsell	Date	Selected parallels
28	CG WALL.1	Bowl	ESA	*Int/ext S*: 2.5YR 4/8, 6/8 *Fab*: 10YR 8/3	LR (2nd cen.)	**Form 58** (Hayes 2008: Fig. 7, no. 165).
29	EE.5:005.9.3	CP	Jerash tc.	*Ext S*: 7.5YR 6/4, 7/4 *Int*: 7.5YR 7/4 *Fab*: 5YR 7/4	LR	**Jerash** (Falkner 1985: nos. 336, 338). This form is part of the broader tradition of LR grooved rim cooking pots (summarised by Parker 2006: 335–6).
30	EE.5:004.5.1	BSJ	Pellet ware	*Ext/int S*: 10YR 7/3 *Fab margins:* 7.5YR 5/2; *core:* 7.5YR 5/1	LR/ EBYZ	**Lejjûn** (Parker 2006: Fig. 34); similar to **Capernaum** (Loffreda 2008: DG77, no. 3).
31	EE.2:006.14.1	Bowl	Hauran ware	*Discoloured* *Ext/int S*: 2.5YR 5/3 *Fab*: 2.5YR 4/3	NAB/R	Similar to **Sī'** (Orssaud and Blanc 2003: particularly Pl. 131, no. 45).

Appendix A: Project Staff (Fig. 24)

Senior staff

Bert de Vries	Calvin College	director; architect
Sally de Vries	Calvin College	administrator
Paul Christians	Open Hand Studios	visual documentation
Jeff DeKock	Open Hand Studios	visual documentation
Muaffaq Hazza	Al al-Beit Univ.	field director
Mohammad Bashtawi Yarmouk Univ.	field superviser	
Elizabeth Osinga	U of Southampton	stratigrapher; ceramics
Jobadiah Christiansen	Kent State Univ.	objects; samples



24. Team Photo, 17 June 2015. By Jeff DeKock.

Lauren Coughlin	American U at Rome	community education
Representative	Dept. of Antiquities	

Field School Students

Bryan Burke	Calvin College	excavator
Ruth Cahill	Calvin College	architect
Rebecca Lawson	Calvin College	excavator
Brianne Lynn	Calvin College	excavator
Elijah Morton	Calvin College	expediter
Jessica Petrie	Calvin College	excavator

Local Staff

Ali Aqil	foreman
Ahmed Hussein Fakhri	site management trainee
Ahmed Hassan Eid (Abu Leith)	site management trainee
Ahmad Hassan es-Serour	site management trainee
Mohammad Hazza' Suwan	excavation trainee
Abdullah Suleyman Ighveli	site management trainee
Awda Halal Hassan al-Masa'eid	mason
Awda Mifleh Awda al-Ghveir	site management trainee
Abdu er-Razak Faris al-Masa'eid	site management trainee
Abd ar-Rahman Hasan Za'al	excavation trainee
Awad Hussein Matar al-hadeib	site management trainee
Bashar abd al-Majeed es-Salihi	site management trainee
Hamadeh Falah Mashwah	site management trainee
Majid Atica Fa'our	site management trainee
Fa'iz es-Senayan Awad	mason
Omar Ghazi Ariyan (Abu Lehyeh)	site management trainee
Mum'a Shatiy Jow'an	guard
Sened Ahmed Saalim ar-Rhaide	guard
Ahlam Kurdi	excavation trainee
Noor Ali	digital communication trainee

Appendix B
Context = Trench:Locus.Pail#.Sherd#.
Form abbreviations:
BSJ = Bag-shaped jar
CASS = Casserole
CP = Cooking pot

Ware abbreviations:
ARS = African red slip
ESA = Eastern Sigillata A
FBW = 'Fine Byzantine Ware'
LRA = Late Roman Amphora
NPFW - Nabataean Painted Fineware
tc. = terracotta

Munsell abbreviations:
S = Slip
P = Paint
B = Burnishing

Dating based on Parker's (2006) and Uscatescu's (2003) periodization, tailored to Umm al-Jimāl's known settlement history (**Table 4**). All dates AD.

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Table 4: Pottery periodization at Umm al-Jimāl.

Abb.	Period name	Date range
R	*Roman*	*c. mid-1st cen.–324*
ER	Early Roman	c. mid-1st cen.–135
NAB	Nabataean	c. mid-1st cen.–106
LR	Late Roman	135–324
BYZ	*Byzantine*	*324–640*
EBYZ	Early Byzantine	324–491
LBYZ	Late Byzantine	491–640
TRANS	Transitional	640–661
EIS	*Early Islamic*	*661–c. 800*
EUM	Early Umayyad	661–700
LUM	Late Umayyad	700–750
EAB	Early 'Abbasid	750–c. 800

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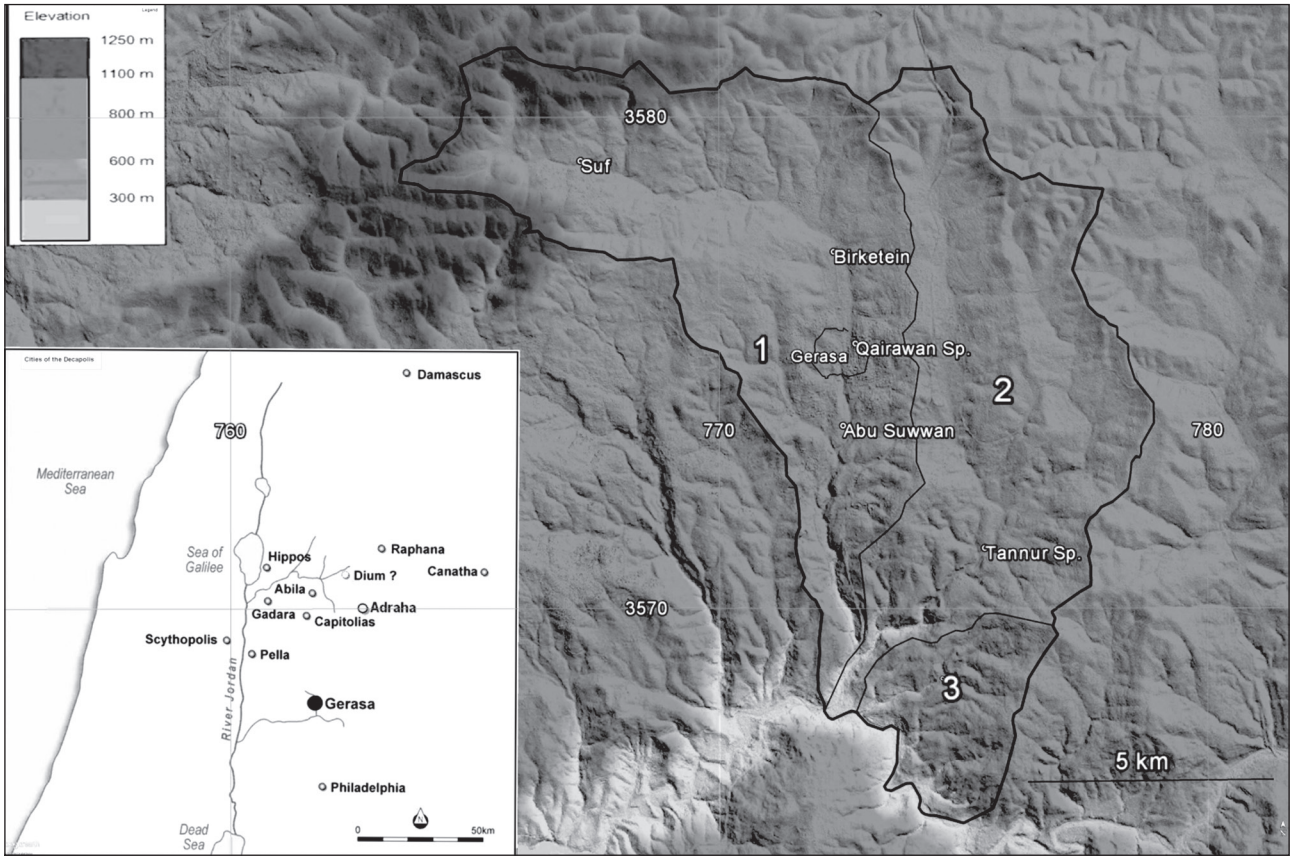
THE JARASH WATER PROJECT 2016 REPORT ON THE FOURTH FIELD SEASON

David D. Boyer

Introduction

The Jarash Water Project (JWP) is investigating the water-management system to Gerasa and its hinterland in the Hellenistic to Byzantine period (2nd century BC - mid 7th century AD). The 100 km^2 project area comprises the Jarash valley[1] and the neighbouring Majarr-Tannūr valley[2] (**Fig. 1**). The JWP study seeks answers to several fundamental research questions, including the sources of water supply for the city and its hinterland, the nature of the water distribution network and the period of its use. This report covers fieldwork conducted in the fourth and final field season between 8th May 2016 and 19th May 2016.

Previous field seasons were conducted in 2013, 2014 and 2015 (respectively Boyer 2017; 2018a; 2018b. Surface surveys identified



1. Study area and catchment boundaries on 5m digital surface model obtained from AW3D satellite: (1) Jarash valley; (2) Majarr-Tannūr valley; (3) South-eastern wadis. (©NTT Data, RESTEC/Image ©2016 CNES/Astrium).

1. From north to south, the Jarash valley comprises Wādī Sūf, Wādī ad-Dayr and Wādī Jarash.

2. This valley comprises Wādī al-Majarr and Wādī at-Tannūr (also known as Wādī ar-Riyāshī).

aqueduct and storage components of an extensive water-management system in the Jarash and lower Majarr-Tannūr valleys, primarily sourced from strong springs (Boyer 2016a; 2016b). The ancient water-distribution system to both rural and urban consumers generally comprised open canals cut directly into outcropping bedrock. However, the survey also recorded masonry canals and relatively short sections of aqueducts carried in tunnels. The limited application of archaeological excavation during the study has meant that the dating of water-related installations has relied on obtaining radiocarbon dates (C_{14}) from charcoal-bearing plaster or mortar lining these installations (Boyer in prepare). Few installations identified in the study have suitable charcoal-bearing plaster, the north-west aqueduct being a notable exception.

Research on cave sites west of the Jordan Valley (Bar-Mathews and Ayalon 2011; Vaks *et al.* 2010; Verheyden *et al.* 2008) has shown that speleothems can be important palaeoclimate proxy archives. To date, there is no published research on speleothems from the Ajlun Highlands, and JWP has initiated palaeoclimate studies on speleothem and tufa samples collected from sites in the Jarash valley in an attempt to fill this knowledge gap. Studies in Turkey and western Europe have found that carbonate sediment (sinter) commonly found lining Roman aqueducts can also be a useful palaeoclimate proxy archive (for example Passchier *et al.* 2016; Sürmelihindi *et al.* 2013), and in this context a separate palaeoclimate study is investigating the carbonate sinter from Gerasa's north-west aqueduct.

The 2016 field program included pedestrian surveys of selected areas to complete the identification of the visible hydraulic installations in key areas. Total-station surveying recorded additional site data at nine important locations in the Jarash valley with the assistance of Department of Antiquities (DoA) staff. The 2016 surface survey recorded twelve new archaeological sites (JWP181-192), bringing the total number of archaeological sites recorded in the four field seasons to 92, and revisited four previously recorded sites (JWP111, 125, 135 and 164). The surface survey focused on sites within the Jarash valley, with only two new sites recorded in the Majarr-Tannūr valley. While the surface survey successfully identified many new archaeological elements, housing and farm development activities limited visibility and access. These factors continue to be the major causes of the destruction of archaeological sites outside of the Jarash Archaeological Park.

The survey identified new aqueduct elements on the east side of Wādī ad-Dayr in the Birkatayn locality and several new spring sites, including a major relict spring site 150m north-west of Birkatayn reservoir that probably supplied the Birkatayn baths.

Contextual geoarchaeological observations made during the field survey contributed to the understanding of the area's landscape history and clarified the depositional extent of the (?) Pleistocene Jarash Conglomerate formation. Studies in the southern Jarash valley provided a relative dating sequence for the main fluvial events in this section of the *wadi*.

Objectives and Methodologies

The program built on the results of the three previous seasons with the aim of finalising the field component of the project. It had four main objectives:

1. To conduct a total-station survey of key archaeological sites identified in the study.
2. To carry out a purposive pedestrian field survey of selected areas identified from photographs and satellite imagery (ALOS World 3D and Pleiades) as being likely to yield information on the ancient water-management system and palaeolandscape.
3. To collect samples of mortar/plaster and carbonate sinter from key water installations for C_{14} dating and laboratory analysis.
4. To make geoarchaeological observations and collect geological materials for analysis.

As in previous seasons, the pedestrian survey focused on locating and recording archaeological sites related to water management. The procedure involved the recording of the archaeological elements at each site by means of a written description, physical measurements, colour digital photographs and sketches, with the location determined by hand-held GPS. The survey concentrated on discrete geographic sectors: in the city area, these included the eastern part of the walled city and on the hill slopes west of the Jarash Archaeological Park,

while in the rural hinterland they included the hills west of the city, the Jarash valley and in the Majarr-Tannūr valley.

The 2016 program included the total-station surveying of nine sites selected because of the uniqueness of their archaeological features and the perceived risk of damage or destruction from new building construction or agricultural activities.

Results

Site Types

The focus on water-related archaeology limits the number of recorded site types. **Table 1** lists the archaeological elements recorded at the various sites and **Fig. 2** shows site locations. **Fig. 3** shows aqueduct alignments referred to in the report.

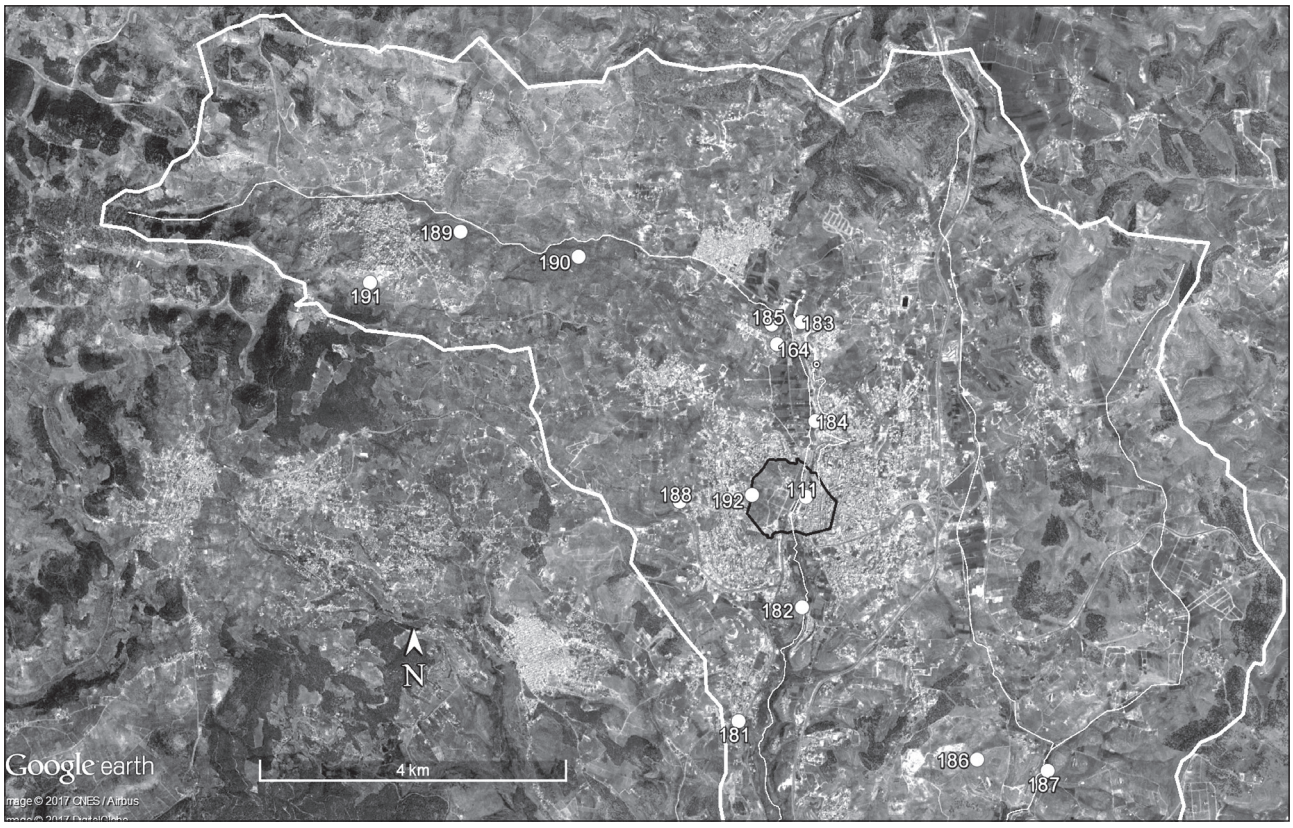
Aqueducts

Qayrawān Aqueduct

The only surviving above-ground section of the Roman aqueduct from Qayrawān spring (site JWP-111) was revisited, as a new stratigraphic profile had been temporarily revealed during new building construction adjacent to the substruction wall carrying Qayrawān aqueduct. Excavations associated with the new building had revealed that the full height of the substruction wall is *ca* 3.5m at this location. This wall is part of the same substruction wall previously recorded by Lepaon (2008: 65-67) in the excavation of the Small (Byzantine) East Baths (Lepaon 2008: 65-67) 10-15m to the south. No date for the Qayrawān aqueduct has been published, but it is likely to date to the same period as the monumental parapet wall at Qayrawān

Table 1: Archaeological site details - Jarash Water Project, 2016 Field Season.

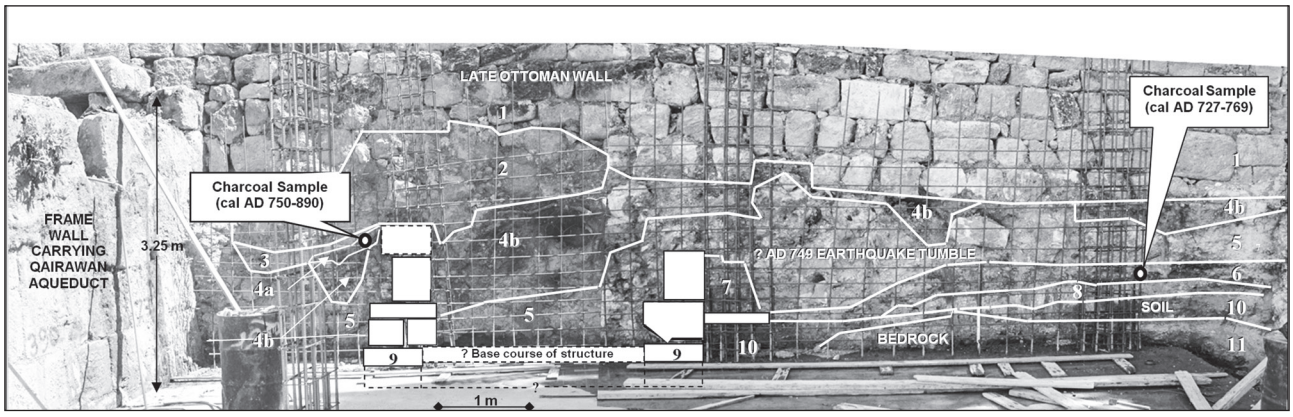
JWP_Site No.	Locus	lat (N)	long (E)	GPS Elev	Remarks
111	1	32.28055	35.89503	562	Masonry structure
125	1	32.30048	35.89516	642	Rock-cut canal
135	1	32.24370	35.92445	473	Water mill masonry canal(leat)
135	2	32.24383	35.92451	473	Masonry structure (foundations)
135	3	32.24383	35.92463	477	Masonry structure (foundations)
135	4	32.24355	35.92445	473	Masonry structure (?mill house foundations)
135	5	32.24350	35.92461	473	Masonry specus blocks
164	1	32.29841	35.89148	640	Rock-cut canal
164	1	32.29841	35.89148	640	Rock-cut canal
181	1	32.25473	35.88517	449	Spring
181	2	32.25450	35.88504	466	Spring
181	3	32.25419	35.88545	459	Spring
182	1	32.28055	35.89503	500	Rock-cut basin
183	1	32.30079	35.89502	646	Rock-cut canal
183	2	32.30091	35.89485	645	Rock-cut canal
183	3	32.30098	35.89481	644	Rock-cut canal
183	4	32.30119	35.89465	644	Rock-cut canal
184	1	32.28931	35.89655	589	Rock-cut canal
184	1	32.28931	35.89657	593	Rock-cut canal
185	1	32.30075	35.89080	649	Rural installation_olive/grape press
185	2	32.30075	35.89080	649	Spring/rock-cut waterfall
186	1	32.24947	35.91779	573	Rural installation_olive/grape press, rock-hole
187	1	32.24794	35.92759	507	Spring, basin
187	2	32.24794	35.92759	507	Rock-cut canal
188	1	32.28024	35.87761	596	Spring (kokosi)
188	2	32.28020	35.87774	603	Spring (kokosi)
188	3	32.28037	35.87841	596	Rural installation_olive/grape press
188	4	32.28037	35.87841	596	Rural installation_olive/grape press
189	1	32.31236	35.84802	848	?masonry canal
190	1	32.30913	35.86430	773	Rural installation_olive/grape press
191	1	32.30617	35.83532	1039	Spring
192	1	32.28088	35.88756	610	Masonry canal (Gerasa SW gate)



2. Location of sites recorded in 2016 (Satellite data: Google, DigiGlobe, CNES/Atrium and CNES Airbus).



3. Plan of aqueducts referred to in report (Satellite data: Google, DigiGlobe, CNES Airbus).



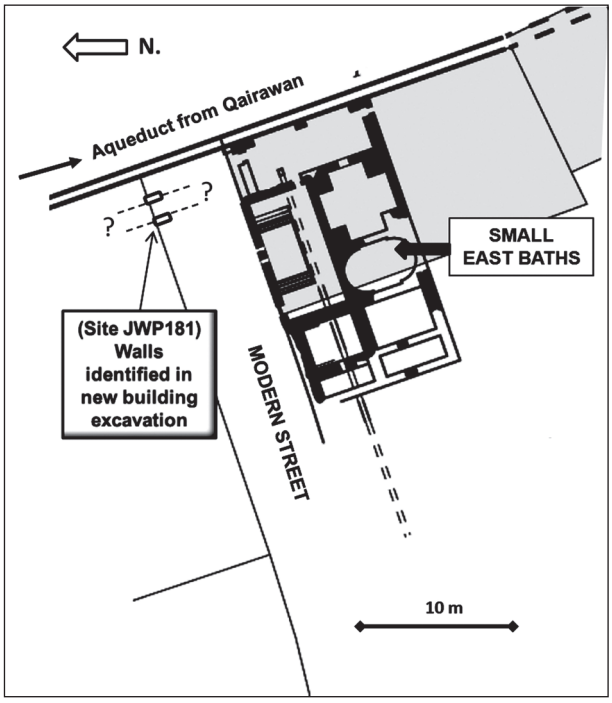
4. Site JWP111: Section showing masonry structure and stratigraphic contexts revealed in a modern building excavation adjacent to the Qayrawān aqueduct frame wall (looking south).

spring. The architecture of this parapet wall appears identical to the architecture of the parapet wall of the *nymphaeum* on the west side of the city, dated by inscription to the late second century AD (Welles 1938: 406, insc. 69).

The 10m long south wall of the building excavation revealed a *ca* 1.5m high, well-layered stratigraphic sequence below a stone wall of late Ottoman (Circassian) date. The section exposed two parallel walls of dressed masonry 1m high, part of a 3.65m wide structure aligned north-south (**Fig. 4**) lying on a (?) masonry floor. The building was probably constructed on Jarash Conglomerate bedrock, and this bedrock was exposed at the western end of the section. The coarse tumble layer in context 5 contains dressed building blocks and is underlain by context 6, which is rich in charcoal dated to cal AD 669-769 (95.4% probability) and overlain by a thick charcoal and ash layer (context 4). A C_{14} date of cal 710-890AD (95.4% probability) was obtained from charcoal in context 4a, making it likely that the coarse tumble layer (and possibly the overlying charcoal and ash layer) is related to the 749AD earthquake. The property owner reported that a watercourse (still carrying water) had been observed during building-site excavation prior to the laying of the concrete slab for the new building, but its function and destination are unknown. This watercourse ran roughly parallel with the Qayrawān aqueduct and passed under the masonry building. The masonry structure may form part of the Small East Baths, which lie *ca* 10m to the south of the stratigraphic section (**Fig. 5**). Lepaon (2012: 294) dated these baths to the mid-fourth century AD.

Site JWP164

The rock-cut aqueduct (SW02) at site JWP164, 150m south-west of Birkatayn, was revisited and excavated to expose the cross-sectional profile of the soil-filled canal. Excavation of the aqueduct at its northern end revealed two stages of canal construction. The first stage involved the cutting of a *specus* up to 0.85m wide and 0.40m deep into an exposed east-facing rock slope. The second stage involved the deepening of the western side of this *specus* to create a separate *specus ca* 0.10m deep, and the construction of a *ca* 5cm high wall of lime-rich mortar on the east side of this new *specus*. The

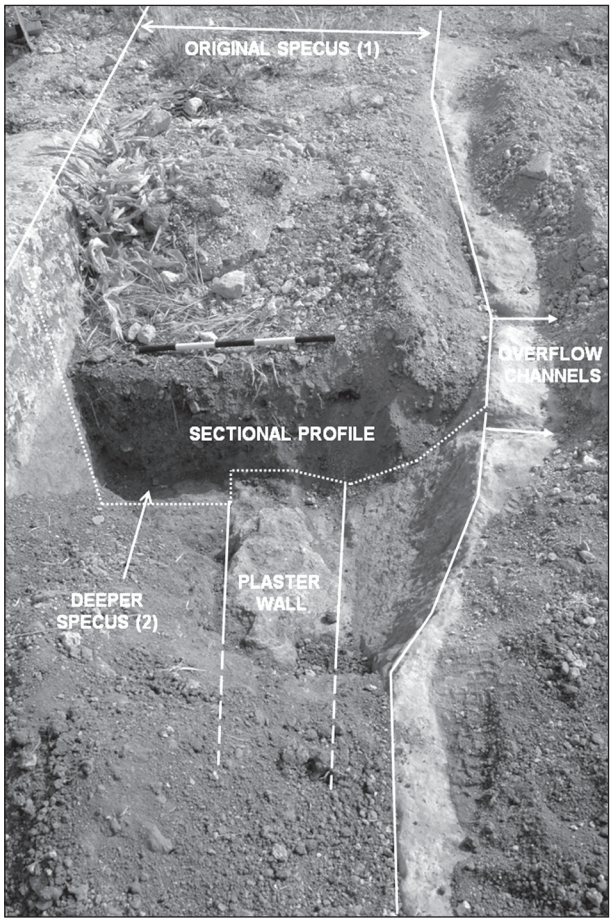


5. Site JWP111: Plan showing proximity of masonry structure to nearby Small East Baths (plan modified from Lepaon 2008: fig. 11).

maximum wettable sectional area of the deeper *specus* is around 30% of the equivalent area for the first, shallower *specus*. While this was presumably done to improve flow velocity in low-flow conditions, it is not clear if this was done to accommodate seasonal fluctuations in spring discharge or was a response to an overall reduction in spring discharge. Two small (overflow?) outlets have been cut into the eastern wall of the easternmost canal, at a point where the original *specus* had been widened (**Fig. 6**).

Aqueducts from (as-Sawdā') Spring

Two ancient canals were supplied from a spring (as-Sawdā') located 400m north-east of Birkatayn reservoir at site JWP183. The upper canal from this spring (SE06) was partly rock-cut and partly constructed on a raised bank at an elevation of *ca* 649m (**Fig. 7a**). Details preserved in several rock-cut sections show that this canal was constructed with a double *specus*, the floor of the western *specus* being 13cm lower in elevation (**Fig. 7b, c**). A similar double-*specus* profile was observed in the lower canal (SW05 - site JWP125), constructed at an elevation 7m below and 25m to the west of the upper canal, where the difference in elevation of the *specus* floors is also 13cm (**Fig. 7d, e**).

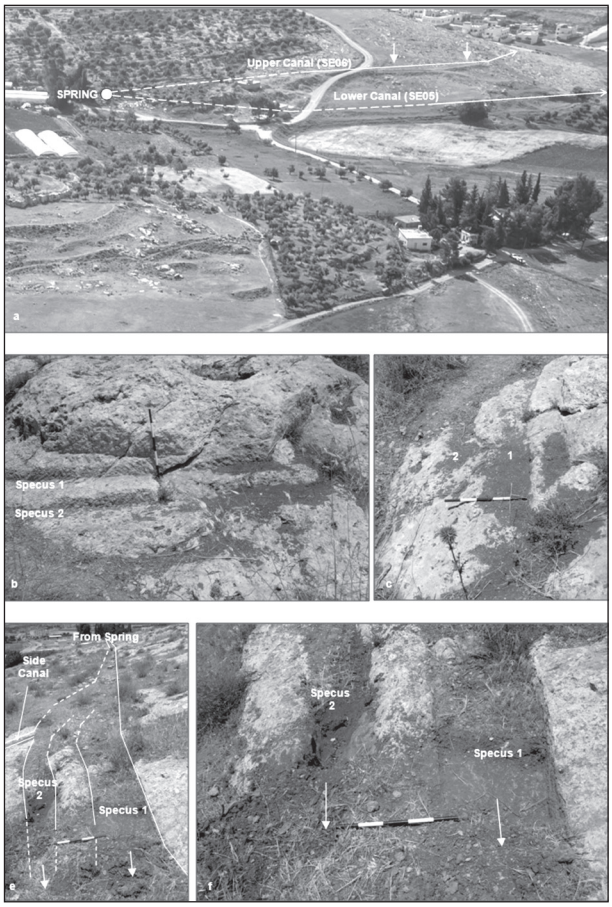


6. JWP164: View of the two specus, separated by a low plaster wall, and small overflow outlets (looking north; scale bar 0.5m).

Springs

Spring Cascades and Natural Fountains

Five new spring sites were recorded in 2016. In all cases, some or all of the observable spring outlets lay within or above a bedrock scarp, and water discharging from these outlets would have formed natural curtain cascades and fountains when the spring was active (**Fig. 8**). Rock-cut modifications to enhance or concentrate water flow were found at the majority of spring sites recorded in 2016 and are a common fea-



7. Rock-cut aqueducts supplied from as-Sawdā' spring: (a) Oblique aerial view (looking south-east) showing relict bank supporting upper canal SE06 (arrows) from spring (Photo courtesy of APAAME: APAAME_20130427_DDB-0558, Photographer, D. Boyer); (b) and (c) Site JWP183, showing the double specus on upper canal SE06; (d) and (e) Site JWP125 showing the double specus on lower canal SE05 (scale bar 0.5m).



8. Relict spring cascade at site JWP191 (looking north).



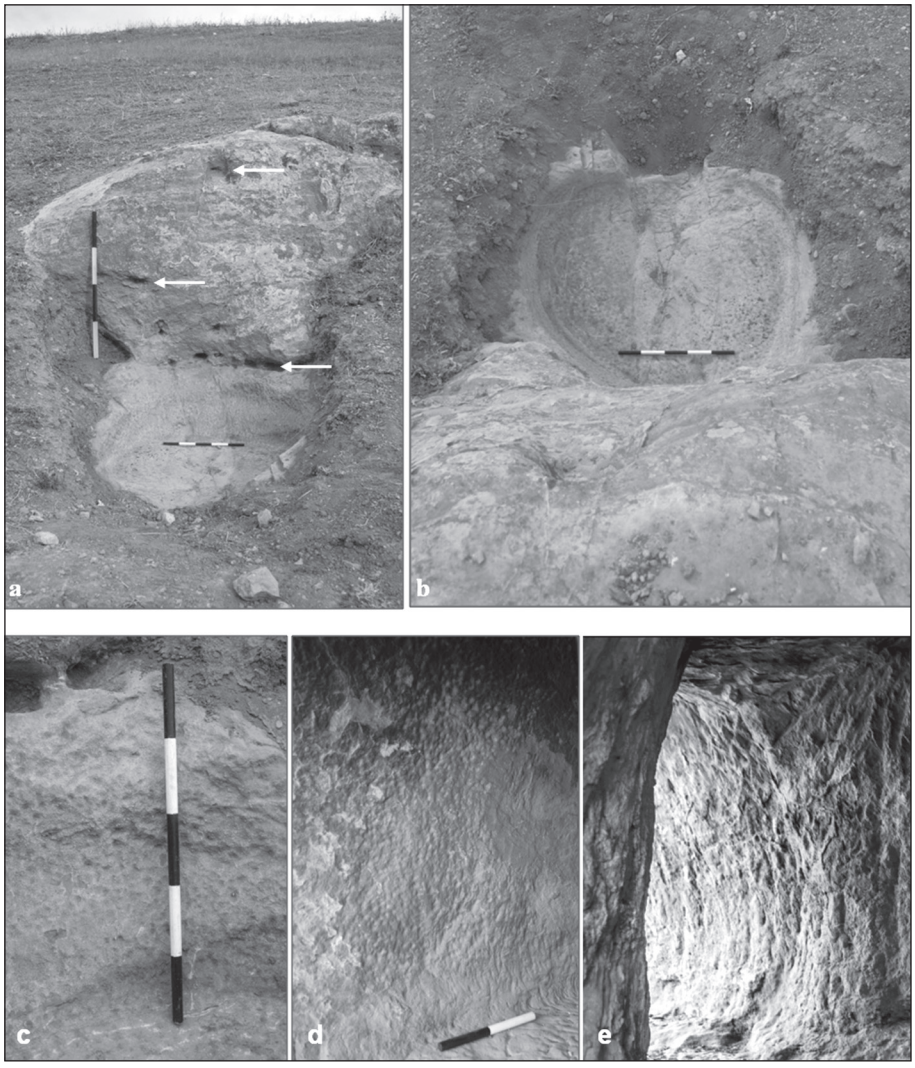
9. Site JWP185: View (looking west) of natural spring cascade with rock-cut channels (arrows) that directed spring-water flow over the 3m high scarp.

ture of spring sites in the Jarash valley. Modifications recorded in 2016 included the cutting of channels to concentrate the flow of water over the top of the cascade to form individual fountains or to direct water flow down the face of the scarp into small catchment basins (sites JWP181, 185, 187 and 191), and the cutting of catchment basins below natural fountain outlets (site JWP182). These modifications would have had the dual effect of dramatising the appearance of the site and making it easier for the water to be collected for domestic use. Modifications to re-direct flow are well preserved at the major relict spring recorded at site JWP185, located on a hill slope 250m north-west of Birkatayn, where at least four channels were cut into the top of the 3m high cascade (**Fig. 9**). This spring may have supplied the Birkatayn baths and may have been a source for the large aqueduct recorded at site JWP164.

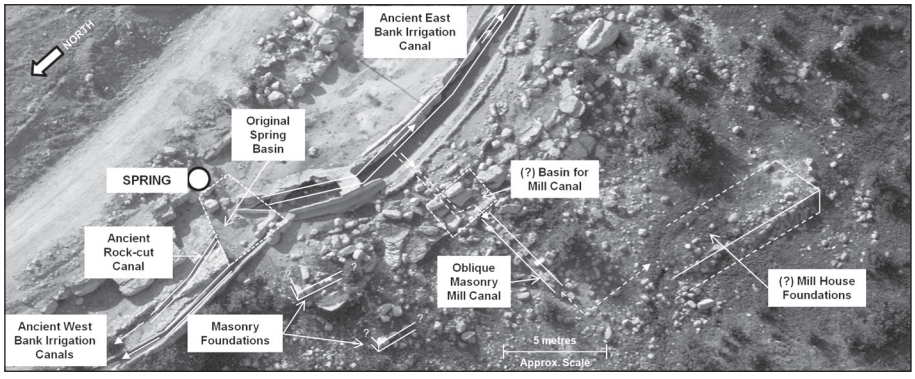
Surveying at the southern end of the large (0.7 ha) relict spring complex at Ficus springs in Wādī Jarash 1km south of the city identified a small, well-preserved, natural fountain and rock-cut catchment basin exposed in a looters hole on the *wadi*'s west bank (site JWP182). Uniquely, the basin surface has a distinctive coarsely 'pecked' finish compared to the usual 'picked' finish found in the tunnel walls and canals at Ficus springs. The picked finish is attributed to the use of a pointed iron pick of '*escoude*' type (Bessac 1988: 37). The coarsely pecked finish of the basin closely resembles the pecked finish observed on the interior surfaces of (?) Bronze Age rock-cut tombs preserved in the Kurnub Sandstone cliffs overlooking the Jarash bridge crossing the Zarqa River (**Fig. 10)**. While this raises the possibility that the basin may date to the Bronze Age, the present evidence does not preclude an earlier or later construction date. Evidence from Petra, for example, shows that pecked finishes on sandstone surfaces were a common feature in Nabataean architecture (Rababeh 2005: 93-95). The site is located on the eastern edge of the terrace that contains the abū aṣ-Ṣuwwān Neolithic 'mega-site' (al-Nahar 2010, 2013) and 550m north of the hilltop Early Bronze Age *tall* of Khirbat Khālid (Hanbury-Tenison 1987: 156; Leonard 1987: 354).

Buildings at Spring Sites

While it is likely that some form of building was originally constructed at each of the larger spring sites in antiquity, very little evidence of these buildings has survived. Surveying in 2016 revealed evidence of building foundations at at-Tannūr spring, which is the strongest spring in the Majarr-Tannūr valley and supplies an extensive irrigation network (**Fig. 11**). The main ancient structure is a water-mill complex, comprising an oblique mill canal (leat) and the foundations of a building thought to be the mill house. Water was supplied to the leat from the spring via a basin. While the best-preserved horizontal watermills in the present landscape are watermills of the *arubah* penstock type with a horizontal leat (Avitsur 1960: 40), there is evidence that horizontal watermills with a slanting or oblique leat (oblique chute) were once a common feature of the historic landscape - although rarely preserved today. The 1m wide masonry wall carrying the oblique chute at Tannūr spring is the best preserved in the study area, although hard to discern amongst the stone tumble on the slope below the spring (**Fig. 12**).



10. Ficus springs: (a) Natural fountains (highlighted) and catchment basin cut into Kurnub Sandstone at site JWP182 (scale 0.5m); (b) Vertical view of catchment basin at site JWP182 (scale 0.5m); (c) Detailed view of coarse 'pecked' finish on the basin surface at site JWP182 (scale 0.5m) ; (d) View inside (?) Bronze Age tombs at az-Zarqā' R. / Wādī Jarash junction, showing coarse-pecked finish (scale 20 cm); (e) Coarse 'picked' finish on tunnel wall, site JWP146 Ficus springs.

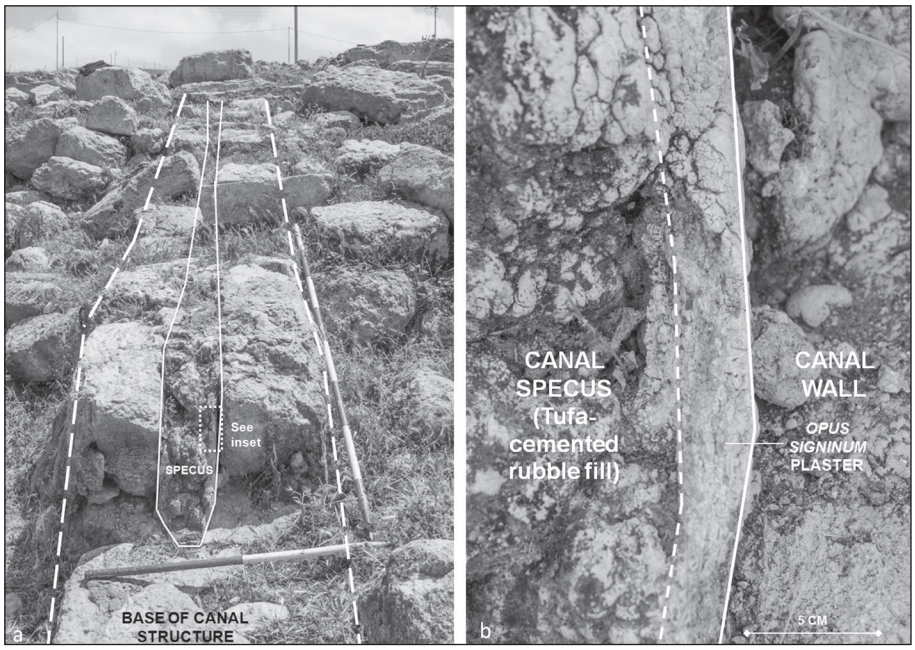


11. Tannūr spring (site JWP135): Aerial view showing main structural elements (Photo courtesy of APAAME; APAAME_20130428_ REB-0064; Photographer R. Bewley).

Blanc and Genequand (2007: 304) considered that oblique chute mills were introduced in the early Islamic period, and provisionally dated several of these mills in Syria to the early 8th - 9th centuries AD. The *opus signinum* plaster lining the *specus* of the oblique chute at Tannūr spring may suggest a pre-Islamic date, although Wilson (2003: 129) noted that the use of this typical Roman plaster continued into the early Islamic period in North Africa and Turkey. Radiocarbon dating of charcoal in this plaster will clarify the construction date.

al-Majnūnah Dolmen Field

A small dolmen field on the edge of al-Majnūnah village was recognised by DoA representative Mr. Adnan Mujalli while surveying in the 'Ayn ar-Riyashah area. The dolmen lo-



12. Tannūr spring (site JWP135): Oblique chute canal: (a) view upslope towards spring (horizontal pole 1m); (b) Detailed view of opus signinum plaster lining canal specus.

cality is shown on a plan by Sapin (1992: fig. 2), but no description has been published. Although not related to water management, the site was briefly recorded during the Jarash Water Project survey as it is under threat from new housing.

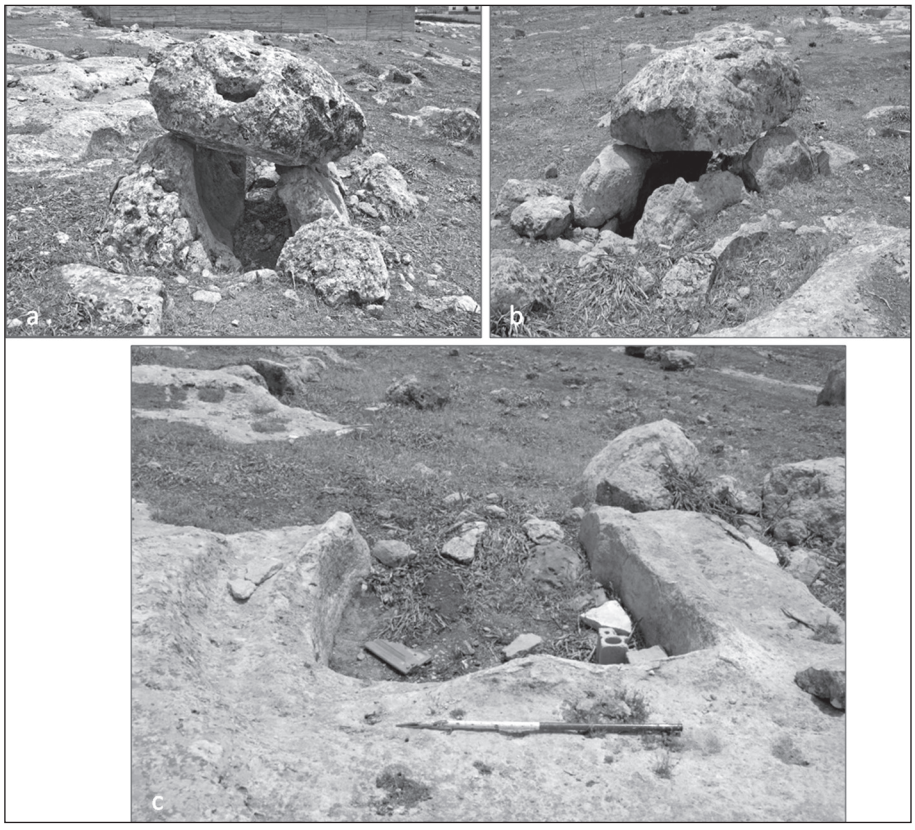
The site covers roughly 0.1ha, although a detailed survey may prove it to be larger. It is located between two houses on the west side of the village, about 0.5km west of 'Ayn ar-Riyashah. Only one dolmen retains its capstone and side megaliths (**Fig. 13a, b**), however the burial floor of this dolmen is a distinctive, smooth bath-shape cut in the bedrock, and many similar features - presumably representing dolmen sites robbed of their megaliths - were observed in close proximity. One of these dolmen floors is rectangular in plan and may represent a multiple-burial site (**Fig. 13c**). The site lies close to western edge of the main dolmen fields in the Majarr-Tannūr valley. However, the site is under threat from new housing construction and warrants a detailed study and preservation.

Geoarchaeological Studies

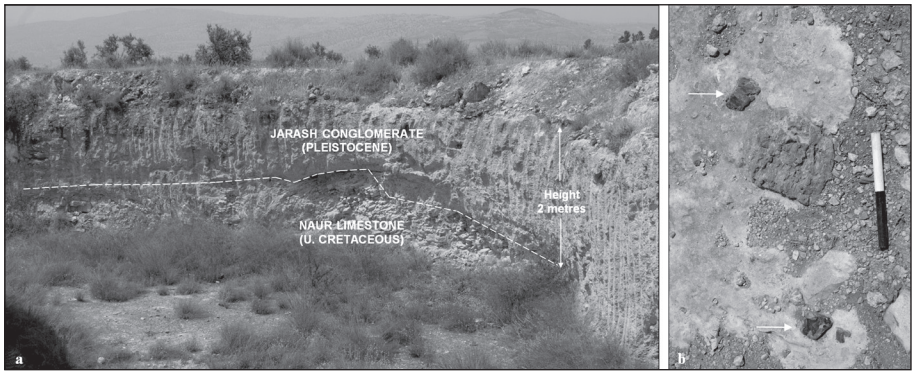
Geoarchaeological surveys conducted by the Jarash Water Project in 2014 and 2015 recognised a new debris-flow type of geological formation at a number of locations in the Jarash valley and, to a lesser extent, in the upper Majarr-Tannūr valley. It has been tentatively assigned a Pleistocene age based on a comparison with the Pleistocene Dawqarah Conglomerate (Parenti *et al.* 1997: 19) in the upper Zarqa valley (Boyer 2017; 2018a–2018d). Similar surveys conducted in 2016 extended the depositional limit of the formation in the Jarash valley to around 8km^2, and also identified exposures of the formation in the lower Majarr-Tannūr valley (**Fig. 14a**), including one locality west of al-Majnūnah village where the formation contains flint cobbles (**Fig. 14b**). This potential flint source may have been a factor in the location of the Neolithic settlements adjacent to the nearby perennial springs at ar-Riyāshī (Hanbury-Tenison 1987: 154 site 15) and al-Mītah (Leonard 1987: 354 site 27). Similarly, the abū aṣ-Ṣuwwān Neolithic 'megasite' south of Jarash is also located adjacent to Jarash Conglomerate bedrock containing flint cobbles that are likely to have been a source of raw material for a local flint industry (Baker and Kennedy 2011: 457).

Investigations at Ficus springs, 1km south of Jarash, revealed evidence of a multistage landscape history of this part of the Jarash valley. Studies are incomplete, but provisional findings indicate two (degradation) phases of *wadi* incision followed by a more stable phase, during which water-related installations (well-preserved fountain catchment basins and probably adjacent rock-cut canals) were constructed. Graffiti (Greek?) preserved *in situ* on a western cliff face probably also date to this phase. Debris flows subsequently filled the *wadi* and

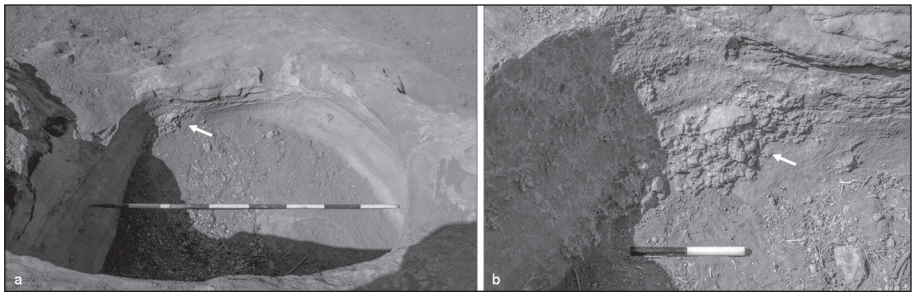
buried at least some of the water installations, as attested by remnant conglomerate cemented to the floor of a fountain's catchment basin on the east bank (**Fig. 15**). These later debris flows are tentatively dated to the pluvial events of the Byzantine period that peaked in 6th and 7th centuries AD (Izdebski *et al.* 2016: 197), and may be comparable to the debris flows recently identified at Abila that have been dated to the same period (Lucke and Schmidt 2017). The later debris flows at Ficus springs appear superficially similar to the older Jarash Conglomerate debris-flow sediments outcropping on the upper slopes of the *wadi*'s west bank at the



13. al-Majnūnah Dolmen Field: (a) and (b) Dolmen complete with side megaliths; (c) Rock-cut floor of large dolmen that may reflect a multiple burial (1m pole).



14. Jarash Conglomerate in lower Majarr-Tannūr valley, west of al-Majnūnah village: (a) Contact of Jarash Conglomerate with underlying Upper Cretaceous Naur Limestone in quarry; (b) Flint cobbles (arrowed) in exposed 'pavement' of Jarash Conglomerate (scale 20cm).



15. Ficus springs, site JWP146, showing debris-flow conglomerate cemented to the floor of an earlier fountain catchment basin: (a) Vertical view of catchment basin; (b) Detailed view of cemented conglomerate on basin floor.

Bāb ʻAmmān locality: they comprise reworked rounded clasts from the older debris-flow material mixed with soil, but are less indurated (**Fig. 16**). Taken together with evidence of the debris flows occupying channels aligned orthogonally to the present *wadi*, it appears that the debris flows were associated with landslips along the west bank of the *wadi*. The massive, *ca* 400m long landslip on the west bank evident in the landscape between Ficus springs and the city could have contributed much of the material for the debris flows, but this landslip event has not yet been separately dated (Boyer 2018c: 236, fig. 10b). A subsequent degradation phase removed the debris-flow sediments from the *wadi* bed and exhumed the buried water installations. The final aggradation phase saw the deposition of *wadi* sediments on the *wadi* bed, and this is the current state of fluvial processes in this section of Wādī Jarash.

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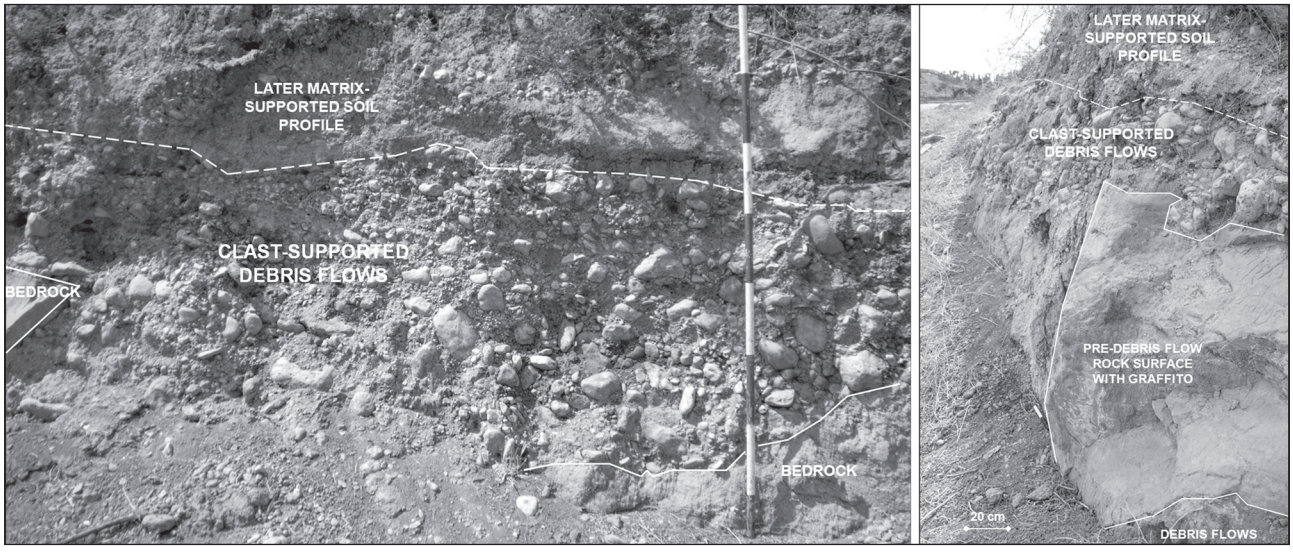

16. Ficus springs: Sedimentary profile exposed on west bank of wadi (2m pole).

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THE HELLENISTIC PETRA PROJECT: EXCAVATIONS ALONG THE COLONNADED STREET PRELIMINARY REPORT OF THE THIRD SEASON 2007

David F. Graf, Steven Sidebotham, Benjamin Dolinka, Tali Erickson-Gini and Alexander Wasse

The primary objective of the Hellenistic Petra Project (hereafter HPP) is to locate, define the character, and determine the perimeters of the early Hellenistic settlement at Petra. In spite of 75 years of excavation at Petra, the period between the 4th and 2nd centuries BC remains elusive and relatively unknown; so we established it as our primary focus for excavations. The methodology is to place a number of small exploratory soundings at strategic locations in the civic center in the Wādī Mūsā basin. By these small surgical cuts into the central urban landscape of the Nabataean capital we hoped to expose evidence for the earlier settlement dating to the late Achaemenid Persian and early Hellenistic eras.

The project director is David F. Graf (University of Miami). The trench supervisors were Professor Steven E. Sidebotham (University of Delaware) and Dr. Benjamin Dolinka (Albright Institute, Jerusalem), assisted by Maria Elena Ronza (Wādī Mūsā) and Jessica Goldfin (Miami). The ceramic analysis was provided by Tali Erickson-Gini (ACOR) and the faunal analysis by Alexander Wasse (Yeditepe University, Istanbul). Jean-Louis Rivard (Toronto) served as the architect.

The excavations took place between July 31 and August 10, 2007. The project was supported by a grant from the Council of Research Administration at the University of Miami and a very generous contribution by Paris Katsoufis of Miami. The project is licensed by the Department of Antiquities of Jordan. The HPP team wishes to express their appreciation to the staff of the Department of Antiquities and to the late Director General Dr. Fawwaz al-Khraysheh for their support and assistance. The Department representative Sulaiman al-Farajat was particularly helpful. We also wish to thank Dr. Jean-François Salles and Christian Augé at the Institut français du Proche-Orient (IFPO), for their support and assistance to the project.

Although in the past extensive major excavations in Petra's civic center have been conducted, relatively few stratified Hellenistic levels or surface finds of the Early Hellenistic period have been recorded that point to the existence of a Hellenistic settlement at the site. Before our HPP III excavations in 2007, the only stratified Early Hellenistic settlement was that discovered by the British excavations of Trench III in the southern portico along the Colonnaded Street, directed by Peter Parr between 1958 and 1964. This trench was located about 90m east of the Monumental Gate leading to the *temenos* area of Qaṣr al-Bint, between the street and portico wall. This area is just south of the paved street in the narrow confines between and beneath the approximately 30 shops constructed between the Temenos Gate and Upper Market as components of the retaining wall of the portico (Kannelopoulos 2001: 11). The adjacent east-to-west Colonnaded Street below runs parallel to the *wadi* bed just to the north of the northern portico. Here between the southern portico and street Parr discovered the remains of some crude domestic structures built of limestone boulders from the nearby *wadi* bed (Phases I-IV), which he dated to the late 3rd century BC on the basis of some Arados coins and an imported Rhodian amphora handle (Parr 1965: 528, 1970: 357-358, 369-370, fig. 1, 2007: 275-280 with plans and photos). The walls that he exposed measured *ca* 85cm to 1m thick and were "resting directly on the natural

and undisturbed gravel of the *wadi* bank" (Parr 2007: 278). These discoveries were described as "well stratified deposits beneath the paved street and the colonnades, offering promise of an undisturbed sequence of structures" (Parr 1990: 15). This important observation of the potential of this area for Hellenistic-era Petra was subsequently ignored for almost half a century until we began our excavations recently in the same area. The emergence of new documentary evidence that the Nabataean dynasty existed in the early 3rd century BC (Graf 2006) enhanced the prospects of finding an earlier Nabataean occupation at Petra.

Parr's earlier exploration along the Colonnaded Street provided the impetus for the HPP launched in 2004. Trench supervisor Leigh-Ann Bedal placed a sounding (our Trench 3) immediately east and adjacent to Parr's Trench III along the Colonnaded Street. Our sounding revealed a similar occupational sequence as that of Parr's Trench III strata, with structures and walls that seem to correlate well and connect with his structures (Bedal in Graf *et al.* 2005: 421-427). Beneath the upper Nabataean levels (Phases V-IV), a few amphora fragments with some black-glazed Hellenistic sherds were found (Phase III), along walls that apparently correspond with those in Parr's Trench III. In even lower levels was a clay floor covered with burnt wood, sandwiched between Greek amphora fragments (Stratum II), and beneath that an earlier settlement (Stratum I), which, like Parr's walls, was resting directly on the undisturbed *wadi* bank. In essence, our sequence of occupation in Trench 3 compares remarkably well with that of Parr's Trench III and supports his findings. These results suggest this area was of high priority for the early Hellenistic period and deserved further consideration.

For this purpose, we returned in 2007 (HPP III season) and placed two more contiguous trenches just east of Parr's Trench III and our Trench 3, separated only by a north-south wall that runs between the portico wall and the street, representing the eastern boundary of our previous Trench 3. Both Trenches 8 and 9 lay in front of the Garden Pool complex to the south and between the southern portico wall and the southern edge of curbstones of the Colonnaded Street (**Fig. 1**). Trench 8 (4m N-S × 3.5m E-W) was located 50m east of the staircase of the 'Great Temple' and about 90m west of the Monumental Gate.

I. Trench 8

S.E. Sidebotham

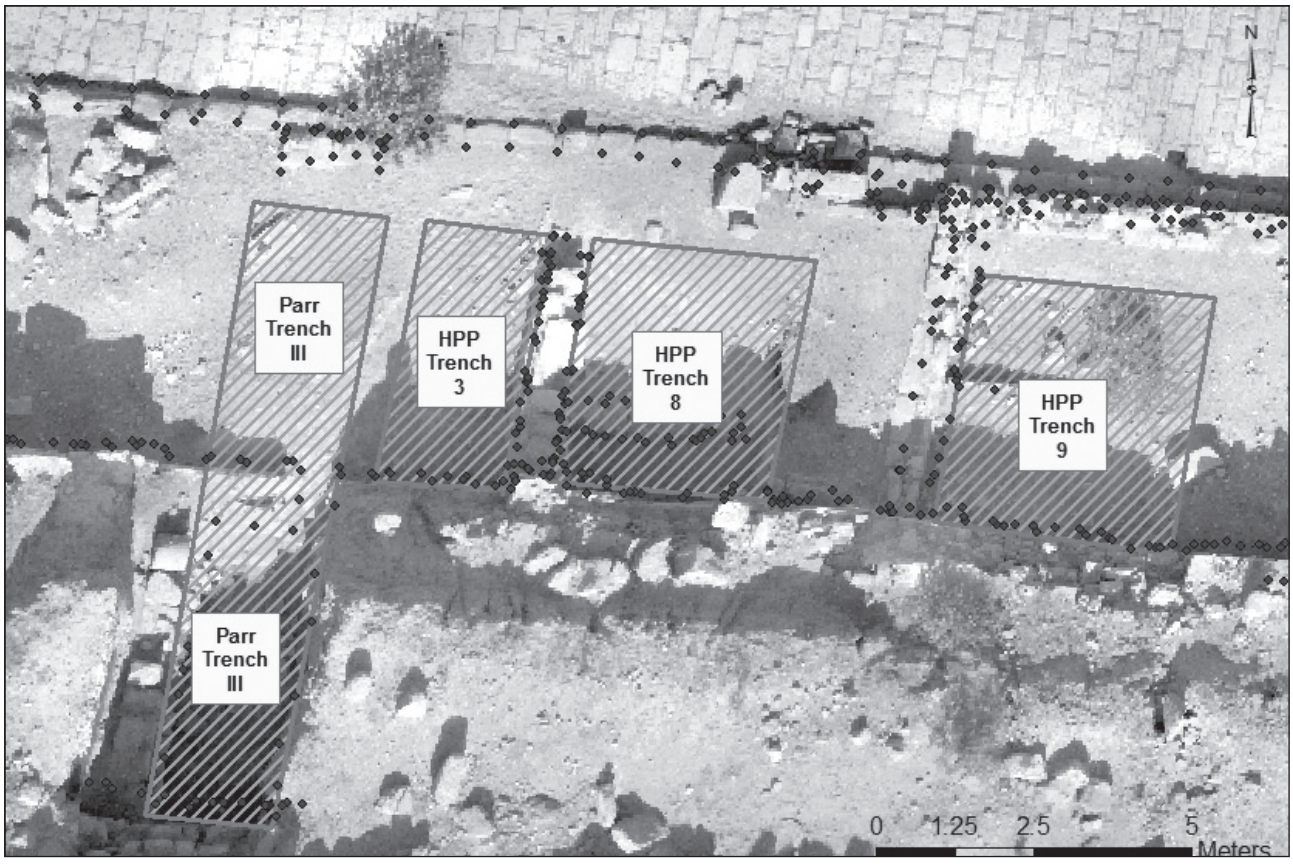
HPP Trench 8 measured 4.0m N-S × 3.5m E-W and was oriented along the southern side of the main colonnaded street (*decumanus maximus*) at Petra. It comprised 21 *loci* - including sub-*loci* (nos 200-220) - and formed ten or possibly eleven phases/sub-phases. Trench 8 lay immediately east of the N-S wall constituting the eastern baulk of HPP Trench 3 and is 2.74-2.82m west of HPP Trench 9. The northwestern corner of HPP Trench 9 was 2.82m east of the northeastern corner of HPP Trench 8 while the southwestern corner of HPP Trench 9 was 2.74m east of the southeastern corner of HPP Trench 8. The northwestern corner of Trench 8 lay *ca* 50m east of the easternmost end of the reconstructed staircase (7.4m wide) that ascends from the colonnaded street to the so-called 'Great Temple'. The Monumental '*temenos*' Gate that marks the current western boundary of the *decumanus* or Colonnaded Street stands approximately 90.9m west of the northwest corner of HPP Trench 8.

In summary, HPP Trench 8 lay east of Trenches 1 and 3 excavated along the southern side of the *decumanus* by the Hellenistic Petra Project in 2004 (Graf *et al.* 2005) and more than 90m east of Trenches 4-7 excavated in 2005 between the Monumental '*temenos*' Gate and Qaṣr al-Bint (Graf *et al.* 2007). Peter Parr's Trench III was also located on the southern side of the *decumanus* east of HPP 2007-8, and between Trenches 1 and 3 excavated during the HPP 2004 season (Graf *et al.* 2005: 419-422, figs. 2 and 7). The purpose of HPP III Trench 8 was to determine if there was any continuation of the structures and early occupation in Trench 3 of HPP 2004 and Parr's Trench III with the area to the east.

I.1: Main Architectural Features of the Trench

Wall 203/303

The most prominent feature directly associated with HPP III Trench 8 was the east-west ashlar wall W203 (W303 in Trench 9). This substantial wall, forming the southern boundary



1. Locations of Trenches along Colonnaded Street: Parr III, HPP 3, 8 and 9 (Courtesy Bjorn Anderson).

of both Trenches 8 and 9, runs almost parallel to the Colonnaded Street for its entire length. Wall W203/303 separated the area of the Colonnaded Street and the line of structures oriented east to west, which have been interpreted as shops/commercial areas and/or small-scale industrial facilities below the plateau (see below). Parr's Trench III and HPP Trenches 3, 8 and 9 are involved in this zone of architecture on the plateau above that includes the area south of wall W203/303, much of which remains unexcavated or only partially excavated to sterile levels (*cf.* Bedal *et al.* 2007; Joukowsky 2007). The western extension of wall W203/303 may have served as a portico for the colonnaded part of the street or a retaining wall. The western extension of wall W203/303 may have served as a northern *temenos* wall or retaining wall for the so-called 'Great Temple' complex. In Trench 8, wall W203 had an overall maximum height of 2.5m, with at least three major construction phases exposed at the conclusion of the 2007 excavation season.

The earliest visible wall phase (Phase 1/203A) comprised three courses of ashlars and part of a fourth course that contained some nicely cut ashlars using a modified *anathyrosis* technique, in places bound together with a fine gray mortar. Equally, the extant gray 'mortar' may be the remnants of plaster that once covered the face of wall W203A. There is evidence of repairs to this wall in the southeastern corner of the trench (which may or may not have been undertaken as part of wall Phase 2/203B). Excavations this season did not reach the bottom or foundation level of wall W203A.

Wall Phase 2/203B (on a slightly different alignment constructed for the most part immediately atop earlier phase 203A) consisted of three courses of recycled blocks with chinking stones, making apparent use of a mud mortar/binding material. It was during wall Phase 2/203B that perpendicular wall W204 was constructed (see below).

Wall Phase 3 (203C), the latest, encompassed two to three courses of reused and well-worn ashlars interspersed with smaller stones aligned in a fashion that slightly overhung both wall Phases 1 (W203A) and 2 (W203B). Neither the second nor third construction phases of

wall W203/303 (W203B and C) were as well built as the first (W203A).

Our excavations provided no absolute date for the construction of any phase of wall W203/303, although floor 201/205 (locus 305 in HPP III Trench 9) appears to postdate the latest use of the first phase of wall W203/303 (*i.e*. W203A) and seems to have been in use with the second phase of wall W203/303 (*viz.* W203B) and wall W204 (see below). The sherds from above floor *loci* 201/205 in locus 206 are primarily Middle Roman (2nd to 3rd century AD) and provided a *terminus post quem* date for use, if not the latest phase of construction (203C). The penultimate phase (203B) of wall W203/303 as well as dates for wall W204 may well accord with a *terminus ante quem* date for the earliest phase of wall W203/303 (W203A). Pottery discovered from the earliest *loci* south of wall W207 (see below) should provide, minimally, *terminus ante quem* dates for the use, if not construction, of the lowest/earliest visible phase of wall W203/303 (*viz. W*203A). Ceramic evidence from the earliest *loci* excavated on the south side of W207 should also provide dates for that wall (see below).

Walls 204 and 207

HPP III Trench 8's western boundary was also a wall (W204), oriented north to south nearly perpendicular to W203/303; its visible remains did not extend to the curbstones bounding the southern side of the *decumanus.* This was the latest wall built in HPP III Trench 8 which was constructed of recycled building materials including ashlars and at least one column drum. Wall W204 measured 1.75-1.80m long (N-S); it survived to a maximum height of four courses (1.01-1.02m) and was two rows wide (0.60-0.65m E-W). Wall W204 abutted wall W203/303 and clearly post-dated the first phase of that larger feature; it was built in the same phase as wall W203B.

A third, rather poorly built wall (W207) comprised small ashlars and other stones, some unhewn, of various sizes. Lavish use of mud mortar and chinking stones indicated a jerry-built structure. Wall W207 measured 2.90m in length (WSW-ENE) × *ca* 0.60-0.65m in width (roughly N-S) × *ca* 0.45m in extant height. W207 was neither exactly perpendicular to wall W204 nor parallel to wall W203A-B-C, but ran at slight angles to both. A break in the eastern end of wall W207 may be its terminus or possibly a doorway. The break was *ca* 0.65m wide inside the trench, and might have extended farther east outside the trench. It appeared to connect the northern and southern rooms appearing in Trench 8. The room on the southern side of Trench 8 (bounded by wall W203 on the south, wall W204 on the west and wall W207 on the north) was quite small. Wall 207 ran beneath W204 on its eastern side, indicating that it predated that feature. Wall 207 continued in a west-southwesterly direction under and, probably, west of Wall W204 and outside the trench. Though crudely built, wall W207 probably belongs to wall Phase 2 (W203B) of the main east-west oriented wall and the southern boundary of the trench: wall W203.

I.2: The Phasing of the Trench

There were six major phases in the Trench, with several sub-phases. Early Hellenistic sherds dominated the lowest level (VI) and the area appears to have been primarily domestic with some suggestions of industrial activity.

Phase Ia

Lay at the northernmost portion of the trench. It was a sondage 0.50m in width (N-S) (locus 220), which extended across the entire east-to-west width of Trench 8 and was excavated down to sterile *seyl*-washed *wadi* material (*cf*. Graf *et al.* 2007: 229). It comprised large cobbles of red sandstone, small whitish-gray pebbles and yellowish sand. This locus contained no artifacts or finds of any kind and was clearly a pre-habitation/construction level.

Phase Ib

Included locus 219, also on the northern side of the trench at a depth of -1.44-46 Datum Point. Pottery was predominantly Early Hellenistic, comprising what appears to be an Attic Black-glazed lamp (III. **Table 3:A**) and the rim of a storage jar (III. **Table 3:B**). A terracotta *tabun* fragment, a cowry shell and ashy deposits may also be noted. This locus contained no architectural evidence of actual occupation. The finds from locus 219 appeared to represent elements of the shops/commercial areas and/or

small-scale industrial facilities (see below) that had been washed by *seyul* into the area.

Phase II

Included wall W203A (the southern boundary of the trench), which may - in fact - be contemporary with Phase Ib (locus 219, which lay on the northern side of the trench). However, this could not be determined from excavations this season.

Phase IIIa

It consisted of wall W207 and the placement of locus 218 (at a level of -1.52 DP in the bottom of the hearth). The hearth was rather well-preserved, bordered by five cobbles and abutting the north face of wall W207 (**Fig. 2**). One Early Hellenistic black-glazed sherd was found within it. The investigation of locus 218 clearly indicated that some domestic/small-scale industrial activities took place during this phase. On the opposite side of the wall, in the southeastern area abutting the wall, locus 215 revealed some Early Hellenistic sherds and one Late Hellenistic sherd (III. **Table 3:C-E**).

In the wider area south of the wall and between the southern terrace wall (locus 217) were some early Hellenistic sherds, but mostly Middle Roman sherds. The levels reached were -83, -84 and -73 DP, from west to east.

Phase IIIb

Included the earliest recognizable surfaces reached during excavations this season: *loci* 210/212/213. Locus 210 was a large, well-constructed flagstone surface measuring 0.80×0.46×0.055m thick. It seems to have been in a context of secondary use, abutting the southern side of wall W207 and the eastern side of wall W204. Locus 210 appeared to be on the same level as *loci* 212 and 213, both of which lay north of wall W207 and consisted of pebbles and soil. All three floor surfaces were clearly in use with wall W207 and perhaps in the same phase with wall W203B. However, as excavations did not reach the bottom of wall W203, we cannot be certain if *loci* 210/212/213 represented the earliest surfaces associated with wall W203; most likely they do not. Early Hellenistic ware dominated *loci* 213 and 212, while locus 210 has mainly Nabataean painted fine ware sherds of the 1st century BC and the rim of a cooking pot of that era (Stratum III. **Table 3:L**).

Phase IIIc

It comprised debris-and-sediment locus 209 (north of wall W207). Here we discovered primarily 1st century AD pottery, with an almost equal quantity of Early and Late Hellenistic sherds, for example an Early Hellenistic black-glazed bowl (III. **Table 3:M**) and a late Hellenistic cooking pot rim (III. **Table 3:O**), but also one notable fragment of the Persian period: a sherd of a painted lekythos of the 5th century BC (III. **Table 3:N**). The sediment and debris in locus 217 lay south of W207. It contained a large amount of animal bones, and sherds primarily of the Roman period mixed with some Early and Late Hellenistic sherds, and an unidentifiable *aes* Nabataean coin . no 4). Locus 217 lay above surface locus 210. Sediment and debris layer locus 215A-B contained a few large sherds of the Early Hellenistic period and one Nabataean Painted Fine Ware sherd of the 1st century AD. Sediment and debris locus 216, situated north of W207, lay above the hearth (locus 218) and included animal bones and non-diagnostic sherds. Locus 206B, a sediment-and-debris layer, produced a large quantity of 1st century AD pottery and Nabataean Painted Fine Ware sherds, mixed with a few Hellenistic and Middle Roman sherds, and several *aes* coins one of which is an issue of Aretas IV-Syllaeus (IV. no 1)**.**

Phase IVa

It included surface locus 208 south of W207



2. Trench 8: View to south with wall W207 and hearth abutting north face.

and, possibly, locus 211 north of W207. The surface of locus 208 was made of cobbles while locus 211 was merely a pile of cobbles, which may have been destined to be flooring contemporary with, but not touching the surface of locus 208. These features and *loci* were roughly contemporary with wall Phase 2/203B.

Phase IVb

This represents the period when wall W207 fell out of use; debris-and-sediment locus 214 filled the break or 'door/opening' at the eastern end of W207 that linked the northern and southern rooms of Trench 8. Locus 214 also covered portions of W207. Locus 214 contained many bones, including those of one or more large mammals, as well as some Hellenistic vessels **(**III. **Table 3:F-H**).

Phase Va

It included wall W204, associated with wall Phase W203B, and the latest surfaces in the trench. The latter comprised locus 201 (flat stones in poor condition, perhaps recycled from elsewhere, and plaster). This floor did not survive across the entire trench. Locus 201 may have been a repair of locus 205, which consisted of cobble-sized stones and soil**,** with a number of Nabataean Painted Fine Ware sherds (Dekor-phase 2b-c), mixed with a few Late Hellenistic (including Eastern Sigillata A) and Middle Roman sherds.

Phase Vb

It included ash pits, burned areas and fire pits from which were recovered immolated bones, a fine piece of worked bone that was green in color, fish vertebrae, mother-of-pearl shell fragments, an iron nail and iron slag (*cf.* locus 202). This evidence suggested that domestic and small-scale industrial activities occurred in this phase of use of the trench. It is difficult to determine at this juncture if Phase 2 of W203 (W203B) or Phase 3 (W203C) was the one associated with surface *loci* 201/205. Locus 203C may have been added to existing wall W203A and B after floor 201/205 had fallen out of use. The pottery revealed in locus 201was dominated by ware of the first three centuries AD, with a few residual sherds of the Late Hellenistic period.

Phase VI

It consisted of locus 200, the latest debris-and-sediment layer in the trench. It was a relatively recent deposition from which were recovered modern glass fragments, plastic bottle tops and cigarette butts, mixed with pottery - likely residual - of the 1st to 4th centuries AD, and quite a few Early Hellenistic sherds. Also recorded from locus 200 was a column-drum-shaped architectural element with a large square hole in the center. Similar objects (one was also found at the extreme northern end of the trench and labeled locus 206A) were also documented in the area of these rooms and the street.

I.3: Interpretation

Some observations and tentative conclusions can be made about what the structure in Trench 8 looked like and what activities might have taken place there. The excavations documented architectural elements comprising two column-drum-shaped stones with relatively large holes of various sizes and shapes centrally drilled all the way through each one (one in locus 200, the other in locus 206a = 36.5-37cm diameter × 13cm high with central hole 7.5cm; a third example was recorded just outside the trench = 29-30cm diameter × 17cm high with central round hole 10cm). The varied diameters of these relatively small, column-drum-shaped stone artifacts and the size or shape of their central holes suggest that they were not the remains of column drums with centering points. The excavations documented no identifiable roofing materials such as roof tiles or roof-tile fragments, suggesting that there was no permanent roofing of this area during the latest phases of occupation. In place of permanent roofing, it is more likely that there was an awning-type arrangement, with the small column-drum-shaped stones acting as supports or anchors for poles atop which were placed cloth or animal-hide awnings. This may have been the arrangement for many of the rooms on the southern side of the *decumanus* in their later antique phases.

Clearly, the walls built against or in association with W203A-B-C (*viz.* W204 and W207) were relatively crudely constructed of reused building materials. Thus, the overall appearance of the architectural unit appearing in Trench 8 throughout much of the occupation reflected

a rather low-status, hastily built structure, meant to be utilitarian rather than impressive.

None of the rooms in Trench 8 were large. The room on the southern side of Trench 8 (enclosed by W203, W204 and W207) was particularly small and likely served as a storage area. Given the generally crude appearance of the architecture and the small size of the rooms it is evident that the activities that took place in these structures were small-scale.

While the area may have had commercial functions in its earlier phases, the discovery of numerous small-scale fires and quantities of burned bone, fish vertebrae *etc*. suggests domestic activities, while the recovery of iron slag, an ancient iron nail, worked bone and mother-of-pearl shell fragments from locus 202 suggest small-scale industrial/manufacturing activities took place here in the later phases. Indeed, it is possible that the rooms situated along the south side of the colonnaded street functioned as residential, small-scale manufacturing and commercial facilities.

Few coins were recovered from Trench 8 and two of these identified as Nabataean provide only a vague *terminus post quem* for *loci* 206B and 217. The ceramic analysis is far more important in contributing better chronological indicators for the phases of Trench 8 (see the pottery report at III).

A subsequent intensive site survey undertaken in late June-July 2008 by a team under the aegis of the University of Delaware produced evidence suggesting that the *decumanus* adjacent to and immediately north of Trenches 8 and 9 underwent repairs and perhaps modifications in orientation and possibly size at some point(s) in its history (*cf*. Seigne 1999; Kanellopoulos 2001; Sidebotham *et al.* 2016: 145-169). Based upon the documentation of oddly aligned pavers and the use of recycled blocks (*e.g*. door pivots *etc*.) in its central and western portions, it appears that the course/orientation and possibly the size of the *decumanus* was likely different in some earlier phase(s) than is currently visible. In addition, the three phases of W203 (A-B-C) in Trench 8 exhibiting slight variations in alignment and the orientation of W204 might suggest that not only the colonnaded street, but also the structures abutting it, may have undergone modifications in size and orientation throughout their use in the Roman period that reflected the configuration of the adjacent thoroughfare.

II. Trench 9

Benjamin J. Dolinka

Trench 9 (HPP III 2007-9) was a 3.5m (E-W) x 4.0m (N-S) excavation unit situated directly south of the Colonnaded Street in the city center of Petra and east of Trench 8. The southern extension was represented by the retaining wall of what was formerly called the 'Lower Market' now known as the 'Garden and Pool Complex' (Bedal *et al.* 2007) situated on the hillock above and south of the trench. The northern extension abuts the curbstones of the paved Roman street. The primary goal in Trench 9 was to expose a complete stratigraphic sequence down to the sterile soil of the *wadi* bed in order to obtain detailed occupational phasing for the area. The main objective was to determine if artefactual evidence could be produced for the Persian and Early Hellenistic periods for which only limited data had been discovered in the adjacent areas of Parr's Trench III excavated between 1958 and 1964 and HPP Trench 2004-3. The aim of Trench 9, along with Trench 8, was to determine if the chronological horizon of the Hellenistic period could be confirmed or even expanded into earlier periods (**Fig. 3**).

After the removal of both topsoil and subsurface soil, a flagstone pavement (locus 301) was encountered across the southern sector of the trench, restricting our exploratory probe to the southern sector and confining our trench to a truncated area of 3.5×2m in the northern sector, close to the street. After removal of several stratified layers in the northern probe, the



3. Trench 9: view to south with flagstone pavement (locus 301).

excavation documented another pavement in the northeastern trench quadrant, much more poorly constructed. The trench was then divided in half again, in order to conduct a deep probe in the northwestern sector down to sterile soil. After reaching the *wadi* bed in the northwestern sector, the pavement in the northeastern sector was removed and the excavation again proceeded to the lowest levels of occupation above the *wadi* bed in the adjacent area. The description of the results of this process follow with consideration of the architectural remains first and then an account of the various occupational deposits in Trench 9.

II.1: Main Architectural Features of Trench 9

Locus 301

It is a stone pavement located in the southern sector of the trench that abuts locus W302 (the west wall) and locus W303 (the south wall). It lay beneath the topsoil of locus 300, which was only 14cm deep at its northern end and 26cm deep at its southern. This pavement consisted of flagstones which were rectangular and uniform in shape, and had an average size of 50×35cm. The locus covers an area measuring 3.50m (EW) by 2.00m (NS), *i.e*. half the trench. The best-preserved portion of the stone pavement (locus 301) is located in the western sector of the trench and measured 1.35m (NS) by 1.05m (EW).

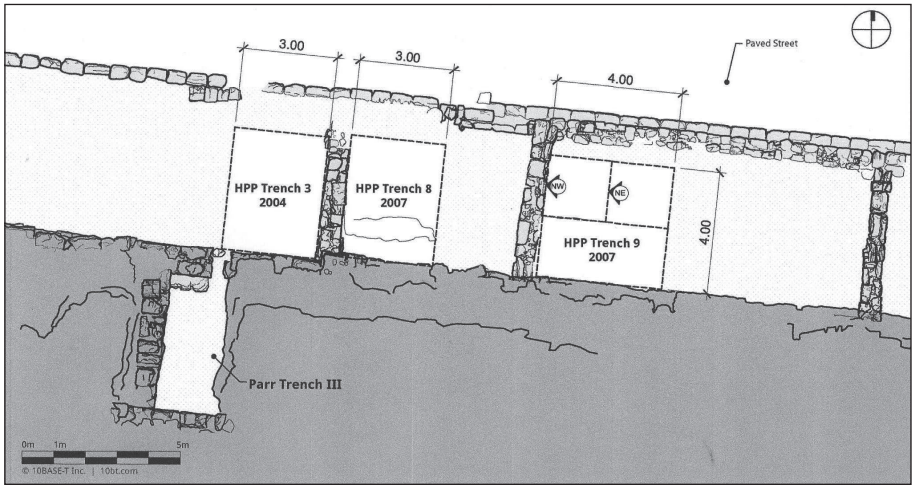
Eight well-dressed limestone ashlars with typically Nabataean diagonal chisel marks on the front and top faces bordered the northern edge of the payment. The ashlars, from east to west, measured 0.16×0.16cm extant (disappearing into the eastern baulk), 43×23cm, 44×16cm, 41×16cm, 33×14cm, 60×16cm (cracked almost in half), 52×17cm and 48×20cm. Interestingly, this pavement matched the same height and level as the Colonnaded Street. Owing to its fine preservation, locus 301 was left *in situ* and neither excavated nor back-filled. All of the remaining work in Trench 9 was conducted in the remaining 3.5×2.0m area to the north of locus 301 (**Fig. 4**).

Locus 302

It was the western wall that runs north-south and represented the western baulk of the trench. It was constructed of limestone, measured 2.00m in length and 32cm in width, and abuts the southern wall (locus W303). The extant remains included two visible courses of varying size and shape. The upper course consists of roughly hewn medium-sized boulders and the lower course had, for the most part, rectangular finely-dressed blocks measuring an average of 48×29×15cm. Pebbles and small chinking stones are between the two courses.

Locus 303

It was the southern wall oriented east to west and was the boundary for the southern baulk of the trench as well as the retaining wall for the 'Garden Pool Complex'. It is equal to locus 203 in Trench 8 and represented the southern baulk for Trenches 8 and 9. It was constructed of well-dressed local red sandstone rectangular ashlars that averaged 48×32cm in size. The central portion of locus W303 exhibited the pier-and-rubble technique, with the rubble fill consisting mostly of medium-sized unhewn boulders of varying shapes.



4. Plan of Trenches 3, 8 and 9 (J.L. Rivard).

Locus 317

It is a limestone wall that ran east-west almost parallel to the Nabataean ashlars on the face of W301 and was equivalent to W207 in Trench 8. It rested on *loci* 308 and 309, and was abutted by the floor surface of locus 307 in the west: a hard-packed pebbly floor that covered the entire probe area. In the western sector it is preserved at a lower depth and consisted of small, mostly flat and rectangular stones - some of which are unhewn - and had chinking of small cobbles. In the eastern sector it is preserved much higher, with an upper course of rectangular, finely-dressed ashlars.

II.2: Phasing of the Trench

Locus 300

It comprised the topsoil layer covering the entire trench. It consisted of a light reddish-brown (5YR 6/3) loose sandy fill with vegetation, and ranged in depth from -20cm in the north to -68cm in the southern part of the trench. This locus yielded a large amount of modern material, such as plastic and a German 50-pfennig coin. Ancient items included architectural fragments, glass, shell, a bronze ring and an unidentifiable bronze coin. This pottery-rich locus contained 1,202 sherds, the majority of which dated to the Early and Middle Roman periods, with one Early Byzantine radial lamp sherd. The finds also included the base of a Hellenistic Nabataean Painted Fine Ware bowl (III: **Table 2:J**).

Locus 304

It was uncovered directly below topsoil locus 300 in the northern half of the trench. It was a mixed fill layer containing a reddish-gray (2.5YR 6/1) sandy soil with intermittent small stones and architectural collapse. It had an average depth of 34cm. In the eastern sector of the trench, the poorly-preserved remains of a white (7.5YR 8/1) plaster floor were revealed. The pottery included three Dekorphase 2a bowl rims, a 1st century BC cooking-pot rim (Zeitler 1990: fig 11:1) and a Nabataean terracotta figurine of a nude youth possibly depicting Harpokrates (Christopher A. Tuttle pers. comm; see Tuttle 2009: 201, 270-272, and esp. 565-566).

Locus 305

It consisted of a reddish-brown (5YR 5/4) compact surface, 5-7cm in depth, which was covered by a thin layer of fine, light red (10R 6/6) sand. This surface appeared only along the northern baulk and most likely served as a leveling surface supporting the plaster floor above (locus 304). The ceramics uncovered from this locus were predominantly Dekorphase 2b-c and a few Middle Roman sherds.

Locus 306

It was a layer underlying locus 305 in the northern sector of the probe and locus 304 in its southern portion. It comprised a pale red (2.5YR 7/2), sandy, uneven fill layer that ranged between 13 and 18cm in thickness, reaching a depth of between -.70 and -.80m. This locus yielded six Dekorphase 2b body sherds, with one Early and one Late Hellenistic sherd and a fragment of a Judean rouletted bowl**.**

Beneath Locus 306 Was Locus 307

A hard-packed, weak red (2.5YR 6/4), pebbly floor that covered the entire probe area, although it was broken in some sections. It measured between 11 and 15cm in thickness. The pottery included mainly Dekorphase 2 sherds, with a rouletted 'honey pot', a cream ware strainer-jar sherd with wavy-band combing, and one Early Hellenistic ledge rim. The depth of the locus varied between -.82 to .92m.

Under Locus 307 Were Loci 308 and 309.

Locus 308 was a partially preserved flagstone floor located in the northeastern quarter of the trench. In the central portion of this locus, along the northern baulk, there was a circular installation. The dominant ceramic finds were Early Hellenistic, including a Black-glazed body sherd, and a considerable amount of Late Hellenistic sherds, including three ESA fragments, a Koan lamp fragment, and an imported amphora rim. The latest Nabataean Painted Fine Ware attested from locus 308 consisted of three Dekorphase 2b rims and a base. Three bronze coins were recovered from this locus, but the only one identifiable was an Aretas IV issue dating to 4/3 BC (IV: no 7). The depth of locus 308 was between -.87 to -.94m.

Also Situated below Locus 307…

Was a layer of collapsed architectural fragments (locus 309). These were found in a weak red (2.5YR 6/2) silty, sandy soil layer, 10cm in thickness. The depth of locus 309 was -.97 to -.99m. The ceramics were mixed, including one Early Hellenistic ledge rim and some Middle Roman sherds. The latest Nabataean Painted Fine Ware was a Dekorphase 2c rim. Two coins provided additional clues to the date of this locus. The earliest was one of the anonymous Nabataean issues of the early Hellenistic period (IV; no 9). The other was a coin of Aretas IV and Shuqilat dating to 39/40 AD**,** perhaps providing a *terminus post quem* for locus 309 (IV. no 9).

Although the Flagstone Floor in the Northeast (Locus 308)…

Was poorly constructed and badly damaged, we decided to shift the focus to the northwestern quarter of the trench with the goal of reaching the sterile soil of the wadi *DFGDFG* bed. The first locus uncovered in the northwestern quarter probe was locus 310, which was directly beneath the collapsed layer of locus 309. It was the first to reach a depth of over 1m from the datum point, varying between -1.03 to -1.43m. Locus 310 comprised a reddish brown (5YR 5/4) silty sand that contained numerous semi-dressed stones of varying sizes, as well as some *wadi* stones. Pieces of plaster, some painted in yellow and black-and-white, were scattered throughout this locus. This was a pottery-rich soil layer that included mainly Early Hellenistic and Early Roman period sherds (III. **Table 2:D**), including some pieces of ESA, amphora body sherds with dipinti, and part of a ceramic lantern with multiple circular piercings that were added pre-firing. The latest Nabataean Painted Fine Ware was represented by five Dekorphase 2b sherds. An important find from locus 310 was another bronze Nabataean anonymous issue of the 2nd century BC or earlier (IV: no 11).

Beneath Locus 310 Was a Loose…

Sandy and yellowish red (5YR 4/6) soil layer (locus 311), mixed with dark black charcoal pieces found within the southern, central portion of the locus. Of interest was the fact that the bottom levels from the northern half of the probe were 20cm lower than those in the southern half, probably representing the natural slope going down to the southern edge of the *wadi* or the occupational mound. The ceramics were mainly Early Hellenistic (three sherds), but included a Late Hellenistic fine ware rim and several Nabataean Painted Fine Ware sherds, the latest a Dekorphase 2b body sherd. The average depth was -1.18m.

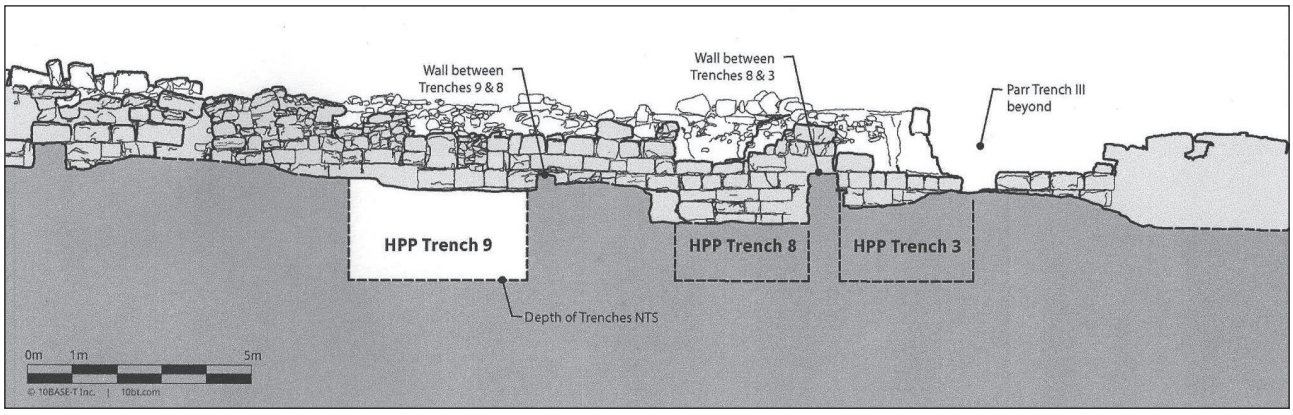
A Series of Three Fire Pits Appeared under Locus 311

The first (locus 312) lay in the southern sector of the probe and measured 64cm in diameter and 8cm in depth. The depth reached was -1.29m. The soil consisted of a very loose, sandy fill mixed with a large amount of light gray (N7) ash and black (5YR 2.5/1) charcoal. The pottery was dominated by Early Hellenistic sherds (III. **Table 2:A-B**), including a nearly complete profile of an incurved bowl that was found *in situ*, upside down and directly on top of the fire pit at -1.27m (III. **Table 2:C**). The northern sector of the northwestern probe revealed two additional hearths (*loci* 313 and 314). These were much smaller in diameter, measuring 31cm and 37cm respectively. Locus 313 yielded a fragment of an incurved bowl and the rim of a jug, both Early Hellenistic, but locus 314 contained only several undiagnostic body sherds. Locus 313 reached a depth of -1.32m.

After Removal of Loci 313 and 314…

A sandy, reddish brown (5YR 5/3) soil layer (locus 315) was discerned in the northern sector of the northwestern probe. This locus contained many stone and cobble inclusions of varying sizes, as well as fragments of plaster, and had an average thickness of 56cm, varying from -1.82 to -2.06m deep. Locus 315 also was rich in pottery, with a considerable amount of Early and Late Hellenistic ware mixed with Nabataean pottery, the latest Nabataean Painted Fine Ware consisting of three Dekorphase 2b rims and one base, and a few Middle Roman sherds. Worthy of note is that this locus reached a maximum depth of -2.06m, at which level the sterile *wadi*-soil layers had been reached (**Fig. 5**).

The penultimate soil layer unearthed in the northwestern probe was locus 316, located in the southern sector below the locus 312 hearth.

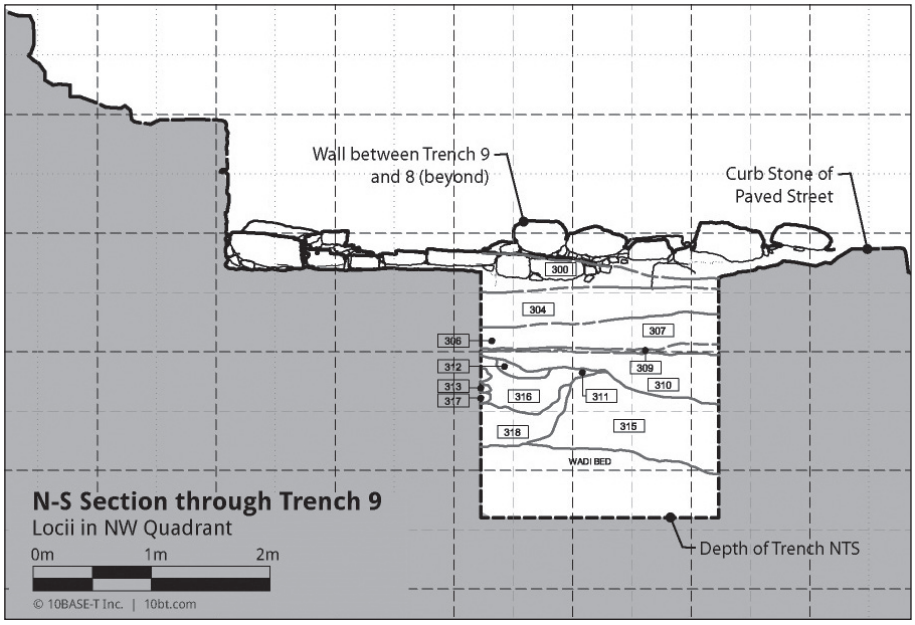


5. Depth of Trenches 3, 8 and 9 (J.L. Rivard).

This locus was deep -averaging 55cm- and consisted of a loose mixed layer of sand and pebbles that was yellowish red (5YR 4/6) in color and filled with numerous animal bones. The ceramics included Early and Late Hellenistic sherds, some ESA and ESB, with 1st century AD Nabataean, including a Nabataean Painted Fine Ware Dekorphase 2b rim and two Dekorphase 2b body sherds. Locus 316 also yielded a basalt grinder and two bronze coins, one of which was another anonymous Nabataean issue from the early Hellenistic period (IV: no 12), while the other was unidentifiable (IV: no 13). A wall made of irregular blocks and stones was encountered bordering the southern side of locus 316 in the northwest sector. A small fragment of an Early Hellenistic incurved bowl was found while cleaning the wall.

A final soil layer (locus 318) was excavated in the southern sector of the northwest probe. It was directly beneath locus 316 and consisted of a sandy, reddish brown (5YR 5/3) fill layer mixed with pebbles. It is equivalent to locus 315 in the northern sector, averaged 21cm in depth, was situated directly above the sterile *wadi* soil and had a maximum depth of -2.01m. Two pieces of Nabataean ware were found, one a Nabataean Painted Fine Ware Dekorphase 1 rim sherd (Schmid 2000: Abb. 76) (**Fig. 6**).

After the northern probe was excavated down to sterile *wadi* soil, excavation was resumed in the northeastern sector of the trench. Removal of the rough flagstone pavement of locus 308 revealed occupational remains in *loci* 319 and 320. Locus 319 was a weak red (2.5YR 6/4) sandy soil layer with numerous pebble inclusions; it was 57-62cm in thickness and reached a depth of -1.87m below the datum point. The pottery was almost exclusively Early Hellenistic, together with even earlier vessels



6. Trench 9: northwestern sector with loci (J.L. Rivard).

of the Persian period **(**III. **Table 1:D-J**). The assemblage includes the rim and bent handle of a Persian 'torpedo' jar (III. **Table 1:H-I**). The rest of the pottery of locus 319 was purely Early Hellenistic: an amphora handle, out-turned and incurved jar rims, lamp nozzles and a small Black-glazed sherd. In addition, perhaps the most important find from locus 319 was a North Arabian bronze coin, an 'Athenian imitation', dating probably to the 4th/early 3rd century BC (IV: no 14). This is the first find of this type in a stratified context at Petra, but hundreds of examples of this issue have now been documented recently across Northern Arabia, suggesting that they are the product of one or more local Arabian mint.

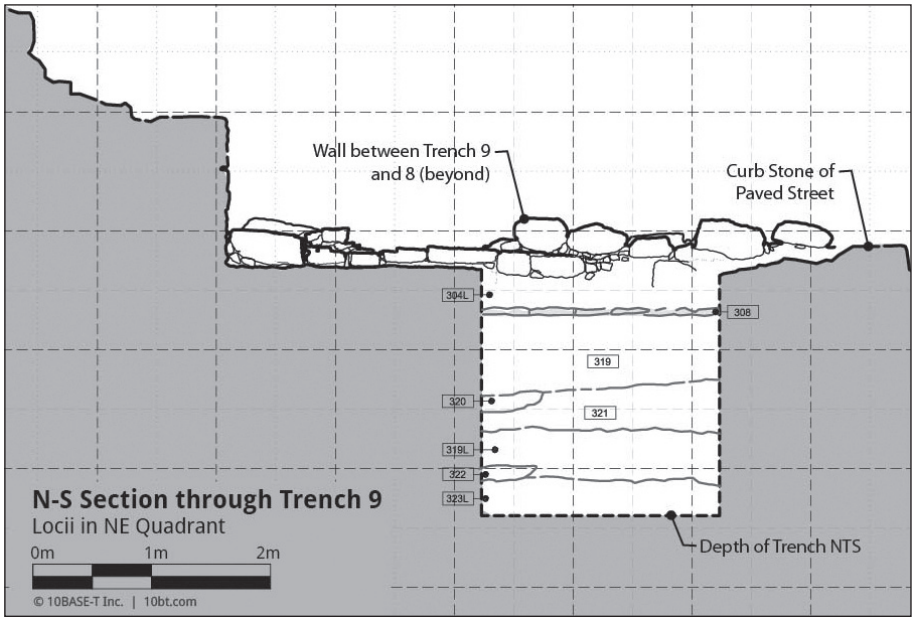
Also found beneath locus 308 was a large fire pit/hearth and its associated deposits (*loci* 320-323), uncovered in the southeastern corner of the probe along the wall of locus 317. Locus 320 was a thick layer of black (5.YR 2.5/1) ash measuring 29cm deep. This ash layer was over an 18cm soil layer of red (2.5YR 6/6) sand (locus 321), below which was a dark red (2.5YR 4/8) burnt soil layer (locus 322) that measured 8cm in depth. The pottery from locus 320 was purely Early Hellenistic (III. **Table 1:A-B**), including a heavy incurved bowl and the out-turned rim of perhaps a fish plate. The final layer excavated in Trench 9 was the bottom of the hearth (locus 323), which comprised another thick black (5YR 2.5/1) layer that was 39cm deep. At this point, the bottom of locus 323 was reached at -2.16m, just above the *wadi* bed, and at a point slightly below that of the northwest sector (**Fig. 7**).

II.3: Interpretation

The results of excavation in Trench 9 from the HPP III excavation season were nothing less than astounding. In a very short amount of time, the excavations revealed a stratigraphic sequence that ranged from the Persian to the Middle Roman/Early Byzantine periods. Important to the goals of the project was the discovery of stratified remains dating from the earliest settlement phase attested in Petra. The artefactual evidence from the associated *loci* included a coin dating to the late 4th/early 3rd centuries BC, early Hellenistic wares including imported Attic black-glazed pottery, and a fairly large ceramic assemblage of common wares of the Persian and Early Hellenistic period that have never been reported from the manifold excavations at Petra to date. This evidence both confirms and also supplements the literary account of the ancient authors with regard to this early occupation of Petra.

II.4: Results of Trenches 8 and 9

These stratified finds indicated a continuous occupation from the late Persian into the Early Hellenistic period just south of the Colonnaded Street, with structures built on the *wadi* bed, which obviously extended further south in earlier periods. In addition, from the architectural



7. Trench 9: northeastern sector with loci (J.L. Rivard).

perspective, the east-west stone wall (N) that Parr discovered in his Trench III appears to run continuously across all our adjacent trenches, in Trench 3 (Graf *et al*. 2005: 423-424, fig. 12, wall ST7a), Trench 8 (W207) and Trench 9 (W317). This wall is poorly constructed of small ashlars and unhewn stones of various sizes, with mud-mortar packing and chinking stones filling in the gaps. The wall is about 0.65m wide in Trench 8 and ran on a slight southwest to northeast angle that was neither parallel with the southern portico wall that marked the southern boundary of the trench nor perpendicular to the north-south walls that divided Trench 3 from Trench 8 and Trench 8 from Trench 9. This early east-west wall, resting on the *wadi* bed, appears to have gone through a number of renovations or repairs. A possible break in this eastern wall in Trench 8 could represent a doorway, indicating that the wall divided the area into a number of small rooms to the north and south. A well-constructed fire pit abutting the north face of the wall contained a single Early Hellenistic sherd (Phase IIIa, locus 218 [see **Fig. 4**]), with predominantly Early Hellenistic sherds just below the pit (Phase II-Ib, locus 219). In Trench 9, a similar find of a large fire pit/hearth on the northern face of what appears to be the same wall, yielded only Early Hellenistic sherds (locus 320). As a result, it appears that the construction of the wall dates from the late Persian/early Hellenistic period, and is bedded directly on the sterile soil of the *wadi* bed. Admittedly, the constructions along the wall represent only small-scale domestic quarters and/or industrial activities, but any early major architectural features could have been simply destroyed or cleared away by later constructions. Since these early strata were less than a meter from the edge of the street, it is possible the Colonnaded Street has destroyed or covered over much of the earlier settlement. In sum, these finds confirm those produced by Peter Parr's Trench III, providing additional credence to his envisaging an "undisturbed sequence of (early) structures" in the area.



8. Hellenistic pottery (S.E. Sidebotham).

III. Ceramic Analysis

Tali Erickson-Gini

The HPP III season in 2007 produced a relatively large amount of ceramic material from two trenches (Trenches 8 and 9) located south of and abutting the paved Colonnaded Street in the city center of Petra. The excavation of Trench 9 produced a clear stratigraphic sequence manifested in the architecture as well as the ceramic and numismatic finds ranging from the Middle Roman/Early Byzantine periods to the Late Persian and Early Hellenistic periods. This sequence was not immediately apparent in Trench 8 with regard to the architectural and numismatic finds. However, Trench 8 produced a pottery sequence similar to that found in Trench 9, with the earliest types discovered in the lower levels of the trench and later types discovered in the upper levels.

The ceramic finds were initially sorted by Benjamin J. Dolinka, the excavator of Trench 9, who separated and catalogued the diagnostic sherds examined in this report and made preliminary counts of both these and the discarded sherds. His initial sorting and recording of the ceramic finds forms an invaluable basis for this report. The HPP III ceramic assemblage was examined later by Dr. Jean-François Salles, director of IFPO, and myself. According to Dr. Salles (pers. comm.), the Black-glazed ware present in the assemblage dates to the 4th-3rd centuries BC and either belongs to Attic Black-glazed vessels or, more likely, to similar wares produced elsewhere in that period that were imported to Petra. He also selected a number of vessels from the assemblage to be drawn and provided the facilities in 2008 at IFPO in Amman, Jordan where the entire assemblage was examined (**Fig. 8**).

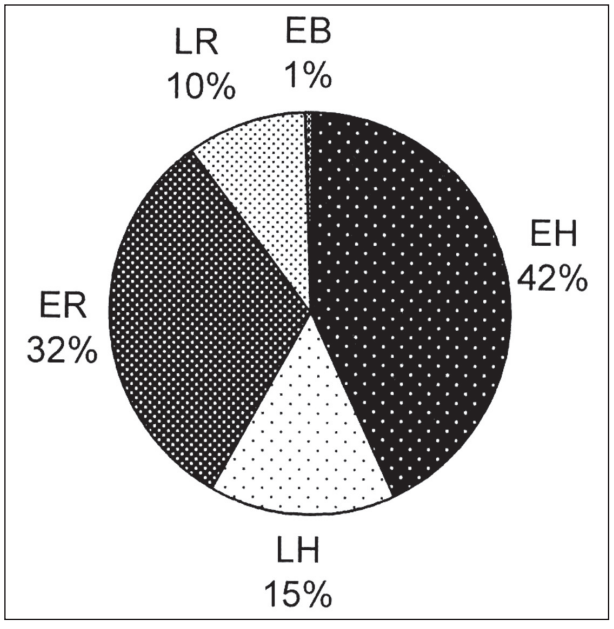
Parallels for the early wares in the assemblage were found primarily from sites located along the Mediterranean coast such as Khirbat al-Burj (Tel Dor), Arsūf (Apollonia), Ashdod

and Tall Michal. In addition, some imported Attic Black-glazed wares were also present. The coastal ports were the interface between the distant inland site of Petra and the Mediterranean world. Thus, it comes as no surprise to find distinct parallels with the assemblages of that region.

*III.1: Pottery from Trench 9 (***Fig. 9***)*
Loci 320 and 319

Persian and Early Hellenistic ceramic finds were discovered in the lowest levels of the excavation in Trench 9 in locus 319 the northwestern quarter of the excavation square. A hearth (locus 320) containing a small amount of pottery was discovered in the southwestern corner of locus 319. A minor amount of later material in the upper level of locus 319 (such as a sherd corresponding to Schmid's Dekorgruppe 1, from Phase 1 in az-Zanṭūr not presented here [Schmid 2000: Abb. 74-75]), marks the interface between the early and late phases.

The assemblage comprises wares identified as belonging to the Late Persian and Early Hellenistic periods. These include incurved rim bowls (**Table 1:A, D**) popular in the Late Persian and Early Hellenistic periods. **Table 1:A** is an early plain ware type clearly inspired by Attic imports, corresponding to Stern's Type E, which appears at the end of the Persian period (Stern 1995: 53). At Khirbat al-Burj (Tel Dor), incurved rim bowls made up 75% of bowls by the beginning of the Hellenistic period (Guz-Zilberstein 1995: 289). This form was produced into the Late Hellenistic period at Petra (Schmid's Dekorgruppe 1, from Phase 1 in az-Zanṭūr [Schmid 2000: Abb. 10-17]). A second type is a plain ware bowl with a concave rim (**Table 1:B**) that imitates the Attic form of the Persian and Early Hellenistic periods (*ibid*.: 290-291). A coarse ware vessel with a thick horizontal rim and thumb-impressed spout (**Table 1:C**) appears to be a type of Early Hellenistic *mortarium* also discovered at Khirbat al-Burj (Tel Dor) (*ibid*.: 295, fig. 6.10). The upright neck and flanged rim covered with a gray slip (**Table 1:E**) resembles that of a globular krater discovered in Persian contexts at Tall Michal (Singer-Avitz 1989: fig. 9.2:3). One of the earliest vessels in the assemblage is a coarse ware cooking pot with an upright neck and flanged rim (**Table 1:F**) with parallels found in the Persian period at Khirbat al-Burj (Tel Dor) (Stern 1995: fig. 2.37:9). Parts of storage jars have Persian and Early Hellenistic parallels (**Table 1:G-I**). The first is an outturned rim belonging to a type of elongated bag-shaped jar commonly found in the region. Parallels may be found in the Persian period at Arsūf (Apollonia) (Tal 1999: Fig. 4.40:3) (**Fig. 9**).



9. Trench 9 pottery analysis (T. Erickson-Gini).

Table 1:H-I are the rim and bent handle of a cylindrical 'torpedo' jar, Stern's Type G (Stern 1995: figs. 2.9:1,4). The bent handle bears traces of plaster accretions. This was a widespread type of storage jar found throughout the eastern Mediterranean region at coastal and inland sites (including Mesopotamia) primarily in the Persian period, that is to say the 6th to 4th centuries BC (Stern 1995: 62). Guz-Zilberstein reports that storage jars of this type were found exclusively in the transitional Persian-Hellenistic period (325-275 BC at Khirbat al-Burj [Tel Dor]) (Guz-Zilberstein 1995: 312). Parallels for our vessel were uncovered in a Persian-period assemblage in northern Sinai at Tall al-Qudayrat (ancient Kadesh Barnea) (Cohen and Bernick-Greenberg 2007: pl. II.132:8). That site was located along an ancient caravan route frequented by the Nabataeans in later periods. Raban suggests that the jars were used to preserve fish (Raban 1976) and they are known to have served as tomb offerings in the Persian period (Tal 1999: 103; Stern 1982: 75-76, fig. 109).

The nozzle of a lamp covered with a buff slip (**Table 1:J**) belongs to a closed lamp commonly found in the region in the Late Persian and Early Hellenistic periods. It appears to be an imitation of Attic lamps of the same period. Petrographic analysis on lamps of this type from Arsūf (Apollonia) (Tal 1999: fig. 4.41:15) suggests a Cypriot or Aegean provenance (*ibid*.: 161).

Loci 312, 310, 308 and 300

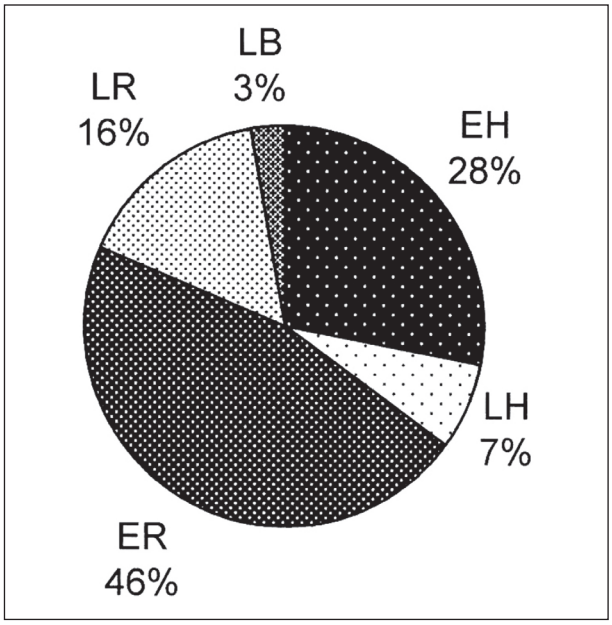
The upper levels of Trench 9 contain vessels of the late 2nd or 1st centuries BC and what appears to be an early cooking pot lid (**Fig. 2:C**) that has parallels in the Persian period at Khirbat al-Burj (Tel Dor) (Stern 1995: fig. 2.4:2). The assemblage is presented here in the order of the *loci*, from earliest to latest.

Parts of imported amphorae were uncovered (**Table 2:B, H**). The rim of **Table 2:H** and base of **Table 2:B** appear to belong to Rhodian jars similar to an example from Khirbat al-Burj (Tel Dor) in the Late Hellenistic period (Guz-Zilberstein 1995: fig. 6.45:1). Bowls include a base of the earliest form of Nabataean Painted Fine Ware bowls, Schmid's Dekorgruppe 1 (**Table 2:J**), dated to between 150 and 50 BC (Schmid 2000: Abb. 74). Open forms include a shallow, incurved rim bowl (**Table 2: E** [se *cf.* also **Table 1:A** and **D**]) and a bowl after the fishplate tradition with a drooping rim (**Table 2:F**). This type of plate belongs to a type generally found in the region in contexts dated to the 3rd and 2nd centuries BC. Plates of this form and ware have been found at Arsūf (Apollonia) (Fischer and Tal 1999: fig. 5:12:3-4). A carinated bowl covered with a gray brown slip has parallels with a form found at Khirbat al-Burj (Tel Dor) (Guz-Zilberstein 1995: fig. 6.7:10). According to Guz-Zilberstein, this type of bowl generally has pinched, horizontal handles, which she dates to the early 2nd through early 1st centuries BC (*ibid*.: 294). No exact parallels could be found for two deep, open vessels (**Table 2:D, G**). The first (**Table 2:D**) is a krater made of a heavy, coarse ware. It has a deep and lined form with an everted, grooved rim. The second (**Table 2:G**) is a large krater or *mortarium* with a lined, everted ledge rim. Part of a lamp nozzle with parallel lines (**Table 2:I**) made of a dark gray ware may belong to a mold-made lamp with radial shoulder decoration discovered frequently at Khirbat al-Burj (Tel Dor) in the period between 200 and 50 BC (Rosenthal-Heginbottom 1995: fig. 5.16:11).

*III.2: Pottery from Trench 8 (***Fig. 10***)*
Loci 219, 217, 215, 214, 212, 210 and 209

Similar to Trench 9, but less defined, the assemblage uncovered in Trench 8 contains ceramic vessels of an early date (Persian and Early Hellenistic periods) as well as vessels from the 2nd and 1st centuries BC. Many of early vessels appear to be residual in later levels. A selection of material from these *loci* is presented here from the earliest levels to the latest. It should be noted that the later levels, including locus 209, contain a mixture of early and late material, including sherds from the later part of the 1st century BC (such as Schmid's Dekorgruppe 2a and 2b), not presented here (**Fig. 10**).

One of the earliest vessels indicated in the assemblage (and in Petra itself) is residual, appearing in one of the later levels (locus 209). This is the shoulder of an Attic painted *lekythos,* possibly produced in the Beldam Workshop (**Table 3:N**). It is quite worn and made of a light red ware with worn red vertical lines applied at the bottom of the neck and on the angular shoulder. According to Tal (1999: 106), *lekythoi* produced in the Beldam Workshop became commonplace in the region by the mid-5th century BC.



10. Trench 8 pottery analysis (T. Erickson-Gini).

A number of imported Attic Black-glazed vessels were revealed in the assemblage. They include the base of an Attic wheel-made lamp (**Table 3:A**) discovered in one of the earliest levels of Trench 8. The walls of the lamp are thick and the base convex and raised towards the center. Lamps of this type were discovered on the Mediterranean coast at Khirbat al-Burj (Tel Dor) in contexts dating to between 420 and 290 BC (Rosenthal-Heginbottom 1995: 234, figs. 5.13:1-2). Two Attic Black-glazed bowls have flaring sides and slightly everted rims (**Table 3:D, M**). According to Tal (1999: 130), this form is one of the most common Attic bowl types imported into the region. They correspond to bowls discovered in the Athenian Agora dated to the period between 400 and 310 BC (Sparkes and Talcott 1970: 128-130, 293-294, nos 801-808, fig. 8, pl. 32). Stewart and Martin (2005: 91) report a complete cessation of Attic imports at Khirbat al-Burj (Tel Dor) after *ca* 300 BC.

Other early bowls include one with a flanged, incurving rim (**Table 3:J**). This appears to be an Early Hellenistic imitation of the Attic ware form similar to bowls uncovered at Arsūf (Apollonia) (Fischer and Tal 1999: fig. 5.7:1) and Ashdod (Dothan 1971: fig. 8:3). Another type has a horizontal, infolded rim covered on the exterior with a dark gray slip (**Table 3:K**). This may be an imitation of Attic flat plates of the late 4th and early 3rd centuries BC (Crowfoot *et al*. 1957: 25). At Khirbat al-Burj (Tel Dor), they were uncovered in Early Hellenistic contexts as well as contexts dated to the 2nd century BC (Guz-Zilberstein 1995: 292-293). No exact parallels were found for a coarse ware bowl with a heavy, squared and everted rim (**Table 3:C**). A shallow plate with a drooping rim after the fishplate tradition (**Table 3:G**) is present (see also **Table 2:F** above).

An early form of krater with a wide, flaring mouth and flattened, everted rim (**Table 3:H**) may be compared with a Late Persian deep krater form from Khirbat al-Burj (Tel Dor) (Stern 1995: fig. 2.3:2, 11). A similar example was uncovered at Arsūf (Apollonia) (Tal 1999: fig. 4.12:11). An early storage jar has a short, slightly concave neck (**Table 3: I**). A groove is located below the neck. It belongs to a class of storage jars found in the Persian period at Arsūf (Apollonia) (Tal 1999: figs. 2.25:9-11). A storage jar with a collared neck (**Table 3:B**) has a deep groove located below the neck and a pointed, upright rim. Jars of this type were found in Early Hellenistic contexts at Khirbat al-Burj (Tel Dor) (Guz-Zilberstein 1995: fig. 6.47:32).

Ceramic vessels found in later levels in Trench 8 include part of a worn molded relief ware ('Megarian'-type) bowl (**Table 3:E**), decorated with a row of plain medallions located between two ridges. The bowl is covered with a worn dark brown paint above and below the row of plastic decoration. The plastic decoration resembles that found on bowls from the Athenian Agora (Rotroff 1982: no 398; pl. 68:88). A hemispherical fine ware bowl with a slightly everted rim and a band of ridges below the rim (**Table 3:F**) is covered with a dark grayish brown slip on the exterior. This vessel may have been produced in Petra (Schmid's Type E7a, attributed primarily to Phase I in az-Zanṭūr [Schmid 2000: Abb. 157-158]).

Two cooking pots (**Table 3:L, O**) found in the later levels of Trench 8 correspond to Nabataean forms dated to the early 1st century BC from az-Zanṭūr (Stucky *et al.* 1994: figs. 15F, K). Both have short, bulging necks and flanged rims.

III.3: Conclusions

The outstanding feature of the HPP III ceramic assemblage is the significant presence of Persian and very Early Hellenistic vessels, including the presence of imported Attic Black-glazed wares in a stratified context (*cf.* Horsfield 1942: 128 nos 80 from bedrock and no 81 from the Katute dump).

This early assemblage appears to have been largely imported to the site. However, petrographic analysis may reveal that some of these vessels were produced locally. In contrast, there is a paucity of material dated to the later 3rd and early to middle 2nd centuries BC. The virtual absence of pottery from this period was also noted by Dr. Salles (pers. comm.). This stands in contrast to the adjacent Trench 3 of HPP I 2004, which showed continuous occupation from the early Hellenistic period to the 1st century AD, and the results of the French excavations in the *temenos* area of Qaṣr al-Bint in the heart of Petra, which provided evidence of a phase of the

Early Hellenistic period that postdates that of Trenches 8 and 9 (Mouton *et al.* 2008; Renal *et al*. 2012). It also conflicts with the numismatic evidence from Trench 9, which produced three Nabataean anonymous issues of Type 2, dating to the late 3rd and early 2nd centuries BC, from the lower layers in a Hellenistic context (see IV. nos 10-12). These finds make perplexing this apparent absence of clearly discernible diagnostic sherds of the 2nd century BC. The coinage suggests that the seeming gap may be a red herring, and that some of the Black-glazed ware may date later than assumed or 2nd century BC wares were disguised in the non-diagnostic sherds that were discarded. But the scarcity of imported wares in Trenches 8 and 9 remains a problem. Rhodian amphorae, molded relief ware (like the so-called 'Megarian' bowls) and the earliest forms of Eastern Sigillata appear elsewhere in excavations at Petra, in some quantity. However, in the HPP III assemblage such finds are comparatively rare, consisting only of a few fragments of Rhodian amphorae (**Table 2:B, H**) and a sherd of a 'Megarian'-type bowl (**Table 3:E**). There is even a marked scarcity of Schmid's Nabataean Painted Fine Ware Dekorphase 1 - a single sherd from Trench 9, dated to the period between 150-50 BC (Schmid 2000: Abb. 73-77) - and no sign of the ribbed-necked jars of the 1st century BC discovered, for example, in significant quantities and variations in an isolated building (farmhouse?) just north of Petra (Knodell *et al.* 2017: fig. 14: 20-27).

Whatever the case, this seeming gap in the ceramic assemblage and stratigraphic sequence requires some explanation, since it appears that most of the area was apparently undisturbed by construction until some time in the 1st century BC and the Early Roman period. This may be connected to our limited soundings, but the apparent ceramic gap is still noteworthy.

The later periods represented in the assemblage include the end of the Late Hellenistic period, *i.e*. the mid-1st century BC, the Early Roman period (the late 1st century BC through 1st century AD), the Middle Roman period (post 106 AD until the early 3rd century AD) and the Early Byzantine period (4th century AD). The pottery of the 1st century BC includes early forms of painted and unpainted Nabataean fine ware corresponding to Schmid's Dekorgruppe 2a, which he dates to the period between 50 and 20 BC (Schmid 2000: Abb. 79-82). That of the next period, the Early Roman, includes Schmid's Dekorgruppe forms 2b, 2c and 3a (Schmid 2000: Abb. 83-89), dated to the period between 20 BC and 80 AD. But some reservation must be expressed about the chronology of Schmid's az-Zanṭūr Dekorphases, particularly Phases 3a-c: 20-80 AD (a), 80-100 AD (b) and 100-150 AD (c). There are no coins at az-Zanṭūr for dating Phases3a and 3c, and rather than the proposed compressed chronology for Types 3b and 3c, it is clear they must be expanded into the 2nd and 3rd centuries AD (see Erickson-Gini and Tuttle 2017: 116-124). With this caveat about the az-Zanṭūr chronology in mind, only the sequences of the az-Zanṭūr Dekorphases are cited for convenience as a general guide. There is also a minimal amount of Eastern Sigillata wares, Nabataean piriform unguentaria, fragments of Nabataean molded lamps (Grawehr's Types C3 and E [Grawehr 2006]) and Nabataean painted and unpainted fine ware and plain ware bowls. The Late Roman phase includes forms of debased Nabataean painted ware bowls (Schmid's Dekorgruppe 3c [Schmid 2000: Abb. 92-93]) and rouletted ware bowls (Schmid's Gruppe 9 [Schmid 2000: Abb. 62-65]). A very small amount of Early Byzantine pottery was found, primarily in the topsoil of Trench 8, which produced parts of an African Red Slip ware bowl, possibly corresponding to Hayes Form 50 (Hayes 1972), as well as a fragment of a molded lamp (Grawehr's Type L [Grawehr 2006]) and a sherd of a Judean rouletted-ware bowl (Magness 1993: 195-186; Erickson-Gini 2010: fig. 4:6). The Early Byzantine vessels and lamp have been found in contexts correlating with the tremendous earthquake in 363 AD that destroyed much of Petra, as at Mezad Hazeva and Mampsis for example (Erickson-Gini 2010: 79-80, 85, 99).

Nevertheless, the substantial Early Hellenistic and even pre-Hellenistic finds in the ceramic assemblage of Trenches 8 and 9 are truly impressive and point to the probability that an Early Hellenistic settlement existed in the heart of Petra at a date earlier than previously assumed. The HPP III 2007 assemblage provides extremely valuable data for the dating of Early Hellenistic wares found in Nabataean sites.

The presence of what appears to be locally produced vessels at this early stage in Nabataean history, including Nabataean anonymous coinage discovered in association with architectural remains, suggests that these Nabataeans had become sedentarized much earlier than previously assumed by scholars. These findings are supported by the discovery of early Hellenistic remains at Qaṣr al-Bint at Petra (Mouton *et al.* 2008; Renal *et al*. 2012), the recent discoveries at Mada'in Salih (ancient Hegra) in Saudi Arabia (Nehmé *et al.* 2014) and early Nabataean forts at several sites in the Negev and western 'Arabah (Erickson-Gini and Israel 2013).

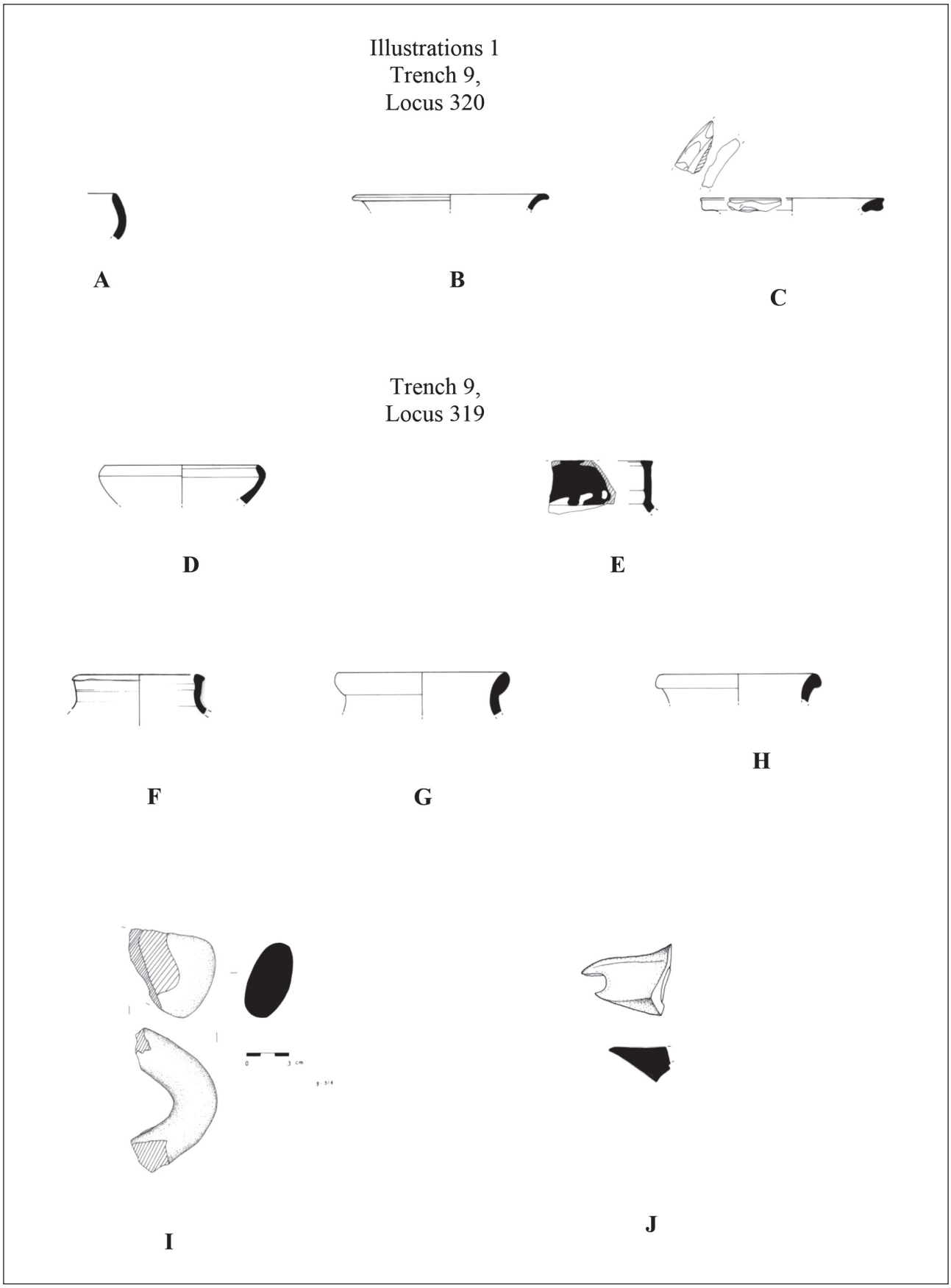
III.4: Catalogue of the HPP III Pottery

Table 1: Trench 9 (L320 – L319/15) (**Fig. 11**).

Fig. 1	Cat. No	Vessel	Description
A	320/3	Incurved rim bowl	Yellowish-red ware 5YR5/6; gray core; numerous tiny to small white inclusions.
B	320/2	Out-curved rim bowl	Yellowish-red ware 5YR5/6; light gray core; occasional small white inclusions.
C	320/1	*Mortarium* with thumb impressions on the rim	Light gray core; occasional medium white inclusions; red slip on exterior 2.5YR5/8; coarse texture, thumb-impression on rim.
D	319/4	Incurved rim bowl	Yellowish-red ware 5YR5/6; slip on interior: light gray 10YR7/2; light brown core; small to large white inclusions.
E	319/7	Krater	Reddish-yellow ware 5YR6/8; gray slip 7.5YR5/1 (slip is drippy on interior); light gray core; occasional medium white and light gray inclusions.
F	319/1	Cooking pot	Yellowish-red ware 5YR5/8; light brown core; numerous tiny to large white and light gray inclusions; rough texture.
G	319/2	Storage jar	Reddish-yellow ware 5YR6/6; light gray slip 10YR7/2; light brown core; occasional large white and light gray inclusions.
H	319/3	'Torpedo' jar rim	Reddish-brown ware 5YR4/4; gray core 7.5YR6/1; numerous tiny to small white inclusions; coarse texture.
I	319/9	'Torpedo' jar handle	Reddish-yellow ware 5YR6/6; pink slip 5YR 7/3; plaster accretions.
J	319/5	Lamp nozzle	Reddish-yellow ware 5RY6/6; very pale brown slip 10YR8/4; traces of charring.

Table 2: Trench 9 (L312 – L300) (**Fig. 12**).

Fig. 2	Cat. No	Vessel	Description
A	312/1	Carinated bowl	Reddish-brown ware 5YR5/4; gray-brown core; occasional very large white inclusions brown slip 7.5YR5/3 on exterior rim and upper interior, drippy on interior.
B	312/2	Amphora knob base	Reddish-brown ware 5YR6/6.
C	312/3	Lid	Light reddish-brown ware 5YR6/4; on both sides; numerous tiny white inclusions; gray slip 7.5YR5/1; semi-coarse ware.
D	310/1	Deep krater	Yellowish-red ware 5YR5/6; numerous small to large white inclusions; gray slip on exterior 2.5YR5/1, extends to upper rim past the groove; heavy coarse ware.
E	308/6	Shallow incurved bowl rim	Light red ware 2.5YR6/8.
F	308/5	Plate after the fishplate tradition	Red ware 2.5YR5/8; occasional small white inclusions; dark reddish-brown slip on exterior and on rim 5YR3/3.
G	308/4	Large bowl or *mortarium*	Red ware 2.5YR5/8; light brown core; occasional tiny white and gray inclusions; light brownish gray slip.
H	308/3	Rhodian amphora	Pink ware 7.5YR7/4.
I	308/1	Lamp nozzle	Very dark gray ware 2.5Y3/1.
J	300/1	Nabataean painted ware bowl base	Red ware 2.5YR5/6; light gray core; red deco 2.5YR4/6.



11. Pottery from Trench 9: illustrations loci 320 and 319, Table 1 (T. Erickson-Gini).

Illustrations 2
Trench 9,
Locus 312



A



B



C

Trench 9,
Locus 310



D

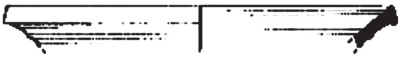
Trench 9,
Locus 308



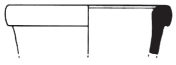
E



F



G



I



H

Trench 9,
Locus 300



J

12. Pottery from Trench 9: illustrations loci 312-300, Table 2 (T. Erickson-Gini).

Table 3: Trench 8 (L219 – L200) (**Fig. 13**).

Fig. 3	Cat. No	Vessel	Description
A	219/1	Attic wheel-made lamp base	Reddish-yellow ware 7.5YR6/6; very dark grayish brown slip 10YR3/2.
B	217/1	Storage jar	Yellowish-red ware 5YR5/6; occasional small white inclusions; very dark grayish brown slip 10YR3/2; coarse ware.
C	215/1	Heavy bowl rim	Reddish-yellow ware 5YR6/6; occasional tiny to small white inclusions; rough texture; brown slip 7.5YR4/2 on exterior rim and upper interior.
D	215/3	Attic Black-glazed bowl rim	Yellowish-red ware 5YR5/8; metallic black glaze 10YR7/3.
E	215/2	Bowl	Red ware 2.5YR5/8; occasional tiny white inclusions; dark reddish gray slip 5YR4/2 on exterior and upper interior rim.
F	214/1b	Molded relief ware bowl	Red 2.5YR5/8 to reddish yellow 5YR6/8 ware; thick dark gray core; occasional tiny white inclusions; very worn dark brown slip 7.5YR3/2 on exterior above and below the plastic decoration.
G	214/2	Hemispherical bowl	Reddish-yellow ware 5YR6/6; worn very dark grayish brown slip on exterior and dripping on interior 10YR3/2.
H	214/1a	Plate in the fish plate tradition	Yellowish-red ware 5YR5/6; occasional tiny white and large white inclusions; light gray slip 10YR7/2 on exterior; drippy brown to red slip 2.5YR4/8 on interior.
I	214/2b	Krater	Yellowish-red ware 5YR5/6; numerous tiny to medium white inclusions; reddish-brown slip 2.5YR4/4 on exterior below rim.
J	214/5	Storage jar	Reddish-yellow ware 5YR6/8; thick light gray core; occasional small white inclusions; very pale brown lip 10YR8/2.
K	212/1	Plate with infolded rim	Reddish-yellow ware 7.5YR6/6; occasional medium white inclusions; very dark gray slip 10YR3/2 on exterior and on the interior rim.
L	210/1	Cooking pot	Reddish-yellow ware 5YR6/8; occasional medium light gray inclusions; light reddish brown slip 5YR6/4.
M	209/10	Black-glazed bowl	Yellowish-red ware 5YR5/8; shiny black glaze 5YR2.5/2.
N	209/11	Painted *lekythos*	Light red ware 2.5YR6/8; faded red decoration 2.5YR4/8; very worn.
O	209/13	Cooking pot	Reddish-yellow ware 7.5YR6/6; numerous tiny and small white inclusions and occasional small light gray inclusions; coarse ware.

IV. Coinage Report

D.F. Graf and S.E. Sidebotham

IV.1: Introduction

The third season of the Hellenistic Petra Project recovered 14 coins. All were *aes* issues; no hoards were discovered. Christian Augé inspected the coins in the field and his readings were extremely accurate. The coins were cleaned using muriatic acid diluted with tap water. Coins were weighed on an Acculab Pocket Pro C/60 precision electronic balance with accuracy to 0.01 of a gram. Coins were measured after cleaning with maximum diameters recorded to the nearest millimeter. All identifiable coins are Nabataean with the exception of catalogue no 14 (Trench 9, locus 319), which is North Arabian dating to the late 4th or 3rd century BC. Two coins (catalogue nos 3 and 6) disintegrated during cleaning. Several of the issues are important (no 1 and nos 10-12, and 14) and are discussed below.

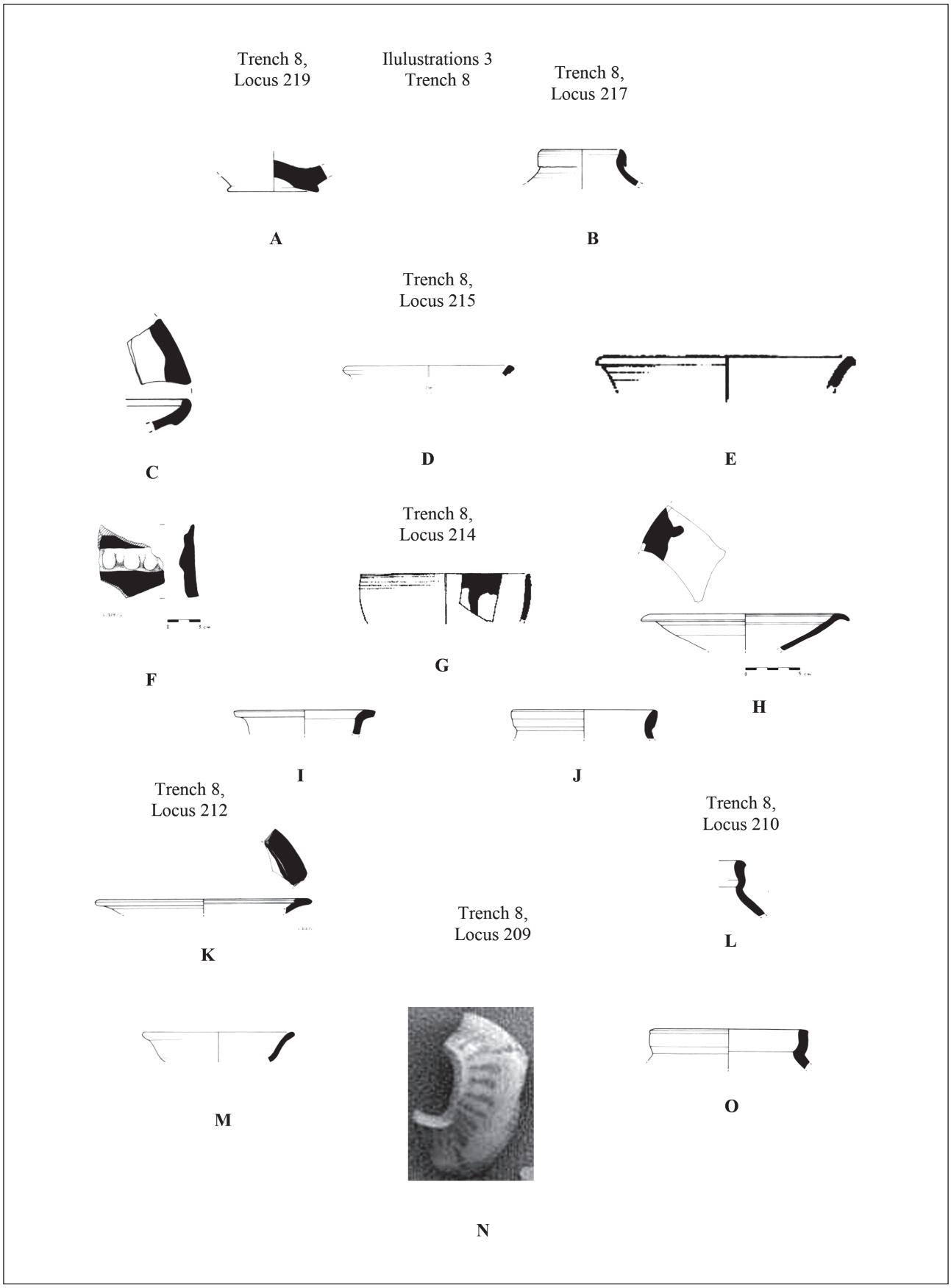
Abbreviations:

Obv. = obverse
Rv. = reverse
stg. = standing
l. = left
r. = right
fig. = figure
mm = millimeters
g. = grams

Format

The following format has been used to record the coins

1) Locus number
2) Date of find
3) Size (or denomination) of coin in mm



13. Pottery from Trench 8: illustrations loci 219-209, (T. Erickson-Gini).

4) Weight in grams
5) Origin of coin
6) Date
7) Obv.
8) Rv.
9) Die positions
10) Parallels (if any).

Entries marked with an * appear in accompanying photographs

IV.2: Catalogue

Trench 8

1*) Locus 206B (August 4); AE 16 Nabataean; 2.10 g.; Obodas II, with monograms of Aretas IV (= *ḥ*) and Syllaeus (= š); 9-6BC; Obv: flat, bust of Obodas II r.; Rv: concave, crossed cornucopiae, on r. *ḥ*, on l. š; parallels: *cf.* Meshorer 1975: 40-43A; Schmitt-Korte 1990: 111-112 no 25-28; Barkay 2017: 71-72, type 7c; al-Salameen 2013. 65-124 [Arabic].
2) Locus 206B (August 4); AE 18; 2.54 g.; unidentifiable.
3) Locus 206 B (August 4); disintegrated.
4) Locus 217 (August 8); AE 15; 1.44 g.; Nabataean ?; Obv. bust r.?; Rv. crossed cornucopiae?

Trench 9

5) Locus 300 (August 1); AE 14; 0.45 g.; unidentifiable.
6) Locus 308 (August 8); disintegrated.
7) Locus 308 (August 7); AE 14; 1.96 g.; Nabataean; 4/3BC; Obv. laureate head of Aretas IV r.; Rv. crossed cornucopiae with o between them, beneath o, the letter *Ḥ*; Meshorer 1975: no 73.
8) Locus 308 (August 8); AE 16 (largest piece); two pieces, about half the coin is missing and lost; 1.99 g. and 0.24 g.; unidentifiable.
9) Locus 309 (August 4); AE 17; 2.46 g.; Nabataean; Aretas IV, 39/40AD; Obv. jugate busts of Aretas IV and Shuqailat; Rv. double cornucopiae, with a three-line inscription *Ḥrtt*/Šqy/*lt*; ↑↑; Meshorer 1975: no 112.
10) Locus 309 (August 4); AE 15; 3.39 g.; Nabataean; Anonymous. Type 2 (*ca* 200BC); Obv. helmeted head r.; Rv. Nike stg. l., r. hand extended, r. hand down by side; Meshorer 1975: nos 1-2.
11*) Locus 310 (August 5); AE 18; 3.19 g.; Nabataean; Anonymous, Type 2 (*ca* 200BC); Obv. helmeted head r.; Rv. Nike stg. l., r. hand extended, l. hand down by side; Meshorer 1975: nos 1-2.
12) Locus 316 (August 7); AE 17; 3.83 g.; Nabataean; Anonymous, Type 2 (*ca* 200BC); Obv. helmeted bust r.; Rv. Nike fig. stg. l.; Meshorer 1975: nos 1-2.
13) Locus 316 (August 7); AE 17; 2.03 g.; Unidentifiable, badly corroded.
14*) Locus 319 (August 9); AE 21; 10.62 g.; northern Arabian; *ca* late 4th-3rd century BC; Obv. Crude stylized head of Athena r. full r. eye; Rv. Owl stg. r. face frontal, on l. olive sprig, legend ΘE downward to r; Hill 1922/1965: 77 (no 3); *SNG* 1981: nos 1453-1454; *cf*. Mildenberg 1996.

IV.3: Analysis and Discussion

There are a few issues of exceptional importance that deserve some comment.

(i) Coin of Syllaeus (**Figs. 14-15**)

Catalogue 1 is an issue of Aretas and Syllaeus. The portrait on the obv. is that of Obodas II, *ca* 30 BC (Schwentzel 2005: 152-153, fig. 5), but has the monograms *Ḥ* (= Aretas) and Š (= Syllaeus) on the rev. (Meshorer 1975: 36-40; Schmitt-Korte 1990: 127-129; Schmitt-Korte and Price 194: 101-103; Barkay 2017: 72, Type 7c; many examples in al-Salameen 2013: 64-114). The putative previous King Obodas designated II is now regarded as fictional (Huth 2010: 214-217). Obodas II is depicted here with a simple Dionysiac 'white' headband with free-hanging ends that is common for Nabataean kings from Aretas III to Rabbel II (*cf*. Smith 1988: 34-44). The king's long-flowing hair



14. Coin 1, Syllaeus, Obv. (S.E. Sidebotham).



15. Coin 1, Syllaeus, Rev. (S.E. Sidebotham).

reflects the hair-style of Dushares-Dionysus (Bowersock 190: 31). Since Syllaeus' name appears in full on some issues (Šly), it is clear that the monogram letters *Ḥ (*Aretas) and Š (Syllaeus) on the reverse represent both claimants to the throne during the succession crisis that followed the death of King Obodas II in 9/8 BC (Josephus, *AJ* 16.293-299). New discoveries greatly expand the types and variants of the silver and bronze issues of Syllaeus, with more than a dozen new variants (al-Salameen 2013: 65-126). There is even a series with a portrait head of Aretas on the obverse and with what may be the portrait of Syllaeus on the reverse, each accompanied by the appropriate Aramaic monogram letters of *Ḥ* and Š, respectively (Huth 2010: 220, fig. 4iii). The newly discovered issues include large quantities of silver coins (hemidrachms), some with the head of Obodas II and others with that of Aretas IV (Hoover and Barkay 2010: 202; al-Salameen 2013; al-Rawabdeh 2015: 80-81). The quantity and variety of the issues of Syllaeus suggest a minting period of some length, so that the Obodas-Syllaeus and Aretas-Syllaeus issues are now dated for an extended period between 9 and 6 BC (Huth 2010: 218-220; Barclay 2017: 67-81 [for other issues of Syllaeus, see al-Salameen 2013; Goussous *et al.* 2014: 17-19, nos 68-81, and for an issue in the Fīnān see Kind *et al.* 2005: 171, no 16 = Meshorer 1975: no 45 variant]). Our catalogue no 1 suggests the period in which both claimants to the throne were mutually recognized, before Aretas was finally confirmed by Augustus and before Syllaeus was allegedly tried, sentenced and executed in Rome (for a discussion of the complicated and controversial literary sources for Syllaeus see Graf 2016b).

(ii) Nabataean 'Anonymous' Issues (**Figs. 16-19**)

Our finds also include three anonymous Nabataean issues, all from Trench 9: catalogue nos 10-12 from *loci* 309, 310 and 316. They were previously assigned to Aretas II (*ca* 110-96 BC), continuing under Obodas I and Aretas III (Meshorer 1975: 12-13), or assigned later to the period of Aretas III to Aretas IV, from *ca* 72 to 9 BC (Schmitt-Korte and Price 1994: 95-96). However, the stratigraphic context of our finds and other excavations at Petra suggest a much earlier date (see ceramic report above). It is also now clear that the issues were produced over a lengthy period. The diverse issues have recently been categorized into four types, chronologically extending from the 3rd century to the late 2nd or very beginning of the 1st century BC (Barkay 2011: 67-73). Type 1 consists of overstrikes of early Ptolemaic issues (Ptolemy I-III), with a helmeted head on the obverse and a standing Nike to the left on the reverse, which is not represented among our specimens. Our finds rather conform to Type 2, dated to the late 3rd or early 2nd century BC (Barkay 2011: 72). Previously, several dozen such issues were found in the British excavations in the 1950s and 1960s, including a few earlier stray finds at Petra (Bowsher 1990: 223). More recently, French excavations at Qaṣr al-Bint found nine such issues in the upper phases of Phase II (b and c), and almost as many uncertain ones. Although initially assigned a traditional date of the end of the 2nd century BC (Mouton *et al.* 2008: 68-6), the diagnostic pottery and radiocarbon dates of the sounding led to a revision of the chronology to perhaps the end of the 3rd



16. Coin 10, Anonymous, Obv. (Byron Maldonado).



17. Coin 10, Anonymous, Rev.



18. Coin 11, Anonymous, Obv. (Byron Maldonado).



19. Coin 11, Anonymous, Rev. (Byron Maldonado).

century and assuredly the early 2nd century BC (Renal *et al.* 2012: 47-48, 51), which conforms to the stratigraphic context of our finds. At Bi'r as-Sabi' (Beersheba) in the Negev, Types 3 and 4 are represented and were assigned a date after 129/8 BC and before 112/111 BC (Kushnir-Stein and Gitler 1992: 13-20). Our stratified finds of Barkay Type II are, then, an important contribution to the early Nabataean 'anonymous' issues at Petra.

(iii) North Arabian Coin (**Figs. 20-21**)

Catalogue no 14 is especially noteworthy as it is one of the earliest coins found in a stratified context at Petra (locus 319). It is clearly modeled on the famous 5th century BC silver Athenian tetradrachms, which circulated extensively in the Near East and were copied locally in the Levant and, apparently, in northern Arabia in the following centuries. These issues are modeled after Athenian tetradrachms, with a stylized head of Athena on the obverse and on the reverse a standing owl, flanked by motifs inspired by the Greek letters *alpha*, *theta* and *eta* of the original Athenian legend and the olive branch. The numerous issues represent diverse types that are dated to the end of the 3rd century into the middle of the 1st century BC, since they appear with Alexander types and early Ptolemaic issues. The closest previously published *aes* parallels (in size and weight) are in the British Museum (Hill 1922/1965: 77, no 3, pl. XI.26, nos 1453-1454), with parallels or similar issues found throughout Palestine (Huth and Qedar 1999; Gitler and Tal 2006b). Our issue from Trench 9 likely dates to the late 4th or early 3rd centuries BC, given its context in locus 319, where early Hellenistic pottery dominates.



20. Coin 14, North Arabian, Obv. (Byron Maldonado).



21. Coin 14, North Arabian, Rev. (Byron Maldonado)

Although similar finds from Petra exist in private (reported in as-Salṭ and Ma'ān) and public collections (at least a dozen or more have been deposited in the Jordan Ahli Bank Numismatic Museum in Amman [*cf.* Goussous and Tarawneh 1991: 32, no 48A]), this is the first stratified find of such an issue in Petra or anywhere else in Jordan.

Since our discovery, hundreds of issues of similar nature are now known from northwestern Saudi Arabia. At Madā'in Ṣāliḥ (ancient Hegra), the excavations since 1986 - and particularly after the French excavations between 2008 and 2016 - have produced hundreds. They have been recently tabulated, classified and discussed in regard to provenance and date (Bauzou 2016). The list and number includes Madā'in Ṣāliḥ (242), Maghāyir Shu'ayb (31), Khuraybah in al-'Ulā (7), Petra (3), Dūmat al-Jandal (1), Babylon (1) and unknown provenance (38), for a total of 320. The concentration at Hegra of 75% of the issues tabulated has led to the assumption that this was the center for issuing the type. However, the number may be inflated as of the 232 Hegra finds, only 168 have been "securely identified" (Bauzou ????). Moreover, it appears that only 15 were found in stratified contexts, the rest comprising surface finds. Moreover, Bauzou's corpus fails to mention two from Qaṣr al-Ḥamrā at Taymā' (Hausleiter 2012: 236, n. 41) and one from Aynuna (Michal Gawlikowski pers. comm.), as well as a dozen or more in the Jordan Ahli Bank Numismatic Museum in 'Ammān, mentioned earlier.

It should also be observed that Bauzou's pronounced classification of the various types (arranged into eight types designated A to H) is primarily dependent on stylistic analysis, with the larger silver issues placed first followed by the bronze issues in descending order dependent on size. From this perspective, the bronze issues appear to devolve from a stylized type to a quasi-abstract 'Picasso-like' type consisting of lines and dots, often with the absence of the Greek A in the legend (Bauzou 2014: 217-220). However, not all the evidence is compatible with this arrangement. One coin categorized as late Type F or G was found in Phase 1, dated by radiocarbon to the 5th to mid-4th century BC (Bauzou 2016: 102), so his classification can only be considered with reservation and caution

until firmer controls emerge and are executed. Some of the types also may be coterminous. Our imitation Athenian bronze tetradrachm has its closest affinity to Bauzou's Type C, which originates - in his opinion - in the 3rd century BC (Bauzou 2016: 103), but - in our case - the context suggests the end of the 4th or beginning of the 3rd century BC. In support of this date is the succession of a number of Nabataean 'anonymous' issues that are assigned to the end of the 3rd century BC in later stratified levels. This chronology is also supported by a similar type from Taymā' that is dated to the late 4th or early 3rd century BC (Hausleiter 2012: 236). The large quantity of diverse and irregular sizes at Madā'in Ṣāliḥ reflects the longevity of their production (Huth 2010: 227-234) and defies compressing them into simply the 2nd century BC (*pace* Roemer and Charloux 2015: 311-312). The find of one of the Arabian issues with Ptolemaic bronze issues in the excavations at Khuraybah in al-'Ulā (Bauzou 2014: 219) supports an earlier date. In sum, all indications suggest a date for the beginning of the bronze imitation issues by or *ca* 300 BC. It should be noted that the anonymous Nabataean issues, well known at Petra, are absent at Hegra where only two of the 329 Nabataean coins dated before the reign of Aretas IV.

As for the issuing authority for the imitation Athenian issues in Arabia or the so-called 'Hegra owls', it has been proposed that they were the product of the Liḥyanite dynasty at al-'Ulā (Augé 2010: 217, fig. 4a-b; Bauzou 2016: 103-104). But none of the coins bears a legend with the name of the city or authority responsible for minting the coins. In the past, it has been suggested that the Liḥyanite dynasty may have been an offshoot of the Qederite confederacy. The frontiers of the sizeable Qederite kingdom are determined by epigraphic evidence. In the west, it is marked by Tall al-Maskhūṭah in the Wādī aṭ-Ṭumaylāt-Suez region of Egypt, where some silver bowls dated around 400 BC, have one inscribed by "Qainu son of Geshem, king of Qedar, offered to Han-'Ilāt" (Rabinowitz 1956: 2, 5-7), considered to be the son of "Geshem the Arab" in the Hebrew Bible who is mentioned as an opponent of the Judaean Nehemiah's attempt to fortify Jerusalem in *ca* 445-433 BC (Nehemiah 2:19; 6:1-2, 6). For the southern frontier, a Liḥyanite text from al-'Ulā that mentions "Gashm son of Sharhas" been connected to the same "Geshem the Arab" (Winnett and Reed 1970: 115-117; *cf*. Eph'al 1982: 204-214). More recently, the dynastic patronym of Šahru appears in a stele from Taymā' that mentions a *Pṣgw* Šhrw *b*[*r m*]*lky lḥyn*, *i.e.* "Pṣgw Šahrū son of the King of Liḥyan", proposed as perhaps the grandson of "Geshem the Arab" in the time of Nehemiah (Cross 1986: 387-391). More importantly, the name Šahrū is derived from the divine name *Shahr*, an epithet of the moon god, perhaps explaining the double crescent on the cheek of the goddess depicted on Arabian imitations of the Athenian tetradrachms. This may also explain the appearance of a *shin* on the two early silver imitations representative of Type A, in which the Aramaic letter (*shin* is inserted after the Greek letter A (that appears like a Δ) in the Greek legend AΘH on the coins (Bauzou 2016: 89). These connections are buttressed by some recently published ancient North Arabian ('Taymanite') texts from the southern environs of Taymā' that contain references to Qedar and Dedan - one text even indicates the author "encamped in QDR (Hayajneh 2012: 123-139, esp. 127 and forthcoming) - lending further support to the extension of Qedar to Tayma' and northwestern Arabia (Graf 2016a: 444-445). Finally, several Thamudic texts (*JS* 695 + 696) from just southwest of Tabūk in northwestern Arabia have been ingeniously connected and re-read as mentioning a "tribe of Gešem" (King 1990: 691). There also are suggestions that the Nabataean association with the Qedarite dynasty was intimate (Graf 2013: 40-41).

Although there are no attested Arabian tertradrachms in southern Palestine, there are local Athenian styled 'Philistio-Arabian' coins that suggest Qedarite presence. A coin inscribed possibly with GŠM/Geshem (Huth and Qedar 1999: 295-297) is questionable (Graf 2015: 295-296), but coins attested in the region that bear the Qedaraite dynastic name ŠHRW are more likely associated with the Arabian confederation (Rizack 1984; *cf*. Graf 2015: 294-295; *pace* Gitler and Tal 2006a: 47-51). This interpretation is supported by other issues in the region inscribed with the names of Arab deities like al-'Uzzā and Manāt (Graf 2015: 296-298), suggesting an Arab derivation. These imitation

Athenian or Athenian styled issues are normally assigned to the period from the late 5th century BC to the campaign of Alexander the Great (Gitler and Tal 2006b: 146-157; *cf.* Fischer-Bossert 2010: 138). The absence of the Arabian coins may be explained by the domination in the area of the so-called 'Philistio-Arabian' types, and assigning them to the Qedarite conferation remains viable given their distribution throughout northwestern Arabia.

V. Analysis of the Faunal Remains

Alexander Wasse

V.1: Intoduction

This report presents a preliminary discussion of the faunal assemblage excavated at Petra, Jordan by the Hellenistic Petra Project in 2007. Almost all of the material (listed in full at Appendix A) recovered was examined during the preparation of this report, the sole omissions being three small bags of animal bone recovered during section cleaning whose stratigraphic provenance could not be accurately determined.

A total of 9,914g of animal bone was recorded. Of this 2,381g or 24.0% by weight was identifiable (**Table 1**), represented by 381 fragments (**Table 2**). In general the material was highly fragmented. A minority of bones were burned, with a handful displaying cut marks consistent with skinning, disarticulation and defleshing (Rixon 1988).

Of the 381 identifiable fragments (**Table 2**), the remains of caprines account for 315 fragments, or 82.7%. A total of 61 caprine postcranial and horncore fragments could be identified as sheep or goat with varying degrees of confidence, with the former (n = 34) slightly outnumbering the latter (n = 27). Chicken, fish and camel each account for approximately 5% of the identifiable fragments. Gazelle, pig, donkey, horse/mule and quail are also represented in the assemblage, but only by a handful of specimens.

Identification was attempted for almost all fragments, excluding vertebrae other than the atlas and axis, as well as ribs. Teeth that comprised less than half a complete tooth crown were also excluded. Measurements were taken following the guidelines of von den Driesch (1976) and Davis (1992). These measurements are listed by locus for each taxon at Appendix B, but have not been examined in detail owing to small sample sizes and the preliminary nature of this report.

V.2: Sample Bias and Recovery

2.1: Sample Bias

Diverse cultural and environmental factors determine the extent to which the remains of the animals that contributed to a faunal sample are represented in it. Factors such as off-site butchery and processing of animal carcasses (the so-called "schlepp effect" [Perkins and Daly 1968]) or differential preservation between taxa and, within a taxon, between dense and less dense skeletal elements (*e.g.* Behrensmeyer and Hill 1980; Lyman 1994) serve to incorporate varying degrees of bias and distortion into the available data. Although all techniques for estimating the likely degree of assemblage attenuation possess deficiencies on account of the assumptions on which they are based, they may nevertheless be usefully employed.

Assuming that the dry skeletons of two of the main taxa represented in the HPP III assemblage (*i.e.* caprines and camel) represent a constant 7% of live bodyweight (Bourdillon and

Table 1: Identified and unidentified animal bone by number of fragments and weight.

Category	n	wt (g)	% wt
Identified	381	2,381	31.6
Unidentified	n/a	7,533	68.4
Total sample	n/a	9,914	100.0

Table 2: Total numbers of identified animal bone fragments.

Taxon	n	% n
Caprine	315	82.7
(Sheep)	(34)	(8.9)
(Goat)	(27)	(7.1)
Chicken	22	5.8
Fish	19	5.0
Camel	17	4.5
Gazelle	2	0.5
Pig	2	0.5
Donkey	2	0.5
Horse / Mule	1	0.3
Quail	1	0.3
Total	**381**	**100.0**

Brackets indicate caprine specimens identified as either sheep or goat.

Coy 1980), if MNI (Minimum Number of Individuals) counts for caprines and camel (**Tables 3** and **6**) are multiplied by 7% of the live-animal bodyweight, an estimate of the bone weight which these taxa ought to have contributed to the assemblage can be obtained (Croft 1998: 296). Calculating the difference between this value and the total weight of bone recovered at HPP III is one way of estimating how much bone has been lost, assuming that whole carcasses were brought to the site in the first place.

The calculation for the HPP III assemblage assumes a live bodyweight of 34kg for caprines (Croft 1998: 296) and 320kg for camel (Russell 1988: 192). Postcranial MNI counts of ten caprines and one camel suggest that the total assemblage weight should have been at least 46.2kg, excluding the contribution of other taxa. As the total weight of bone that was actually recovered for all taxa was just 9.91kg, it may be surmised that at least 78.5% of the HPP III assemblage is missing.

Table 3: Caprine remains by skeletal element.

Element	Left	Right	Unknown	Total
scapula	9	10	-	19
d. humerus	7	5	1	13
p. radius	8	2	-	10
d. radius	4	3	-	7
p. ulna	3	3	-	6
p. femur	4	3	-	7
d. femur	4	-	-	4
d. tibia	5	5	-	10
p. tibia	3	1	-	4
patella	1	-	-	1
astragalus	4	3	-	7
calcaneum	9	1	-	10
p. m/carpal	4	7	-	11
d. m/carpal	3	3	-	6
p. m/tarsal	3	7	-	10
d. m/tarsal	2	4	2	8
axis	-	-	-	2
sacrum	-	-	-	1
pelvic fragments	-	-	-	25
long bone shaft	-	-	-	7
carpal	-	-	-	5
tarsal (other than ast. and cal.)	-	-	-	3
phalanx 1	-	-	-	45
phalanx 2	-	-	-	10
phalanx 3	-	-	-	8
Total postcranial fragments				239
head and teeth	-	-	-	76
Total fragments				**315**

The above figure should be regarded as a rough estimate rather than a calculation with any pretensions to accuracy. Nevertheless, it serves to highlight that the HPP III assemblage is no exception to the general rule that "faunal assemblages normally represent only a very small proportion of even the minimum amount of material from which they could possibly have been derived" (Croft 1998: 296).

2.2: Recovery

All excavated deposits were dry sieved through a 2-4mm. mesh, thereby aiding the recovery of all but the smallest faunal remains (Payne 1972); wet sieving was not carried out.

2.3: Summary

In sum, the evidence suggests that the HPP III faunal assemblage had undergone serious attrition and was highly attenuated before the 2007 excavations took place. This situation is by no means unique, as "it will inevitably prevail to some degree in any assemblage which was retrieved by less than total sieving through a fine wet sieve" (Croft 1998: 298). Nevertheless, it does serve to emphasize the extent to which discretion must be applied when interpreting the results of this study.

V.3: Skeletal Element Representation

Analysis of postcranial skeletal element representation for the most numerous taxon in the HPP III assemblage, *viz.* caprines, is hindered by relatively small sample sizes (**Tables 2 and 3**). Cranial fragments and teeth are collectively by far the most common part of the skeleton represented, comprising 24.1% of caprine remains. This is almost certainly a reflection of the fact that each animal has many more teeth in its head than any other easily identifiable skeletal element. Notwithstanding small sample sizes, comparison of postcranial element frequency for caprines indicates that all parts of the skeleton are relatively evenly represented in the assemblage (**Table 3**). This suggests that whole animals were brought to the site, whether alive or dead, and that there was little preference for

Table 4: Mortality of caprines, based on epiphyseal fusion.

Stage	Element	n Unfused	n Fused	% dead by end of stage
Infant (birth to 1 yr)	d. scapula	3	10	
	d. humerus	2	10	
	p. radius	0	2	
TOTAL		**5**	**22**	**18.5**
Juvenile (1 to 1.5-2.5 yrs)	d. tibia	2	9	
	d. m/podial	6	9	
TOTAL		**8**	**18**	**30.8**
Subadult (1.5-2.5 to 3.5 yrs)	p. ulna	3	1	
	d. radius	3	4	
	p. femur	4	2	
	d. femur	4	1	
	p. tibia	3	1	
	calcaneum	5	2	
TOTAL		**22**	**11**	**66.7**

one part of the animal over another on the part of the inhabitants of this area of Petra.

V:4: The Animals

4.1: Caprines

Even though caprines are the most common taxon in the HPP III excavations, the total post-cranial assemblage of caprine bones numbers just 239 specimens, of which only 61 could be identified as either sheep or goat, with the former slightly outnumbering the latter. This makes it impossible to reconstruct a separate age profile for each taxon, and difficult to reconstruct a combined age profile for caprines in general, *i.e.* sheep and goat combined, with any degree of certainty.

With that caveat in mind, epiphyseal fusion data (**Table 4**) (based on Silver 1969) suggests that 18.5% of caprines died during their first year (all ages necessarily approximate), 12.3% during their second year and 35.9% during their third year, leaving 33.3% to be slaughtered as adults. A slight peak between the ages of 24 and 36 months would accord well with Payne's (1973) model for meat production in a domestic flock: "if meat is relatively more important and winter feeding presents no difficulty killing at 2-3 years will probably be the rule" (Payne 1973: 282).

Data for mandibular tooth eruption and wear (**Table 5**) (based on Payne 1973) are equivocal, owing to small sample sizes, but appear to be biased in favor of older animals. Lower second and third molars provide slight evidence that only a minority, *viz*. 21.4%, of caprines in the HPP III soundings were slaughtered during their first two years of life. Of 14 recordable specimens, 11 displayed the relatively heavy wear indicative of survival into and beyond a third year. This accords reasonably well with the epiphyseal fusion estimate of 30.8% dead by two to two and a half years of age.

The caprine remains appear on cursory examination to represent relatively small animals, especially in the case of goats. This, and the unequivocal presence of twisted goat horncores, suggest that the great majority of Petra caprines were domestic animals kept for consumption. A minority of extremely large specimens could be derived from large domestic males, but their presence also raises the possibility that some hunting, whether of wild goat or Nubian ibex, continued in the Petra region until well into the Hellenistic period.

Table 5: Eruption and wear data for caprine mandibular teeth.

Mandibular tooth row	dp4	P4	M1	M2	M3
Eruption	*0-6 wks*	*24 mths*	*3 mths*	*12 mths*	*24 mths*
	-	-	-	h	c-d
	i	-	d	-	-
	-	-	h-k	-	-
Single teeth					
dp4	h				
P4	g, i				
M1	h				
M2	b, b, h, h, h, h-j, h-j				
M3	h, j, j, j, j-m (+2 no data)				

4.2: Chicken

Chicken is an infrequent but recurring taxon within the HPP III assemblage, represented by a total of 22 specimens. All parts of the skeleton are present, suggesting that there was little preference for one part of the bird over another. A noticeably wide range of sizes could be discerned, ranging from bantam-sized remains at one end of the scale to those of modern domestic fowl at the other, suggesting that different breeds of chicken had evolved by the Hellenistic period.

4.3: Fish

The remains of fish were more frequent in the HPP III assemblage than the relatively dry, inland location of the site might suggest. Similarly-sized vertebrae from a locus were recorded as one specimen when it was felt that they probably derived from the same individual. On this basis, 19 specimens were identified as fish and separated from the main assemblage pending analysis by a fish bone specialist. The relatively large size of some of the fish remains was, however, self-evident, suggesting that dried or otherwise preserved fish from the Red Sea or Mediterranean were traded significant distances inland as early as the Hellenistic period. Fish remains are a recurring if not always a common feature of the Roman, Byzantine and early Islamic faunal assemblages from the southern Levant, *e.g*. Gharandal (Wasse 2003) and Upper Zohar (Lernau 1995).

4.4: Camel

Camel was represented in the HPP III assemblage by 17 identified specimens, but its frequency is likely to have been much higher than this figure suggests, as camel-sized but otherwise unidentifiable vertebrae, rib and long bone shaft fragments were present in almost every locus.

Table 6: Camel remains by skeletal element.

Element	Left	Right	Unknown	Total
d. radius	1	-	-	1
astragalus	1	-	-	1
p. m/podial	-	1	-	1
d. m/podial	-	-	1	1
phalanx 1	-	-	-	1
phalanx 2	-	-	-	2
Total postcranial fragments				
head and teeth	-	-	-	10
Total fragments				**17**

4.5: Gazelle

Two gazelle specimens were identified: a calcaneum from Trench 9, locus 305 and a proximal metatarsal from Trench 9, locus 316. These provide tentative evidence for the continuation of at least some hunting in the Petra area into the Hellenistic period.

4.6: Pig

Two pig specimens were identified: an unfused metacarpal IV from Trench 9, locus 300 and a first phalanx from Trench 8, locus 206B. The scarcity of pig in the HPP III assemblage is unsurprising in view of this taxon's preference for mesic environments and/or riverine thickets. The presence of these two specimens suggests either that there was a trade in pork (*c.f.* fish, see 4.3 above) or, more likely, that suitable environments for pig were present in a number of restricted niches around Petra, most likely in *wadi* beds or around the springs of Wādī Mūsā, during the Hellenistic period.

4.7: Donkey

Donkey is represented in the Petra assemblage by two specimens from Trench 8, locus 214: a distal radius and a distal tibia, perhaps from the same individual animal.

4.8: Horse/Mule

An unfused distal tibia, tentatively attributed to horse or mule rather than a donkey on account of its morphology and relatively large size, was recovered from Trench 9, locus 316.

4.9: Quail

A single quail humerus was recovered from Trench 8, locus 209.

V.5: Discussion and Conclusions

The most important contexts excavated during the 2007 season were four fire pits/hearths represented by *loci* 218-219, 312-314, 316 and 319-320. These are located along the edge of a small *wadi* on the southern side of an east-west wall located a few meters south of the colonnaded street. As these fire pits/hearths were located in the lower levels of the excavation

units, they are amongst the earliest deposits excavated in 2007. Comparison of the animal bones from these fire pits/hearths with those from the remaining, presumably later, *loci* provides a rough measure of faunal changes at Petra through time (**Table 7**).

The data in (**Table 7**) demonstrate that there is little appreciable difference between the earlier and later material, other than a slightly higher proportion of 'exotic' taxa, *e.g.* chicken and fish, in the later material, in which a generally wider range of taxa is anyway represented. Whether this reflects a gradual increase in dietary sophistication through time, the larger sample size of the later material or the possibility that the animal bones from the fire pits are unrepresentative of the assemblage as a whole is impossible to say at present owing to the limitations of available data.

The identified faunal remains from the four fire pits/hearths, plus a shell concentration represented by locus 201, are presented in **Tables 8 to 12**. No evidence for the deposition of particular taxa, whole animals or specific parts of animals in these *loci* could be discerned. The balance of probability is that the greater part of this material represents refuse from consumption that was dumped along the east-west wall located just south of the Colonnaded Street. This raises the possibility that the adjacent small *wadi* and its immediate environs served as some sort of dump or small-scale industrial area, where rubbish accumulated in pits and was perhaps periodically burned - albeit incompletely. In this context, it should be noted that a high proportion of animal bones from *loci* 201, 205, 206B, 306 and 319 was stained green, suggesting high concentrations of copper or copper residues, and that a higher than average proportion of animal bones from *loci* 207, 319 and 320 was burned.

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Table 7: Faunal changes through time.

Taxon	n early	% n early	n late	% n late
Caprine	76	82.6	239	82.7
(Sheep)	(5)	(5.4)	(29)	(10.0)
(Goat)	(4)	(4.3)	(23)	(8.0)
Camel	9	9.8	8	2.8
Chicken	3	3.3	17	5.9
Fish	2	2.2	19	6.6
Gazelle	1	1.1	1	0.3
Horse / Mule	1	1.1	-	-
Donkey	-	-	2	0.7
Pig	-	-	2	0.7
Quail	-	-	1	0.3
Total	**92**	**100.0**	**289**	**100.0**

Early = fire pits represented by *loci* 218-219, 312-314, 316 and 319-320.
Late = all other *loci*.

Table 8: Identified animal bone fragments from fire pit in Trench 8, Locus 218-219.

Taxon	N	% n
Caprine	5	83.3
Chicken	1	16.7
Total	**6**	**100.0**

Table 9: Identified animal bone fragments from fire pit in Trench 9, Locus 312-314.

Taxon	N	% n
Caprine	9	100.0
Total	**9**	**100.0**

Table 10: Identified animal bone fragments from fire pit in Trench 9, Locus 316.

Taxon	N	% n
Caprine	27	77.1
(Sheep)	(1)	(2.9)
(Goat)	(2)	(5.7)
Camel	3	8.6
Fish	2	5.7
Chicken	1	2.9
Gazelle	1	2.9
Horse / Mule	1	2.9
Total	**35**	**100.0**

Table 11: Identified animal bone fragments from fire pit in Trench 9, Locus 319-320

Taxon	n	% n
Caprine	35	83.3
(Sheep)	(3)	(7.1)
(Goat)	(3)	(7.1)
Camel	6	14.3
Chicken	1	2.4
Total	**42**	**100.0**

Table 12: Identified animal bone fragments from shell concentration in Trench 8, Locus 201.

Taxon	n	% n
Caprine	7	77.8
(Sheep)	(1)	(11.1)
Fish	1	11.1
Camel	1	11.1
Total	**9**	**100.0**

VI. Summary of HPP III Results

The primary object of the HPP III season was to locate stratified levels of the occupation of Petra during the Persian and Hellenistic periods. In this regard the project was remarkably successful. Both Trenches 8 and 9 provided excellent evidence of the Early Hellenistic period, *i.e*. of the late 4th and early 3rd century BC, with the latter trench even providing ceramic material from the Persian period. In fact, the finds became richer and more impressive as we progressed eastwards from Parr's Trench III toward the so-called Trajanic Markets. The Early Hellenistic pottery in Trench 8 comprised 28% of the ceramic assemblage, whereas Trench 9 produced 42%. Two particular ceramic finds symbolize the success of reaching pre-Hellenistic period material: in Trench 8, locus 209, the discovery of a shoulder of an Attic painted *lekythos*, perhaps from the Beldam Workshop in Attica dating to the second quarter of the 5th century BC (III. **Table 3:N**), and a rim and bent handle of a cylindrical 'torpedo' jar in Trench 9, locus 319 (III. **Table 1:H-I**), a form common in the Levant and Mesopotamia in the 6th to 4th centuries BC. The latter was found in the same 4th/3rd century BC context with the North Arabian imitation of an Athenian tetradrachm and other purely Early Hellenistic ware. The discovery of a string of the 'anonymous' Nabataean issues of the late 3rd-early 2nd century BC supports a Nabataean occupation at Petra in the early Hellenistic period.

The most outstanding architectural feature of Trenches 8 and 9 is the main wall running on a slight angle from southwest to northeast, not quite parallel to the Roman street. This wall in Trench 8 (locus W207) is rather poorly built, with small ashlars and some unhewn stones of various sizes, and is *ca* 0.60-0.65m wide. Lavish use of mud mortar and chinking stones indicated a jerry-built structure. Wall W207 measured 2.90m long (WSW-ENE) × *ca* 0.60-0.65m wide. The fact that it is not perpendicular to the retaining wall or the street curbing suggests that it was of earlier construction. Its crude construction may reflect, to some extent, rebuilding. It appears to continue in Trench 9, where it is almost parallel to the Nabataean ashlar facing that supports the pavement in the southeastern part of the trench. This limestone wall (W317) runs in a similar ESE-WNW direction that connects very well with the wall (W207) in Trench 8. It should be noted that in the eastern sector in Trench 9, the upper courses of the wall comprise well-dressed ashlars, in contrast to the shabbier construction in Trench 8. This wall in Trenches 8 and 9 appears contiguous with the wall discovered in our earlier Trench 3 and seems connected to Parr's east-west wall in his Trench III. According to Christopher Tuttle (correspondence in 2013), it is possibly connected to a wall discovered in a deep probe beneath the forecourt of the so-called Great Temple further to the west. If this is the case, our 20-25 meter-long wall extends even much further to the west. The wall in our trenches is constructed on the sandy soil of the *wadi* bed, with Early Hellenistic materials at the foundation.

In sum, the prospects of finding an extension of the Hellenistic settlement further east along the southern area adjacent to the Colonnaded Street seem excellent, and it is possible that the settlement also extends to the northern side of the street. Future exploration of the area to determine the extent of the settlement would appear to be a fruitful enterprise.

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A PRELIMINARY REPORT ON THE 2016 SEASON OF EXCAVATION AT ABILA OF THE DECAPOLIS

David Vila

Abila was a Decapolis city just 12 Roman miles east of Gadara (Umm Qays). The site evidences its most substantial occupation in the Late Roman, Byzantine, Umayyad and Abbasid periods. However, since the 1980s stratified remains have been excavated indicating nearly continuous habitation from the Early Bronze (EB I) to the Abbasid periods (with some reuse of the site in the later Islamic eras as well) [For an overview of the site see Mare 1997]. The excavation staff during the 2016 season consisted of ten senior staff archaeologists and 28 student volunteers from the United States, Eastern Europe, Latin America and other countries, and approximately 60 Jordanian workers hired from the local communities. The representatives of the Department of Antiquities were Mr. Emad Obeidat, Director of the Bani Kinanah office of the Department of Antiquities and Ms Ferial Issa from the Irbid office. The season of excavation was run from July 3rd through July 28th, with an initial four days preceding this as a field school for our student volunteers, and three days at the end of the excavation season for closing down our operation in Ḥarthah, where we make our base.

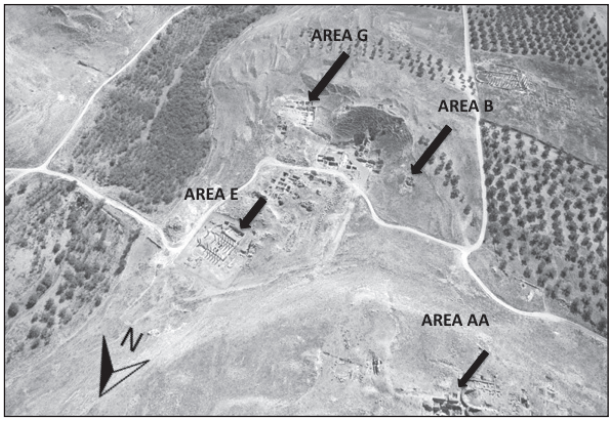
The central goals for the 2016 season of the Abila Archaeological Project were: (1) to deepen the excavation in key squares in Area AA on the north *tall* in order to examine how the Byzantine, Hellenistic, Iron and Bronze Age occupational levels extended east and north on Tall Abila; (2) to continue working toward the completion of the excavation of two Byzantine churches (Areas G and E) in preparation for publication, and for better presenting the churches for tourism; (3) to excavate a presumed 'market place' in the area adjacent to the basalt road in what has been Area B, beside the 'theater cavea' in the center of the site (**Fig. 1**).

Area AA

Represents the History of Tall Abila from the Abbasid to the Early Bronze Periods

Goals in Area AA for the 2016 excavation season included continued excavation of the Early Bronze period, clarification of the Early Bronze/Middle Bronze transition, and understanding the relationship of the various walls in AA to determine the process of settlement. We were unable to pursue the clarification of the EB/MB transition due to our limited time in the field this season and because of our focus on the new fortified walls in the eastern squares. Excavated areas are located at latitude 32.68251 and longitude 35.86842. Under the supervision of Dr. Susan Ellis (Wayne State College), the excavation team for this area included Kevin Morrow, Roger Acevedo, Samuel Cross-Meredith, Martin Krnac, Matthew Johnson, Jessica Flinkman, Damaris Galdames and Dana Landro.

At the end of our 2014 season of excava-



1. Overview of 2016 excavation areas.

tion, Square 5 was already at the Early Bronze levels. Our hope for the 2016 season was to be able to excavate this square down to bedrock. Unfortunately, this was not possible because we uncovered several floors and stone *loci*. We are now about 75cm from our goal, as indicated in adjacent squares. Presently, we focused on excavating the two-thirds of a square south of the Early Bronze age wall in Square 5, locus 5100. The first locus this year was locus 130, which was a soft, windblown soil of a light brownish gray color. After 15cm we changed to locus 131, an arbitrary change for control. Pottery in these *loci* included red and red/black Khirbat al-Karak ware, a marker for the Early Bronze III period.

After another 15cm we came upon a grayish brown soil which contained more ash. This locus (132) can also be seen in the west balk of Square 1. After clearing about ten centimeters from the entire area we made an arbitrary change of locus number to 133 for the next locus. This locus was about 15cm further down when we came upon a heavier clay layer (134) with a locus of a few random rocks in the west-central portion of the square. These rocks were sitting on soil and did not constitute a wall. We removed them and continued to the next locus, 135, a light brownish gray soil (more ash), which then changed to a brown, windblown soil, suggesting abandonment for a time (locus 136). Each of these *loci* was between ten and 14cm deep.

The removal of locus 137 revealed a group of rocks (locus 138) sitting on a mudbrick surface (possible floor), locus 139. These rocks appeared to be random in nature, not forming a wall or structure. We removed the rocks along with locus 138, digging into locus 140 below. This revealed another rock grouping (locus 141), this time with the appearance of being a possible wall. These rocks were sitting on another surface, locus 142.

All pottery from these *loci* was Early Bronze, hand-made without a wheel. Many pieces were burnished brown or red, or pattern burnished in brown or red. The ware is varied, as is the temper. Many pieces are recognizably identical in ware, temper and decoration from our earlier excavation of Square 1. Altogether we excavated 112cm of soil in Square 5.

The Fortified Walls in Area AA

Excavation during 2014 in Square 16 uncovered a few centimeters of wall (locus 16019) just under the soil in the northeast corner of the square. Our plan for 2016 was to excavate Square 16 to the level of a probe in the western portion of the square against wall 16018 and to excavate Square 9 as the most likely area in which to reveal a continuation of wall 16019 (**Fig. 2**).

In 2016, we began in Square 16 by removing the north balk to see the joining of wall 16009 and the east/west wall (16008) visible in the north balk. This wall also articulated with wall 16018. After much consideration the eastern balk was also removed to fully expose wall 16009. These walls, as with all the walls in AA, appear to be aligned to true north, while our squares are oriented to magnetic north. Therefore, all walls run into balks rather than aligning with balks, and the balk must be removed in order to fully view the walls.

After clearing these two balks, excavation resumed in Square 16 with locus 22. As this locus was removed (about 12cm), we discovered a stone feature (locus 16023) in the south-central portion of the square. This was a series



2. Fortification walls bisecting Area AA.

of stones forming a basin about 65cm wide and 70cm from north to south; it was covered with flattish stones (**Fig. 3**). The stones were large, semi-flat and cobble-sized, alternating basalt with limestone. The feature continued into the south balk. We excavated the interior of locus 16023, labeling the soil as 16024. This soil was reddish loose clay, but no pottery, seeds or any other artifacts were found. The feature was approximately 17cm deep. In order to expose both this feature and wall 16019 we began removing the south balk of Square 16 (north balk of Square 11). Locus 22 contained pottery from Umayyad to Bronze Age. The *loci* near the plaster floor (locus 25) were mainly Roman and Hellenistic.

Locus 16023 led into *loci* 11032 and 11033 (soil), and 11039 (rock tumble) in the center of Square 11. These *loci* were sitting upon a plaster floor which we excavated as locus 11038 (west of 11033) and locus 11038 (east of 11033). Pottery in *loci* 11032 and 11033 was mixed from Umayyad to Bronze Age. Pottery in *loci* 11037, 11038 and 11039 was preponderantly Roman and Hellenistic.

We then shaved off the topsoil of Square 10 (10001) solely to define the top of the wall (10002) as it passed through Square 10. This let us join up with the wall as excavated in Square 9 (9002).

Because of some anomalies in the construction of the wall we decided to open Square 22. The topsoil (locus 22001) and next *loci* (22002, 22005-8) were also quickly removed as they were visible in the balks. Pottery varied from Byzantine to Iron Age. In the process, 1.3 meters of soil was removed, as measured at the north balk.

Removal of the balk both answered questions and caused more confusion. The wall, which runs through Squares 16, 9, 10 and 22, is well built, with shaped stones supported by chinking. It has a rubble core and measures 193cm in width. We have not yet reached the bottom of the wall, nor have we seen a foundation trench in either the soil or the balks. There appear to be at least three building phases. The lowest visible phase is seen in Square 16. The lowest courses (*ca* 60cm) consist of smaller, square-shaped stones with larger chinking stones. The next courses (*ca* 50cm) are of larger, well-cut squarish stones with smaller chinking stones. These upper courses are capped by a layer of plaster which is visible in the soil balks and are probably part of the plaster surface which was laid over the entire area during the time the Byzantine water channel was in use. There is a 402×193cm area of laid stones on top of this plaster layer, which is found in Square 22. This layer is offset from the underlying wall by about 25cm.

A puzzling feature found in Square 22 is that the large wall abruptly ends, and abuts another wall of similar structure that is offset by 50cm. This second wall (locus 22009) is built on the west side in a fashion similar to the longer wall, but the construction on the east side is much more like Iron Age construction, *viz*. chunky, unformed boulders. This is topped by a single course of well-formed, squared stones.

At present, we are not able to determine the date of the construction of either of the two walls and are also unable to explain their exact function. Excavation in 2018 will focus on tracing these walls down in an attempt to ascertain their date and function, and their relation with the other excavated structures in Area AA.

Area B

This area was re-opened after a hiatus of 12 years, the last season of excavation in this area being in 2004. The excavated squares in this area are located at latitude 32.68098 and longitude 35.8689. Members of the excavation staff working in this area, under the supervision of Cheryl Eaton (PhD candidate, Aberdeen University), were Peter Helman (assistant to the area supervisor), Samuel Vila, Andrew Heldenbrand, Kelly Escarcega, Dr. Blake Hartung and Betsy Curtis.



3. Installation in Area AA.

Three squares (46, 47 and 48) were opened with the goals of further exploring a basalt pavement, including a street curb and secondary east-west cross walls that had been partially excavated in 1992, and further exposing a well-built, north-south wall running parallel to the street and abutting the cross-walls on the west. These features, along with installations on the east side of the basalt street, suggest the possible location of a market place, with shops bordering the west side of the street. Upper levels contained significant Islamic domestic occupation with pottery, a storage pit and other artifacts dating to the 8th through the 10th centuries AD (**Fig. 4**).

Despite the short dig season, all projected goals were reached (with the use of probes within each square), further exposing the east-west cross walls and locating the north-south wall and western end of the basalt pavement. Left by necessity for next season will be the goal of more fully exploring the suggested market place by completing the excavation of each square, removing the eastern balks of Squares 46 and 47, as well as the balk between them, and opening a square immediately east of Square 48 in order to reach the pavement abutting the basalt street there.

Square 46

Supervising Square 46 were Liz Bennett and Andrew Heldenbrand. Of the three squares opened just west of the Byzantine basalt street, Square 46 was located the farthest north, closest to the modern east-west access road which is located about 6m north. In order to provide an eastern balk in the steeply sloped terrain, the north-south sides of Square 46 were laid out a half-meter shorter than the 4m east-west sides.

Initial elevations of the square were ascertained using as a zero datum point the basalt curb immediately west of the northeast corner of the partially uncovered east-west cross wall just east of the balk between Squares 46 and 47. The elevation for the northeast corner of the cross-wall was determined to be 171cm, with the northwest and southwest corners of Square 46 at 322cm and the southeast and northeast corners at 250.5cm. Final corner elevations of the full square (July 21) were 200cm northwest, 210cm southwest, 177cm southeast and 166cm northeast corner. For the 2m square southeast probe (46× [see further below]; July 26) they were 67.5cm northwest, 95.5cm southwest, 59.9cm southeast and 68.5cm northeast. Elevations will be updated with respect to those of the basalt street in due course; these were taken in an earlier season but were not immediately available.

Highlights

Human Remains Discovered

On July 14, human skeletal remains were uncovered (locus 007, elevation 132.5cm [see further below]). These were excavated on July 15, at the end of the first full week of excavation. Preliminary findings indicate the remains were those of a male, aged 25-35, not quite 5 feet tall. Lying in an east-west direction with the head at the west, the remains appeared to have been buried Islamic-style, on the right side with the face pointing south toward the *qibla*. Associated pottery (locus 008, pail 007) ranged in date from the Late Roman through Abbasid periods [Pottery reading by Abila Project ceramicist Dr. Susan Ellis, July 18, 2016: Abbasid 1/1 (one sherd found; one saved and registered); Umayyad 2/0; Late Byzantine 9/0 and Late Roman 1/0].

Probe 46× Opened

On July 21, with about a week of excavation remaining, a 2m square probe (46×) was opened in the southeast section of the square in effort to determine whether a surface of fitted stone pavers uncovered in adjacent Square 47 (locus 009, elevation 156cm [see further below]) continued into Square 46. However, no



4. Storage pit in Area B.

evidence of a surface was found. Instead, further excavation uncovered sequential layers of large limestone boulders (*loci* 011, 012, 013, 014 [see further below]), suggesting tumble north from the secondary, east-west cross wall largely hidden by the balk between Squares 46 and 47, and extending east of the east balk to the northwest-southeast basalt street.

North-South Wall Uncovered

On July 26, with one day left in the season, a single large limestone ashlar was discovered (locus 014, elevation 89.5cm [see further below]) beneath the sequential layers of secondary limestone cross-wall tumble described above. The position of the ashlar in the probe (46×) was in line with two large, level and aligned ashlars discovered the same day in probe 48× (locus 016, elevation 94.5 cm), which extended into the north balk there.

Interpretation

The elevation of the uncovered ashlars noted above (46×014; 48×016) suggests they extend through Square 47 below the surface of fitted stone pavers (Square 47, locus 009, elevation 156 cm) and beneath the uncovered east-west cross wall and secondary north-south wall in that square (see further below). The alignment of these ashlars suggests they belong to the well-built, north-south wall running parallel to the basalt street and abutting the cross-walls on the west. Exposure of this wall was amongst the goals of the 2016 season. Excavation of Square 46 thus ended after a final top plan and west balk plan were drawn and final photos were taken on July 27.

Square 47

Supervising Square 47 were Samuel Vila and Kelly Escarcega. The square, measuring 4m by 4m, was located just west of the Byzantine basalt street, between Square 46 immediately to the north and Square 48 immediately to the south (with a 1m balk separating each square). Initial elevations of the square corners, ascertained as described above, were 323cm northwest, 365cm southwest and 240cm for the southeast and northeast corners.

Final corner elevations of the full square (July 21) were 246.5cm northwest, 128cm southwest, 143cm southeast and 142cm northeast. For the 2m square southeast probe (47×, July 26 [see further below]) they were 16cm northwest, 5cm southwest, 81cm southeast and 15cm northeast. As is the case with Square 46, elevations for Square 47 will be updated with respect to those of the basalt street, which were taken in an earlier season but were not immediately available.

Highlights

Secondary Build of North-South Wall Uncovered

On July 8, excavation uncovered a line of large, limestone boulders (locus 002, elevation approx. 300 cm) running along the west balk. The boulders align with the well-built north-south wall running parallel to the basalt street. They appear to be part of a secondary wall built using it as a foundation, given the use of the boulders and repurposed limestone ashlars.

East-West Cross Wall Uncovered

On July 13, excavation exposed an east-west cross wall (locus 004, elevation approx. 250 cm) running through the center of the square and extending east of the east balk to the northwest-southeast basalt street. The cross wall appears to be parallel with the east-west cross wall largely hidden by the balk between Squares 47 and 46, which extends east of the balk to the basalt street. The wall appeared to be secondary, given the use of boulders and repurposed limestone ashlars.

Tabun and Pavers Uncovered

On July 18, excavation uncovered the intact rim of a clay *tabun* (locus 008, elevation 166.5 cm), measuring about 1m in diameter and 8-10cm in height. Located immediately north of the east-west cross wall (locus 004) and below locus 003, the *tabun* (10YR/7/4 [very pale brown]) appeared to have been used only a few times, given that while it contained some ash and burn marks (along with broken pieces of *tabun*), it lacked the characteristic blackened interior [based on July 20, 2016 reading by Ellis]. Dating was difficult to determine; associated pottery ran from the Early Byzantine through Umayyad periods [Associated pottery: Umayyad 2/0, Late Byzantine 19/0, Early Byz-

antine 1/0] similar - though not identical - to that associated with the human remains uncovered in Square 46. These were located roughly 3m north (and north of the east-west cross wall), 34cm below and just west of the *tabun*. The relationship between the *tabun* and human remains is undetermined. The bottom of the *tabun* rim was resting directly on a surface of flat, fitted stone pavers (locus 009, elevation 156 cm) that with further excavation was found to cover most of the north side of the square.

Probe 47× Opened

On July 21, the decision was made to leave undisturbed for further study the surface of flat, fitted stone pavers noted above (locus 009, elevation 156 cm) and to open a probe (47×) roughly 2m square in the southeast portion of the square, south of the east-west cross wall, in an effort to reach the basalt pavement, even with the basalt street curb east of the square. Initial probe-corner elevations were 120cm northwest, 134cm southwest, 143cm southeast and 137cm northeast. Excavation during the six days remaining in the season uncovered soil and some tumble, and ended at the partial remains of a plaster floor (locus 014, elevation 5 cm) and pieces of glass tesserae in the southeast corner of the probe.

Interpretation

The plaster floor (47×, locus 014) noted above is similar to the excavated surface of a square located south of Square 48 (bounded by at the north by a similar east-west secondary cross wall and on the west by the north-south well-built wall) that was fully excavated in a previous season. The basalt pavement, even with the curb of the northwest-southeast basalt street, ends east of the surface of that square. Exposing the pavement and determining the relationship of the plaza to the basalt street was among the goals of the 2016 season. Excavation of Square 47 thus ended after a final top plan and eastern and western balk plans were drawn and final photos were taken on July 27.

Square 48

Blake Hartung supervised Square 48 and was assisted for one week by Betsy Curtis, who briefly joined the dig mid-season. The square, measuring 4m by 4m, was located just west of the Byzantine basalt street, immediately south of Square 47 and on the most steeply sloping terrain of the three squares excavated in 2016. As a result, it contained the largest amount of debris and tumble.

Initial elevations of the square corners, initially ascertained as described above, were 381.5cm northwest, 379.5cm southwest, 194cm southeast and 252cm northeast. Final corner elevations of the full square (July 21) were 212.5cm northwest, 274cm southwest, 194cm southeast and 182cm northeast. For the 2m square southeast probe (48×, July 26 [see further below]) they were 111cm northwest, 97cm southwest, 81.5cm southeast and 84cm northeast. As is the case with Squares 46 and 47, elevations for Square 48 will be updated with respect to those of the basalt street, which were taken in an earlier season but were not immediately available.

Highlights

Secondary Building Room Uncovered (Probe 48×)

Between July 18 and 22, excavation uncovered the northeast portion of a room bounded by a north-south wall (locus 010, elevation 182 cm) and an east-west wall (locus 011, elevation 177 cm) of boulders and repurposed ashlars that met at in a corner oriented to the northeast near the center of the square. Given the short excavation season and interest in excavating inside rather than outside the building, it was decided on July 26 to open a probe (48×) focusing on the roughly 2m square southwest portion of Square 48 that composed the room corner's interior.

Plaster Floors #1 and #2 Uncovered

On July 21-22, excavation uncovered the first of two plaster floors (locus 012, elevation 144 cm) composed of limestone, ash and straw, roughly 2-3cm thick across the probe. Associated pottery ranged from the Late Byzantine through Mamluk periods (see further below). On July 26, the second plaster floor was uncovered (locus 015, elevation 98cm), with associated pottery ranging from the Late to Early Byzantine periods (see further below).

Level, Aligned Ashlar Uncovered

On July 26, two large, level ashlars aligned in a north-south direction and located near the center of the probe were uncovered (locus 016, elevation 94.5cm) below the second plaster floor noted above; these continued into the north balk.

Interpretation

The two ashlars (48×, locus 016) noted above align with a well-built, north-south wall running parallel to the street and abutting the cross walls on the west, and with a single large, limestone ashlar uncovered in Square 46 (locus 014, elevation 89.5 cm). Associated pottery ranged from the Late Roman through Abbasid periods (see further below). A large section of the wall, which runs parallel to the basalt street and abuts the cross walls on the west, is exposed in a similar square south of Square 48 that was fully excavated in a previous season. The alignment and elevation of the ashlars suggest they are part of this wall. Exposure of the wall was among the goals of the 2016 season. Excavation of Square 48 thus ended after a final top plan and western square and eastern probe balk plans were drawn and final photos taken on July 27.

Area G

The Area G church is an ecclesiastical structure comprising a three-aisled, single-apsed basilica with adjacent rooms located at the northeast end of Tall Umm al-'Amad. Squares excavated during the 2016 season were located at latitude 32.6805 and longitude 35.8696. The area supervisor of Area G was Dr. Adam Chambers; his student volunteers were Jeff Prager (assistant to the area supervisor), Harrison Bearden, Charlie Vila, Josh Kruntorad, Alan Vongnhay, Kate Barlowe, Anne Clemenger and Abigail Danley.

The previous two seasons of excavation (2012 and 2014) have focused on uncovering a room adjoining the main church sanctuary that may have served as *diaconicon*, a room functioning as a preparatory space for rituals performed in the church. The 2014 season involved several probes intended to expand squares opened in the previous seasons to expose the south wall of the *diaconicon*. Work also continued clearing the western end of the room (35 Probe) to delineate its extent, and to establish any relationship with associated rooms near the church's entrance.

The 2016 season focused on further uncovering the space leading 'up church' from the west, along with clearance of the *diaconicon*'s western end. Three 4×4m squares (41, 42 and 43) were opened west of the *diaconicon* and the narthex space leading to three entrances that opened to the central nave and two side aisles. A typical feature of Byzantine churches in this region, as at the nearby sites of Umm Qays and Jarash, is an atrium that served as a communal space outside of the more sacred precincts of the church. Although these outer spaces were less ornate, they still featured tiled floors and architectural features including colonnades, niches and occasionally fountains. While it remains unclear if these features are present at the Area G church, it is important to determine the nature of the remains of the structure's entrance.

In order to begin work this season, several large piles of ashlar blocks and fragments - which had been created to preserve them at the site - had to be removed in order to lay out the grid for the squares. Likely due to a particularly wet rainy season, thorns and weeds were overgrown throughout the excavation area, and had to be cleared by hand and by burning them. This added a few challenges for making progress early in the season. The square supervisors in Area G were mostly students from John Brown University, and all were assets to completing the fieldwork this season. A final photo from Square 43, the central excavated square, revealed a mosaic floor surface (**Figs. 5 and 6**).

Square 41

This square was opened directly west and just beyond the end of the *diaconicon*. It was the southernmost of all the squares. Early efforts in the excavation area, which included the adjacent squares, focused on the removal of extensive amounts of rocks, overgrown vegetation and debris (G41000). In Square 41, the first soil strata (001, 002) were a complex matrix of sand to cobble-size rocks representing significant erosion from the *tall* above and to the west of the excavation area [An important oversight of this season, particularly in light of its brevity



5. Layout of squares in Area G.



6. Mosaic flooring in Area G basilica.

owing to Ramadan, was that these earlier strata, which consisted mainly of fill derived from natural erosion of the *tall*, could have been excavated with a bit more rapidity, which will be a goal for next season]. Owing to the location of the church at the side of the *tall*, the natural effects of erosion have caused the shifting of soil and material remains from higher levels, which has created several strata with a mixture of pottery dating from the Roman to the Islamic periods. Further excavation encountered a similar soil matrix in a lower stratum, with increasing amounts of silt and a small quantity of pottery and tessarae (003). Lower strata (004, 005) became increasingly dense with broken limestone fragments and tessarae. Several large ashlars were broken and safely removed to allow for continued work. Pottery in the vicinity of the floor level was increasingly from the Islamic period (mostly Umayyad), reflecting the extensive reuse of the area for domestic purposes at this time. There were consistent numbers of tesserae recovered as excavation continued; these increased in lower soil layers (004, 006), averaging several hundred each day. This may indicate that a tessellated floor lies below - as encountered in Square 43 - but this has yet to be determined.

As the excavation season approached its final week, owing to time constraints a 2×4m probe (005) was started in an attempt to reach the floor surface in order to determine the best strategy for future excavation goals. The probe reached a new soil stratum with increasing amounts of silt/clay. The density of broken architectural debris, including column fragments, increased at this lower level to such a degree that excavation became difficult. It was at this point that excavation ceased.

Square 42

Just west of the southern end of the narthex, Square 42 was opened in order to determine the nature of the space leading up to the entrance of the church, which was expected to be an atrium, a common space in most churches at the site and in the region.

As with the adjacent squares (41, 43), the initial surface-soil matrix (G42000) consisted of typical debris that was quickly cleared. Excavation continued with the removal of two soil strata (002, 003) consisting mainly of fill from the erosion of the *tall* to the west. Its soil matrix was composed primarily of sand and limestone fragments from gravel to cobble size. The pottery at this upper level reflected a spectrum from the Roman to Islamic periods, but consisted primarily of Byzantine ceramic fragments. A daily average of about 100 tesserae was collected, recorded and discarded, as well as some small glass and bone fragments. The material remains were rather sparse in the upper layers, leaving a good amount of soil to work through in the initial two weeks of excavation. The soil

continued to be somewhat dense with fragmented limestone and small rocks, but became increasingly silty as excavation continued into another stratum (004).

At the beginning of the final week of excavation, which was limited to three days of work, a probe (005) was initiated in the northeast corner of the square in order to expedite excavation to the floor surface. A partial wall (007) was uncovered with a heavily eroded basalt column standing upright, along with another fragmentary, basalt column laying on its side. A lower soil stratum (006) was also uncovered, with higher clay composition. A column section (008) was uncovered laying horizontally which, along with the presence of column fragments in the balk, may provide some indication of an atrium space. As with Square 41, a floor surface was not reached, in part owing to the density of architectural debris, large rocks and column fragments; excavation thus had to be concluded.

Square 43

This square was opened opposite the entrance to the southern aisle of the church and what appears to be a north-south colonnade delineating the west entrance to the narthex. The surface (G43000) was cleared of debris; this included a large amount of thorns, brush, small rocks and ashlar fragments. As with the adjacent squares to the south, the initial stratigraphy consisted of a wash matrix from erosion of the *tall* above, which resulted in a wide range in pottery from the Roman to Islamic periods. This loose soil had cobble to sand sediment, with a large amount of limestone fragments of various shapes and sizes. After the removal of these upper layers (001, 002), another stratum (003) was encountered with a greater amount of limestone architectural fragments and silt. This soil matrix continued to have a greater clay component in the stratum below (004), but was less dense with small rocks and broken ashlar fragments. As with the adjacent squares, a probe (005) was made in one part of the square owing to time constraints. This was in the eastern half of the square and was intended to expedite the uncovering of a floor to be identified as an atrium. Evidence of column fragments was uncovered in soil stratum 006, along with an increasingly loamy soil matrix. A damaged tessellated floor (007) was finally uncovered in the last week. It has a criss-cross pattern of black, red and white tesserae, with a small diamond shape at the center with a black outline and red interior. The floor was fragmented and looks to have been damaged by fallen ashlars, probably from the earthquake in AD 749 which destroyed the church. An Islamic-period coin was found at the same level as the floor.

Square 35 Probe Clearance

Another project undertaken this season involved cleanup from previous excavation seasons that uncovered the ancillary room to the south of the main sanctuary, identified as a *diaconicon*. Excavation of this room revealed extensive secondary use after the earthquake which destroyed the church, but it also revealed outer walls of fine ashlar construction, along with architectural features like marble columns and altar posts, and ornate *opus sectile* flooring. In 2014, several probes (38, 39 and 40) were excavated to extend existing squares (31, 32 and 33) in order to expose the *diaconicon*'s south wall. An *opus sectile* floor had been uncovered toward the western end of the *diaconicon*; it also appeared in other parts of the room. Another probe (35) had been opened in a previous season to determine the extent of the north-south wall that was thought to provide a western end to the *diaconicon*, but this work had been cut short by the end of the season in question. The half-excavated probe was subject to a great amount of erosion, and it was determined that its stratigraphy was compromised by several years of fill [This was confirmed later in the season after reaching the floor surface, several modern plastic bags were found at the same level]. One objective was to remove the probe's eastern and northern balks, and to remove the fill layers down to the floor surface.

Removal of the balks and clearance of the probe further uncovered a well-cut western wall of the *diaconicon*, with a continuation of the *opus sectile* flooring bordered by red and white limestone pavers that formed a decorative border. The *opus sectile*, which had not been preserved completely intact, formed a carpet pattern with a combination of red, blue and white marble pieces in the shapes of rectangles, octagons and squares. An interestingly cut basalt

stone with a step design was uncovered, but its identification has not yet been determined. The floors were drawn and then backfilled in order to protect them from further damage. The eastern balks were removed from the square extensions (39 and 40) to further expose the southern wall of the *diaconicon*, and to further open the room to delineate its features.

Preliminary Interpretations

An important objective of the season was to determine the nature of area leading up to the church's western entrance, which is believed to be an atrium. Squares 41, 42 and 43 were part of a grid laid out with the intention of uncovering this important space which has appeared in ecclesiastical complexes both at Abila and at other nearby cities with significant Byzantine communities (Jarash, Gadara and Pella). It is believed that the tessellated floor uncovered in Square 43, which accesses the narthex space just west of the entrance to the south aisle of the church, may be evidence of the atrium. Unfortunately, due to the abbreviated season, the floor was not reached in the probes of the adjacent squares. It is anticipated that the next season of excavation will reach this floor throughout the remainder of Square 43, and possibly in Squares 41 and 42. Along with the tessellated floor, evidence of another important feature common to atriums - the colonnade - was uncovered in each of the squares this season (42007, 42008). Column fragments, including parts of drums and capitals, were encountered amongst the extensive collapse and debris of the area. These elements indicate that further excavation will reveal the Area G church's atrium.

The clearance of the west end of the *diaconicon* seems to indicate that it was built at the same time as, or shortly after, the construction of the church, with ornate flooring similar to that uncovered in the main sanctuary. It was accessed via one doorway at the west end of south aisle and another from the narthex. Later, after the church's destruction by an earthquake, the larger room was subdivided by secondary walls.

Area E

In Area E, excavations were conducted as proposed in the dig design, with excavation units on the north side of the area following the mosaic-paved processional passage first exposed in 2014, and three excavation units west of the formerly covered portico that runs north and south along the west side of the five-aisle pilgrimage church. The squares excavated this season lie at latitude 32.68201 and longitude 35.87013. Area E was supervised by Dr. Robert Smith of Mid-America Christian University, supported by the following student volunteers: James Bennett, Henry Vila, Josafat Guillen, Jacob Russell, Marissa Johns, Gabrielle Marcy, Melissa Endicott and Dr. Maxie Burch (assistant to the area supervisor).

Squares 109 and 119

The Area E excavations focused on two portions of the complex. The first was in the north where two excavation units were opened. Square 109 was excavated by Maxie Burch and Jacob Russell. They removed topsoil in locus 001 to a depth of 1.5m on the west side. Along the south side, the 60-cm wide south wall of the new church was designated as locus 002. The top of the east wall of the new church was not exposed, but in the northeast corner of the square at the location of the new church apse, several clumps of small wall mosaic - some with reflective foil behind glass - were found. Excavation was terminated for the season since it was determined that a new church lay below and that there are three meters of fill to the floor. Efforts were concentrated in Square 119 to the east. Excavation of the topsoil on the west side of the square revealed a wall running north-south that curved out in the northwest corner. The topsoil was designated locus 001. The wall was designated locus 002. This wall was determined to be the eastern wall of the church and was mainly composed of sawn, soft limestone ashlars. This wall reveals some repairs of cracks that appear to have been caused by seismic movement. Search was made for carbon samples in the mortar, which could indicate the date of the repair. Wall 002 was exposed to a depth of *ca* 3.25m. It was punctuated with a doorway (locus 011) that was *ca* 2.05m high and *ca* 90cm wide, with an undecorated basalt lintel. The threshold was a piece of hard, red hematitic limestone. The closure of the doorway with five courses of ashlars indicates a deliberate change in the

desired movement of people. Entrance was no longer needed from the west into the space at the end of the south aisle. A vertical, unbonded crack in the south wall may suggest the addition of an interior *pastophorium*. The apse was designated locus 003. The upper two courses remaining show a transition from being vertical to arching over to create a stone half dome over the apse. The bottom four courses were made of basalt. There are a total of 12 surviving courses of ashlars in the apse. These stones are tied together in a running bond.

Excavation of collapse debris east of wall 002 revealed a parallel wall (005) *ca* 2m to the east. This wall was made of recycled, large limestone ashlars that are levelled with small pieces of hard limestone and basalt. This wall is 60cm thick and forms a passage that is floored with mosaic. The locus of the floor is 007. This mosaic has a large white tesserae border on both sides of the passage. In the center is a carpet mosaic of circles within an orange border on a black background. The circles are *ca* 36cm in diameter and have concentric circles of tesserae. The colors go orange, black, white, black, orange, black, white. This carpet mosaic has white crosses in the spaces between the circles. This mosaic was in place before evident adjustments. In a second phase, an east-west wall (locus 011) *ca* 60cm thick was added and damaged the floor. The orange border was cut. The floor was repaired, employing darker orange-red tesserae. At the location of wall 011, the number of circles in the floor is reduced from four wide to two wide. On the south side of Square 119, the mosaic floor is covered by three basalt ashlars that form a step (locus 008). This step is formed directly on top of the carpet mosaic. This shows that the steps were added after the mosaic was in place. Above the basalt step was a hematitic hard limestone threshold (locus 009), with evidence that it once had a doorway that opened to the north. The locking socket is on the north side suggesting general access was from the south passageway. South of the threshold is another mosaic floor (locus 009). This is *ca* 2×2m and has a geometrical, eight-pointed star pattern that is repeated four times on each side making a total of sixteen stars. The pattern is made up of red, white and black medium-sized tesserae. On the north side there are three small designs by the stairs. On the south side are small designs similar to those on the north side. In the second course above the floor is a large ashlar inscribed with a seven-branched, three-footed menorah (locus 010). This stone is obviously reused. This area was excavated as a part of Square 119 even though it was originally part of Square 118 from the 2014 season of excavation. The mosaic of locus 009 stands *ca* 20cm above the passageway to the west and 40cm above the mosaic to the north. It is likely that mosaic 009 was a donation that covers 007 below. The result is that people had to step up and then take two steps down. The edge of the mosaic on the east side is in poor repair and suggests that the wall 005 was a rebuilding effort. The two mosaics exposed this season in Square 119 are a continuation of the processional way that moved people from the portico of the five-aisled church to the unexcavated church in Square 109 and beyond.

Square 87

This square extends from a doorway in the north-south wall which runs along the west side of the portico. In cleaning the balk area to the north of the doorway, a two-line Kufic inscription was found that was interpreted as an appeal to Allah for forgiveness. Preliminary study of the inscription leans toward the inscription being Islamic rather than Arab Christian, and thus dates to a later use of the church structure. The north-south wall at the side of the portico is *ca* 55cm thick and is made of sawn limestone ashlars. This wall was designated locus 002. It is punctuated by a doorway which opened westward away from the portico. This doorway (locus 003) is 1.3m wide. The threshold of the doorway is made of hematitic limestone. Stepping down 8cm was space for doors to pivot inward. An east-west wall, 50cm thick and made of sawn limestone ashlars, lies alongside the north side of the square and separates it from Square 88 to the north. This wall is punctuated by a 1m wide cut that was filled in *ca* 1.25m west of the northeast corner of the room. The floor framed by the walls was once surfaced with a carpet mosaic having a design of rose buds within a black border. Flanking the sides of the doorway, sections of large white floor tesserae were exposed intact. A 1.5m strip across the eastern

side of the room preserved no mosaic floor. This area of missing flooring lined up with the cut in the north wall. The wall on the south side of the church square is less well defined and shows evidence of reconfiguration. Basalt-paving ashlars provided a foundation for limestone column bases that supported columns made of green chlorite schist marble. The missing column is probably the one with kufic inscriptions that Dr. Mare relocated into the church. The fill layer contained a well-cut capital that once was atop the monolithic green marble column. The orientation of tumbled stones in the fill and the pottery indicate that the structure in the square was destroyed by the earthquake of AD 749 and that the place was not used by squatters for secondary activities other than plunder.

Square 88

This square lies west of the *ca* 4m wide portico that runs north-south along the western end of the five-aisled basilica. A doorway in the west wall of the portico was exposed in 2014, along with the tesserated passageway paved with red and black diamonds that flank the north side of the five-aisled church. Locus 001 is the soil layer that was exposed in the doorway and continues across the square. It is a layer of collapse debris from the earthquake of AD 749. The pottery from this layer was consistently Late Byzantine/Umayyad. No reconstructable pottery was found. The sherds are primarily ribbed bag-jar fragments used in the seating of plaster on walls. The north-south wall was designated locus 002 and was made of sawn limestone ashlars. It is about 55cm thick. Wall 002 was plastered with a *ca* 1-cm thick layer of lime plaster, consisting of a first layer pressed into the joints that was covered by a thinner finish coat. Wall 002 was punctured by a doorway (locus 003) with a hematitic limestone threshold. Inside the threshold, which was made for the doors to open to the west, the floor is paved with a red and black diamond-pattern mosaic that is similar to that in the passageway to the east. This floor was covered over with basalt pavers, as was the mosaic in entrance to the room. The room has a limestone ashlar wall on the north side and a parallel wall on the south side. At a point *ca* 1.25m from the northeast corner of the room, the wall was cut and subsequently filled in. This feature aligns with a similar cut in the wall on the south side of the room. Between the two features a line of basalt ashlars paves the floor and covers over a waterway/drain that remains to be investigated. On the south side of the square abutting the wall, a staircase ascends to the west. The floor in the northwest corner of the room is paved with large white tesserae and leads to a doorway that goes into Square 78. This room provides access to the water features that were a part of pilgrim activities related to water at the time of the earthquake in the mid-eighth century.

Square 87 was excavated by Jacob Russell and Joe. The work began at the western side of the square against the feature that is interpreted as a staircase leading up to the top of the terrace. In the center of that feature is a 1.1m wide by 1m deep vertical indentation that is covered with calcite, demonstrating the flow of mineral rich water. The base of this feature was accessed by steps. The third step appears to have been made up of a bituminous limestone carving of a saint. The placement of the stone in mortar appears to have been less than respectful. The soft stone was clearly not exposed to long-term foot traffic or sun exposure, and was located above a lower water feature. In the southwest corner of the square, the staircase carried people up to an elevated platform as part of ritual activities. In the room below, water flowed through two ritual installations. In this room three reconstructable cooking pots were found. The room was filled with a large amount of carbon and clay. The supporting roof appears to have burned and glass oil lamps in a *polycandelon* were smashed. A reconstructed glass vase with three applied handles was found. Water was directed to flow into a mudstone-faced niche that had a hole at the bottom and water flowing through a ritual basin.

Next to the main water installation, access was gained through a mudstone covering to a passageway supported by an arch and corbelling in a perpendicular passageway. More work needs to continue here. The pottery picked up from the surface of the tunnel was from the mid-eighth century. A small, intact glass ‘perfume’ bottle was found in the tunnel.

In the next season of excavation, the remaining unexcavated area (Square 77) in the space west of the five-aisle church needs to be exca-

vated and the soil dump needs to be removed from the atrium. This excavation should reveal the north side of the atrium and ascertain whether or not the large feature next to the terrace wall is indeed a staircase. The tunnel exposed in Square 78 also needs to be investigated. I suspect that it will attract a good deal of illicit interest. Between seasons, it seems likely that more water features will be exposed. In the processional passage at the top of the stairs from the portico, the soil dump needs to be removed and excavations should proceed westward in Square 89. This will likely expose a continuation of a mosaic passage that goes along the south side to the front of the newly exposed church on the north side of Area E. The excavation of the new northern church will be a major undertaking since it will be filled with fallen ashlars to a depth of *ca* 3m. Square 109 suggests that the church will have three aisles and an interior width of *ca* 15m.

Square 78 revealed a staircase laid on top of a mosaic floor surface that rose to a platform where significant amounts of ash and bone were uncovered. In addition, many of the structural features of this square gave evidence of use related to water, *viz*. various water channels and openings to cisterns that sat below the excavated square (**Fig. 8**).

In the northeast section of the area excavated this season, a large wall was encountered that joined with what appears to be an apse structure. Further excavation will be needed to determine the exact nature of this structure but, with nearly 12 courses of stone *in situ*, it will likely give us important evidence into the nature of the occupation in Area E (**Fig. 9**).

Additional work was done at the site to remove approximately 100 cubic meters of excavated soil, at a cost of nearly 900 JD. Work was also done with geo-electrics in Wādī Quwaylibah under the direction of Dr. Bernhard Lucke and in cooperation with Dr. Rashid (Department of Geology, Yarmouk University).

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7. Excavation of Area E basilica.



8. Water installation in Area E.



9. Wall with apse-like protrusion.

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THE FIRST PRELIMINARY REPORT OF THE KHIRBAT UMM AL-GHUZLĀN EXCAVATION PROJECT[1]: INVESTIGATING AN EB IV OLIVE PROCESSING SITE IN NORTH JORDAN

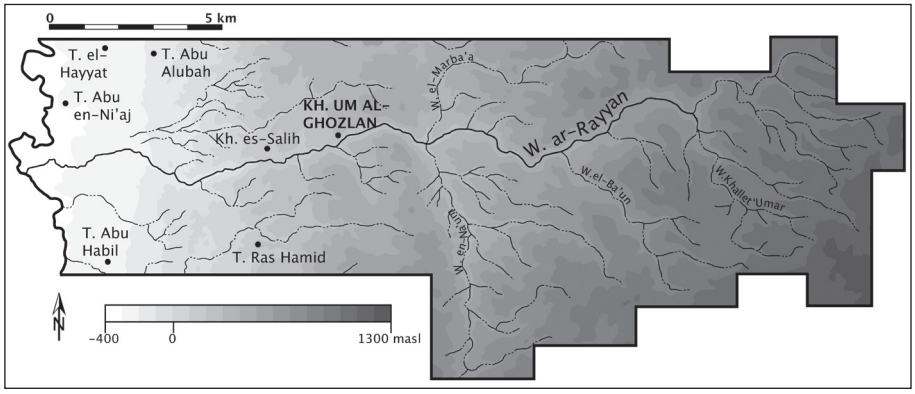
J.A. Fraser, C.R. Cartwright, N. Zoubi, A. Carr, N. Handziuk, B. Spry, A. Vassiliades, K. Wesselingh and H. Winter.

The Early Bronze Age (EB) IV (*ca* 26/2500-2000BC [Falconer and Fall 2016]) site of Khirbat Umm al-Ghuzlān lies in the middle reaches of the Wādī ar-Rayyān (formerly Wādī al-Yābis) in the eastern escarpment of the Jordan Rift Valley (**Fig. 1**). The site sits 390 meters above sea level (masl) on a defensible knoll that protrudes across a low saddle from the Tall ar-Rās ridge (UTM 749729E 3588534N; **Fig. 2**). Although only 0.4ha in size, the Ghuzlān knoll is surrounded by an ovoid enclosure wall, partly constructed by a double row of megalithic slabs (**Fig. 3**).

In October 2016, the APAAME Project captured aerial photographs documenting bulldozer damage to the northwest portion of the site, including part of the monumental enclosure (**Fig. 4**). In response, a small team from the British Museum initiated a rescue excavation between 25 February and 23 March 2017, funded by the Curtiss T. and Mary G. Brennan Foundation and the Gerald Averay Wainwright Fund[2]. Excavations in four trenches uncovered at least two EB IV architectural complexes. The nature of these buildings and their associated finds suggest that Khirbat Umm al-Ghuzlān served as a specialized production and storage site for high-value liquid products such as olive oil in the late 3rd millennium BC.

Past Research

Wādī ar-Rayyān descends for 18km from the ʻAjlūn mountains (1200masl) to the Jordan Valley floor (300mbsl). Its headwaters receive over



1. The Wādī ar-Rayyān defined by the survey boundaries of the Wadi Yabis Survey. EB IV sites identified by the Wadi Yabis Survey (Mabry and Palumbo 1988: Fig. 1 and Table 1).

1. The 2017 season was directed by James Fraser (then Project Curator for the Ancient Levant, British Museum) with Nasr Zoubi (Representative of the Department of Antiquities of Jordan), Adam Carr, Natalia Handziuk, Beau Spry, Anthoulla Vassiliades and Holly Winter. Ehab al-Jariri joined the team for one day as Surveyor from the Department of Antiquities of Jordan. Dr. Caroline Cartwright (Senior Research Scientist, British Museum) served as scientific director for the project during post-processing analysis.

2. The project is grateful to Dr. Monther Jamhawi (then Director General, DoA) for allowing the rescue excavation to proceed. Nasr Zoubi provided assistance and in-field advice as Representative of the DoA, and we are grateful for the administrative support of Aktham Oweidi at the DoA. The project is affiliated with ASOR, and invaluable support was provided by Barbara Porter and her staff at ACOR. We are also grateful for the in-field support provided by the University of Sydney's Expedition to Pella. Dr. Stephen Bourke offered invaluable comments on a draft of this paper. The project was funded by the Curtiss T. and Mary G. Brennan Foundation (USA) and the Gerald Averay Wainwright Fund (University of Oxford).

600mm of rainfall per year, and several springs feed the perennial Rayyān stream. Although long known as the *Yabis* (barren), the *wadi* was renamed the *Rayyan* (fertile) in the 1990s, and this toponym is used here (Fraser 2018: 180).

The Wādī al-Yābis Survey (WYS) investigated the catchment between 1987 and 1992 as a joint project between the University of Arizona and the University of Rome. Khirbat Umm al-Ghuzlān was identified in 1987 as site WY28 (Mabry and Palumbo 1988: 289). Gaetano Palumbo dated most surface sherds to the EB IV period, based on highly fired sandy fabrics and diagnostic features including ledge handles and everted rims, although sherds dating to the 2nd and 3rd centuries AD were also found (Mabry and Palumbo 1988: 288; Palumbo 1990: 98). Palumbo did not describe the site in detail, but noted that one of the largest dolmens in the catchment stands at the base of the al-Ghuzlān knoll (Palumbo 1992: 48, 2008: 242; also Fraser 2018: fig. 10.8).

In 2007 and 2009, the University of Sydney's North Jordan Tomb Project (NJTP) visited the site as part of a larger survey documenting megalithic features along the adjacent Tall ar-Rās ridge (Fraser *et al*. 2009). Significantly, the Ghuzlān knoll was the only locus along the ridge that yielded EB IV materials (Fraser 2018: 239). As Khirbat Umm al-Ghuzlān was threatened by encroaching olive groves, the NJTP produced a site plan of all surface architecture (Fraser and Batayneh 2009). This plan was updated as part of the British Museum project in 2017 to include the recent destruction.

Surface Architecture

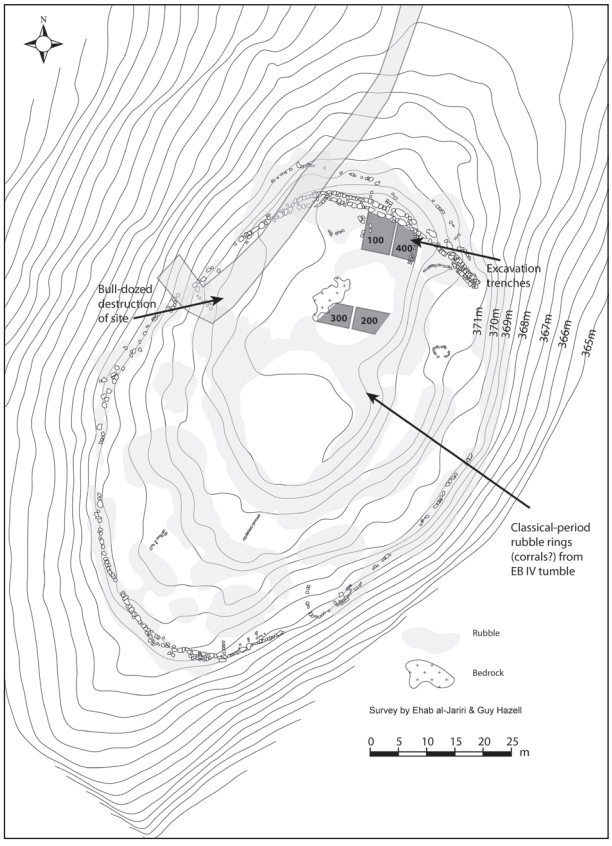
The site plan is presented in **Fig. 3**. The surface architecture includes an 'Enclosure Wall' surrounding the Ghuzlān knoll, and two large circles of heaped stones within. These features are described below.

Enclosure Wall

The enclosure consists of a discontinuous perimeter wall around the Ghuzlān knoll, defining an ovoid area 100×50m (0.4ha). This 'Enclosure Wall' is described in detail elsewhere (Fraser and Batayneh 2009). In summary, the wall is only one row wide and preserved only one or two courses high around the steep eastern, southern and western sides of the knoll that fall sharply into the *wadi* below. In contrast, the northern portion of the wall constitutes a substantial piece of monumental architecture (**Fig. 5**). This section controls access to the site across a low saddle linking the Ghuzlān knoll to the Tall ar-Rās ridge. It extends 30m across the top of the saddle, then follows the contours southwest around the knoll for 12m. It comprises two rows of large field stones and megalithic boulders and is preserved up to four courses high, although a concentration of tumbled rocks suggests it once stood higher.



2. Khirbat Umm al-Ghuzlān above Wādī ar-Rayyān, seen from Tall ar-Rās ridgeline. Facing SW (Photo by A. Carr).



3. Plan of surface architecture at Khirbat Umm al-Ghuzlān.

Rubble-Ring Features

Two large circles of heaped stones sit on the highest point of the knoll within the enclosure, the largest of which defines a cleared area 22×24m. Both rings consist of small and medium field stones heaped approximately 1m high with no apparent structure (Fraser and Batayneh 2009). As discussed below, these features postdate the Enclosure Wall, and were probably associated with herding in the 1st millennium AD.

The Khirbat Ghuzlān Excavation Project

The primary objectives of the first season of excavations were:

1) To articulate the sequence of occupation at the site;
2) To determine the stratigraphic relationship between the Enclosure Wall and Rubble-Ring features.

These objectives were realised through the excavation to bedrock of four trenches in the two areas: Trenches 100 and 400 against the monumental portion of the Enclosure Wall, and Trenches 200 and 300 within the northernmost Rubble-Ring feature (**Fig. 2**). All trenches were between 1 and 1.5m deep, and yielded the same stratigraphic sequence summarised in **Table 1**.

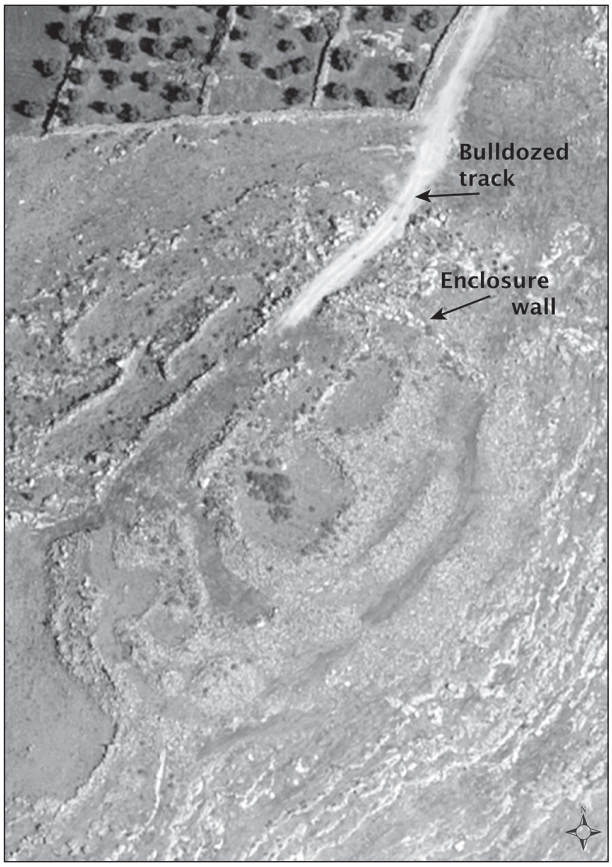
Table 1. Summary of strata excavated at Khirbat Umm al-Ghuzlān.

1. Topsoil	Dark brown silty-clay with EB IV and Classical period sherds,
2. Tumble	Tumbled stones from Stratum 3 architecture within a red silty-clay matrix with EB IV sherds.
3. Occupation	Yellow clayey-silt deposits with EB IV materials, including occupation surfaces associated with standing architecture.
4. Levelling fills	Stone cobbles within red silty-clay fills introduced to flatten irregular bedrock.
5. Natural	Sterile rendzina soil.
6. Bedrock	Microcrystalline limestone.

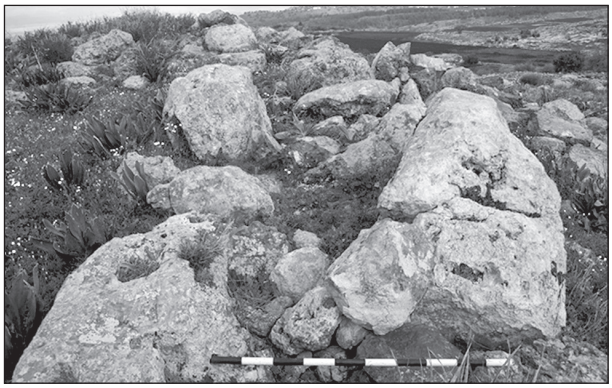
Trench 100

Trench 100 was opened to establish the stratigraphic relationship between the Enclosure Wall and the northernmost Rubble-Ring feature. As shown in **Fig. 6**, the trench measured 7×5m (NS×EW) and was located between the inner (south) face of the Enclosure Wall and the outer (north) side of the Rubble Ring.

Excavations quickly revealed a raised platform of limestone bedrock that dominated the trench. Two single-row walls of medium field stones (Walls 104 and 120) were roughly aligned north-south in the west of the trench: Wall 120 ran beneath the rubble accumulation of the large ring feature, while Wall 104



4. Aerial image of Khirbat Umm al-Ghuzlān taken October 2016 by Robert Bewley for the APAAME Project. APAAME_20161002_RHB-0100.



5. Northern portion of Enclosure Wall. Facing west, 1m scale (Photo by A. Carr).

abutted the inside face of the Enclosure Wall. Both these walls and the Enclosure had been constructed directly over bedrock or over a fill of small stones within a red silty-clay matrix used to level irregular bedrock depressions. A limestone mortar was found wedged in a bedrock split between these walls, suggesting the platform served as an activity area. Walls 104 and 120 may define the east side of a structure mostly situated west of the trench. No occupation strata were preserved, and topsoil directly overlay the raised bedrock shelf.

The bedrock platform dived to a natural depression 1.25m deep. Four lensing silty-clay fills were excavated within this depression beneath a layer of rock tumble, with substantial quantities of cultural material including sherds, broken spindle whorls and flint tools. These fills suggest the depression was used as a rubbish dump. Most animal bones retrieved from the site were recovered from these contexts.

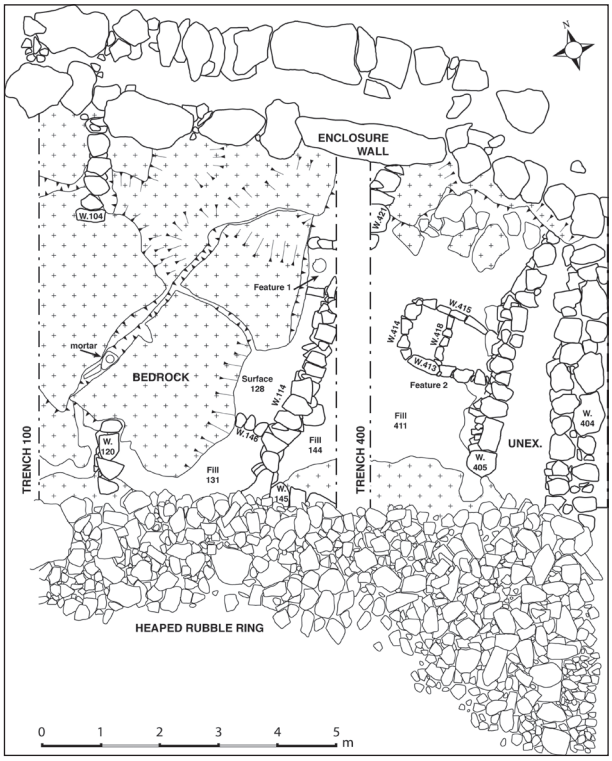
The east side of the bedrock platform was fashioned to create a 1m deep vertical shelf. Wall 114 ran adjacent to the shelf, extending northeast from beneath the Rubble-Ring feature, and a probable return (Wall 145) was detected in the southeast corner of the trench, beneath the accumulated rubble heap (**Fig. 6**).

Excavations between Wall 114 and the vertical bedrock shelf revealed a stone bin (Feature 1) defined by two rows of upright stones and a bedrock base. A cut-down jar base was found within. Three large stones (Wall 146) placed between Wall 114 and the bedrock platform divided this external area into two spaces, containing an earth surface running to Feature 1 (Context 128) and a silty-clay fill to Wall 120 (Context 131).

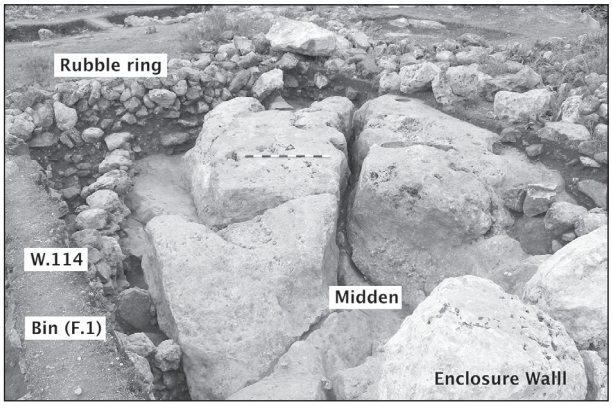
Trench 400

In order to determine the relationship between Wall 114 and the Enclosure Wall, Trench 400 (6×4m) was opened 0.5m east of Trench 100 (**Figs. 6, 8 and 9**). These excavations revealed that Wall 114 continued to abut the inside face of an upright megalithic slab used in the Enclosure Wall. A parallel wall, Wall 405, was uncovered 3m east of Wall 114, also abutting the Enclosure Wall.

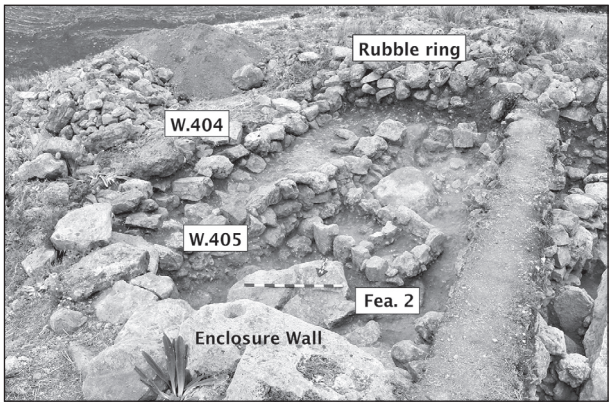
These walls define a rectangular space 3m wide and approximately 6.5m long. It is un-



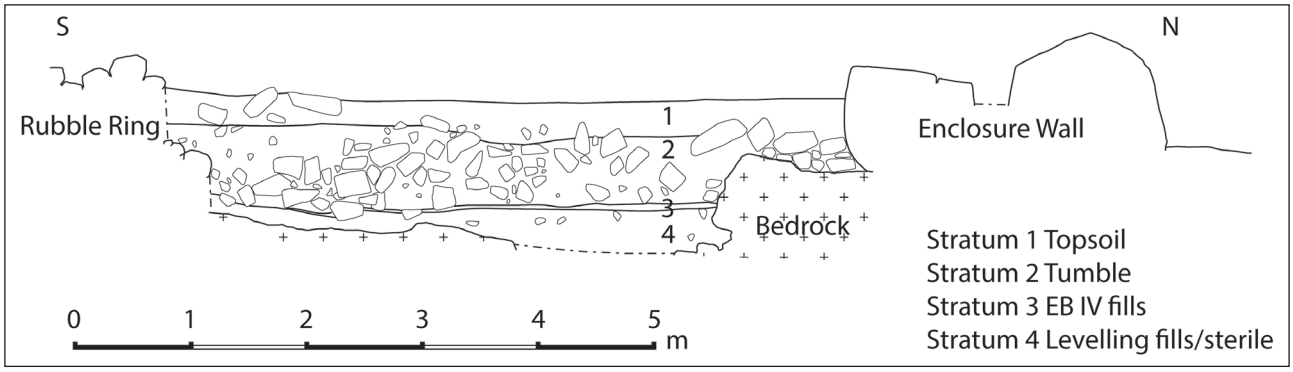
6. Plan of Trenches 100 and 400 at end of excavation (Drawn by H. Winter and J. Fraser).



7. Trench 100 at end of excavation. Facing SW, 1m scale (Photo by A. Carr).



8. Trench 400 at end of excavation. Facing SE, 1m scale (Photo by A. Carr).



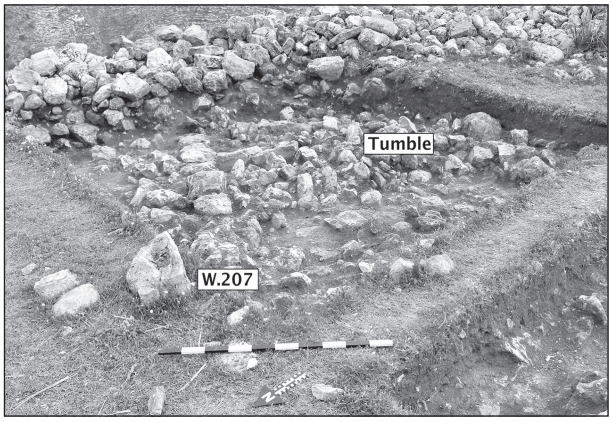
9. Section of Trench 400 west baulk. Facing W (Drawn by H. Winter and J. Fraser).

likely that this area served as occupation space, given its unmodified irregular bedrock and the absence of floors. Rather, the area probably served as an animal pen: a possible feeding trough (Feature 2 in **Fig. 8**) protruded from Wall 405, divided into two cells by a low partition. If so, Feature 1 in Trench 100 may have contained stored animal feed, with the jar base within being the scoop used to transfer feed to the trough. Feature 2 was constructed over the red silty-clay levelling fill.

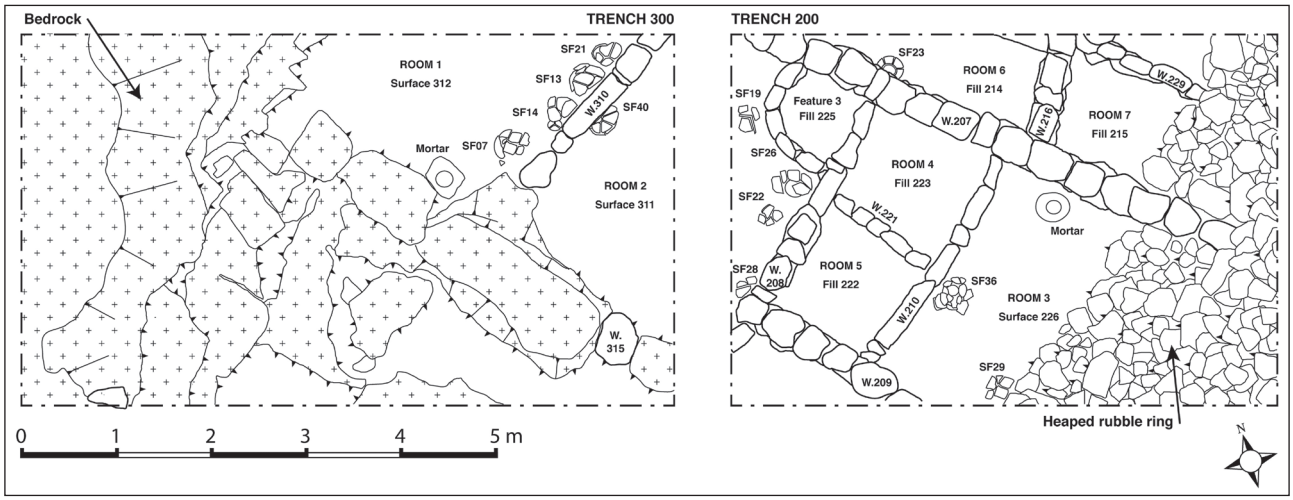
A large wall, Wall 404, was identified below topsoil running south from the inside face of the Enclosure Wall and continuing beneath the Rubble-Ring feature. This wall formed the eastern edge of Trench 400. Unlike the smaller walls exposed elsewhere in these trenches, Wall 404 was constructed of large field stones in two rows. The wall is not aligned with the adjacent Wall 405, but rather forms a triangular wedge (**Fig. 11**); this space remains unexcavated. Future excavations will investigate the southern continuation of this wall and its relationship to the possible storage area identified in Trenches 200 and 300.

Trenches 200 and 300

Trenches 200 and 300 were opened between the interior side of the northern heaped-rubble feature and a large outcrop of limestone bedrock (see **Fig. 3**). Both trenches measured 4×6m, separated by a 0.5m baulk. Excavations exposed an extensive area of tumbled stone overlying an architectural complex with at least nine walls and seven rooms or courtyards (**Figs. 10-13**).



10. Initial excavation of Trench 200. Top of Wall 207 emerging amongst Stratum 2 tumble, running beneath the Rubble-Ring feature.



11. Plan of Stratum 3 in Trenches 200 and 300 (Drawn by N. Handziuk, B. Spry and A. Vassiliades).

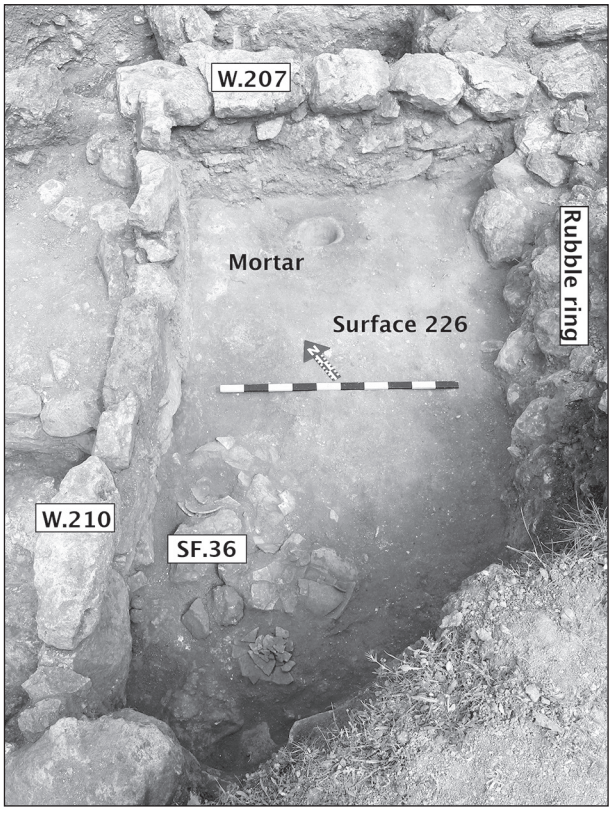
The two largest walls (Walls 207 and 209) ran northwest-southeast beneath the Rubble-Ring feature. Three cross walls (Walls 310, 208 and 210) divide the area into Rooms 1, 2 and 3; a fourth area with no apparent doorway was partitioned by Wall 221 into two 1×1m cells (Rooms 4 and 5). An additional northwest-southeast wall (Wall 229) defines a narrow space north of Wall 207, and at least one short cross wall (Wall 216) divides this area in two (Rooms 6 and 7). It is unclear whether Wall 229 defines the edge of a second structure immediately north of Trench 200, or represents a continuation of the same complex. All walls consist of a single row of medium field stones constructed directly over bedrock or on a levelling fill of fist-sized rounded cobbles in red silty-clay.

Although the northern, southern and eastern extents of the structure lie beyond the excavation area, the structure's western end was built against a raised bedrock shelf, and even incorporates it as part of Wall 315. A hard orange earth surface was detected in the room/courtyard defined by these walls (Context 312). Four broken but partly complete EB IV storage jars (Special Finds [SF] 07, 13, 14 and 21) were found on the floor against the wall, and a large limestone mortar was wedged in a bedrock split (**Fig. 11**).

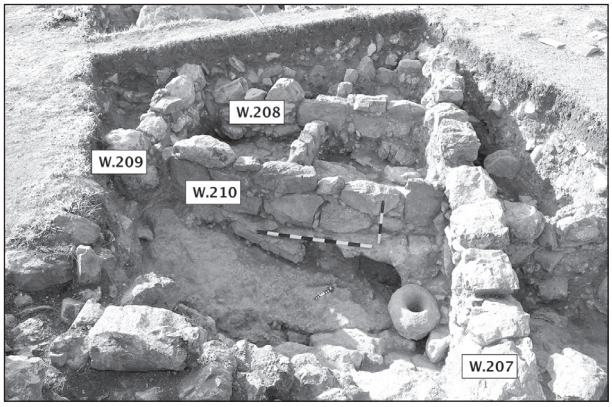
Immediately east, Walls 310, 207 and 208 define a rectangular room (Room 2) that measures 3.1×2.4m. Excavations revealed a curved bin of upright stones (Feature 3) constructed against the northeast corner. The bin contained an upper fill of brown sandy-clay (Context 220) over a lower fill of red sandy-clay (Context 225), which yielded several joining jar sherds, a Canaanean blade segment (SF 034 [**Fig. 19**]) and several animal bones. Although partly obscured by the baulk, clusters of joining sherds from three storage jars (SF 19, 22 and 28) and a spouted holemouth jar (SF 26) were discovered on an earth floor (Context 219) against the stone bin and Wall 208; another storage jar (SF 40) was uncovered on the opposite side of the room on the equivalent surface in Trench 300 (Context 311).

The two partitioned square features (Rooms 4 and 5) yielded neither cultural remains nor floor surfaces. A bedding of small cobbles in a red silty-clay matrix filled the uneven bedrock between Walls 207-210, over which all walls were built.

A large, rectangular room/courtyard was excavated on the east side of Wall 210 (Room 3). The room contained a single surface of hard, yellow silty-clay (Context 226), on which an extensive spread of joining sherds from at least one storage jar (SF 36) and a mostly-complete amphoriskos (SF 29) were discovered. A large mortar was embedded within the surface so that only its top was visible (**Fig. 12**); removal of the surface revealed that the mortar had been



12. Joining pottery sherds on earth surface near rim of mortar in Room 3, Trench 200. Facing NE (Photo by A. Carr).



13. Architectural complex in Trench 200 at end of excavation. Facing west (Photo by A. Carr).

placed within a bedrock niche when the layer of levelling fill was laid over the irregular bedrock (**Fig. 13**).

The small spaces within Rooms 6 and 7 did not yield any surfaces, and the stone tumble of Stratum 2 appeared to overlie the levelling fills of Stratum 4 that underlay Walls 207 and 216. However, the concentration of joining storage jar sherds SF 23 in Room 6 suggests these rooms once contained a floor that has not survived, or which was missed in the excavation of these narrow spaces.

Phasing

These excavations indicate two distinct phases of activity:

EB IV Phase

The lower phase was defined by the standing architecture in all four trenches, including the Enclosure Wall. All associated Stratum 3 deposits yielded exclusively EB IV materials (see "Ceramics" below). As Walls 104, 421, 405 and 404 abutted the inside face of the Enclosure Wall in Trenches 100 and 400, it is likely that the knoll was enclosed before many or all its structures were built within. The irregular bedrock outcrop that forms the Ghuzlān knoll was prepared for construction by the introduction of levelling fills, which underlie those walls constructed in areas where the bedrock is uneven, including part of the inner row of the Enclosure Wall. This situation recalls the preparation of bedrock detected at the EB IV enclosure site of Dhahrat Umm el-Marrar on a defensible hilltop in the foothills of the rift escarpment (Falconer and Fall 2019: 167).

EB IV occupation appears short-lived. There is no evidence for architectural modification, and only primary floor surfaces were identified. The EB IV settlement was abandoned leaving vessels *in situ* and the walls in place. The tumbled stones that characterize Stratum 2 were found in all trenches (see **Fig. 10**), suggesting that the Ghuzlān knoll became an extensive ruin-field as these abandoned structures collapsed.

Classical-period Phase

The EB IV rock tumble was cleared from the north of the site to create two circles defined by heaped rings of cleared rubble. Five EB IV walls (Walls 120, 114, 404, 207 and 229) were shown to underlie the northernmost rubble feature. This phase may date to the Classical period, as the associated topsoil contains mixed EB IV and Classical-period sherds. The rubble features possibly served as animal corrals.

Ceramics

The excavations collected over 6700 sherds, of which 3759 derived from securely stratified EB IV contexts classified as "Stratum 3" in **Table 1**. As summarised in **Table 2**, 940 of these sherds were diagnostic. This corpus includes the identification of at least 12 broken but partly complete jars lying on the floor surfaces within the structure excavated in Trenches 200-300. Ongoing analysis may detect further joins between sherds, refining the provisional data presented in **Table 2**.

The ceramics display highly fired, sandy wares. Distinct fabric groups are apparent within the corpus, including pale, green and yellow-buff fabrics, although full characteriza-

Table 2. Summary of ceramics recovered from Stratum 3.

Vessel Type	Tr. 100	Tr. 200	Tr. 300	Tr. 400	Total
Necked jars	19	17	14	14	64
Holemouth jars	3	9	31	0	43
Spouted jars	3	3	0	0	6
Jars (indistinct)	193	197	270	13	673
Bowls	8	8	2	3	21
Cooking pots	35	8	77	11	131
Amphoriskoi	0	1	1	0	13
Diagnostic Total	261	243	395	41	940
Bodysherds	658	762	510	889	2819
Sherd Total	919	1005	905	930	3759

tion awaits detailed study. A dark-brown coarse sandy fabric with white lime inclusions is identified as a cooking ware.

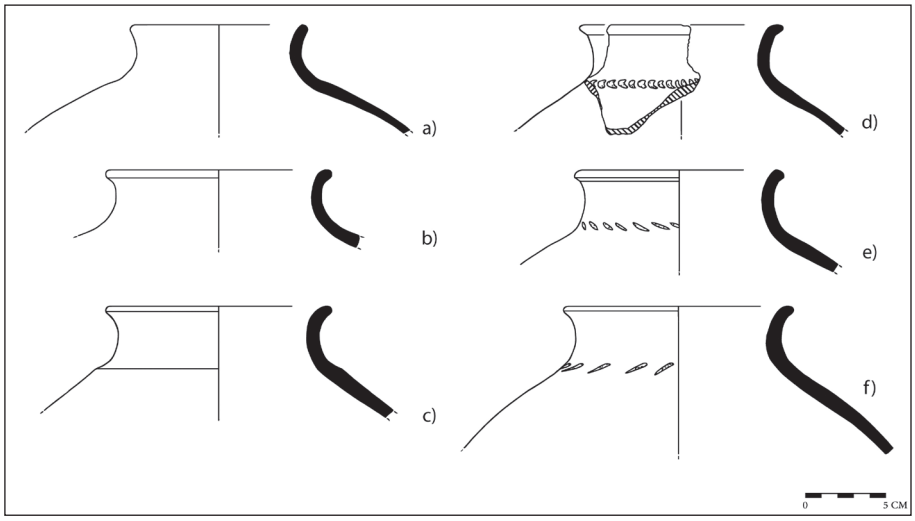
Traces of red slip or red paint, occasionally identifiable as 'trickle-painted' ware, were detected on several sherds. However, burial above the limestone bedrock has caused a heavy mineral concretion to form on most sherds which is difficult to remove. Consequently, it is unclear what proportion of the corpus was painted or slipped. For this reason, painted or slipped decoration has not been indicated in **Figs. 14-17** (but see **Tables 3-6**).

The Stratum 3 assemblage is overwhelmingly dominated by storage jars, which constitute 83% (n=780) of diagnostic sherds (**Figs. 14-16**). Jar forms comprise tall, narrow-necked jars with everted rims (10-14cm in diameter) and holemouth jars with short, everted or beveled rims (14-16cm in diameter). Narrow-necked jars constitute 60% (n=64) and holemouth jars 40% (n=43) of the jar assemblage. Those sherds listed as "Jars (indistinct)" in **Table 2** denote jar sherds such as handles, bases and other fragments that could derive from either the necked or holemouth forms. Examples of both forms were found with applied 'envelope' handles protruding from the widest point of the body (**Fig. 16**). Every envelope handle exhibited three folds.

Many of the narrow-necked jars were decorated with a single row of incised slashes around the base of the neck, most of which were made from a high right to lower left side, but occasionally reversed (**Fig. 14d-f**). Holemouth jars were undecorated, with the singular exception of a rim sherd incised with a horizontal line and zig-zag motif (**Fig. 15g**). This sherd also included a vertical loop handle, and had a diameter much wider (23cm) than other jars from the site.

A partly complete spouted holemouth jar (**Fig. 15h**) was excavated in Room 2 against the curved storage bin (SF26 in **Fig. 11**). This vessel displays traces of red paint on the rim and red paint or slip on the body. A high tubular spout indicates liquid storage. As such a large vessel could not be lifted and poured when full, it may have served as a decanting vat into which pressed olive liquid could settle to allow the oil to rise above the water content and be decanted away. Two spout fragments were collected from the rubbish midden in Trench 100.

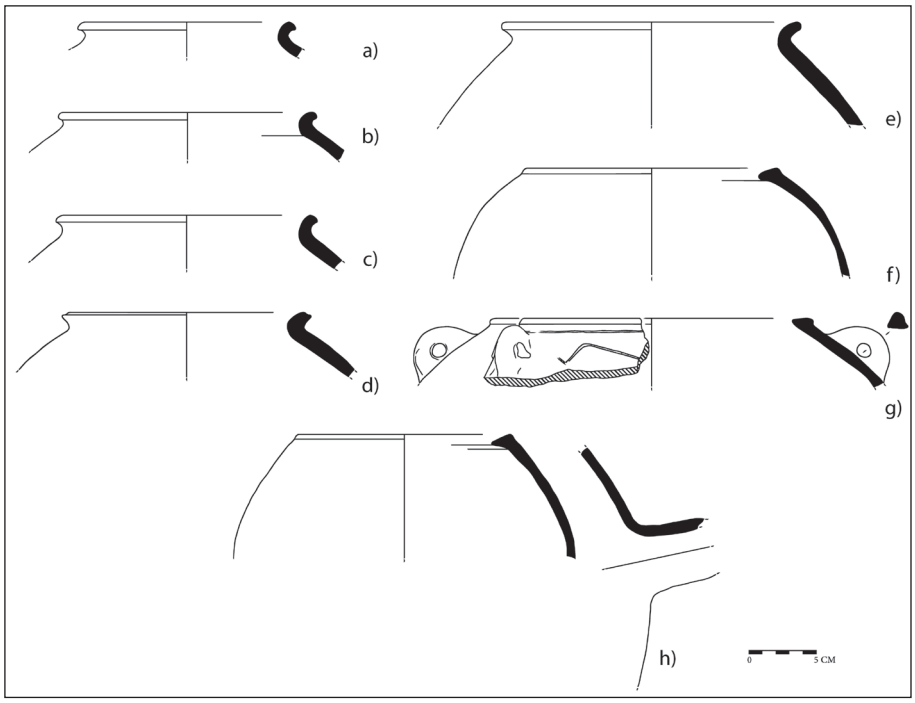
Only 2% (n=21) of the Stratum 3 diagnostic corpus were identified as open forms (**Fig. 17**). These sherds were mostly deep bowls or cups



14. Narrow-necked jars with everted rims (Drawn by Monjed Qasem).

Table 3: Narrow necked jars.

a) Jar rim	KG-309-04	Ware pale buff, fine grit and sand temper.
b) Jar rim	KG-226-02	Ware pale buff, fine grit and sand temper.
c) Jar rim	KG-226-01	Ware pale orange buff, fine grit and sand temper.
d) Jar rim	KG-107-03	Ware pale buff, fine grit and sand temper, incised crescents.
e) Jar rim	KG-115-01	Ware pale buff, fine grit and sand temper, slash incised.
f) Jar rim	KG-115-03	Ware pale orange buff, fine grit and sand temper, slash incised.



15. Holemouth jars (Drawn by Monjed Qasem).

Table 4: Holemouth jars.

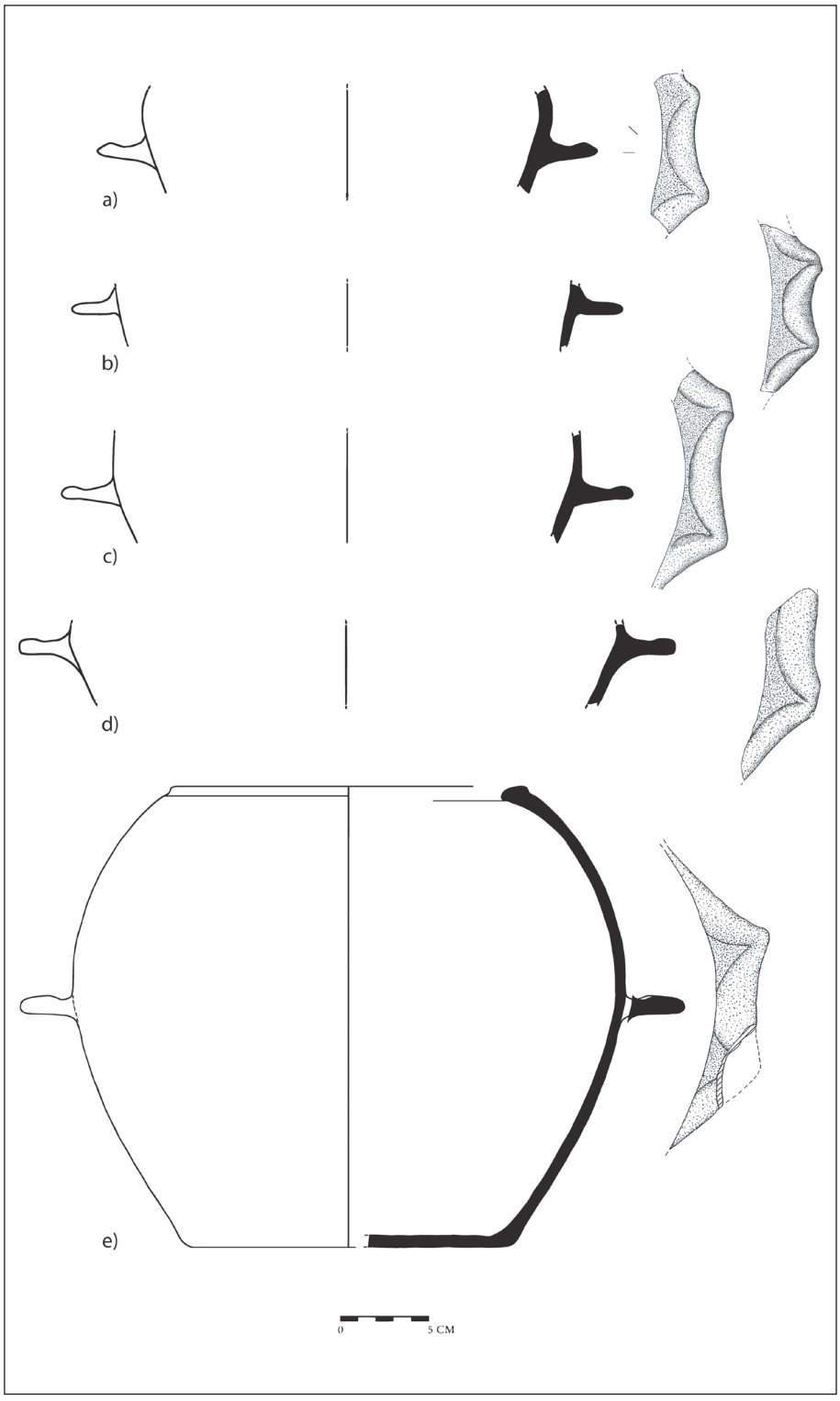
a) Cooking pot	KG-408-03	Ware coarse brown buff, white lime grit temper.
b) Jar rim	KG-214-01	Ware coarse orange buff, grit and sand temper.
c) Jar rim	KG-131-03	Ware coarse orange buff, grit and sand temper.
d) Jar rim	KG-308-11	SF16: Ware coarse orange buff, grit and sand temper.
e) Jar rim	KG-308-01	SF13: Ware coarse orange buff, grit and sand temper.
f) Jar rim	KG-308-04	SF12: Ware coarse pale buff, fine grit and sand temper.
g) Jar rim	KG-107-01	Ware pale buff, grit and sand temper. incised line and zig-zag below rim, vertical lug handle.
h) Jar rim	KG-219-01	SF26: Ware pale orange buff, grit and sand temper, traces of red paint on rim, neck and spout.

with upright or slightly inverted simple rims (14-18cm diameter). Occasional examples had small ledge handles, including a knob on the rim of a rare broad bowl (**Fig. 17e**) and thumb-impressed scalloped ledge handles on the mid-body of two deep bowls or cups (**Fig. 17c-d**). Several sherds had traces of red paint, although the nature of this decoration was indistinct; decoration was likely present on more sherds than those detected.

Cooking ware, identified by a distinctive coarse sandy fabric with small lime inclusions, constituted 14% (n=131) of the diagnostic assemblage. Sherds included both holemouth (**Fig. 17a**) and everted rim forms, the latter with dimensions between 14-15cm. A broken but mostly restorable amphoriskos was discovered on the floor of Room 3 (SF29 in **Fig. 11**). As shown in **Fig. 17i**, this vessel has a small, squat body with two vertical loop handles below a short, everted rim, and traces of red trickle-paint were detected on the neck.

Botanical Remains

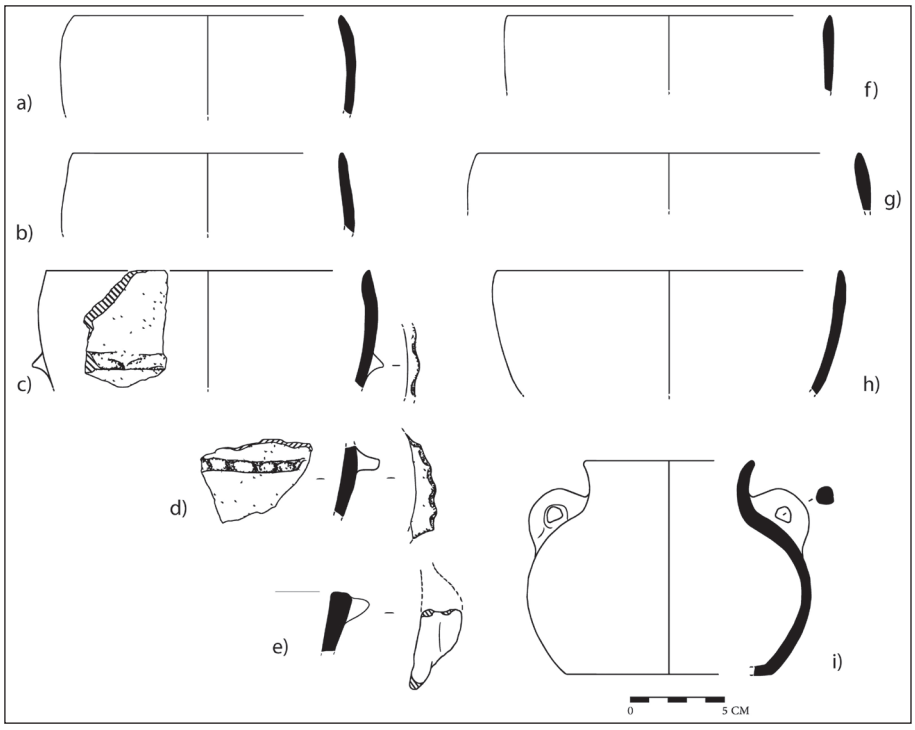
Sampling for archaeobotanical remains was an integral part of excavation procedure. Bulk samples of sediment were taken from all securely stratified contexts, with an ideal volume of 20 litres. Thirty-eight samples were processed by machine flotation. Light fractions (flots) were collected in 1.0mm and 0.3mm mesh sieves. The flots are currently being analysed for archaeobotanical remains by Dr. Caroline Cartwright at the British Museum, using reflected light optical microscopy and variable pressure scanning electron microscopy. This



16. Envelope jar handles (a-d) and profile of holemouth jar SF07 (Drawn by Monjed Qasem).

Table 5: Jar handles and holemouth jar.

a) Handle	KG-219-01	SF28: Ware orange buff, grit and sand temper.
b) Handle	KG-219-02	Ware coarse orange buff, grit and sand temper.
c) Handle	KG-309-01	Ware pale buff, grit and sand temper.
d) Handle	KG-308-09	Ware pale buff, grit and sand temper.
e) Jar	KG-305-01	SF07: Ware pale buff, grit and sand temper.



17. Deep and broad bowls (a-h) and amphoriskos SF29 (Drawn by Monjed Qasem).

Table 6: Bowls and amphoriskos.

a) Deep bowl	KG-410-01	Ware orange buff, grit and sand temper.
b) Deep bowl	KG-211-01	Ware fine pale buff, grit and sand temper.
c) Deep bowl	KG-106-04	Ware pale buff, grit and sand temper, thumb-impressed ledge handle.
d) Handle sherd	KG-226-04	Ware pale buff, grit and sand temper. Thumb-impressed ledge handle.
e) Handle sherd	KG-403-02	Ware pale orange buff, grit and sand temper, folded ledge handle from rim. Very rolled.
f) Deep bowl	KG-211-04	Ware fine pale buff, grit and sand temper.
g) Deep bowl	KG-308-02	Ware pale buff, grit and sand temper.
h) Deep bowl	KG-213-01	SF37: Ware fine pale buff, grit and sand temper, traces of red paint on rim int. and ext. Possibly trickle-painted.
i) Amphoriskos	KG-211-02	SF29: Ware pale buff, grit and sand temper, traces of red paint on neck and shoulders.

study is partly funded by the Mediterranean Archaeological Trust.

The flots from Khirbat Umm al-Ghuzlān demonstrate a near absence of charred seeds and grains. This situation strikingly contrasts the abundance of charred wheat, barley, lentil and other domestic and wild taxa recovered from lowland EB IV agrarian villages such as Tall Abū an-Niʿāj (Falconer and Fall 2019). It is unlikely that this issue is due to poor preservation, as fragments of wood charcoal were retrieved, and charred organic remains were preserved in the Chalcolithic site of al-Khawarij in a similar geo-morphological zone nearby (Lovell *et al.* 2006: 56-58). Rather, the paucity of charred seeds and grains was probably associated with the lack of domestic hearths, fireplaces or ashy debris detected at the site.

Fourteen small charcoal samples were collected. Using scanning electron microscopy, these samples were examined in transverse, radial longitudinal and tangential longitudinal planes. All 14 samples were identified as olive (*Olea europaea*), several of which exhibit the effects of heat (**Fig. 18**). It is difficult to assess the significance of olive-wood charcoal for the issue of olive cultivation, given the low number of samples. However, we draw two provisional inferences:

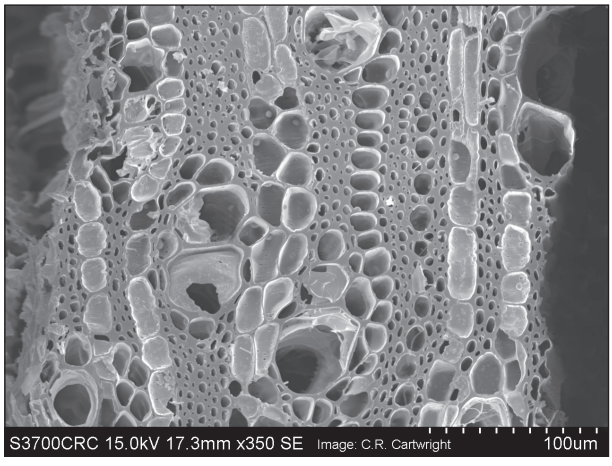
1) First, it is striking that olive was the only species identified in the corpus of wood charcoal. In an analysis of Jordan Valley

village sites, Fall noted that orchard taxa (mostly fig) represent 50% of burned wood, as fuel was also sourced from endemic trees and shrubs (Fall *et al*. 2015: 185-190; Falconer and Fall 2019: 137). As all wood charcoal at Khirbat Umm al-Ghuzlān was olive, we can assume that olive wood was in ready supply, as fuel would otherwise have been sourced from local trees such as oak, pistachio or pine. This situation is consistent with orchard maintenance, where communities stockpile orchard prunings for fuel.

2) Second, the paucity of charred seeds and grains suggests specialised economic activities. Charred seeds commonly enter the archaeological record as animal dung, burnt as fuel. Botanics at Tall Abū an-Ni'āj attest a broad range of charred seed species consistent with grazing (Falconer and Fall 2019: 137-139). However, the absence of charred seeds at Khirbat Umm al-Ghuzlān suggests that dung was not burned, consistent with the supply of orchard prunings as an alternate supply of fuel.

Faunal Remains

Only 46 animal bones were recovered, contrasting the corpora of faunal remains from Tall Abū an-Ni'āj (Falconer and Fall 2019: 29-32). Archaeozoologist Dr. Karyn Wesselingh identified sheep/goat (n=15), cow (n=5) and bird (n=3), with undiagnostic bones from medium (n=19) and large (n=4) mammals also present. Significantly, the corpus of ovicaprid remains represents all parts of the skeleton (appendicular and axial skeleton including both front and hind limbs), suggesting animals were killed at or near the site. No *Sus* remains were detected, unlike at Tall Abū an-Ni'āj where pig constitutes 28% of the faunal assemblage (Falconer and Fall 2019: 29). These data suggest that pastoralism was practiced at the site, supported by the possible animal pen in Trench 400, as well as the presence of small finds associated with textile production (see below).



18. SEM image of olive-wood charcoal by C.R. Cartwright (Courtesy of the Trustees of the British Museum).

Chipped Stone Tools

The chipped-stone assemblage comprised only 34 individual pieces. It is possible that many small tools and pieces of debitage were not collected, as no contexts were sieved. However, the 20 litre soil samples taken from 38 Stratum 3 contexts provided instances of 100% collection as a check on the number and nature of smaller finds overlooked. These coarse fractions yielded little cultural debris, suggesting the stone-tool assemblage was limited. The 34 pieces derived from mostly local sources, probably from the many flint beds that outcrop along the Tall ar-Rās ridge (Fraser 2018: 327-230). A single core suggests limited production, and only two of the 20 flakes were retouched. The most striking aspect of the assemblage was 12 flint blades, several of which exhibit the trapezoidal cross-section characteristic of Canaanean blades (**Fig. 19**).

Other Finds

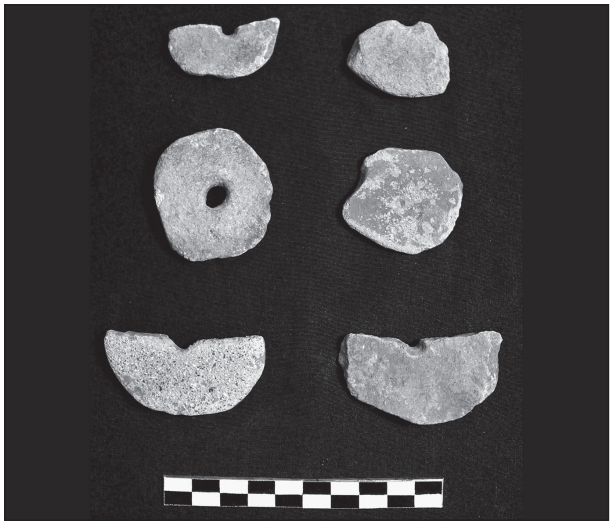
Six perforated spindle whorls recut from ceramic sherds (**Fig. 20**) were recovered from the midden deposits in Trench 100 or from the strata of wall tumble that sealed them. Two fine basalt objects were found in the animal pen in Trench 400: a rectangular weight with a circular perforation drilled from both sides (**Fig. 21**), and a bi-conical object with a grooved central axis (**Fig. 22**; *cf.* grooved hammer stones at Tall Abū an-Ni'āj [Falconer and Fall 2019: Figs. 8.11-8.13]).

Discussion

These initial excavations have produced data that differ significantly from the material culture recovered from the EB IV site of Tall Abū an-Ni'āj, 3km northwest of the mouth of Wādī ar-Rayyān on the Jordan Valley floor. These differences are summarised below.



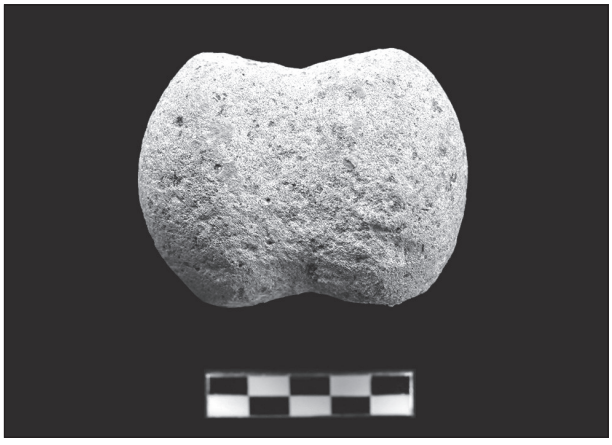
19. Flint Canaanean blades (SFs 18, 34, 20 and 49).



20. Spindle whorls from midden deposits in Trench 100.



21. Basalt weight SF46.



22. Basalt groove SF47.

Occupation

Khirbat Umm al-Ghuzlān appears to have been occupied briefly, with single earth floors and no architectural modification; in contrast, Tall Abū an-Ni'āj yielded seven phases spanning 500 years (Falconer and Fall 2016). Limited occupation is also reflected by a paucity of ashy fills, whereas strata at Tall Abū an-Ni'āj included ashy debris, hearths and ash-filled *tabun*s consistent with domestic activities.

Ceramics

The ceramic corpus at Khirbat Umm al-Ghuzlān comprises many jars (83%) and few bowls (2%); Tall Abū an-Ni'āj produced a broader repertoire in which jars constituted 35% of the assemblage and bowls 41% (Falconer and Fall 2019: Table 7.1).

Botanical Remains

Khirbet Um al-Ghozlan yielded exclusively olive-wood charcoal, suggestive of orchard maintenance; in contrast, the inhabitants at Tell Abū an-Ni'āj burned a variety of tree, shrub and orchard taxa (Falconer and Fall 2019: Table 3.2), while charred wild seeds suggest they burned dung as well.

Faunal Remains

Ovicaprid remains dominate the small assemblage at Khirbat Umm al-Ghuzlān, and no evidence of pig has yet been found; in contrast, the significant quantities of faunal materials from Tall Abū an-Ni'āj comprise 58% caprid, 28% pig and 12% cattle (Falconer and Fall 2019: 29-32), suggesting permanent occupation near the Jordan River conducive for swine husbandry.

Although Tall Abū an-Ni'āj is almost five times larger than Khirbat Umm al-Ghuzlān (2.5ha and 0.4ha respectively), the most striking difference is the Khirbat Umm al-Ghuzlān monumental enclosure wall, while Tall Abū an-Ni'āj is undefended. Why enclose such a small

site? While Tall Abū an-Ni'āj was probably occupied as a sedentary, agro-herding farming village (Falconer and Fall 2019), the evidence from Khirbat Umm al-Ghuzlān suggests that this enclosure site served a specialised economic purpose. Given the site's location, it is likely that it was used as a processing center for upland horticultural crops such as olive, which grow better in the well-drained slopes of the rift escarpment than on the flood-prone Jordan Valley floor (Lovell 2002: 96-97). Accordingly, the site may have been enclosed to protect seasonally produced caches of high-value oil jars before their distribution through the settlement systems of the rift escarpment, or to population centres on the Jordan Valley floor. The dominance of jar forms attests large-scale storage, and spouted jars were probably used within the extraction process; the presence of olive-wood charcoal connotes activities associated with orchard maintenance; and several rock-cut olive presses have been documented on the Tall ar-Rās ridgeline nearby (Fraser 2018: 233-236).

The implication is that so-called urban features of the EB II-III period such as fortification systems and specialised production were reconfigured within local settlement networks in the EB IV. This situation suggests an innovative rural response to urban collapse that may have underlain the Canaanite urban florescence in the 2nd millennium BC.

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GHAWR AṢ-ṢĀFĪ EXCAVATIONS 2016

Konstantinos D. Politis

Archaeological excavations were conducted in Ghawr aṣ-Ṣāfī by the Hellenic Society for Near Eastern Studies (HSNES) from December 2015 to January 2016 under the direction of Dr. Konstantinos Politis (MoTA-DoA permit number 2015/68). The project was supported by the Sustainable Cultural Heritage through Engagement of Local Communities Project (SCHEP) funded by USAID. Additional support came from Macquarie University, Sydney, Australia. The team consisted of Jordanian, Greek, Australian, American and French members under the supervision of Mr. Mohamed Al-Zahran of the Department of Antiquities of Jordan (DoA).

Excavations

Area TeS (Ṭawāḥīn as-Sukkar)

A main focus of the season's work was revealing more of the functioning of the sugarcane factory, *Maṣna' as-Sukkar* (formerly called *Ṭawāḥīn as-Sukkar*), to the north.

Approximately 382 cubic metres of windblown sand was removed in an area measuring 17×15m. At a depth of 1.5m, a clear - though disturbed - surface with plaster remnants was found, which was originally paved with sandstone slabs. Beneath these was a well-plastered conduit that continued from the bridge connecting the channels from the pressing chambers (**Figs. 1** and **2**).

This led north-east to an area with ashy deposits where a test trench revealed an arched structure over a circular plastered collecting basin with an outlet above, which presumably carried the pressed sugarcane juice (**Figs. 3** and **4**).

A probe inside the conduit exposed the lead piping which must have covered the entire extent from the pressing chambers and was removed for its value as metal once the sugar factory was abandoned (**Fig. 5**). A late Mamluk-period hand-made and painted pot, tightly lodged into the conduit, dated this event to the 15th century AD (**Fig. 6**).



1. South-west view of sugar-cane juice conduit (K.D. Politis).
2. North-east view of sugar-cane juice conduit (P. Edwell).

Area KSI (Khirbat ash-Shaykh ʻĪsā)

Excavations begun in 2015 continued in Trenches IX, X and XI.

Trench IX

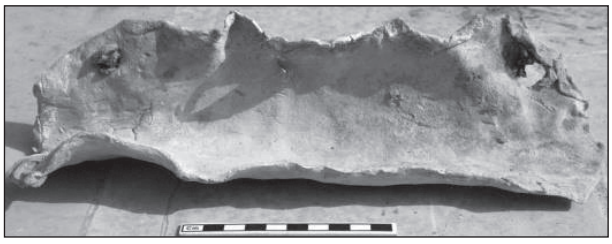
Trench IX was excavated from Ayyubid-Mamluk and Abbasid levels down to the remnants of the mosaic floor of the church of Byzantine *Zoara* (**Figs.7, 8, 10 and 11**). Unfortunately, part of this was disturbed by a modern artesian well, and the pavement was not in very good condition as much had been disrupted during the Abbasid-period occupation. A door opening was revealed, as were some geometric patterns on the mosaic, but no dedicatory inscription was evident though the beginnings of letters were discerned going into the western unexcavated section (**Fig. 9**). Documentation (photographic and 1:1 copy on polythene sheets), stabilisation and conservation were carried out following excavation (**Figs.12a, b**) The pavement was then entirely covered with open-weave plastic sacks (restricting condensation over the mosaics) and backfilled with soil from recent excavations.



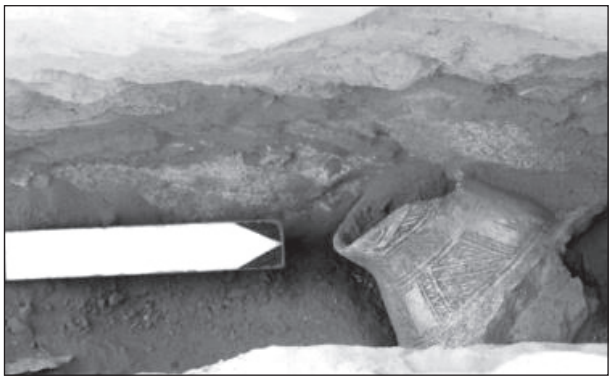
3. Pressed sugar-cane juice outlet (P. Edwell).



4. Circular plastered collecting basin with an outlet above (Y. Dray).



5. Lead piping section (Y. Dray).



6. Mamluk-period pot in situ (K.D. Politis).



7. General view of Trench IX from west showing the mosaic floor and east wall of the church (R. Schick).



8. West half of the north section of Trench IX, showing the level of the adobe brick wall and top plaster floor a third of the way down; the lower adobe brick layer is visible at the top of the small section in the north-west corner (R. Schick).

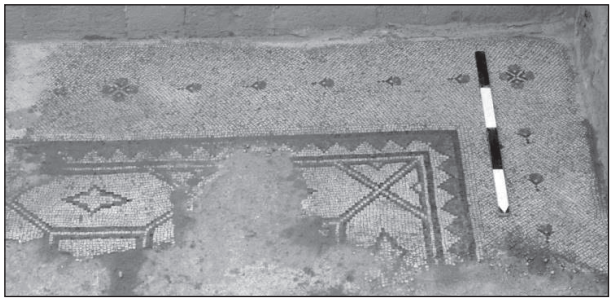
Trench X

During the December 2015-January 2016 season, excavation in Trench X continued in the north-east part of the trench, north of Wall 02, in order to determine the sequence of layers down to the level of the mosaic floor in the adjacent Trench IX. Excavation proceeded down from the top of Wall 10 (Wall 26 of Trench IX), the post-church wall built above the west wall of the narthex (Locus 74 of Trench IX) and blocking the original Byzantine-period door.

In Locus 12, storage-jar sherds were found which proved to be from a large *in situ* circular storage jar in the south-east corner next to Wall 02, the E-W south wall, and Wall 10, the N-S late-phase wall. The storage jar, which was first detected *in situ* at the bottom of Locus 12, was assigned Locus 15. The top of Locus 17 is probably the surface associated with the Locus 15 storage jar. The jar was later reassembled in a conservation training session (see below) (**Fig. 13**).



9. West section of Trench IX, showing the original west wall of the church, the later-phase wall built on top of it, blocking the west doorway from the outside (R. Schick).



10. The mosaic floor in the south-west corner of Trench IX (R. Schick).

Trench XI

The aim of the 2015-2016 season in Trench XI was to continue excavations undertaken in the 2013 season. It was hoped that the area of Trench XI might be the location of an industrial pottery kiln where the settlement's inhabitants were producing sugar pots on a large scale in the Ayyubid-Mamluk period, given the presence of some 'kiln-wall lining' (some a metre wide) and pottery-waster chunks in Trenches IX, X and XI.

Part of a room was excavated which revealed six complete pots *in situ* belonging to the 12th-14th centuries AD. Two were sugar-molasses pots; when emptied, actual sugar crystals were found inside (**Figs. 14a, b**).



11. The mosaic floor in the doorway in the eastern wall of the church (R. Schick).



12. (a), (b) Extent of mosaic pavement uncovered in Area IX, documented and stabilised (K.D. Politis).



13. Trench X. View to east showing the top of the Locus 15 storage jar and the Locus 13 soil inside it three-quarters excavated. The hole at the bottom of the storage jar is clearly visible. Around the north and east side of the storage jar is the bottom of Locus 12 and top of Locus 14, while on the west side is the higher level of the bottom of Locus 14 and top of Locus 17, with the lower level of the bottom of Locus 14 at the extreme bottom of the photograph (R. Schick).

Although there were more finds to support the existence of a pottery kiln in the immediate vicinity, the excavations in this area were inconclusive and were therefore terminated once the top of the Abbasid level was reached (**Fig. 15**).

Conservation

As part of the SCHEP support, training in archaeological conservation was conducted with a number of pots being restored during the season's work in the Museum at the Lowest Place on Earth at aṣ-Ṣāfī. This greatly facilitated their documentation and study (**Figs. 16a, b**).

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14. (a), (b) In situ pots belonging to the 12th -14th centuries AD (A. Ariotti); sugar crystal found in molasses pot 2 (P. Edwell).



15. Top of Abbasid layer in Area XI.41 (A. Ariotti).



16. (a), (b) In the course of restoring pot from KSI.X.15 in the Museum at the Lowest Place on Earth at aṣ-Ṣāfī (K.D. Politis).

THE ANASTYLOSIS OF THE APSIDAL HERODIAN THRONE NICHE IN THE ROYAL COURT OF THE FORTIFIED MOUNTAINTOP PALACE OF MACHAERUS, OVERLOOKING THE DEAD SEA IN PEREA, JORDAN

Győző Vörös

Introduction

The following study focuses on the 2019 anastylosis at Machaerus, in the area of the apsidal niche behind the north-western colonnade of the Doric peristyle courtyard. In the first two parts of this article, the presentation of the archaeological evidence and its research history, together with the relevant literary references, will be presented. In the third part, using the classic method of historical archaeology, we will contextualize the archaeological evidence with the historical sources, giving a clear historical interpretation of the dead monument. Finally, in addition to the literary references, we will contextualize the historical-archaeological legacy with four imaginative artworks as well, the presentation of which was ingeniously close to the historical reality of sacred archaeology at Machaerus. The project of the Hungarian Academy of Arts during April-May 2019 was under the direction of the author, supported by the following team members: Tamás Dobrosi (surveyor), Ueli Bellwald (restorer) and Basem Mahamid (representative of the Department of Antiquities).

Archaeology

The discovery of the royal court of Machaerus happened during the third excavation season of the late Virgilio Canio Corbo OFM (Corbo 1980: 365-376) (**Figs. 1-3**). After the 1980 field season, Corbo asked Eugenio Alliata OFM in Jerusalem to execute the first architectural reconstruction drawing of the newly revealed Doric peristyle courtyard. This was published the following year by Corbo and his co-director Stanislao Loffreda OFM, in the *Liber Annuus* of the Studium Biblicum Franciscanum (Corbo and Loffreda 1981: Fig. 5a) (**Fig. 4**). Meanwhile, as we can see on Corbo's plan and in the attached contemporary excavation photograph, the area of the Herodian throne seat remained unexcavated under *ca* 2 meters of ancient debris (**Figs. 2** and **5**).

The discovery of the apsidal throne niche behind the north-western colonnade of the Herodian royal court occurred 13 years later, during the second excavation season of the late Michele Piccirillo OFM, but remained unidentified (**Fig. 6**) [Piccirillo took full responsibility for the excavations, with the fieldwork of the 'Cooperativa Archeologia' of Firenze being under his and his architect's direct leadership: *Michele Piccirillo of the Studium Biblicum Franciscanum and architect Luigi Marino of the University of Florence, responsible for the project and the realisation of the excavation work* (Bianchi and Faggella 1993: 407). They also thanked *for his precious contribution, Eugenio Alliata of the Studium Biblicum Franciscanum as well*, who was at that time the assistant of Piccirillo (*ibid*.: footnote no 2; see also Piccirillo 2004)]. They had so much overlooked the importance of the only curved wall of the Machaerus citadel that their 1993 fake monument presentation completely ignored it. They even built a modern wall in front of it, to hide the apsidal niche (**Figs. 8 and 9**) [This could only have happened by misattributing the semi-circular Herodian wall to the Hasmonean period: *The range of rooms set along the northwestern side of the peristyle probably trace preexistent Asmonaean rooms, as the light stone clearing with respect to the position of the stylo-*



1. Helicopter photograph (2004) of Machaerus in the first rays of the rising sun, looking towards the Dead Sea and Jerusalem in the background (courtesy of ACOR, Jane Taylor Collection).

bate of the peristyle seems to testify, and above all, the lack of the connection between the external wall and the structure which defines the triclinium to the north-west (Bianchi and Faggella 1993: 411, footnote no 12). However, they arrived to the opposite conclusion on the same page: *[T]he rooms built to the north-west of the peristyle, must be dated to a phase later than the destruction* [57BC] *of the rooms themselves which, disregarding the period of their actual foundation* ["Asmonaean", as they wrote just above, which means *ca* 90-57BC]*, must have been in use up till the final destruction of the fortress* [which is 72AD]. Finally, they decided to crown their confusion with the erection of a modern wall in: *the lack of the connection between the external wall and the structure*].

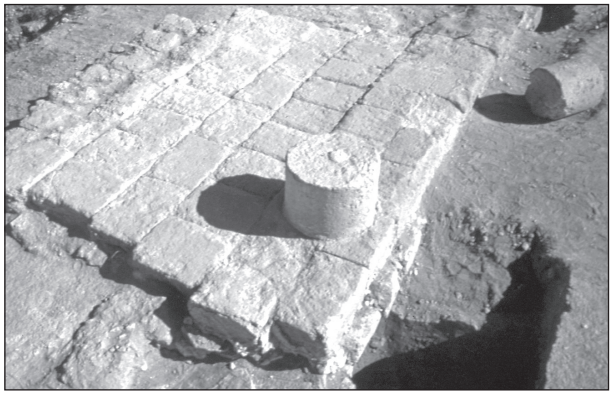
It is baffling that they published the apse in their preliminary reports, but left it out of the posthumously published 2017 final report on the 1992-1993 archaeological mission of Piccirillo (Marino *et al.* 2017: 62, fig. 179 [the layout drawing is attributed in the caption to Alliata], 96, figs. 327-328, 97, fig. 330 [In this 2017 Italian academic publication, in a lost relation with reality, the authors celebrated their 1993 fake monument presentation at Machae-



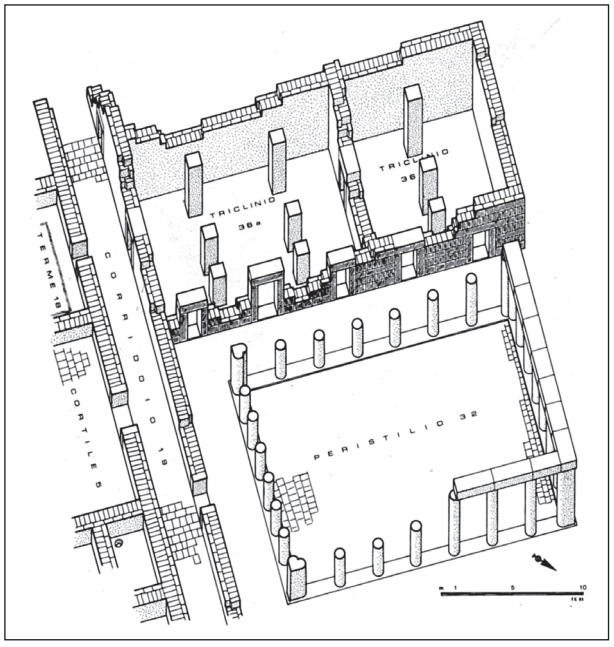
2. The discovery of the Machaerus royal courtyard in 1980. Eugenio Alliata OFM (left) with his two fellow archaeologist-priests and compatriots, Virgilio Corbo OFM (right, under the sunshade of the dig director) and Pietro Kaswalder OFM (above). In the foreground, an unidentified person. The area of the apsidal throne niche (behind Corbo) remained unexcavated under approximately two meters of accumulated ancient debris.

rus, which had by 2014 been 'purified' from the site by order of the Department of Antiquities].

Building (1) a modern covering wall in front of a semi-circular niche was only part of their intentional forgery. In addition to this, they (2) presented the Herodian Doric peristyle courtyard as an Ionic one, (3) faked four partial anastyloses with modern column drums - but on 'original' Ionic column bases and with an original Ionic capital, and finally (4) re-erected on the reconstructed south-western stylobate five attic bases (amongst them two originals)



3. The only in-situ Doric column base that was discovered by the Italian Franciscans in 1980. View from the south. They also discovered a second Doric column drum (or base) (see right side of photograph) that was no longer in situ.



4. The architectural reconstruction of the peristyle courtyard, with the triclinium and main corridor, made by Eugenio Alliata (Corbo and Loffreda 1981: Fig. 5a). The number of columns is correct; we concur that there had to have been several doors from the triclinium to the courtyard, although none could be located.

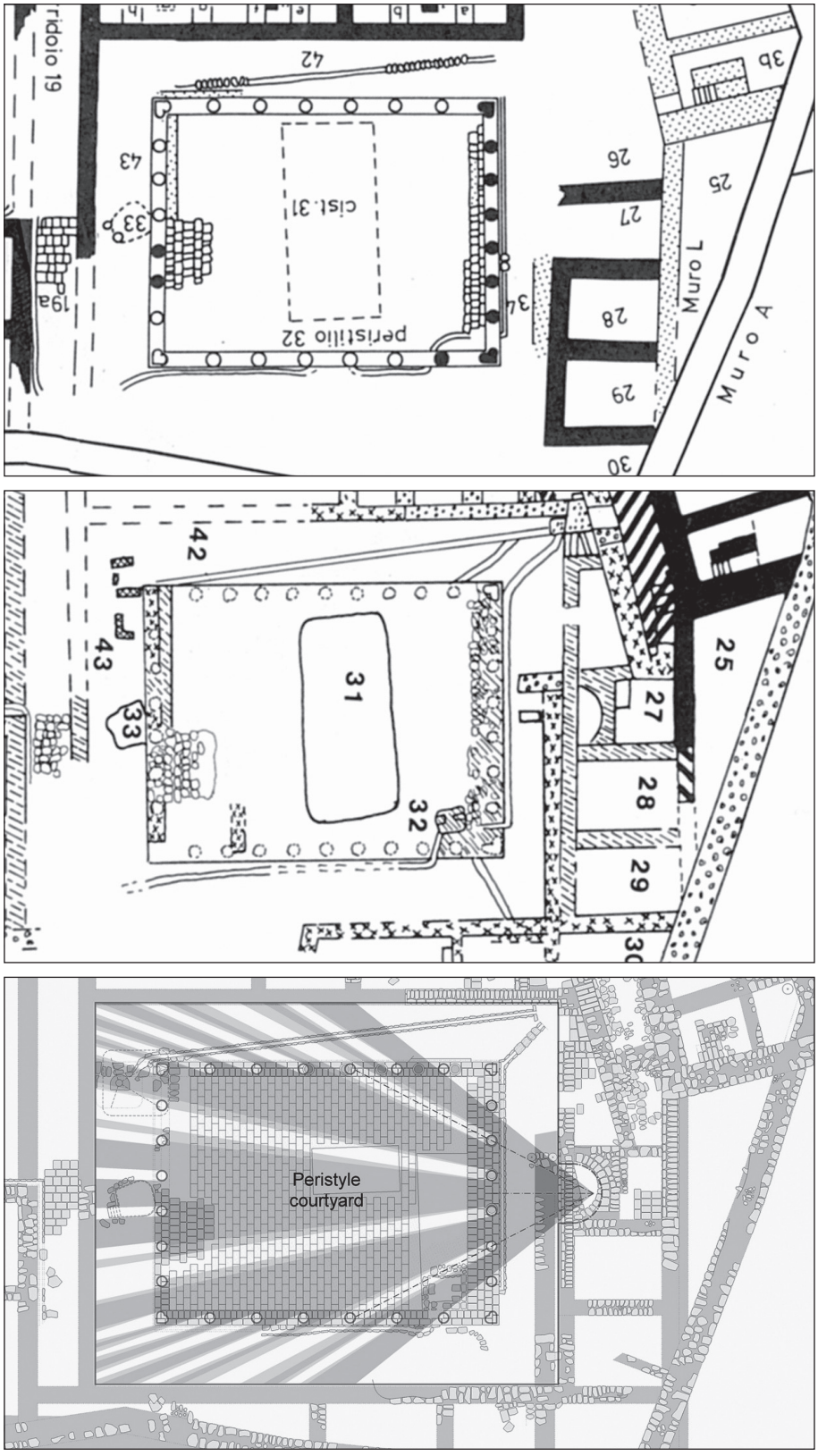
- where there were no columns standing in Antiquity [For the background to the forgery and its 'purification', see Vörös 2015: 24-79].

The archaeological excavations of the Hungarian Academy of Arts, which started in 2009, in 2014 removed all of the above-mentioned false Ionic columns (the architectural elements of which originally stood in the Herodian royal bathhouse), and finally in 2019 removed the fake modern covering wall in front of the now freshly restored apsidal throne niche as well. With this act, the mission of removing the 1993 fake monument presentations from the Machaerus citadel was accomplished.

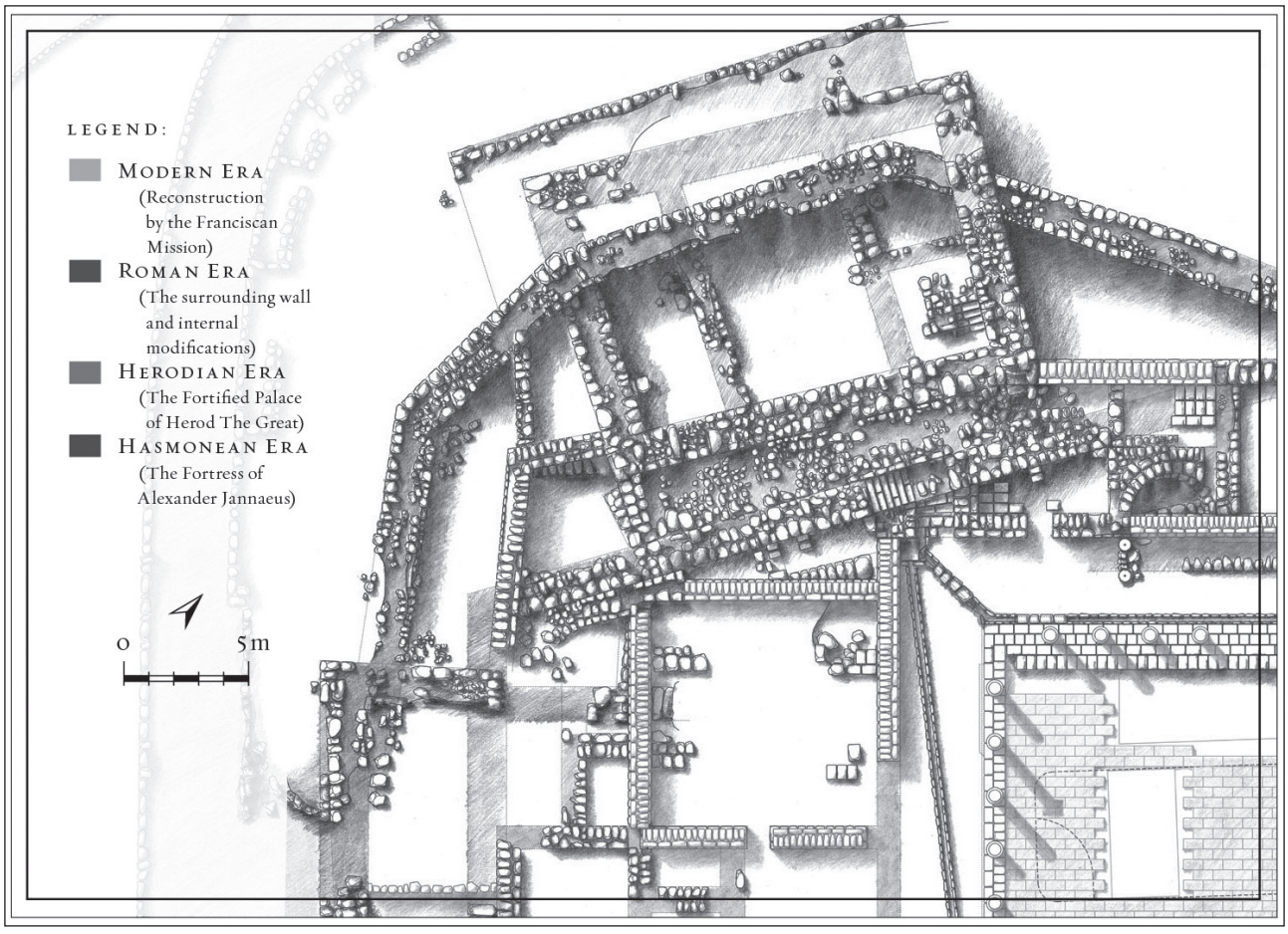
After detailed archaeological studies in the field, we were by 2012 able to reconstruct theoretically the original Doric architectural space, that was designed in the Late Hellenistic canon with the Greek module of 34.5cm (**Figs. 7** and **10-13**) The heart of the Herodian hilltop castle was the royal courtyard. Its alignment was completed on the mountaintop summit using the Pythagorean ratio of 3:4:5 for the right-angled alignment of the architectural space. With the same so-called *pygme*-unit, that is the Greek forearm module (34.5cm or 13.6in, called Pygmaioi [from *pygmê*, the length of the forearm; much smaller than a cubit, it is only the distance from the elbow to the wrist-joint of the knuckles]), they designed not only the courtyard but also the colonnade of the Doric tetrastyle porticus (1 column-base radius = 1 module). The intercolumniation on the short side was two (systyle) and on the long side three (diastyle) column diameters respectively. Vitruvius, chief architect of the Emperor Augustus warned that when columns are placed three column diameters or more apart, stone architraves break (Vitruvius, *De architectura* III 3.4). As no architrave stones survived at Machaerus, most probably the Herodian builders used Lebanese cedar instead of stone.

The surviving Doric column drums derived from similar columns, and not only from one column. In the Doric peristyle courtyard, there were originally 24 similar columns (plus four heart-shaped ones at the corners), of which nine column prints survived on the stylobate (plus two heart-shaped corner-column prints). However, the Herodian Early-Roman-type royal bathhouse was Ionic in style, while the

late-Hellenistic-style courtyard was Doric. This was confirmed not only by the *in-situ* column bases, but also by archaeological artefacts that came to light during the excavation of these two different architectural spaces in the Herodian royal castle. Inside the Apodyterium hall of the bathhouse there could originally have been 12 similar Ionic columns on the crepidoma (with



*5-7. Three subsequent architectural-layout documentations of the peristyle courtyard clearly demonstrate the 1993 error of Luigi Marino (***Fig. 6***), the Florentine architect of Michele Piccirillo OFM. In the first layout from 1980 (top), the number of columns was properly surveyed and documented (graphic; photographic) by the Corbo mission, with eight columns on each of the porticus sides. The black column bases on the stylobates were all based on archaeological evidence, viz. the column prints and only in-situ base. However, for the 1993 reconstruction of the Piccirillo mission (middle), the false notion of 11 columns was fabricated on the longer porticus sides (finally executed as ten), in order to create similar spacing between the columns on all sides of the porticus (with systyle as opposed to the archaeologically demonstrated diastyle intercolumniation on the long sides). They even forged the Doric architectural space as Ionic. The illustration of the Hungarian mission (bottom) shows why the Herodian builders wanted to have eight columns on each side of the 3:4-ratio courtyard. It gave the illusion (in a typical Hellenistic-Alexandrian architectural gesture) that the person in the throne-seat was sitting in his apsidal niche in front of a square architectural space.*



8. The north-western area of the Biblical citadel clearly shows the four different periods of the complex in the direct vicinity of the apsidal throne niche.

much smaller diameters than the Doric drums). In the meantime, from the surviving architectural elements we were able to piece together just one complete Ionic and one complete Doric column. We re-erected these Herodian columns in the very places where the first Franciscan Archaeological Mission found the only two *in-situ* column bases of the Herodian royal castle, in 1979 and 1980 respectively (**Fig. 14**).

Our complete column re-erections fulfil the requirements of monument anastylosis as defined in international conventions on monument presentation. Thus, we used: (1) exclusively original architectural elements, (2) re-erected in the original places and (3*)* as they originally appeared. Their heights fit the classic Late-Hellenistic architectural canons: the Doric column being 11 modules (380cm) and the Ionic 19 modules (475cm). We had serious difficulty with the individual drums, because of the two column entases. The Doric entasis is conical, while the Ionic is cigar-shaped (like a pregnant column). The Doric column even fits the classical 11-module standard of the Greek *pygme* unit of the courtyard perfectly. Both re-erected columns were originally decorated with plaster, giving them the appearance of white marble monoliths.

During the 2019 archaeological field season, after removal of the modern wall in front of the apsidal throne niche, we excavated the



9. This photograph depicts the same area as Fig. 8, with the Dead Sea in the background. View from the north-east.

area down to bedrock. After exposing and documenting the foundations of the archaeological area, we re-erected by anastylosis the first row of stones of the apsidal throne niche, to give a 3D understanding of this important architectural space to pilgrims and visitors. As archaeology is a visual academic discipline, in the accompanying illustrations the reader can easily study the nature and scientific details of our fieldwork (**Figs. 15-20**).

History

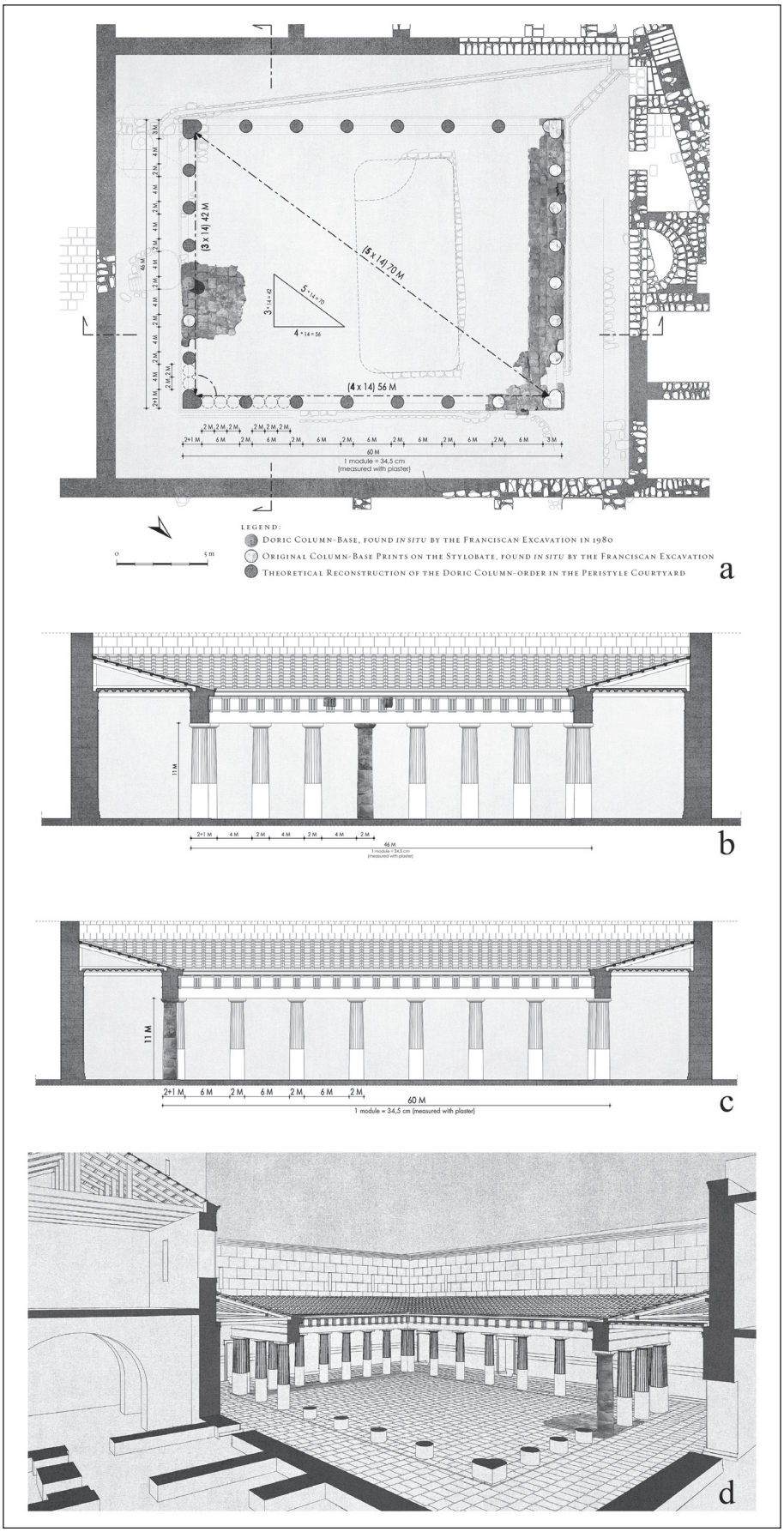
The Transjordan (Perean) Judean fortress of Machaerus (Gk. Μαχαιροῦς, meaning 'sword') was built by the Hasmonean Alexander Jannaeus in *ca* 90BC (destroyed by Gabinius in 57BC). It was transformed into a royal palace and city by King Herod the Great in *ca* 30BC (destroyed by King Aretas IV in 36AD). From its hilltop location east of the Dead Sea, Machaerus could provide a view all the way to the Temple of Jerusalem, Masada, Jericho and even to Alexandreion. Pliny the Elder (*Hist. Nat.* V. 15, 16) acknowledged that "Machaerus, next to Jerusalem, was once the most strongly fortified place in Judea", in a unique strategic location overlooking the Dead Sea and the West Bank. Historical events at the fortress are narrated by



10. Ground-floor plan of the fortified Herodian royal palace (ca 30BC [destroyed 36AD]). The Herodian architectural legacy of Machaerus has very strong similarities with the well-dated analogies of the Judean palace-fortresses, today in Israel (Netzer 2009: 202-217). The royal palace structure was placed within the ruined surrounding wall of the Hasmonean fortress, the four fortification towers were rearranged, and the water-harvesting system received a second cistern (or maybe even a third one in the southern courtyard). The reconstruction of the Herodian ground plan was initiated by the Corbo mission; Alliata even prepared preliminary architectural reconstructions of the peristyle courtyard and triclinium.



11. The theoretically reconstructed royal settlement had an upper city (citadel) and a lower city (suburb) with a well-preserved surrounding wall. This housed the entourage of the royal court, the Herodian household, during the reigns of father and son, King and Tetrarch Herods. According to our understanding, the lower city would have been the historical place where Saint John the Baptist suffered political house arrest by Antipas, in the company of his disciples. The superimposed 3D architectural model sits on a helicopter photograph (APAAME_20171001_REB-0071). View to the south.



12. The reconstructed space in the Herodian royal courtyard at Machaerus: (a) layout plan; (b) architectural cross elevation; (c) architectural longitudinal elevation; (d) architectural reconstruction drawing. The latter is not an imaginary or suppositional illustration of the royal courtyard. The details are all based on archaeological evidence, as discerned through photomontage of the original architectural elements in the illustrations. During excavation of the lower city of Machaerus, several additional architectural fragments and column elements may come to light that will be incorporated into the next phase of our monument presentation.

Flavius Josephus (*e.g. War* 1.167–174, 2.485–486, 7.171–177; *Ant.* 13.416–418, 14.89–97) and Strabo (*Geographica* XVI, 2, 40). The account given by Josephus that Herod Antipas had John the Baptist imprisoned and executed at the fortress (*Ant.* 18.116–119) compliments the descriptions in the Gospels of Mark (6:14-29) and Matthew (14:1-12), which are in turn confirmed by Eusebius (*Eccl. Hist.* I. 11, 4-6). Combining the information given by Josephus and the Gospels, Machaerus can be identified as the scene of the tragic birthday banquet of Tetrarch Herod Antipas, and the place where Princess Salome danced. It is important to emphasize that Machaerus was the only royal palace of King Herod that was inherited by Antipas, and was thus the best symbol of his Herodian legacy and a perfect place for his birthday party in *ca* 29AD (see Luke 3:1-3). After a period of occupation by Judean rebels, the post-Herodian garrison fortress was destroyed by the Romans during the winter of 71/72AD (*War* 7.190–209).

We may reconstruct the 'microhistory' of Machaerus - based exclusively on historical sources - via the following time lines, so as to come to a clear understanding of its one-and-a-half-century history during the Late Second Temple period.

Machaerus Timelines

Late Hellenistic (Hasmonean) Period

ca **90BC:** Machaerus fortress was founded by King Alexander Jannaeus; during the reign of his widow Queen Salome Alexandra (76-67 BC) it became one of the royal treasure houses of the Hasmonean rulers until…

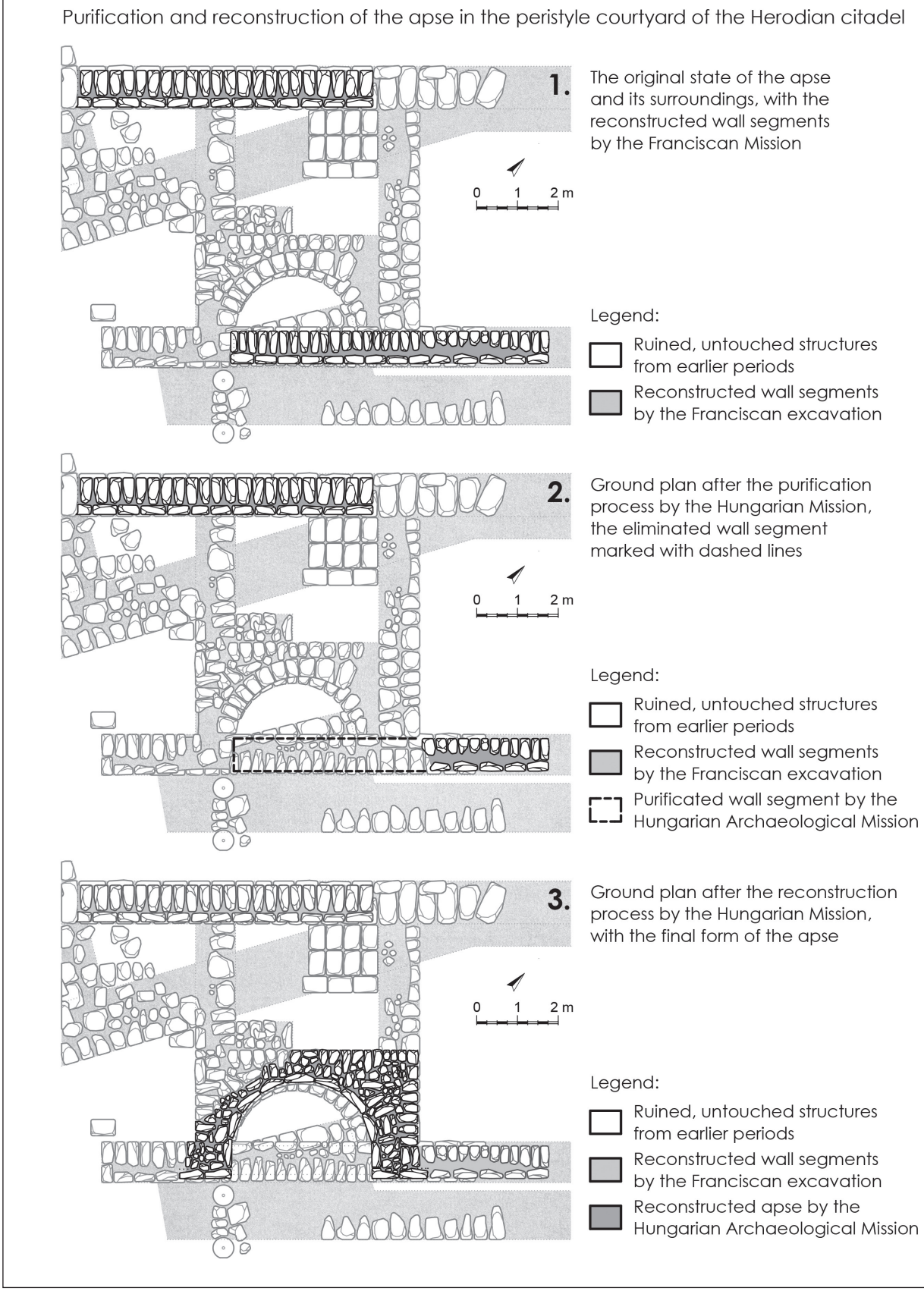
57BC: …when it was demolished by the Roman general and Syrian provincial governor Aulus Gabinius. King Aristobolus II tried to seek protection for his one thousand soldiers



13. The 3D architectural model doesn't simply incorporate the colours of the royal Herodian courtyard; the Lithostrotos stone pavement - like the colonnade - is an authentic, faithful reconstruction of the original.



14. The above photograph showing the two complete Herodian columns of the Machaerus royal palace that were re-erected in 2014 became the cover illustration of the 2016(4) issue of American Journal of Archaeology.

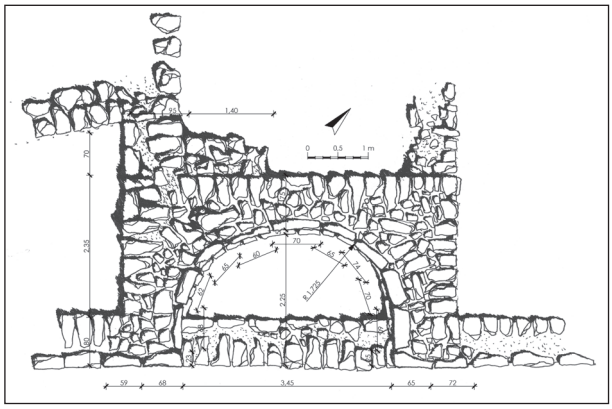


15. Restoration of the semi-circular apse in the peristyle courtyard of the Herodian citadel.

in Machaerus and consequently reinforced the ruined walls, but the Romans captured and destroyed the Hasmonean fortress two days later - for a second time.

Herodian Period

ca **30BC:** King Herod the Great erected a city on the Machaerus hill, surrounded it with walls and towers, and provided it with large cisterns. On the top of the hill, within its citadel, by replacing the ruins of the Hasmonean fortress he built a magnificent royal palace for himself that was reached via a road leading up through the city. Following the death of King Herod in…



16. Graphic documentation of the new monument presentation of the apsidal throne niche behind the porticus corridor of the north-western Doric colonnade of the Herodian royal courtyard. View from above.



17. The semi-circular apsidal niche of the royal Herodian throne seat from the courtyard. The original floor level is lost; probably a staircase led to the throne on an elevated platform.



18. The authentic new monument presentation of the Herodian apsidal throne niche in the royal courtyard of Machaerus, with the Dead Sea in the background. View from the north-east.

4BC: …his son Herod Antipas inherited the fortified city together with the territories of Perea and Galilee; Machaerus was the only royal palace the Tetrarch inherited from his father.

29AD: According to Josephus, Antipas imprisoned and executed John the Baptist within the fortified walls of Machaerus, with the Gospels of Mark and Matthew giving detailed descriptions of the circumstances of his imprisonment and execution. During the confinement of the Baptist, there was an exchange of messages through his disciples between himself and Jesus in Galilee. According to the Gospel of Luke, we can date the event of this imprisonment to *ca* 29AD.

36AD: The Nabataean King Aretas IV Philopatris, once father-in-law of Tetrarch Herod Antipas, defeated the troops of his former son-in-law and destroyed Herodian Machaerus.

Early Roman Period

44AD: After the death of King Herod Agrippa I in 44AD, when the ruins of Machaerus - together with Perea - came under the control of the Roman Prefectus Judaeae in Jerusalem, a military-garrison stronghold was established for the Roman army on the ruins of the original Machaerus citadel.

66AD: The citadel was taken over by the citizens of its lower city, and later reinforced by Zealot rebels. After the destruction of Jerusalem, the Romans - for a third time - conquered Machaerus in…

71/72AD: On the order of Emperor Vespasian, the fortress of Machaerus was destroyed by the Legion X Fretensis under the command of Lucilius Bassus, Roman Legatus of Judea province. Subsequently, the site vanished into the oblivion of human history.

Modern Period

1807 (17 January): Ulrich Jasper Seetzen identified the Machaerus citadel.

1909 (1 January): Fr. Félix-Marie Abel OP identified the lower city of Machaerus.

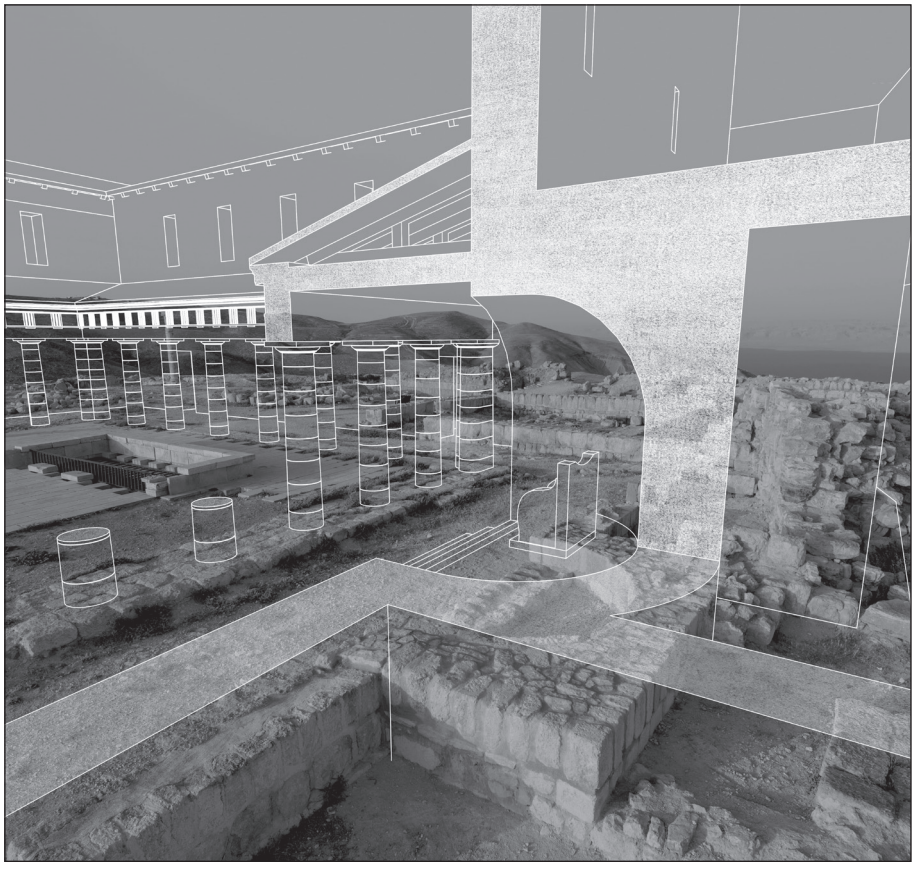
1965–1974: August Strobel surveyed and published the Machaerus circumvallation wall.

1968–2018: Complete excavation of the Machaerus citadel down to the Herodian layer.

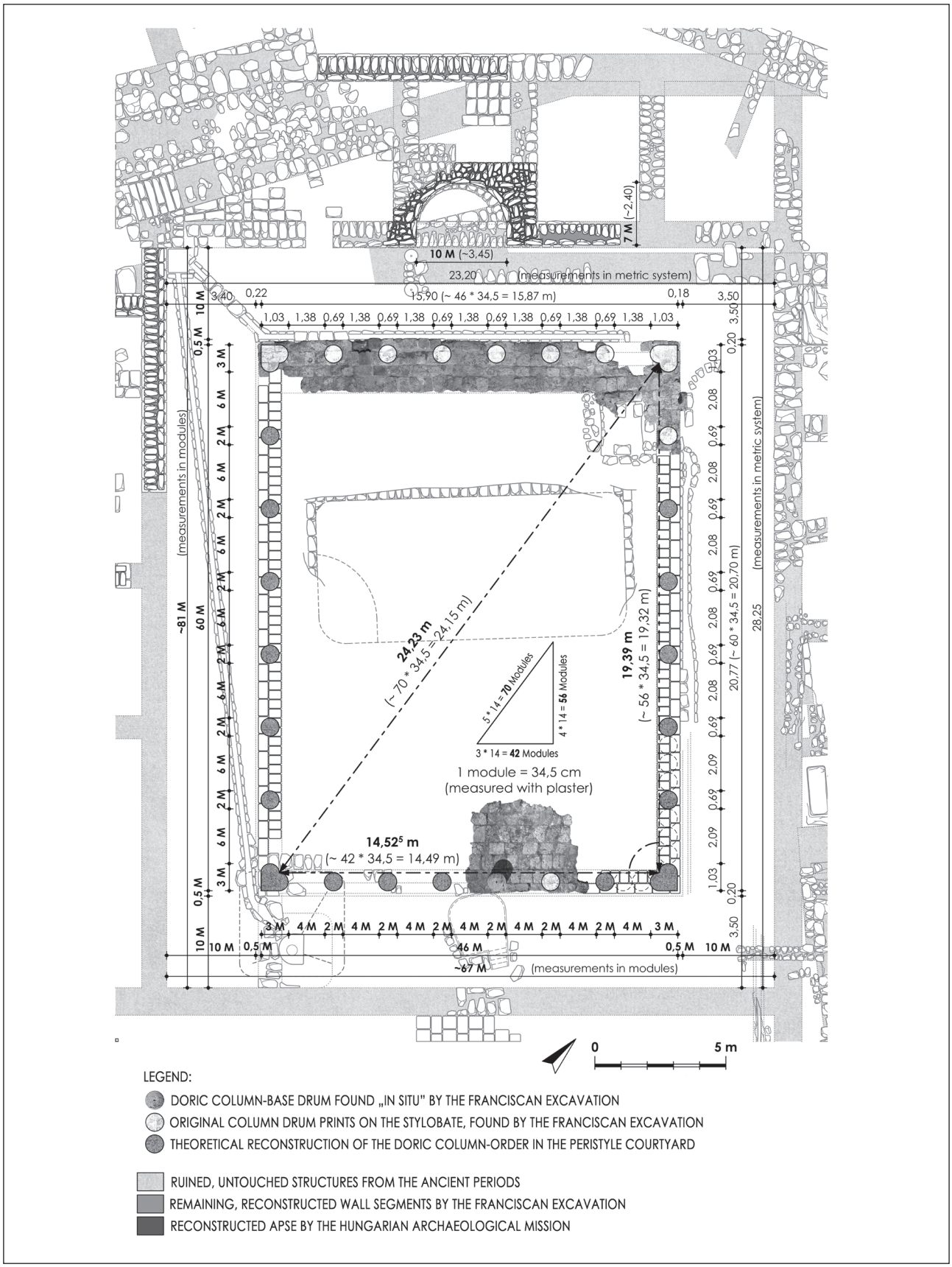
2019: Archaeological excavation of the Hasmonean foundations around the royal throne seat of the Herodian palace.

Historical Archaeology: Contextualizing Relevant Historical References with the Surviving Archaeological Evidence at Mount Machaerus

The above historical sources are in full harmony with the results of archaeological research at the Biblical site. The first fifty years of excavation (1968-2018) were conducted by three academic institutions, *viz*. Southern Baptist Theological Seminary (1968), Studium Biblicum Franciscanum (SBF) (1978-1981; 1992-1993); Hungarian Academy of Arts and the SBF (since 2009), all in collaboration with the Department of Antiquities of Jordan. These excavations revealed the complete fortified Herodian royal palace (for an overview of the history of research at Machaerus 1968-2018 see Vörös 2019: 30-83). In addition to theoretical architectural reconstructions, it proved possible to re-erect with clean anastyloses: (1) a complete Ionic column in the Apodyterium hall of the Herodian bathhouse; (2) a complete Doric one in the central peristyle; (3) the first course of stones of the once magnificent throne seat in the same Machaerus royal court of the King and Tetrarch Herods. The Roman siege by the Legion X Fretensis resulted in a circumvallation wall with camps around the citadel, as at Masada, and an unfinished agger ramp. These latter archaeological remains were discovered by August Strobel in 1965 and published in 1968; he made a detailed survey in 1973 which was published the following year (Strobel 1968, 1974). The lower city of Machaerus was discovered by Felix-Marie Abel OP in 1908, and was partly excavated by Virgilio Corbo OFM in 1981 (Loth-Abel 1997*,* 59; Corbo and Loffreda 1981). The architectural legacy and archaeological material recovered (including epigraphic, ceramic and numismatic evidence) all confirm the detailed description of Josephus. There is no contradiction anywhere; the historical



19. Theoretical architectural reconstruction of the Herodian throne seat, superimposed on a photograph of the surviving ruins in a cut-away view. The Gabbatha-elevation of the bema judgement seat raised on an elevated platform is clearly depicted, with steps leading up to the podium with the throne. View from the north.



20. The complete layout of the Herodian Lithostrotos courtyard at Machaerus is fully described with the ancient architectural alignment system.

references all align with the archaeological evidence (epigraphy: Vörös 2013: 254-277, 2019: 264-271; ceramics: Loffreda 1996; numismatics: Piccirillo 1980).

The once magnificent 660-m^2 royal courtyard, with its still *in-situ* apsidal throne niche on the axis of symmetry, had to be the historical site of the birthday banquet of Antipas described by the Gospels. Many people were invited, even from Galilee in the northern part of his tetrarchy: "An opportunity came on Herod's birthday when he gave a banquet for the nobles of his court, for his army officers and for the leading figures in Galilee" (Mark 6:21). It is not just the largest architectural place in the fortified palace of Machaerus, but the only space where the Tetrarch would have been able to receive such a large gathering of official guests. This Doric courtyard was presumably the very place where, according to Josephus, Antipas made his historical judgment of a death sentence on John the Baptist. Antipas most likely passed judgement from the bema-elevation throne seat of the stone-paved royal court in his Praetorium.

Machaerus was the Golgotha of the Baptist; Jesus himself compared his future death with that of John in the following statement: "'they did not recognise him but treated him as they pleased: and the Son of man will suffer similarly at their hands.' The disciples understood that he was speaking of John the Baptist" (Matthew 17:12-13).

The archaeological remains of the Jerusalem Praetorium (John 19:13), where Jesus was condemned to death by Pontius Pilate, are probably lost. However, we have here - on Mount Machaerus - one of the closest architectural and archaeological parallels of its courtyard, in the former palace of the King and Tetrarch Herods. On the *Gabbatha* ('elevation') of the Machaerus palace even the *in situ* Herodian *Lithostrotos* ('stone pavement') survived in the royal courtyard. Machaerus, the setting for a tremendously important scene in the Gospels, was always an imagined site for Bible, Gospel and religious- or history-book illustrators. As a result of the Franciscan-Hungarian archaeological excavations and architectural 'Lego-puzzle', the historical place and its architectural spaces have been elucidated. Within the walls of this Biblical royal castle lived four figures of the Gospels: King Herod the Great, his son Tetrarch Herod Antipas with his second wife Princess Herodias, and their daughter Princess Salome from the previous marriage of her mother. Today, it's not just possible to visit the archaeological site, but - virtually - we can also explore the spaces of the Passion and Calvary of Saint John the Baptist.

The architectural drawings and computer models of this study are not imaginary or suppositional illustrations of the Machaerus royal courtyard. Insofar as they are detectable through the photomontages and attached architectural illustrations, the details are all based on archaeological evidence. When we put together the information provided by Josephus and the Gospels of Mark and Matthew, it had to be the scene of the tragic birthday of Herod Antipas, where he (from the throne seat) and John the Baptist (facing him) had their conversations: "because Herod was in awe of John, knowing him to be a good and upright man, and gave him his protection. When he had heard him speak, he was greatly perplexed, and yet he liked to listen to him" (Mark 6:20).

Without the ten *pygme*-module wide (345cm) porticus-gangway corridor and the same width of the apsidal throne niche, less than 10 percent of the column drums and pavement stones survived, with only one *in-situ* column base and a single capital. However, this fragmented information set up all the necessary details for a complete theoretical reconstruction of the architectural space, including a complete column anastylosis with the proper Doric entasis. During the excavations of the lower city of Machaerus, several additional architectural fragments and column elements will come to light that will be incorporated into the next phase of the presentation of the monument (re. the Golgotha and the Gabbatha of Machaerus, see [in depth] Vörös 2013: 342-363, 2015: 80-89).

History of Art: Contextualizing the Historical-Archaeological Evidence with Representations of the Royal Throne Seat in the Herodian Machaerus Palace

There are tens of thousands of images and representations related to the subject of Herodian Machaerus, such as 'the prison of John the Baptist', 'the banquet of Herod' and 'the dance

of Salome', but especially those connected to the life of the Baptist. These include 'John in prison', 'Herod Antipas listening to John from the throne seat', 'John is sending his followers to Jesus' and 'their return with the message of Jesus to the imprisoned prophet'. The commonest subjects of these representations are the martyrdom of John (also among the most popular illustrations of the Gospels), 'Salome bringing the head of the Baptist on a salver to Herodias' and of course the 'beheading of John the Baptist' itself.

Many of these portrayals of the architectural legacy and material heritage of Herodian Machaerus reflect then contemporary European royal castles and courts. In these fictive representations, the figures wear not ancient, but mediaeval, renaissance or baroque costume. The architectural heritage and spiritual legacy of Machaerus lived on in the world of imaginations, first as Bible illustrations and then as *Biblia pauperum* in the form of frescos, reliefs and icons in churches, and later in the backgrounds of paintings depicting the above-mentioned subjects. It was in 1807 when, after 1,735 'lost years', Ulrich J. Seetzen rediscovered the ruins of the ancient royal castle (Seetzen 1810), and only in 1968 when the ongoing archaeological excavations were started by American Baptist colleagues.

A century before the first archaeological excavations on the Machaerus hilltop, Edward Armitage made in 1868 a fascinating oil painting entitled *Herod's Birthday Feast*. Today it is amongst the treasures of the Guildhall Art Gallery in London (**Fig. 21**). The Victorian painter was an alumnus of the École des Beaux-Arts in Paris, and most probably made this marvellous painting under the literary influence of the French *Machaerous* book of Auguste Parent that was published in Paris the same year (Parent 1868). Since Parent had not written about Doric fragments or the remains of a (half-) peristyle courtyard at Machaerus citadel, the Gospel-scene representation is based simply on the fantasy of Armitage. However, as a brilliant artist, he felt the *genius loci* of the Biblical citadel, and his 1868 painting is the closest to the architectural and archaeological reality of the Herodian royal court of Machaerus in the history of art.

We would like to offer three additional examples of art-historical masterpieces representing the throne seat of Herod Antipas. The first two illustrations are from Florence, but with six centuries' distance between them. The 13th-century dome mosaic of the famous Baptistery of Florence (by an unknown master) is titled in art history as *Saint John Reproaches Herod and Herodias*; it was definitely known by Giovanni Fattori, who painted in 1856 his *Saint John the Baptist Rebuking Herod* that can be found close by, in the Gallery of the Academy of Florence (**Figs. 22-23**). The artistic structure of the two compositions is the same. The throne of Herod Antipas is in an apsidal niche on the right, and he is in the company of Herodias and Salome. John the Baptist is facing the three royals on the left, with a rod in his hand. However, while the anonymous mosaicist imagined Corinthian columns, Fattori envisioned a colonnade with Egyptianized papyrus capitals.

In the meantime, we are convinced that the famous Fattori masterpiece was influenced by another painting as well, one executed a good two decades earlier, that is to say the artwork of



21. Edward Armitage, Herod's Birthday Feast. Oil on canvas (155×277cm), 1868. Guildhall Art Gallery, London.



22. Saint John reproaches Herod and Herodias. Baptistery (dome mosaic detail), ca 1240-1310. Florence.



23. Giovanni Fattori, Saint John the Baptist rebuking Herod ('San Giovanni Battista rimprovera Erode'). Oil on canvas (282×357cm), 1856. Gallery of the Academy, Florence.



24. Antoine Ansiaux, Saint John the Baptist blaming Herod ('Saint Jean-Baptiste faisant des reproches à Hérode'). Oil on canvas (277×326cm), 1822. Palais des Beaux-Arts, Lille.

Antoine Ansiaux with the nearly same title and topic. Today it is in the Palais des Beaux-Arts of Lille (see **Fig. 24**). Once again, in the wonderful oeuvre of Ansiaux we can see the same artistic structure as in the two aforementioned compositions, but with closer similarities of detail to that of Fattori. Salome wears blue clothes in both paintings and the two representations of the right foot of Antipas are apparently identical. Furthermore, Ansiaux represents a lion-armed throne, Fattori a sphinx-armed throne. Also, the two paintings are virtually the same size - 282×357cm *vs* 277×326cm - which affords powerful life-sized depictions of the important figures at a dramatic moment in the Gospels.

In addition to the above similarities, in all the three representations:

- John the Baptist is standing barefoot on the left with a rod in his left hand, wearing clothes of camel hair;
- A crowned/diademed Antipas is sitting on his throne on the right;
- The Hasmonean royal princesses, Herodias and Salome, are present;
- The decorated royal thrones are on elevated platforms.

It seems credible that both Romantic painters, Ansiaux and Fattori, knew the mediaeval Florentine mosaic work, and that Fattori also knew the painting of Ansiaux. However, we have to take into consideration the possibility that Ansiaux and Fattori might both have followed a lost antitype tableau as well. Meanwhile, for us it is more important that the three masterpieces properly demonstrate the importance of the relevant Gospel scene in imaginative mediaeval and Romantic visual artworks, that is contextualizing the historical place of the bema in the Lithostrotos-Gabbatha on the Golgotha of Saint John the Baptist.

Summary

In the above study, by combining archaeology, history and art history we have been able to demonstrate that the literary references of the Gospels can be wonderfully contextualized in historical archaeology and with imaginative works of art, when the artists felt the *genius loci*. However, in our view there are only nine historical sites on the Gospel archaeology map of the Holy Land where such an attempt or quest can be executed (**Fig. 25**). Amongst these sacred places, Machaerus has a unique position, one where the archaeological legacy survived as a *ca* 90BC - 72AD 'time capsule' (see 'Machaerus Timelines' above). As Cardinal Gianfranco Ravasi rightly confirmed, "In that palatine area that overlooks the Dead Sea, and where now archaeology has revealed in its entirety the relics of its past, even in the pulsation of its ancient daily existence, an act of abuse of power was committed, in all of its brutality. Machaerus, therefore, may today still be an emblem of the many crimes of history, but above all it is an epiphany of courageous witness to truth and justice, as the anthem that serves as a prologue to the fourth Gospel sings: 'A man sent by God came: his name was John. He came as a witness to bear witness to the light, so that all might believe through him' (John 1:6-7)" (Vörös 2019: 18-19).

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25. Historical sites of the Gospels that can be confirmed by archaeological evidence in the Holy Land.

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PRELIMINARY REPORT ON THE 2017 SEASON OF THE MADABA PLAINS PROJECT: TALL JALŪL EXCAVATIONS 2017

Paul Gregor, Robert Bates, Paul Ray, Constance Gane and Randall Younker

Introduction[1]

Andrews University conducted archaeological excavations at Tall Jalūl between June 25 and July 28, 2017. This season, the excavation was directed by Paul Gregor. Robert Bates, of the Institute of Archaeology at Andrews University, served as field archaeologist and Field B supervisor. Seven faculty, students and volunteers were joined by more than 20 Jordanian workers during the excavations this season.

Excavations at the site of Tall Jalūl (**Fig. 1**) began in 1992, with excavations in the Jalūl Islamic Village beginning in 2008. For background information on Tall Jalūl, the Jalūl Islamic Village and the history of excavation at the site, see Gane *et al*. 2010; Gregor 2009; Gregor and Gregor 2009 and 2010; Gregor *et al.* 2011, 2012 and 2017; Herr *et al*. 1994, 1996 and 1997; Younker *et al*. 1993, 1996, 1997, 2007 and 2009; Younker, Gane and Shqour 2007; Younker and Merling 2000; and Younker and Shqour 2008.

Results of the 2017 Season at Tall Jalūl

Field B

Field B was originally opened in 1992 on the eastern side of the *tall* in the hope of finding the city gate. By the end of the season two superimposed flagstone pavements were found. The lower pavement extended through Squares B4, B6 and B8 and sealed against a revetment wall (B4:13=B6:13=B8:06), while the upper pavement included Squares B2, B3-5, B7 and B9. The gate for the lower road was found in Squares B7-10. The lower pavement was initially dated to the early 9th century BC, and the upper pavement to the 9th/8th century BC. In 1999, Squares B11-19 were added further to the southwest to explore how the roads entered into the city. Square B15 revealed that the upper pavement had some additional paving throughout the Iron Age, with the latest dating to Late Iron Age II. In 2005 four new squares were excavated. Square B20 was opened to determine the full length of the upper road north of Square B1 and Squares B21-23 were opened to determine the full width of the upper road. In Square B20 a 2×3m area of the upper road was exposed, but in Squares B21-23 no further evidence of either the upper or the lower road was discovered (**Fig. 2**).

In 2016 two probes were opened to provide firmer dates for the construction of the upper and lower pavements, one in Square B2, where the upper and lower roads were superimposed, and the other in Square B6 where only the lower road was exposed. The probe in Square B2 revealed the continuation of the lower pavement (B2:21=B6:15, B4:10) from B6 as well as the revetment wall (B2:12=B6:13). However,

1. We wish to thank Dr. Monther Jamhawi, 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, Department of Antiquities of Jordan. We would also like to thank Barbara Porter and Jack Green of the American Center of Oriental Research (ACOR) for their usual assistance. Finally, we appreciate the help of Taher Gonmeen and Issa Syrianni, of the Department of Antiquities of Jordan, who served as our department representatives in 2017 season.

Staff for the 2017 season included director Paul Gregor and field archaeologist Robert Bates. Jacob Moody served as object registrar, photographer and oversaw GPS readings on the tall.

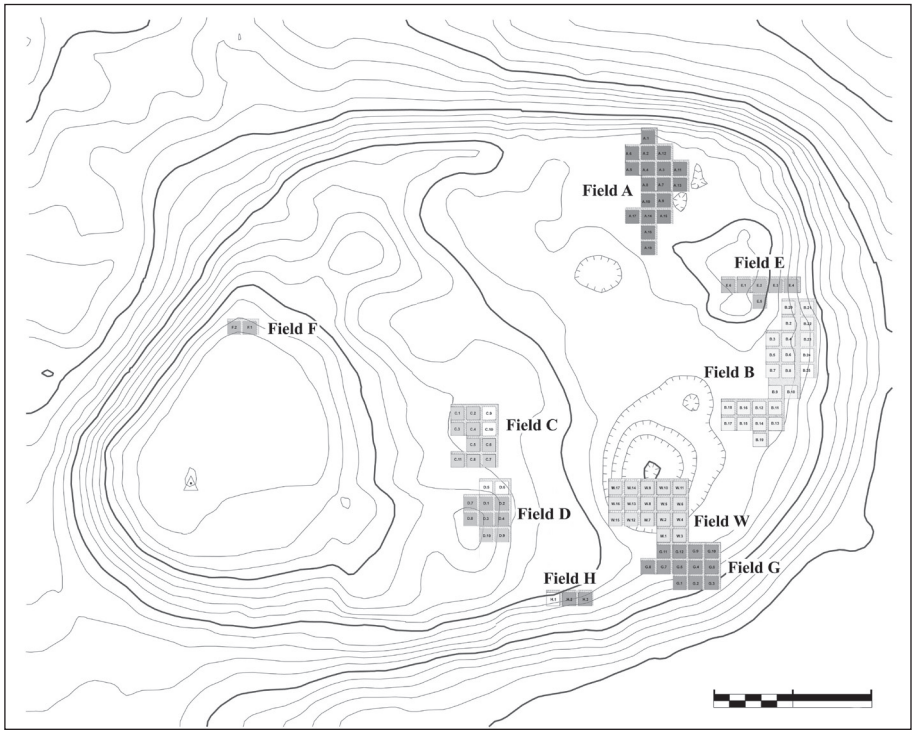
Square supervisors for Field W included Jacob Moody and Trisha Broy in Field W, while Rebecca Bates served as square supervisor in Field B. Volunteers for both fields were Dorian Alexander, Aleksandra Jovanovic and Hala Ajilat.

in this Square (B2) the lower pavement was located 0.40m below the revetment wall instead of sealing against it as in Square B6 (**Fig. 3)**. The probe in B6 showed that the revetment wall (B06:13) was two courses below the lower pavement that seals against it.

Following the 2016 season, questions still remained regarding the stratigraphic sequence of the architectural features in Field B as they relate to the lower pavement in particular. Since the revetment wall is below the lower pavement in Square B6, but above the lower road in Square B2, the question that must be asked is: when was the revetment wall built in relation to the lower pavement? Was the lower pavement already in place when the revetment wall was built, forcing the original builders to dig part of it up in Square B6 to lay its two foundation courses? Or was the revetment wall built before the lower pavement and then modified after both walls fell out of use? Since the lower pavement is located under the revetment wall in Square B2, at what point does its slope separate from the foundation of the revetment wall? The purpose of the 2017 excavation in Field B was to address some of these questions and to try to determine where the lower pavement and revetment wall separate, forming the gap found in Square B2 (**Fig. 3**).

In 2017, a probe was opened on the north balk of Square B4, in a section which had not previously been excavated. The purpose of this probe was to trace the lower pavement (B4:10) in Square B4 as it enters the north balk, in order to determine the point at which it no longer sealed against the revetment wall (B4:13=B2:12). An area approximately 2×3m was opened, the flagstones of the upper pavement (B4:05) removed and the soil excavated. The area closest to the east balk had washed out during previous seasons, so care was taken to ensure that no contamination from later periods affected the stratigraphic interpretation. Interseasonal debris was removed and sifted, but was not included in the analysis.

In the process of the excavation, a stone-debris field (B4:27) consisting of 12 medium to large boulders was found at the same elevation as a similar stone-debris field found in Square B2 (B2:16). These stones may have provided the initial foundation for the upper pavement (B4:05=B2:05). It was also discovered that the upper course of the revetment wall that enters into the north balk was not fully supported by the course below it. One of the stones of the upper course of the revetment wall was offset laterally outward by 0.10-0.15m, and was only supported by soil and chink stones (**Fig. 4**). When the supporting soil was excavated, it was found that revetment wall (B4:13) changes



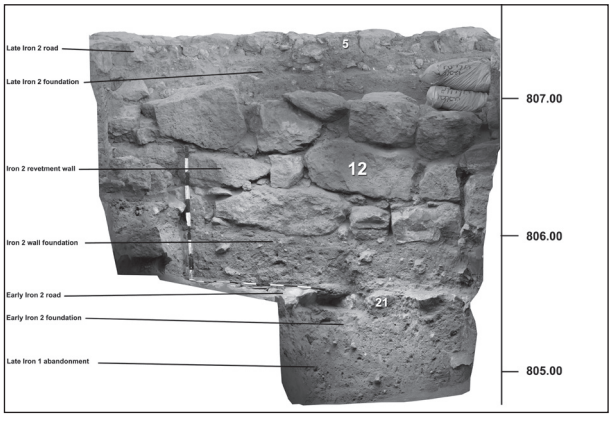
1. Tall Jalūl topographical map showing fields excavated to date.

direction by *ca* 10 degrees east, causing it to pass over the lower pavement (B2:21) in Square B2 (**Figs. 5 and 6**). As for the lower pavement itself, it was determined that from the south balk of Square B4 to the north balk of Square B2, it continued to slope downward at approximately 6.5 degrees, that is to say at an 11% grade. In addition, the upper and lower pavements also pitched from west to east between 9.5-10 degrees (**Fig. 7**). Although the overall width of the lower pavement could not be determined, the currently exposed area suggests that it was between 3.0-3.5m wide (**Fig. 8**).

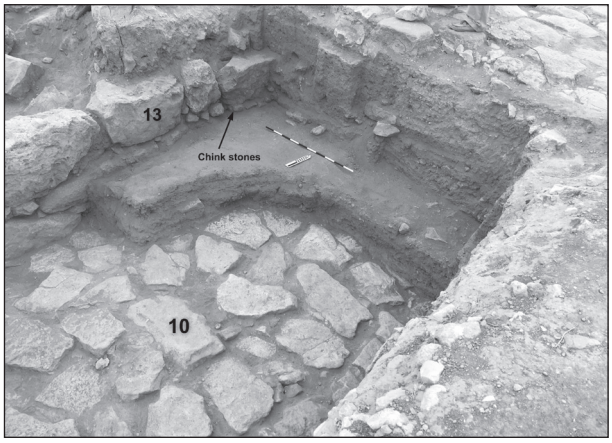
As in Square B6, it was found that the new section of the lower pavement in Square B4 seals against the revetment wall, suggesting



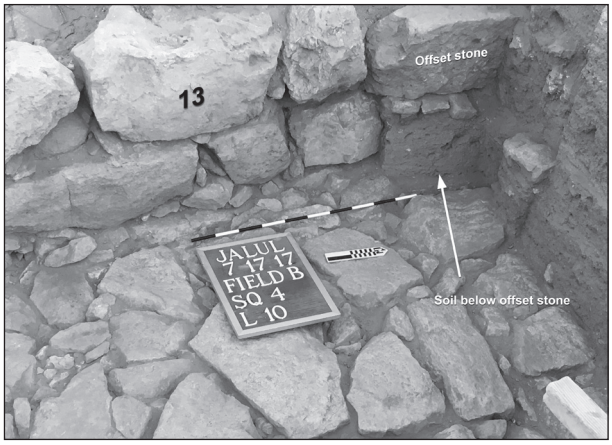
2. Tall Jalūl, Field B 2017.



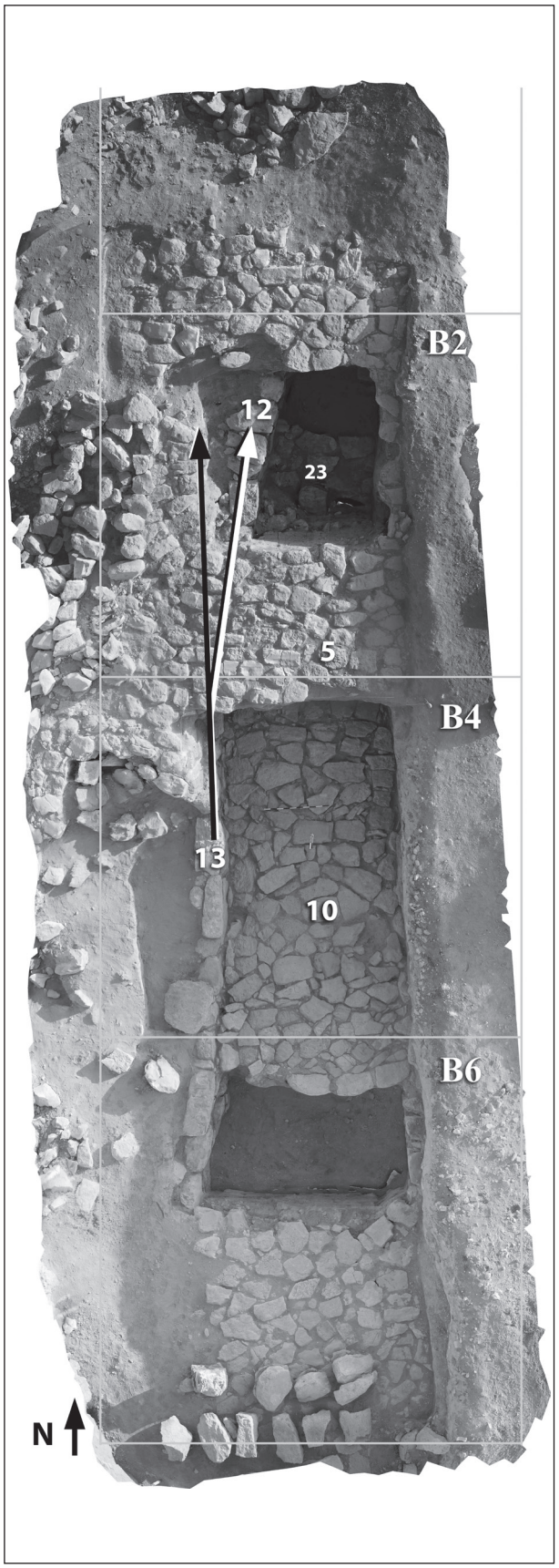
3. Square B2 facing west. Wall 12 lies 40cm above the lower pavement.



4. Facing northwest, showing chink stones supporting the offset stone from Wall 13 that changes the direction of the wall.

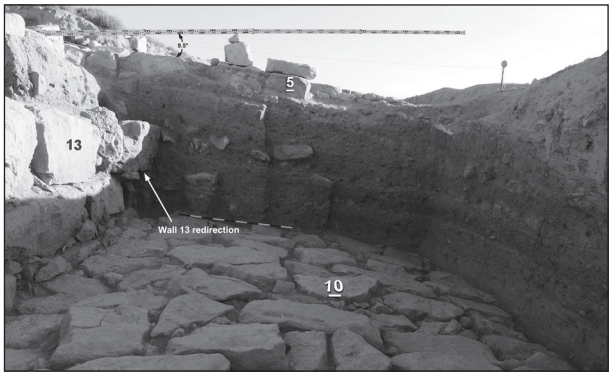


5. Facing east, showing the soil below the offset stone.



6. *Field B, showing the path of the revetment wall from the offset stone.*

their contemporaneous construction. A re-examination of the 1992 excavation photos also suggested that some stones from the lower pavement (B4:10) may have been used as the foundation for the revetment wall (B4:13) in this area, since they appear to go under the pavement (**Fig. 9**). In addition, sherds found in the soil between the flagstones of the lower pavement consist of bowls, cooking pots and jars,



7. *North balk of Square B4, showing the slope and pitch of the upper and lower pavements with the redirected Wall 13.*



8. *Square B4 facing west, showing the excavated lower pavement and exposed revetment wall.*



9. *The 1992 photo of Square B4, facing east. Locus 10 appears to go under Wall 13.*

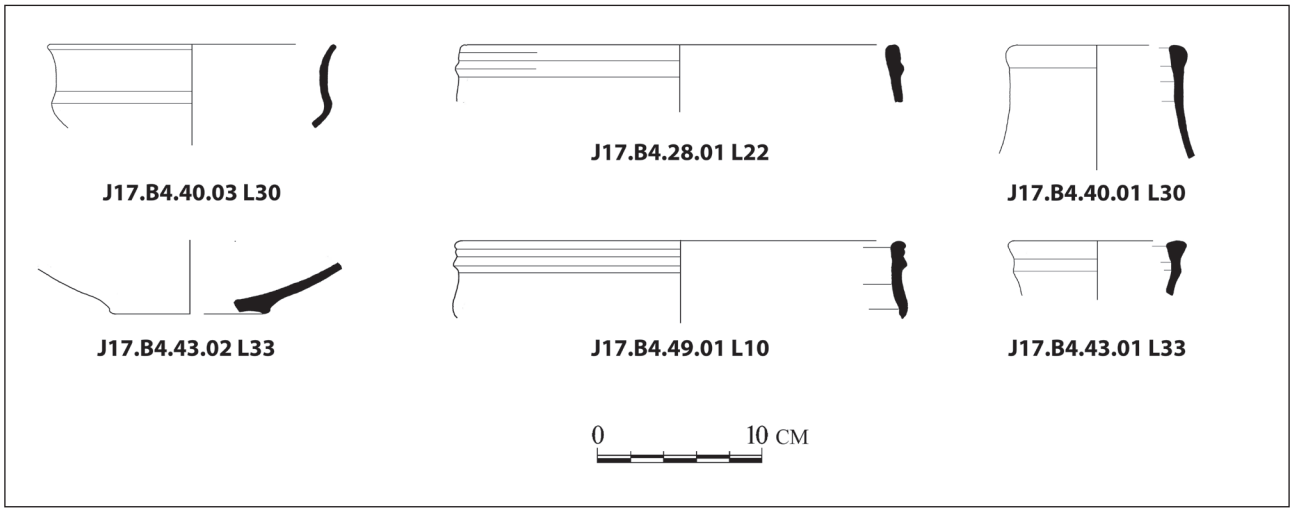
consistent with those found below it - in Square B6 - in 2016. If this scenario is correct, it would also suggest a later phase of construction, with the revetment wall being diverted from its original path over, rather than parallel, to the lower pavement in Square B2 (**Fig. 6**), possibly during the mid-Iron Age II. Alternatively, it is possible that the revetment wall (B2:12=B4:13, B6:13) was added slightly later - following the construction of the lower pavement - to deal with erosion, with the westernmost part of the section in Squares B4 and B6 being pulled up to accommodate the wall construction. If so, it would seem that only some of the lower pavement (sections found in parts of Squares B4, B6 and B8) would have been exposed at that time, while in Square B2 it would have been completely covered with debris.

In terms of dating, the ceramic evidence suggests that the lower flagstone pavement (B4:13) was built in early Iron Age II, a date consistent with the material found previously (**Fig. 10**). In addition, no evidence of hard-packed surfaces or possible dirt roads, as suggested in 2016, was found in Square B4 in 2017.

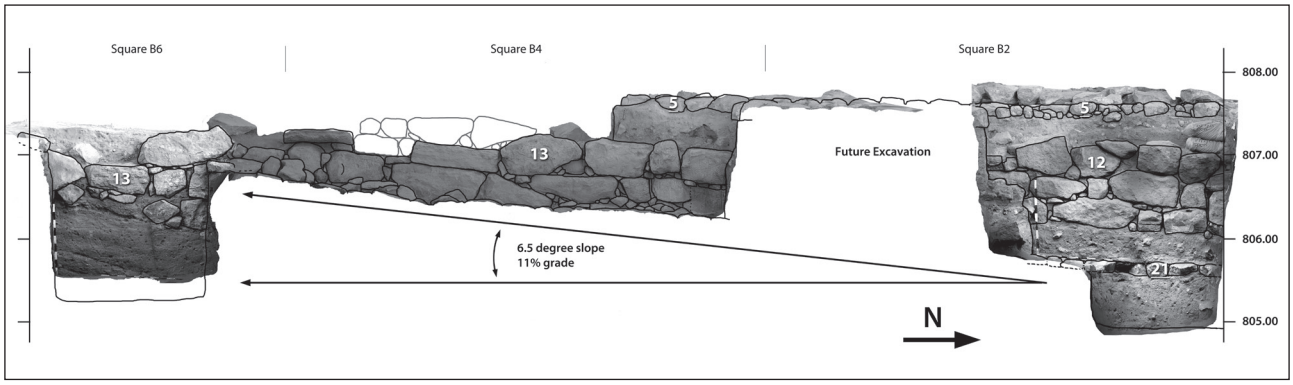
Some questions still remain regarding the relationship of the revetment wall to the lower pavement in Square B2. At what point does the lower pavement actually deviate from the revetment wall? Further excavation is needed on the west side of the revetment wall in Squares B2 and B4 in order to determine the relationship between it and the lower pavement. Additional excavation on the south side of Square B2 could also help clarify at what point the lower pavement separates from the revetment wall (**Fig. 11**).

Field W

Field W was carefully laid out on the southeastern ridge of the large depression on the southeastern side of the *tall* (see **Fig. 1**). Through the end of 2017, seven seasons of excavation in Field W have been completed, with 17 squares excavated (**Fig. 12)**, although Squares 16 and 17 are not yet completed. During the 2017



10. Ceramics: Square B4 ceramics from the 2017 season.

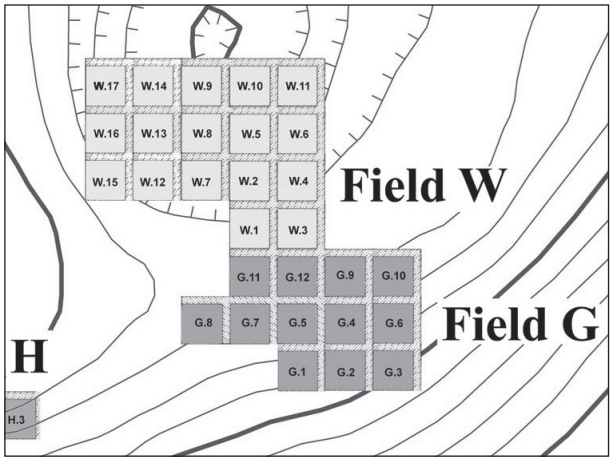


11. Squares B2-6 facing west, showing the slope of the lower pavement and its relationship to the west face of the revetment wall.

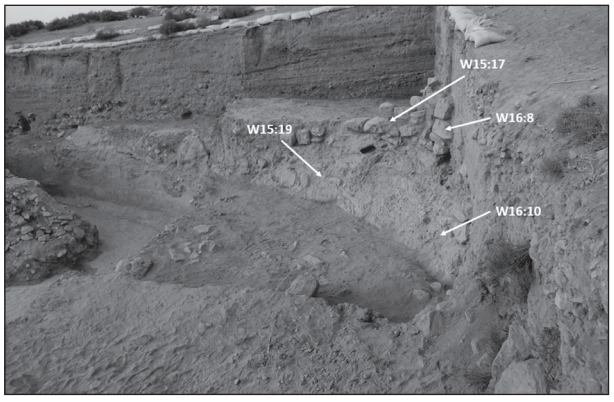
season work continued in Squares 15 and 16, which were opened during the 2016 season of excavation. Excavation in the water reservoir in Field W was begun in 2010 and is now almost half completed. The goal of this season was to reach the floor of the reservoir in Squares 16 and 17.

10th Century BC Occupational Phase

This occupational phase is represented by the reservoir wall located in Squares W15 and W16, and the surface or floor in Square W15. The reservoir wall (W15:17=W16:8) sits on bedrock which was carved for *ca* 2m to create the floor of the reservoir. The wall consists of several courses of medium-size limestone blocks. There is no sign of plaster due to the fact that only a small fragment of the wall is still preserved. The wall was mostly robbed out during the periods after the water reservoir ceased to serve its function, that is to say during and after the Persian period. Plaster (W15:19=W16:10) was found under the wall on a section of carved bedrock (**Fig. 13**).



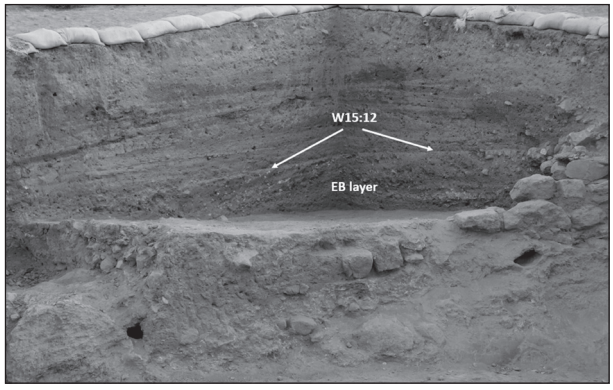
12. Field W squares excavated to date.



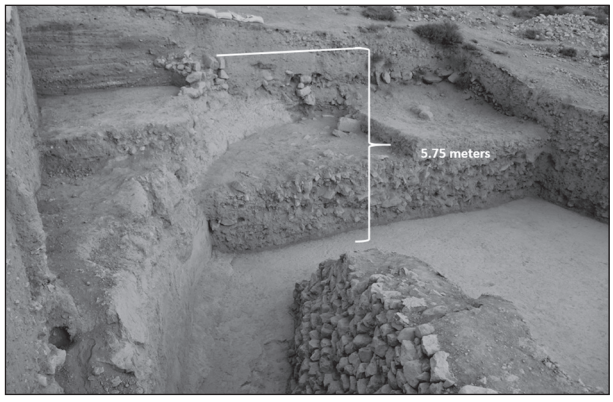
13. Wall and plaster of reservoir.

A surface/floor (W15:12) consisting of a beaten-earth layer was revealed outside the reservoir. The floor itself and earth layer above it contained significant amounts of pottery fragments belonging to Iron Age IIA (10th century BC) (**Fig. 14**). This is consistent with a similar floor revealed in earlier seasons of excavation in Squares W2 and W11. The floor sits on debris filled with Early Bronze Age pottery. It seems that this area of the reservoir was cleared of earth debris, and the bedrock was carved to a depth of 3m in the western section and up to 1m on its eastern side to create a level floor. The wall was then built on the bedrock to level the sides of the reservoir. The builders also created a walking surface outside the reservoir. It is at that time that all the layers that presumably accumulated during the Middle and Late Bronze Age were removed and dumped elsewhere.

The reservoir is about 25m wide, 35m long and almost 6m deep. When full it could have contained *ca* 6,000 cubic meters of water (*ca* 2 million gallons). The size of this open-air reservoir would appear to make it the largest structure of this type so far encountered in the entire Middle East, that dates to this time (**Fig. 15**).



14. 10th century BC floor.



15. Depth of reservoir.

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PRELIMINARY REPORT ON THE KHIRBAT AṢ-ṢAFRĀ SURVEY 2017[1]

Paul Z. Gregor

Khirbat aṣ-Ṣafrā[2] is located about 17km southwest of Mādabā and occupies an area of 1.05 hectares. It sits on a natural hill (**Fig. 1**) near the road that connects Mādabā with Mā'īn Hot Springs and, further, the Dead Sea (**Fig. 2)**. The site occupies a flat plateau on the western side of Wādī ar-Rīshah, which is a northern tributary to Wādī Zarqā' Mā'īn. Since the site is located at the source of Wādī ar-Rīshah it is likely that a natural spring once existed there.

The entire region is composed of hills with steep slopes with very little cultivable land. There are plots of arable land mainly located at the bottom of various *wadi*s. Even today these plots are used for cultivation of wheat and barley. Most of the area around Khirbat aṣ-Ṣafrā is used for grazing sheep and goats.

Ruins of buildings are scattered throughout the site and traces of remaining walls are still visible on its surface. The site is rectangular in



1. Khirbat aṣ-Ṣafrā, facing east.

1. We wish to thank Dr. Monther Jamhawi, 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, Department of Antiquities of Jordan. We would also like to thank Barbara Porter and Jack Green of the American Center of Oriental Research (ACOR) for their usual assistance. The professional surveyor was Ehab al-Jariri, appointed by the Department of Antiquities of Jordan. Finally, we appreciate the help of Mr. Issa Siriani and Abdullah al-Bawareed who served as representatives for the Department of Antiquities of Jordan.
The director of the 2017 survey project was Paul Gregor, with Jacob Moody, Trisha Broy, Dorian Alexander and Hala Ajilat (all of Andrews University) as participants in the survey process. Jacob Moody created digitalized bird's-eye-view photos, and scanned diagnostic sherds. Pottery plates were created by Jacob Moody and Paul Ray.
2. In Arabic, *Ṣafrā* means 'yellow'. The description fits well with the environment around the site.

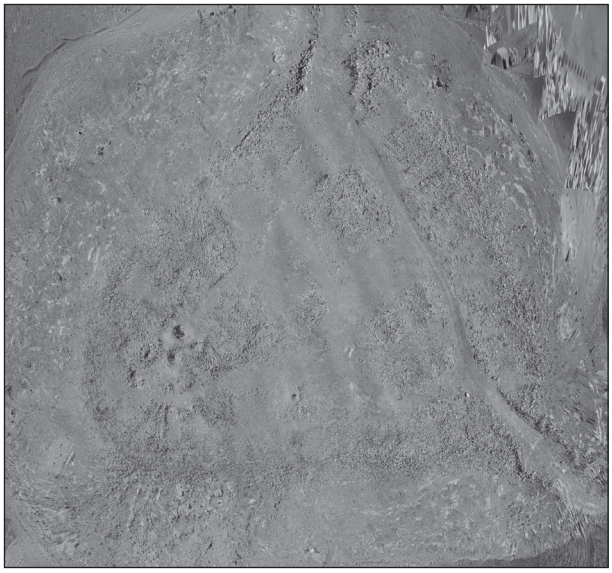
shape (**Fig. 3**), and encompassed by a double (casemate) wall. At some places, the outer casemate is still standing up to 1m in height. The space between the casemate walls is approximately 1.5m wide. The highest point of the site is located on its southwestern section and is 761.5m above sea level. The lowest section is found on its northeastern side, at 756.5m above sea level (**Fig. 4**). From these elevations it is obvious that the entire settlement was placed on a relatively flat platform on top of the hill.

The acropolis of the settlement was most likely located on its southwestern side and it is here that the highest concentration of ruined buildings is found. There has been some illegal digging by local people in this area and some of the holes revealed the presence of caverns. These caverns seem to be filled with debris almost to the tops of their openings. There are no visible chisel marks, suggesting that they are natural openings in bedrock. There is no evidence of plaster to suggest that they served as cisterns for collecting rain from the roof tops of adjacent buildings. However, further excavation should reveal if they were used as cisterns during the occupational periods of the site.

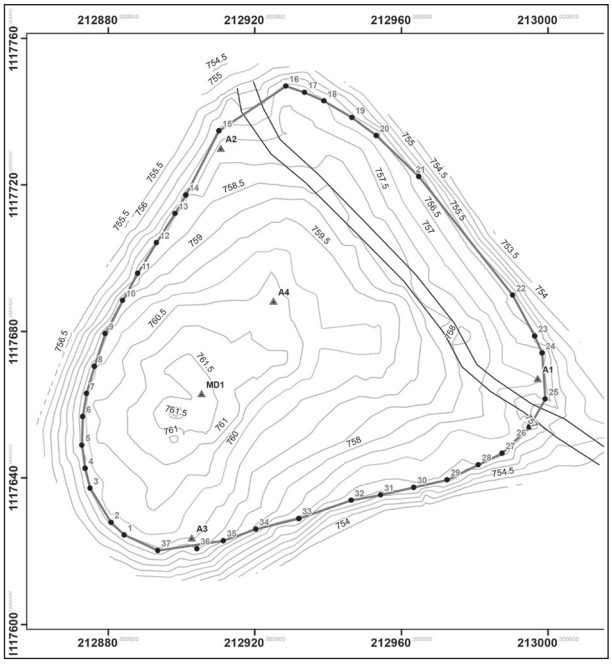
The settlement was easily accessible on its eastern side where the city gate was likely located. Unfortunately, the locals have bulldozed both this section and the northern corner of the fortification to create a road for pickup trucks to bring supplies to a nearby *bedouin* camp (**Figs. 3 and 4**). Apart from the acropolis area to the southwest, heaps of stones - representing ruined buildings - are visible around the perimeter



2. Regional map.



3. Aerial photo of Khirbat aṣ-Ṣafrā.



4. Topographic map of Khirbat aṣ-Ṣafrā.

of the city walls. A large part of the central area seems to lack ruins (**Fig. 3**). In some places, the earth layers have been washed away, leaving the bedrock exposed. It would appear that this section of the site served as a plaza or open space for public activities while the site was occupied. It is also possible that Khirbat aṣ-Ṣafrā was a military settlement with its center being used for horse and chariot maneuvers.

History of Early Research in the Region

The earliest recorded modern visit to this region was by Ulrich Seetzen during 1806. He visited the Mādabā area on March 22 of the same year. On his way south he mentioned Mā'īn, which he identified with Baal Meon, and also spoke of the Mā'īn Hot Springs (Seetzen 1810: 37). Since his visit was very brief, he did not mentioned Khirbat aṣ-Ṣafrā, but he was certainly in close proximity. He was followed by L. Burckhardt (1812), C. Irby and J. Mangles (1818) - with the same results. Their visits to the region were very brief and the omittance of Khirbat aṣ-Ṣafrā is understandable. F. De Saulcy (1851) visited the southern section of Moabite territory and misplaced several sites on his map [He placed Mādabā south of Wādī al-Mūjib (River Arnon)].

Later, during 1872, H.B. Tristram did the first survey of what is traditionally believed to be Moabite territory. This survey of the Moabite plateau covered an area from the hill country of 'Ammūn to Wādī al-Ḥasā (Brook Zered). At one point he found himself at the town of Mā'īn, which he identified as Baal Meon. He also visited Wādī Zarqā' Mā'īn but did not mention the Mā'īn Hot Springs. Evidently he was very close to Khirbat aṣ-Ṣafrā but did not pay a visit to the site (Tristram 1874: 302-4).

About the same time the American Palestine Exploration Society tried to create a map of eastern Palestine, with another attempt during 1875-77, but with limited results. During mid-April of 1876, S. Merrill found himself at Mā'īn and also the hot springs (Merrill 1881: 248; Moulton 1928: 55-69). A few years later, in 1881, C.R. Conder surveyed 500 miles of Transjordan covering the territory between the Wādī Zarqā' Mā'īn in the south and Wādī Nimrīn in the north. In his report he mentions the town of Mā'īn and Wādī Zarqā' Mā'īn, but nothing is mentioned of Khirbat aṣ-Ṣafrā in spite of the fact that he had to be within close proximity (Conder 1989: 142-49). It seems that he was mainly concerned about dolmens rather than a systematic recording of all sites in this region. George A. Smith reflects very briefly on hot springs at Wādī Zarqā' Mā'īn also, but without further explanation of surrounding sites (Smith 1907: 571).

The next major survey was conducted by Nelson Glueck in 1933. He found himself on the eve of May 30 at a place he identified as Ubaiyeh (Site 80) where he camped for the night. On May 31 he visited several sites (Ḥajar al-Mansūb = Site 81; al-Mughayrāt = Site 82) before he came to town of Mā'īn (Site 83) (Glueck 1934: 33). Based on his estimates, al-Mughayrāt is located about 4km southwest of Mā'īn. If he had traveled a few kilometers southwest from al-Mughayrāt he would have come to Khirbat aṣ-Ṣafrā, but did not do so.

Although Khirbat aṣ-Ṣafrā was unnoticed and not mentioned in early surveys, it appears for the first time on the map of Palestine compiled by G. Armstrong after several surveys for the Committee of the Palestine Exploration Fund. The map was published in 1890 (Armstrong 1980) (**Fig. 5**). The site is listed as 'el Safrah' and marked as a ruin. Obviously, some of the early explorers did come across Khirbat aṣ-Ṣafrā, but for unknown reason it was never mentioned in any of the early reports.

The 2017 Surface Survey at Khirbat aṣ-Ṣafrā

During June 2017, Andrews University conducted a surface survey of Khirbat aṣ-Ṣafrā. The site was divided in three sections. The first section was located outside the city walls, covering an area of 10m. The second section covered a 10m-wide strip inside the wall perimeter, and the third section was located in central part of the site. In addition to collecting ceramics from the surface we excavated two probes to gain a better understanding about the stratigraphic sequence of deposited layers. One probe (Probe 1) was located in the central section of the site and another (Probe 2) between the casemate walls. Probe 2 was completed by reaching the bedrock, while Probe 1 was only partially finished. It appears that the debris which accumulated during and after the abandonment of the settlement is

only about 1m deep. The outer city wall appears to be about 1m thick while the inside wall was a bit thinner. The stones that are part of the still-standing wall seem to be roughly hewn and medium sized. Most of them are limestone with a few chert stones.

During the survey, 1,061 pottery sherds were collected from the surface. From the 10m strip outside the city perimeter we found 555 sherds, of which 35 were diagnostic. From the strip covering 10m inside the city wall perimeter we found 228 sherds, of which 25 were diagnostic, and from the strip within the central area of the city we collected 278 sherds, of which 39 were diagnostic (*cf.* **Table 1**).

During the course of the excavation of Probe 1, we collected 24 sherds with only one diagnostic sherd, belonging to a jar. In Probe 2 we found 35 pottery sherds, again with only one diagnostic sherd, this time coming from a juglet. It seems that majority of the pottery assemblage consists of bowls (43) and jars (32). We also collected cooking-pot fragments (16) and storage-jar (5), juglet (2) and jug (1) sherds.

Most of the diagnostic sherds are very fragmentary, with only a few centimeters of the neck or body existing below the rim. We also found three fragments belonging to a collar-rim jar. The collar is clearly visible, as is a small section of jar's neck. The trajectory of the neck part



5. Palestine Exploration Fund map.

seems to go upright suggesting that the jar was produced during the earlier part of Iron Age IIA. Based on preliminary readings, most of the diagnostic sherds belong to Iron Age IIA or IIB (**Figs. 6-9**; *cf.* **Table 2**), with the exception of a few sherds belonging to the Roman period. None of the sherds had slip or burnishing of any kind.

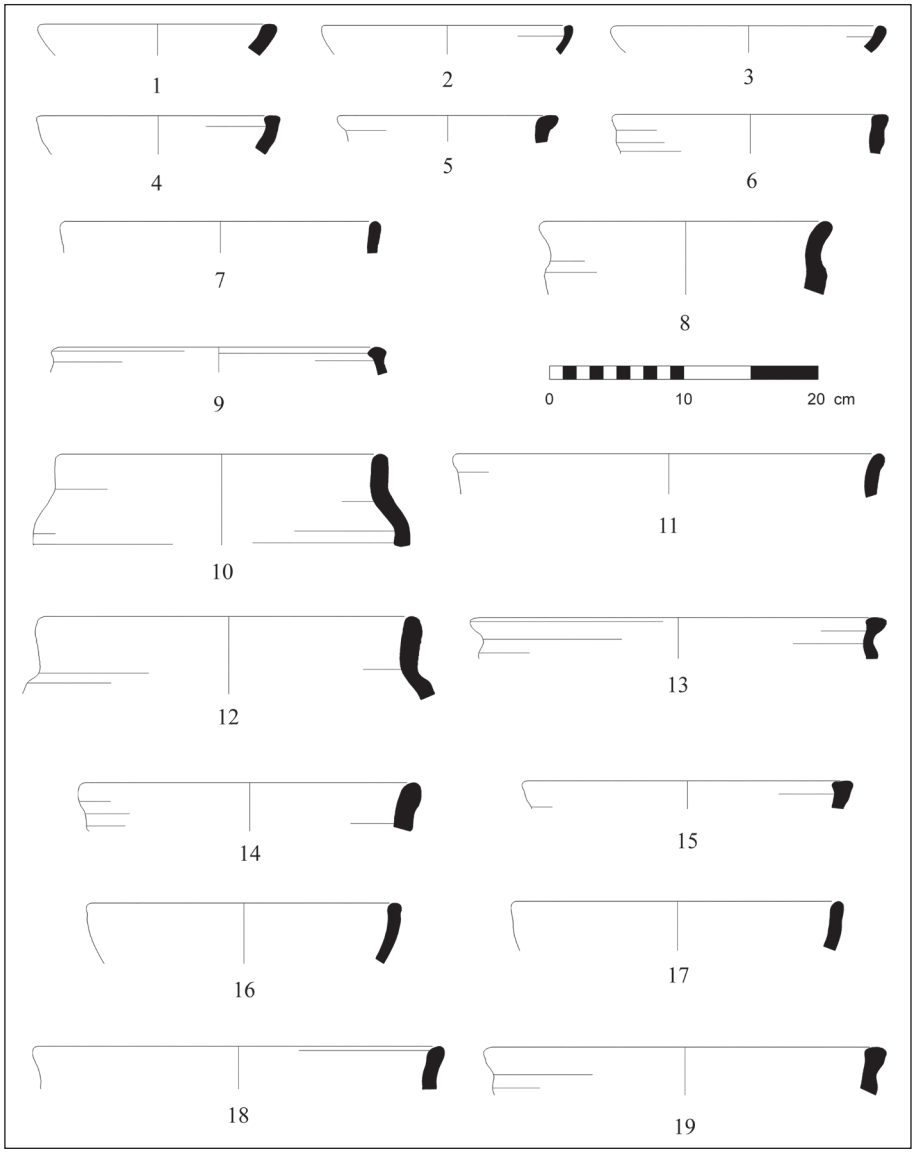
It would appear that the site was established during the early part of Iron Age II and continued to exist for couple of centuries. The ceramic

Table 1: Distribution of ceramic finds.

Location	Bowls	Jars	Cooking pots	Jugs	Juglets	Storage jars
10m outside strip	19	10	4	1	1	
10m inside strip	12	9	3			1
Center strip	12	13	9		1	4

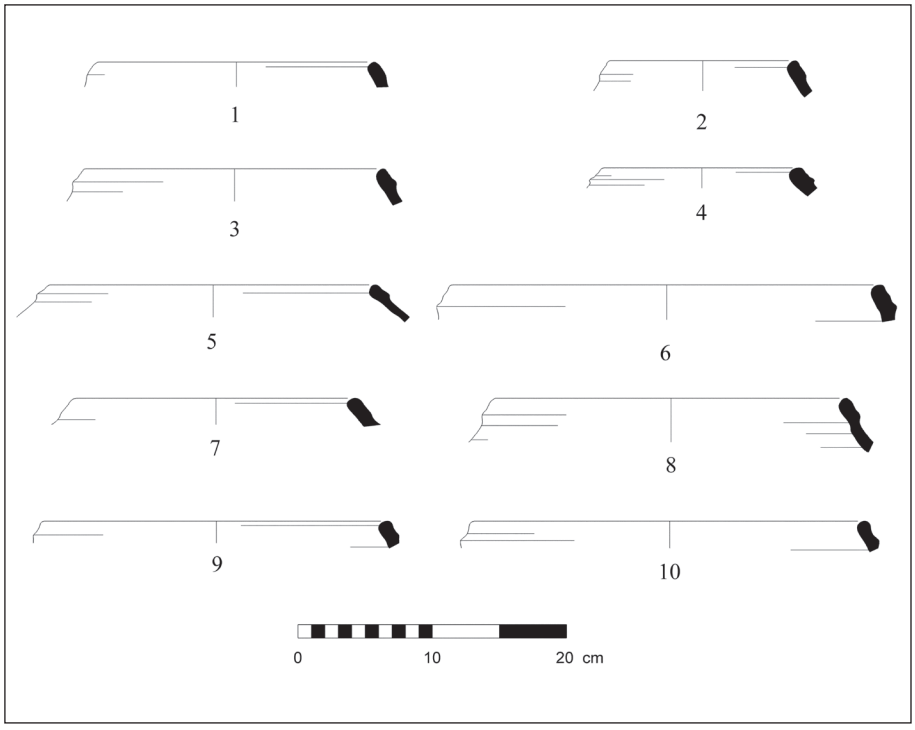
Table 2. Distribution of ceramics illustrated at **Figs. 6-9**.

Location	Bowls	Cooking pots	Jars	Storage jars
10m outside strip	6.3, 10, 11, 14, 16	7.2, 3, 10	8.1, 2, 3, 4	--
10m inside strip	6.1, 2, 4, 5, 7, 12, 13, 15, 17	7.5	8.5	--
Center strip	6.6, 8, 9, 18, 19	7.1, 4, 6, 7, 8, 9	8.6, 7, 8	9.1, 2, 3

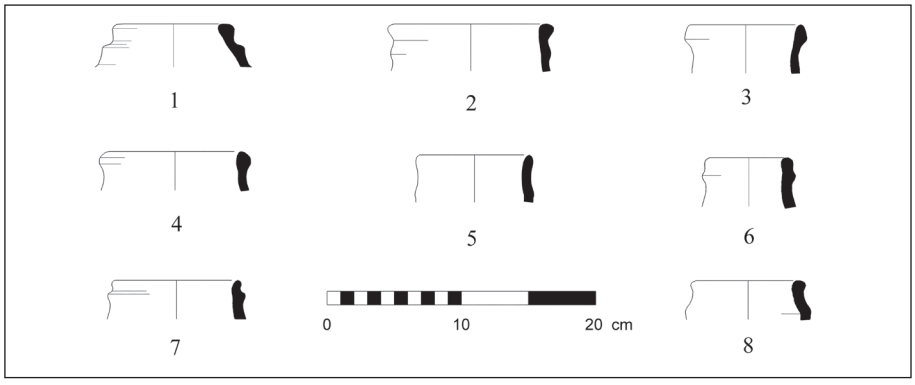


6. Bowls.

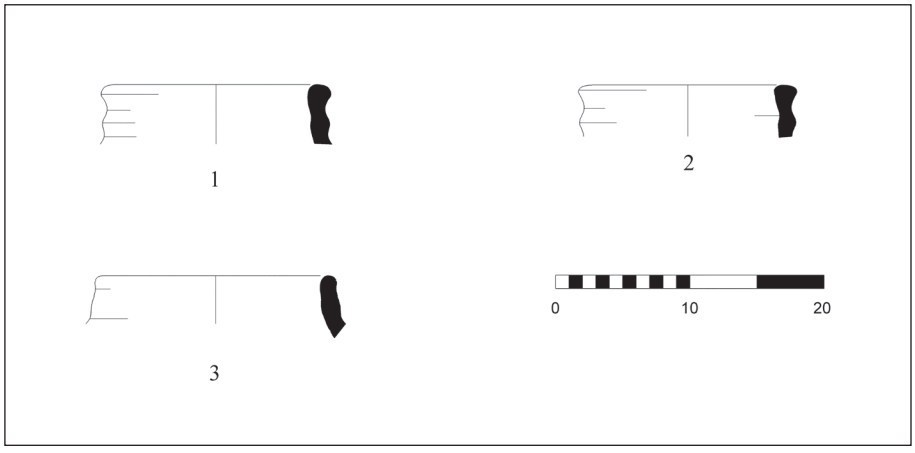
assemblage as found on the surface included no ethnic indications of any kind, so we cannot conclude with certainty who established the settlement. Future excavations will hopefully provide evidence to resolve this issue. In addition, since the ceramic assemblage consists of bowls, cooking pots, jars, jugs, juglets and storage jars, it would appear that the site was a typical small village settlement, although one cannot rule out the possibility that it served as military outpost.



7. Cooking pots.



8. Jars.



9. Storage jars.

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PRELIMINARY REPORT ON THE 2018 SEASON OF EXCAVATIONS AT KHIRBAT AṢ-ṢAFRĀ

Paul Gregor, Paul Ray, Constance Gane, Trisha Broy and Jacob Moody

Introduction[1]

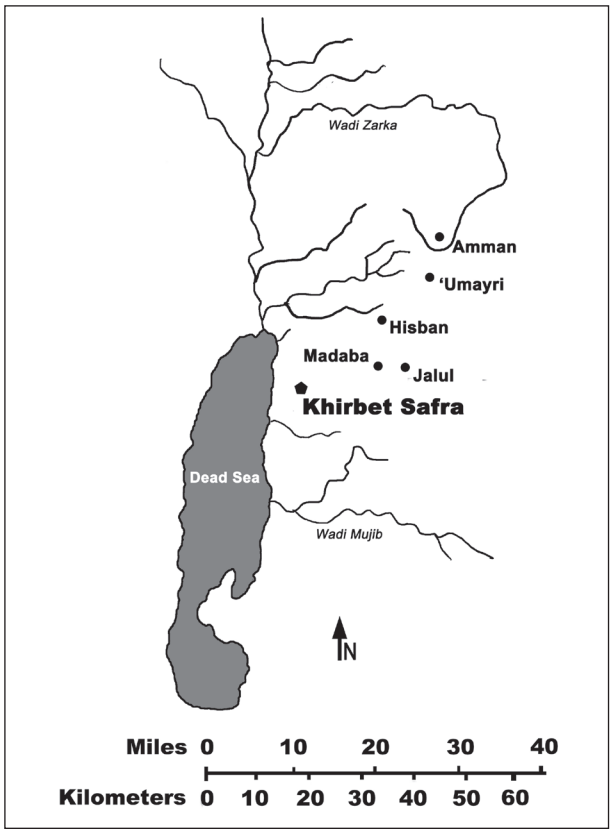
Andrews University conducted archaeological excavations at Khirbat aṣ-Ṣafrā between June 17 and July 27, 2018. The excavations were directed by Paul Gregor, Constance Gane and Paul Ray of the Institute of Archaeology at Andrews University, with Gane, Ray and archaeology doctoral students Trisha Broy and Jacob Moody as field supervisors. About thirty faculty, students and volunteers were joined by 11 Jordanian workers during the excavations this season.

Andrews University has been excavating the site of Tall Jalūl, near Mādabā, for a number of years (1992-present) as part of the Madaba Plains Project. Phase I of the excavations at the site ended in 2012, although short-term excavations in selected fields have continued (2014-2017) during the publication hiatus, prior to the renewal of large-scale excavations (Phase II) in the future. In accord with the regional scope of the project, the idea of excavating an additional small site, with a relatively limited research design, came to fruition with the opportunity to do a surface survey of the site of Khirbat aṣ-Ṣafrā in the summer of 2017. This led to physical excavations at the site beginning in 2018. For background information on Tall Jalūl, the Jalūl Islamic Village and the history of excavation at the site, see 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 2017 Khirbat aṣ-Ṣafrā survey and a history of earlier research in the immediate region, see Gregor forthcoming.

Results of the 2018 Season at Khirbat aṣ-Ṣafrā

Khirbat aṣ-Ṣafrā is an approximately 2.6-acre, triangular-shaped site located about 17km southwest of Mādabā, overlooking the Dead Sea (**Fig. 1**) on the western side of Wādī ar-Rīshah, a northern tributary to Wādī Zarqā' Mā'īn. A casemate-type wall system surrounds its perimeter. Four excavation fields (A-D) were laid out using GPS on the basis of a grid of 6×6m squares, placed over a topographic map created by Department-of-Antiquities surveyors in 2017, with the tops of some part-exposed ar-

1. We wish to thank Dr. Monther Jamhawi, 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 American Center of Oriental Research (ACOR) for their usual assistance. Finally, we appreciate the help of Amal Rawahna and Nisrin Khaled Fuqaha of the Department of Antiquities of Jordan, who served as our department representatives during the 2018 season.
Staff for the 2018 season included director Paul Z. Gregor, co-directors Constance Gane and Paul Ray. Paul Ray also served as object registrar, with the help of Constance Gane and Elizabeth Emswiler. Constance Gane and Trisha Broy served as pottery registrars, and Jacob Moody and Paul Ray oversaw GPS readings on the site. Robert Bates, Talmadge Gerald and Michael Orellana served as technical advisors, dealing with the electronic database and iPad issues. The square supervisors for Field A were Roy Gane and Talmadge Gerald; for Field B Elizabeth Emswiler, Eva Glazer and Georg Filippou; for Field C Valentino De Bombol and Ricardo Scarfullery; and for Field D Dorian Alexander and L. Scott Baker. Volunteers included Einra Baker, Katherine Clayton, Seth Coleman, Delilah Drew, Isabella Kunze, Ryleigh Snow, Marriot Boursiquot, Jude Senatus, Aleksandra Jovanovic, Kristijan Milovanovic, Michael Orellana, Laren Kurtz, Aevril Kurtz, Aimme Vitangcol and Benjamin Regoso.

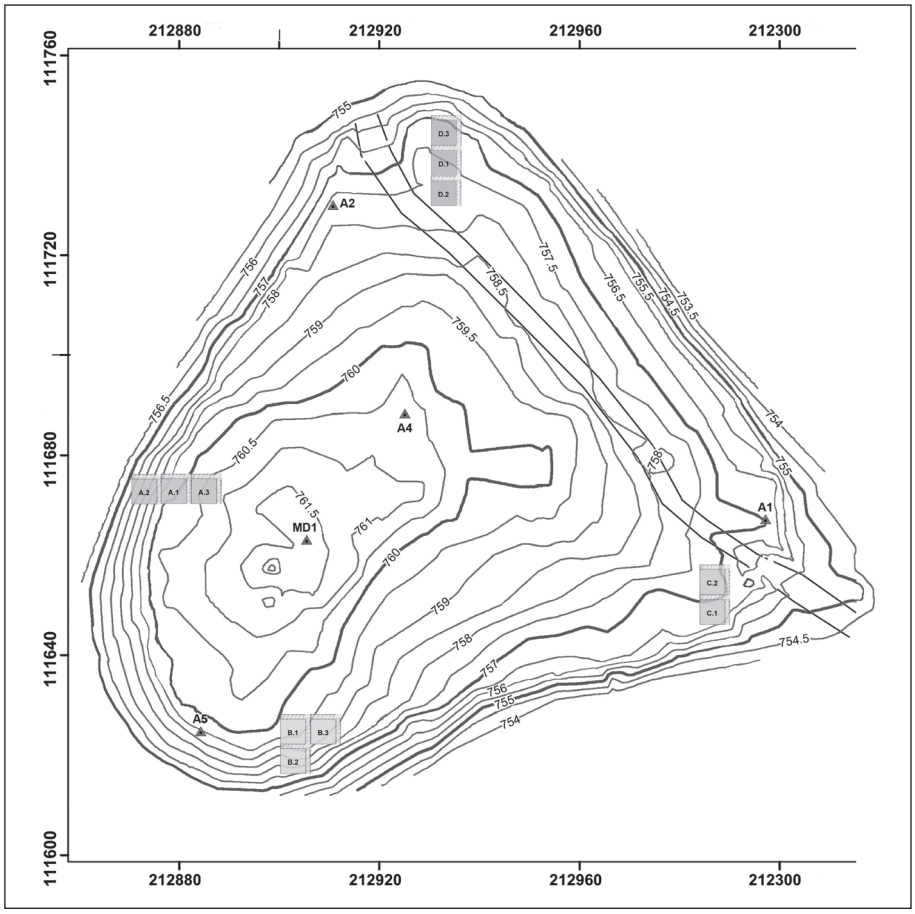


1. Regional map.

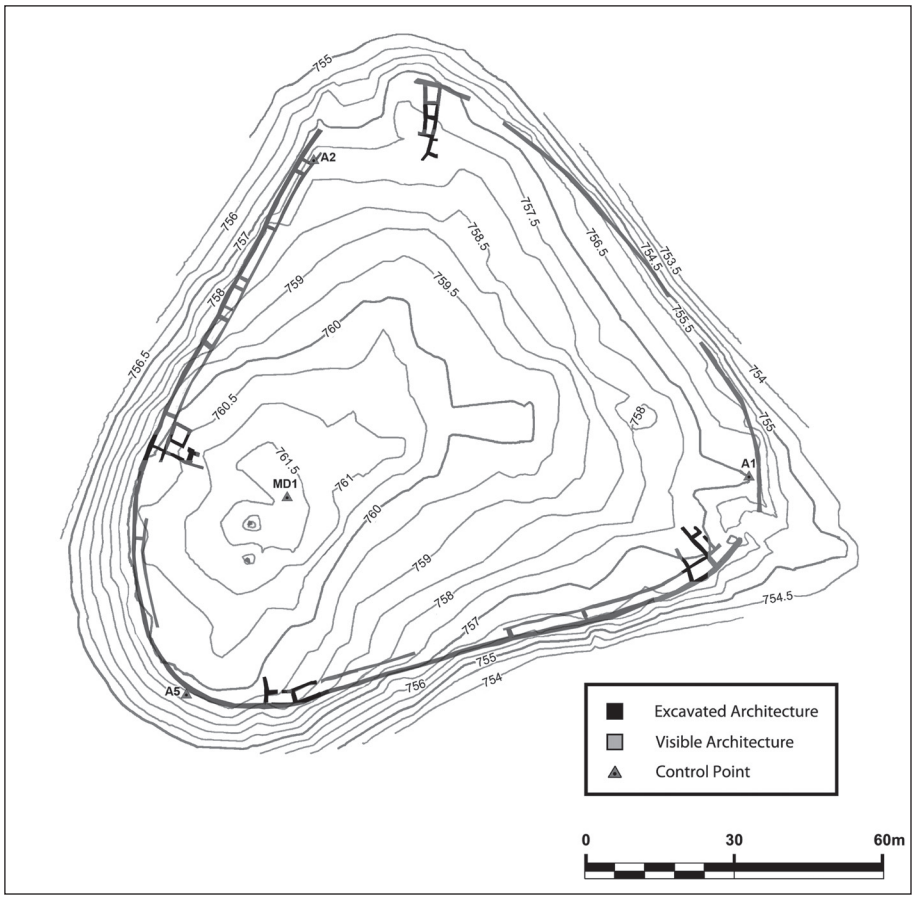
chitecture serving as fruitful locations for their initial placement (**Fig. 2**).

The Fortifications

The casemate-wall system was exposed in three of the four excavation fields (A, B and C) that were opened this season (**Fig. 3**). In each field, the walls were freestanding, built directly upon bedrock. The latter was uneven, with a number of 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* 1.3-1.4m thick, two-row outer wall (A1:4; B2:1=B3:7; C1:4), a *ca* 0.7-0.8m thick, one-row inner wall (A1:3; B1:2=10=B3:2; C1:3) and *ca* 0.4-0.6m thick, single-row cross walls (A1:5, 10, 17; B1:11; B3:6; C1:12, 20) were constructed with large field stones and smaller chink stones, creating broad rooms *ca* 5.0m long × 2.0-2.25m wide. In two fields (B and C) entryways (B1:9; C1:19=23) were found in the inner wall, connecting rooms on either side. In Field B, the entrance was built over the step-like bedrock that rose up gradually (or was perhaps modified),



2. Topographic map of Khirbat aṣ-Ṣafrā with excavation fields.



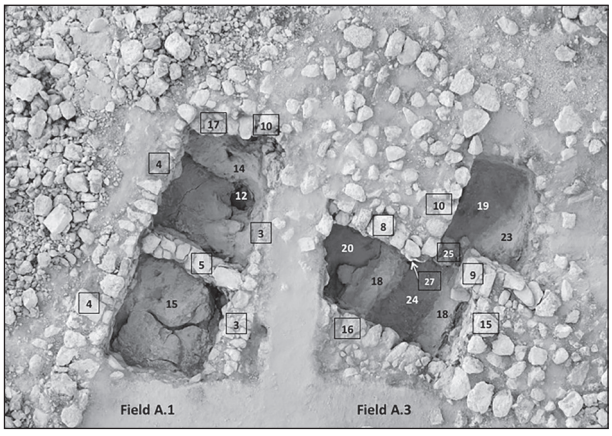
3. The casemate fortification system at Khirbat aṣ-Ṣafrā.

leading from the broad room of the casemate into the long room of another structure, built immediately inside the inner wall. In each field, the initial construction of the casemate-wall system dates to the early Iron Age I.

Field A

Field A (**Fig. 4**), consisting of two squares (A1 and A3) laid out on the western edge of the site, was supervised by Constance Gane. Parts of both squares were excavated to bedrock. Early Iron Age I ceramic remains were found directly upon the bedrock (A1:14=15) in Square A1, which consisted of two rooms next to the outer casemate wall. Both rooms exhibited beaten-earth surfaces (A1:9, 11), with ceramics dating to early Iron Age I, stone grinders and pestles, and numerous animal bones. Above this surface in both rooms was a mix of Iron Age I, Iron Age II and Byzantine-period ceramics among what appears to be mudbrick-superstructure collapse, indicating a violent disruption of occupation here.

Square A3, though also disrupted by tectonic activity, provides a clearer occupational history. A doorway provides access between the southern and northern rooms along the inner casemate wall. Here, the same early sequence of red-bricky material with early Iron Age I pottery was sealed by a plastered floor (A3:21) - with early Iron Age I ceramics imbedded in the plaster - in the southern room. Above this level, a thick (up to 0.5m) ashy lens covered most of the two rooms, indicating a conflagration. Post-occupational debris suggests a period of abandonment. Above, was a beaten earth surface



4. Field A.

(A3:17) which dates to the Byzantine period. At this time substantial Byzantine walls (A3:8-10, 15-16) were built, at least one built upon an Iron Age I wall. A later beaten-earth surface (A3:11) also dates to this time. These surfaces and walls indicate a relatively well-established Byzantine-period occupation on this part of the site.

Field B

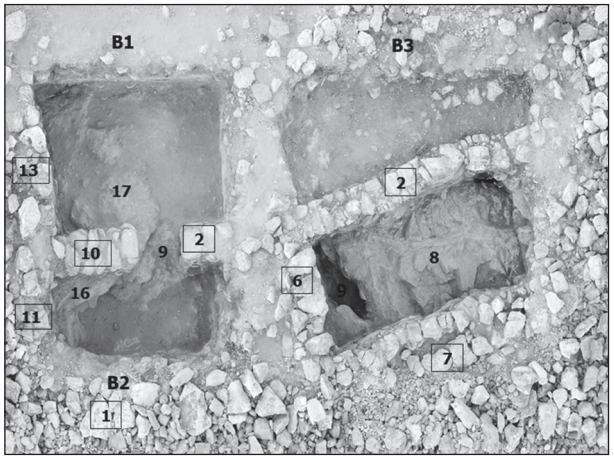
Field B (**Fig. 5**), supervised by Paul Ray, consisted of three squares (B1-3) laid out on the southwestern edge of the site, of which one (B1) was completely excavated, a second (B3) partly so, and a third (B2) - while not excavated - was nevertheless used to trace the outer wall on this side of the site. Bedrock was reached in parts of both of the excavated squares.

In Square B1, several use layers were discovered in a long room on the inner side of the broad room of the casemate wall (B1:2=10), bounded on the west by Wall B1:13, and possibly on the east by an as yet unexcavated wall in the balk between Squares 1 and 3, following the trajectory of the cross wall of the eastern casement (locus B3:6). The first occupation layer (B1:14; B3:9), dating to early Iron Age I, was located above the red-bricky fill material (B1:15) that was also found in locus B3:11, above bedrock (B1:16=17=B3:8). Many animal bones and a number of domestic and textile artifacts were found within this layer. During late Iron Age I, a beaten-earth surface (B1:5) was laid on top of the initial use layer, after which - during early Iron Age II - another beaten-earth surface (B1:6) was laid above a fill layer (B1:7). Stone thresholds connected with both beaten-earth surfaces were found in the doorway of the inner casemate to keep everything level on both sides of the wall.

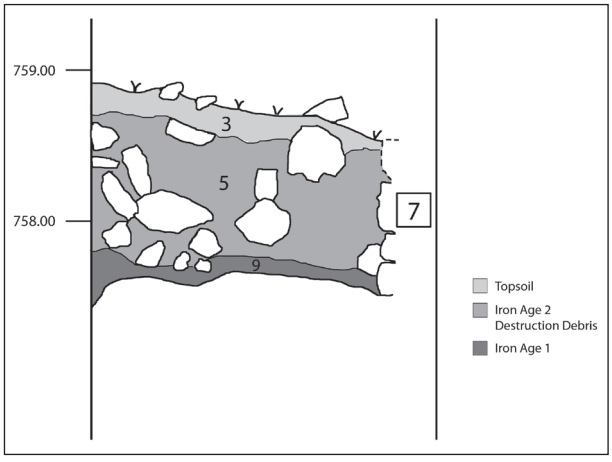
A destruction, probably caused by an earthquake some time in Iron Age IIB (8th century BC), forced large portions of the outer casemate wall to fall down the hill to the south of the site [In general, architectural elements fall in the opposite direction to plate movement during tectonic activity, which on the east side of the Dead Sea Transform is to the north], leaving *ca* 0.75m of the mudbrick superstructure (B1:12; B3:5) of the inner casement wall in the broad rooms, in Squares B1 and 3 (**Fig. 6**), with smaller amounts of destruction debris (B1:4, 8; B3:4, 10) in other parts of the building, after which the structures in this part of the site were abandoned. Later, during the Byzantine period, there seems to have been some squatter activity, as three isolated whole-vessel forms (a juglet and two cups) and part of a jar were found in pits (B3:12, 13) dug in Square B3, with post-abandonment earth material (B1:1, 3; B3:1, 3) accumulating ever since.

Field C

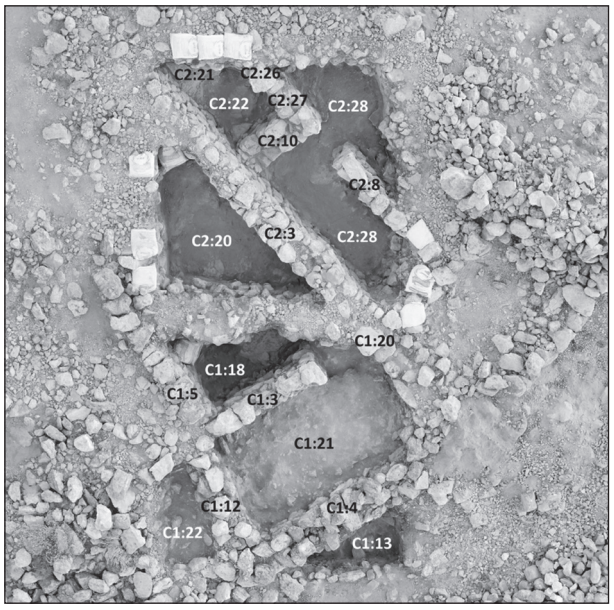
Field C (**Fig. 7**) is located on the southeastern corner of the site and was supervised by Trisha Broy. The excavations in this field consisted of two squares (C1 and C2). Some Late Bronze Age II/early Iron Age I transitional pottery was found on the surface (C1:17; C2:17, 25) created from the red-bricky material on top of bedrock. This material was sealed below a destruction layer (C1:16; C2:16, 18, 23, 24), approximately 0.1m thick, which contained a large amount of broken ceramic vessels and domestic food-preparation objects, such as



5. Field B.



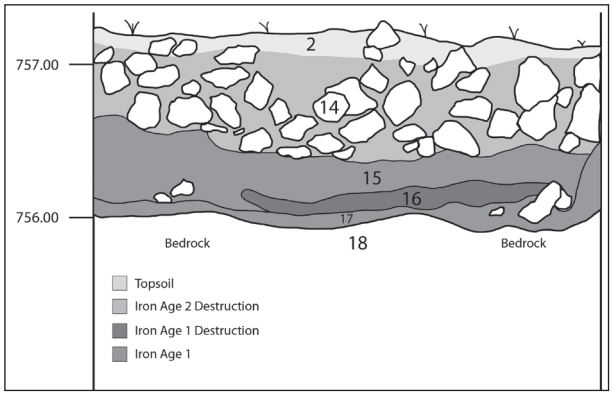
6. Field B3 east balk.



7. Field C.

grinders and pounders (**Fig. 8**). The ceramics date primarily to the Iron Age I, with a few earlier forms.

A second occupational level (C1:15; C2:11, 12, 13, 14, 15, 19) consisted of a beaten-earth floor in both squares. The entrance between the broad room of the casemate and the room immediately inside was blocked (C1:19=23) at this time, as was another entrance (C2:27) to the northeast that connected a narrow room or alley with an apparent staircase (C2:21) to a larger room of as yet unknown dimensions. Flat-lying pottery sherds, a pair of bronze bangles, and a roof roller were found on the surface (C2:12, 15) of this narrow room. Above this surface, in both squares, was a series of ash layers (C1:9, 10, 11, 14; C2:4, 5, 6, 9) suggesting another conflagration. These *loci* contained ceramics that date to the Iron Age II. Above these ash layers was an abandonment layer (C1:1, 2, 6, 7, 8; C2:1, 2, 7) consisting of a heavy concentration of boulders from wall tumble, dated by ceramics to Iron Age II.

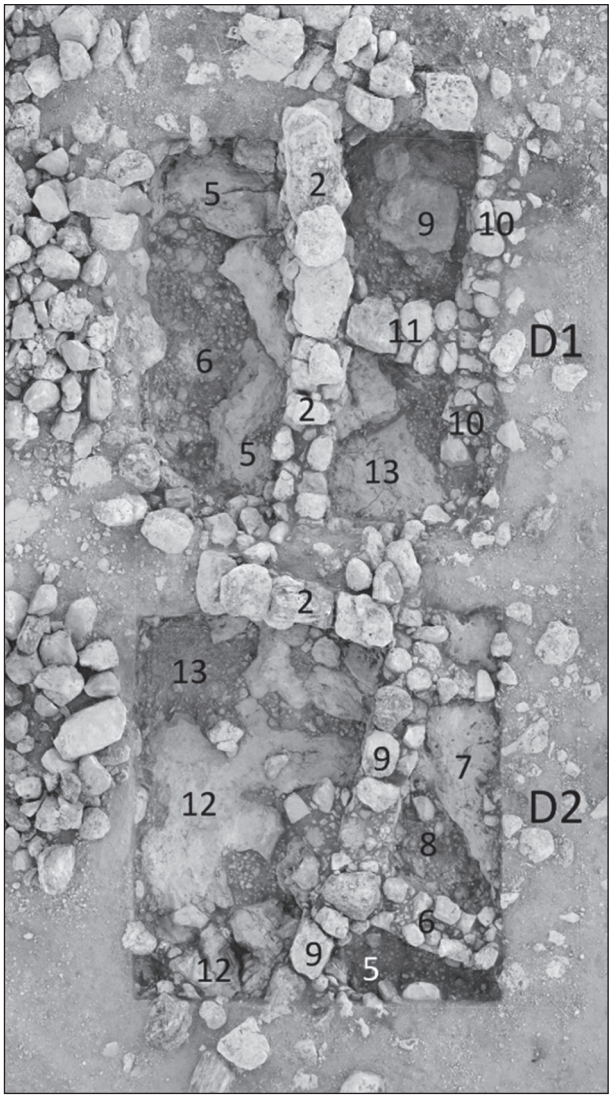


8. Field C1 north balk.

Field D

Field D (**Fig. 9**), supervised by Jacob Moody, is located on the northernmost edge of the site. Three squares (D1-3) were planned for Field D this season, of which only two (D1-2) were fully excavated. This area was chosen for excavation because of the visible wall lines, some with stones larger than anything else visible on the site. The soil is also rather shallow in this part of the site, in places extending only 0.1m above the bedrock.

As in the other fields, there was a clear preparation phase here where the walls of buildings were laid upon a red-bricky material (D1:6, 12;



9. Field D.

D2:5, 8, 13) which leveled the uneven bedrock (D1:5, 9, 13; D2:7, 12). The vast majority of this deposit was without material-culture remains, but diagnostic early Iron Age I sherds were found on top of this fill layer (in D2:8), helping to date the earliest construction in this part of the site. The walls built on top of this material (D1:2, 10, 11; D2:2, 6, 9) form sections of at least two buildings, in a square-shaped layout, within which parts of three to four rooms were excavated.

In these rooms, the first occupational layer (D1:8, 14), which had flat-lying early Iron Age I pottery, was built right on the bedrock, upon which was an ashy layer with a half of a small storage jar, plus a possible incense stand in the northeasternmost room of Square D1 and part of an early Iron Age I biconical jar and several grinding stones, pounders and a possible hob in the southeastern room of the same square. Further excavation is needed to determine the function of these buildings.

No clear occupation layers were found above the ash layer, indicating - it would seem - a possible abandonment of this area of the site. These abandonment layers contained mostly Iron Age I - with a few datable Iron Age II - sherds. The topsoil had a nearly even mix of Iron Age I and II sherds, with only two small Byzantine-period body sherds.

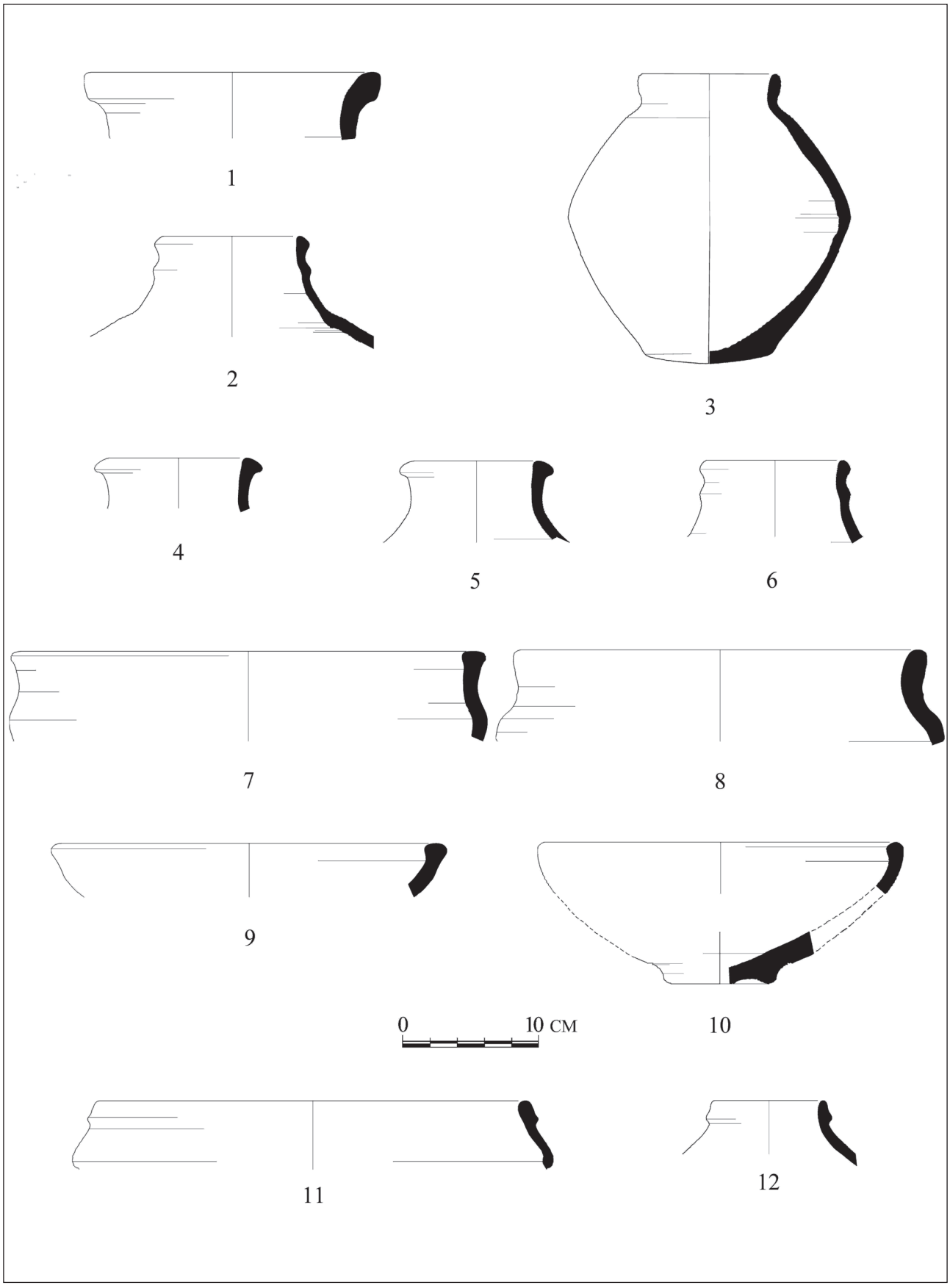
Preliminary Conclusions

Based on results from the first season of excavation, the first settlement at Khirbat aṣ-Ṣafrā was established during the earliest part of Iron Age I (possibly 13th century BC). The settlement was destroyed by fire (thick ash layers were found in Fields A, C and D) at the end of Iron Age I or the beginning of Iron Age IIA (*ca* 10th century BC). At the present time the cause of the fire is not known, but a second settlement was established soon after, most likely by the same group of people (evidence of this settlement is present in Fields B and C). After that time, Khirbat aṣ-Ṣafrā remained occupied until the 8th century BC, when the entire site was destroyed for the second time (most likely by earthquake) [The earthquake, if connected with the one mentioned in Amos 1:1 (*cf*.. Zechariah 14:5), would have occurred in *ca* 760BC with a magnitude of 7.3 (Migowski *et al*. 2004: 307, Table 2) and, like many earthquakes along the Dead Sea Transform, left its mark on both sides of the Jordan river (Raphael and Agnon 2018: 769, 777-78, Table 2), with Khirbat aṣ-Ṣafrā possibly now adding its name to the list of those sites (Dayr ʻAllā, Tall as-Saʻīdiyyah, Pella, Ḥamrat Fīdān and Tall al-ʻĀdliyyah) on the Transjordanian side of the river]. Following this destruction, the site was abandoned with the exception of a structure found in Field A, and some pitting activities in Field B during the Byzantine period.

Phase	Period	Field
Occupational Phase 1	Byzantine Period	A, B
Occupational Phase 2	Early Iron IIA (10th-8th cent. BC)	B, C
Occupational Phase 3	Early Iron I (13th-10th cent. BC)	A, B, C, D

During the archaeological survey conducted in the summer of 2017, numerous ceramics were collected from the surface of Khirbat aṣ-Ṣafrā (Gregor forthcoming). Based on a preliminary study, the ceramic horizon represented Iron Age IIA and B occupational periods. However, as noted above, Phase 3 from the 2018 season of excavations represents a major Iron Age I occupation. That little or no evidence of Iron Age I ceramics was found in the survey pottery seems to be because this material was covered and sealed by a major destruction layer in Iron Age II. This result is typical of walking surveys, as there is a tendency to recover more sherds from the better-represented upper levels of a site as well as from the over-represented material connected with destruction events (Faust and Katz 2012; Shai and Uziel 2014) [While two probes, one 1×1m and a second 1×2m, were excavated in the center and between one section of the casemate walls on the western side of the site respectively, to a depth of less than 1m, only one diagnostic sherd was found in each probe, suggesting - perhaps - a more effective result if the shovel tests were at least 2×2m in size (Faust and Katz 2012)]. Typical Iron Age I ceramics (**Fig. 10**) from Phase 3 include collar-rim pithoi (**Figs. 11**, **12**), biconical jars (**Fig. 10**:3) and Manasseh bowls (**Fig. 10**:9-10).

During the first season of excavation, 240



10. Selected Iron Age I ceramics from Fields A-D.

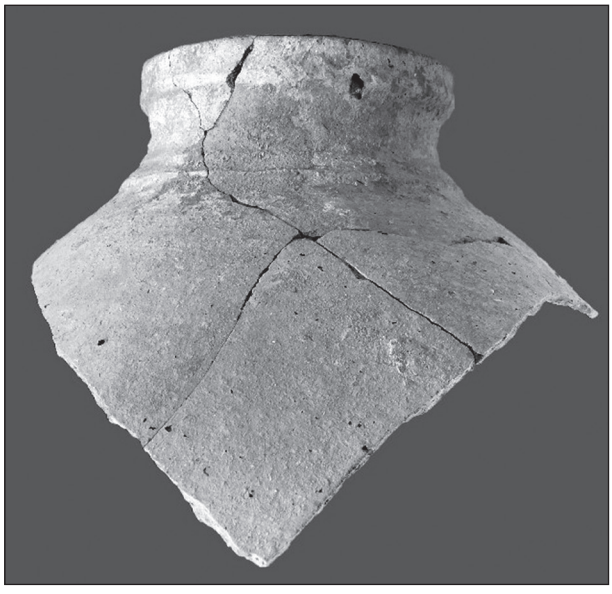
objects were discovered, most of which (133) were related to agricultural activities. In addition, 20 textile objects were also recovered, with only seven related to warfare. Based on the objects, it is likely that the site of Khirbat aṣ-Ṣafrā represents a typical domestic settlement, with an emphasis on farming activities, which of course does not exclude the possibility that during at least part of the year the occupants were also tending sheep and goats.

Logistics

While the excavation team has experimented for several years with digital locus sheets in selected excavation areas at Tall Jalūl, this season - at Khirbat aṣ-Ṣafrā - the excavation went totally electronic for the first time. The locus sheets from the Madaba Plains Project field manual were converted into a completely digital format by Robert Bates using File Maker Pro software, and were run in the field on the File Maker Go app on iPads in each square. The data were backed up wirelessly via 'air drop' from the iPads to a laptop computer at the end of each day in the field. Daily progress shots, photos of pottery readings and artifacts were taken on the iPad camera and embedded into the locus sheets, as well as being stored on the device. GPS was used for geospatial information. Top plans were produced either on the Touch Draw app using the iPad, or manually, on graph paper that was subsequently scanned to the iPad. In addition, morning field shots and end-of-the-season photography were taken by means of a 'wonder pole' (a telescoping device with a camera mount on top), using a digital camera integrated with an iPad as an optical piece, with the numerous images being combined together by Jacob Moody using Photo Scan Pro software to create a final 3D image of each square.



11. Early form collar-rim pithos.



12. Collar-rim pithos.

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THE 'HOUSE WITH THE LOOM' - AN IRON AGE II DOMESTIC COMPLEX ON TALL ZAR'Ā: PRELIMINARY REPORT ON THE 2018 AND 2019 SEASONS

Katharina Schmidt

Introduction

In autumn 2018 and spring 2019, excavations on Tall Zar'ā were continued[1]. The focus of these campaigns aimed at the detailed investigation of the Iron Age strata and its preceding periods, including a stratigraphic evaluation of the transition from the Iron Age to the Hellenistic period. Owing to its uninterrupted stratigraphy, Tall Zar'ā offers a rare opportunity to capture and study a complete sequence from the Hellenistic to the Iron Age.

This new excavation and research project is headed by Katharina Schmidt of the German Protestant Institute of Archaeology (GPIA) at Amman. The team consisted of students from various German and Jordanian universities, as well as a number of experts from different fields[2]. The excavations were funded by the German Archaeological Institute (DAI).

The project forms part of the 'Gadara Region Project', an initiative of the Biblical Archaeological Institute (BAI) at Wuppertal under the direction of Dieter Vieweger and co-direction of Jutta Häser. Since 2004 it has been a cooperative project between the GPIA and the BAI of the University of Wuppertal. The project incorporated excavations on Tall Zar'ā and a landscape archaeological survey (2009-2011) in Wādī al-'Arab. Earlier excavations on Tall Zar'ā were carried out from 2003 to 2011. Since 2012, the results have been processed and prepared for a final publication series[3].

Tall Zar'ā is located in Wādī al-'Arab, about 5km from the ancient Decapolis city of Gadara (modern Umm Qays). The deeply incised valley provided excellent living conditions with its numerous springs, fertile soil and a temperate climate. The *tall* measures about 240×240m at its base and about 160×160m on the plateau. Its significance results from the artesian spring at its centre, which created optimal settlement conditions over thousands of years; fresh water was available on the site until 2012 when it finally dried out [For an overview of Wādī al-'Arab and further literature see Vieweger and Häser 2017: 20-22].

2018 and 2019 campaigns

In the past excavation campaigns of 2001-2016, three different areas on the *tall* were investigated (**Fig. 1** [see Vieweger and Häser 2017: 27-57]). The new excavations of 2018 and 2019 focus on Area II, at the far north of the settlement hill. This position on the *tall* features

1. I would like to express my sincere gratitude to Dieter Vieweger and Jutta Häser for entrusting me with the continuation of excavation work at the site. I would like to also thank the Department of Antiquities of Jordan for its constant support, and the German Archaeological Institute for its financial contribution.

2. Head of registration Benjamin Schröder; surveyor Juliane Goischke; ceramic specialists Samar Shammas (Iron Age period), Bettina Springer-Ferazin, Eva Strothenke (Hellenistic period); senior archaeologists Brita Jansen, Mohammad al-Najjar; specialists on stone objects and flint Benjamin Schröder, Hans-Martin Jakubik; archaeology students (alphabetical order) David Burkhardt, Amany al Dabouki, Karlotta Herbst, Philip Massar, Laith Melkawi, Yoshua Mende, Erdal Türker; volunteers Maria Bernatzki, Antje Cassel. Drawings were prepared by Sereen al Shoubaki. My sincere gratitude for the immediate conservation of the metal and pottery finds goes to Naif Zaban, ACOR Conservation Technician, and the ACOR Conservation Cooperative.

3. These will be published in nine volumes as freely available online versions. The first volume (Vieweger and Häser 2017) is available as free .pdf download at http://www.tallziraa.de/Final-publication/Volume-1/1_472.html. A list of all the monographs, preliminary reports and PhD theses can be furthermore be found at www.tallziraa.de, as well as in Vieweger and Häser 2017: 3 FN 6.

the highest elevation with the largest accumulation of building debris. Immediately to the north, the natural rock slopes steeply down to a maximum of 44m and thus the most prominent and protected place of the site is formed. In what follows, only one of the many contexts explored and excavated in the 2018 and 2019 campaigns will be discussed: the 'House with the Loom'.

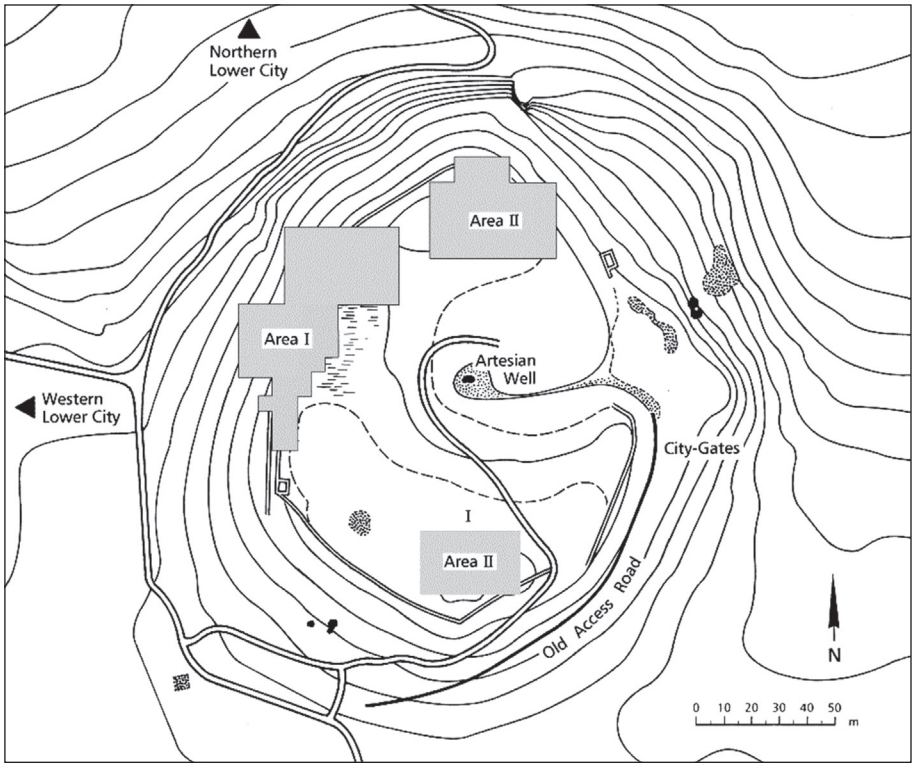
The Iron Age II 'House with the Loom' (Fig. 2)

The building compound under consideration, called 'House with the Loom' because of its specific finds (see below), is located *ca* 4m south of the northern edge of the *tall*. Four phases of this building complex were excavated in the 2018 and 2019 seasons, all of which can be attributed to the Iron Age period. The major phase 2 is discussed here. It yielded a complete room inventory, shedding light on its chronology and use which in turn lead to further conclusions. The building complexes to the east and northeast of the 'House with the Loom' are not considered here.

*Architectural Features (***Fig. 2***)*

The compound is approximately 3.50×3.30m in size and consists of one major room that is bordered in the west by wall W11690 (0.60m), in the north by W11842 and W11626 (0.55m), and in the east by W11732 (0.65m). The southern delineating wall was not completely preserved. It is likely that, after the collapse of the house (phase 2), later renovations (phase 1) almost completely demolished this wall [Only the wall of phase 1 (W11633) is preserved in the archaeological record. It was built on top of the demolition waste of phase 2. Publication of the full complex is in progress, Schmidt 2021a]. Also, a later pit disturbs this context, making reconstruction more difficult. The entrance to the building complex lies in the northern wall (W11626), evidenced by a threshold (Th11911); east of the threshold, an upright elongated stone represents the door frame.

It is likely that Inst11898 belonged to the southern boundary of the compound. It consists of a large standing stone, encircled by several large, rounded boulders situated on the floor level of the house. This installation was probably not only part of the southern wall, but also served as support for the roof [The assumption that Inst11898 is part of the south wall is based on the extent of the compound in later phase 1 and earlier phase 3. In both phases, the southern boundary wall is in the same location, suggesting that the house of phase 2 also extends



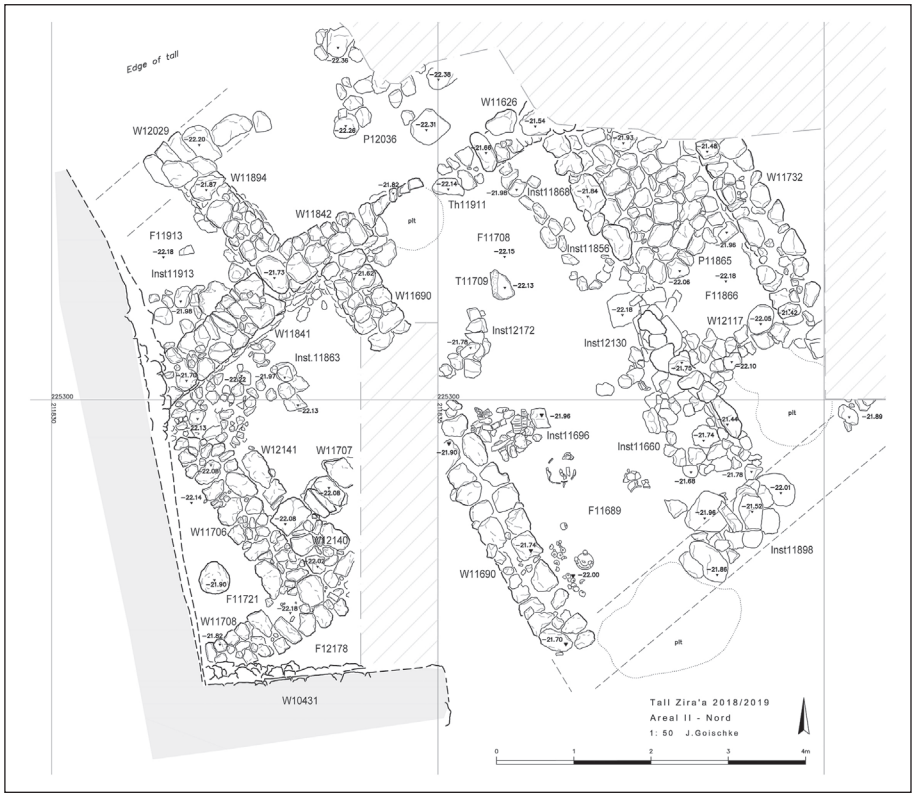
1. Plan of Tall Zar'ā showing the three excavation areas (GPIA/BAI).

to this point]. A similar construction of roof-supporting stone slabs is preserved at Tall Abū al-Kharaz where, however, they are placed in the center of the room (phase XIV) (Fischer 2013: 42, fig. 26A). Around Inst11898, a large number of complete stone tools were found, among them a large grinding stone (TZ114171) (17.2×9.5cm), a quern (TZ114274), a hammer stone (TZ114158) and a pestle (TZ114395). When removing one of the stones in the direct vicinity of the large upright stone, an intact stone stamp seal came to light (TZ114329) (**Fig. 4**:1). All tools were most likely part of the ground-floor inventory, which was buried by the roof and walls when the house collapsed.

The compound is divided NW-SE into two parts, a larger in the west and a smaller in the east. A number of larger rocks and installations in front of them (Inst11868, Inst11856, Inst12130, Inst11660) serve as room partitions. The installations were accessible from the western room of the house. Inst11868 and Inst11660 have a rectangular structure, while Inst11856 and Inst12130 are rounded. The two northern installations, Inst11868 and Inst11856, belong to floor F11708 and can be considered hearths on account of the large accumulations of ash found inside. Inst11868 is rectangular in shape and consists of quarry stones adjoining the large rocks to the east. The total length is 1.37×1m. In the south, a second hearth (Inst11856) is attached. It is round, significantly smaller and contained a number of cooking-pot body sherds. On the north-western side of the room, Inst11696 is built directly next to W11690 and is also surrounded by ash. The installation consists of a bed of flat stones (diam. 40cm) and a rising, rounded stone structure (diam. 50cm). Many vessel fragments, some of which were cooking pots, derive from this installation.

In the middle of the northern part of the room, opposite the entrance, a *tabun* (T11708) was built on the same floor F11708; a large accumulation of ashes was also recorded here. The floor within the house (F11708) consists of beaten mud; a loom weight (TZ113713), drill socket (TZ113722) and rubbing/polishing stone of pumice (TZ114531) derive from here (**Fig. 5**:4).

The southern part of the room also has a beaten mud floor (F11689). A large number of finds were made from this area of the house. The room evidently contained a loom standing in the western area next to the wall (W11690), this being evidenced by 23 unfired clay loom weights that were recovered next to the wall



2. Plan of the 'House with the Loom' building compound, phase 2 (Iron Age II) (GPIA/BAI; plan: Juliane Goischke).

(**Figs. 2, 3**). Directly next to it, a complete tripod bowl made of basalt was found, lying upside down on top of a rounded boulder (TZ113522) (**Figs. 2, 3** and **4**:2). In the middle of the room, two complete ceramic decanters (TZ113492, TZ113372) were unearthed (**Figs. 3, 5**:1-2), in addition to two cooking pots which were, however, completely broken (**Fig. 2**). Further objects from this context include a fragment of a basalt tripod bowl (TZ113356) (see below), a spindle whorl made of stone (TZ112913) (see below), a bronze ring (TZ113341) and a quern fragment (TZ113463).

In the eastern partition of the room, there is a pavement (P11865) of large rounded boulders, which in the north adjoins W11626 and in the west adjoins the stone structures Inst11868 and Inst11856 [Stone pavements that are not necessarily part of a courtyard are preserved - for example - at Tall Abū al-Kharaz (Fischer 2013: 42, fig. 26A). The size of these boulders is similar, but the overall size of the compound is significantly larger]. No finds were recovered from here. In the southeast, a beaten mud floor (F11866) joins the pavement, which is in the southeast bordered by a narrow, two-row quarry-stone wall (W12117). The south-easternmost corner of the house is disturbed by a later pit.

To the north of the house, in front of the entrance, is a badly preserved pavement (P12036) made of large, rounded boulder stones. This pavement probably reached to the northern city wall. As yet the outer wall has not been unearthed; it is however likely that W12029, which was built on top of an earlier wall, served as an outer wall also in this phase.



3. Selection of objects from the 'House with the Loom', phase 2: 'doughnut shaped' loom weights, two decanters (TZ113372, TZ11349), tripod mortar bowl (basalt) (TZ113522) (GPIA/BAI, photo: Mohammad Adi).

Above the floor, spread over the entire area of the 'House with the Loom', air-dried mud bricks were repeatedly found, especially in the eastern part of the compound above pavement P11865 and in the debris over the stone installations (11868, 11856, 11660). This suggests that the superstructure of the stone walls - or at least that of the internal partition wall - consisted of mud bricks. In some cases, lumps of clay were found with imprints of straw that might have come from a roof covering. The situation indicates that the building collapsed and covered the inventory of the 'House with the Loom'.

In the succeeding phase 1, another building was found on top of that of phase 2. This used the previous walls, apart from the southern one where a new wall was erected.

Objects from the 'House with the Loom' (selection)[4]

*Stamp Seal, Greenish-Gray Stone (TZ114329) (***Fig. 4**:1*)*

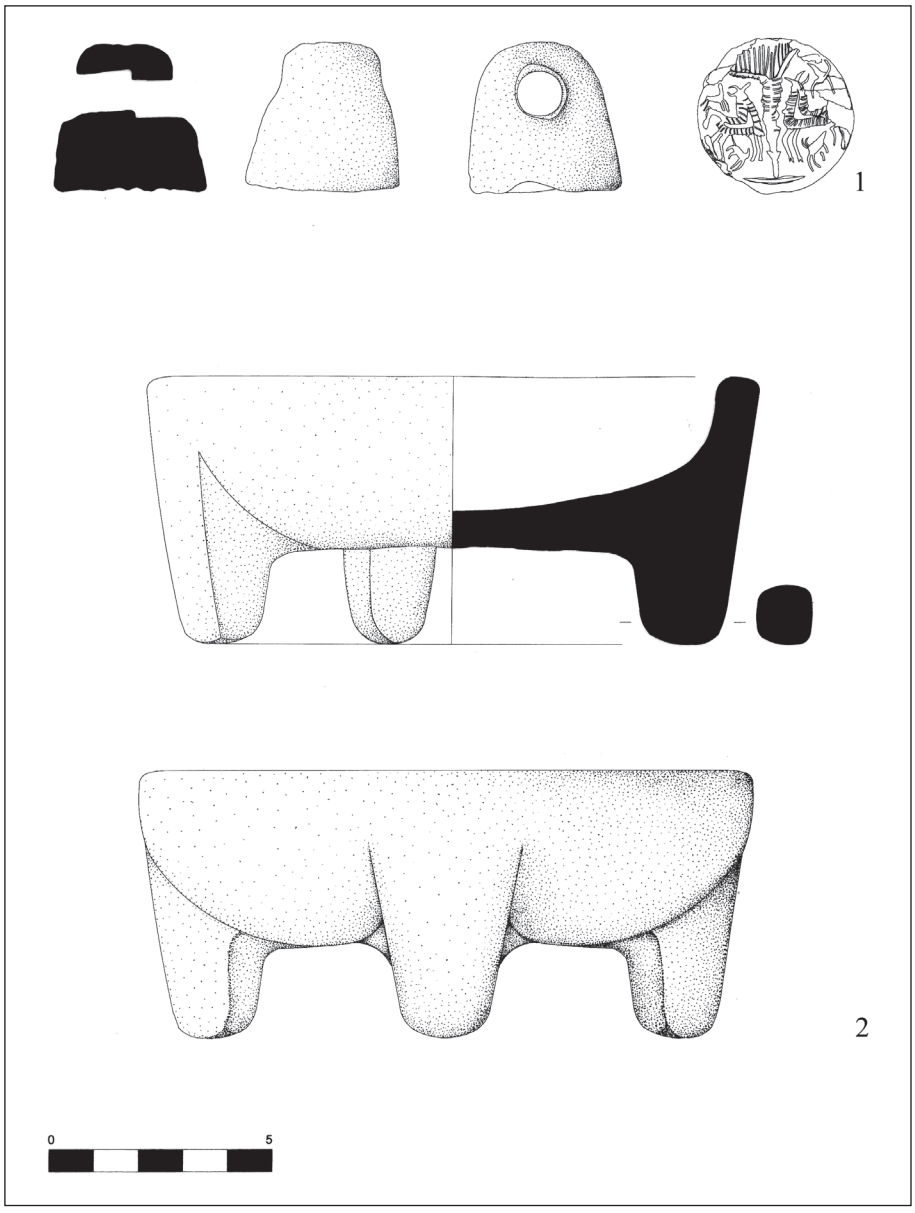
Locus 11898

H: 4.4, Diam. Bottom: 3.4, Diam. Top: 2.1

Conoid, very regularly carved, surface smoothed; rim of the base is slightly damaged; the stone is damaged showing cracks on the base; the perforation has a diameter of 1.1cm on one side and 1.2cm on the other, round scratch marks around the perforation suggest the use of a drill coming diagonally from both sides; hollowed-out and linear engraving; the stone has a greenish-grey colour and is most likely not local.

Base: Two caprines stand on a baseline and flank a tree that is placed in the middle of the image. They each face the tree and suckle their young. The heads of the animals are slightly thrown back, with the muzzles directed upwards. The front and hind legs are strongly angled, with the hooves of the right animal being represented by two fine lines. The tail is U-shaped and pointing downwards. The muzzles of the animals, as well as their horns, are represented by simple lines; the fur of the animals is indicated by short scratch lines, which converge

4. Only a small number of objects found in the 'House with the Loom' are discussed in detail here; the publication of the complete corpus is in progress. All sizes in this article are indicated in cm.

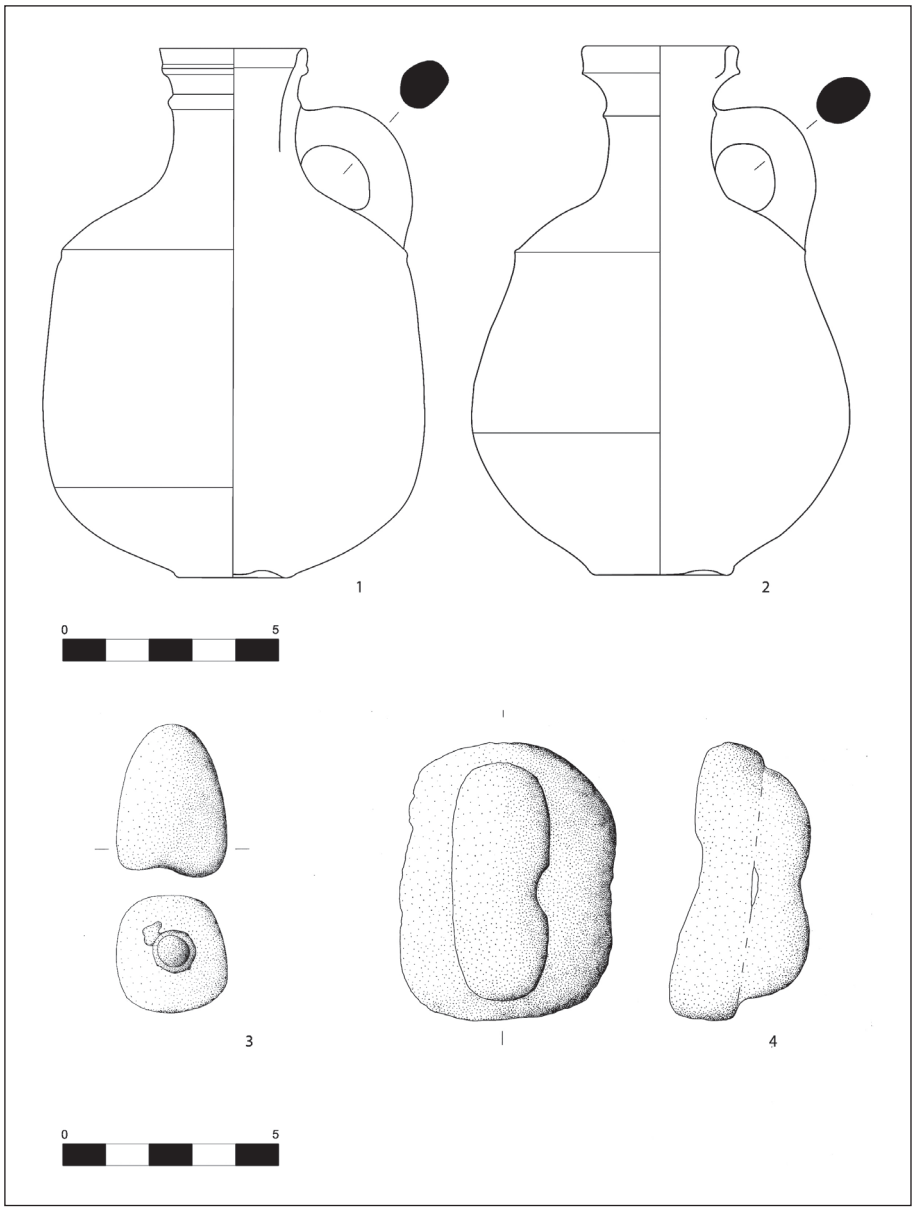


4. |1. Stamp Seal (TZ114329);(GPIA/BAI;, drawings: Sereen al-Shoubaki). |2. Tripod mortar bowl, basalt (TZ113522). (GPIA/BAI; drawings: Sereen al-Shoubaki).

centrically into a deep line. The young animals stretch their heads out to their mothers; their front and hind legs are also strongly angled. The tree stands on the base line, with the branches being indicated by horizontal (trunk) and vertical (top) fine, short incised lines. Above the backs of the two caprines are two striding caprines, one facing left, the other right.

The noteworthy characteristic of this image is its combination of two features: first, the antithetical arrangement of the caprines towards a central tree; second, the motif of herd animals and suckling young. The antithetical arrangement finds a comparable image on a stamp seal from Tall Abū al-Kharaz, dating to the Late Bronze Age (Fischer 1994: 137, fig. 6.2). However, in this seal image the caprines are climbing the tree and no young animals can be seen. Also, the style seems to vary from the one found at Tall Zar'ā.

A good parallel for the image from Tall Zar'ā with regard to style and the combination of motifs has been published by Keel (2017: 477, no. 442). This dates to the Iron Age IB through the beginning of Iron Age IIA (1,150-950BC). Here a caprine, suckling youngster, grazing animal and tree are all shown, but not in an antithetical group. The motif of the suckling mother can be found in numerous examples from Mesopotamia and northern Syria (Keel 1980: 89-140), as well as Egypt (Keel 1980: 54-89) and Palestine (Shuval 1990: 105-110).



5. |1. Decanter TZ113372; |2: Decanter TZ11349; |3: Rubbing/polishing stone (TZ114531); |4: Drill socket, silica or soapstone (TZ113722) (GPIA/BAI, drawings: Sereen al-Shoubaki; Bettina Springer-Ferzin).

The motif itself has been comprehensively dealt with by Keel (1980) and is related to different manifestations of religious ideas in the various regions of the Near East (Keel 1980; Meyer 2008: 281-284). According to Keel (2017: 476), the combination of suckling young, herd animals and trees is unusual, as is the position of the granzing caprines since this is usually occupied by a scorpion.

The stamp seal from Tall Zar'ā can be placed into the period from Iron Age (IA) I to IA II, and might therefore be slightly earlier than the rest of the inventory from the 'House with the Loom'. The question of whether it might be an heirloom has yet to be discussed in future studies.

*Tripod Mortar Bowl, Basalt (TZ113522) (***Figs. 3, 4.2***)*

Locus: 11691

H: 12.5, Diam. Max: 27.2, Th: 2

Free-standing tripod bowl made of dense basalt, regularly worked, smooth surface; only at the edge is a small piece broken off. The three legs start right under the rim and taper slightly inwards. They become much narrower from the base (6.5) to the foot (3.9) and are slightly rounded towards the foot (th. 4.9). The inside of the bowl is rounded, slightly sloping towards the centre from edge to bottom; its maximum depth is 6cm. The inside surface is heavily abraded, indicating use as a grinding bowl. Use-wear analyses are pending for the pieces from Tall Zar'ā.

Tripod bowls are common in Iron Age corpora and were used for food preparation. Two good comparanda come from Tall ar-Rumayth (Lapp 2015: 296, fig. 10.2 no 1, 2) (phase VI and IVb?, 730-790BC).

Fragment of a Tripod Mortar Bowl, Basalt (TZ113356)
Locus 11585
L: 18.8, Wth: 14.3, H: 9.5, Diam. Max. 22, Th: 2.5

Fragment of a free-standing tripod bowl, made of basalt. One leg and quarter of the bowl including the rim are preserved. The bowl is very regularly worked and the surface is smooth. The three legs start right under the rim; they are short (2.0) and straight; the feet have quite a regular quadrangular base (5.2×5.8). The wall thickness of the bowl decreases from the rim (2.8) to the bottom (1.8). The inside of the bowl is smooth and shows signs of use in the form of small, regular pitting and shine; use-wear analysis of the bowl is still pending.

A comparable piece comes from Tall Abū al-Kharaz, phase XIII (800-770BC) (Fischer 2017: figs. 160: 3, 161, 485: 9).

*'Doughnut-Shaped' Loom Weights, Unfired Clay (***Fig. 3***)*
Locus 11687

Locus	TZ-number	weight (gr.)	diam.	h
11687	113578	116	6.3	4.6
11671	113713	128	6.4	
11687	113546	191	6.7	4.6
11687	113570	210	7.3	5.4
11687	113575	235	7.3	6.2
11687	113566	266	7.4	5.4
11687	113567	181	7.4	5.0
11687	113569	163	7.4	6.4
11687	113577	167	7.4	5.5
11687	113544	228	7.5	6.0
11687	113547	233	7.5	6.5
11687	113542	209	7.7	6.4
11687	113576	163	7.8	4.6
11687	113545	253	8.0	6.5
11687	113548	293	8.0	6.0
11687	113550	228	8.1	4.8
11687	113572	291	8.1	6.2
11687	113543	273	8.3	5.9
11687	113551	225	8.3	5.8
11687	113571	247	8.3	5.8
11687	113574	258	8.4	6.8
11687	113565	366	8.6	6.2
11687	113541	621	9.8	8.4
11687	113549	343	9.9	6.1

All of the loom weights are 'doughnut-shaped', which is characteristic for the Iron Age in the Levant [Boertien 2015: 264 with further references and examples. For an explanation of looms and wefts in general see Boertien 2015: 262-269]. The average weight of the 23 loom weights that were found in this same place is 250gr.

Spindle Whorl, Reddish Stone (TZ112913)
Locus 11585
Diam: 4.1, Wth: 1.4, Weight: 25 Gr

Flat, uniform, 'doughnut-shaped', centrally pierced (0.8). The stone is well smoothed; traces of use are present: on the upper side there is shine and on the bottom there are circular incisions around the perforation. It is credible to identify TZ112913 as a spindle whorl rather than a loom weight because of its low weight, even though its shape rather resembles a loom weight [For an explanation of spindle whorls in general see Boertien 2015: 159-262. Similar spindle whorls to those found at Tall ar-Rumayth (reworked sherds; conical stone whorls) have also been uncovered at Tall Zar'ā (Schmidt 2021b)].

*Rubbing/Polishing Stone, Pumice (?) (TZ114531) (***Fig. 5**:4*)*
Locus: 12133
L:10, Wth: 7.6, H: 5

Rectangular pumice stone (?) with a carved, elongated handle.

Very similar examples of rectangular rubbing/polishing stones with handles were identified at Tall ar-Rumayth (stratum VI-VIIb, 830-750BC), there made of scoria (Lapp 2015: 307, fig. 10.9), Ḥisbān, made of pumice but much younger in date (Kotter and Ray 2009: 120, 9.8 no. 3), and Hazor (Yadin *et al.* 1961: pls 173:4, 176:18, 188:8-9). Lapp (2015: 305-307) suggests that this type of object was used together with grindstones and mortars of vesicular basalt [For a summary of these objects and a bibliography see Lapp 2015: 305-307].

Drill Socket, Silica or Soapstone (?) (TZ113722)[5] *(***Fig. 5**:3*)*
Locus: 11671
L: 5.5, Wth: 4.3, Diam: 1.4

Truncated cone to pyramidal shape, similar to the shape of a pestle; lower side carefully straightened with a central hole that is not entirely pierced through the object (*ca* 0.7), polished.

Comparable pestle-shaped bow-drill sockets come from Tall Jawa (Daviau 2002: 93, 225 fig. 2.50 nos 1-2) and were used to perforate stone, ceramic and other hard materials [For parallels from other sites with bibliography see Daviau 2002: 94].

Pottery[6]

*Jugs and Decanters (***Figs. 3, 5**:1-2*)*

Amongst the most significant finds of the 2018 campaign are two almost complete decanters, TZ113372 and TZ11349. Both vessels have a layer of red slip on the outer surface, and belong to the same ware group (no 30). The first decanter (Locus11585/TZ113372) is similar to one from Tall Abū al-Kharaz, phase XIV (770-732BC) (Fischer 2013: 219, fig. 198: 8-9), whilst the other piece (Locus11585/TZ113492) parallels a decanter from Beer-Sheba V (Gitin 2015: 233, pl. 2.4.7:7). These two decanters therefore fit well into the Iron Age IIB period.

A part of flaring rim was either part of a jug/decanter or the spout of a krater (Locus11585/TZ101866-2). It compares well with an IA IIB jug from Tall Abū al-Kharaz phase XIV (Fischer 2013, fig. 419:9).

Cooking Pots

Several medium- and large-sized cooking pots were discovered in the 'House with the Loom'. One of these pots (Locus11585/TZ101866) has an applied pot mark on its handle, which is a simple circular imprint; the rim of this pot is straight and has a rounded section. Parallels come from Tall Abū al-Kharaz level XIV, which dates to the IA IIB (Fischer 2013: fig. 38:2-3). Another cooking pot (11691/TZ101924-2) also has a rim of rounded section, similar to an example found at Tall as-Sa'īdiyyah V, which also dates to the IA IIB (Gitin 2015: 293, pl. 2.6.7:5). Another rim of a pot is slightly inverted with an edge under the rim (Locus11585/TZ101866-4); it finds close parallels at Beth-Shemesh IIa and dates to the IA IIB (Amiran 1969: 231, pl. 76:7).

Jars

Parts of a (probably) cylindrical jar show close similarity to examples found at Hazor level VIII and Megiddo V (Amiran 1969: 239, pl. 79:1-2).

Another part of a jar has a pointed base (Locus11964/TZ101931-3) and probably dates to the IA IIC (*cf.* Gitin 2015: 378, pl. 3.4.6:7).

The pieces that compare best with the ceramic assemblage of Tall Zar'ā are those from Tall Abū al-Kharaz phase XIV, with a date in the Iron Age IIB.

Interpretation and Future Work

The 'House with the Loom' represents a rich source of knowledge for the everyday life of the IA IIB period since it collapsed completely, burying a large quantity of objects. What might have caused the roof to collapse remains uncertain at this point. Traces of fire can only be found to a limited extent in the north-eastern part of the compound; traces of a possible earthquake might be present on wall W11842, which has shifted markedly to the north in the western area. The question of whether this displacement was the result of heavy rainfall that led to the destabilisation of the wall cannot be decided.

The 'House with the Loom' is clearly of domestic character. All fire-related installations are found in the northern area of the compound, close to the doorway. They include a *tabun*, which indicates that bread was baked and food was cooked in this area.

The southern part of the compound shows evidence of food preparation (cooking pots, tripod bowl, quern), but here no fire was used. The basalt tripod mortar bowls were used to crush, grind and pound solid substances (Squitieri 2016: 73; Lapp 2015: 295). The quern was also used for this activity. Craft activities were

5. I thank Hans-Martin Jakubik for this identification and reference.

6. I would like to thank Samar Shammas for her preliminary identification and dating of the pottery assemblage discussed here, for the final report see Shammas 2021.

also carried out here, as the presence of a bow-drill socket witnesses.

As the loom weights and spindle whorl indicate, textile production took place as well. Since the loom weights were found lying in a row next to the western wall W11690, it can be assumed that the loom stood *in situ*, representing a functioning loom which had evidently not fallen from the roof when the house collapsed. According to Boertien (2015: 263), weaving could be performed outdoors as well as indoors if sufficient light was present, *e.g.* by means of windows or door openings. This might imply that the southern part of the compound was unroofed, or that there was another - larger - door opening in the southern wall. With regard to the textiles produced here, we note again that the average weight for the 23 loom weights found together here is 250gr. This is comparable with the data from Tall ar-Rumayth and also Khirbat al-Mudaynah, which fall at approx. 248gr (Boertien 2015: 267). Considering the average weights from these two sites (Rumayth; Mudaynah), Boertien (2015: 267) concluded that woollen textiles were produced - because wool needed lighter weaving weights. It is probable therefore that textiles of wool were also produced in the 'House with the Loom'. Further studies of loom weights in the future will shed more light on textile production at Tall Zar'ā.

In the stone-paved area at the east of the compound, no traces of working tools of any kind were found. It seems probable that items which did not survive were stored here, probably in baskets, leather or other organic materials. Analysis of extant soil samples will provide more precise information on the function of the paved compound.

Aside from analysis of soil samples, complete study of the pottery corpus within this complex will give a more precise idea of the function of the various building elements, and should facilitate the identification of storage locations associated with the sherds of large- and medium-sized storage vessels that have so far been identified. This same is true of the metal finds, which are currently undergoing conservation.

On basis of the small finds, as well as the pottery assemblage and its comparanda, phase 2 of the 'House with the Loom' can be attributed to the Iron Age IIB period. Very close comparisons can be made with the corpus from Tall Abū al-Kharaz phase XIV (770-732BC), especially with regard to the pottery.

The complete inventory of the 'House with the Loom' shows in an exemplary manner daily - and especially female - household activities, including weaving, food preparation, cooking and baking. Stamp seals were personal objects and therefore the property of the seal owner. The stamp seal found in the 'House with the Loom' was thus not only part of the inventory of this building, but belonged to one of its inhabitants, if not the owner.

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THE DOLMEN CULTURE PROJECT: AN INTRODUCTION TO THE AL-JUFFAYN MEGALITHIC FIELD AND DISCRETE FIELD #1

Kennett Schath, Eloisa Casadei and Andrea Polcaro

Site Location and Description

The al-Juffayn dolmen field is located on the southwest edge of the modern town al-Juffayn, overlooking the Jordan valley and Sheikh Hussein bridge to the west. The east corner of the field corresponds to the coordinates N 32°28'55.0", E 035°38'59.5". The site measures 1km east-west and 1.2km north-south.

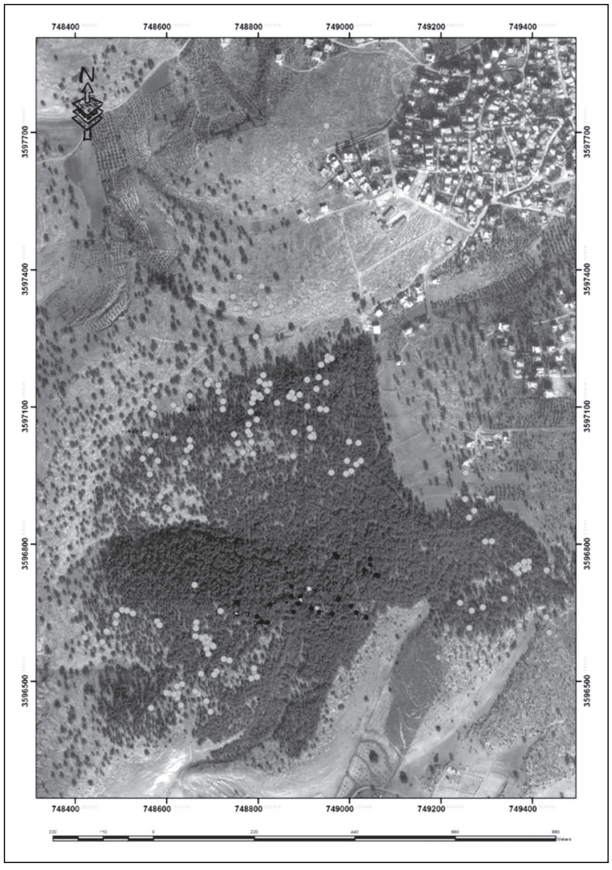
Fig. 1 shows a satellite view of the greater al-Juffayn megalithic field. The light grey dots indicate archaeological evidence registered using a handheld GPS device [Marcia Marcantonini was responsible for GPS collection, Martina Pignattini for most of the photography, and Tawfiq Huniti for survey]. The total-station survey is represented by black dots.

Trees in the forest restrict visibility and brush obscures surface findings. In a few small areas structures could not be reached because of fallen trees and dense vegetation. On a positive note, the site is on government land and the forest hides many of the structures. Even though people go into the area, looting has been kept to a minimum.

Destruction to the fields derives from five causes: industrial; urban; agricultural development; human plundering; natural. The main destruction to the field is from roads and trees. The city and agricultural fields encroach directly on the field edges. Destruction to outlying areas cannot be determined. Valley terracing has taken place through the centuries and continues until the present.

The al-Juffayn field falls into three main subfields, all having distinct clusters with different concentrations of dolmens. The three sub-fields are separated by significant valleys, described later and shown at **Fig. 3**. The al-Juffayn field is a highly complex alignment of megalithic structures in a ritual landscape which holds important historical and cultural implications.

Archaeological knowledge of the site is rather thin, being mostly restricted to the area immediately north of the forest. In 1998, as part of the Pella Hinterland Survey, Fiona Baker logged 154 dolmens and other structures. Her survey was written up as a preliminary field report but has not been published to date. No other reports have been published for the al-Juffayn dolmen field showing the number and



1. The al-Juffayn megalithic field.

types of structures. Gajus Scheltema describes the field and provides directions to al-Juffayn in his field guide [For location/coordinates and directions, see Scheltema 2008: 67-68].

Delineation and Constraints

Although this survey was conducted in a very short period of time, three main goals were largely achieved: (1) to locate the field's boundaries; (2) to locate a megalithic field large enough to contain several dolmen clusters with associated structures; (3) to identify a discrete field for further research, conservation and development.

Because of limited time, the focus was on recording a full representation of structures around the boundaries, and then selecting a cluster for total-station survey - which resulted in the discovery of Discrete Field (DF) #1 (see below).

There were several limitations for the collection of structural data. Time constraints meant that only clearly recognisable structures were recorded, with many small or obscure structures being passed over. The diversity of structures made selection time consuming, and some doubts still remain. The dense groupings in outlying areas were quickly examined for large indicative structures. In sum, this article is an introduction to the al-Juffayn megalithic field (henceforth JMF), rather than a definitive report.

Definition of Terms: Area/Field, Clusters, Centers, Discrete Field and Their Separation

There are at least two large megalithic fields at al-Juffayn. Therefore, if we speak about only one of these fields in relation to other parts of the field, we must acknowledge that there is a 'greater' complete field. The greater megalithic field will be introduced in its simplest form: clusters and DF #1 (**Fig. 2**), fields and their separation (**Fig. 3**), and structures and their distribution (**Table 1**).

Four areas were surveyed with a handheld GPS device; DF #1 was then surveyed with a total station. These five areas are shown at **Fig. 2**; contours are shown at **Fig. 3**, with black lines as cluster boundaries.

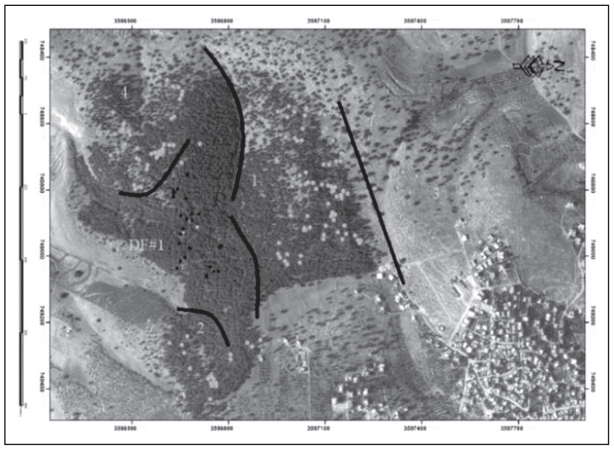
By 'center' we refer to an area of a field with many ritual or cultic elements. As the center is where certain ritual functions would have taken place, cup holes, cisterns and standing stones are usually present. Field 1 most likely has a center, although it proved hard to define.

The term 'discrete field' refers to a well-defined cluster of structures with clear boundaries. The difference between a cluster and a discrete field is that the latter contains ritual or cultic elements.

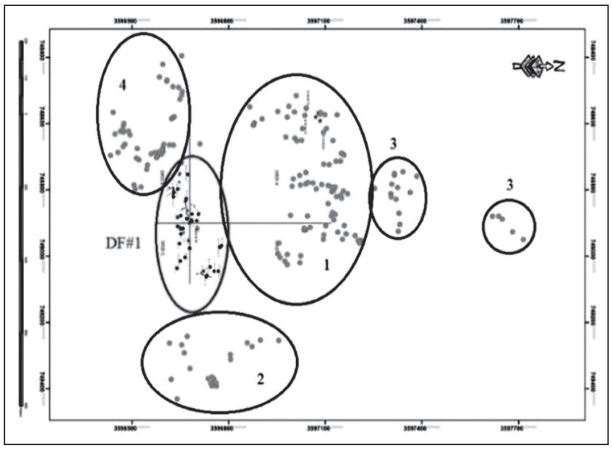
When examining the distribution of clusters, 'separation' enables boundaries to be recognized. Because we were unable to record fully the locations of walls providing separation [Hodder and Renfrew (1984) both discuss the implications of clusters and separation], walls were not used to determine clusters.

As this field is exceptionally complex, the list of documented structures is preliminary. The well-preserved nature of the field and the number of structures and their types, as well as the diverse grouping of structures, makes publication of an introduction to the JMF valuable.

Figs. 2 and 3 and **Table 1** can be used with



2. Clusters and Discrete Field #1.



3. Fields and their separation.

the descriptions to better understand the four fields and DF #1. As the descriptions and figures are examined, the separation of clusters should become clear.

Field 1 covers the largest area in dense clusters. These clusters contain all of the structure types listed at **Table 1**, except cisterns. Field 1 is bordered by valleys to the north and south, which provide separation. **Fig. 3** shows the separation, more clearly on the south than on the north. The construction of a road cut between Fields 1 and 3 destroyed many large dolmens along its course.

The field has four tumuli, two standing stones and seven circles. These structures are significant for identifying social groups. The numerous cup holes, walls and alignments may indicate ritual functions. With a deep valley for separation, to say nothing of the quantity and diversity of structures, this field most likely has a 'center'.

Field 2 is a small cluster that occupies a hill with great views of the Jordan valley. It is bordered by a small valley to the west and a flat area towards modern al-Juffayn, which is encroaching upon the field with urban and agricultural development. A road provides access on the eastern side of the field.

This field has very few megalithic structures (see **Table 1**); the plan and layout is markedly different to the rest of the greater field, and may indicate a dwelling area.

Field 3 covers the part of the greater field that is devoid of vegetation. The northern boundary is defined by the drop from the highlands to the Jordan valley. At the edge of the drop is a cluster of five very large dolmens. The field is being encroached upon by the main east-west road, as well as by urban and agricultural development. The second cluster in this field is close to Field 1, and also borders the rim of the Jordan valley. This corner shows indications of many walls that may have defined a ritual area. This field is the most heavily looted.

Field 4 can only be accessed by passing through very rugged valleys or climbing steep slopes. There is what seems to be a narrow 'avenue' to DF #1 which is blocked by a wall. This field has a high concentration of structures and is covered by the densest part of the forest. For this reason, as more complete surveys are done the number of structures will certainly increase. This field is also protected by central and outer valleys which separate two clusters of megaliths. Walls are of several types here and crisscross the land. Because of the brush and trees, the walls were impossible to trace and document in the time available.

DF#1 was selected for the third phase of the project, in which one of the surveyed areas was subjected to a more complete survey using a total station. DF #1 contains every type of structure found throughout the greater field except cists (see **Table 1**). In terms of the most important structures for identifying a center (*viz*. dolmens, standing stones, circles and tumuli), they are found in abundance. DF #1 is exceptional in terms of the number and type of structures in alignment with each other. The cup holes, cisterns, tombs and walls seem to indicate some sort of ritual activity.

Types of Structure

Dolmens represent 63% of recorded structures (see **Table 1**) and are represented in all five areas of the field. They seem to be found in discreet clusters. Many of the clusters exhibit degrees of separation caused by both

Table 1: Types and number of structures by field.

Type	Area 1	Area 2	Area 3	Area 4	DF#1	Total
Dolmen	12	7	10	34	15	78
Standing stone	2	1	1	1	6	11
Circle	7	1	2	1	4	15
Walls	12	3	2	7	18	42
Tumulus	4	0	0	1	7	12
Tomb	2	3	0	3	4	12
Cup hole	7	0	0	1	5	13
Structures	6	1	0	2	1	10
Cist	1	0	1	2	0	4
Cisterns	0	0	0	0	4	4

topographical and man-made elements. **Fig. 3** shows where valleys provide separation.

Many of the general dolmen types introduced by Zohar (1992) are represented [Zohar's typology is widely used, but it is recognized that other types of dolmen exist]. In addition, there are several other types, *e.g.* G type (**Fig. 4**) and demi-dolmen (**Fig. 5**).

The following dolmen types are found in the JMF: types A and B, possibly type C, and variations of types D and G. Demi-dolmens and some other special designs were discovered, but these must be examined in more detail prior to publication. Dolmens in this field seem to be constructed in a manner that adapts them to the landscape.

As with most dolmen fields, the dolmens are placed where they have a wide view and are oriented to some feature. The larger dolmens seem to be clustered in proximity to what could be considered a 'center', with smaller dolmens being built on the periphery. Tumulus-type structures are usually associated with a 'center' or are regarded as being related to dolmens themselves. 'Tumulus' is our designation for the piles of stone that we recorded. Possibly, some of those we designate as tumuli are actually cairns.

Standing stones are represented in all areas of the greater field. These megaliths are often directly related to a dolmen cluster or are positioned near a dolmen. At other times they seem only to be found on the periphery of a cluster. Although it is recognized that standing stones may characterize an area, this doesn't seem to be the case in the al-Juffayn field. Here they are found in clusters and in alignment with many different types of structure. Special design features found here include the placement of two stones together and the placement of stones at conspicuous angles.

The collection and documentation of standing stones was restricted to those with architectural components, such as being placed against bedrock or having a retaining wall [The term 'architectural component' is used by the first author to specify individual parts of megalithic structures that may define particular features]. Many of the smaller standing stones were not recorded, because they could not be contextualized or were of diminutive size.

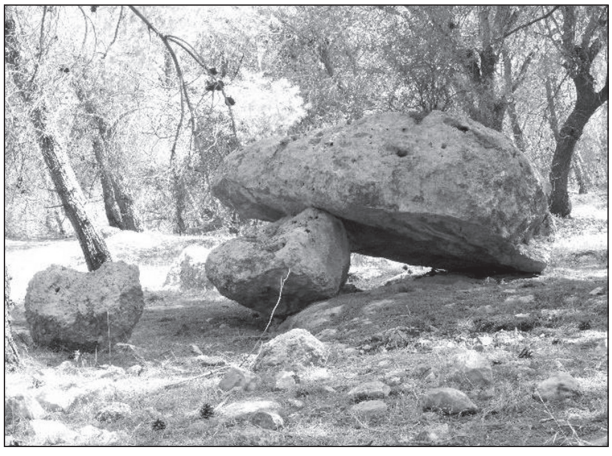
Rock-cut tombs are found in four of the five al-Juffayn fields. It is highly likely that the remaining area contains similar rock-cut tombs which were not discovered because of the brush cover. The tombs all seem to be carved into rock and are of a common design associated with both the Early Bronze Age and Roman period. Further study is required to date them more closely.

Cup Holes are found in groups. Flint also is found near the cup holes, where much debitage is located. The vast majority of cup holes are human made.

Circles are represented in all areas of the greater field and, just like standing stones, are found in large quantities. The circles were of three general types: (1) surface; (2) non-complete (3) curb. The surface circles are seen on the surface of the ground. The non-complete circles were circular in shape, with the circle usually having some cut rock or bedrock in the structure. They are often half circles or have features such as entrances. Curb-type circles



4. G Type dolmen.



5. Possible demi-dolmen.

have larger stones above ground and may have the appearance of a platform. Only clear circles were documented.

Structures (as documented during this survey) include any rock-cut or stone foundation or enclosure that could not be categorized with greater certainty. There are a vast number of undetermined structures in this field, many of which will take time to analyze.

Cists in the al-Juffayn field are very hard to recognize because of the vast cover of bedrock and large stones. They are typically seen at ground-surface level, but in the al-Juffayn field are constructed directly on bedrock. When reviewing the season's photographs, it became apparent that - owing to an absence of top stones - some of the structures were cists. Further studies must be made of the many structures that seemed to be dolmens, but couldn't be positively identified as such.

Cisterns are only located in DF #1. This is important because they are likely to indicate domestic activity. They may also be indicative of a more sedentary aspect to life in this area.

Walls are visible throughout the greater al-Juffayn field. They seemed to be everywhere, as a result of which it proved difficult to select a representative sample for documentation. There are different shapes and sizes, using both natural and cut stones of varying dimensions. Many walls could also be viewed as alignments. Two examples are of note: (1) connecting walls for three tumuli in a row; (2) a wall splitting a double dolmen.

Pottery and Lithics

The site chronology proposed by the authors extends from the Chalcolithic to the beginning of the Early Bronze Age. However, a total lack of ceramic evidence related to the period makes this chronological attribution problematic. Furthermore, soundings have highlighted extended re-use of the area in the Late Roman or Early Byzantine period. The homogenous pottery repertoire dates from the Late Roman to Byzantine periods, with the closest parallels being at Tall al-Bīrah, Khirbat al-Wad'ah and al-Bīrah South (Peruzzetto and Wilson 1996).

The lithic material can be related to dolmen construction dating from the Chalcolithic to Early Bronze Age. Interesting to note is the exceptional abundance of natural flint on the site, directly on the bedrock surface. A considerable quantity of flint and stone tools were found, especially blades, scrapers, drills, arrowheads and sickles.

Final Remarks and Discussion

The JMF has at least two separate large dolmen groups with associated megalithic structures. These two groups can be further separated into clusters. The boundaries of the site are largely identified. Since they are topographical in nature, most of them are very clear. On the other hand, many cluster boundaries are unclarified, so comprehensive studies must be completed. With regard to the condition of the site, although there is destruction by industrial, urban and agricultural development, looting of the structures is minimal. The JMF is possibly the best-preserved dolmen field in Jordan.

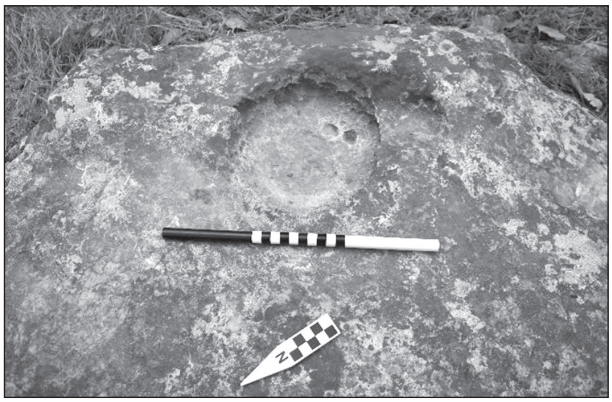
The greater al-Juffayn megalithic field remains in a very complete state. It has several areas that can be studied concurrently with conservation and development activities being undertaken in others. The forest protects the site as it is on government land and is patrolled. Before the field can be subjected to further soundings or excavation, it needs to be protected. Urban development extends directly to the edges of the forest and fields are being plowed in the small valleys coming from the field.

Future plans are to take a three-pronged approach to the documentation of the field: (1) surveys must be completed on the boundaries so assessments can be made of the different fields; (2) DF #1 will be fully surveyed using a total station and 3D technology, with research and conservation assessments being made; (3) the site needs to be surveyed to plan for selected soundings aimed at ascertaining the date of the field.

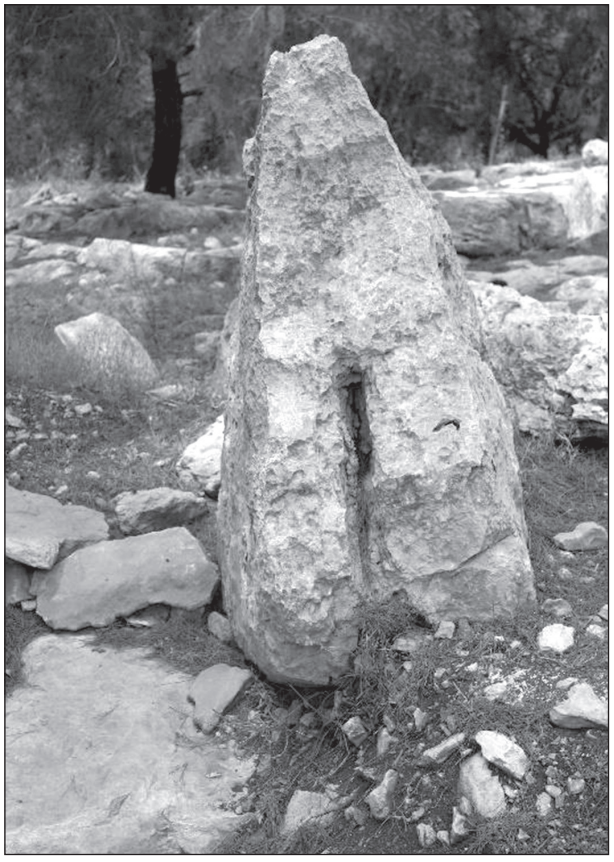
The cooperation of the al-Kurah office was exceptional and demonstrated how advantageous it is to have a Department of Antiquities archaeologist working on the project. It is the desire of this team to work with Jordanians in protecting, exploring and developing this cultural site.



6. Tumulus.



9. Cup hole.



7. Standing stone.



10. Circle.



11. Structure.



8. Tomb.



12. Cist.



13. Wall.

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THE 2017 EXCAVATION OF THE EARLY AHMARIAN SITE OF AL-ANṢĀB 1 IN THE LOWER WĀDĪ ṢABRAH, GREATER PETRA AREA, JORDAN

Dirk Leder, Jürgen Richter and Joel Orrin

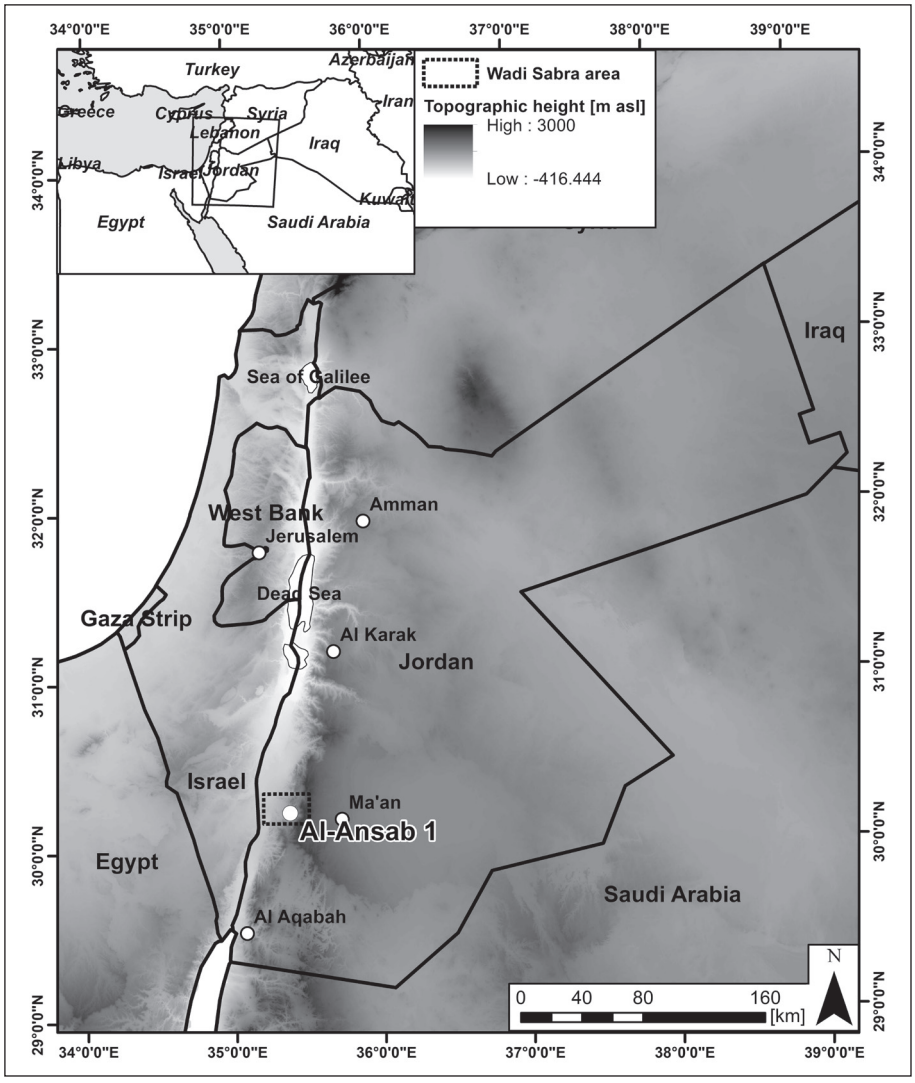
Introduction

Geo-archaeological research in the Wādī Ṣabrah has been conducted jointly by the University of Cologne, RWTH Aachen and University of Jordan since 2008. The fieldwork carried out in Jordan constitutes an essential part of the collaborative research project CRC 806 -'Our Way to Europe' (http://www.sfb806.uni-koeln.de/) which is funded by the German Research Foundation (DFG). CRC 806 is designed to investigate the pathway of *Homo sapiens* from Africa to Europe by focusing on past human-environment interactions. Jordan, as part of the Levant, plays a key role in the Out-of-Africa 2 model making it a focal point of the CRC research framework. Field research in the Wādī Ṣabrah focuses on the Upper Palaeolithic, in the wake of which nearly 50 (pre-)historic sites ranging from Middle Palaeolithic to Nabataean age have been discovered and recorded (Richter *et al.* 2015).

During the course of geo-archaeological research in the Wādī Ṣabrah conducted by CRC 806, (1) sedimentological and geochemical compositions of Pleistocene sediments have been investigated (Bertrams *et al.* 2012a, 2014), (2) newly developed remote sensing methods aimed at the identification of Pleistocene sediments using satellite imagery have been applied and advanced (Löhrer *et al.* 2013), (3) major Upper Palaeolithic sites have been excavated, techno-typological studies on lithics have been conducted and their historic context was established (Schyle and Richter 2015), (4) geological and archaeological contexts have been OSL-dated while some preliminary carbon-14 results have also been produced (Klasen *et al.* 2013). Furthermore, (5) a model of Late Pleistocene to Holocene landscape evolution has been proposed (Bertrams *et al.* 2012b), while recently (6) advanced lithobiont studies attempt to further investigate taphonomic and palaeoenvironmental aspects of the Wādī Ṣabrah sites (Kiers 2017).

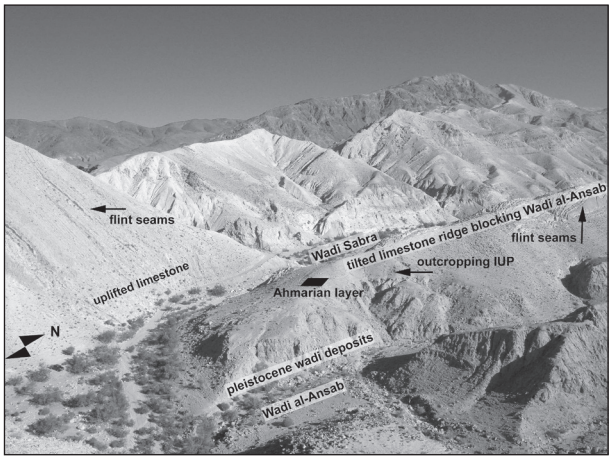
Wādī Ṣabrah is located in the Jordan Rift Valley, a tectonically active zone with the Dead Sea at its lowest geographical position (**Fig. 1**). The adjacent Wādī 'Arabah connects the Dead Sea in the north with the Red Sea to the south, while the Wādī Ṣabrah is located east of this rupture and west of the Jordanian Highlands some 15km southwest of the Nabataean capital of Petra. The rugged landscape of the Wādī Ṣabrah is mainly characterised by red sandstone of the Palaeozoic Umm 'Ishrīn formation, some white sandstone of the Palaeozoic Disi formation, some limestone of the Mesozoic Na'ur formation and the Palaeocene/Eocene Umm ar-Rijām Chert limestone that contains flint nodules in many places, plus a few basaltic outcrops of the Ahaymir volcanic rock formation (Bertrams *et al.* 2012a; Parow-Souchon 2017).

al-Anṣāb 1 is located in the lower Wādī Ṣabrah on a Pleistocene sediment promontory at 610m asl some 25m above the narrow wadi bed (**Figs. 1 and 2** [UTM Grid 36R: 0729360 E / 3347130 N]). Pleistocene sediments at al-Anṣāb have been preserved due to the adjacent limestone crest of the Umm Rijam Chert limestone that protects the site from erosion. The surrounding ridges contain abundant flint blocks that were frequently used for tool making at al-Anṣāb 1 (Parow-Souchon, 2017). Besides flint raw material, a spring is located just a few hundred metres from the site, which must have made al-Anṣāb particularly attractive for prehistoric hunter-gatherers.



1. Location map of al-Anṣāb 1 in the southern Levant.

al-Anṣāb 1 was discovered during survey activity in 1983 and was rediscovered in 2009 (Schyle 2015a; Schyle and Uerpmann 1988). This was followed by a series of field campaigns in 2009, 2011 and 2013, which had goals such as establishing a chronological framework for geological and cultural layers, revealing patterns of past climate change and placing al-Anṣāb 1 in its culture-historical context (Bertrams *et al.* 2012a; Hussain 2015; Klasen *et al.* 2013; Schyle 2015a). These objectives were approached by means of sediment studies, radiometric dating and techno-typological studies of the lithic material, which was recovered in abundance from a relatively small portion of the site. Based on techno-typological studies and corroborated by radiometric dates, al-Anṣāb 1 can be described as a typical Southern Early Ahmarian site that is characterised by narrow blade/lets struck from unidirectional volumetric cores that were then retouched into *el-Wad* points, edge-retouched pieces and typical Upper Palaeolithic tools including a few carinated pieces (Gilead 1991; Goring-Morris



2. al-Anṣāb 1 in its local context. The Pleistocene sediments containing al-Anṣāb 1 and 2 are protected from erosion by a ridge of Umm ar-Rijām Chert limestone.

and Belfer-Cohen 2018; Kadowaki *et al.* 2015; Schyle 2015b). The Early Ahmarian is associated with the permanent establishment of Homo sapiens in the Middle East just after Neanderthals became extinct (Higham *et al.* 2014; Hublin 2015; Shea 2003).

In contrast to earlier fieldwork at al-Anṣāb 1, excavations in 2015 and 2017 aimed to shed light on prehistoric on-site activities that would have resulted in functional structuring of the site. This research question is approached by excavating extensive occupation surfaces and stringently mapping finds and features with the aim of identifying discrete on-site activity areas and events. Further archaeoscientific studies such as residue and use-wear studies, and faunal and charcoal analyses are planned. Consequently, the goal of the 2017 campaign was to expand the excavation area at al-Anṣāb 1 aiming to further investigate activities carried out by early Homo sapiens in the Middle East.

Excavations in 2017 were carried out between April 9th and May 13th . Team members were Prof. Dr. Jürgen Richter (University of Cologne; Project Director), Prof. Dr. Maysoon al-Nahar (University of Jordan; Project Director), Dr. Dirk Leder (Deputy Site Director), Dipl. Ing. Joel Orrin (Site Technician), Kira Dähling (MSc Geology; Site Assistant), Laurenz Rathke (BA Archaeology, Site Assistant), Jonathan Schoenenberg (BA Archaeology, Site Assistant) and Jelena Marinkovic (Geoarchaeology Undergraduate Student; Site Assistant).

Method of Excavation

One-metre squares form the base unit of the excavation grid. Each m^2 was further subdivided into four squares measuring 50×50cm each (¼m^2) which were then excavated in 5cm-deep units (spits). All finds >1cm that were recovered while excavating (lithics, bones, charcoal *etc.*) have been single plotted using an EDM total station (Leica TS06 ultra 2") to provide three-dimensional data. Such finds were continuously drawn and photographed in plan while their levels were taken using the EDM. In addition, finds >2cm were georeferenced using at least two measuring points (blade/lets) or more (*e.g.* cores, flakes, rocks, *etc.*) depending on the object's contours. Finds <1cm were collected and georeferenced based on the ¼m^2 and spit numbers they had been retrieved from. All sediments were sieved through 2mm mesh to facilitate complete recovery of all artefacts and palaeo-environmental samples. All finds retrieved in this way were georeferenced on the basis of ¼m^2-spit units.

Owing to the high density of finds at al-Anṣāb 1 (ca 300 finds per ¼m^2 spit), it was felt appropriate to document 'intermediate plans' to ensure that all finds were photographed and drawn *in situ* before reaching the base of the spit. Once a spit base was reached, a plan was drawn, photographs were taken, surface levels recorded by EDM, and sediments, features, disturbances, *etc.* described in writing.

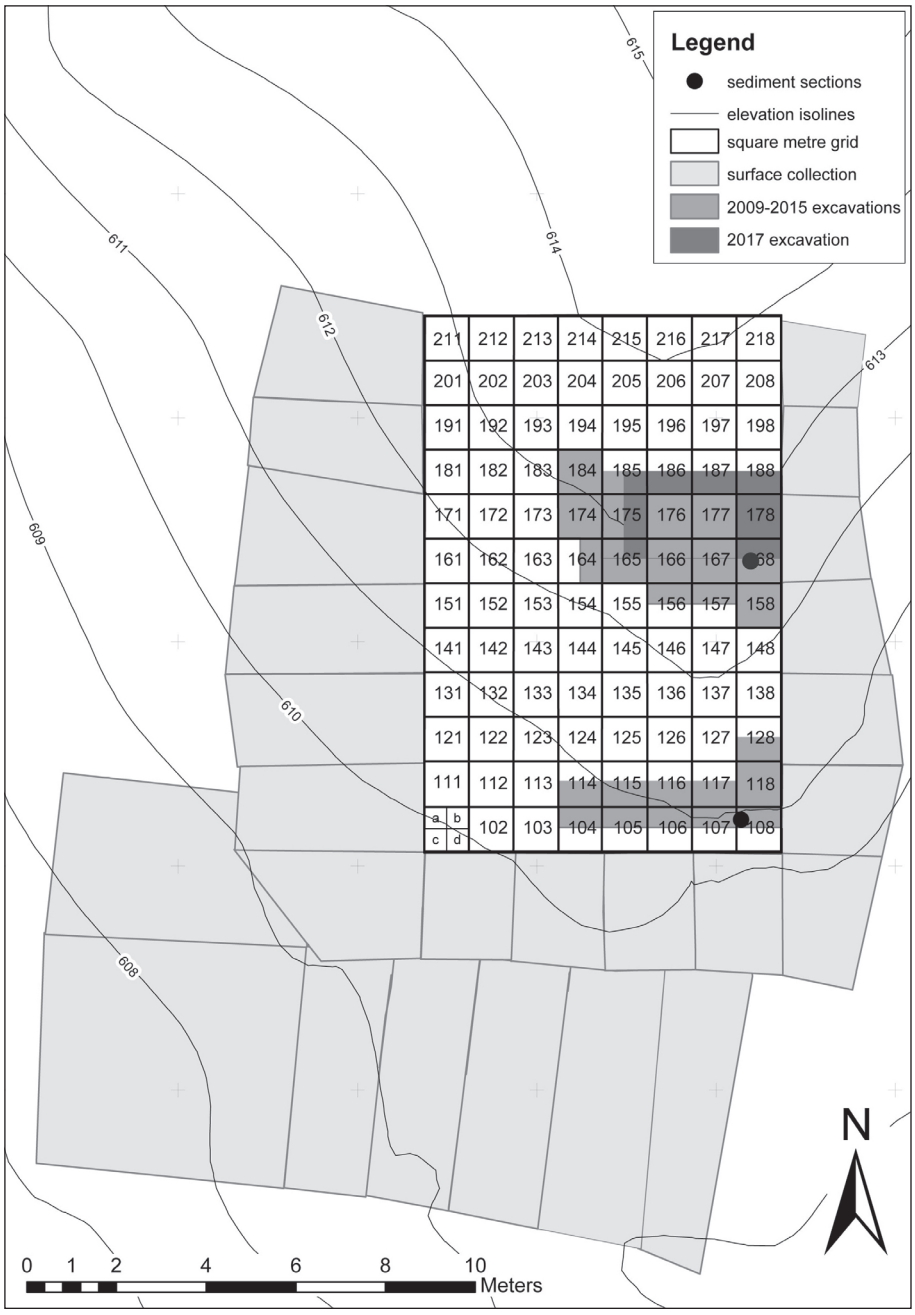
Whenever features were discovered, they were documented in plan and section (written description, photographs and drawings, plus SFM/photogrammetry). Finds retrieved from inside features were kept separate from those outside features. Sediment samples were taken from all features and their surroundings for further geo-archaeological studies. In addition, OSL samples and samples from surrounding sediments were taken from the north section after sunset. Finally, micromorphology samples were taken from the north and east sections.

Site Plan and Stratigraphy

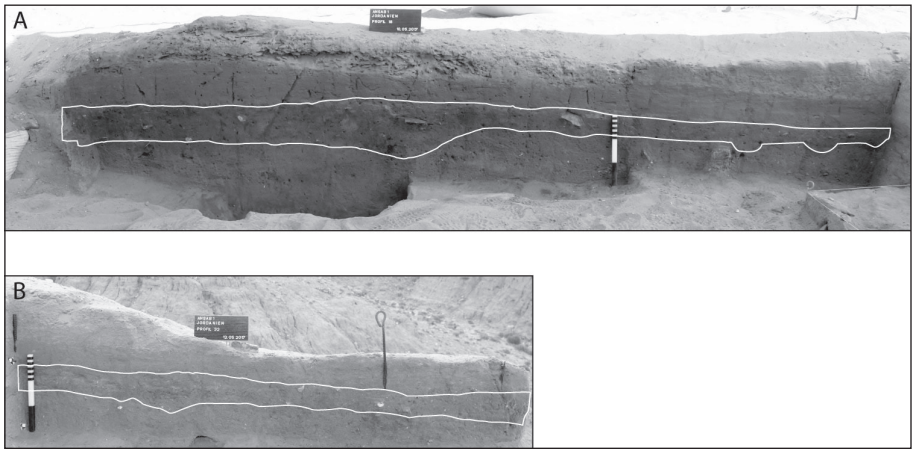
The 2017 excavation area was located in the so-called 'upper section' area, continuing work carried out during the 2009-2015 survey and excavation campaigns (**Fig. 3** [Schyle 2015a]). The square metres excavated in 2017 surround square metres excavated in the previous 2015 campaign (166, 167, 176 and 177), which were themselves surrounded by square metres excavated during the 2009, 2011 and 2013 campaigns. The 2017 trench enclosed the central fireplace excavated in 2015. Despite the aforementioned high finds density and small team size we were able to complete 4.5 square metres between square metres 165 and 188 in a stringent manner.

A generalised stratigraphy is described here based on the representative north and east sections (**Figs. 4** and **5**):

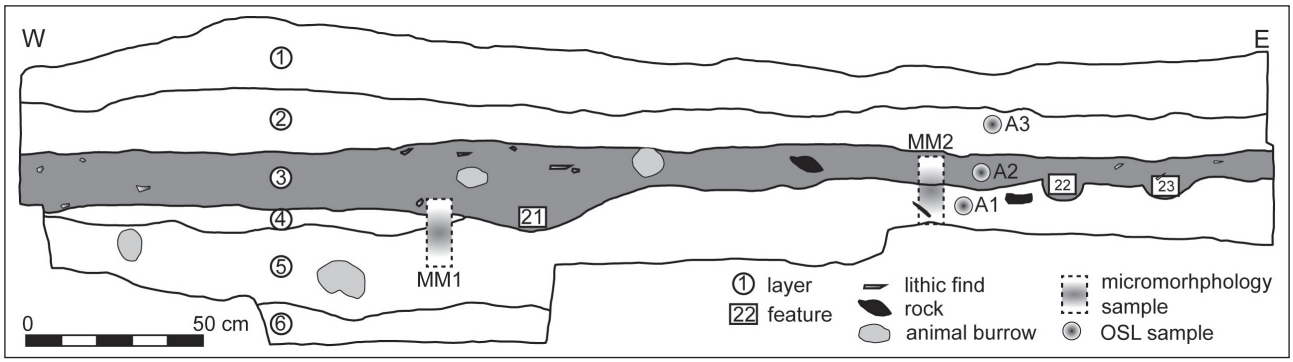
Layer 1 is up to 20cm thick and covers the whole sediment sequence in the northern half of the excavation area, whereas in the southern half, layer 2 was found on top of the sequence.



3. Excavation plan of al-Anṣāb 1 showing the location of the 2017 excavation and previous excavation activities, as well as the relief of the Pleistocene sediment spur.



4. Photographs of the north (A) and east sections (B) of the 2017 excavation indicating the archaeological horizon framed in white.



5. Drawing of the north section. The archaeological horizon is highlighted in grey; the locations of micromophology and OSL samples, as well as the finds, are indicated on the drawing.

Layer 1 consists of loose to semi-compact reddish-beige medium sand with horizontally layered calcareous deposits and some small pebbles.

Layer 2 covers the entire excavated sequence and s a maximum thickness of 20cm. Layer 2 was described as compact, reddish fine to medium sand with a few patchy calcareous deposits.

Layer 3, the archaeological horizon, was exposed throughout the entire excavation area and was up to 20cm thick in the western part, thinning to less than 10cm in the east. It is a compact grey-brown medium to fine sand that constitutes the cultural layer. It contains abundant lithics, some bone, ochre and charcoal fragments. A few animal burrows and desiccation cracks are restricted to the western half.

Layer 3 could be subdivided into sub-layers 3a and 3b in a south-eastern portion of the east section. While layer 3b is identical to layer 3, the superimposed layer 3a can be described as a thin sediment band of 110cm length and 2-6cm thickness; it is a mottled greyish-red medium to fine sand with abundant flint artefacts and some bone fragments, ochre *etc.*

Layer 4 is a sediment pocket measuring 120×10cm that was found beneath layer 3 in the western part of the excavation. It consists of light greyish-red fine sand, which differentiates it from the underlying layer 5. Layer 4 is less compact than layer 3 and contains a few flint artefacts, possibly in secondary position, that are similar to those embedded in layer 3.

Layer 5 extends across the entire excavation area with a thickness of up to 30cm. It consists of beige medium to fine sand containing small pebbles in parts and a few lithic finds similar to those embedded in layer 3. Hollow animal burrows are abundant in the upper part of layer 5, which sometimes caused layer 3 material to collapse into these burrows during excavation. As a result, finds from the last millimetres of the final spit could only be collected instead of single plotted. Layer 3 was not directly affected by these recent burrowing activities as: (a) no artefacts were found in the cavities; (b) the much looser sediments of layer 5 were much easier for rodents to penetrate in contrast to the consolidated layer 3 sediments.

Layer 6 was exposed only in a western portion of the north section. It is a homogenous reddish-brown fine sand that retains moisture much better than the layers above.

The described stratigraphy of the 2017 campaign is in good agreement with previous descriptions of directly adjacent sections at al-Anṣāb 1 (Bertrams *et al.* 2012a; Schyle 2015a).

Archaeological Finds

The majority of finds consists of lithic artefacts (n=18,070), followed by faunal remains (n=882) and ochre pieces (n=82) (**Table 1**; **Fig. 6**). Unfortunately, bone preservation is poor owing to fragmentation and weathering. As well as artefacts and fauna, we were able to

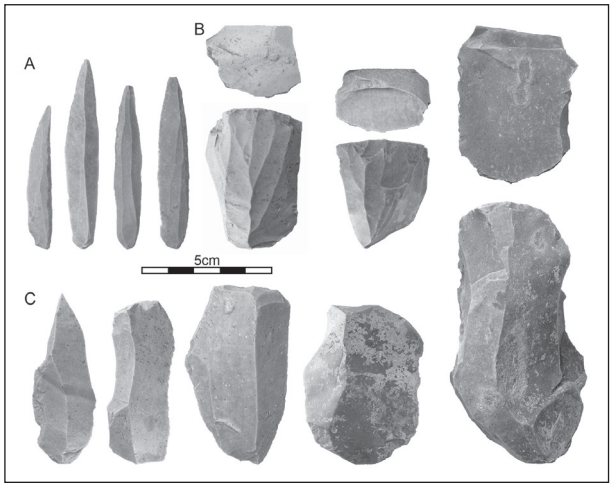
Table 1: Archaeological material recovered during the 2017 excavation.

Material	Lithics	Fauna	Ochre	Charcoal	Soil Samples*	Rocks/Other**	Total
n	18,070	882	82	92	50	149	19,325
%	93.51	4.56	0.42	0.48	0.26	0.77	100.00

* Includes three micromorphology and six OSL samples.
** Includes one carved stone collected from the surface.

retrieve 92 charcoal and 50 sediment samples, the latter including samples for OSL dating and micromorphology.

The lithic material recovered from al-Anṣāb 1 represents the entire chaîne opératoire from core initialisation to re-tooling as evidenced through the presence of cortical pieces (>50% cortex cover), core trimming elements (CTEs), flakes, blades, chips (flakes <1cm), cores and tools (**Table 2**). Common CTEs are crested blades (n=32 [often with one-sided crests or only partial crest]) and some core tablets (n=9) indicating the core initialisation and preparation methods applied at al-Anṣāb 1. Cores belong to the sub-pyramidal type and were exploited in a frontal, unidirectional manner (Hussain 2015; Schyle 2015a). Their extraction surfaces largely show blade/let scars.



6. Typical lithic finds from al-Anṣāb 1: a: El-Wad points; b: blade/let cores; c: burins and endscrapers (photos: H. Schluse).

The tool kit of the 2017 campaign consists of only 86 retouched pieces, mainly burins, edge-retouched pieces and El-Wad points in that order (**Table 3**). The tool-kit composition is in good agreement with those of previous campaigns, only burins were more abundant in 2017 at the expense of edge-retouched pieces.

Blanks employed in tool production were mostly blades (46.5%) and bladelets (25.6%), followed by flakes (<14% [**Table 4**]). Chunks, CTEs and cortical pieces were frequently used in tool production too (<14%). The 19 El-Wad points from the 2017 campaign are often fragmented (n=11) and mostly belong to the subtype of backed blade/lets, although specimens with either fine or semi-abrupt retouch are common as well. Twelve El-Wad points were made on blades and seven on bladelets. Burins were regularly made on blades (n=12) and to a lesser extent flakes (n=5), while edge-retouched pieces were predominantly made on bladelets (n=11) and blades (n=7). Endscrapers on the other hand were made on various products that were likely selected for their sturdy properties (broad, thick specimens).

Table 2: Lithic finds from the 2017 excavation and their state of preservation.

Lithics	Total n	Total %	Single plotted	% of total	Fragments (single plotted)	Fragmentation rate (%)	Burnt (single plotted)	Burning rate (%)
Core	53	0.29	52	98.11	4	7.69	2	3.85
CTE	119	0.66	112	94.12	24	21.43	6	5.36
Cortical piece	86	0.48	68	79.07	25	36.76	4	5.88
Flake	1,360	7.53	580	42.65	274	47.24	50	8.62
Blade	745	4.12	514	68.99	329	64.01	37	7.20
Bladelet	1,410	7.80	353	25.04	229	64.87	10	2.83
Chips and chunks	14,234	78.77	309	2.17	21	6.80	103	33.33
Other	63	0.35	23	36.51	1	4.35	0	0.00
Total	**18,070**	**100.00**	**2,011**	**11.13**	**907**	**45.10**	**212**	**10.54**

Table 3: Tools retrieved in 2017 and previous campaigns.

Tools	El-Wad point	End-scraper	Trun-cation	Burin	Notch/ dent.	Edge retouch	Multi-tool	Total
2017	19	11	1	23	8	22	2	86
%	22.09	12.79	1.16	26.74	9.30	25.58	2.33	100.00
2009-2015	65	40	17	29	0	91	8	250
%	26.00	16.00	6.80	11.60	0.00	36.40	3.20	100.00
Total	**84**	**51**	**18**	**52**	**8**	**113**	**10**	**336**
%	**25.00**	**15.18**	**5.36**	**15.48**	**2.38**	**33.63**	**2.98**	**100.00**

Table 4: Tool blank selection at al-Anṣāb 1.

Tools by blank	El-Wad point	End-scraper	Trun-cation	Burin	Notch/ dent.	Edge retouch	ES-burin*	TR-burin	Total n	Total %
CTEs		1		2		1			4	4.65
Cortical piece				2		1			3	3.49
Flake		4		5	1	2			12	13.95
Blade	12	3		12	4	7	1	1	40	46.51
Bladelet	7	1	1	1	1	11			22	25.58
Chunks		2			2				4	4.65
Other				1					1	1.16
n	19	11	1	23	8	22	1	1	86	100.00
%	22.19	12.79	1.16	26.74	9.30	25.58	1.16	1.16	100	
Burnt	2	0	0	2	0	0	0	0	4	4.65
Frag.	11	6		6	4	15	1	0	43	50.00

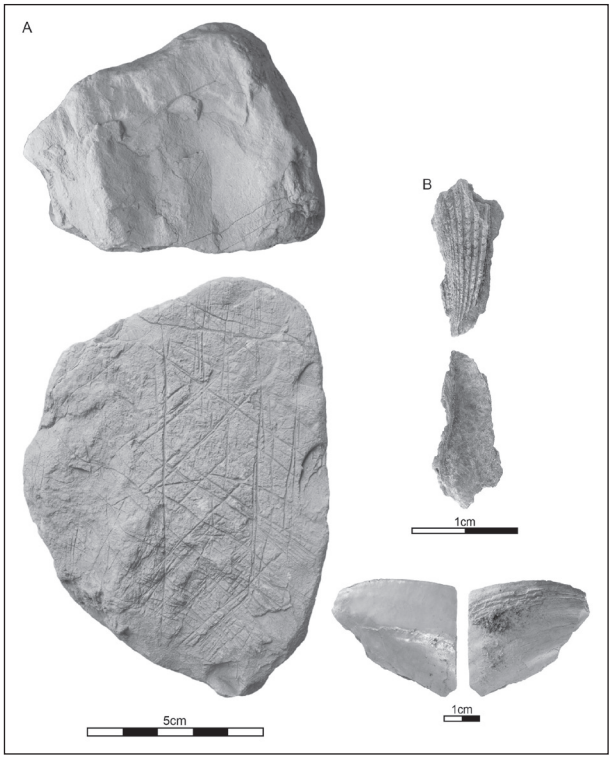
*Collected from surface.

When assessing the proportions of the various artefact classes, it becomes apparent that cores (0.3%) and tools (0.5%) are under-represented while blanks (19.5%) and debris in particular (chips and chunks [78.8%]) are abundant. This is in line with the interpretation of al-Anṣāb 1 as a primary workshop site, which culminates in a high blank:core ratio (66.3:1), a high blank:tool ratio (40.9:1) and a high debris:core ratio (268.6:1), while the tool:core ratio is low (1.6:1). The figures seem suggestive of some core export from the site, or at least from the excavated portion of it.

Fragmentation of lithic artefacts has so far been computed for single plotted finds (n=2,011 [**Table 2**]). What is striking is the high degree of fragmentation affecting nearly half of all lithic artefacts (45.1%). The abundance of broken artefacts might be due to trampling during extensive and/or repeated periods of site occupation. Fragmentation values are particularly high in blades and bladelets, whereof approximately two-thirds are incomplete compared to less than half of all flakes, and even less in cortical pieces and CTEs. More frequent blade/let fragmentation should be a result of their thin and elongated proportions that render them more fragile than sturdy flakes, CTEs or chunks. Consequently, this would result in considerably lower numbers of complete blade/lets in comparison to flakes and would thus alter the current flake:blade:bladelet ratio of 1.9:1:2 (see inter alia Schyle 2015c for a recent discussion of this topic).

Traces of burning occur among approximately one-tenth of all single plotted lithics (**Table 2**). While chunks frequently show traces of burning or are in fact shattered (one-third), other artefact classes - bladelets in particular - rarely show heat impact resulting in low values of around 5% for these categories.

In addition to the aforementioned finds, three special objects are worth mentioning. Firstly, two marine shells were retrieved from the cultural layer (**Fig. 7**). Both specimens are fragmented and show no signs of perforation on



7. Special finds from al-Anṣāb 1: a: carved yellow sandstone block from the surface; b: marine shell fragments (photos: H. Schluse).

the preserved portions that could indicate usage as, for example, body ornaments (Bar-Yosef Mayer *et al.* 2009; Kuhn *et al.* 2001). While both fragments can be classified as marine bivalve molluscs, they have not yet been identified to species level. However, considering the ochre-stained shell, an attribution to the Cardiidae family (*e.g.* Glycimeris sp.; Acanthocardia sp.) is possible, while the other specimen might belong to Panopea sp. instead. The same range of bivalve molluscs has been reported from broadly contemporaneous sites along the Mediterranean coast (Bosch *et al.* 2015; Douka *et al.* 2013; Kuhn *et al.* 2001). The al-Anṣāb 1 molluscs must have been transported to the site by humans from either the Red Sea or Mediterranean, which would mean a minimum transport distance of 90km from the former and even 170km from the latter.

The other peculiar object is a weathered yellow sandstone block measuring 12×8.9×6.8cm, with X-shaped carvings arranged in a row and framed by long parallel lines (**Fig. 7**). The object was found on the surface just south of the excavation area, which leaves its cultural affiliation open. Comparable objects have thus far not been reported from any Ahmarian site in the Levant.

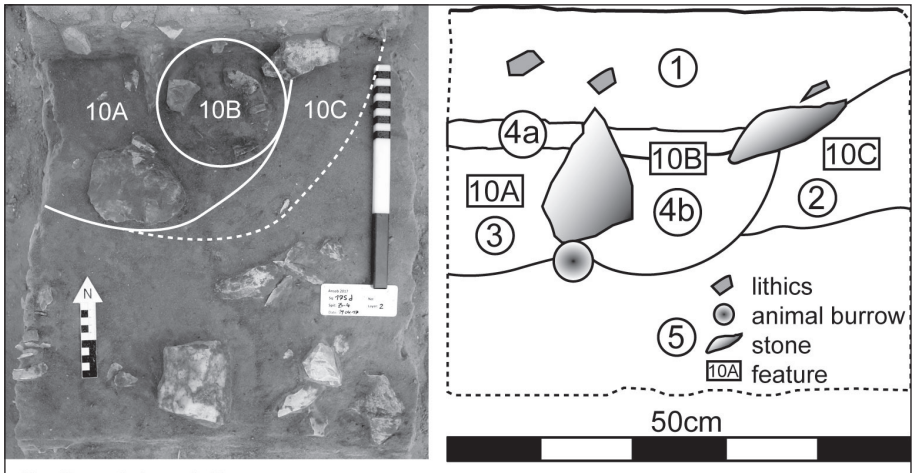
Features

The majority of excavated features in al-Anṣāb 1 can be described as charcoal concentrations containing the usual lithic artefacts and faunal remains (features 11-23). They are oval, circular or rounded-amorphous in plan, with a shallow depth of up to 3cm. Three were documented as shallow depressions in the northern section (features 21-23). All these features might be associated with the central fireplace excavated in 2015; analyses of on-site activities are currently underway.

Feature 10 is the only exception to that general picture (**Fig. 8**). In plan, feature 10 was recognized by its darker colouring that was likely the result of higher charcoal content. What at first seemed like just another charcoal concentration turned out to contain a pit of some 20cm depth and diameter (feature 10B). In plan, feature 10B had a circular shape and was lined with rocks and lithic finds. It contained two sediment fills. The top fill was darker grey in colour than the archaeological horizon and was also found outside the pit to the west (layer 4a). It was found superimposed on a light grey sediment that was lined with lithics of different sizes dipping downwards (layer 4b). The function of the pit is currently unclear, but is subject of further analyses.

Conclusion

al-Anṣāb 1 is a typical Southern Early Ahmarian site with diagnostic lithic artefacts such as *el-Wad* points, abundant narrow blade/lets



Sediment description:
1 = gray-brown fine to middle sand, archaeological horizon
2 = sediment of feature 10C, gray-beige silty sand
3 = sediment of main feature 10A, light gray-brown fine to middle sand
4a = upper fill of feature 10, dark gray-brown fine to middle sand
4b = lower fill of feature 10B, light gray-brown fine to middle sand
5 = reddish-beige coarse sand with small rounded pebbles

8. Plan and profile view of feature 10.

and unidirectional blade/let cores. The excavation carried out in 2017 continued survey and excavation work conducted within the framework of CRC 806 between 2009 and 2015. As well as abundant lithic finds, organic remains such as charcoal, bone, and sea and egg shell were retrieved, providing much potential for future studies.

Preliminary findings show that various activities had been carried out by prehistoric hunter-gatherers at al-Anṣāb 1, including stone knapping, food processing and the use - and possibly cleaning and re-use - of a hearth. The discovery of a pit next to that hearth adds further data to the question of on-site activities that we intend to explore further in the near future by continued excavations and scientific analyses.

Acknowledgements

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EXCAVATIONS AT THE EPIPALAEOLITHIC SITE OF AL- KHARRĀNAH IV, SEASON 2018

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Abstract

From 9 June to 12 July 2018, the Epipalaeolithic Foragers of al-Azraq Project (EFAP [University of California, Berkeley and University of Tulsa]) conducted excavations at the Epipalaeolithic site of al-Kharrānah IV. The 2018 excavation at al-Kharrānah IV is the seventh field season at the site, focused on exploring the nature of prehistoric (Late Pleistocene) occupation of al-Kharrānah IV. During this season we completed excavation of an Early Epipalaeolithic hut structure (Structure 2) discovered in the 2010 season. The goal of the 2018 excavation season was to fully excavate Structure 2 in order to understand the distribution of artifacts within the structure and the relationship between the structure and the surrounding deposits. This year's excavations have prepared us for targeting specific new areas for work, namely continuing to excavate several hut features during future field seasons.

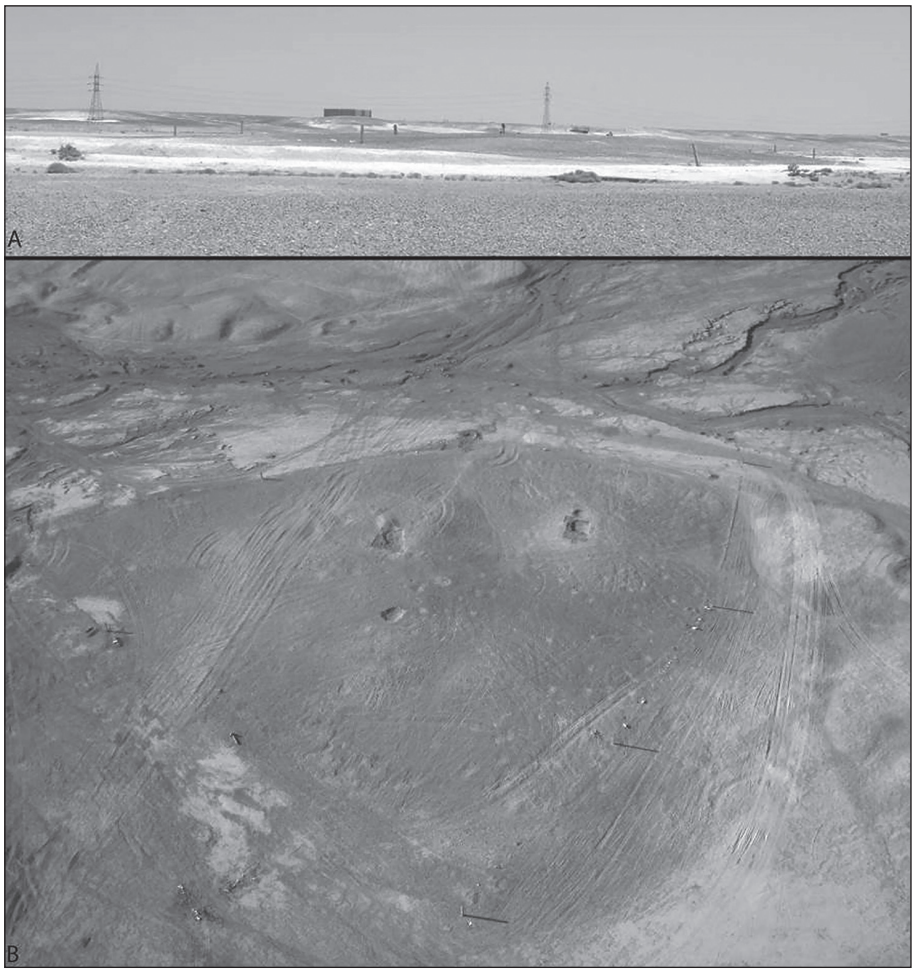
Introduction

The transition from hunting and gathering to the origins of agriculture is one of the pivotal changes in human prehistory. To address long-term changes and explore the nature of hunter-gatherer behaviour at the cusp of agriculture, this paper discusses recent excavations at the Early Epipalaeolithic site of al-Kharrānah IV, located in the al-Azraq basin, Jordan. al-Kharrānah IV was occupied between 19,800 and 18,600 years ago and, in this 1,200-year span, multi-season, prolonged and repeated habitation of the site created one of the largest Palaeolithic sites in the region. The site contains some of the region's earliest evidence for architectural structures (in the form of brush huts), artifact caching and symbolic artifacts. The wealth of archaeological material and immense size of the site suggests that al-Kharrānah IV was a hunter-gatherer aggregation locale. The presence of structures at the site suggests emerging trends towards sedentism, while the rich artifact record within the structures hints at ritual behaviours associated with the built environment prior to the origins of agriculture.

The 2018 excavation at al-Kharrānah IV was the seventh season of excavation at al-Kharrānah IV, exploring the nature of the prehistoric (Late Pleistocene) occupation of the site. al-Kharrānah IV is situated approximately 1km southwest of Qaṣr al-Kharrānah at an elevation of *ca* 640m asl (**Fig. 1**). The site was originally surveyed in the 1970s by Garrard and Stanley Price (Garrard and Stanley Price 1977), and small test excavations were conducted in 1981 and 1983 by Mujahed Muhesien (Muheisen 1988a, b). Renewed work began at the site in 2008 as part of the Epipalaeolithic Forgers in al-Azraq Project (EFAP). As a result of the extremely large size of the site and the unique nature of its material record, our renewed excavations at al-Kharrānah IV are providing critical data on an under-researched period of Jordanian prehistory and highlight the significance of the site for our current understandings of the transition from forager to farmer in the southern Levant (*e.g.* Jones *et al.* 2016; Macdonald *et al.* 2018; Maher *et al.* 2016; Maher *et al.* 2012; Ramsey *et al.* 2018; Ramsey *et al.* 2016; Spyrou *et al.* 2019).

al-Kharrānah IV Background

al-Kharrānah IV is extremely important as it is one of the largest and archaeologically

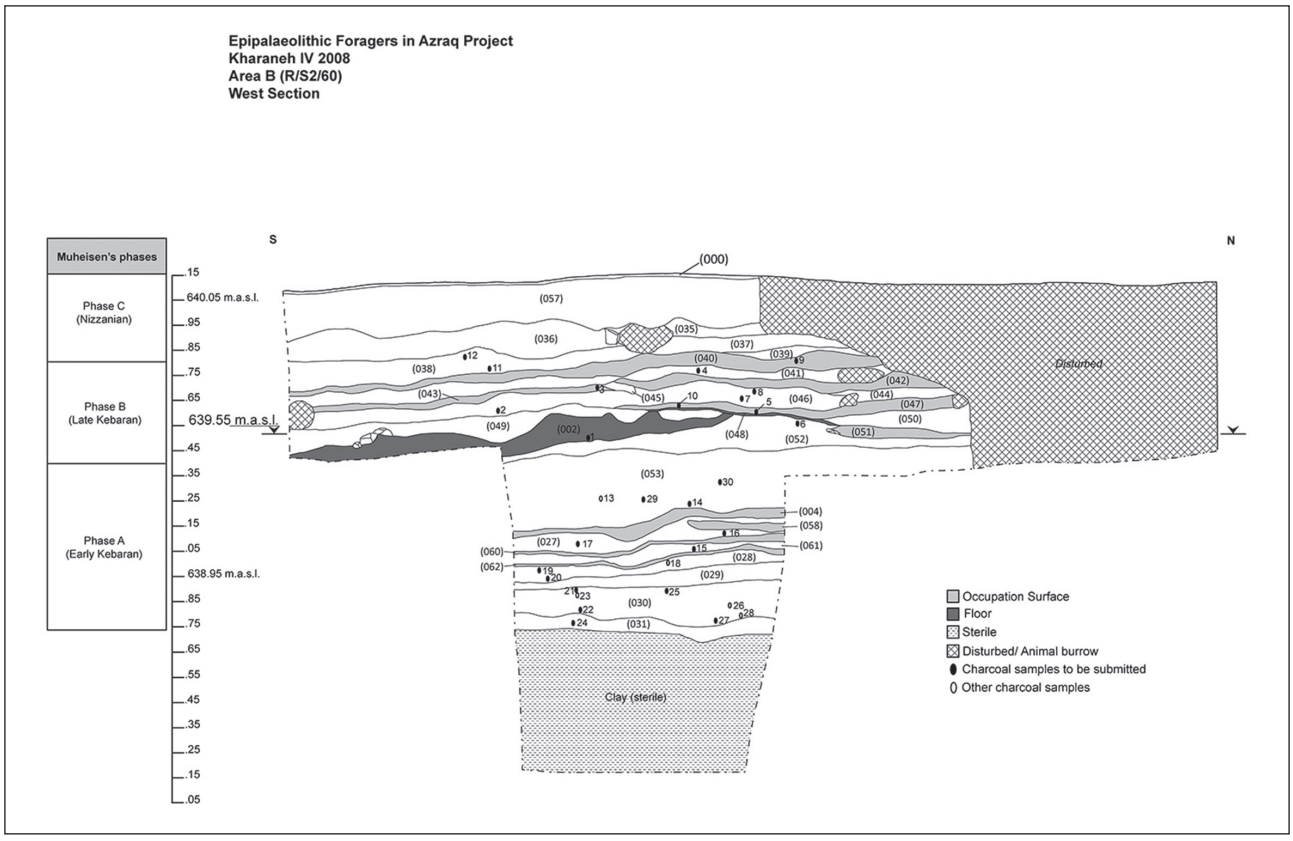


1. Aerial view of the Epipalaeolithic site of al-Kharrānah IV. Top image shows a view of the site from the south, with Qaṣr al-Kharrānah in the background.

densest Epipalaeolithic sites in Jordan, spanning the Early to Middle Epipalaeolithic periods. The site exhibits a complex suite of archaeological remains, including architecture and human burials. Sites containing such a wide array of features are extremely rare from this period in Jordan. In addition, the location of such a large occupation site near al-Azraq, a well-watered wetland environment during the late Pleistocene, suggests that al-Kharrānah IV has the potential to provide us with key data on palaeoclimate, prehistoric technology, mortuary practices, sedentism, architecture and plant use prior to the Neolithic period.

Excavations at al-Kharrānah IV in 2008-2010, 2013 and 2015-2016 were the first stages of work by EFAP to reconstruct the nature of the Late Pleistocene occupation at al-Kharrānah IV. The goals of the previous field seasons included: (1) re-locate and re-open Muheisen's two old excavation trenches in order to correlate his previous work at the site with our new excavations; (2) expand horizontally from these two areas to expose the site's horizontal stratigraphy, as well as any archaeological features, such as hearths, living floors, burials and architecture; (3) excavate a deep probe in one of the trenches down to sterile deposits in order to fully document the site's vertical stratigraphy; (4) conduct a brief landscape survey of the immediate area to document landscape change and possible ancient lake or spring deposits. During the 2008-2016 field seasons we were able to document the complete vertical stratigraphy, and now better understand the excellent preservation conditions at the site, particularly regarding the charcoal samples which have provided an excellent sequence of dates for occupation at al-Kharrānah IV (**Fig. 2**).

During the 2010 excavation season we uncovered two hut structures, Structure 1 and Structure 2, in the Early Epipalaeolithic area (Area B), and in 2013 identified a potential third structure (**Fig. 3)** (Maher *et al.* 2012). These features are exceptionally rare for the Early Epipalaeolithic period and represent some of



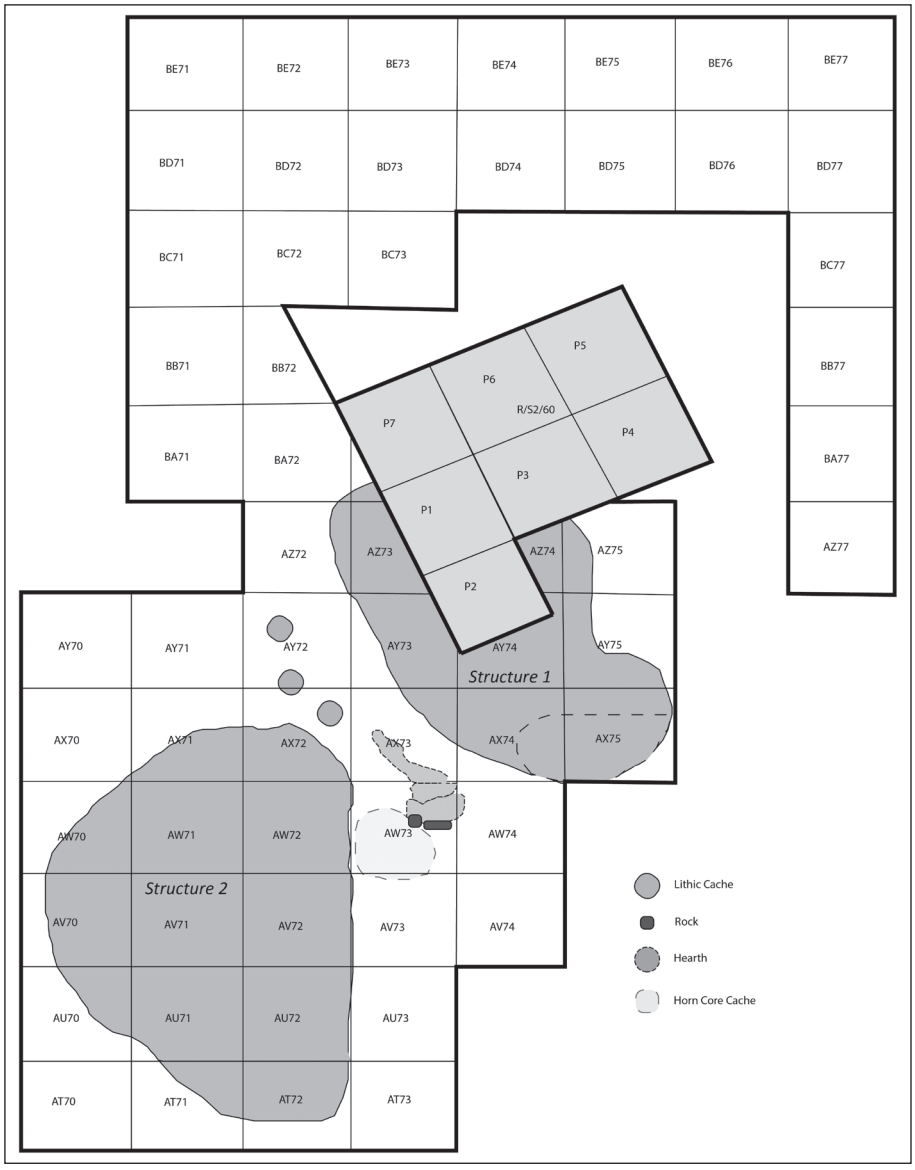
2. Stratigraphic section of Early Epipalaeolithic deposits (Area B). Section of hut Structure 1 can be seen, as indicated by the black layer.

the only known habitation structures from the Early Epipalaeolithic in the Levant (Maher *et al.* 2012). Structure 1 is semi-subterranean, kidney-shaped and approximately 2.5m by 3.5m in size. The structure is composed of several different strata. The lowest deposits are represented by three superimposed compact surfaces, interpreted as three stratified floor deposits. This suggests that although the structure was small, the floor surface was refreshed and the hut reused on several occasions. The deposit above these floors is a thicker fill deposit. The final hut deposit is characterized by an organic-rich burnt sediment, interpreted to be the burnt superstructure. Once the occupants of the structure decided to abandon it, they burnt the hut, thus terminating the cycle of reuse. After the hut was burnt, a deposit of sterile orange sand was placed over the burnt deposits, closing the structure's life history. The preservation of hut structures, flintknapping areas, food-preparation areas and living surfaces at al-Kharrānah IV is unique, and contributes crucial data for reconstructing people's on-site activities during the Epipalaeolithic.

During the 2015 season we returned to al-Kharrānah IV to expose and map the boundaries of Structure 2, originally identified in 2010. More than half of the structure was still covered by unexcavated squares when it was first discovered in 2010. During the 2015 and 2016 field seasons, we exposed and mapped the surface of the structure. The upper deposits of Structure 2 are similar to Structure 1, with a burnt layer interpreted to represent a burnt superstructure capping the deposits.

In 2016 we discovered a human burial lying on the structure's floor, just underneath the burnt superstructure (**Fig. 4**). The burial was situated directly underneath the burnt layer of the superstructure, suggesting that it was placed within the structure just prior to burning.

The burial was found in a semi-flexed position, with the head turned to one side and one hand resting on the face. This position suggests care in how the body was placed, arranging it in a specific manner. There are several artifacts surrounding the body, including lithics and faunal remains, but the lack of a clear burial pit makes it challenging to identify whether these



3. Plan map of Area B; Structures 1 and 2 are highlighted in light grey.

objects were interred intentionally with the burial or were objects that were already located in the hut.

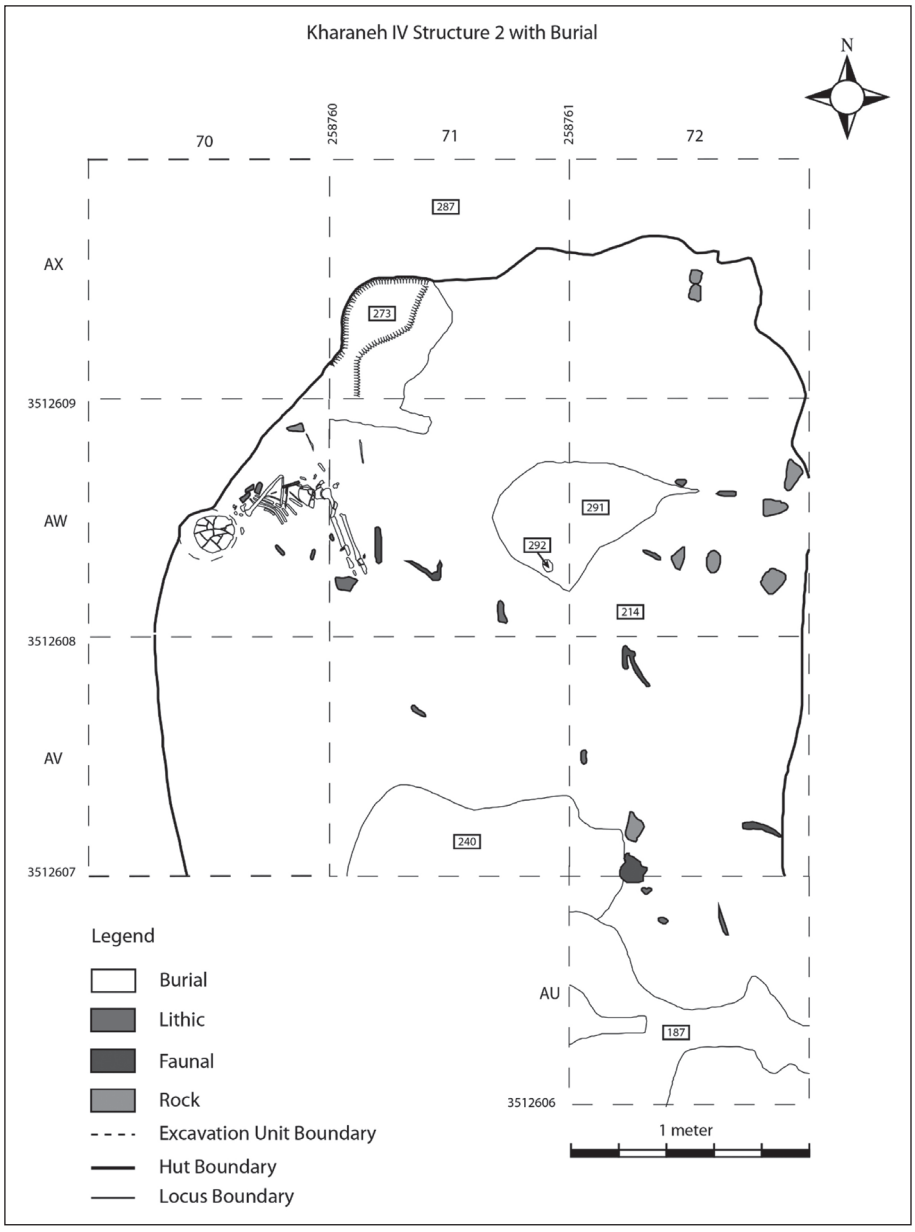
The interred individual is an elderly woman, approximately 55 years old. She suffered from osteoarthritis, as evidenced by her vertebra, and had suffered a fall which resulted in a fractured wrist that had healed before she passed away. Her skeleton shows evidence of heating and burning, consistent with patterns seen when a body is encased in a protective layer while burning. It is likely that she was wrapped in a hide blanket or even covered by a thin layer of sediment before the hut structure was burnt on top of her, protecting the bones from the heat.

In 2018 we returned to excavate the remaining deposits from Structure 2 to identify the living floor(s) and explore the relationship between the structure, the burial and the surrounding deposits.

Excavations 2018

For the 2018 season, excavations focused on exposing, mapping and excavating Structure 2, initially uncovered in 2010. We re-opened a section of the Early Epipalaeolithic area (Area B, called R/S2/60 by Muheisen) that had been excavated in 2010 to expose Structure 2. We re-opened twelve 1×1m units previously excavated during the 2010, 2015 and 2016 excavation seasons (AU70, AV70, AW70, AX70, AU71, AV71, AW71, AX71, AU72, AV72, AW72 and AX72) **(Fig. 5**).

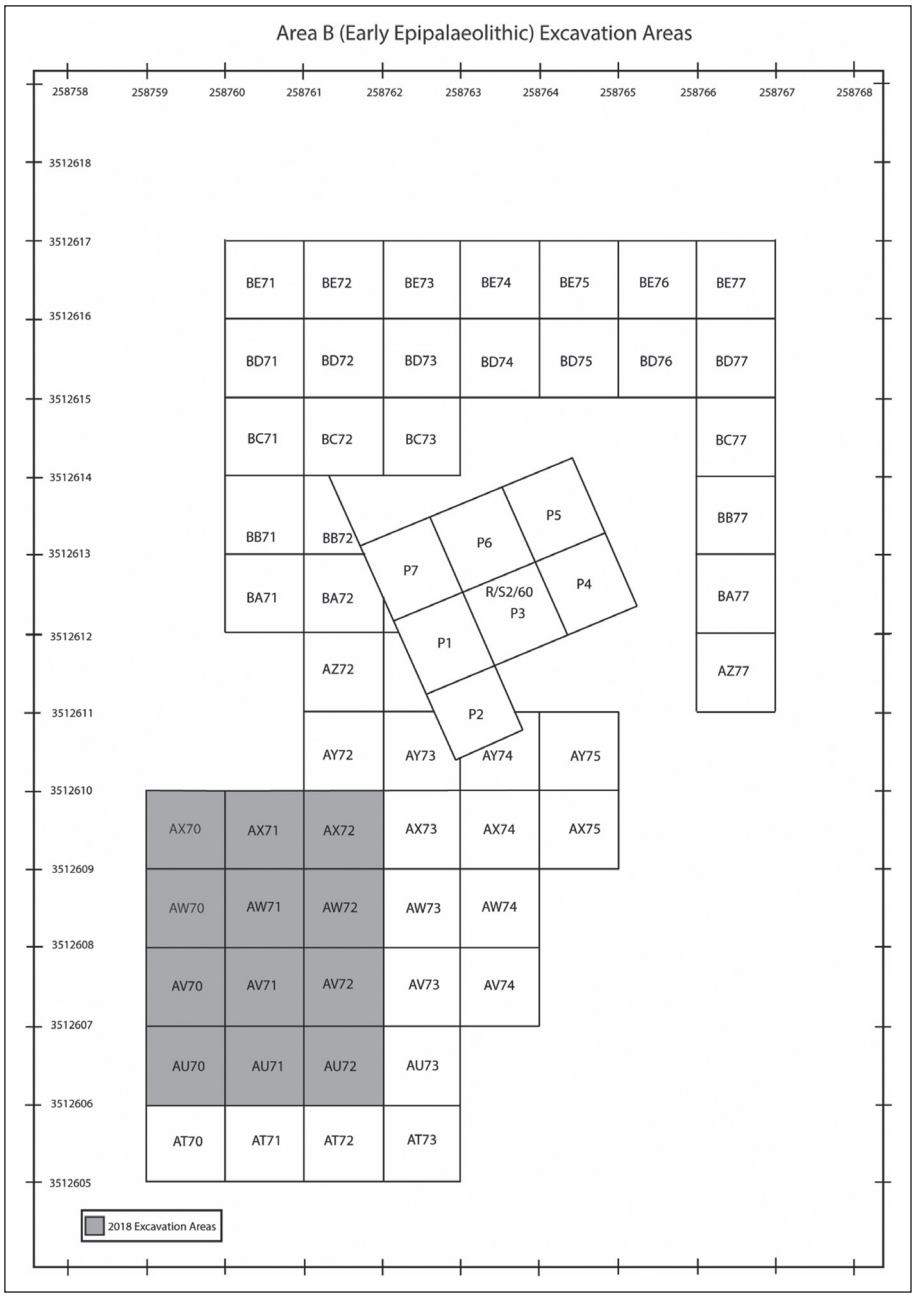
We began the 2018 field season by removing the backfill from areas where Structure 2 was initially exposed. In 2016, the last excavation



4. Plan map of exposed surface of Structure 2 (2016 field season).

season at the site, the surface of the structure was exposed. When we returned in 2018, the entire upper surface of the structure (locus 214) was exposed and subsequently excavated. This deposit is dark brown sediment with a very high density of charcoal fragments. Underneath is a medium brownish red sediment with burnt artifacts and charcoal (locus 324). These deposits are like the deposits found in the upper levels of Structure 1 (excavated in 2013) and are similarly interpreted as the burnt remains of the structure's superstructure. Phytolith analysis from Structure 1 suggests that the superstructure was composed of phragmites leaves and tamarisk branches, resulting in a roof constructed from locally available plant life (Ramsey *et al.* 2018). Analysis of the burnt upper deposits from Structure 2 will determine whether this structure was also constructed from similar local flora.

Underneath the two burnt-superstructure deposits is a highly mottled and undulating deposit (locus 326). This deposit is very heavily disturbed by rodent burrows in the eastern half of the structure, causing various compact levels and textures throughout the locus. It contains a high density of lithics and bone, randomly orientated within the sediment. Owing to the undulating surface and random orientation of the artifacts, we interpret this locus to be a fill deposit within the structure. Sitting on top of the mottled and undulating deposit, between AX71 and AX72, is a small, burnt combustion feature (locus 328).



5. Plan map of excavation areas in Area B. Shaded areas represent excavation squares excavated in 2018.

Underneath is a compact, clay-rich sediment with large flat-lying objects (locus 332) (**Fig. 6**). This deposit contains large bones and lithics on the surface, while the subsurface deposits had a very low artifact density in comparison to other deposits on site. The compact, clay-rich nature of the deposits, as well as the low density of flat-lying artifacts, suggests that this is the floor of the structure. Sitting on this surface in AW72 was a burnt hearth feature with two episodes of use (*loci* 333, 334, 335 and 336). This suggests that there was a maintained combustion feature within the structure during its use. Beneath the compact, clay-rich surface (locus 332), we discovered a second surface (locus 337). This surface was identified on the basis of several very large, flat-lying bones - including aurochs bones - which were not present in the deposit above (**Fig. 7**).

Abutting Structure 2 is a highly mottled, loose sediment (locus 316). This surface is likely contemporaneous with the use the structure, representing the deposit outside of the hut. The eastern outside surface of Structure 2 contained more than a dozen gazelle horn cores, many of them *in situ*. Beneath the outside surface is an artifact-rich sediment (locus 340) that abuts the deposits underneath the structure. The deposit



6. Floor surface of the western half of Structure 2 (locus 332). The boundary of the structure is outlined in black.



7. Large cranium (aurochs?) on the surface of locus 337.

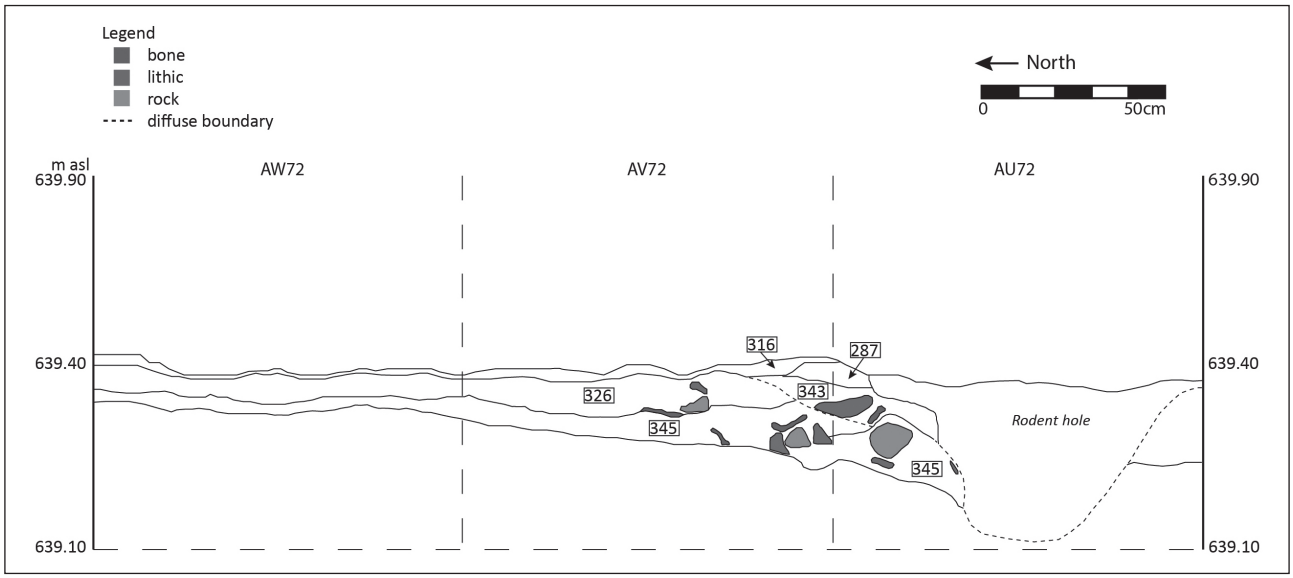
underneath Structure 2 (locus 346) is looser than the clay-rich floor and contains a higher density of artifacts**.**

Overall, excavations in Area B revealed an *in-situ* series of deposits that relate to the Early Epipalaeolithic occupation of al-Kharrānah IV. The stratigraphy of Structure 2 includes a burnt superstructure (*loci* 214 and 324), a fill deposit (locus 326) and two compact clay-rich floors (*loci* 332 and 337), with an underlying deposit containing large mammal bones (locus 337) (**Fig. 8**). The area around Structure 2 (locus 316) is extremely rich in Early Epipalaeolithic material and will continue to be a focus of our future research.

Discussion

The unique site of al-Kharrānah IV raises numerous interesting questions for future research, particularly regarding the intensity of occupation at large sites like al-Kharrānah IV prior to the Natufian period. This research helps us to understand how the changing landscape during the Late Pleistocene affected land-use and settlement patterns during the Epipalaeolithic period (*ca* 20,000-16,000BP). We are interested in investigating why prehistoric people selected this particular location for settlement and why they repeatedly occupied the site throughout the Early and Middle Epipalaeolithic periods.

The excavations conducted during the 2018 field season will help answer important questions relating to the earliest evidence of hut features in Jordan and ritualized actions situated in dwellings. Through the analysis of the archaeological materials in Structure 1 and Structure 2, we can gain insight into how Early Epipalaeolithic people structured their indoor and outdoor spaces, giving us a glimpse of how they organized and



8. Structure 2 east section showing the hut deposits and associated macroartifacts discussed in the text.

negotiated daily life. Comparing the artifacts of the two structures will help reconstruct the differences and similarities between different 'households' during this period. Understanding how people used their built environment will give us a better understanding of the lifeways of people during the Late Pleistocene.

The Epipalaeolithic site of al-Kharrānah IV represents the largest Epipalaeolithic occupation in Jordan. The unique nature of the deposits, including the presence of several hut structures and an associated burial, highlights the importance of this site for understanding the nature of human behaviour prior to the origins of agriculture. Continued research into the nature of the hut structures at al-Kharrānah IV will illuminate how people organized their domestic space and the range of activities performed at this site. We hope to return in future field seasons to continue our work at this important site to gain a better understanding of why people aggregated at this place in the landscape.

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EXCAVATION AND MAGNETIC PROSPECTION IN JARASH'S SOUTHWEST DISTRICT: THE 2015 AND 2016 SEASONS OF THE LATE ANTIQUE JARASH PROJECT

Louise Blanke, Richard Hugh Barnes, Kyle Brunner, Marie Brøndgaard Jensen, Lise Goossens, Rudolph Knieß, Aisha Mellah, Raffaella Pappalardo, Dana Pilz and Apolline Vernet

Introduction

This article accounts for the 2015 and 2016 campaigns of the Late Antique Jarash Project (henceforth LAJP). In 2015, approximately 7ha in Jarash's southwest district was surveyed using magnetic prospection, while a residential area on the district's hilltop was examined through key-hole excavations (**Fig. 1**). In 2016, finds (especially ceramics) retrieved from the excavations were recorded and analysed during a short study season.

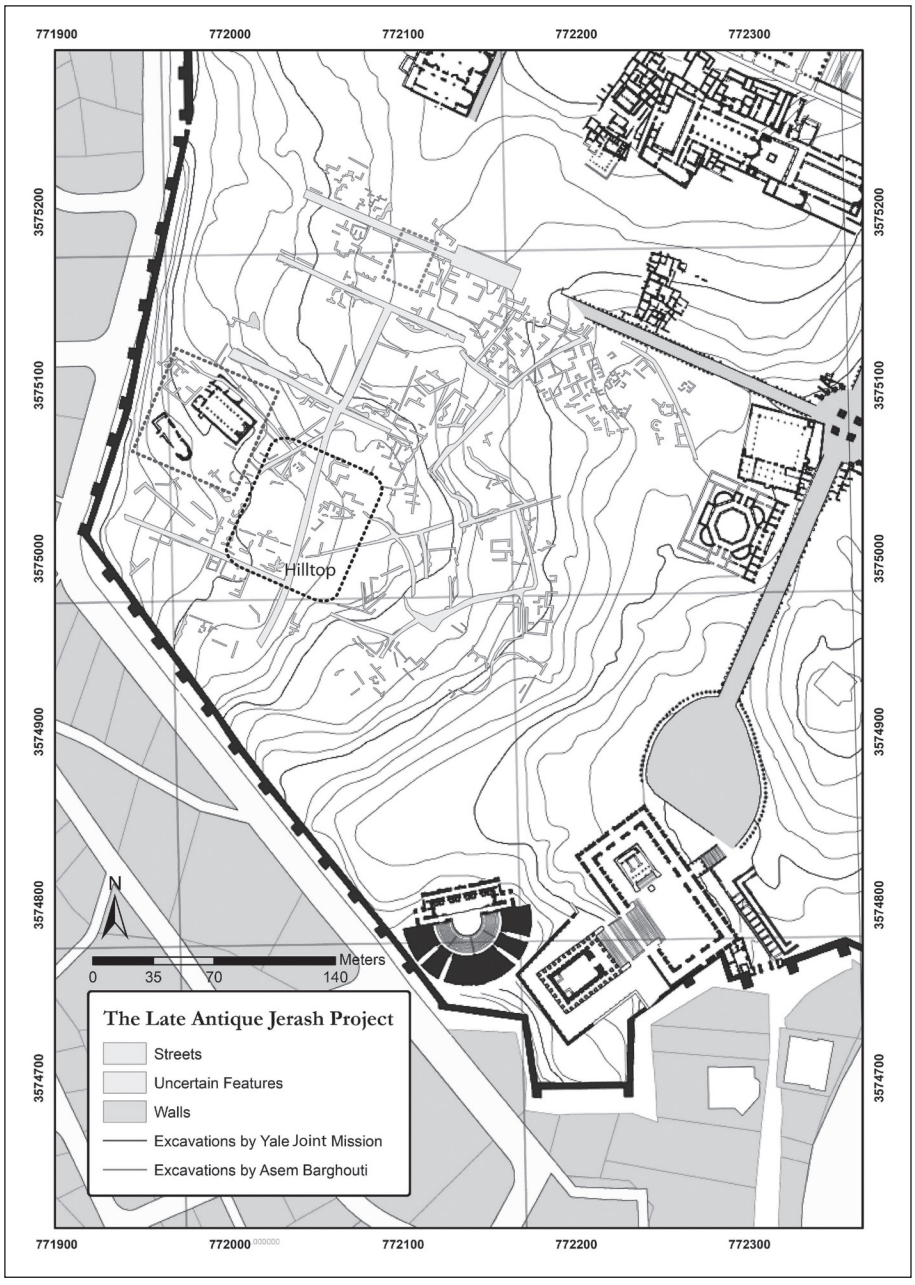
LAJP builds on a survey of architectural surface remains that was carried out in 2011 as part of the Danish-Jordanian Islamic Jarash Project (Blanke *et al.* 2015). The survey identified features associated with the residential usage and water supply in Jarash's southwest district and traced the remains of streets running parallel with and perpendicular to the South Decumanus.

LAJP commenced as an independent project in 2015 with the aim of investigating the infrastructure and daily life of a residential area over the *longue durée*, with an emphasis on the city's development in the 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.

Excavations conducted throughout the city since the 1980s have established an unbroken material record reaching into the Umayyad period, but major disruptions to urban life have been associated with the great earthquake of 749 (Ambraseys 2009: 230-238). Archaeological work in the city centre on the so-called Umayyad House on the South Decumanus and excavations by the Islamic Jarash Project have demonstrated that the centre was rebuilt after the 749 earthquake, with a long history afterwards (Blanke and Walmsley forthcoming; Rattenborg and Blanke 2017; Walmsley 2018). Archaeological work carried out in other parts of Jarash suggests a different occupational history, however, maintaining major patterns of disruption and abandonment after the earthquake. Published data from Jarash's northwest quarter and from the Temple of Zeus have increased our understanding of the afterlife of the city in the Middle Islamic period (twelfth to fifteenth centuries). Here, life was resumed after a long hiatus had transformed the former city into a rural settlement of fields and farmhouses (see, for example, Lichtenberger and Raja 2016; Peterson 2017; Tholbecq 1997-98).

The results from LAJP's first two seasons have vastly increased our understanding of Jarash's development over the *longue durée*. So far, our excavations have revealed that it was not only in the city centre that life continued after the 749 earthquake. On the contrary, new archaeological evidence produced by LAJP suggests that the entire southwest district was rebuilt to accommodate urban life, with religious, administrative and commercial units restored in the town centre and residential structures constructed on the terraces leading from the centre towards the city wall (Blanke 2018; see also Rattenborg and Blanke 2017).

Below follows an account of the magnetic prospection, excavation and finds studies (mainly ceramics) with an emphasis on methodology and results. The presentations are followed by a summary of how these new data affect our understanding of Jarash as a whole.



1. Map of Jarash's southwest district with emphasis on survey area and the hilltop, which has so far been the focus of the excavations carried out by LAJP. © LAJP.

Magnetic Prospection

Between 2nd and 8th November 2015, Eastern Atlas carried out a magnetic prospection in Jarash's southwest district. In 2011, the Danish-German Jarash Northwest Quarter Project contracted Eastern Atlas to survey an area to the east and northeast of the Temple of Artemis (Kalaitzoglou *et al*. 2012). Here, Eastern Atlas tested a number of geophysical methods and concluded that magnetic prospection was best suited for the topography and geological composition found in Jarash. Therefore, this method was applied exclusively to survey Jarash's southwest district.

The southwestern part of the city is characterised by a sloping landscape that inclines uphill from the Cardo and the congregational mosque in the centre of town towards the city wall. A plateau located towards the summit – generally described as the hilltop – comprise distinct architectural features that have so far been the focus of our excavations. The area southwest of the hilltop is characterised by a terraced landscape, while the highest point towards the north exhibits a hilly nature with several holes, excavation trenches and recently deposited stone heaps.

Remains of archaeological structures related

to buildings and terracing characterise the landscape throughout the southwest district; the ground is covered in stone fragments of archaeological origin. The bedrock outcrops at the steep margins of the site and has been identified as karst limestone of a type that was also used to build the area's architectural features.

In general, the site offers complex surface conditions with steep slopes, uneven ground, heaps of stone and other irregularities. These could influence the data outcome and thereby complicate interpretation of the magnetic data, especially in the heavily disturbed northeast part of the survey area. Consequently, the main challenge consisted of negotiating the many field obstacles such as slopes, piles of stones and spoil heaps. Special measures were taken regarding the magnetic survey system and the positioning of the data.

Measuring Parameters

Magnetic anomalies are caused by changes in the complex magnetic properties of the soil. The amplitude of the magnetic anomalies is determined by the contrast of magnetic susceptibility between an archaeological structure and the surrounding uninfluenced soil, as well as by the volume and depth of the magnetic structure. Two types of magnetisation can be observed in magnetic measurements: induced and remanent magnetisation.

Induced magnetisation is ascribed to the effect that the elementary magnets of a matter partly align with an external field (*e.g.* the Earth's magnetic field) and will therefore enhance it. The magnetic susceptibility describes the propensity for this alignment determining the strength of the enhancement of the magnetic field. The highest magnetic susceptibility values in soils are observed in ferro- or ferrimagnetic minerals like the iron oxides magnetite and maghaemite. These minerals occur ubiquitously in the soil, forming microscopically small grains. There are several possible explanations for their origin and concentration in soils:

1) Heating: In soils with rich organic content in reducing conditions, iron oxides of low magnetisation can be transformed into magnetite and maghaemite under the influence of fire (Le Borgne 1955).
2) Microbially mediated: Microbes populating rich organic deposits can change the soil conditions sufficiently to favour the conversion of weakly magnetised iron oxides to more magnetic forms (Linford 2004).
3) Magnetotactic bacteria: These bacteria are able to produce intra-cellular crystalline magnetite which allows them to navigate in the Earth's magnetic field. These magnetite crystals remain in the soil after the death of the bacteria (Fassbinder *et al.* 1990).
4) Pedogenetic origin: The magnetic susceptibility can increase during soil formation processes in which organic material is absent (Maher and Taylor 1988).
5) Incorporation of magnetic material: Increased magnetisation of the top soil can result from anthropogenic accumulations of magnetic materials.

Besides ferro- and ferrimagnetism, there are further magnetic characteristics in materials, which show observable effects when an external magnetic field is applied. Most minerals and soils can be described as paramagnetic. In paramagnetic materials, a secondary induced magnetic field is produced, but its elementary magnets tend not to align with the external magnetic field. Therefore, the strength of the induced magnetic field is very weak, qualified by positive - but low - values of magnetic susceptibility.

Some other minerals, like calcite, which is the main component of limestone, are diamagnetic with negative values of magnetic susceptibility. Diamagnetic materials literally repel the external magnetic field and form a strong magnetic field in the opposite directions, which results in an anomaly field with negative amplitudes. Based on this effect, buried constructions made of limestone can be identified in magnetic data as assemblages of linear patterns with negative amplitudes of the measured anomaly field.

While induced magnetisation requires an external magnetic field for its development, remanent magnetisation remains in a material after its creation. The most important type of magnetic remanence is caused by the heating of a material over its specific Curie temperature. In this process the elementary magnets become mobile and align with the external Earth's magnetic

field. During the subsequent cooling, the alignment of the magnets is conserved and consequently the burnt material becomes a strong magnet. Since the average Curie temperature of soil components is around 650ºC, fireplaces, kilns, layers of burnt daub, accumulations of pottery and other burnt material can be detected by exploiting this effect (Schmidt 2009).

In addition, other types of remanent magnetisation occur in soils. For example, small grains of magnetic mineral tend to align with the external magnetic field during sedimentary processes, producing the so-called detrital or depositional remanent magnetisation (DRM). This effect can also be observed in anthropological deposits, with remanent magnetisation thus being registered in the fills of human-made pits or ditches (Fassbinder and Becker 2003).

Methodology and Data Positioning

For the magnetic investigations in Jarash's southwest district, an array of seven Förster fluxgate gradiometer probes was used (**Fig. 2**). The probes were mounted on a light, foldable frame, which was carried over the heavily undulating area. For data positioning a marker wheel as well as a Global Navigation Satellite Systems (GNSS) receiver were attached to the system. This gradiometer array is a component of the convertible LEA MAX system which usually functions as a cart, pulled by hand or pushed, but owing to the challenging surface conditions it was converted into a carried system.



2. The challenging surface conditions of Jarash's southwest district are characterised by field obstacles such as rocks, piles of stones and steep slopes. Photo shows seven Fluxgate Förster Gradiometer FEREX CON650 sensors mounted on a portable array. © LAJP.

Table 1: Technical parameters of the magnetic prospection.

Method	Magnetic prospection
System	LEA MAX (Eastern Atlas)
Sensors	Förster fluxgate gradiometer FEREX CON650
Data logger	LEA D2 with 10 channels (Eastern Atlas)
Measurement category	Vertical gradient in nT
Configuration	7 sensors, mounted on a portable array Vertical sensor separation: 0.65 m
Resolution	0.5 m profile distance / max. 0.1 m point distance
Topographic measurement	GNSS receiver (NovAtel SMART-VI), RINEX-data logging, coordinate system: WGS84 / UTMzone 36 (EPSG:32636)
Data positioning	Absolute error after post-processing: 0.2 m
Processing and filters	Eastern Atlas decoding program including offset and drift correction
Data format	ASCII, GeoTiff
Image resolution	0.2 m x 0.2 m

The Förster FEREX CON650 fluxgate gradiometer probes register the vertical gradient of the vertical component of the Earth's magnetic field with an accuracy of 0.2 nT (nanotesla). The measured gradient (*i.e.* the difference between two vertically arranged sensors in the gradiometer probe) is insensitive to the typical large fluctuations of the Earth's magnetic field and is determined only by the magnetisation of local sub-surface objects. The technical details concerning the investigation are specified in **Table 1**.

The data positioning for the magnetic survey was realised by means of a GNSS receiver (NovAtel SMART-VI) incorporating a Receiver Independent Exchange Format (RINEX) raw-data log for correction purposes. An additional post-processing step was conducted using the data from the MRAV Merav Station, which is part of the Israeli survey network. The achieved data quality was mainly of RTK floating ambiguity solution, providing a position accuracy of 0.2m. The coordinate system in use is WGS84 UTM Zone 36North.

The magnetic data shown in the maps (**Figs. 3** and **4**) reflect the archaeological situation and surface conditions of the investigation area at Jarash. Parts of the area could not be covered by magnetic measurements owing to the presence of excavation trenches, piles of rocks, steep slopes and other surface obstacles. In order to present the genuine magnetic data, Eastern Atlas did not extrapolate or interpolate data to fill the gaps. In this manner, misinterpretation can be avoided. **Table 2** sums up the main natural and anthropogenic features impacting on the magnetic data. **Fig. 3** shows the magnetic data in amplitudes of 5nT. The interpretation is presented in **Fig. 4**.

Following the data processing, the magnetic data images were thoroughly examined for anomalies that might indicate archaeological features. The general approach to the classification of magnetic anomalies is to distinguish them according to their amplitudes, polarisation and shape. In consequence, first, anomalies of unambiguously modern origin are separated and marked in blue colour. The second step consists of grading the anomalies with assumed archaeological background. In order to structure them, several classes of magnetic anomalies and corresponding causal physical structures are introduced. The specific anomaly characteristics, the related archaeological structures and the colour scheme used in the interpretation maps are defined in **Table 3**.

Interpretation

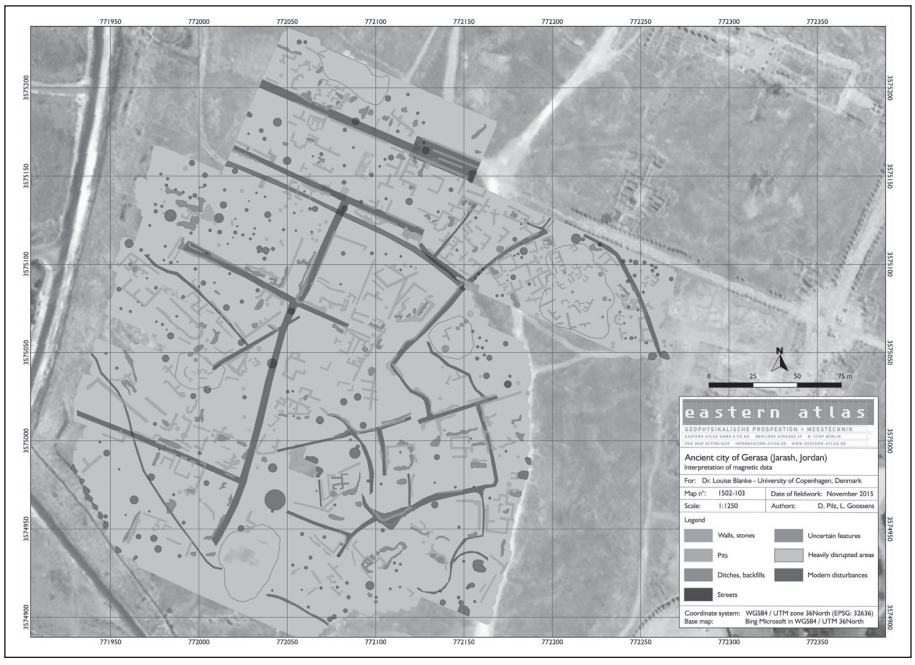
In general, the magnetic data show numerous anomalies caused by modern interference. Dipole anomalies of high amplitudes occur frequently throughout the whole investigated area. Their origin is to be found in deposits of



3. Magnetic prospection of Jarash's southwest district. © LAJP.

Table 2: Measuring conditions and key figures of the magnetic prospection.

Site	**Ancient city of Gerasa**
Historical context	Occupation from Hellenistic Period to 8th century AD
Terrain	Heavily undulated with steep slopes, partly terraced, excessive amount of stone fragments on the surface (partly piled), huge obstacles
Geology	Karstified limestone
Soil	Very thin or no soil layer
Surface	Variable (from rough to very rough)
Visible archaeological structures	Stones, walls, terraces, remains of collapsed buildings, ruins
Vegetation	Mostly dry grassland, few bushes
Land use	Archaeological park
Weather	15-30°C, sunny, dry, partly foggy, partly rainy
Sources of disturbance	Deposits of restored archaeological blocks and other excavated material, excavation trenches, heavily disrupted areas, scrap metal, wirefences
Investigated area	approx. 7 ha (=70,000 m²)



4. Interpretation of magnetic data from prospection of Jarash's southwest district. © LAJP.

construction waste, scrap metal and large iron poles, possibly resulting from past excavations or other archaeological activity. Furthermore, the data are affected by partly open excavation sections (such as Asem Barghouti's excavations on and near the South Decumanus, and the Yale Joint Mission's excavation of the Mortuary Church and church of Sts Peter and Paul), modern roads and disrupted areas of stone piles and spoil heaps. A long, linear anomaly recognised in the data in the southern and southwestern part of the area reflects a cable, which is also visible at the surface. The most dominant modern features in the data are marked in blue colour, while heavily disrupted areas are outlined in light blue colour.

Apart from the modern disturbances, the data reveal a very complex archaeological landscape, manifested through different phases of construction, destruction and rebuilding. Features of archaeological origin were subjected to a further categorisation. A distinction was made between streets, walls and stones, pits, ditches and backfills, and - finally - uncertain features.

The magnetic markers of roads are characterised by slightly positive anomalies and are depicted in dark grey on the interpretation map (**Fig. 4**). The South Decumanus is recognised in the data in the northernmost end of the investigated area. Interestingly, a widening of this street is identified extending from Barghouti's excavation towards the east. About fifty meters south of the Decumanus, another linear positive anomaly is identified as a street, clearly running parallel to the Decumanus. The same applies for another road about sixty meters further to the south. Another hundred meters further to the south, a third parallel road is visible as a linear positive anomaly. One of the known primary access routes in Late Antiquity, a street that runs from the triple church of Sts Cosmas and Damian, St Paul and St George, intersects with the South Decumanus and extends towards the south, can be recognised. It seems to be aligned with the Roman-period grid system, although it stands out on account of its slightly irregular course to the south of the surveyed area. Branching off from this street, smaller linear positive anomalies in the data are identified as irregular alleys, for example the north and south alleys running along the two excavated churches (*i.e.* the Mortuary Church and Church of Sts Peter and Paul). The street layout in the area southeast of the Decumanus seems to be more complex. Here, the data show different, irregular positive anomalies that have been interpreted as streets. They deviate markedly from the Roman orthogonal street grid and seem in comparison to be orientated almost diagonally (see Blanke 2018 for a discussion of the dating of these street systems).

The remains of building structures can be recognised by negative anomalies, indicated in dark yellow at **Fig. 4**. Generally irregular in

Table 3: Colour scheme of the magnetic-data interpretation.

Colour	Magnetic anomaly type	Amplitudes	Type of magnetisation	Related structures
	Distinct linear negative anomalies of moderate amplitudes	-1... -10 nT	Induced, diamagnetism	Walls, foundations, stone settings, stones
	Distinct circular and oval positive anomalies	+5... +15 nT	Predominantly remanent	Fillings of pits and post holes, burial chambers, fillings possibly containing pottery fragments, metal objects and burnt material, scattered construction debris enriched with burnt daub and pottery fragments
	Mainly linear, partly irregularly shaped positive anomalies	+5... +10 nT	Induced and remanent	Organically enriched fillings of ditches and backfills of construction debris
	Slightly positive anomalies in stripes of several meters wide	+2 ... +10nT	Induced and remanent	Pavement remains of streets and paths, occupational layer with organically enriched material
	Mainly distinct linear negative anomalies of moderate amplitudes	-1... -10 nT	Induced, diamagnetism	Uncertain, dubious features located in heavily disrupted areas, possibly remains of walls or stone settings, possibly modern features caused by rearranged or relocated archaeological fragments of limestone
	Various, not clearly defined	-	Unclear	Heavily disrupted areas with difficult topography due to the geomorphological conditions and/or areas with piled rock fragments (mainly of archaeological origin)
	- Clearly defined dipole anomalies - Weak dipole anomalies - Slightly positive anomalies	> ±50 nT ±5... ±25 nT +3... +5 nT	Induced Induced Unclear	- Modern disturbances: by iron poles, fences, scrap metal or other ferromagnetic sources - Cable, small or deeper ferromagnetic sources - Modern path

form and orientation, they differ in dimensions and cover the space alongside the linear positive anomalies (streets). The foundations of the two churches are recognisable in the data, as are some larger structures south of the Decumanus. Jarash's prolonged and complex building history is demonstrated in the data, as the structures seem to alter their orientation in alignment with the streets. About one hundred meters south of the widening of the Decumanus, a group of linear negative anomalies - interpreted as walls - show an overlap, possibly indicating different building phases. Noteworthy is the impression that, to the southeast of the Decumanus, the architecture occurs more densely. The magnetic image shows a fragmented area, with features that form smaller units orientated to the smaller alleys. However, the tangle of linear negative anomalies cannot provide conclusive answers on the architectural characteristics, owing to the complex circumstances and elaborate chronology of the site.

Throughout the area, circular strong positive anomalies of varied size are visible in the magnetic data. These represent pits and are depicted in orange in **Fig. 4**. Fills of pits and post holes

may contain ceramic fragments, metal objects, burnt material or scattered construction debris that are causing the anomalies.

Some strong linear positive anomalies are interpreted as backfilled ditches. These often occur alongside linear negative anomalies (streets) and are indicated in brown on the interpretative map. Groups of these linear positive anomalies almost show the negative print of building structures, reflecting ditches now filled with organic material - where the foundations were once situated.

A few areas are disrupted to such an extent that unambiguous interpretation is impossible owing to spoil heaps or stone fragments. These areas are visualised in light blue, while the single features are depicted in dark pink. In the immediate proximity of the mosque, spoil heaps from past excavations had accumulated and were arranged. This heavily disrupted area is reflected in the magnetic data and hinders an unambiguous interpretation. The recognised single features marked in dark pink could either be of archaeological origin or represent the magnetic markers of stone heaps.

The Magnetic Prospection in Summary

The results of the magnetic prospection campaign in Jarash's southwest district allow us to draw the following conclusions:

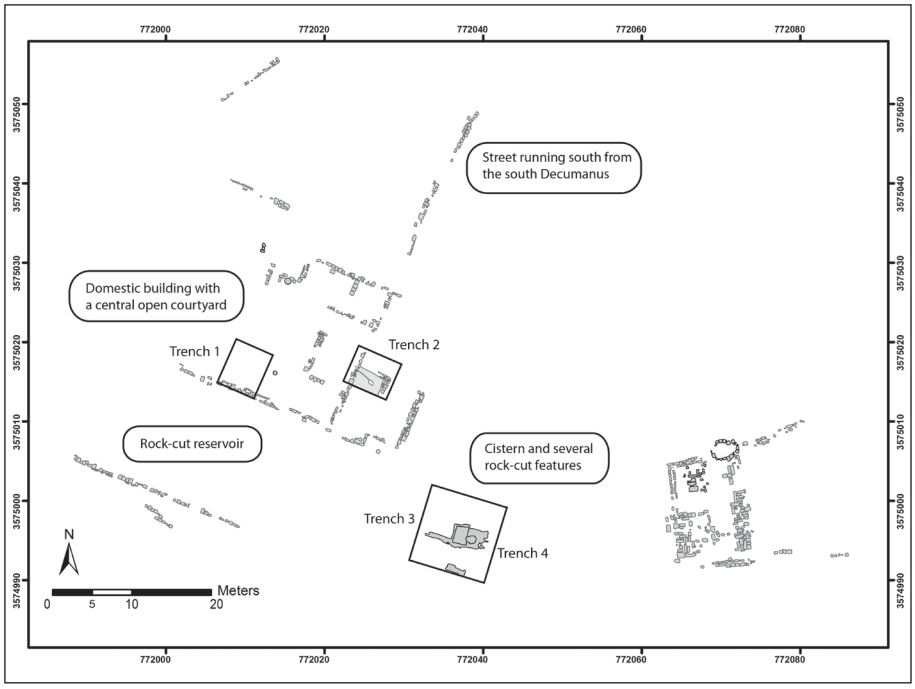
- Despite challenges presented by the surface conditions, complex landscape and severe field obstacles, the magnetic data offer important new insights into the archaeological remains of Jarash's southwest district and provide good evidence for a large number of hitherto unknown archaeological features.
- Interferences to the data caused by modern streets, metal objects and spoil heaps somewhat complicate the archaeological interpretation of the data.
- The data show the remains of an orthogonal street plan, which includes the South Decumanus as well as the remains of an irregular, more complex, almost circularly orientated street plan in the eastern part of the surveyed area. A widening of the South Decumanus is identified, and the perpendicular street dating from Late Antiquity continues to the southwest in the data. Smaller alleys on both the east and west sides of this street were identified.
- Many buildings were detected on the strength of the magnetic data. In some areas, an overlap of architectural features is visible, possibly resulting from different building phases. The structures seem to be more fragmentary southeast of the Decumanus, but the overlay of archaeologically relevant anomalies with magnetic anomalies caused by spoil heaps and stone piles precludes a deeper insight into the character and function of these constructions.
- Several positive anomalies are interpreted as pits and fills of archaeological origin, mostly found in association with streets and architectural features.
- The complexity of the site is clearly visible in the magnetic data. Further investigation can only be encouraged in order to better understand the intricate history of the site and enable the interpretation of possible archaeological structures by placing them in a broader context on a substantial horizontal scale.

Excavations in Jarash's Southwest District

The remaining part of this article summarises the results of four excavation trenches located on the hilltop in Jarash's southwest district (**Fig. 5**). Trenches 1 and 2 examine two rooms within a large residential building, while Trenches 3 and 4 examine a cistern and series of orthogonal cuts made into an outcrop of bedrock located southeast of the residential building. The ceramic assemblage retrieved from each trench is discussed at the end. The surface remains of the residential building as well as the bedrock cuts were recorded in detail as part of the 2011 survey (Blanke *et al*. 2015). These two areas were selected for further investigation in accordance with LAJP's research aim of examining Jarash's residential history over the *longue durée*. This goal entails an examination of the amenities of daily life, such as the construction and maintenance of the water supply, the organisation and development of streets and alleys, and the disposal of rubbish.

A Residential Building on the Southwest Hilltop (Trenches 1 and 2)

The residential building (examined in 2011 as Area D [see Blanke *et al.* 2015: 232]) covers some 20×25m and is located on the north-south street, which can be traced from the triple



5. Detail of hilltop in southwest district showing location of Trenches 1-4. © LAJP.

church complex to the north of the Decumanus. Prior to excavation, three rooms were identified along the eastern end of the building. A fourth room was identified along the north wall, while the presence of internal walls at the south end of the complex implies further rooms here. The collapsed building material slopes towards a depression in the western part of the building, which could have resulted from a relative absence of structural collapse indicating the possible location of an open courtyard. A pear-shaped cistern cut into bedrock is located at the northern extent of the courtyard. In 2015, two trenches were excavated in order to examine a room within the building (Trench 1) and a room encroaching onto the north-south street from the building (Trench 2).

Trench 1: A Storage Room in a Residential Household

Trench 1 is located at the southern end of the residential unit and covers the western part of a room as well as a small part of the building's courtyard (**Fig. 5**). Prior to excavation, sections of the room's outer walls were visible on the surface. The aim of the 2015 season was to establish a chronological sequence for the building's occupation and abandonment, in addition to identifying the usage of this part of the building. Consequently, the excavation (5×6m) focused on the junction of what has been identified as the building's main courtyard and an adjacent room opening onto it. Owing to time constraints, the excavation concentrated on the room, which was excavated to the level of bedrock. An outline of its main phases follows below.

Results and Stratigraphy

The excavation revealed that, similar to other structures in Jarash, the walls were built directly on the bedrock (see, *e.g.* Gawlikowski 1986: 110). Smaller cuts were made into the bedrock to facilitate the construction of walls and piers, while a deeper cut was made along the northern part of the room to accommodate the insertion of two large ceramic storage units. Three walls were identified within the trench: a southern (east-west) wall that constitutes the south limit of the building; a western (north-south) wall that separates the courtyard from the room; and, finally, a northern (east-west) wall (**Fig. 6**). A doorway with two steps provided access between the courtyard and room. The southern and western walls were constructed from courses of large squared stones with levelling between each course consisting of stone rubble and reused architectural fragments. The stones' appearance suggests that they were re-used from a nearby derelict building: their edges are smooth (rather than angular) and they vary considerably in size.



6. Trench 1 after excavation. View towards the north. Note north-south wall separating room from courtyard with centrally placed opening for door and remains of ceramic emplacements in northern part of the room. © LAJP.

Of similar material and construction technique are two pillars that stand on the eastern edge of the trench. Several arch stones found in the collapse suggest that the pillars supported an arch spanning the room from north to south. A building block in the northern pier included a rope hole, which could have been used to either suspend a pot or to tether an animal. Given the general use of the room for storage (see below), the former option seems more probable.

It is worth noting that the construction technique of the northern wall differs markedly from that of the room's other architectural features. The lower courses consist of smooth, medium-sized stones set in a thick earthy mortar. The construction technique comes across as less solid than that applied to other walls, which has led to the conclusion that the wall served as a partition rather than a load-bearing construction. Furthermore, the wall does not display any architectural link with the northern pillar and may have belonged to a second construction phase, either replacing an existing wall or creating a new division of space within this part of the building.

No dateable material can be associated with the construction of the main structure or the partition wall. In comparison with other structures excavated at Jarash, the construction technique applied to the southern and western walls is similar to that of the so-called Umayyad House located on the South Decumanus (Gawlikowski 1986: 124), as well as that of shops excavated on the North Decumanus (Watson 1986: 365). Based on the ceramic assemblage, these structures were dated by their excavators to the late sixth or early seventh centuries.

The main architectural elements related to the occupational usage of the building are two ceramic storage vessels set directly on the bedrock, embedded within a stamped yellow clay floor (**Fig. 7**). Only the lower parts of the ceramic installations are preserved *in situ*, as the vessels were crushed when the building collapsed. These two pithoi-style vessels were set directly onto the bedrock within a circle of stones, which served to stabilise and support them. The stone circles as well as the lower parts of the vessels were then covered in a compacted yellow clay mixed with lime that also served as the floor of the room. No residue was recovered from within the vessels, but comparative examples from Caesarea Maritima suggest a likely association with food storage, for example, olive curing before consumption - in which olives are soaked in brine to remove the bitterness from their taste (Ramsey and Holum 2015: 667).

The building collapsed in a single violent event – most likely an earthquake – which sealed the occupational deposits below a thick layer of wall and roof collapse. It is clear from the material assemblage retrieved from the room that it was still in use at the time of the earthquake. Finds associated with the use of the building comprised a rich assemblage of ceramic sherds from which 22 vessels could be reconstructed. Most of these vessels are associated with storage of foodstuffs; it has therefore been possible to identify the use of this part of the building (see section on ceramics below). Several thick, square iron nails were found directly on the floor or in the collapse immediately above the floor.



7. Remains of two ceramic pithoi embedded into the construction of the floor. © LAJP.

This type of nail is often associated with carpentry and may have been used in the construction of the building's roof. Other finds associated with the use of the building include coins (which were cleaned by a conservator in 2017 and will be included in a separate report on that season), an iron knife and a small bronze cup.

Following the collapse of the building, the area was abandoned and remained untouched until our excavations were initiated in 2015. While adjoining areas saw secondary usage in field systems, it is likely that the amount of rubble here was thought too extensive for this to be viable.

Trench 2: Encroachment onto the Thoroughfare

Excavations in Trench 2 commenced to investigate the Late Antique encroachment of buildings onto the thoroughfare that runs perpendicular to the South Decumanus, as well as the construction, maintenance and use of those structures. Based on the surface remains examined during the 2011 survey, there were clear outlines of a building extension from the main residential structures onto the street (Blanke *et al.* 2015: 231-233). A 5×5m trench was placed over the northeastern corner of this extension from the face of the street wall eastwards (see **Fig. 5**).

Results and Stratigraphy

The three walls that were uncovered in the excavation unit incorporate two identifiable phases of construction. The western (north-south) wall (defined here as Wall 1) is the façade of the building that lined the street running south from the South Decumanus. This street was identified during the 2011 survey and confirmed by geophysical examination. Wall 1 marks the earliest phase of construction in Trench 2. The excavation revealed that the residential building was accessed from the street through a narrow doorway that was blocked during the second architectural phase (**Fig. 8**).

A one-metre extension of the excavation unit to the west was made to fully expose the top of Wall 1, which is 82cm thick. Walls 2 and 3 form the second phase of the construction in Trench 2 and were later additions encroaching onto the street. Wall 2 runs east-west and abuts



8. Trench 2 showing Wall 1 with blocked doorway. View towards the west. © LAJP.

Wall 1 at a length of 3.6 metres (**Fig. 9**). A doorway is situated approximately in the middle of this wall. It is unclear whether this door had street access or led to another room. However, comparing the layout here with that found in Barghouti's excavation some 150 metres further north suggests an unbroken line of rooms encroaching from the buildings onto the street (Barghouti 1982). Wall 3 runs parallel to Wall



9. Overview of Trench 2 upon completed excavations. Note continuation of room towards the south. © LAJP.

1 and is bonded to Wall 2. It stretches across 2.5m within the excavation unit but continues south beyond the limit of the excavation. The 2011 survey recorded a total length of *ca* 8m. The section at the southern limit of Trench 2 features two pillars incorporating reused architectural elements from Roman-period buildings as a part of their construction. Similar to Trench 1, the pillars would have supported a transverse arch spanning the room from east to west. No doorway was found in Wall 3 that would have led onto the street, but one is likely present south of the excavated area, as the room continues in that direction.

The construction of Walls 2 and 3 is consistent with the technique documented in Trench 1 (see above) and the area defined as GO of the Islamic Jarash Project located immediately west of the congregational mosque in the centre of Jarash (Blanke *et al.* 2015; Rattenborg and Blanke 2017; Walmsley *et al.* 2008: 113-118). Additionally, the construction is consistent with other sites that experienced street encroachment in the *ajnad* of Ḥimṣ and al-Urdunn, such as Palmyra and Scythopolis (al-As'ad and Stępniowski 1989: 206-210; Tsafrir 2009: 77-79 [see also Jacobs 2009]).

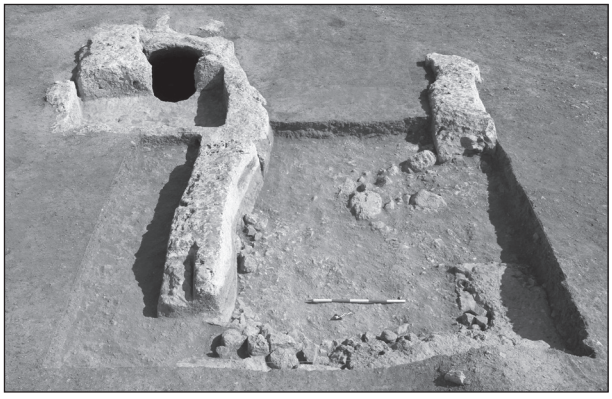
The main construction materials are large reused limestone blocks intermixed with small packing stones and *terra rossa*. The walls were built directly onto bedrock, which had been cut to accommodate the construction. As seen in Trench 1 (see above), Trenches 3 and 4 (see below), and the rock-cut reservoir in survey Area C of the LAJP 2011 season, cut bedrock was an integral part of construction for the southwestern hilltop (Blanke forthcoming; Blanke *et al.* 2015: 233-235).

The areas within and outside the structure in question both had significant amounts of wall collapse consisting of small to large limestone blocks and architectural elements, mainly door jambs and a single column drum. Surprisingly, very few ceramics and only few objects were found here compared to the other excavation units, of which Trench 3 and 4 yielded a particularly large number of ceramic sherds. This would suggest either that the area was abandoned before the structure collapsed, or alternatively that the room featured a type of usage which did not require a large number of objects. The stratigraphic sequence within the room is quite simple, with distinct differences between silty topsoil and wall collapse comprising stone tumble mixed with hard clay and *terra rossa*.

The finds from the room comprised ceramic sherds, as well as an abundance of partially and fully preserved iron nails. The combination of carpenter's nails found within the lower layers of collapse, mixed with the same type of yellow clay that was used for flooring in Trench 1, suggests that both here and in Trench 1 the roof was constructed of timber beams that spanned the stone arches and were then packed with clay. This would have created a flat roof, which would probably have required some maintenance involving relaying and hardening of the clay. A single bronze coin was found near the surface layer. After fully excavating Trench 2 and revealing the bedrock, no *in-situ* finds were recovered from the surface, which may suggest that the room was abandoned before the walls collapsed. Surprisingly, the floor of the room is cut bedrock. Divots and holes formed by natural erosion had been filled with small packing stones and sealed with stamped clay in order to create an even surface.

This partial section of the structure offers clues as to how the inhabitants of Jarash expanded their residential buildings onto the city's thoroughfares. The dating of the buildings' first two phases is unclear, but the ceramic evidence suggests that the extension was completed towards the end of the sixth or seventh century and saw some form of usage into the Abbasid period.

Evidence found here pertaining to street encroachment may fit Hugh Kennedy's 'From Polis to Madina' model (Kennedy 1985 [see also



10. Trench 3 during first stage of excavation showing cistern and bedrock cuts that were visible on the surface. View towards the east. © LAJP.

Foote 2000]). Depending on the exact function of this room, it is intriguing that a large extension was made onto a thoroughfare where there would have been major foot traffic between the domestic quarter and the major triple-church complex north of the South Decumanus. This would parallel the extensions made in the Jarash *suq* on to the Cardo near the Umayyad mosque (Walmsley *et al.* 2008: 118-121).

A Cistern, a Quarry, a House and a Rubbish Dump (Trenches 3 and 4)

Trenches 3 and 4 are located southeast of the residential building and street that were explored in Trenches 1 and 2 (see **Fig. 5**). Trench 3 takes up 5×5m while Trench 4 measures 10×5m. The trenches were laid out to examine a series of bedrock cuts surrounding a pear-shaped cistern. Several of these cuts were visible on the surface and had been examined in detail as a part of LAJP's survey in 2011 (Blanke *et al.* 2015). Given the location of the cuts and cistern immediately east of the area's main reservoir, it was believed that the cuts would be associated with the water supply leading downhill from the reservoir into the town centre. Excavation commenced to address the relationship between the cistern and the cuts, to examine whether these features were a part of the main water-supply system in southwest Jarash, and to evaluate the chronology and abandonment of this system. The two trenches are located immediately adjacent to each other and are therefore be dealt with below as one unit.

Trenches 3 and 4: Objectives and Pre-Excavation Conditions

The area immediately surrounding the cistern comprises several features that were visible on the surface prior to the excavation of Trenches 3 and 4. These are, a rectangular basin located immediately west of and draining into the cistern; an east-west bedrock outcrop in the northern part of Trench 3 that was formed by long straight cuts - with a rectangular and curved groove on its south face; and a small section of another east-west rock-cut feature located in the southern part of Trench 3 (**Fig. 10**) (Blanke *et al.* 2015: 233-235). The surface conditions mainly comprised an evenly distributed silty soil across the two trenches. Unlike the residential unit explored in Trenches 1 and 2, which was covered in debris and collapsed building material, Trenches 3 and 4 featured an even surface resulting from agricultural activities, as well as recent usage as a football field.

Results and Stratigraphy

Excavation of the bedrock cuts revealed five main phases of use. The first phase comprised the initial use of the area for water collection. Several features are associated with this phase. Most important is the pear-shaped, rock-cut cistern, which is described in detail in LAJP's report on the 2011 survey season (Blanke *et al.* 2015: 233-235). Associated with this cistern are at least two sedimentation tanks that may have served as part of an overflow system in which water was collected in the westernmost tank. From here, water flowed through an overflow channel east into another tank and then into the cistern. It is not clear how water was collected, but comparative material from sites in Jarash's hinterland - as well as in northern Jordan more generally - suggests that rain water was often collected on prepared bedrock surfaces and then directed into cisterns for storage and further use (see, for example, Arce 2014; Baker and Kennedy 2009, 2011).

During the second phase, the water system was partially abandoned, although the cistern and easternmost tank remained in use. Instead, quarrying became the predominant use of this part of the site. This is evident from a series of stepped cut marks on the south, north and west sides of the cistern (**Fig. 11**). It is possible that some quarrying also took place prior its use for



11. Post-excavation overview of Trenches 3 and 4. View towards the west. Note stepped quarry cuts north and south of the cistern as well as doorjamb and rope hole in bottom-left side of photo. © LAJP.

water storage, but this cannot be confirmed from the archaeological remains. In the area's third phase, it was used for domestic purposes, which included a thorough remodelling of the bedrock south and southwest of the cistern. Here, the bedrock was transformed through a series of modifications that created a rectangular room which saw domestic usage as either a stable or modest living quarter. Within the room, modifications included postholes that were cut into the floor, which, combined with deep ledges at the tops of the walls, suggest that it was roofed by a wooden construction (**Fig. 12**). In the eastern part of the room, the bedrock was cut to accommodate a door. A threshold and pivot hole were cut into the floor, while the vertical face of the bedrock was cut to form a level surface. Finally, rope holes were cut into both the exterior and interior of the room, allowing for ceramic vessels to be suspended or to act as tethering points for animals.

It is not possible to date the use of this domestic phase, but its abandonment can be dated from an extensive ceramic deposit which was dumped into the bedrock cuts. During the fourth phase, Trenches 3 and 4 were used as a rubbish dump. These distinct deposits of mainly ceramic material were dumped into the former domestic structure from the fifth to the seventh century. The composition of the ceramic assemblage is described below. Other finds from the rubbish deposit include bones, glass and discarded building material, such as *tegula* (roof tiles), brick fragments and a single fragment of a *pilae* (circular tile from a hypocaust system). The final (fifth) phase saw the area transformed for agricultural purposes. This development entailed moving large quantities of soil to the location (*ca* 0.7m). The soil was then spread across the area to create an even surface. Ceramic sherds dating to the Mamluk period (mid-thirteenth to early sixteenth centuries) were found embedded within the deposits and suggest a *terminus post quem* for the use of this part of the site for agricultural purposes.



12. Detail of room in Trench 3 after completed excavation. View towards the north. Note vertical bedrock, roof-supporting postholes in floor and ledge in upper part of image, as well as two rope holes designed as tethering points or for the suspension of pots. © LAJP.

Preliminary Study of the Ceramic Assemblage from Trenches 1-4

The analysis of the ceramic assemblage was initiated in 2015 and carried out alongside the excavation of the four trenches. The study was completed in 2016. 16,535 sherds were retrieved from the excavation of Trenches 1-4, of which 1,852 were identified as diagnostic (Pappalardo forthcoming). Below follows, first, an outline of the applied methodology and, second, an overview of the ceramic forms retrieved from each trench, accompanied by a brief discussion of what this material means for our understanding of the dating and use of each area.

Methodology

The first stage of pottery processing was the setting-up of a recording system, which entailed creating an Excel spreadsheet for preliminary classification of ceramic sherds. Sherds from the same trench and locus were grouped according to ware, fabric, colour and - if possible - shape. At this stage, the different wares were identified based on their function (*e.g.* table, storage or cooking wares). From here, several categories of sub-ware were identified based on fabric (*e.g.* orange-red ware, light grey ware *etc.*), technical aspects (*e.g.* handmade, wheelmade) and shape (bowls, amphorae, lamps *etc.*) (see **Table 4**). Following this initial identification, all diagnostic sherds were marked with a unique identifier comprising trench, locus and a progressive number in order to identify the specimen in drawings and photos. Furthermore, all diagnostic sherds were photographed, drawn and recorded in detail in a designated FileMaker Pro database.

Trench 1

2,515 sherds were retrieved from the excavation of Trench 1. This assemblage can be

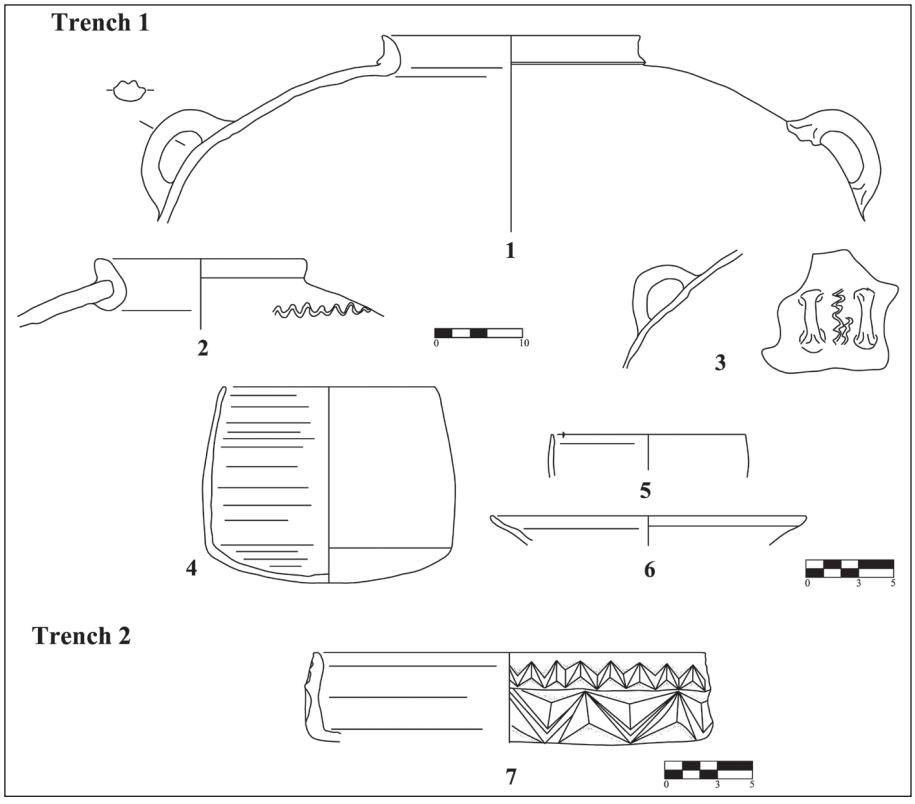
Table 4: Wares and subwares identified according to their functional aspects, then according to fabric and technical aspects.

Ware	'Subware'
Table, storage and food-processing wares (common wares)	**O-RW**: Orange-red ware; wheel-made (local fabric); Munsell 2.5 YR 7/6; 6/6; 5/6. Inclusions: tiny-small, few, lime; tiny, very few, grits.
	LGW: Light-grey ware; wheel-made (local fabric); Munsell: 5YR 6/1; 5/1. Inclusions: tiny-small, few, lime; tiny, very few, grits.
	LBW: Light-brown ware; wheel-made (local fabric); Munsell: 7.5 YR 7/6–5/6. Inclusions: tiny, very few-few, grits.
	NLF: Not local fabric (in this case, the colour, the inclusions, and the technical aspect should be specified).
	LBH: Light-brown ware; handmade (local fabric); Munsell: 7.5YR 6/6. Inclusions: tiny, very few, grits; tiny, very few, voids.
	LGH: Light-grey ware; handmade (local fabric); Munsell: 5YR 6/1; 5/1. Inclusions: tiny, very few, grits; tiny, very few, voids.
Cooking ware	**O-RWC**: Orange-red ware; sometimes tempered with quartz (cooking local fabric); Munsell: 2.5 YR 7/6; 6/6; 5/6.
Table wares (fine wares)	**Jerash Red Slip**: Munsell: 2.5 YR 6/8 (Uscatescu 2001)
	Jerash Bowls: Munsell: 2.5 YR 6/8 (Watson 1989)
	African Red Slip
	Eastern Sigillata
	Other types of fine ware
Transport wares (amphorae)	**O-RW**: Orange-red ware; wheel-made (local fabric); Munsell: 2.5 YR 7/6; 6/6; 5/6. Inclusions: tiny-small, few, lime; tiny, very few, grits.
	LGW: Light-grey ware; wheel-made (local fabric); Munsell: 5YR 6/1; 5/1. Inclusions: tiny-small, few, lime; tiny, very few, grits.
	LBW: Light-brown ware; wheel-made (local fabric); Munsell: 7.5 YR 7/6–5/6. Inclusions: tiny, very few-few, grits.
	NLF: Not local fabric (the colour, the inclusions, and the technical aspect should be specified).
Storage ware (coarse ware)	**LBH**: Light-brown ware; handmade (local fabric); Munsell: 7.5YR 6/6.Inclusions: rich in small,–medium and large–lime inclusions; Sometimes with vegetal, and chamottes inclusions. Dark-grey/grey core.

roughly divided between two contexts: a deposit associated with the use of the room that was sealed by the collapsed roof and walls (960 sherds), and sherds found within the collapse and upper layers that were not directly linked to the building's occupational phase (1,555 sherds). Of these contexts, the sherds found within the sealed deposit proved to be the most informative and will be the focus of the following paragraphs.

The 960 sherds retrieved from the sealed deposit mainly comprised 22 highly fragmented, but almost complete, vessels with only few sherds from other ceramic vessels. Most were large handmade pithos-style storage vessels (**Fig. 13**:1-3). They are characterised by large globular bodies with elbow-shaped handles and inward folded rims. The fabric is mainly red-orange with a grey core and lime inclusions, and a light orange slip on the exterior surface. Other types are the multi-handle pithoi, some of which show incised combed decoration on the body or on the edge of the rim. Several other types of storage jar were retrieved from the context (see Pappalardo forthcoming for a full overview of the assemblage). Comparanda from Jarash and other sites in northern Jordan suggest that the large storage pithoi were produced into the seventh or early eight century, but continued in use well into the later eighth or ninth centuries (for Jarash, see Lichtenberger *et al.* 2013: 40; Uscatescu 1996: fig. 97; for al-Ḥumaymah, see Amr and Schick 2001: fig. 6-7; for Umm ar-Raṣāṣ, see Alliata 1991: fig.17.1; for Tall Ḥisbān, see Gerber 2014: fig. 6; for Capernaum, see Loffreda 2008: Type ANF 27, 151, DG 103:1-12; DF 829).

The most noteworthy vessel from the sealed deposit is a black polished bowl, which (albeit fragmented) is almost completely preserved (**Figs. 13**:4**, 14**). The bowl has a straight rim and body with a curved base. The shape is comparable to ceramic vessels retrieved from excavations in Pella (Walmsley 1995: fig. 5, n. 10-11), Mahesh (Whitcomb 1989: fig. 4:a-e), Jerusalem (Magness 1993: FBW form 1D [4] – FBW form 1E [2-4]) and Capernaum (Loffreda 2008: PIAT 72, DG 262 n. 5, 8) where it has been dated to the late eighth or ninth centuries, which provides a *terminus post quem* for the collapse of the building. The black fabric with a polished surface is a distinctive trait of these bowls, which led Jodi Magness to suggest that they are imitations of the more valuable stone or metal bowls (Magness 1994: 200). Sherds from two further vessels made from the



13. Pottery form Trench 1: 1-3: Pithoi; 4-6: Black polished bowls. Pottery from Trench 2: Cutware bowl. © LAJP.



14. Black polished bowl found in the sealed occupational deposit in Trench 1. © LAJP.

same black fabric with a polished surface were retrieved from the sealed deposit (**Fig. 13**:5-6).

Trench 2

The excavation of Trench 2 revealed by far the lowest quantity of sherds, comprising a total of 498 with only 67 diagnostic specimens. Unfortunately, the diagnostic sherds are highly fragmented, but it has been possible to identify several handmade basins. Among the notable ceramic finds is an almost complete profile of a shallow bowl with a vertical body, flat base and distinct triangular carved design commonly known as Cutware or Kerbschnitt (**Fig. 13**:7), which is typical of the late eighth or ninth centuries (Bessard 2013: fig. 14; Walmsley *et al.* 2008: 133-134; Uscatescu 1996: fig. 108, n. 754-755; Gawlikowski 1995: fig. 9-10). The bowl testifies that some activity took place here into the early Abbasid period.

Trenches 3 and 4

The ceramic assemblage from Trenches 3 and 4 comprised an impressive 13,522 sherds, of which 1,570 are diagnostic. By far the most informative context was associated with the area's fourth phase when it was used for rubbish disposal (see section on Trenches 3 and 4 above). Concentrated in the westernmost part of the trench were 1,004 sherds with 230 diagnostic specimens, many of which were preserved to almost complete forms. The deposit yielded 66 almost identical juglets with a flared rim, cylindrical neck, globular body, flat or disc shaped base and with a vertical handle running from the neck to the shoulder (**Fig. 15**:1-3). The juglets vary in height from 9 to 11.5cm, with a diameter of 2.5 to 3.5cm. The fabric is almost fine with scattered small, lime inclusions and the occasional inclusion of grit. The colour is not homogenous, but varies from shades of brown, red and grey (Munsell chart 7.5 YR 4/4, 5YR 5/8, 5YR 5/2), which probably results from the firing process. Parallels for this type of juglet were found in contexts excavated in Jarash's northwest quarter (Lichtenberger *et al.* 2013: 32, n. 76), in the Macellum (Uscatescu 1996: Group XXIV-XXVI, fig. 78, n. 440), in the intermediate terrace of the Artemis Sanctuary and in the Propylaea Church (Parapetti 1986: 183, fig. 9.5; Sepio and Baldoni 2010: fig. 10, n. 5). These comparative examples suggest a fifth- or sixth-century date of production.

Thirty-nine specimens of a type of large basin were also retrieved from this context. The basin has an ovoid-shaped rim, an almost vertical body and ranges in diameter from 40 to 50cm (**Fig. 15**:4). The colour is light brown to greyish (Munsell chart 5YR 6/3). Comparative material from Jarash and Pella suggests that this type of basin was produced from the sixth century into the early seventh century (Uscatescu 1996: Group XLII, fig. 99, n. 668-671; Smith *et al.* 1992: Pl 110, n. 12).

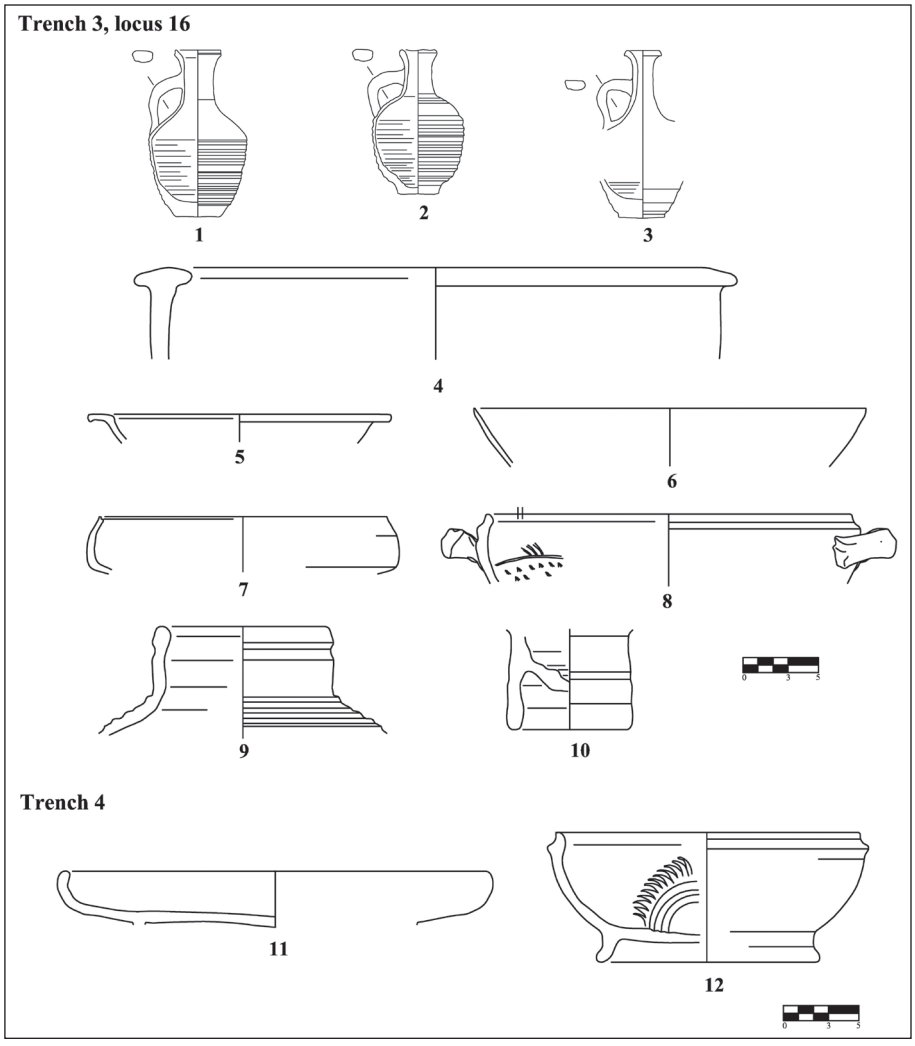
The homogeneity of this assemblage is important, suggesting perhaps that the rubbish deposit represents discard from a local shopkeeper. Given the completeness of the vessels and lack of ceramic wasters, there is no indication that the material derives from a production site. A number of other specimens found within the rubbish deposit suggest that vessels belonging to a domestic assemblage were also discarded here. The fine-ware assemblage included eight sherds of African Red Slip Ware A and C (Hayes 3 and Hayes 50A [see Bonifay 2004: 156, type 2]; Hayes 1972: 69), as well as three sherds of the locally produced Jarash Red Slip Ware, one of which is the local version of Hayes 50 (**Fig. 15**:5-6) (Uscatescu 2001: form 2).

The common-ware assemblage comprised at least 20 bowls, four of which are of the same shape with a carinated body and bifid rim (**Fig. 15**:7). These bowls probably belong to the Roman tradition, as they are mainly attested in the late Roman contexts. The type is comparable in shape to bowls found in the Macellum area and on the intermediate terrace of the

Artemis Sanctuary (Uscatescu 1996: fig. 38, 18-21; Fontana 1986: fig. 9, n. 4). The carinated-bowl type is attested at Pella where it has been dated to the third or fourth centuries (Smith *et al.* 1992: pl. 108, n. 12). Among the cooking ware, the most noteworthy vessel is a casserole with a cut rim and horizontal handle with an incised decoration representing a stylised fish (**Fig. 15**:8). The decoration is fragmentary but was identified on the basis of comparisons with vessels found in Capernaum (Loffreda 2008: 169, DG 155.1.b, 2). Finally, ten body sherds and five handles from imported amphorae were found. These comprise the Late Roman 5/6 amphora with cylindrical neck and rounded rim. (**Fig. 15**:9). Parallels for this type of amphora are found at the Propylaea Church (Sepio and Baldoni 2010: fig. 2, n. 13) and at the Macellum (Uscatescu 1996: fig. 94, n. 611, Group XXX-VII). The bottom of a Kapitän 2 amphora was also retrieved from this context (**Fig. 15**:10) (Sciallano and Sibella 1994: 99).

Overall, the ceramic material retrieved from this part of the rubbish deposit ranges in date from the fifth to sixth century, but it is important to underline the presence of vessels that can be dated to the fourth century, comprising *ca* 10% of the total assemblage.

Importantly, the eastern part of Trenches 3 and 4 reveal a similar rubbish deposit, although here the date range is somewhat later than its western counterpart. The ceramic sherds, which mainly date to the sixth and seventh centuries, comprise a similar composition of material deriving in part from a shopkeeper's assemblage and in part from a residential context (see Pappalardo forthcoming for a full overview of the assemblage). This eastern section of the rubbish dump contained, for example, 74 specimens of the so-called Jarash bowl, two of which were almost complete (**Fig. 15**:11-12) (Uscatescu 1995: type 32A and 19D).



15. Pottery from Trench 3, locus 16 (rubbish deposit): 1-3: Juglets; 4: Handmade basin; 5: African Red Slip Ware (Hayes 3); 6: Jarash Red Slip Ware (imitation of Hayes 50); 7: bowl with bifid rim; 8: Casserole with incised decoration; 9: Not local fabric amphora, late Roman 5/6 type; 10: Not local amphora, Kapitän 2 type. Pottery from Trench 4: 11-12: Badly fired Jarash Bowls. © LAJP.

Concluding Remarks

LAJP's seasons in 2015 and 2016 have significantly increased our understanding of urban development in Jarash's southwest district. In summary, the most important discoveries concern the street system and continuous residential use of the area well beyond the mid-eighth century earthquake. The geophysical examination revealed two street systems. One (located in the western part, towards the city wall) followed the Roman grid system while the other (located in the eastern part, towards the congregational mosque and city centre) followed a different, (by comparison) almost diagonal orientation. Archaeological investigations in the city centre by the Islamic Jarash Project between 2002 and 2010 uncovered a bathhouse that occupied the southwest corner of the intersection of the Cardo and South Decumanus from the fourth to the late seventh or early eighth century (previously described in publications as the Central Bathhouse [see, for example, Blanke 2015, 2016, forthcoming]). Here, excavations revealed that the Central Bathhouse was built to accommodate two converging alignments. The northern part of the bathhouse was orientated to the grid defined by the Roman street system (*i.e.* the Cardo and South Decumanus), while the bathhouse proper was aligned *ca* 30 degrees off this grid to follow the diagonal streets. This suggests that an earlier street system already existed west of the bathhouse prior to its construction. Thereby, the diagonal streets pre-date the remodelling of the city in the Roman period and the introduction of the orthogonal street system (discussed further in Blanke forthcoming). Residential buildings located to the west of the mosque that were rebuilt after the mid-eighth century earthquake also align with this grid, confirming its longevity (Rattenborg and Blanke 2017).

The excavations on the hilltop have established that urban life continued here well into the Abbasid period. This discovery is important as it demonstrates how not only the city centre was rebuilt after the earthquake, but also that residential life was resumed in large parts of Jarash's southwest district. The excavation of a storeroom in a domestic house in Trench 1 provides some information on the organisation of daily life within a residential setting, while also emphasising the continuing occupational history well beyond the mid-eighth century. Further examinations are required to establish the date and circumstances under which this part of Jarash was finally abandoned.

Examination of the bedrock cuts in Trenches 3 and 4 brought further evidence for the longevity and complexity of this part of the city, revealing that the hilltop in Jarash's southwest district was first used for the purposes of quarrying and water collection. Only at a later date were streets and buildings constructed here to incorporate the area into the city's urban fabric. The rubbish deposits are important as they suggest both residential and commercial usage, with the latter being represented in the ceramic assemblage, much of which seemingly derives from a shopkeeper's discarded collection.

LAJP's 2017 season saw further exploration of Jarash's water supply, street systems and residential areas. The results of the 2017 season will be reported separately in the coming issue of the ADAJ.

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AL- MASARRĀT CAVE TOMBS: PRELIMINARY OSTEOLOGICAL REPORT

Abdalla Jamil Nabulsi, Romel Gharib and Ahmad Lash

Introduction

al-Masarrāt (ash-Sharqiyyah) is a small village in az-Zarqā District, about 17km northeast and 20km north of the cities az-Zarqā and ʻAmmān respectively. It is located between the fertile Eastern Heights and the arid desert to the east. Between 2002 and 2006, a number of excavations were undertaken by a team from az-Zarqā office of the Department of Antiquities (DoA). They uncovered some architectural structures of settlement(s) dating from the Roman/Byzantine periods until present times. During the third season of excavations in 2004, eleven disturbed tombs were discovered; eight of which were cave tombs (**Fig. 1**). The cave tombs ("hypogea" were cut into the limestone hillsides, each with six to eight burial niches and some with multiple rooms. The tombs dated from the Roman to the Early Byzantine periods as indicated by associated archaeological material from these tombs, *e.g.* coins, pottery and glass (Gharib 2004:29). The cave tombs show similarities to a multitude of similarly dated tombs in different parts in and around Jordan (*e.g.* Harding 1950; Kritzeck and Nitowski 1980; Tal 2003; Badawi 2007; Daszewski 2008; Abu-Shmeis and Nabulsi 2009; Nassar 2012). A DoA rescue excavation was undertaken under difficult conditions, from June to August 2004 to recover the archaeological and skeletal material from the al-Masarrāt cave tombs. This report outlines the results of the osteological analyses that were carried out on the salvaged human skeletal remains from these tombs as well as further information about other related finds.

Sorting of the skeletal material lead to the exclusion of some remains, mostly from Tomb-4 and 6, that were obviously from recent burials, *i.e.* a few centuries old. These were excluded from analyses and properly re-buried [The authors share the opinion that as well as not being covered by the Antiquities law or guidelines, the handling (study) of recent human burials is not legally, hence scientifically, covered]. The remaining skeletal remains for analyses were from multiple *loci* associated with Tomb-1, 2, 3, 7, and 8. None came from the remaining six tombs. The material is strongly fragmented, although many small compact bones, *e.g.* tali and patellae, are in relatively good condition. A left ulna is the only intact long bone. There is an over-representation of the small hand and feet bones, which in some cases made up more than 25% of the available skeletal material from a single locus! Cranial, and bones from the upper body parts, including the vertebrae, are underrepresented or uninformative. For the analyses, material retrieved from the same locus on different days (pails) was treated as one but was separately examined and stored. The material was macroscopically examined for some demographic parameters, including estimating



1. Entrance to Tomb-1 (graphic: Lash [all other graphics by first author]).

age at death and sex determination, anatomic variations (according to Berry and Berry 1967; Fennigan 1978; Hauser and de Stefano 1989), and pathological features. Some osteometric measurements (Bräuer 1988) were carried out but are not included here.

Demography

The obtained skeletal material clearly indicates the incidence of multiple burials in each locus of the five excavated cave tombs at al-Masarrāt. The fragmentary state of the material restricted the allocations to specific individuals. Therefore, the count of the most frequent bone part of one side was applied to determine the minimum number of adult individuals in each locus. In some cases, this was confirmed by a second anatomical part, while in a few others divergent measurements (size) of the corresponding bone part from the opposite side were taken into consideration. The data presented here are based on accumulated observations of single bone parts and not individuals.

Determination of possible sex and age at death was restricted to the presence of more than one marked feature, primarily of the lower jaw (mandibular), cranial, pelvic, and long bones. Variable bone growth features were the most discriminant in determining the number and possible age of the sub-adult burials, but sex was less determinable for this group. This method of analyses might lack some accuracy, but it was the only possible for this material. The results presented at **Table 1** show the distribution in the age groups and the possible number of males and female burials in each group for each tomb. Adults were assigned to two age groups. The identifiable numbers of 18-40 year olds are associated with the population's fertility, while those above 40 years of age might reflect life expectancy within the community. The sub-adults groups reflect the differentiated child mortality within the population concerned. The resulting estimations suggest that at least 179 individuals were buried in the five tombs, 95 adults (35 males and 24 females) and 84 sub-adults (4 males and 9 females). About half of the adult burials remain of unknown sex or age at death. The estimated minimum number of burials varied from eight in Tomb-7 to 52 in Tomb-2. There were also variations relating to possible genders and child mortality ratios. The lower ratio of possible adult females was most likely related to the more robust and thus better preserved male bones. Most of the above 40 years age group were estimated to have survived beyond the age of 50 years. The total count of sub-adults was probably underestimated due to the method of determination and the fact that children's skeletal remains, infants in particular, are more vulnerable to deterioration than those of adults. The data revealed that the majority of child mortality was among those between one and ten years of age, but mostly

Table 1: Age and sex distributions obtained from the examined skeletal remains of the burials in the five al-Masarrāt cave tombs (M: male, F: female).

Age Group	Tomb 1	Tomb 2	Tomb 3	Tomb 7	Tomb 8	Total
Infant	7	5	3	0	0	15
1-10y	14 1 M/1 F	17	9 2 M/1 F	2 1 F	5 3 F	47 3 M/6 F
11-17y	5	6 2 F	6 1 M/1 F	0	5	22 1 M/3 F
All sub-adults	26 1 M/1 F	28 2 F	18 3 M/2 F	2 1 F	10 3 F	84 4 M/9 F
18-40y	2	1 1 M	5 2 F	2 2 M	5 3 M/1 F	15 6 M/3 F
>40y	5 4 M/1 F	10 5 M/3 F	8 4 M/3 F	1 1 M	6 5 M/1 F	30 19 M/8 F
Unknown age	17	13 2 M/3 F	9 2 M/1 F	3	8 2 M/1 F	50 6 M/5 F
Total adults	24 4 M/1 F	24 8 M/6 F	22 6 M/6 F	6 3 M	19 10 M/3 F	95 31 M/16 F
Totals	**50** **5 M/2 F**	**52** **8 M/8 F**	**40** **9 M/8 F**	**8** **3 M/1F**	**29** **10 M/6 F**	**179** **35 M/25 F**

among those who died before reaching the age of six years. It appears that if a child managed to survive past the first five or ten years, he or she would very likely live well beyond the age of 40 years.

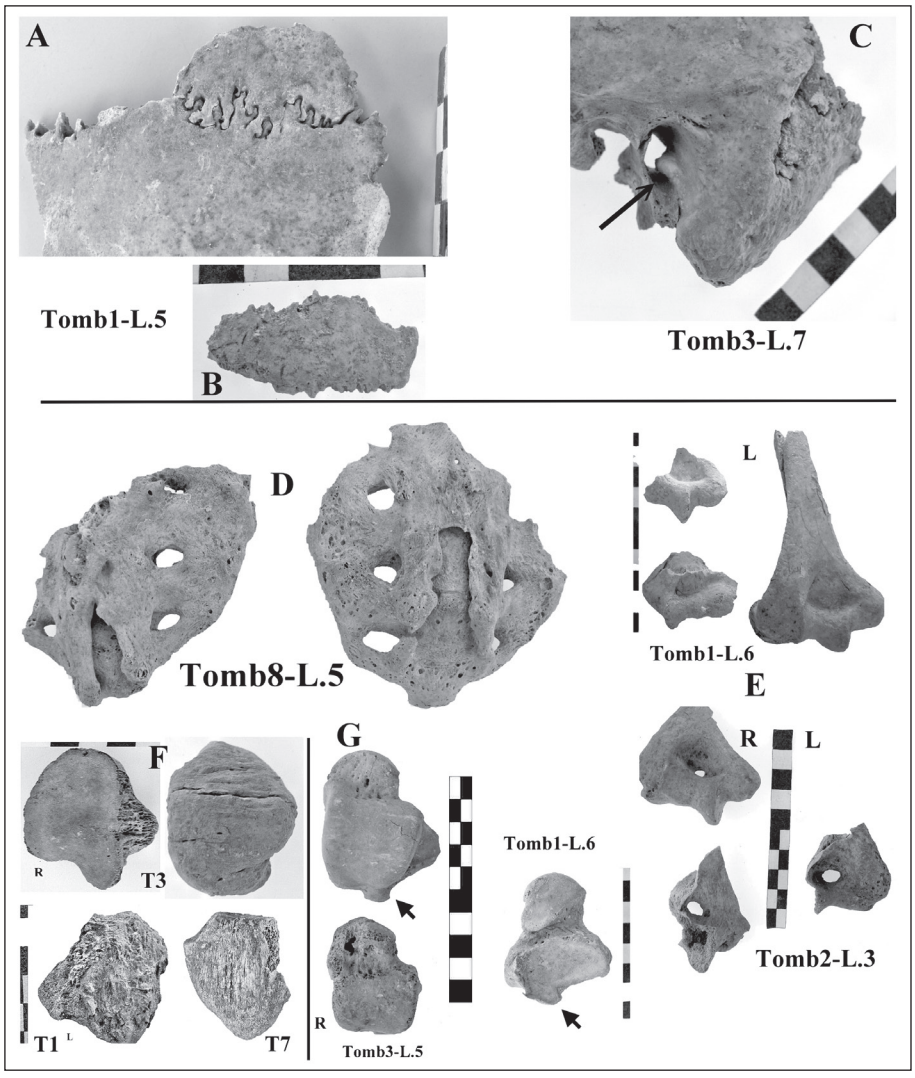
Biological Characteristics

Osteometric measurements were obtained from skeletal parts of unknown sex. Since they are known to display strong sexual dimorphism, they were only applied to differentiate between burials and are not considered further here. A number of epigenetic (normal anatomic) variants were documented. These traits are largely hereditary and tend to be evenly distributed with some exceptions among both sexes, (Hauser and de Stefano 1989; Czarnetzki 2001). The available skeletal material allowed for the documentation of some of these traits. Their presence or absence on the examined bones per tomb, regardless of body side, is listed at **Table 2**. Despite their limitations, the available data provide some significant observations.

In Locus-5 of Tomb-1, a relatively large elongated and nearly rectangular sagittal ossicle was part of the incomplete cranial parts of an adult and a two to five year old child (**Fig. 2a, b**). Both are almost of similar shape and size (adult 45x25mm; child 41x22mm). Anatomically, the ossicles appear to be part of the right parietal bone connected with the left one just above the lambda point. These features discriminate the two cases from those reported elsewhere in terms of position, size, and shape (*e.g.* Khan *et al.* 2011:293). Though the heritability of cranial ossicles was suggested to be low (Bennett 1965; Hauser and de Stefano 1989:84-87), the resemblance in shape and incidence of the sagittal ossicles in the same locus suggests that their bearers could be related. Auditory torus exostoses, bone outgrowths in the ear canal (**Fig. 2c**), were present in the temporal bones of at least two individuals from Tomb-1 and 3. The trait has been linked to cold water exposure in marine resources exploiting populations (*e.g.* Kennedy 1986; Mazza 2016:428). The cases from al-Masarrāt, located on the fringe of the arid eastern Jordan, contradict such a suggestion. Hence, the trait appears to be influenced by biological rather than environmental factors as earlier suggested (*e.g.* Hutchinson *et al.* 1997; Godde 2010:488). The third trait is spina bifida (SB), in which the sacral canal of the sacrum varies from pathologically complete open to normal closed. Amongst the nine examined sacral parts from al-Masarrāt, there were

Table 2: Normal anatomic (epigenetic) variants observed in the human skeletal material from the five al-Masarrāt cave tombs in absolute numbers (also **Fig. 2**). The table reflects the state of available skeletal material (v: the absolute number observed; n: total examined bone parts; ?: uncertain case).

Tomb Trait	Tomb 1 v/n	Tomb 2 v/n	Tomb 3 v/n	Tomb 7 v/n	Tomb 8 v/n	Totals v/n
Metopic suture	1/3	0/3	0/1	0/2	0/1	**1/10**
Suprameatal spine	2/3	7/9	3/4	0/1	2/2	**14/19**
Suprameatal depression	2/3	3/9	3/4	0/1	2/2	**10/19**
Auditory torus exostoses	1/3	1? /9	1/3	0/1	0/1	**2+1?/17**
Sagittal ossicle	2+1?					**2+ 1?**
Squamo-mastoide suture	1/3	3/8	3/4	1/1	2/2	**10/18**
Mastoid foramen	1/2	7/8	3/4		2/2	**13/16**
Lambdoid ossicle	1/1		1/1		1/2	**3/4**
Bilateral parietal foramen	1/3	2/4	0/1		3/4	**6/12**
Molar carabellis	1/19	4/94	1/41	1/13	1/25	**8/192**
Ponticolus atlantis	2/5	0/2			1/2	**3/9**
Divided atlas articulation	1/4		1/2		0/2	**2/8**
Cervical transvrs. foramen	10/14	1/5			1/5	**12/24**
Septal aperture	3/19	3/7	3/16	0/2	0/5	**9/49**
Stieda's process	5/11	6/13	16/22	1/1	2/5	**30/52**
Patellar variants	1/3	3/9	3/7	1/1	0/1	**8/21**
Spina Bifida	1/1	1/2	1/2		4/4	**7/9**



2. Most relevant examples of the normal anatomic (epigenetic) variants observed in the human bones from the al-Masarrāt cave tombs. |a-b: Sagittal ossicle of an adult and a child; |c: Auditory torus exostoses on the left cranial side (arrow); |d: Mild and medium spina bifida; |e: Absence (upper) and presence (lower) of the septal aperture on the distal end of the humerus; |f: Patellar variants from different tombs; |g: Stieda's process of the talus (arrow) (in all figures, scale in cm if present).

six mild and one medium cases of SB (closure reached the end or begin of the third sacral segment, **Fig. 2d**). Also of interest were patellar variants and stieda's process of the talus. These were obviously more frequent at al-Masarrāt (33.3% and 57% respectively) than reported elsewhere (comp. Scapenilli and Capasso 2000:29; Reddy 2015:60). These ratios appear to suggest gene fixation known to occur in small inbred populations (Corruccini 1974:438).

Though not detailed at (**Table 2**), the available data displayed concentrations of some significant traits in a single locus, as was the case in the sagittal ossicles, septal aperture of the humerus, and mild SB, while in others, *e.g.* patella, Stieda's process, they were distributed between the different *loci* of the five tombs (**Fig. 2d-g**). These observations can hardly be random. Hence, it might be possible to argue that burials in single *loci* belong to members of a nuclear family affiliated to an extended family or clan that used the tomb as a 'familial' burial place. Also, the different tombs could represent the different clans or lineages of a small interrelated, multi-lineal, and endogamic population at a given time. These assumptions, though highly speculative, might be considered to reflect a social organization that does not differ much from the one that prevailed regionally and locally in past (*e.g.* Joffe2002:454; van der Steen 2002:10-33, 81-86) and present times (*e.g.* Falah 1982:286; Nabulsi 1999). Nevertheless, more and better evidence is required to infer on this hypothesis.

Pathology

A total of 456 permanent and 15 deciduous teeth were retrieved from the excavated tombs. Most of these were detached from their sockets. Restricting observations to strong dental

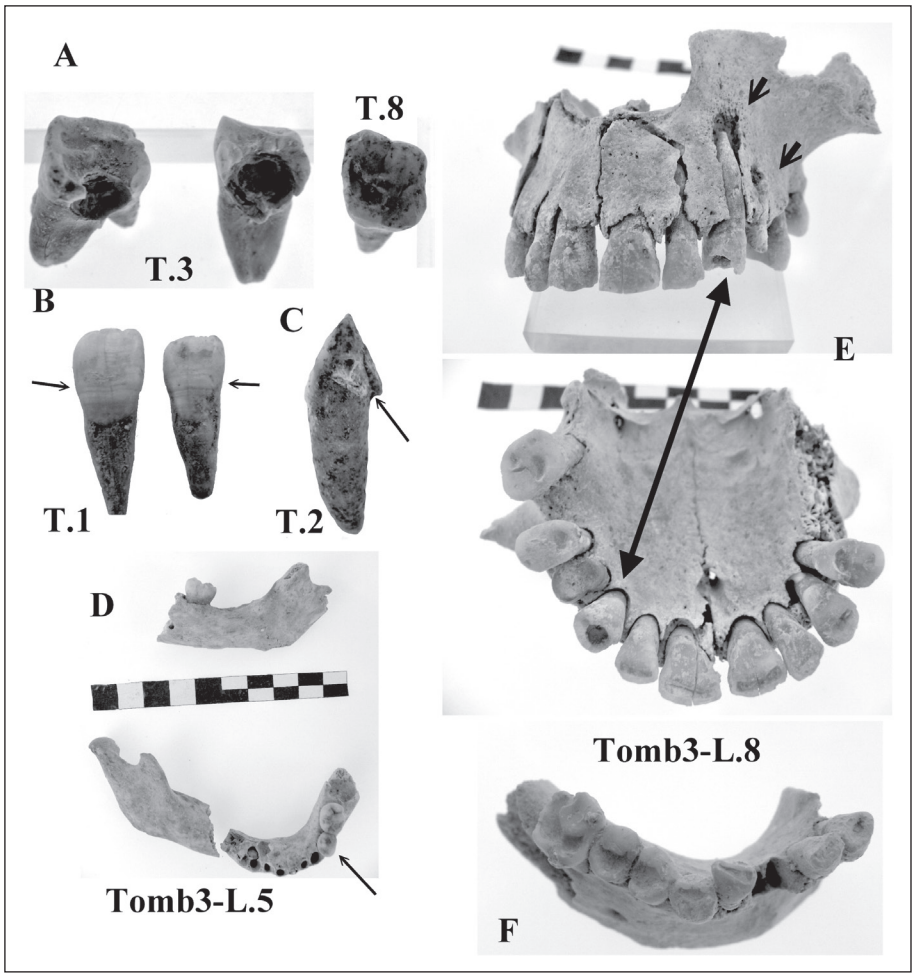
wear (grade 5 or higher) there were variations in the incidence ranging between 20 and 40% of the teeth in each tomb (**Table 3**). Dental wear in some teeth was manifested by cavitation of the chewing surfaces, mostly with no evident caries. Except for Tomb-1, carious lesions were observed in 20-35% of all molars and premolars, and in three canines from Tomb-2 and 3 (*ca.* 12% of all teeth) predominantly in adults. They were present on the chewing surface and/or neck of the infected teeth (**Fig. 3a**). The frequencies were within the reported values of local ancient populations (comp. Albashaireh and Al-Shorman 2010). The incidence of caries was suggested to be common amongst agricultural societies and is usually associated with rich carbohydrate diet, such as white bread, figs. and dates (Roberts and Manchester 1995: 48; Hillson 2001). Fragments from six of seven upper and 14 of 20 lower jaws indicated pre-mortem tooth loss, particularly of molars and premolars, mostly with healed sockets. In some cases apical abscesses were observed. In addition to pre-mortem molar tooth loss in one maxillary bone, there were two abscesses on the left side: at the canine with caries and at the neighbouring premolar, which was broken during lifetime. In both cases the alveolar channel was opened with free access of bacteria (**Fig. 3e, f**). It thus appears that pre-mortem tooth loss and abscesses were not always caries related. Paradontoses was found on some fragments from both jaws. Only few teeth revealed calculus. The incidence of enamel hypoplasia was comparatively low. It was present in only 3% of all available teeth from the al-Masarrāt tombs (*cf.* Griffin and Dolon 2007:216; Perry 2007; Weeler 2012:226). These included 4 canines and 10 incisors from the Tomb-1, 2 and 7. Enamel hypoplasia is usually associated with childhood stress conditions, *e.g.* illness (Hillson 2001:265).The multiple horizontal lines on the enamel of the 14 affected teeth (**Fig. 3b**) suggested multiple stress situations during the first six years of life, as classified by Grupe *et al.* (2015:353, Abb. 8.70).

There were many examples of inflammatory lesions in the sub-adult skeletal material, particularly in infants and children below five years of age (**Fig. 4**). They appeared to be proportionally distributed between the five tombs. The lesions were mostly in the form of new bone formation on the cranial inner surface (meningitis) or on the surfaces and joints of long bones, which is typical for non-specific generalized infection. In one extreme case, the bones were ensheathed with a woven bone layer (**Fig. 4c**). Inflammatory reactions are responses to chronic bacterial infections (Roberts and Manchester 1995: 125; Ortner 2003:179-226). Many childhoods infectious diseases develop within days and if fatal leave no trace on the skeleton. Nonetheless, they were most probably the main factor behind al-Masarrāt's child mortality.

The adult skeletal material provided evidence for at least 25 cases of inflammatory responses to chronic bacterial infections, whereof their incidence was lowest in Tomb-2 (**Table 3**). They included three parietal bones of the skull and 22 long bones, pectorals, and even a metatarsal

Table 3: Absolute numbers of pathological observations made on the skeletal material from al-Masarrāt cave tombs. (C: caries; H: enamel hypoplasia; W: strong tooth wear, n: number, d: deciduous teeth).

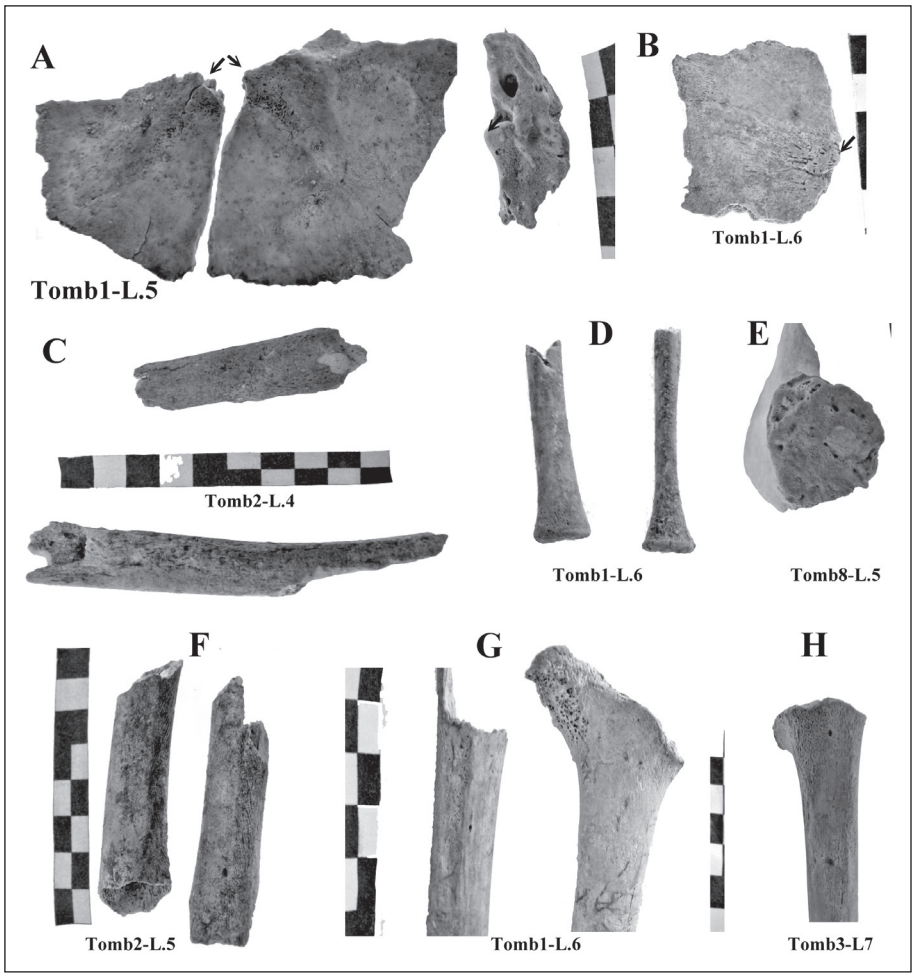
Tomb	**Tomb 1**	**Tomb 2**	**Tomb 3**	**Tomb 7**	**Tomb 8**
Teeth	C-H-W/n	C-H-W/n	C-H-W/n	C-H-W/n	C-H-W/n
Molars	1-0-2/19+3d	19-0-15/94+6d	9-0-7/41	5-0-2/13	5-0-5/25+2d
Premolars	0-0-2/11	9-0-12/54	4-0-13/21	1-0-2/3	0-0-1/6
Canines	0-1-4/14	1-2-14/44+1d	2-0-11/13	0-1-3/4	0-0-1/2
Incisors	0-5-5-/13+2d	0-4-3/42+1d	0-0-9/18	0-1-1/3	0-0-0/1
Totals	**1-6-13/62**	**29-5-44/242**	**15-0-40/93**	**6-2-8/23**	**5-0-7/36**
Traumatic injury	3		4		1
Cribra orbitalia and	2				
Cribra cranii				2	1
Tumour	1	1			
Osteochondroses d.	3	1	3		1
Inflammatory lesion	7	3	7	2	6



3. Dental pathology. |a: Two molars with caries lesions on the neck and a third on the chewing surface (occlusal); |b: Two incisors with enamel hypoplasia (arrows); |c: Tooth calculus on a canine; |d: Lower jaw of a five-year-old child with caries on one premolar (arrow); |e-f: Upper and lower jaws of >40-year-old male with caries and tooth loss. There are two abscesses on the left maxillary canine and 1st premolar (small arrows).

(**Fig. 5a-c**). Periostitis was observed on fibulae in at least nine different burials. In most cases they were localized on the median shaft surface near the proximal epiphyses (**Fig. 5c**). In addition, a juveniles' femoral shaft (Tomb-1) as well as two tibiae (Tomb-2) showed periostitic lesions similar to those found on the fibulae (**Fig. 4f-h**). The localization and distribution of the lesions is typical for treponemal disease (*cf.* Roberts and Manchester 1995:151-9; Ortner 2003:273-319). This was substantiated by two further observations. The surface of a right radius (Tomb-8) revealed a gummatous osteomyelitis in the form of multiple shallow, 3-5mm diameter cavities (**Fig. 5d**). Most of the external surfaces on parietal bones from two burials in Tomb-3 and 7 were covered by 1-2mm porous lesions (**Fig. 5a**) similar to those described by Hackett (1981) as "caries sicca sequence". The most probable form of treponematosis in this arid rural area is endemic syphilis, well known in this region since antiquitiy (Hackett, 1963).

Osteomyelitis was diagnosed on one rib and the mid-shaft of a tibia. In Tomb-1, Locus-14, there was an osteomyelitic lesion on a right humerus at the level of a lateral osteochondroma (benign tumour) and ventral periostitis on a possibly corresponding left humerus. Another osteochondroma was present near the distal end of a fibula from Tomb-2 (**Fig. 6a, b**). In Locus-6 of Tomb-1, a child's and an adult skull revealed an unhealed cribra orbitalia, while cribra cranii with thick cranial wall was observed on fragments from three *loci* of Tomb-7 and 8 (**Fig. 7**). These pathological conditions were often associated with nutritional irregularities and infectious diseases, though others including factors affecting blood circulation are more likely (*e.g.* Facchini *et al.* 2004; Wapler *et al.* 2004; McIlvaine 2015). Analyses of degenerative alterations were limited by the quantity and quality of available articulation (join) surfaces. When present, they were mild on the elbow joints, mostly medium to strong on the articulation surfaces of the shoulders, hip, knees and feet (**Fig. 8**). Degenerative changes were



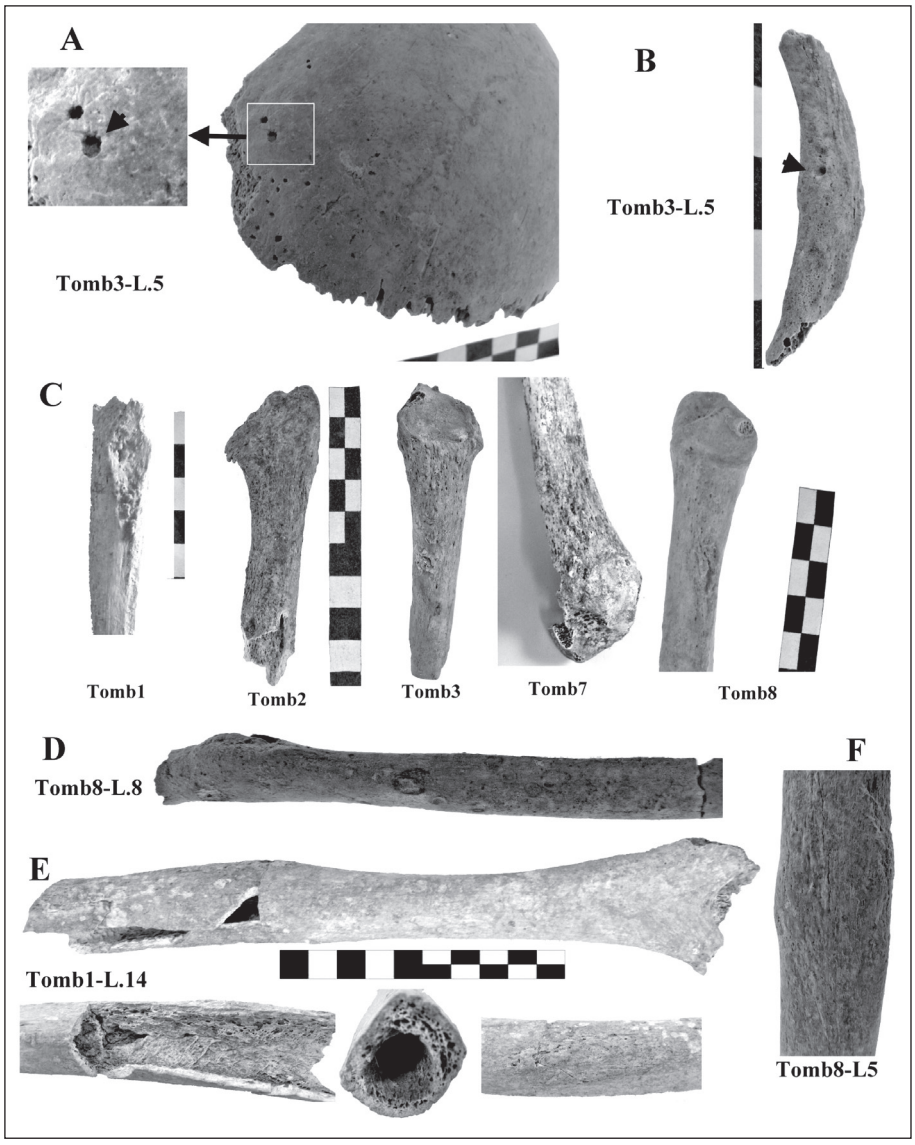
4. Pathological features observed in sub-adults: |a, b: Inflammatory lesions on inner cranial surfaces; |c: Long bones of a ca five-year-old child ensheathed with woven bone; |d: Inflammatory lesions on the long bones of an infant; |e: Inflammatory lesions on a pelvic part of a child <5 years of age; |f-h: Periostitis on the long bones of juveniles (12-17 years of age) from different tombs.

sporadic in the scanty vertebral material. They were strong in some of the first two vertebrae, atlas and axis, and mostly light to medium in the other cervical vertebrae. The thoracic and lumber vertebrae were mostly damaged, although there were two with strong osteophytic outgrowths and at least one with Schmorl's nodes (**Fig. 8a, c**). The observed degenerative alterations seem to indicate physical activity or stress, involving the shoulder and lower extremities in particular. This was substantiated by enthesopathies that formed on muscle insertions of different bones. In this material they were mostly present on ulnae and bones of the lower extremities (**Fig. 9a-c**). A vertebral body and a fragment of a female ilium were the only bone parts with signs of osteoporosis.

Osteochondroses dissecans (OD: pitting of articulation surfaces) excluded, there were a number of healed traumatic injuries, with one exception all from Tomb 3. They included two minor compression fractures on skulls, injuries on two fibulae, fractures of one proximal metatarsal, and near the distal end of a left ulna (**Fig. 6d**). The healing of the fourth metatarsal resulted in its fusion, medially, with the fifth (**Fig. 6e**). Also, a right scapular lateral margin suggests a possible shoulder dislocation. OD was observed on the joint surfaces of at least three patellae and three different feet bones (**Fig. 8g-j**). The surfaces of a number of bones often revealed multiple, short and deep double-line scratches that were probably caused by scavenging rodents (**Fig. 9d**). These are very different from the curved shallow grooves on the lateral surfaces of two tibiae (**Fig. 9e**). These are blood vessels grooves, usually associated with active terrestrial mobility (Sołtysiak 2015:350).

Cremation burials

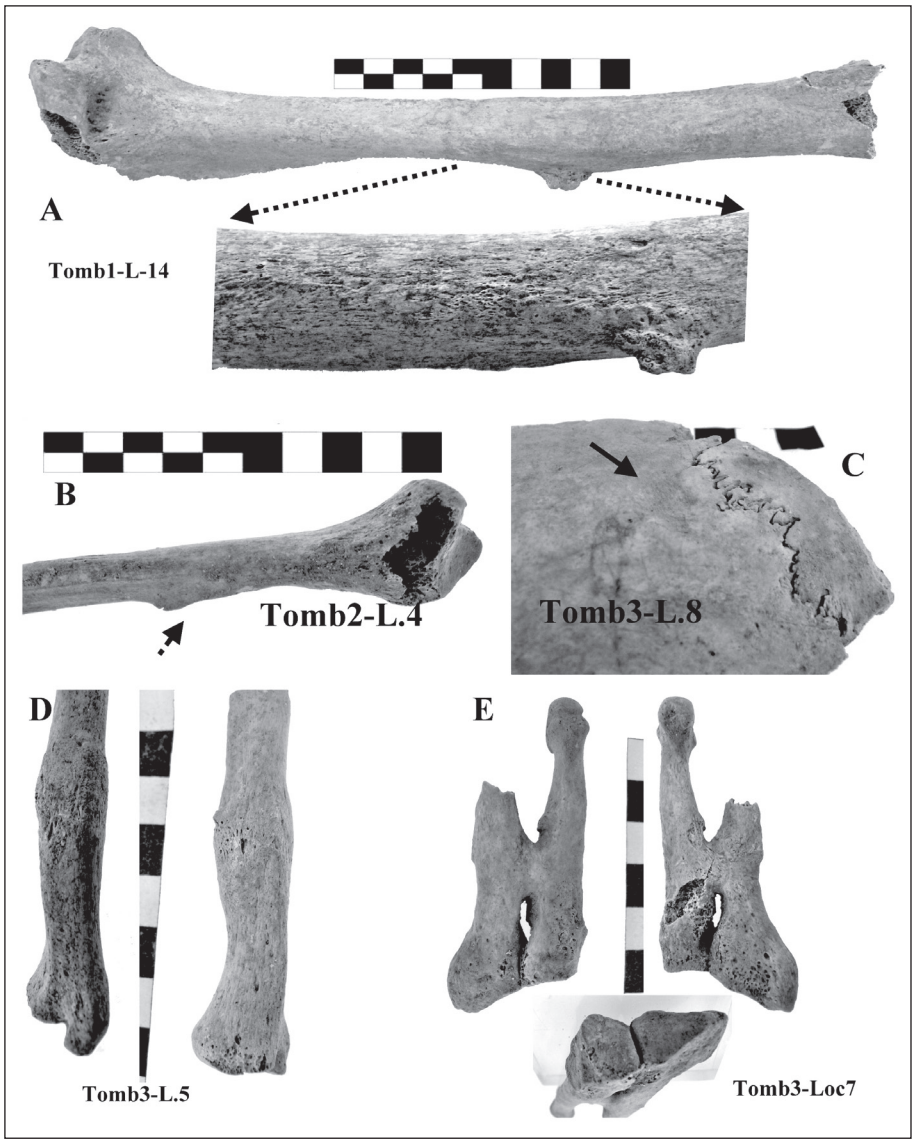
Among the examined human skeletal material there were a number of deformed bone fragments. These were coiled (inwardly bent) with longitudinal, horizontal, and circular cracks on their surfaces. They had a whitish or grey



5. Inflammatory lesions: |a: Caries sicca on the parietal bone with enlarged radiant pores; |b: Osteomyelitis in a rib with pus outlet (arrow); |c: Different fibulae with periostitis; |d: Gummatous osteomyelitis on a right radius; |e: Reconstructed right humerus with osteomyelitis; |f: Osteomyelitis on a tibia shaft fragment.

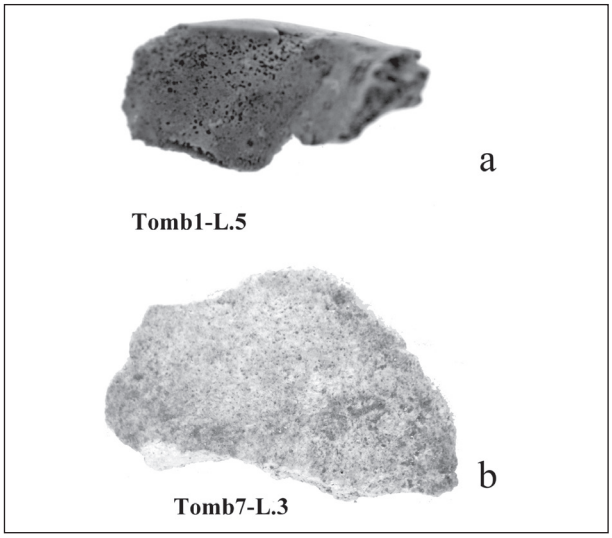
to light blue colour, while others were black or charred. Coiling and cracks in human bones are caused when the corpse is incinerated in temperatures of 700-1100 C° (Grupe *et al.* 215:125-9). It is evident that this was the case in these deformed bones from al-Masarrāt, though some fragments suggested burning temperatures in the lower part of the afore mentioned range. This could be attributed to inexperience and/or insufficient fuel (wood) or other random factors. The archaeological context and available evidence indicate that cremation was practiced by this local community during the Roman period. Cremated human bones were found in three al-Masarrāt tombs: Tomb-2 in six *loci* of 3 rooms, two *loci* of Tomb-3, and one locus of Tomb-8 (**Fig. 10**). This implies that these tombs were in use from at least the 2nd century AD, if not earlier, since the practice of cremation was abandoned in Rome by the end of that century (Toynbee 1971: 50; Morris 1992:31-34). The available cremated bones only allow for the assumption of single cremation burials in each locus, or at least one in each of the five burial rooms of the three tombs, given the disturbed state in which the tombs were found. Thus, the estimated minimum number of burials in the five al-Masarrāt tombs increases to 184 if not 188.

The incidence of Roman cremation burials in and around Jordan is suggested to be rare. So far, there are eight reported cremation burials from six different sites in Jordan. Beside Ibrahim and Gordon (1987:15-18, plate 6) and Al Muheisen and Tarrier (1996), Abu-Shmeis and Nabulsi (2009) reported on four further cases

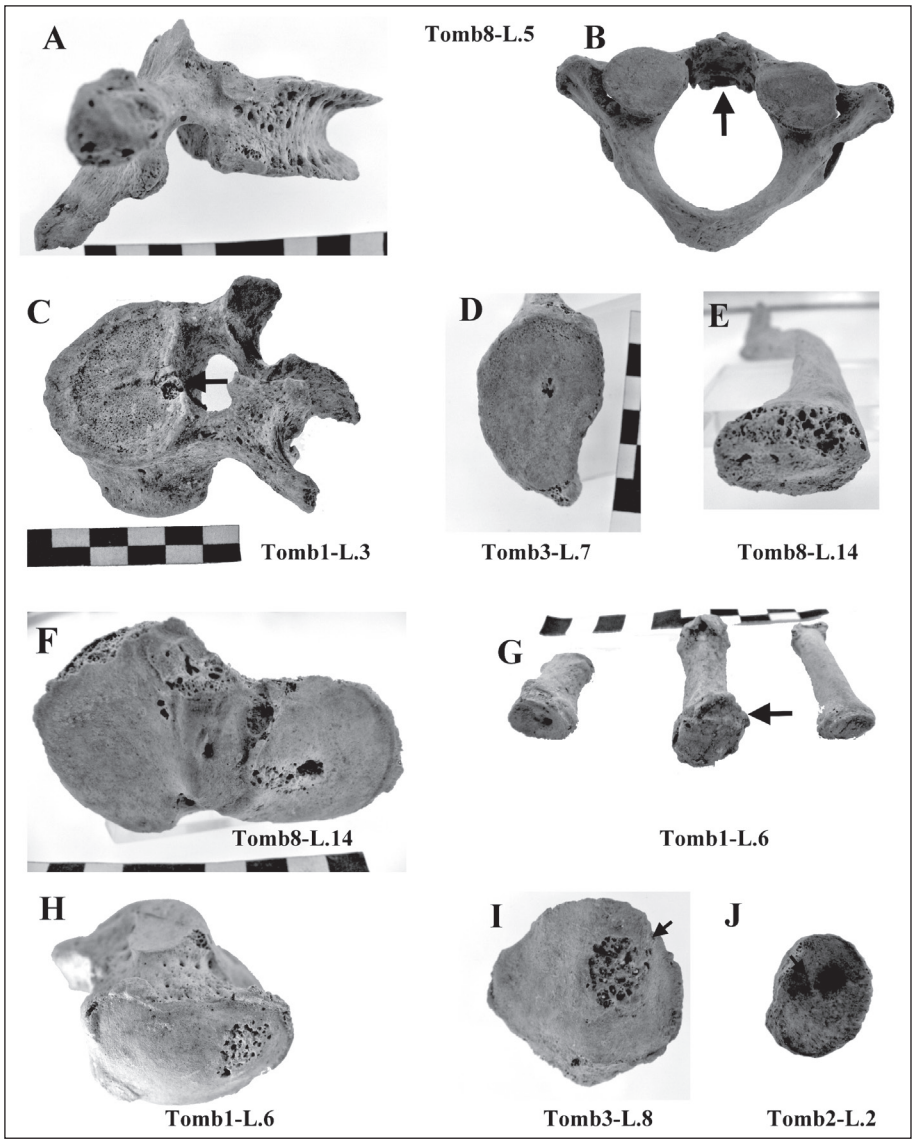


6. Tumours and traumatic injuries: |a: Osteochondroma on a left humerus with periostitis; |b: Left fibula with an osteochondroma (arrow); |c: Small traumatic injury on the left parietal bone; |d: Left ulna with a healed fracture; |e: Healed fourth metatarsal fracture led to fusion with the fifth.

alongside information on Roman cremations in and around Jordan. The majority of the cremated bones were of adults and those in Tomb-8 of a male (**Fig. 10d**). The four cremation burials from Umm as-Summāq al-Janūbī and the Ḥajarah cave tombs in Amman were also reported to be of adult males (Abu-Shmeis and Nabulsi 2009:520-522). These finds were the only cremation remains that were the subject of biological examination. It thus appears that Roman cremation burials in Jordan were restricted to adult males. All previously reported cases were urn cremations, in which pottery or leaden urns were used to store the incinerated human remains. Most of the cremated material from al-Masarrāt was muddy. The bones were obviously scattered on the floor of the burial beds. The original urns, if used, were possibly



7. |a: Cribra orbitale in the right orbita of a five-year-old child; |b: Cribra cranii on an adult's left parietal bone with thickening of the diploe.

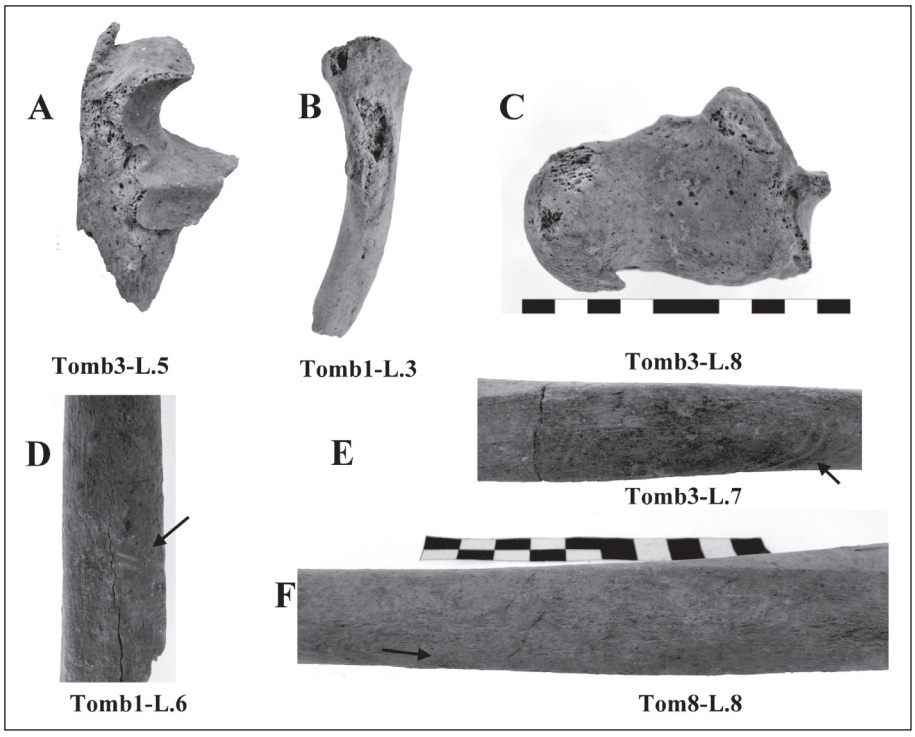


8. Degenerative alterations: |a: Lumbar vertebra with osteophytic outgrowths; |b: Caudal view revealing degenerative changes on the atlas's articulation facet with the axis's dens (arrow); |c: Schmorl's nodes (arrow) on a lumbar vertebra; |d: Glenoid cavity with arthrosis; |e: alterations on the sternal facet of a right clavicular; |f: Degenerative alteration on a right tibia's proximal (knee) articulation surface; |g: Metatarsals with osteochondrosis dissecans (left), healed intra-articular fracture (middle [arrow]) and degenerative features (right); |h: Left talus with arthrosis; |i, j: Osteochondrosis dissecans on a left patella and metatarsal.

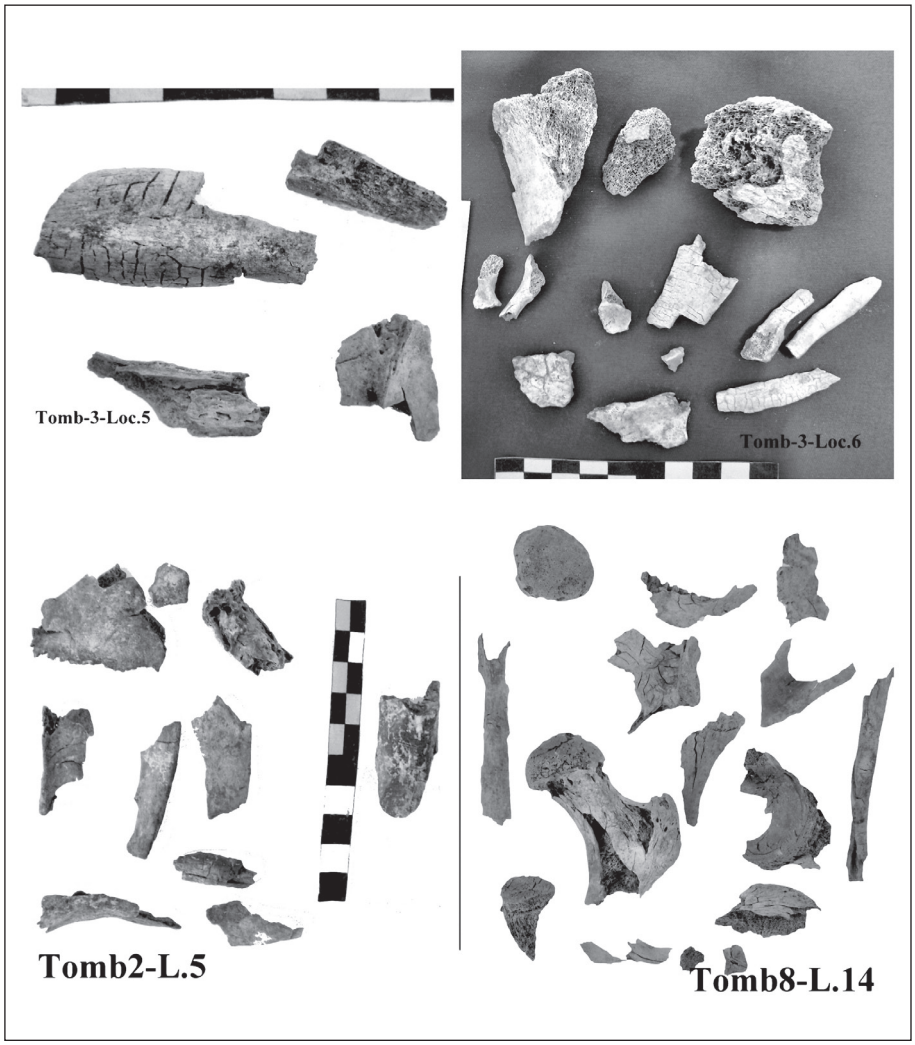
broken or damaged as indicated by multiple pottery fragments (see below) or even reused for other purposes in later times. The cremation evidence implies that some of al-Masarrāt's small agricultural community had the resources to practice this expensive funerary ritual. It can also be understood as an indication of cultural influence in the sense of practising this funerary rite like '*civi*'-lized Romans.

Animal Bone

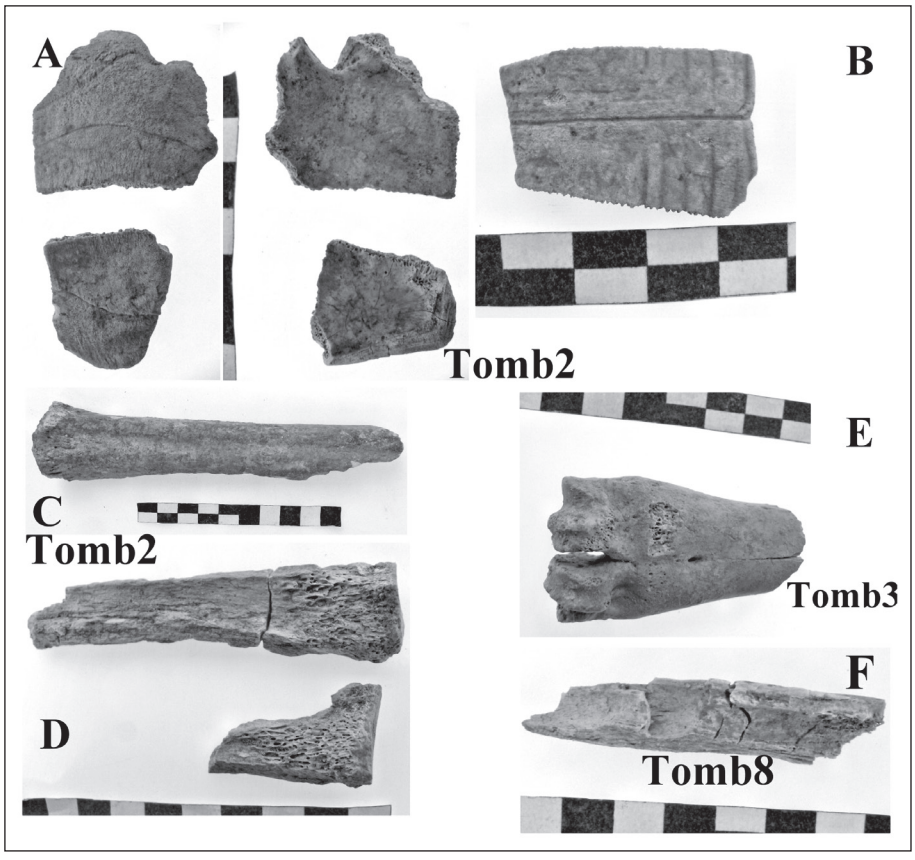
There were two types of animal bone deposits found in the al-Masarrāt tombs. The first included single fragments of sheep and/or goat foot bones found in multiple *loci* of Tomb-2 and 3. Some of these indicated possible cut or butchery marks (**Fig. 11c-e**). This kind of deposits is usually associated with funerary feastings, a practice with a long history in the burial customs of this region (*e.g.* Becker 2002; Al-Muheisen 2008; Al-Shorman and Khwaileh 2011; Beech 2012). A further fragment was found among the cremated bones from Tomb-8 (**Fig. 11f**). This suggests that feasting was also part of the cremation ritual that is known elsewhere, particularly in Roman Europe (Toynbee 1971; Pierce, 1998: Kunst and Doneus 2013:399). There are no similar finds in any of the reported Roman cremation burials from this region. Other animal bones found were accidental and appear not to have been burial related. These included some rodent bones, the presence of which is also evidenced by the aforementioned marks on many of the human bones. Multiple fragments identified as the shells (carapace) of freshwater turtles or tortoises were found among the bone



9. Non-pathological features: |a-c: Enthosopathies on different bones; |d: Rodent bite; |e, f: Blood-vessel impressions.



10. Cremated human bones found in different loci of Tomb-2 and 3; the material from Tomb 8 was of an adult male.

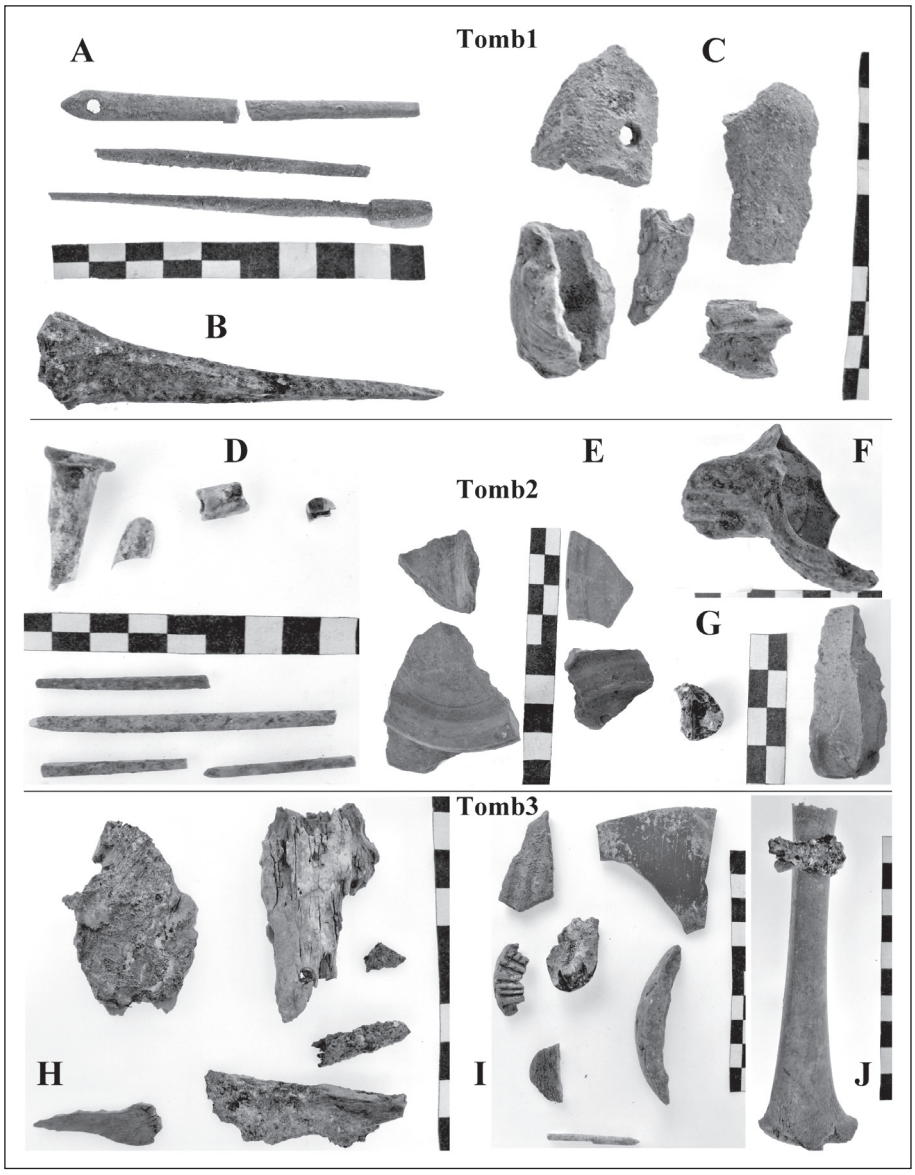


11. Animal bones found in the al-Masarrāt tombs: |a, b: Fragments of freshwater-turtle/ tortoise carapace; |c-e: Goat or sheep tarsal fragments with cut marks; |f: Cremated animal long-bone fragment.

material from Tomb-2 (**Fig. 11a, b**). Though the incidence of these reptiles has been confirmed in some archaeological reports (*e.g.* Simmons *et al.* 1988:38, Grosman *et al.* 2016), the preserved condition of this material suggest a much younger date than that of the human burials. Their presence is possibly related to a total or partial inundation of the tomb. Hence, the disturbances in this tomb at least may have been partially due to natural cause.

Other Objects

Beside the previously reported objects (Gharib 2004:29, 34) fragments of archaeological material were found comingled with the retrieved human remains from al-Masarrāt cave tombs. There were pottery fragments from Tomb-2 and 3, all most probably of Roman date. They included fragments of two red-brown oil lamps, one with a handle and discoid body, the bases of light brown platters and vessels, possibly of 15-25cm diameter, and a body sherd of a typical red Roman vessel (**Fig. 12e, i**). Also, fragments of a handmade earthen object of a yellowish colour were recovered from Tomb-1. This oval shaped object with rough surfaces was of about 9cm length and 4.5cm diameter. There was a 5mm perforation near the top of the narrow end (**Fig. 12c**). The function and date of this closed, obviously man made, spindle-shape object remains unknown. A palm wood fragment of *ca.* 35×50×5mm with a 'rusty' *ca.* 3mm nail perforation, a smaller second one with an iron-rust surface, and a much smaller third one was probably associated with a flat, right angle-bent iron fragment (*ca.* 6×2cm) and two 2mm thick, flat bronze fragments (largest *ca.* 3×1cm). The metal fragments revealed traces of wood on one surface suggesting that all were part of a wooden box, obviously not a coffin (**Fig. 12h**). Personal items found could be of either Roman or Byzantine date. These consisted of multiple bone or ebony needles fragments (perforated end), as well as long hairpins, iron rings and bracelets. Furthermore, there was a fragment of an anklet attached to the distal end of an infant's left tibia in Tomb-3 (**Fig. 12a, d** and **j**), as well as a 'knife' made of animal bone (**Fig. 12b**). Also present were two flints in Tomb-2, which could be evidence of much earlier human activity in this tomb and region (**Fig. 12f, g**), whereby contamination cannot



12. Objects found among the analyzed bones from Tomb-1, 2 and 3.

be excluded. The pottery and numismatics evidence presented previously (Gharib 2004) and here, as well as the evident practice of cremation indicate that the five al-Masarrāt tombs of this report were in continuous use as burial places from the 1st or 2nd century AD up to and not beyond the 4th century AD.

Summary and Conclusion

This report has presented information obtained primarily from human remains recovered from five excavated cave tombs in al-Masarrāt near az-Zarqā'. The fragmentary mix of incomplete skeletal material requires treating these results with caution. Still, the material provides some significant and informative points about the ancient local population under study. The five cave tombs are related to the small al-Masarrāt settlement nearby (Gharib 2004:25), and as noted above they were possibly in continuous use from the 1st to the late 4th centuries AD. The total number of burials in these tombs was estimated at between 184 and 188. Biological analyses of the skeletal material suggests that the community of that time consisted of multiple inter-related units or families with an estimated total population size of 50±10 individuals, excluding possible servants and slaves. The skeletal material reflects health conditions often found among agricultural communities. These include high child mortality, frequent caries and infectious lesions, strong degenerative alterations of the joint surfaces of the extremities, as well as the formation of

enthesopathies. There are sufficient observations suggesting that the community suffered from an endemic infectious illness, probably endemic syphilis. The observed relative low incidence of enamel hypoplasia may contradict the observed frequency of infectious lesions. These observations do not reflect socio-economic hardship but rather the hazards that confronted an agricultural community of that time. In Roman times, some members of this agricultural community had the resources to practice the expensive cremation funerary ritual, at least once in each of the three tombs. The material also provides evidence that feasting was part of the community's funerary rites. Low or no incidences of enamel hypoplasia, the presence of animal bones, as well as evidence of human cremation are findings restricted to Tomb-2, 3 and 8. It is unclear whether these observations are connected.

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REVISITING LATE NEOLITHIC SITES IN JORDAN, AUTUMN 2018

Pascal Flohr and Bill Finlayson

Abstract

The Late Neolithic is understudied in Jordan due to a research bias and poor visibility of the remains, especially in western (agricultural) parts of Jordan. Previous work in the Wādī Ziqlāb has shown that when sub-surface survey (test trenches), remote sensing and predictive modelling were combined, many more prehistoric sites could be identified; we aim to test if this approach also works in other parts of Jordan. We undertook an extensive literature review to identify potential Late Neolithic sites and visited a selection of these in the agricultural and steppic parts of south and central Jordan during the autumn of 2018. The aim of the site visits was to check, and if necessary correct, site location and gain more information about the archaeology at some of the sites; a second aim was to do a condition assessment. Twenty-two sites were visited and documented, 17 of which were Late Neolithic. Over half of these (ten Late Neolithic sites, 12 in total) have been affected by agriculture, and are under continued threat, while three of the sites are under threat of dam-building works and subsequent flooding.

Introduction

The Late, or Pottery, Neolithic is an important, but still poorly understood, period in the history of Jordan. It is during this period (*ca* 6500-5000 cal. BC) that many of the developments in subsistence economy and society that commence in the Epipalaeolithic and Early, or Pre-Pottery, Neolithic finally coalesce into a combination of small-scale mixed farming communities and mobile pastoralists. The Late Neolithic is the culmination of this long period of 'neolithisation' when small (and occasionally larger) communities, relying on domesticated crops and animals and increasingly their secondary products, for the first time created a recognisable farming landscape. The social and economic structures that were formed in the Late Neolithic underpin the subsequent development of complex urban societies.

The Late Neolithic is also of particular significance because of the large climatic fluctuations that took place, making it an extremely interesting case study regarding how past societies coped with climate change. Around 6250 cal. BC, or 8200BP, the so-called 8.2ka event occurred, the most cold and arid Holocene event recorded in the Greenland ice cores (Alley *et al*. 1997), for which evidence has been found in climate archives throughout the northern Hemisphere (Alley and Agustsdottir 2005). This 200-250 year 'event' probably led to increased aridification in the Middle East, and was likely superimposed on a more general aridification running between *ca* 6600 and 5800 cal. BC (Rohling and Pälike 2005). Surprisingly, these climatic changes did not have large-scale effects on the societies in the Middle East at the time, but relatively minor adaptations were made to cope with its effects (Flohr *et al*. 2016); more regional and site-based research is needed to better understand these coping and adaptation processes.

The Late Neolithic is known from a limited number of sites in Jordan, mostly in the northern part of the country, where a steady stream of information has been coming from the Wādī Ziqlāb and adjacent areas since the 1980s (Banning 1995, 1989; Banning *et al*. 2015; Kadowaki *et al.* 2008). Various other sites have been excavated in the north, such as 'Ayn Rāḥūb

(Kafafi 1989; Muheisen *et al.* 1988), Jabal Abū Thawwāb (Kafafi 2001, 1988), ʻAyn Ghazāl (Kafafi 1990; Rollefson 1993), al-Ḥussayah (Bartl and Kafafi 2015; Kafafi *et al*. 1997), Tall Abū aṣ-Ṣuwwān (al-Nahar 2010) and Wādī Shuʻayb (Simmons *et al.* 2001). In the Jordan valley the Late Neolithic is represented by Abū Ḥāmid (Dollfus and Kafafi 1993, 1986; Lovell *et al*. 2007) and is present at Tulaylāt al-Ghassūl (Bourke *et al.* 1995); both these sites appear to date to the very end of the Late Neolithic (second half of 6th millennium BC). In central and southern Jordan only the earlier Late Neolithic sites of WHS 524/DH 49 (Bossut and Kafafi 2005), adh-Dhirāʻ (Finlayson *et al*. 2003) and the later Late Neolithic sites of ʻAyn Waydha' (Kuijt and Chesson 2002), Tall Wādī Faynān (Najjar *et al.* 1990), and Basṭah (Gebel 2009) have been excavated. Sites in the eastern desert are better preserved and many prehistoric sites survive in this area, resulting in much recent and current research (for Late Neolithic sites see for example Richter 2014; Rollefson *et al*. 2012, 2013). Analysis of these known sites suggests that there is considerable variety in site type, in the forms and shapes of architecture, in material culture, and in local economic livelihoods across Jordan during the Late Neolithic (Kafafi 1998, 1993).

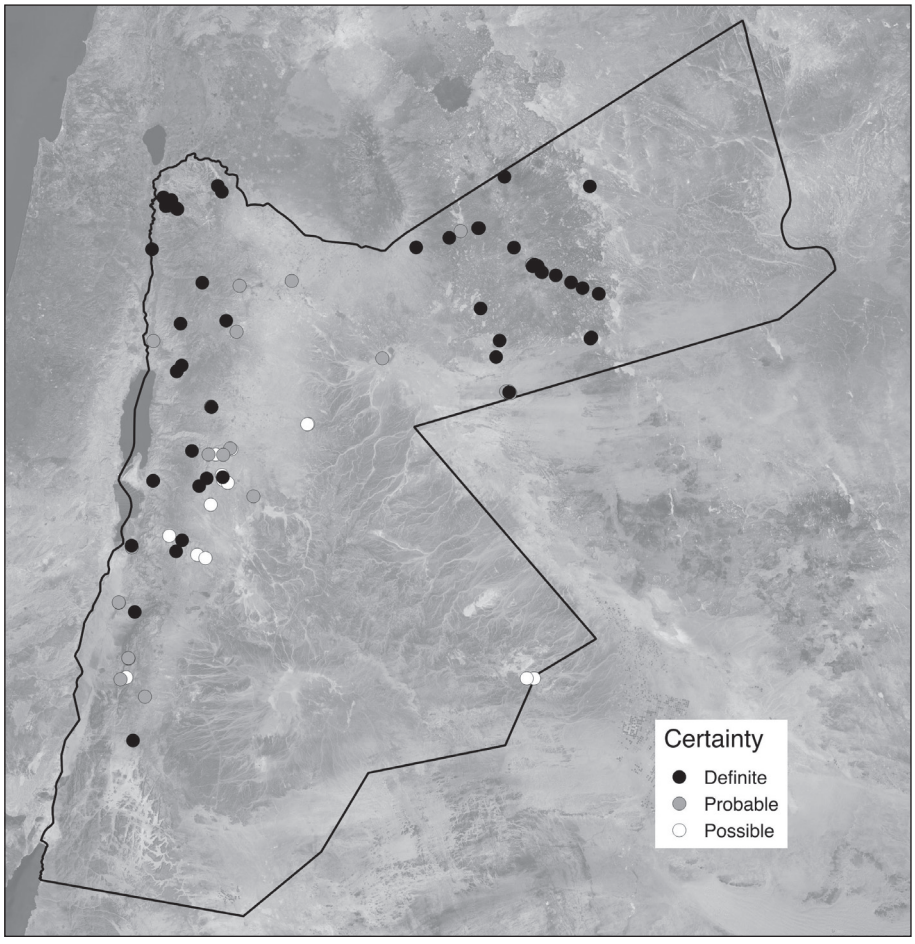
Despite the evident significance of the Late Neolithic, it remains understudied in Jordan. As is clear from the list above, only a small number of researchers are actively engaged in work on this period and the number of Late Neolithic sites excavated, frequently by only a few small trenches, remains low, especially when compared to other periods. The reason for the limited research is in part a research bias as the period is somewhat ignored in between extensive research on the earliest origins of farming of the Early Neolithic and research on the increasing social complexity of the Chalcolithic and Bronze Ages (where there is again more 'origins' research into the first cities and first states). To make the situation more difficult, within the agricultural zone - which is key to understanding this period - Late Neolithic sites generally have a low visibility (Banning 2015: 91). They are often small to start with, are frequently eroded or covered by colluvium, and often have no standing remains. Late Neolithic pottery erodes easily, so that in many cases not much survives on the surface (Banning 2015). In addition, the material culture, including the chipped stone, is often not diagnostic and consequently hard to correctly identify by non-specialists (Banning 2015). There is also the possibility that as the Late Neolithic site distribution, based on an established agricultural economy, is probably echoed by the 'modern' settlement pattern, many sites may be buried below later sites [as at Pella (Bourke *et al.* 2003, 1998)]. Overall, this lack of visibility has an obvious effect on research and conclusions drawn from, for example, settlement patterns [*e.g.* the Late Neolithic has been understood as a period of decline after the florescence of large Late PPNB sites, which has in turn been linked to climate change and landscape over-exploitation in the Late PPNB (Köhler-Rollefson 1992; Rollefson 2011)]. The poor visibility of Late Neolithic sites equally has an impact on heritage management as sites cannot be protected (or documented before destruction) if their location is unknown.

In this context, it is surprising that close inspection of the literature, guided by databases such as MEGA-Jordan and making a point to include basic survey and preliminary reports such as those published in this journal, reveals that many Late Neolithic sites have already been successfully identified (**Fig. 1**) (see Methods). While there is often very little information provided about these sites, it is clear that sites are preserved and can be found. When field research has been conducted to locate the Late Neolithic, in areas where no definite Neolithic sites could be found using traditional survey methods, targeted surveys using sub-surface survey (soundings) to locate sites that had been covered by colluvium had much better results (Banning 2015). This approach was further improved by specifically targeting probable prehistoric site locations, taking into account geomorphology and focusing on preserved parts of the prehistoric landscape, in combination with predictive modelling using Bayesian allocation algorithms for Neolithic site indicators such as the presence of springs and *wadi* junctions (Hitchings *et al.* 2016, 2013). This methodology provides a way forward to locate the Late Neolithic by specifically targeting preserved

aspects of landscape and areas with high probability of Neolithic sites, followed up by test excavation (Banning 2015: 94).

The success of Banning's methods indicates that this approach should be tried elsewhere within the agricultural zone and we plan to test if the method also works for central and southern Jordan. An initial step in this process, as a prerequisite for building predictive models, is to systematically identify site locations. This can often not be done from desk-based sources, even where surveys have been undertaken, as the nature of the information from survey and preliminary reports means the character of the sites and even site locations, especially when the work was conducted in the pre-GPS era, are often not clear. In some cases we have established that site positions may have been recorded over hundreds of metres or even several kilometres away from their actual locations. It was therefore necessary to undertake site visits to check (and where necessary correct) site-location data and to gain additional information about the remains present, especially from surveys where only little has been reported. At the same time we assessed the condition of the sites, as in many cases the last documented condition might have been recorded as many as 30 years ago, since which time agricultural and urban expansion has been profound. The site visits presented here form a very initial step in our planned research.

This study into the location and preservation of Late Neolithic sites was conducted as part of the Endangered Archaeology in the Middle East and North Africa (*EAMENA*) project, funded by the Arcadia Fund. This project has its roots in the Aerial Archaeology in Jordan (*AAJ*) project (Kennedy and Bewley 2009) and aims to identify, understand and monitor the endangered archaeology of the MENA region (www.eamena.arch.ox.ac.uk; Bewley *et al.* 2016). To this end it uses remote sensing, specifically freely available satellite imagery, and disseminates this information through a freely available online Arches database. In this EAMENA database, information on the archaeology, location and condition (damage and threats) of the



1. Map with Late Neolithic sites identified from the literature so far. Based on published survey and excavation data referenced in the text, MEGA-Jordan (also Mueller-Neuhof pers. comm. 2018). The map is not yet complete; in particular it is missing Sumio Fujii's sites in the Jafr basin and beyond, and sites in the rest of southeast Jordan.

sites is recorded. The use of remote sensing to study the region has led to the documentation of thousands of previously unrecorded archaeological sites by this project. The EAMENA database currently contains over 250,000 records in total (at the time of writing [May 2019]). The MENA region is especially suitable for this type of analysis, as many archaeological remains are still standing and are therefore clearly visible on the imagery. However, use of these data sources means that prehistoric sites - especially Palaeolithic and Neolithic sites, as well as later, more ephemeral site types (or site types otherwise less visible from the air, *e.g.* rock art) - are underrepresented in the database. To address this issue, the information in the database is supplemented by analysis of published records and this project served to address this bias by focusing on the Late Neolithic. The site visits, although in this case targeted at the Late Neolithic, are a standard process in the EAMENA project to check and supplement remote-sensing data acquisition.

Methods

A literature search for Late Neolithic sites in Jordan was conducted. This included searches in the Department of Antiquities' MEGA-Jordan database (www.megajordan.org), and study of available survey and excavation reports (Baird *et al.* 1992; Banning 1989; Betts *et al.* 1995; Betts 1998; Fiema *et al.* 2008; Garrard *et al.* 1994; MacDonald 1988; Mortensen *et al.* 2013; Parker 2006 [see introduction for excavated site references]). Most archaeological surveys in Jordan have been either general purpose, or focused on later periods. Relatively few surveys have included specialists in early prehistory, and attribution to specific periods was often uncertain. Nonetheless over 110 possible, probable or definitely Late Neolithic sites were found. To date, we have studied 96 of these (**Fig. 1**). For each site, the available information on the archaeology was entered in the EAMENA database. The location was checked using the information in the publications and satellite imagery (Google Earth; Bing). Even when coordinates were available, the topographic information provided in records was often extremely useful in locating the actual positions of sites. Subsequently, the satellite imagery was used in combination with aerial photographs from the Aerial Archaeology in Jordan (AAJ) project (see the APAAME website) to undertake an initial condition assessment of all the Late Neolithic sites in the database.

Not all sites could be visited during the time available, so the focus was on central and south Jordan, from the *ghawr* and Wādī ʻArabah to the plateau/steppe edge. Within this area, sites were selected based on the need to verify their location, and the need to know more about the archaeology, their potential significance and their proximity (*i.e.* their location close to another site which met the earlier criteria). The site visits were conducted over three full and two half days between 30 September and 6 October 2018. [Two days of site visits to potential sites identified using remote sensing (satellite imagery) were also conducted as part of the EAMENA Cultural Protection Fund training, but these are not presented here]. The Late Neolithic sites were specifically targeted, but when sites of other periods were nearby they were documented, especially if they appeared to be under threat. As time was limited, some remote areas or areas with difficult access could not be reached. If a site was not found at or near its documented position it was not possible to conduct an intensive search over an area of several square kilometres within the time constraints of the project. Consequently, when sites were not found it is not clear if this was because they have been destroyed in the 30 or more years since they were described, or if they are simply in a very different location. When sites were successfully located, their positions were recorded by GPS and the site photographed, their locations and archaeological remains were described, and a rapid condition assessment was done using standardised forms. No material was collected, but surface material was (briefly) examined in the field to compare with the site record, to assess the date of the site, and to document site extent. All new information, including ground photographs, was entered in the EAMENA database.

Once an accurate location has been determined and the current condition assessed on the ground to provide baseline site-condition information, remote-sensing imagery can be used to monitor changes. Updated information

based on the site visits and results of the renewed imagery analyses was entered in the EAMENA database and is included in the site reports below.

Site Visit Reports

General Remarks

In this section and in **Table 1** we provide summary reports of each of the visited sites with their location (with location certainty in brackets), a brief site description, and the condition assessment based on field and remote sensing data. More detailed information and more images have been recorded in the EAMENA database, referenced by the EAMENA database number. The EAMENA database is freely available; access can be gained by registering at www.eamenadatabase.arch.ox.ac.uk (see eamena.web.ox.ac.uk/database for more information).

Dead Sea Area

<u>'Ayn Wayda'ah (EAMENA-0134424) – Late Neolithic Settlement Site</u>

Name(s): 'Ayn Wayda'ah

MEGA-Jordan number: n/a

Location: 35.578646 E, 31.242430 N (Definite)

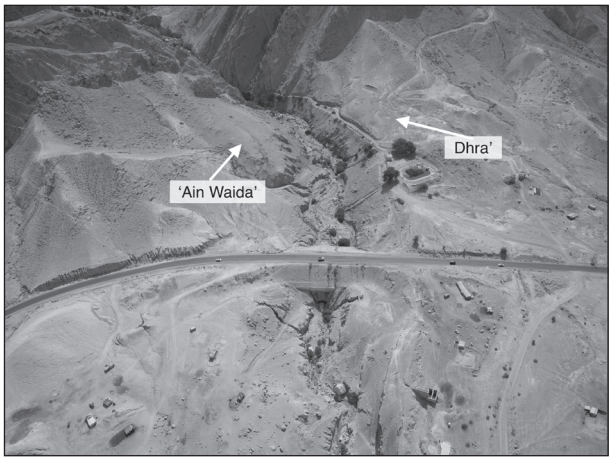
Location notes: *Wadi* terrace on the north side of the Wādī adh-Dhirā', where the steep mountains of the east side of the rift valley meet the Dead Sea plain (**Figs. 2-3**). Springs are located about 100m upstream. On the opposite, south side of the *wadi* is the Pre-Pottery Neolithic A (PPNA) and earlier Late Neolithic site of adh-Dhirā' (see below).

Description: 'Ayn Wayda'ah was first recognised during the survey linked to the site of adh-Dhirā', and was subsequently excavated in 1994 (Kuijt and Chesson 2002; Kuijt and Mahasneh 1995). The site covers about 6000 square meters of rectilinear architecture, with artefacts scattered beyond that, possibly over as much as 20000 square meters (Kuijt and Chesson 2002: 121; Kuijt and Mahasneh 1995). Three distinct architectural phases were distinguished, although the earliest (Phase A) was poorly defined. Based on material culture, considered as Qatifian by the excavators, and radiocarbon dating, phase B was identified as part of the later Late Neolithic/Early Chalcolithic, dating to the end of the sixth millennium BC. It is followed by a Chalcolithic phase. The site was interpreted as sedentary based on the architecture, scale of settlement and the multiple building phases (Kuijt and Chesson 2002: 120).

Condition: The site has likely been affected by erosion since the Neolithic/Chalcolithic (with significant downcutting of the *wadi* possibly commencing during the occupation of the site), but the terraces have remained intact with only minor surface erosion and colluviation (Finlayson *et al.* 2003: 4-5). While erosion remains a threat for any site near a *wadi*, the water flow in the *wadi* has decreased since canalization and the nearby hydrological station being built (Finlayson *et al.* 2003: 4-5). Indeed when comparing the photograph in the 2002 site report (Kuijt and Chesson 2002: Fig. 2) to those of 2018 (**Fig. 2**), the terrace appears to be in a stable condition.



2. The site of 'Ayn Wayda'ah as seen from adh-Dhirā' on the opposite side of the wadi. Looking north (Photo: EAMENA/ Pascal Flohr, 30 September 2018).



3. Aerial photo showing the sites of adh-Dhirā' and 'Ayn Wayda'ah (Photo: Aerial Archaeology in Jordan/Matt Dalton, APAAME_20181014_MND-0786, 14 October 2018).

Table 1: Overview of visited sites, their EAMENA database reference number, coordinates (in decimal degrees), area, date of visit, with general and condition remarks. For each site it is indicated of disturbance by agriculture or by a road was identified.

Name	EAMENA number	Longitude (X, easting)	Latitude (Y, northing)	Area	Date of visit	General remarks	Condition remarks	Disturbances	
								Agriculture	Road
Late Neolithic:									
Ain Waida'	EAMENA-0134424	35.578646	31.242430	Dead Sea, South Jordan	30/09/2018	Excavated LN settlement	Eroded, but stable		
Dhra'	EAMENA-0119703	35.577504	31.241374	Dead Sea, South Jordan	30/09/2018	Excavated PPNA and LN settlement	Military trenches, stable		
SGNAS 92	EAMENA-0134445	35.461656	30.929588	Wādī 'Arabah, South Jordan	30/09/2018	Location could not be confirmed. Farm and fields.	Probably destroyed by agriculture	X	
SGNAS 21	EAMENA-0134446	35.390661	30.670846	Wādī Fīdān, South Jordan	30/09/2018	Could not be reached because of dam works.	Possibly destroyed by bulldozing for dam, under threat of dam works and subsequent flooding.		
SGNAS 29	EAMENA-0134588	35.390273	30.672255	Wādī Fīdān, South Jordan	30/09/2018	Scatter, caves.	Currently in fair condition, but likely to be destroyed by dam works and subsequent flooding.		
Tell Wadi Feinan	EAMENA-0122093	35.477915	30.627119	Wādī Faynān, South Jordan	30/09/2018	Excavated LN settlement.	Ongoing erosion; agricultural fields.	X	
WHS 524	EAMENA-0122649	35.703569	30.911805	Wādī al-Ḥasā, South Jordan	01/10/2018	LN settlement	Almost completely destroyed by road cut. Remainder is eroding heavily.		X
WHS 307	EAMENA-0122431	35.736263	30.963617	Wādī al-Ḥasā, South Jordan	01/10/2018	LN settlement?	Partly destroyed by bulldozing, possibly affected by agriculture.	?	
WHS 149 (Khirbet Hammam)	EAMENA-0122272	35.666088	30.984165	Wādī al-Ḥasā, South Jordan	01/10/2018	PPNB and probably LN settlement	Much affected by agriculture, ongoing but might be relatively stable now. Cut by road.	X	X
LAS 188	EAMENA-0134416	35.870625	31.253203	al-Karak Plateau, Central Jordan	02/10/2018	Site itself could not be reached, photographed across wadi. Location uncertain.	Seems in stable condition.		
Unnamed Site 1	EAMENA-0135554	35.874208	31.252654	al-Karak Plateau, Central Jordan	02/10/2018	Probably Neolithic chipped stone, scatter in field	Track, ploughing	X	

Unnamed Site 2	EAME-NA-0135555	35.877503	31.249257	al-Karak Plateau, Central Jordan	02/10/2018	Probably Neolithic chipped stone in bulldozer cut	Bulldozing (agriculture, track)	X	X
'LAS 27'	EAME-NA-0133962	35.790018	31.381600	Mādabā, Central Jordan	05/10/2018	Might not be *in situ*, material could be brought in in relation to terrace wall building and/or field improvement	Natural erosion, ploughing	X	
Umm Meshrat	EAME-NA-0135621	35.895175	31.586354	Mādabā, Central Jordan	05/10/2018	LN settlement	Erosion, ploughing, continued occupation, some digging, road	X	X
MN 329	EAME-NA-0133882	35.708378	31.753868	Mādabā, Central Jordan	30/09/2018	LN settlement	Largely or completely destroyed by agricultural bulldozing	X	
MN 423	EAME-NA-0133883	35.707007	31.751373	Mādabā, Central Jordan	06/10/2018	Same LN settlement as MN 329 (?), location could not be confirmed	Largely or completely destroyed, if location correct	X	
MN 526	EAME-NA-013384	35.733737	31.778972	Mādabā, Central Jordan	06/10/2018	LN scatter, possibly low tell, location could not be confirmed	Largely or completely destroyed, if location correct (location very uncertain)	X	
Other periods:									
SGNAS 028	EAME-NA-0134589	35.390083	30.672277	Wādī Fīdān, South Jordan	30/09/2018	Classical (?) field system, next to SGNAS 29	Likely to be destroyed by dam works and subsequent flooding.		
WHS 427	EAME-NA-0122551	35.772500	30.955200	Wādī al-Ḥasā, South Jordan	01/10/2018	Water mill on south bank of Wadi Hasa	In danger of complete collapse.		
LAS 170 + 172	EAME-NA-0086180	35.82829	31.214444	al-Karak Plateau	02/10/2018	Large stone circles, cairns	Partly destroyed by agricultural development.	X	
Wadi Kanisah Roman/Classical site	EAME-NA-0135618	35.705517	31.751168	Mādabā, Central Jordan	06/10/2018	extra site recorded, near MN 423	Affected by agriculture and construction.	X	
Church/ Monastery of Deacon Thomas	EAME-NA-0134597	35.735785	31.778426	Mādabā, Central Jordan	06/10/2018	next to MN 526	Conservation, looting, graffiti, vegetation. Protected.		

adh-Dhirā‘ (EAMENA-0119703) – Early and Late Neolithic Settlement Site
Name(s): adh-Dhirā‘
MEGA-Jordan number: n/a
Location: 35.577504 E, 31.241374 N (Definite)

Location notes: *Wadi* terrace on the south side of the Wādī adh-Dhirā‘ opposite ‘Ayn Wayda‘ah, where the steep mountains of the east side of the rift valley meet the Dead Sea plain (**Fig. 3**). Springs are located *ca* 100m upstream.

Description: adh-Dhirā‘ was first described by Raikes while he was working on a road project, with test trenches being excavated by Crystal Bennett in 1979 (Bennett 1980). More test trenches were excavated in 1994 (Kuijt and Mahasneh 1998, 1995), and the site was more extensively excavated in the early 2000s (Finlayson *et al.* 2003). The site consists of *ca* 6500 square meters of Early Neolithic occupation with mud and stone structures, including probable residential buildings, food-processing areas and granaries (Finlayson *et al.* 2003; Kuijt and Finlayson 2009). This is overlain by an extensive Late Neolithic occupation consisting of rectilinear structures and large and small pit features (Finlayson *et al.* 2003). Check dams built to retain both soil and moisture in an adjacent *wadi* probably relate to this occupation and indicate the start of downcutting through the terrace (Kuijt *et al.* 2007). The Early Neolithic occupation is clearly dated to the PPNA by the material culture as well as radiocarbon dates; no radiocarbon dates are available for the Late Neolithic phase, but the pottery is of Jericho IX style (Finlayson *et al.* 2003).

Condition: The *wadi* to the north has likely incised since the Neolithic and an erosion gully is present to the south of the site, but the site’s location between limestone barriers and a hard ridge has protected it, while surface erosion and colluviation appear to have been minimal (Finlayson *et al.* 2003: 4-5). The site has mainly been affected by military use during 1967, for which larger and smaller trenches were dug, some with small concrete and breezeblock revetments (Bennett 1980; Kuijt and Mahasneh 1998); only the large tank trench is still readily visible these days (**Fig. 4**). The western end of the site is cut by a modern water plant with reservoir (Finlayson *et al.* 2003) (**Fig. 3**). Towards the *wadi*, on the north side of the site, a track has been bulldozed, while other bulldozed tracks approach the site from the southwest and southeast (already present in 1994 [Kuijt and Mahasneh 1998]). The site has been excavated but the excavation trenches have been backfilled; the military tank trench is still partially open and therefore more susceptible to erosion (**Fig. 4**).

SGNAS 92 (EAMENA-0134445) – Late Neolithic and/or Chalcolithic Scatter
Name(s): Southern *Ghawrs* and Northeast ‘Arabah Archaeological Survey site 92 (SGNAS 92)
MEGA-Jordan number: 4075 (JADIS 1903.037)
Location: 35.461656 E, 30.929588 N (Low)

Location notes: Described by the SGNAS as located south of the Wādī Fīfā, just east of the main road, in a ploughed field (MacDonald 1992: 258). It is therefore likely located in the agricultural fields to the west rather than on the *wadi* banks and outcrops to the east. This location could not be confirmed during our site visit, but where the site is estimated to be (or have been) is on the edge of the Dead Sea plain farm land, where low hills start to rise up.

Description: Scatter of some (4) Late Neolithic, many (69) Late Neolithic/Chalcolithic, and 7 Chalcolithic sherds and small stone piles (MacDonald 1992: 258). Currently nothing is visible in the identified location (which may be incorrect) (**Fig. 5**).

Condition: The survey report states that the site could have been substantially damaged/partly destroyed by agriculture (ploughing) by the time of visit in 1985/86. It was not possible to visit the location for very long, but there were certainly no stone piles in the field which is the most likely candidate for the site, and no artefacts were seen. The field seems to have been landscaped and traces of bulldozing were visible; the area is currently in agricultural use (**Fig. 5**). If the site was indeed at this location, it is likely destroyed, unless occupation remains were present at a considerable depth.

Wādīs Fīdān and Faynān
SGNAS 21 (EAMENA-0134446) – Multi-period Findspot, Fields
Name(s): Southern *Ghawrs* and Northeast ‘Arabah Archaeological Survey site 21 (SGNAS 21)
MEGA-Jordan number: 8561 (JADIS 1800.019)

Location: 35.390661 E, 30.67085 N (Low; site could not be reached so location not checked)

Location notes: The site was described as being on the south side of the Wādī Fīdān and partly in a side *wadi* (MacDonald 1992: 251).

Description: Agricultural fields with retaining and/or terrace walls, possible an aqueduct, and remains of dams in a side *wadi*, likely of later date (Early Bronze Age and Nabataean sherds were found), but with several Late Neolithic sherds (MacDonald 1992: 251).

Condition: This site could not be reached because of active dam construction works (**Fig. 6**). As the site is described as being along the south side of the *wadi* by MacDonald (1992: 251), it might have been completely destroyed by bulldozing and large-scale earth removal for the dam. However, it might be (partly) located in the area that was (at least at 14 October 2018) still preserved (**Fig. 6** [APAAME_20181014_MND-0671]). The Late Neolithic site may have already been seriously damaged by later prehistoric and Nabatean activity. In either case, the area is severely threatened by the dam works and subsequent flooding.



4. Eroded section of the 'tank trench' at adh-Dhirā', originally twice as deep. Looking east (Photo: EAMENA/Pascal Flohr, 30 September 2018).



5. Possible location of SGNAS 92. Only a field is visible. Looking west (Photo: EAMENA/Pascal Flohr, 30 September 2018).

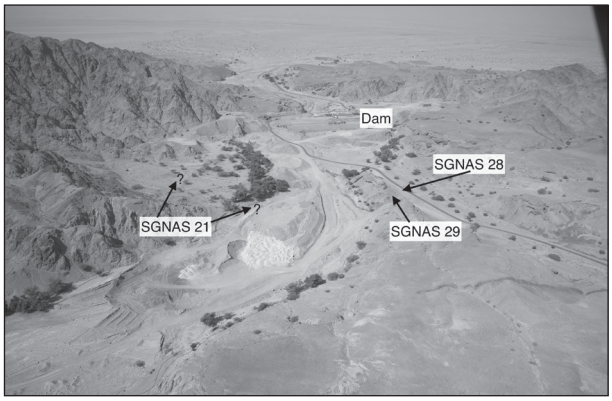
SGNAS 29 (EAMENA-0134588) – Late Neolithic + Chalcolithic Scatter and Caves

Name(s): Southern *Ghawrs* and Northeast 'Arabah Archaeological Survey site 29 (SGNAS29)
MEGA-Jordan number: 8560 (JADIS 1800.017)
Location: 35.390273 E, 30.672255 N (Definite)

Location notes: On an outcrop where a side *wadi* meets the Wādī Fīdān (**Fig. 6**).

Description: Identified by the SGNAS survey as a dense scatter on a steep slope, with probably robbed graves, and ash and bone on the slope (MacDonald 1992: 252). Identified as multi-period by the SGNAS team (Late Neolithic, Late Neolithic/Chalcolithic, Chalcolithic, Chalcolithic/EB, Iron Age, Late Byzantine and Islamic). This was confirmed by our site visit: there was definitely prehistoric chipped stone present, plus many later ceramics, probably (also) associated with SGNAS 28. There were caves on top of the steep slope, which might be where the graves mentioned by the SGNAS were located (**Fig. 7**).

Condition: The site is currently in a fair condition, although the caves upslope were not investigated. They were reported to have been robbed (MacDonald 1992: 252). The scatter is present on a steep slope, and presumably washed down (**Fig. 7**). The artefact scatter site is under severe threat of dam works and subsequent flooding, although the caves/tombs might remain above water.



6. Location of SGNAS 28 and 29 and possible locations of SGNAS 21, with recent dam works (Photo: Aerial Archaeology in Jordan/Matt Dalton, APAAME_20181014_MND-0671, 14 October 2018).



7. SGNAS 29. Steep slope with caves on top and dense scatter on the slopes, looking southwest (Photo: EAMENA/Pascal Flohr, 30 September 2018).

SGNAS 28 (EAMENA-0134589) – Classical Period Field System
Names(s): Southern *Ghawrs* and North-east 'Arabah Archaeological Survey site 28 (SGNAS 28), Raikes' Site H
MEGA-Jordan number: 3909 (JADIS 1800.018)
Location: 35.390083 E, 30.672277 N (Definite)

Location notes: Adjacent to SGNAS 29, with their scatters overlapping. In the valley bed and banks, where a side *wadi* enters the Wādi Fīdān from the northeast (see **Fig. 6**).

Description: This is a later period (Iron Age and Nabatean/Early Roman pottery) site directly adjacent to SGNAS 29, consisting of agricultural fields (MacDonald 1992: 252). Although there is no Late Neolithic present as such, the site was visited because of its close proximity to SGNAS 29 and the severe threat of dam works. A terrace or retaining wall, presumably part of the field system, was clearly visible running roughly W-E, and has been partly uncovered by an archaeological excavation which appears to have been conducted relatively recently (**Fig. 8**). According to the SGNAS description there are multiple such walls present, but these were not obvious at the time of the visit (which was focused on the Late Neolithic, so did not look closely for the SGNAS 28 walls). A dense scatter of sherds is present; it is not clear where the scatter SGNAS 29 ends and the SGNAS 28 scatter starts.

Condition: The current condition of the site was fair, with the terrace/retaining wall still standing. However, it is under threat of the current dam works and subsequent flooding. The area has been disturbed already by a bulldozed track and by a road through the *wadi* bed. This was further developed between our visit on 30 September and 14 October, probably in relation to the dam works (*e.g.* APAAME imagery of 14 October [**Fig. 6**]).

Tall Wādī Faynān (EAMENA-0122093) – Late Neolithic Settlement Site
Name(s): Tall Wādī Faynān, WF25
MEGA-Jordan number: n/a
Location: 35.477915 E, 30.627119 N (Definite)

Location notes: Cut by the Wādī Faynān, close to the confluence with the Wādī Khālid (Najjar *et al*. 1990).

Description: This later Late Neolithic site was excavated in 1988 (Najjar *et al.* 1990). Up to 2.5m-deep deposits, 120m long in the *wadi* section (Najjar *et al*. 1990: 29). Three phases on top of virgin soil were revealed in a 5×5m trench (**Fig. 9**) and in the section: Late Neolithic, Chalcolithic and Roman-Byzantine agricultural. A rectilinear stone structure belongs to the Late Neolithic phase. Radiocarbon-dated on charcoal (so there could be old-wood effect), earliest dates available were during second half of 6th millennium BC.

Condition: In poor-fair condition. Deflated top in places, owing to erosion, and parts of the site have eroded into the *wadi* (Najjar *et al.* 1990). The site remains on the edge of the *wadi*, so erosion keeps being a threat. For example, the 1988 trench was set several meters back from the edge (Najjar *et al.* 1990: Fig. 2), but is now on the edge (**Fig. 9**). The site was not backfilled, so remains are visible but sensitive to erosion. The trench is on the edge of modern, intensively worked fields, and the site probably extends below these fields. Modern agriculture and irrigation (especially water ponds) represent active threats.

Wādī al-Ḥasā
WHS 524 (EAMENA-0122649) – Late Neolithic Settlement Site
Name(s): Wādī al-Ḥasā Survey site 524 (WHS 524), Khirbat adh-Dharīḥ Survey Site 49 and 119 (DH 49 and 119), Khirbat adh-Dharīḥ II
MEGA-Jordan number: 9994 (JADIS 2013.200)
Location: 35.703569 E, 30.911805 N (location of trenches; Definite)

Location notes: The site overlooks the Wādī

al-La'bān, a large side *wadi* of the Wādī al-Ḥasā. It is cut by the main road; what remains of the site is to the west of the road.

Description: This site was identified in the 1980s by both the Wādī al-Ḥasā Survey and the Khirbat adh-Dharīḥ Survey, who both concluded the site was a Pottery Neolithic A site (Bossut *et al.* 1988; MacDonald 1988). It was made visible by a road cut, and the exposed sections were studied and trenches dug. Ash layers, lithics, ceramics, bone, burnt stones and ground-stone tools were observed in the road-cut (MacDonald 1988: 129), and can still be seen in the section. Trenches excavated in 1993 confirmed an early Late Neolithic (PNA) date and yielded architectural remains (Bossut and Kafafi 2005). The site stretches for about 200m roughly N-S along the *wadi*, and is about 25m wide (Bossut and Kafafi 2005).

Condition: The site has been almost completely destroyed by the road (**Fig. 10**). It had already been severely damaged by the road at the time of the first visit in 1979, and was thought to have been possibly completely destroyed by road works by 1982 (MacDonald 1988). However, the adh-Dharīḥ Survey team found a presumably additional part of the site in 1987. Subsequent road widening damaged the site further, but parts of it were still intact in 1993 when archaeological rescue trenches were dug (Bossut *et al*. 1988; Bossut and Kafafi 2005). During the 2018 visit these trenches were still visible (**Fig. 10**), so the road appears not to have been substantially widened since 1993 in this place; however, we only observed remains over about 40 metres, while Bossut and Kafafi (2005) mention 200m (although probably not anymore continuous at that date). As remarked by Bossut and Kafafi, and confirmed by our site visit, the site is relatively narrow (about 25m [Bossut and Kafafi 2005]), and is in its east-west extent mostly destroyed by the road with only a narrow (few metres) strip preserved in some places in the west. The road section and trenches have been heavily eroded and are affected somewhat by vegetation. As it will be difficult to consolidate the section and there is a further risk of road widening, it would be best if the remainder of the site was to be excavated before the section collapses and/or the road is further widened.



8. SGNAS 28 (with 29 in background). The wall can be seen in the archaeological trench. A cave, possibly part of SGNAS 29, in the background. Looking south (Photo: EAMENA/Pascal Flohr, 30 September 2018).



9. Tall Wādī Faynān. 1988 excavation trench, now on the edge of the wadi. Looking east (Photo: EAMENA/Pascal Flohr, 30 September 2018).



10. WHS 524, almost completely destroyed by the road. Heavily eroded archaeological remains visible in the photo, from about where the tree is at the left (former excavation trench here) to where the hill is cut back (Photo EAMENA/Pascal Flohr, 1 October 2018).

WHS 307 (EAMENA-0122431) – Late Neolithic Settlement

Name(s): Wādī al-Ḥasā Survey site 307 (WHS 307), Rās as-Sīq

MEGA-Jordan number: 5511 (JADIS 2204.003)

Location: 35.736263 E, 30.963617 N (Definite)

Location notes: The site is located on the slopes directly south of the base of the Wādī al-Ḥasā, just west of the gate house for the modern at-Tannūr dam, above a pool in the *wadi*. MacDonald (1988) and Clark (1992) describe an upper part of the site on two knolls separated by a small *wadi*, and a lower part on the floodplain; we only observed remains on one knoll and none on the floodplain (**Fig. 11**), although we cannot rule out that we missed something during our brief site visit.

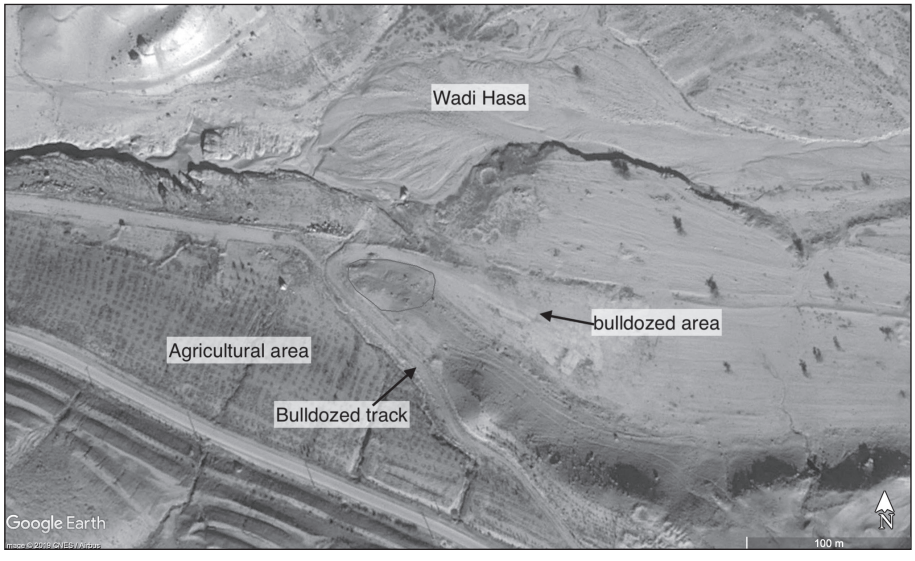
Description: The site was identified during the Wādī al-Ḥasā Survey of 1979-1983 with the main occupation being Late Neolithic, with Middle Palaeolithic, Nabataean, Roman and Byzantine material (Clark 1992; MacDonald 1988); we noted Neolithic and Classical period material during our visit. The survey team described the site as having remains of walls and a chipped-stone and pottery scatter (Clark 1992; MacDonald 1988), and we observed both the artefact scatter and a curvilinear wall in 2018. The Wādī al-Ḥasā Survey also observed a 90m linear feature of unshaped stone, possibly a wall, running from the slopes and over the lower segment of the site and they mention stone circles on the lower part; we did not observe these features.

Condition: We did not observe remains on the lower part of the site, where there has been recent bulldozing. During the site visit we assumed that the bulldozing had been restricted to the fringes of the site, but given that the Wādī al-Ḥasā Survey recorded remains in this area it is possible that this part has been destroyed since the 1980s. A longer site visit recording the whole area in more detail is needed, combined with sub-surface survey. The remaining portion of the site on the slopes is located between agricultural fields; we did not note a clear *wadi* in between the preserved remains, so it is possible that the second knoll described by the WHS has been affected too, but again this would need to be confirmed. On the agricultural fields surrounding the currently visible archaeological remains, landscaping appears to have taken place and vegetation planted; the flat area close to the *wadi* has been ploughed (*e.g.* Google Earth CNES / Airbus 10/8/2013). The lower portion of the site is probably occasionally affected by flooding (Google Earth CNES / Airbus 3/1/2017 might show post-flooding conditions [**Fig. 11**]). At the moment the situation appears stable, with no obvious change in condition or land use between 2013 and 2018 (Google Earth CNES / Airbus 10/8/2013 and DigitalGlobe 12/7/2018).

WHS 149 (EAMENA-0122272) – Neolithic Settlement

Name(s): Khirbat al-Ḥammām, Abū Ghurāb, Wādī al-Ḥasā Survey site 149 (WHS 149)

MEGA-Jordan number: 10036 (JADIS 2104.039)



11. Satellite image with the location of WHS 307. The blue shape indicates the area where we observed archaeological remains during the 2018 site visit; the original area was probably larger (Google Earth CNES / Airbus 3/1/2017).

Location: 35.666088 E, 30.984165 N (Definite)

Location: On a *wadi* terrace on the south side of the Wādī al-Ḥasā, near a junction with a relatively large *wadi* coming from the north. The area is rich in agricultural fields and is close to hot springs (**Fig. 12**).

Description: The site was located by the Wādī al-Ḥasā Survey, who collected eight Late Neolithic sherds, along with Epipalaeolithic and Early Neolithic lithics (MacDonald 1988). During excavations in 1999 only Pre-Pottery Neolithic B stratified remains were found in a 2×0.5-1.0m test trench (Petersen 2003), but this small-scale excavation does not exclude Late Neolithic occupation elsewhere on the site.

Condition: The Wādī al-Ḥasā Survey (1979-1983) reported that the site had been cut by the road and was farmed with erosion channels also visible (MacDonald 1988). Between a visit by Petersen in 1992 and the 1999 excavations, a large circular machine-dug depression had been created, and irrigation reservoirs, a pump and bulldozed dirt tracks had appeared (Petersen 2003: 117). At the time of our site visit, the road was still there, with the road cut continuing to erode (**Fig. 13**). The site was also still under cultivation, with related disturbances such as trees, shrubs and crops (**Fig. 13**). Terracing is present (**Fig. 13**); it is unknown when this was created, but based on the imagery it has been present since at least 2010 (Google Earth Digital Globe 8/9/2010). A shack is present on top of the site; this was built between 2013 (Google Earth CNES / Airbus 10/8/2013) and 2016 (Google Earth CNES / Airbus 29/10/2016). It probably does not do much damage. While the farming and associated activities will continue to damage the site, the farmer insists he will not be undertaking any further major work and the site appears relatively stable with no extensive excavation having occurred recently, but the possibility remains a threat to the archaeology.



12. View from WHS149 (Khirbat al-Ḥammām), with estimated site extent in blue, showing the area is agriculturally rich (Photo: EAMENA/Pascal Flohr, 1 October 2018).

WHS 427 (EAMENA-0122551) - Mill

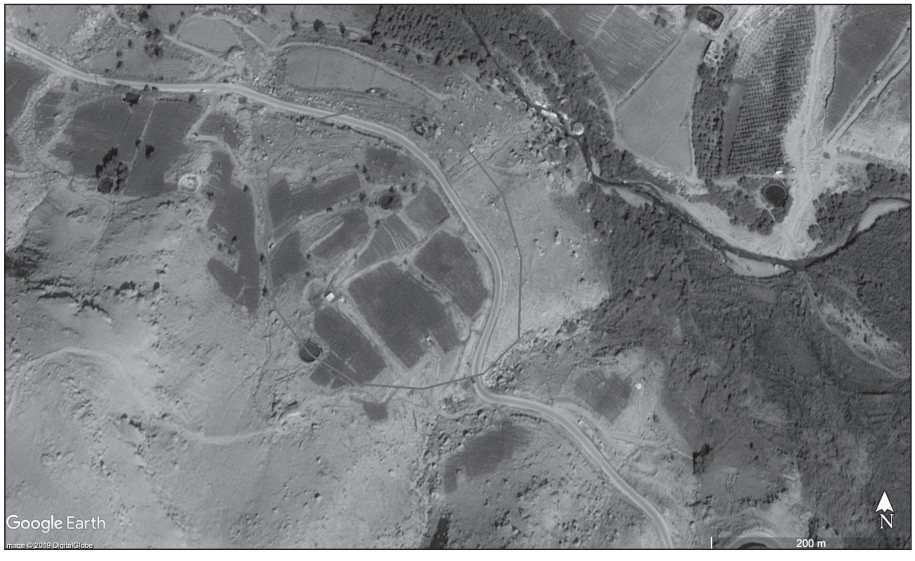
Name(s): Wādī al-Ḥasā Survey site 427 (WHS 427)

MEGA-Jordan number: 10950 (JADIS 2204.029)

Location: 35.772632 E, 30.955294 N (Definite)

Location: Southern banks of Wādī al-Ḥasā close to the main road where it crosses the *wadi*.

Description: This is not a Neolithic site but as it appears about to collapse we decided to document its current state while we were present. It is a penstock shaft mill, with the sluice and mill tower partially intact, but the mill building is reduced to rubble (**Fig. 14**). Part of



13. WHS 149 on a satellite image, showing the disturbance by the road and especially agriculture (terraces; reservoirs; crops) (Google Earth, DigitalGlobe 29/10/2016).

the conduit is still present. The mill was one of twelve watermills recorded by the Wādī al-Ḥasā Survey (MacDonald 1988: 286-288). The dating of the mills remained uncertain, but they were thought to be possibly Roman-Byzantine, as - among other things - implied by associated pottery at some of the sites (MacDonald 1988: 288). On the other hand, such mills continue to be used and built until they were replaced by diesel mills in the 20th century (Gardiner and McQuitty 1987).

Condition: The site is very unstable; it is undercut, possibly by water action, and a large crack is present in the shaft (**Fig. 14**), which is likely to collapse soon. The stones have eroded and it appears structural robbing has taken place. Smaller disturbances are caused by burning (presumably picnic fires), while a tree is growing through the conduit, its roots likely causing damage.



14. WHS 427, penstock mill with shaft still standing but mill building reduced to rubble (Photo: EAMENA/Pascal Flohr, 1 October 2018).

al-Karak Plateau

LAS 188 (EAMENA-0134416) – Late Neolithic Settlement

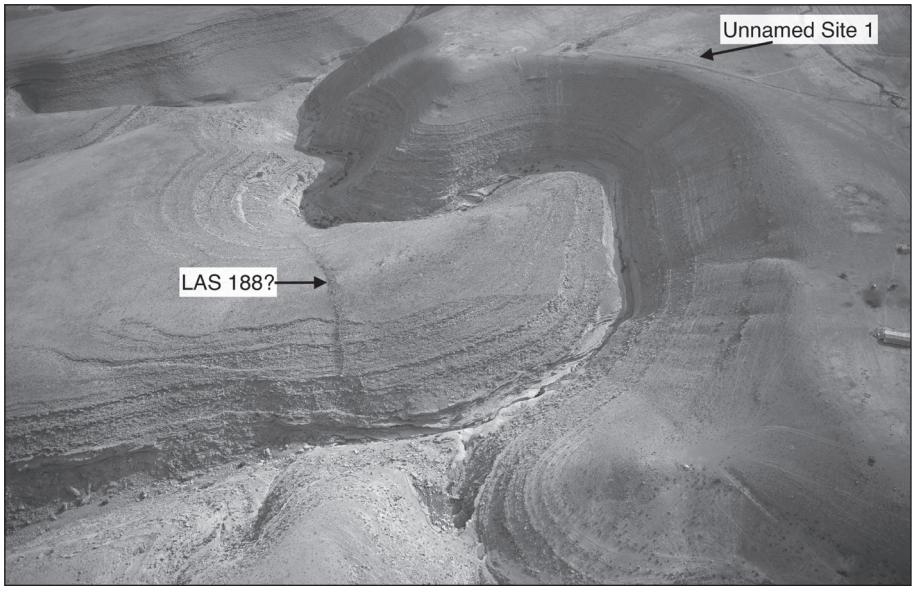
Name (s): Limes Arabicus Survey site 188 (LAS 188), LAS Field #529

MEGA-Jordan number: 6490 (JADIS 2307.057)

Location: 35.870625 E, 31.253203 N (Low)

Location notes: At the end of a ridge above a deeply incised *wadi*. The site is described as being located above a meander bend of the Wādī abū Shā'ir, with many rock shelters beneath the site and a wall closing off the site to the north (Clark *et al.* 2006: 73). On the imagery it was difficult to identify the location of this site with certainty; an area cut off by a wall or natural linear feature can clearly be seen, but no internal features could be distinguished. Unfortunately the site could not be reached within the time available, and we only visited the other side of the very steep and deeply incised *wadi*. This did not solve the issue of location confirmation, as the same could be seen as on the imagery: that a wall (or wall-like feature) closed off the knoll, but no internal features as described in the survey report could be seen. This was further confirmed by APAAME imagery taken in the weeks after our site visit (**Fig. 15** [and other APAAME images taken that day]).

Description: The site was identified by the Limes Arabicus Survey team (Clark *et al*. 2006; Parker 2006), who described the site as a Late Neolithic village site with stone-constructed circular structures, albeit with a shallow occupation-debris depth, closed off by a wall (Clark



15. Possible location of LAS 188 and location of the new findspot (Unnamed Site 1) (Photo: Aerial Archaeology in Jordan/Matt Dalton, APAAME_20181014_MND-0146, 14 October 2018).

et al. 2006: 73). As many as 40 Late Neolithic lithics were found, but no ceramics. From our position at the other side of the *wadi* we could see a feature which could be the wall isolating the promontory, although without visiting the actual site we cannot be certain it is not natural. No other clear structural remains could be observed from our point, or on the satellite and aerial imagery (**Fig. 15**).

Condition: If the site is indeed in this location, it appears to be in a stable condition (Google Earth CNES / Airbus 31/12/2004 to DigitalGlobe 14/3/2018, APAAME imagery 2007 and 2018, field visit 2018). There may have been erosion into the deeply incised *wadi*, depending on how close to the edge the site reaches. It is possible that the structures described by the LAS have been destroyed by human or natural factors since the survey team recorded the site in 1985, but this needs to be confirmed on the ground.

Unnamed Site 1 (EAMENA-0135554) – Neolithic Findspot
Name(s): n/a
MEGA-Jordan number: n/a
Location: 35.874208 E, 31.252654 N (Definite)

Location notes: Opposite (south) side of *wadi* from the potential location of LAS 188, near an electrical sub-station and the track leading to this (**Fig. 15**). On the edge of the now deeply incised *wadi*.

Description: Interestingly, chipped stone was found in the area of our vantage point when observing LAS 188. This was probably Neolithic in date (not PPNB but not otherwise diagnostic), although based on field observations only.

Condition: The newly found scatter is on the side of the *wadi* with more modern activity, as the area appears frequently used by seasonal agriculturalists and/or pastoralists. The scatter is mainly affected by the track going through or very near it and is in a ploughed field.

Unnamed Site 2 (EAMENA-0135555) – Neolithic Findspot
Name(s): n/a
MEGA-Jordan number: n/a
Location: 35.877503 E, 31.249257 N (Definite for findspot)

Location notes and description: About 450m southeast of the unnamed site 1, and about 750m southeast of the suspected location of LAS188, on the track, chipped stone of probably Neolithic age was found in a bulldozer cut (**Fig. 16**). No traces of architecture or even of a substantial chipped-stone concentration were found, but the remains appear more or less *in situ*.

Condition: A possible site might have been destroyed by bulldozing, or there were always only a few occasional pieces present. Bulldozing was related to the field.

LAS 170 and 172 (EAMENA-0134833 and EAMENA-0086180)
Name(s): Limes Arabicus Survey sites 170 and 172, LAS Field #800A and B, ASKP Site 225
MEGA-Jordan number: 5554, 11006 (also 12222?)
Location: 35.828290 E, 31.214444 N (GPS point in large circle on top of hill; cairns and scatter continue north to and across *wadi*)

Location notes: While trying (unsuccessfully) to locate site LAS 164, we came across a concentration of stone circles and cairns. These are most likely sites LAS 170 and 172, with LAS 171 just to the west (Clark *et al.* 2006). On a basalt outcrop just north of the al-Qaṭrānah-al-Karak road, overlooking the *wadi* to the north and west (*wadi* meander). A large modern farm is present just to the east, partially on top of the site. The concentration of circles is present on top of the outcrop, with cairns spread over the slopes towards the *wadi* and on the *wadi* terraces. Near the *wadi* base some more sherd and chipped-stone scatters are present, including a sparse scatter near a cave across the *wadi*.



16. Location of Neolithic findspot (Unnamed Site 2) in bulldozer earth. Looking west (Photo: EAMENA/Pascal Flohr, 2 October 2018).

Description: cluster of stone structures (circles/sub-circles) (**Fig. 17**), as well as many cairns which are probably graves from various periods; this is LAS 170. Site LAS 172 is a long north-south wall, which appears to end at the edge of the *wadi* and extends almost 2km to the south (based on satellite imagery; now only partially preserved).

Condition: Most of LAS 170 appears preserved, although the area is cut by agricultural fields and a reservoir to the east (**Fig. 17**). LAS 172 (the wall) and some cairns have been damaged by this development, especially by bulldozing to create a modern field boundary. Based on imagery the reservoir was dug between 2013 and 2015 (Google Earth CNES / Airbus 15/6/2012 and 13/3/2015), while the clearance bulldozing of the wall appears to have been done between 2013 (Google Earth CNES / Airbus 18/3/2013) and 2017 (Google Earth CNES / Airbus 1/12/2017). Farm development including bulldozing for landscaping, excavation for reservoir, and building of farmhouse and tracks to reach fields, all between 2012 and 2015, with additional clearance between 2015 and 2017. The farm landscaping and construction work appears finished for now, but it cannot be excluded that the fields will be extended at some point.



17. Large stone circle, probably part of LAS 170. Farm to the east (left in photo), road and factory to the south (Photo: EAMENA/Pascal Flohr, 2 October 2018).



18. Area where we thought LAS 27 was located and where another scatter and terrace walls and check dams were present. Looking northwest over the wadi junction with terrace walls all around (Photo: EAMENA/Pascal Flohr, 5 October 2018).

'LAS27' (EAMENA-0133962) – Scatter, Terrace Walls, Check Dams

Name(s): wrongly identified as Limes Arabicus Survey site 27 (LAS 27)

MEGA-Jordan number: 5616 (JADIS 2208.004)

Location: 35.790018 E, 31.381600 (Definite)

Location notes: The location we had for LAS 27 was based on the one given in MEGA-Jordan. When studying the LAS maps (Parker 2006) more closely afterwards, it appeared that this location is not in fact LAS 27, which is situated much further east. The currently described site (so not LAS 27) is located in rolling fields south of Mādabā and south of Wādī al-Mūjib in a field north of a minor west-east road and southwest of a *wadi* junction. The field is sloping northeast towards this junction and has a shallow SW-NE gully (**Fig. 18**).

Description: Two scatters, very restricted in size. The main (eastern) scatter is present at the head of a shallow NE-facing gully (as in the description of the real LAS 27 (Clark *et al.* 2006: 57), but in contrast to LAS 27 it contains both pottery and lithics from a variety of periods. It includes a probably Late Neolithic retouched flint tool and later pottery. The scatters are in close association with currently maintained terrace walls containing redeployed architectural stone; worked masonry is present. At least 0.5m of soil is retained by these terrace walls. There are also badly eroded check dams in the gully which are not currently maintained. It is possible the chipped stone and pottery come from rubble taken from elsewhere to fill the gully and might therefore not be *in situ*. What appear to be old terrace walls are visible across the *wadis* to the north and east (**Fig. 18**).

Condition: The terrace walls and check dams are affected by water action and continued use (maintenance; structural alteration). The scatter is also affected by the water running through

the gully, but more so by ploughing. The artefacts were potentially brought in from elsewhere as there is some evidence that material has been dumped. In the northwest of the field some modern excavation has been undertaken, possibly to dig or maintain a well, but this probably did not affect the main scatter.

Between Mādabā and the Dead Sea (Mount Nebo Area)

Wādī Kanīsah

The Wādī Kanīsah was surveyed by Peder Mortensen and his team as part of the Mount Nebo survey in the 1990s. Only the Palaeolithic and Neolithic periods of the Mount Nebo survey have been published so far (Mortensen *et al.* 2013), but from this, in combination with APAAME photos and MEGA-Jordan, it is clear that the area is archaeologically very rich. The Neolithic sites are concentrated in the middle part of the *wadi*, where the monastery of Theokotos is present (APAAME flight of 14/4/2013; EAMENA-0135616). One Early Neolithic and two Late Neolithic settlement sites were reported, although the two Late Neolithic 'sites' were probably part of a single habitation site or site cluster (Mortensen *et al*. 2013). Sherds with incised herringbone pattern are present, so the site(s) seems early Late Neolithic (Yarmoukian). In addition there were multiple Early Neolithic scatters and findspots.

MN 329 (EAMENA-0133882) – Late Neolithic Settlement

Name(s): Mount Nebo survey site 329 (MN329)
MEGA-Jordan number: n/a
Location: 35.708378 E, 31.753868 N (Definite)

Location notes: Directly north of the local road, north of the *wadi* on a terrace (now a series of agricultural terraces).

Description: A small (30×40m), low (*ca* 1m high) *tall* was found during the Mount Nebo survey in 1993 (Mortensen *et al.* 2013: 120-121). An ashy layer was seen, and a considerable concentration of chipped stone and pottery dating to the Late Neolithic period found. The material included sherds with incised herringbone pattern, indicating a presence during the earlier part of the Late Neolithic. During the 2018 site visit we observed chipped stone, including many flakes, which is in agreement with a Late Neolithic date, although by themselves not diagnostic. Interestingly there was also chipped stone that could be PPNA in date. No ceramics were observed in 2018. The farmers living on the upper terraces found a piece of plaster.

Condition: The site appears to have been recently destroyed by bulldozing for agricultural purposes (**Fig. 19**). In September 1993 the site appeared largely intact and undisturbed (Mortensen *et al*. 2013: Fig. 91). Probably by December 2004 (Google Earth CNES / Airbus 31/12/2004) but certainly by March 2006 (Google Earth DigitalGlobe 21/3/2006) the site was demarcated by a stone wall and prickly-pear fence (Mortensen *et al.* 2013: Fig. 91 [this photo dates to 2008]). It might have been around this time that the site was terraced. By 2008 at the latest, mature trees were present on the lower terrace and younger trees had been planted on the upper terraces (Google Earth DigitalGlobe 24/5/2008). The area continued to be used in the same way until at least 2013 (Google Earth CNES / Airbus 24/05/2013 and APAAME 14/04/2013 [*e.g.* APAAME_20130414_MND-0400]). However, by March 2018 the trees and fence had been removed (Google Earth DigitalGlobe 14/3/2018), probably by bulldozing, resulting in the bulldozed fields and likely completely removal of the site, as observed during the field visit at 30/9/2018. The backslopes of the terraces have been cut by *ca* 1m, with most of the archaeological artefacts found at the front of the terraces, presumably moved there by the bulldozing.



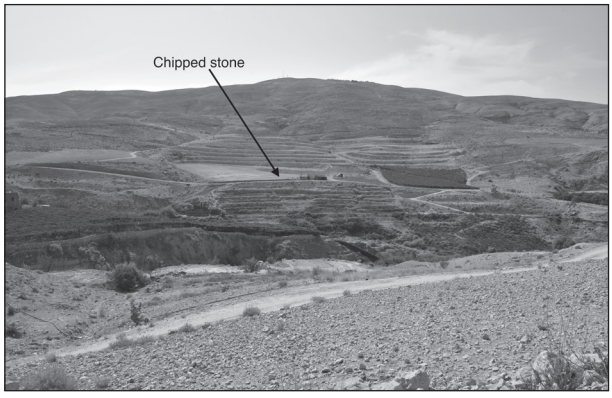
19. MN 329, (almost) completely destroyed by agricultural bulldozing (Photo: EAMENA/Pascal Flohr, 30 September 2018).

MN 423 (EAMENA-0133883) – Late Neolithic Settlement
Name(s): Mount Nebo survey site 423 (MN423)
MEGA-Jordan number: n/a
Location: 35.707007 E, 31.751373 N (Low)

Location notes: This site is present south of the *wadi*, on a plateau near the *wadi* bed, opposite MN 329; it was thought to be part of the same habitation cluster (Mortensen *et al*. 2013: 117, 121). In contrast to MN 329, this site could not be unequivocally found in 2018. The location we visited was based on the original photograph (Mortensen *et al.* 2013: Fig. 95), although the site might be lower down towards the *wadi* (this location could not be reached). Above this location, just south of the road, undiagnostic chipped stone was found in an agricultural field, which is therefore the most likely candidate (**Fig. 20**) (it is a plateau; however this was not overgrown in the photo in Mortensen's report, while the text states the site was).

Description: The Mount Nebo survey team found a collection of Late Neolithic pottery and chipped stone on what is probably a small (*ca* 50×50m) low *tall*, contemporary with MN 329 material (Mortensen *et al*. 2013).

Condition: If the site is indeed in the location near the current road, it appears to have been destroyed by agricultural activity. The slope was already terraced in September 1994 (Mortensen *et al*. 2013: Fig. 95), and it is clear from remote-sensing imagery that it continued to be used for agriculture. Towards the west it was further affected by bulldozing between 2006 and 2008 (see below; this mostly affects another site). The field where the chipped stone was found during our visit was certainly used for agriculture by 2006, and definitely by 2008, with evidence for ploughing and crops on the imagery (*e.g.* Google Earth DigitalGlobe 24/5/2008). The site might also have been cut by the road, which existed as a bulldozed track in 1994 (Mortensen *et al*. 2013: Fig. 95). The road was widened after 2006 (Google Earth DigitalGlobe 21/3/2006, compared to CNES / Airbus 24/5/2013) and asphalted between 2013 and 2018 (Google Earth CNES / Airbus 24/5/2013 and DigitalGlobe 14/3/2018).



20. MN 423 seen from across wadi, looking south. The location where chipped stone was found in the field adjacent to the road is indicated (Photo: EAMENA/Pascal Flohr, 6 October 2018).

MN Unknown Number (EAMENA-0135618) – Classical Site
Name(s): Unknown
MEGA-Jordan number: n/a
Location: 35.705517 E, 31.751168 N (Definite)

Location notes: Near the probable location of MN 423, just west along the road, north of the road and likely cut by it.

Description: A dense scatter of what appears to be Roman, or at least Classical, pottery was found. There appears to be a low '*tall*', slightly cut by the road. This has probably been recorded by the Mount Nebo survey. We quickly recorded this site because of its close proximity to MN 423; it is most likely another site, but until we know for sure where MN 423 is exactly it cannot be excluded that these two are the same.

Condition: The site is in a poor condition. What is probably its southern edge has been cut by the road. A small building is present on top, and there has been extensive digging on the top and side of the '*tall*', probably in relation to agriculture. Satellite imagery shows that the area directly northeast was landscaped (bulldozed) for agriculture between 2006 and 2008 (DigitalGlobe 14/6/2006 and DigitalGlobe 24/05/2008).

MN 526 (EAMENA-0133884) – Late Neolithic scatter
Name(s): Mount Nebo survey site 526 (MN 526)
MEGA-Jordan number: n/a
Location: 35.733737 E, 31.778972 N (Low certainty for MN 526; definite location of observed scatter)

Location notes: In 'Uyūn Mūsā. Described by Mortensen *et al.* (2013: 121) as next to the

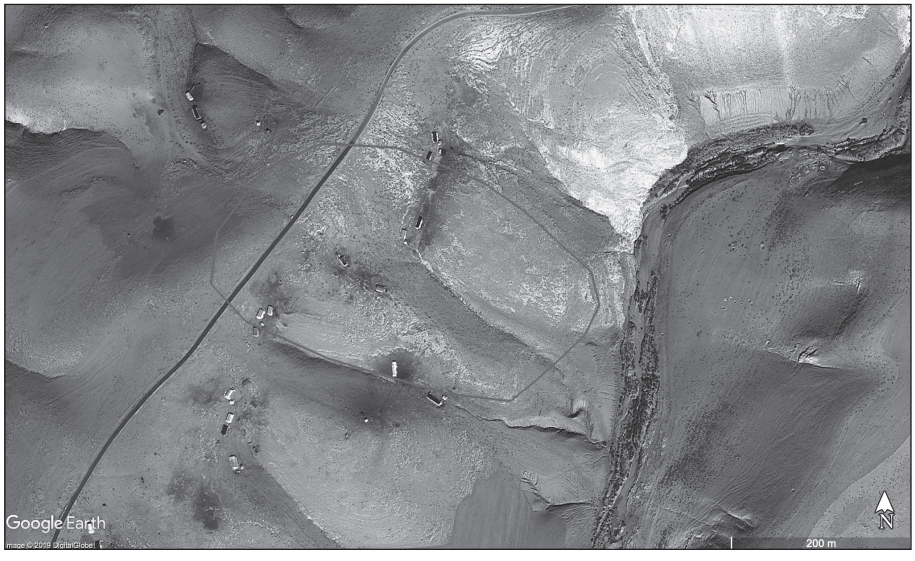
Church of Kayanos. We did not know where this church is exactly; it is sometimes described as close to the Church of Deacon Thomas, which is clearly present *ca* 160m southeast of the currently identified site. We looked throughout the agricultural area here (mainly olive groves). Older (20th-century, Ottoman?) farms are present, with frequent remains of apparently Classical period, such as occasional sherds and architectural remains. Near a low hill, which could be the low *tall* described by Mortensen *et al*., a concentration of sherds and prehistoric chipped stone was found on and near the track to the south of it (**Fig. 22**).

Description: Mortensen *et al*. (2013: 121) describe a low *tall* with a scatter of sherds and flint of Late Neolithic date. During our visit, we did not find clearly Late Neolithic material, but a scatter of prehistoric chipped stone was present together with later pottery, certainly including Byzantine, and probably also Roman, material. This was present next to what could be a *tall*, but perhaps only a natural hill, which could only partially be accessed owing to modern fencing (**Fig. 21**). On this hill/*tall*, there are (recent) terrace walls which include ashlar masonry.



21. 'Uyūn Mūsā, with the possible tall, possibly MN 526. Taken from the Dayr of Deacon Thomas, looking west (Photo: EAMENA/Pascal Flohr, 6 October 2018).

Condition: The site was described by Mortensen *et al*. (2013: 121) as having been destroyed by ploughing and other agricultural activities at the time of the survey in the 1990s. Indeed the entirety of the 'Uyūn Mūsā groves are heavily affected by agriculture, with olive trees widespread, and (bulldozed) tracks running through. On the low hill which might be the location of MN 526 there has been a lot of agricultural activity: terrace rebuilding; bulldozing; road construction (tracks, and tarmacking of these); olive and vine planting and growing; ploughing; an irrigation system; construction of buildings (**Fig. 21**). These were observed on imagery as well as in the field and are ongoing. Based on imagery, these appear to have increased substantially after 2006. The area inside the fence could not be visited, but it appears an older (roofless) building was present here until 2014 (Google Earth DigitalGlobe 19/7/2014), but has been destroyed since (Google Earth DigitalGlobe 14/3/2018). The modern construction on top of the hill/*tall* has been there since before 2006 (Google Earth DigitalGlobe 21/3/2006). Notwithstanding the extensive disturbances, if the site is indeed a low *tall*, the lower layers might be preserved, although they would be disturbed by the tree roots.



22. Umm Mashraṭ satellite image (Google Earth, DigitalGlobe 23/12/2012), showing the estimated area of Neolithic remains at Umm Mashraṭ with eroded gullies/wadis, the road and modern seasonal occupation.

Church of Deacon Thomas (EAMENA-0134597) – Byzantine Church
Visited because close by MN 526.
Name(s): the Church/Monastery (*Dayr* or *Deir*) of Deacon Thomas
MEGA-Jordan number: 58774
Location: 35.735785 E, 31.778426 N (High [coordinates from Google Earth])

Description: Building standing (or reconstructed) to about 2 metres high, clearly associated with Byzantine pottery, and identifiable as the *Dayr* of Deacon Thomas (MEGA-Jordan). The northern room contains the church; there are two rooms to the south of this. No other buildings or rooms are standing.

Condition: The site is registered in MEGA-Jordan and well known. Conservation work has taken place. The site has been researched and mosaics (and presumably other finds) have been taken to the museum. The site, or at least the main, standing building, is not affected by agricultural activities or the road. There is graffiti on the walls, some rubbish has been dumped by visitors and looting pits are present. Some plants are growing in the building and in the walls. Nonetheless, the condition of the site is probably relatively stable, although the threat of looting, more graffiti and ongoing effect of vegetation continues.

Near Mādabā
Umm Mashraṭ (EAMENA-0135621) – Late Neolithic Settlement
See also EAMENA-0134425 to EAMENA-0134428
Name(s): Umm Mashraṭ/Meshrat (I and II), Wādī ath-Thamad Regional Survey Site/Wādī ath-Thamad Survey Site 40, 95, 96, 97, 104 and 105 (WT-40, WT-95, WT-96, WT-97, WT-104, WT-105)
MEGA-Jordan number: 11556, 11557, 5945
Location: 35.895175 E, 31.586354 N (Definite)

Location notes: Stretching from a ridge where a modern tarmac road is present over relatively steep slopes towards the *wadi* (**Fig. 22**). The slopes are separated by a deep gully. The area is within a depression forming a catchment area (Foley and Foley 2008).

Description: Group of six or more 'sites' identified by the Wādī ath-Thamad survey, all noted to be Late Neolithic, and probably forming a single Neolithic occupation area (Foley and Foley 2008). The area was identified by the Wādī ath-Thamad Project survey in 1998 and 2001; surface recording was conducted and small probes and trenches were excavated in 2001 and 2004 (Cropper *et al.* 2003; Foley and Foley 2008). A considerable number of sub-circular and circular structures and linear wall lines are present in different areas of the site (28 identified on the surface of Umm Mashraṭ II), in combination with parts of mud-plaster floors, at least one hearth, and cupholes (Cropper *et al*. 2003; Foley and Foley 2008). A burial was found under a mud surface (Foley and Foley 2008). Sherds include examples characteristic of Yarmoukian as well as Jericho IX type (Cropper *et al*. 2003). The lithics are predominantly flakes, with many burins present (Foley and Foley 2008; also our field observations). Interestingly, none to very few sickle blades, axes, adzes or ground-stone tools were found, indicating limited cereal processing. With the many ovicaprid bones and lack of game (Foley and Foley 2008), the site's inhabitants appear to have focused on pastoralism.

Condition: the site(s) appear to be in a fair condition. The area, especially the slopes, have been much affected by erosion and a substantial gully runs through the site (**Fig. 22**). Erosion has also affected the excavation trenches and other pits dug at the site. Agricultural activity did not seem to be a major factor during the 2018 site visit, but ploughing was reported to have substantially affected the northern knoll (Umm Mashraṭ I) between 1998 and 2004, leading to the 2004 rescue excavations (Foley and Foley 2008). On the imagery, fields are visible on the ridge directly west of or potentially on the site (Google Earth DigitalGlobe 23/12/2012). A road passes through the upper parts of the site. It has been there since at least 2004 (Google Earth CNES / Airbus 31/12/2004) and has been tarmacked and widened since before 2012 (Google Earth DigitalGlobe 23/12/2012). At the time of the site visit part of the area was occupied by Bedouin with their herds, and on the satellite imagery it is clear that this is a regular occurrence. There is, however, no permanent construction and only a small part of the site is occupied, so the impact is relatively low. There might be trampling impact, especially on the

open trenches, and the animals will eat vegetation – on the one hand vegetation could damage the archaeology, on the other it would reduce erosion. There has been some excavation, in part probably former archaeological trenches, but also other digging, potentially looting (not large scale), with more on other side of *wadi* (*e.g.* Google Earth DigitalGlobe 23/12/2012 [**Fig. 22**]).

Discussion and conclusions

The site visits have helped us to determine the actual location of sites found in existing databases and reports, so that it is now possible to analyse and monitor them using remote sensing and to use them in developing a predictive model. The site visits also allowed us to make detailed condition assessments on the ground, checking remote-sensing condition analyses.

The analysis of Late Neolithic site location is ongoing. Part of this process is to determine the nature of each site. Some, based on the presence of architecture, or substantial and dense artefact scatters, are interpreted as likely settlement sites, while others are assumed to represent more temporary or ephemeral uses of the landscape. We note that even within the agricultural zone, it is likely that locations regularly associated with activities routinely performed away from settlements, such as herd management, will have been present. It is clear, but also not surprising, that all the probable settlement sites are very close to *wadis* and in, or very near to, areas highly suitable for agriculture, such as alluvial fans (see also Hitchings *et al*. 2016). These locations are now often covered by irrigated and ploughed fields, or by modern orchards. Water availability would have been important not only for agricultural sites, but also for herd management of semi-obligate drinkers such as sheep. Umm Mashraṭ in the Wādī ath-Thamad is an interesting example because it seems more like a pastoralist site, with an absence of sickle blades and low numbers of ground-stone tools (Foley and Foley 2008). Most excavated sites (except of course those in the desert) are more typically small hamlets with mixed agriculture, but most of these excavated sites are in the current agricultural zone. It would be interesting to study more sites located in the steppic zone. Simple proximity to a *wadi* is not precise enough to help develop a predictive model, but it appears that location near *wadi* junctions may be a more significant factor: the Wādī Ziqlāb project found settlements were often located near *wadi* junctions (Hitchings *et al.* 2016). This appears to hold true for settlements in other areas, like al-Ḥusayyah, Khirbat al-Ḥammām (**Fig. 12**) and Tall Wādī Faynān, although it is not entirely consistent. The presence of *wadi* terraces suitable for farming may also be an important factor. Identifying such terraces through a combination of slope and soil data will be an important step in developing a predictive model, which is likely to be an iterative process as we investigate which parameters are most useful.

As the locations of most Late Neolithic sites are favourable for agriculture in past and present, sites have been - and continue to be - disturbed by farming activity (**Table 1**). Ten out of the 17 visited Late Neolithic sites or areas were affected by agricultural development, with four sites almost or completely destroyed by it. This is a higher percentage than for all the sites in the EAMENA database that have been analysed so far, where 19% of the sites in the whole MENA region, and 16% of the sites in Jordan, have been affected by agricultural or pastoral activities (analysis done in May 2019). The lower total affected can be partly explained by the inclusion of desert areas, contrasted to our focus on agricultural areas during our site visits, but it may also reflect the location preference of Late Neolithic sites in areas with good agricultural potential. There are other development damages and threats, including roads and other infrastructure, such as the dam works in Wādī Fīdān (see **Fig. 6**). The latter is threatening three of the visited sites, and others too. Looting, however, is often restricted or even absent, presumably partly because of low visibility of the sites on the surface but also probably because the material from Late Neolithic occupation has less commercial value.

It is evident that sites further into the steppe tend to be less disturbed, with the Wisād Pools sites in the eastern desert being a good example (Rollefson *et al.* 2013, 2018). This was obvious when making condition assessments based on remote sensing, as there is less agricultural, settlement or infrastructure development

(although bulldozing often takes place, possibly linked to prospection). This effect does, however, skew our understanding of Late Neolithic settlement patterns, which are biased towards the zone of preservation. However, in all probability Late Neolithic settlement was concentrated in the agricultural zone, possibly with major sites often subsequently buried under later settlements. Pella, where Late Neolithic layers were found at the lowest levels (Bourke *et al*. 2003), is a rare example of a large later settlement that has been fully excavated to the base of its stratigraphic sequence; there may be other such examples.

The work reported here is only a first step in ongoing research. We intend to visit more of the sites identified by the desk-based research and to use the corrected locations and data about these sites to undertake more GIS descriptive analyses. Precise landscape positions will be used to set up a model to try to predict Late Neolithic site location. In addition to the information gathered in this project, information from the long-term work in the Wādī Ziqlāb will also be used to support the model's development. The work conducted there by Banning and colleagues has been both long term and intensive, while at present the study reported here is in its infancy and extensive over a large area. The next phase of research will become more geographically focused and intensive, using and testing the predictive model in a target area on the al-Karak plateau. The work will start by using remote-sensing imagery to identify areas where the Neolithic landscape may survive, considering the local geomorphology to assess likely areas of burial and erosion (*cf.* Banning 2015). Site visits and small-scale survey will be conducted, with the intention of expanding the project to target other locales. Ultimately, this work will be followed up by excavation of selected sites, with preference given to those suffering greatest attrition.

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PHOTOGRAMMETRIC DOCUMENTATION AND PHASING OF A ROCK-CARVING GALLERY AT AL-ḤUMAYMAH

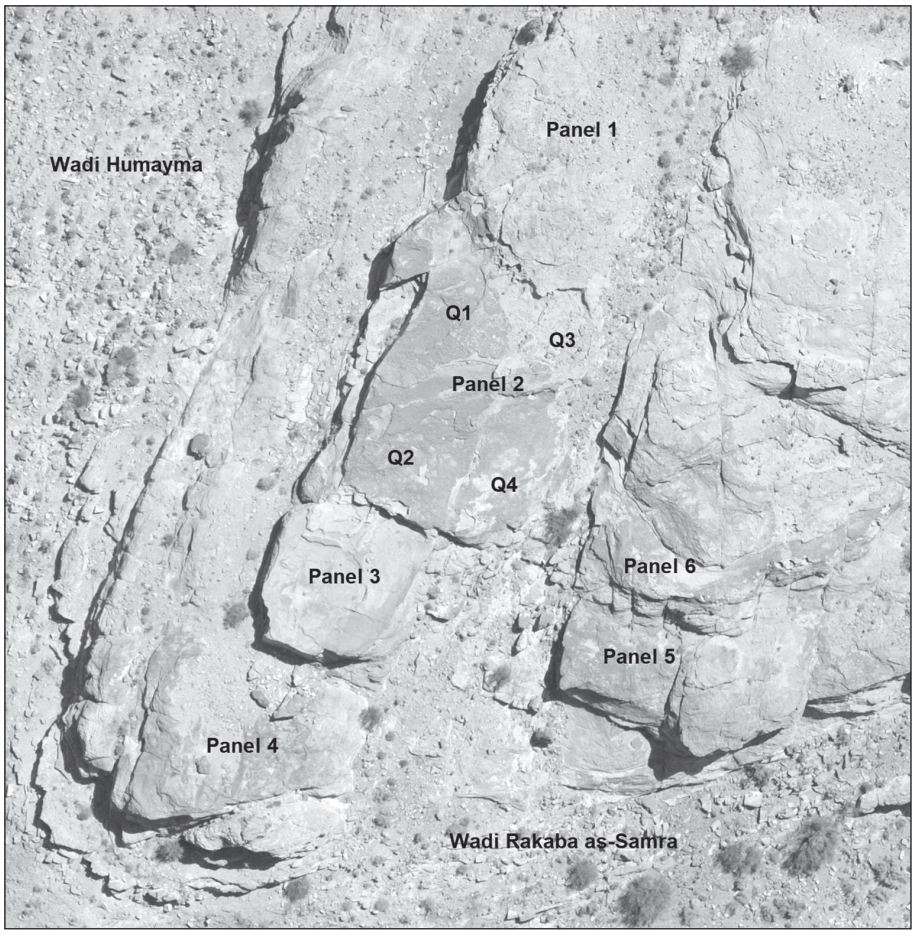
M. Barbara Reeves and Craig A. Harvey

The 2014 season of the al-Ḥumaymah Excavation Project was devoted to surveying rock-carved graffiti and other human activity areas on Jabal Kalkhah and the sandstone ridges west of al-Ḥumaymah's Nabataean through early Islamic settlements (Reeves, Harvey and Seymour 2018). In the course of this survey, a local resident, Swaylem al Manaja, directed our attention to a natural sandstone pavement on the slopes of Jabal Kalkhah that was covered in more than a hundred rock-carved images and texts. This is, by far, the largest known concentration of rock carvings in the al-Ḥumaymah area and thus suggests a place of great significance in the local environment. That impression is supported by a corridor and stairway leading to the site from Wādī al-Ḥumaymah, additional rock art, texts and a *betyl* niche in the vicinity, and by the dramatic natural location (**Fig. 1**). This pavement/panel is part of Jabal Kalkhah's Eastern Cascading Plateau Site, a triangular plateau of descending bedrock panels that cascade from south to north down the eastern flank of Jabal Kalkhah. The triangular front of the plateau has been carved by two run-off *wadis* (Wādī al-Ḥumaymah and Wādī ar-Raqabah as-Samrā) that merge below its lowest (northern) tip. Run-off water now (and possibly in ancient times) also pours down the hill across the panels, causing erosion and the buildup of sediment and rocks which has obscured some rock carvings and possibly other traces of human activity. The site provides excellent views of the surrounding terrain, and from its highest elevations it is possible to look over the intervening ridges to the ancient settlement and Roman fort. None of the surrounding slopes are as dominant, however, as the notched peak of Jabal Kalkhah which towers above the site to its northwest, across the open expanse carved by Wādī ar-Raqabah as-Samrā. Ancient evidence suggests that this high peak with its distinctive notch served as a focus of local cult and civic identity in al-Ḥumaymah's Nabataean and Roman periods (Reeves 2016).

An aerial overview of the bottommost sections of the Cascading Plateau Site (including some of the panels we surveyed, the *wadi*s, and the entrance corridor and stairs) is shown in **Fig. 2**. Many of these sandstone panels have exposed surfaces covered in a dark desert varnish. This thin but durable natural patina, which can be carved through (by pecking, abrading or incising) to reveal the light stone beneath, has provided a popular canvas for rock-carved images and texts throughout desert regions for thousands of years. Several horizontal and vertical surfaces at the Cascading Plateau Site have received rock-carved graffiti, but by far the greatest concentration of carvings has been on the large, horizontal and black-covered surface of Panel 2. This panel



1. View down Jabal Kalkhah's Eastern Cascading Plateau towards people standing on Panel 2.



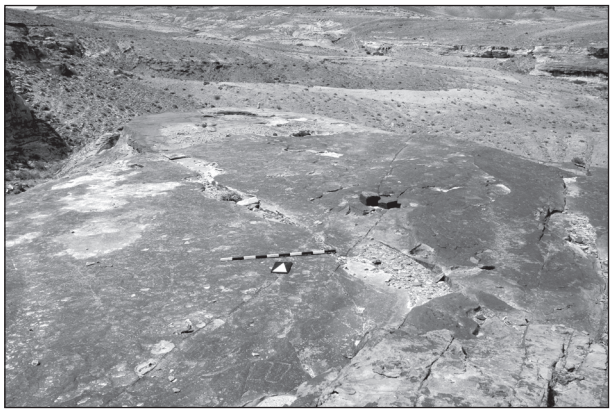
2. Northern tip of Jabal Kalkhah's Eastern Cascading Plateau (Detail of APAAME_20171001_ REB-0814. Photographer: Rebecca Banks. Courtesy of APAAME).

is *ca* 14m wide × *ca* 18m long. As shown in **Fig. 2**, the panel is best conceptualized in terms of four distinct quadrants. Quadrants 2 and 4, at the front of the panel where it overlooks Panel 3 and Wādī ar-Raqabah as-Samrā, have a flat surface representing the top of one sandstone stratum (**Fig. 3**). In contrast, Quadrants 1 and 3 to the rear have undulating surfaces incorporating the tops of many different sandstone strata. As for the panel's other natural division, Quadrants 1 and 2 are divided from Quadrants 3 and 4 by a seam in the sandstone that bisects the panel. This seam has been heavily eroded between Quadrants 2 and 4 with the result that some of the carvings there have partially disappeared. An even larger zone of erosion, associated with a runoff channel, runs down the right side of Panels 1 and 2 and likely contributed to the nearly complete erosion of the sandstone section between Panels 3 and 5. It has also resulted in a great deal of erosion to the varnish and rock carvings in Quadrant 4 of Panel 2.

Given that the natural qualities and preservation of Panel 2's four quadrants differ, it is no surprise that the number of rock carvings discovered in each quadrant was very different. Humans had chosen to carve graffiti predominately into the flat surfaces of Quadrants 2 and 4. Nature had best preserved the carvings in Quadrants 1 and 2. As a result, Quadrant 2 now has the highest concentration of well-preserved carvings on Panel 2, which itself has the highest concentration of carvings at al-Ḥumaymah. Given the number of carvings and subsequent erasures, the frequency of overlap, and obvious differences in patination and inscribed languages, it is apparent that this concentration of carvings has been added to and subtracted from for thousands of years. As such, it has functioned as a rock-carving gallery, an ongoing record of the interests, beliefs and behaviours of human contributors from various cultures and time periods (*cf.* Polkowski *et al*. 2013: 114-15).

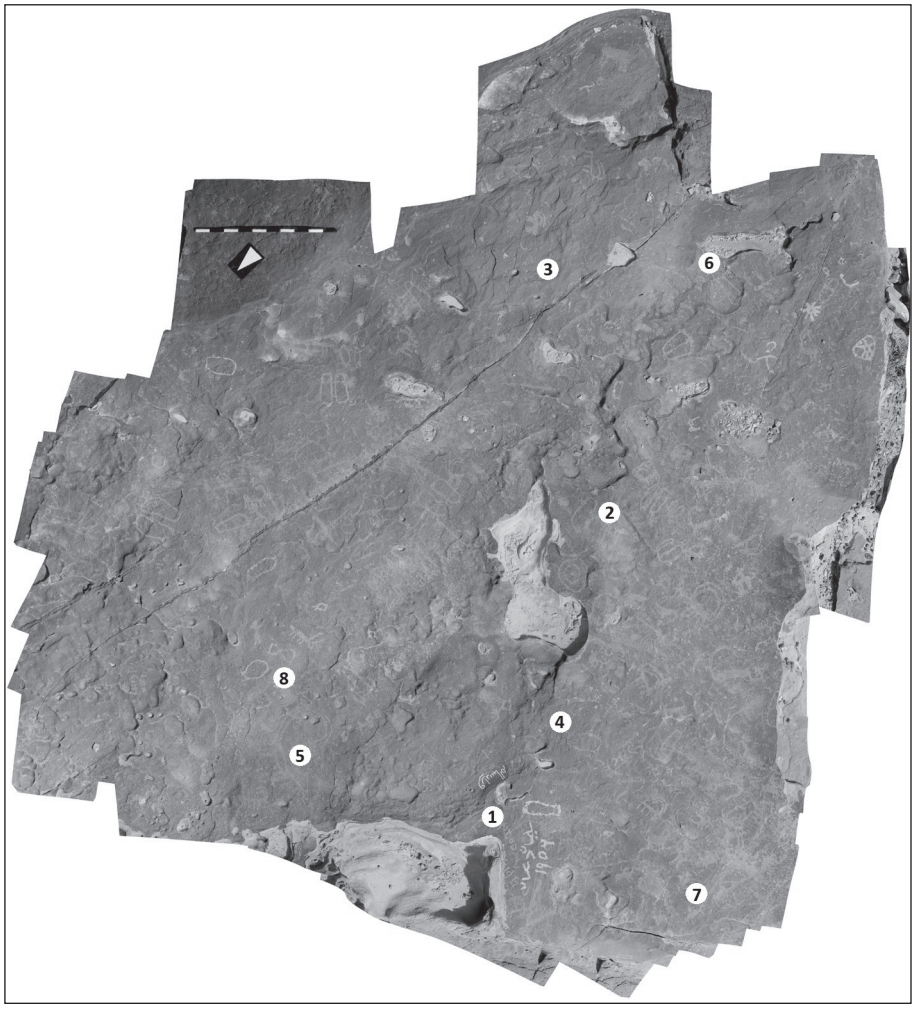
In order to record and analyze this gallery properly, we needed to be able to preserve as much context about each carving as possible. We needed to be able to document accurately the relative sizes, patinas, locations,

orientations and micro-environments of the carvings so that we could study them back in our offices. Conventional photographs, consisting of vertical shots of interesting carvings and oblique shots across the panel, would not be able to record this contextual information adequately, and close-range aerial photography (*e.g.* by drone or kite) was not an option during our survey. We therefore decided to employ a land-based photogrammetric technique involving the merger of hundreds of high-resolution digital images. The field technique was to have one team member walk across this area taking overlapping vertical photos from a constant height (*ca* 1.5m). 240 photos were taken, each comprising an area of *ca* 0.9 × *ca* 0.6m. All photos were taken using natural light during a one-hour period in the afternoon when the whole panel was in full sun. A Nikon D200 digital camera was used with ISO set at 200, the f-stop at f/10, and focal lengths of 18 or 30mm. Each resulting photo was *ca* 7MB in size with a resolution of 300×300dpi. No scales were included in the individual photos; instead, a meter stick and north arrow were placed just beyond Quadrant 2's boundary with Quadrant 1 and photographed *in situ* as part of the overlapping documentation. Following the fieldwork, the images were merged using Agisoft PhotoScan.



3. Panel 2, Quadrants 2 and 4 with Panel 3 below.

The resulting merged image/stitch is shown in **Fig.4**. Its shape conforms to Quadrant 2's



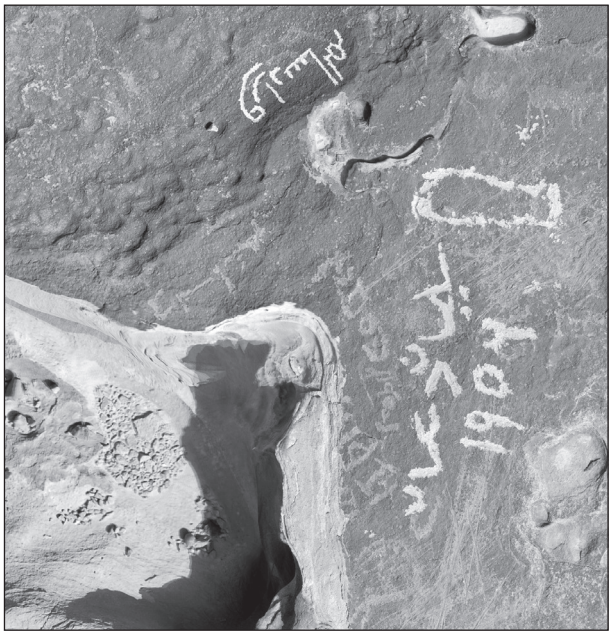
4. Photogrammetric stitch of Panel 2, Quadrant 2 with rock carvings discussed: (1) Fig. 6; (2) Fig. 7; (3) Fig. 8; (4) Fig 9; (5) Fig 10; (6) Fig. 11; (7) Fig. 12; (8) Fig. 13.

basic shape and its jagged edges reflect its creation from the merger of rectangular photos. The stitch is 6.95m long × 6.38m wide and provides excellent resolution of details down to *ca* 0.05m across. The meter stick and north arrow can be used in Photoshop to measure and check the orientation of both individual and associated carvings. By using the merged image in conjunction with aerial photos and site-context photos, it is also possible to examine whether individual carvings were pointing towards particular landscape features. Relative patina is also easy to assess across the merged image. This is especially important as the area of the stitch comprises the top of a single sandstone stratum. Side views (**Fig. 5**) and eroded sections within this flat-topped stratum further reveal that it is part of the Honeycomb layer of the Umm ʻIshrīn formation (*cf.* Rababeh 2005: 37-39). As noted above, carving through the stone's hard dark surface varnish exposes the unpatinated natural white colour. New carvings would have originally stood out as white against the desert varnish and then become progressively darker through time as a new patina/varnish formed. Relative patina can consequently be used on this panel in conjunction with superposition, inscriptional information and subject matter for the purpose of relative dating. A caveat that should be acknowledged here is that although comparison of patinas is a traditional method by which archaeologists have assessed the relative age of rock carvings (Anati 1999; Bednarik and Khan 2009; Eisenberg-Degen and Rosen 2013), the technique is subject to error if, for example, the underlying stone is not homogenous, if erosion patterns across the panel are not uniform, if photographs are taken with different cameras or at different times of day, or if comparisons are attempted between carvings situated on different surfaces (*cf.* Bednarik and Khan 2009; Betts 2001: 97-98). In the case of our photogrammetric survey of Panel 2, the combination of a homogenous stratum of sandstone and the controlled photographic conditions should have mitigated most concerns. Still, given that some local variations across the panel could affect patination (*e.g.* areas more impacted by erosion than others), our assessment strategies involve considering micro-contexts when evaluating relative patination and focusing on clear differences in patination rather than subtle variations.

A couple of examples serve to illustrate the relative-dating possibilities and limitations across the panel. **Fig. 6** shows a cluster of Arabic and Thamudic inscriptions at the bottom edge of the panel. The bright white inscription at the top of the photo is almost assuredly the most recent. It was added after the slightly darker Arabic inscription that includes a 1950s date. The 1950s inscription is, however, much lighter than the Thamudic inscriptions beneath and around it. There is another Arabic inscription visible immediately above the eroded quadrant. Its patina is much darker than the other Arabic inscriptions or the repatinated eroded surface.



5. View of Panel 2 from Panel 3. Note light colour and honeycombed nature of sandstone beneath and above Panel 2's desert varnish.



6. Cluster of Thamudic and Arabic inscriptions and erasures at the bottom of Panel 2.

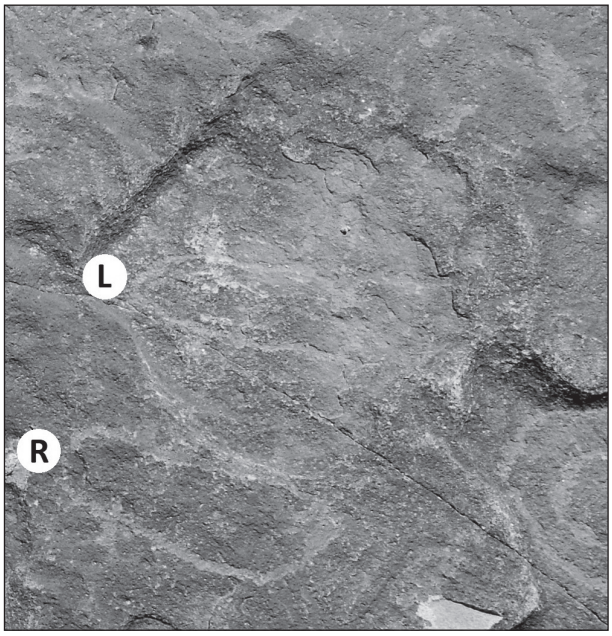
Indeed, its patina is most similar to that of the Thamudic inscriptions, which probably date no later than the fourth century AD (*cf.* Graf 2018). It is thus likely that this is an early Arabic text, which in northwest Arabia date as early as the sixth century AD (*cf.* Nehmé 2017).

In the case of the above example, all of the inscriptions were located in a small area with consistent erosion factors (except for the eroded-out quadrant). A different situation can be seen in the case of a pair of shoeprints that, given that they share the same basic shape and were placed side by side at shoulder width, were most likely carved at the same time (**Fig. 7**). Their micro-environments differed, however. The left shoe was carved into a small, shallow hollow that would have trapped water and sediment, and subsequently caused it to age differently than the right image. Local erosion patterns in that hollow have washed out the colour of the left carving and its background stone. Thanks to the high resolution across the photogrammetric stitch, such micro-contexts are easy to spot and to account for in the overall analyses.

Turning now to the rest of the panel, it is apparent that the medium-dark patinas on the aforementioned Arabic and Thamudic inscriptions are similar to those of more than a dozen other Thamudic and Nabataean inscriptions. Although, as previously mentioned, it is problematic to use slight variations in patina to date this set of inscriptions more precisely, the medium-dark patina provides a benchmark for phasing carvings across the panel. Inscriptions and images with a medium-dark patina constitute the largest group of easily visible carvings on this panel. They reflect a several-hundred-year-long period when people of different cultures were coming to this site and leaving written or pictorial marks of their presence.

In order to understand this period when a high volume of carvings of a multi-cultural nature were deposited on this panel, it seems best to turn to the local context (*cf.* Oleson 2010: 50-62; Reeves 2019). A Nabataean town was founded at al-Ḥumaymah in the first century BC on a pre-existing trade route. The town was on the desert plain, but elevated sites such as this one on Jabal Kalkhah and others on the adjacent ridges were used for cisterns, tombs and religious purposes. A Roman garrison took up residence at al-Ḥumaymah in the early second century AD to control access along the trade route, rebranded as the *Via Nova Traiana*. Soldiers and civilians subsequently co-existed at al-Ḥumaymah for more than two centuries. By the fifth century Christianity had developed into a major cultural influence at al-Ḥumaymah as seen by the construction of five churches. Islam subsequently supplanted it as the dominant religious force, particularly after the Abbasid family bought the land and lived in a qasr with an adjacent mosque from the late seventh to mid eighth century. After the Abbasid family left to take up the caliphate, al-Ḥumaymah was never again the site of a large or important settlement. There are likely several reasons for al-Ḥumaymah's decline, including a decreased water supply after the aqueduct built by the Nabataeans stopped flowing. It should also be noted that even when the aqueduct was flowing, al-Ḥumaymah only ever had a small population (Oleson 2010: 401-4), although this was supplemented by those passing through on the transregional road.

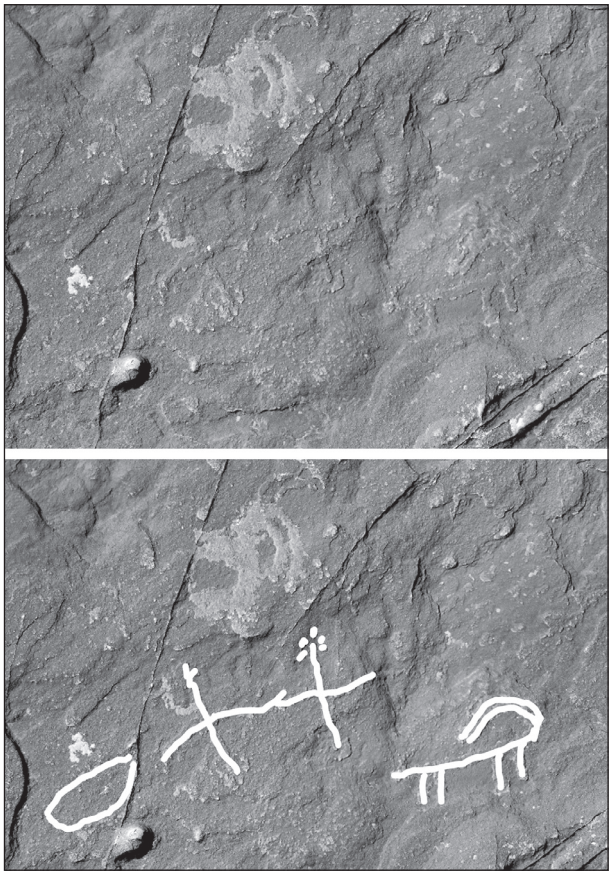
Based on this historical overview, it seems most likely that the Nabataean, Thamudic and Arabic texts with medium-dark patinas come from the heyday of the ancient settlement in the first century BC through eighth century AD, although they could also be slightly before or after. Pictorial carvings with the same



7. Phase 2 shoeprints with differential preservation owing to different micro-contexts (photo contrast enhanced).

medium-dark patina are roughly contemporary with these inscriptions. We will refer to the period in which they were carved as Phase 2. Other carvings on the panel (mostly Arabic texts and symbols) that are much lighter are apparently much more recent. They are hypothesized to date to the period of sporadic occupation in and around the ancient settlement between the Abbasid family's departure and the present day. Moreover, given the lightness of these carvings in comparison to those of Phase 2, they are more likely from the later part of this period. We will refer to this period as Phase 3. Finally, there is an obvious group of images that are much darker than those with the medium-dark patina or have patinas that are indistinguishable from that of the background stone. These Phase 1 carvings are hypothesized to predate the foundation of the Nabataean town by a considerable time. Although the oldest carvings here are possibly contemporary with the Palaeolithic activity areas on al-Ḥumaymah's hills and ridges (Henry 1995), especially nearby sites on Jabal Kalkhah (J406a-b; J405) and Ridge 2 (J403; J407), it seems unlikely that such very old carvings would survive on a panel so exposed to wind, sun and rain (*cf.* Bednarik and Khan 2009: 17). It thus seems more likely that the images were left by people passing by al-Ḥumayma in subsequent millennia. Although there is no other evidence of human activity anywhere at al-Ḥumaymah between the Palaeolithic and Nabataean periods, there was, as already mentioned, an ancient transregional route on the nearby plain as well as Neolithic (Simmons and Najjar 2007: 234, fig. 1), Chalcolithic (Abu Azizeh 2013a: 115, fig. II.12), Bronze Age (Abu Azizeh 2013b: 118, fig II.14) and Iron Age sites (Jouvenel 2013, 126, fig. II.18; Oleson 2010: 50) elsewhere in southern Jordan.

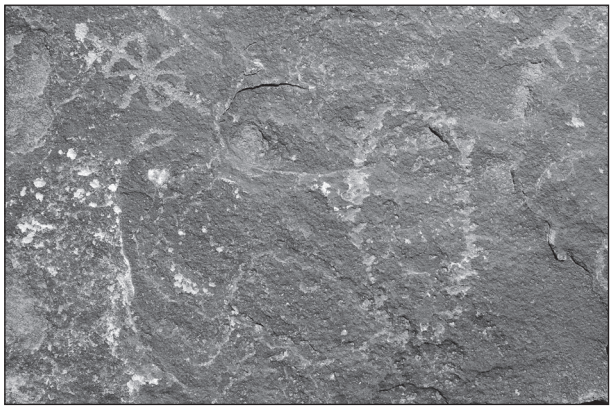
Carvings attributable to Phase 1 are the hardest to discern on this panel. Some underlie later carvings that have obscured their images. Many also have patinas that are almost indistinguishable from the background stone. It is very hard to see the details of such carvings. It is also difficult to be certain that an image that matches the background stone was carved by humans rather than created by nature. When images from this phase can be seen it is usually because they stick out as anomalies beneath later carvings or in otherwise uncarved areas. Images that can be assigned to this period include animals, footprints, geometric forms and as yet indeterminate shapes. **Fig.8** shows some very dark figures from this phase next to a bovid and symbol(s) from later phases. The darkest figures, with patinas indistinguishable from the background stone, consist of two linked upright crosses (or schematic anthropomorphs [*cf.* Anati 1972: 39-42]) with radiating lines emerging from one end and possibly details (unsketched) in the lower half. Also from this period, but with a lighter patina, is a stick-figure ibex and an outlined oval or footprint. **Fig. 9** shows another outlined oval with a patina matching the background stone (L) next to which another oval was later added (R), probably to suggest a pair of shoes. There is also a smaller outlined shoeprint bridging the space between the previous two. Its patina matches that of the left shoeprint but its shape, size and the direction it points towards are all different, suggesting a different intent. Another shoeprint (a right outline with rectangular sides) also likely dates to



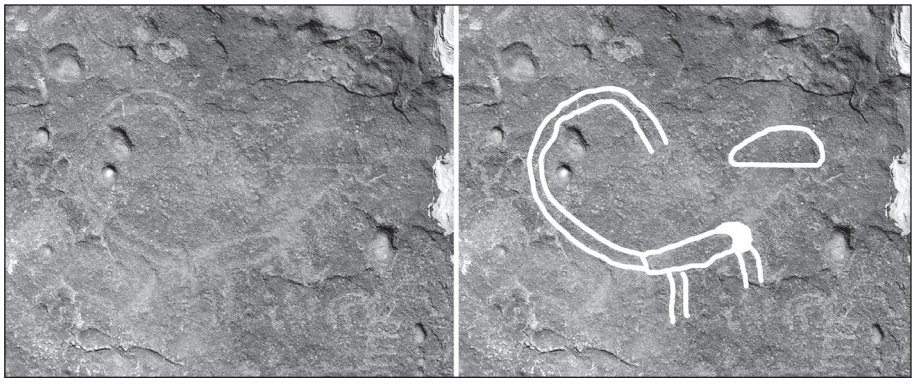
8. Phase 1 carvings with very dark patinas and tentative sketch of details.

Phase 1, given that its patina closely matches the background stone (**Fig. 10**). It is next to a bovid with a similar patina, also drawn in outline. This is the largest bovid on the panel (0.58m high × 0.41m wide). It should be noted here that although some scholars have assigned large outlined animals to a very early chronological period (Anati 1972: 11-12), Betts (1987, 2001) has shown that outlined animals appear in archaeological contexts in Jordan ranging from the seventh millennium BC to the Islamic period. The chronology of rock-carved outlined shoeprints seems to be similarly broad. Those from Jordan's Ḥismā desert are hypothesized to range in date from at least the fourth millennium BC until the present (Inglis 1988: 71, 74; Borzatti 2005: 71). In addition, there are variations in form and size between the bovids and shoes from this panel that, based on patina, seem to date to our first phase. Such variations are a good reminder that the panel's Phase 1 extends over thousands of years and likely encompasses diverse cultural groups and artists with individual stylistic preferences.

The second phase of rock carvings on this panel, Phase 2, encompasses all of the Nabataean, Thamudic and early Arabic inscriptions and most of the visible carvings (*i.e.* those with a medium-dark patina). Many of the carvings on adjacent panels at the Cascading Plateau Site, especially those accompanied by Greek and Thamudic inscriptions, probably also date to this period. Inscriptions were clearly an important element of the overall significance of the rock-carving gallery during this phase. Approximately 18 inscriptions, plus 18 erasures of what are probably other inscriptions, correspond to this period in the photogrammetric stitch. They appear alone or in combination with images such as footprints. Only one of these inscriptions has been published at present (**Fig. 11 center**). It is a Thamudic E text, accompanied by a pair of footprints, that is hypothesized to have been written by an officer in al-Ḥumaymah's fourth-century unit of *equites sagittarii indigenae* (Graf 2018). Most of the other extant inscriptions appear to be in the Thamudic scripts, although the longest and most elaborate inscription on the panel is written in Nabataean. The patinas of both the erasures and the underlying carvings suggest that they also both date to this phase (**Figs. 6 and 12**). Erasures are concentrated on the back-left section and front-right section of the stitch. Some were located next to other inscriptions, some next to footprints, and some next to figures on camels and horses. Why anyone went to the trouble of crossing out 18 previous carvings is unknown, but at that time bright white erasure marks with traces of letters poking out beneath would have made a very dramatic addition to this age-old gallery of the settlement's history. There are several historical events that could relate to a local redefinition of the site's identity, including the Roman acquisition of the Nabataean Kingdom, events surrounding



9. Three shoeprints (two from Phase 1; one from Phase 2) and Phase 2 symbols (photo contrast enhanced).



10. Phase 1 carvings and tentative sketch of details. The ibex's tail is obscured by a canine carved at a different time.

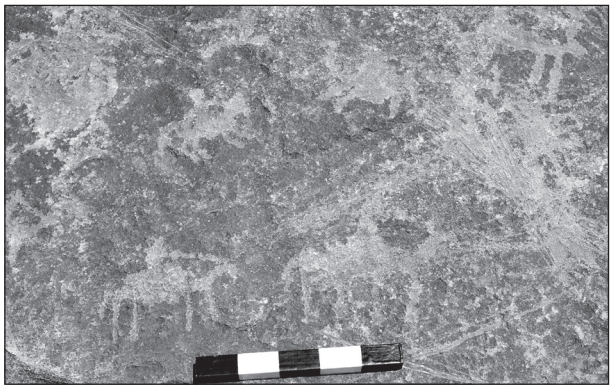
a (temporary) departure of the Roman garrison in the third century, and subsequent Christian and Islamic cultural domination. Work on identifying the time of the erasures is ongoing and being done in collaboration with the analysis of the extant inscriptions.

There were also many footprint images across this panel during Phase 2 (and the other phases). Their form, orientation and significance is the subject of a forthcoming paper (Reeves in preparation). Other images that were carved during this period include wild horned bovids (predominantly ibex), images of humans on camels and horses, canines hunting bovids, an anthropomorphic figure in the orant position, and abstract symbols (**Figs. 8-9, 11-13**). It is interesting that the frequency and location of each type of image varies. For example, footprints are very common and appear right across the stitch whereas riders are less common and are concentrated in the bottom-front corner.

The final phase of rock carvings on this panel, Phase 3, reflects a period of relatively little carving activity. Only *ca* 20 carvings (and no erasures) correspond to this period. This is in sharp contrast to the high concentration of carvings and erasures from Phase 2. The scarcity of Phase 3 carvings is consistent with there being only small-scale and sporadic human activity in the al-Ḥumaymah region during this period. It is also quite likely that this particular site, with an exposed bedrock surface and no rock shelters or cisterns nearby, had little functional value and had lost the special significance it had during the previous phase. The two inscriptions already discussed constitute the latest additions to this panel, both dating to the twentieth (or possibly twenty-first) century (see **Fig. 6**). The footprint signed and dated in the 1950s is especially interesting as it likely reflects someone coming upon this unique site, seeing all the footprints and inscriptions, and deciding to add his own. In doing so he seems to have interacted with the pre-existing gallery by choosing to place his name below (and partially over) ancient texts. Likewise, the carver of the other modern inscription seems to have interacted with the gallery not only by aligning the angle of his text with that of the early Arabic inscription, but also by partially carving over another ancient (non-Arabic) text. Interaction with the gallery is also apparent in the case of the *wusum* (abstract tribal symbols) that were added beside and over pre-existing images and texts (**Figs. 11 and 13**). In one case (**Fig. 11**) someone has even selectively recarved three parallel lines within a Thamudic letter, possibly to reveal and emphasize a particular *wasm* (*cf.* Khan 2000: 52-53, 89). It is not presently known whether these Phase 3 *wusum* represent families that lived in this area or people traveling through who wanted to commemorate their



11. Phases 2 and 3: inscriptions, footprints, shoeprints, ibex and wusum.



12. Phase 2 horse and camel riders and erasures (photo contrast enhanced).



13. Phase 2 orant figure and inscriptions; Phase 3 wusum, bovid and possible shoeprint.

presence. It is also unclear whether a couple of outlined ovals with one flat end and one pointed end from this phase are intended to represent *wusum* or footprints (**Fig. 13**). A couple of other footprints and some straight-horned bovids were also added to the gallery during this final phase.

Although there is still a great deal of work to be done in analyzing this panel, this paper provides an introduction to the type of analyses that photogrammetric documentation supports. The analysis of relative patinas across this homogenous rock stratum has allowed us to divide the history of this rock-carving gallery into three major phases. Unlike most other rock carving sites in Near Eastern deserts, this gallery is also special in that it is adjacent to a major archaeological site that has been excavated and surveyed for several decades. Drawing on the archaeological evidence of human activity at al-Ḥumaymah, we have tentatively associated each of these phases with a broad period in the site's history. But the creation of a high-resolution image incorporating most of the panel has been, and will continue to be, essential for comparing the patinas, locations, orientations and overlap of carvings across this rock-carving gallery. The photogrammetric stitch allows us to study the whole panel over and over again and to zoom in on small details. Thorough examination will allow us to study the interests and priorities of the people adding to, and subtracting from, this important rock gallery over many thousands of years. In a future season, we hope to return to the field in order to extend our photogrammetric documentation to the full surface of this carved gallery and to the carvings on adjacent panels.

Acknowledgements

The al-Ḥumaymah Excavation Project is accredited by the Archaeological Standards Committee of the American Schools of Oriental Research and licensed by the Department of Antiquities of the Kingdom of Jordan. Funding for the 2014 survey was provided by the Senate Advisory Research Committee of Queen's University. Reeves is project director and chief analyst of the stitch. Harvey is associate director and was responsible for creating the stitch. Manal Basyoumi, Swaylem al Manaja and Brian Seymour assisted with the fieldwork. Darcye Lovsin and Emily Welsh assisted with locating and interpreting images at Queen's University. We are also very grateful to Dr. Monther Jamhawi, Director-General of the Department of Antiquities, and to Dr. Barbara Porter and all the staff at ACOR for their assistance with the fieldwork.

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THE SITE OF AS-SALA‘: 2016 ARCHAEOLOGICAL CAMPAIGN

Rocío Da Riva, Roser Marsal, Marisol Madrid, Juan Marín, Ethel Allué, Marina Lozano and Eva Miguel

Introduction

The site of as-Sala‘ (also known as Qal‘at as-Sala‘) is located 3km from modern Buṣayrā (Edomite Bozrah) and 10km from aṭ-Ṭafīlah, the modern capital of the eponymous administrative district located in southern Jordan (**Fig. 1**). as-Sala‘ is some 4km from the King’s Highway and about 50km north of Petra. The site stands on a rocky outcrop above two surrounding *wadis*: Wādī al-Ḥirsh and Wādī al-Jamal. These connect with the Wādī ‘Arabah through the Wādī Khunayzīrah (**Fig. 2**). The geographical coordinates of the centre of the site are 30º46’50”N, 35º34’30”E and the average elevation is 867m. The highest point of the promontory is 877m above sea level and the total surface area of the site is approximately 42 hectares (Da Riva *et al.* 2017).

2015 and 2016 Campaigns; Absolute Chronology from Samples Obtained in 2016[1]

During our first campaign (2015) we undertook a survey of the site and produced a cartographic basemap for future studies. The work was carried out using case studies in the area, mostly in the vicinity of Buṣayrā, and archaeological maps and data archived in the JADIS (Jordan Antiquities Database and Information System) and MEGA (Middle Eastern Geodatabase for Antiquities) systems of the Department of Antiquities (DoA) of Jordan. The archaeological field survey of 2015 was non-intrusive and extensive (Da Riva *et al*. 2017).

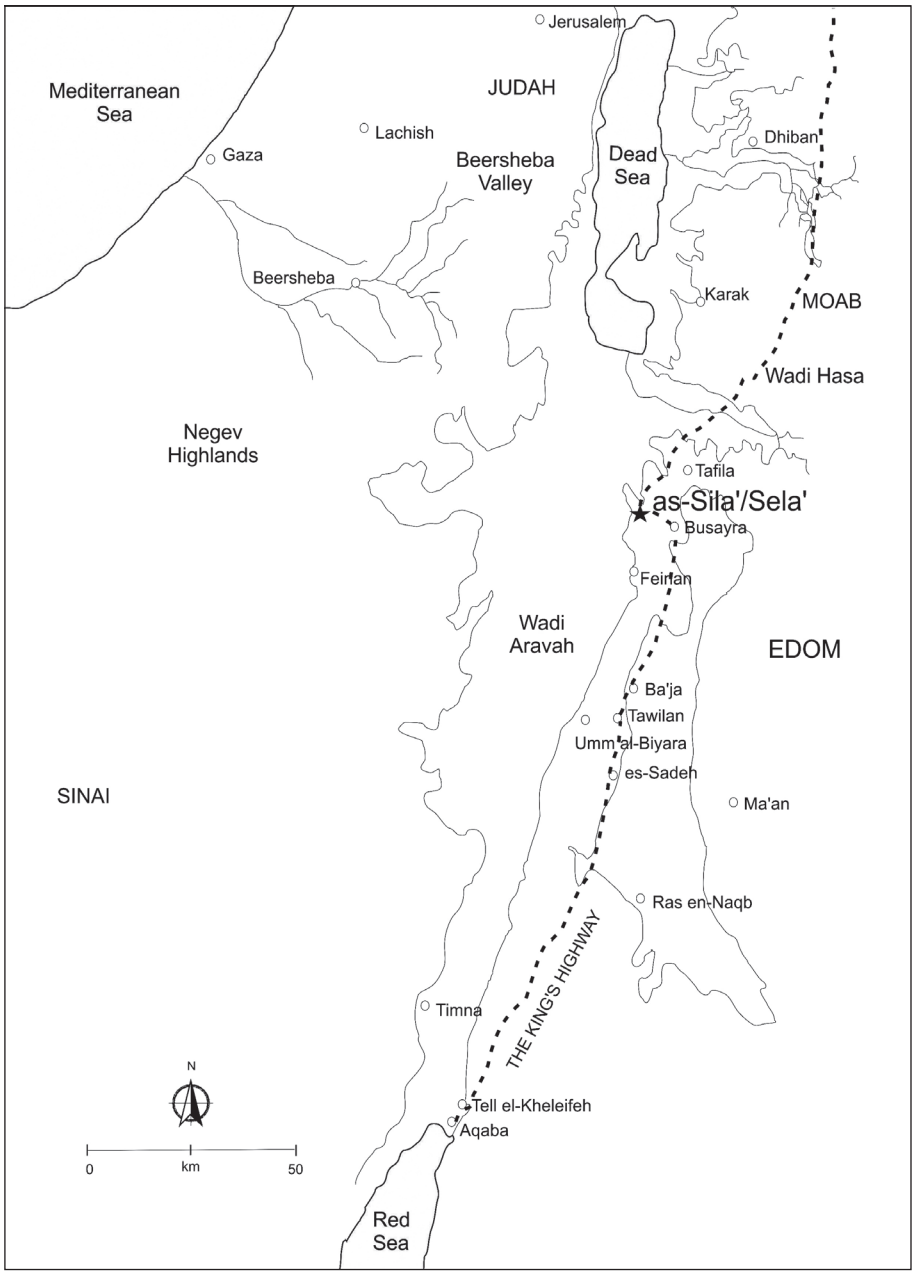
The objective of the 2016 campaign in as-Sala‘ was twofold. The first part of the project was a survey conducted to identify cisterns, channels and structures related to water use at the top of the mountain of as-Sala‘, using the 2015 survey map as a base. The second part of the campaign was devoted to the excavation of two areas near the entrance tower: Area G (grave area) and House 1 in Area F (**Fig. 3**). Three samples from timber recovered in layers 5, 6 and 10 of House 1 and a sample derived from dental remains from the grave area were sent to the laboratories of the Centro Nacional de Aceleradores (CNA) of the University of Seville in Spain (http://cna.us.es). From the wood the following absolute dates were obtained: sample 4194.1.1 from Layer 5 (1643-1682 cal AD); sample 4195.1.1 from Layer 6 (1486-1604 cal AD); sample 4196.1.1 from Layer 10 (1451-1529 cal AD). The dental remains (sample 4399.1.1) were recovered from Grave 7 (layer 17): 127-164 cal AD.

All project information has been placed at



1. General view of as-Sala‘.

1. We kindly acknowledge the permission granted by the Department of Antiquities of Jordan and its director for permission to work at as-Sala‘. The director of the 2016 campaign was Rocío Da Riva of the University of Barcelona. The campaign took place between 6 and 25 April 2016. Sponsors: Spanish Ministry of Education and Culture; ICREA; PALARQ. Institutional support: University of Barcelona. Team: Juan R. Muñiz, Marta Corrada, Adrian Piñán, Roser Marsal and Eva Miguel. The team completed the work with the assistance of surveyor Ehab Jariri (Department of Antiquities of Jordan). The workers Riad Audat, Mofeed Audat, Hassan Audat and Ahmad Qatamine also collaborated in the project. DoA representative: Mr. Abdalla Rawashdeh, DoA office, aṭ-Ṭafīlah.



2. Map of southern Jordan.

the disposal of the DoA of the Ministry of Tourism and Antiquities, in the form of reports and site cards to be included in the MEGA Jordan database: http://megajordan.org

Archaeometric Characterization

In this section we present the results of the archaeometric characterization of 22 pottery sherds, most probably hand-made geometric-painted ceramics (HMGP). They were dated to the late Islamic (late Mamluk/early Ottoman) period on the basis of archaeological criteria and the radiometric dates from the house where the pottery was recovered (**Fig. 4**). The archaeometric results show two main groups (A and B).



3. House 1.

Group A may be the result of mixing two different clays (illitic and kaolinitic), a technique known from at least the Iron Age and documented in the Ṭawīlān area (**Fig. 5**). Group B is calcareous with a wide range of CaO values, probably indicating low standardisation of the preparation process (**Fig. 6**). Scanning Electronic Microscope (SEM) study permits identification of the microstructure of the sherds, which consists of a continuously vitrified surface with a high concentration of fine bloating pores of small diameter. This kind of microstructure is typically produced in a reducing atmosphere, by the fast heating rate when a bonfire or pit is used and fuel and pots come into contact with each other. Moreover, all samples show traces of the organic material that would have been used in the preparation of the paste, suggesting a similar tradition. Microanalyses of the decoration reveal the use of an iron-oxide base for the dark/reddish colour of the geometric patterns.

Wood Remains

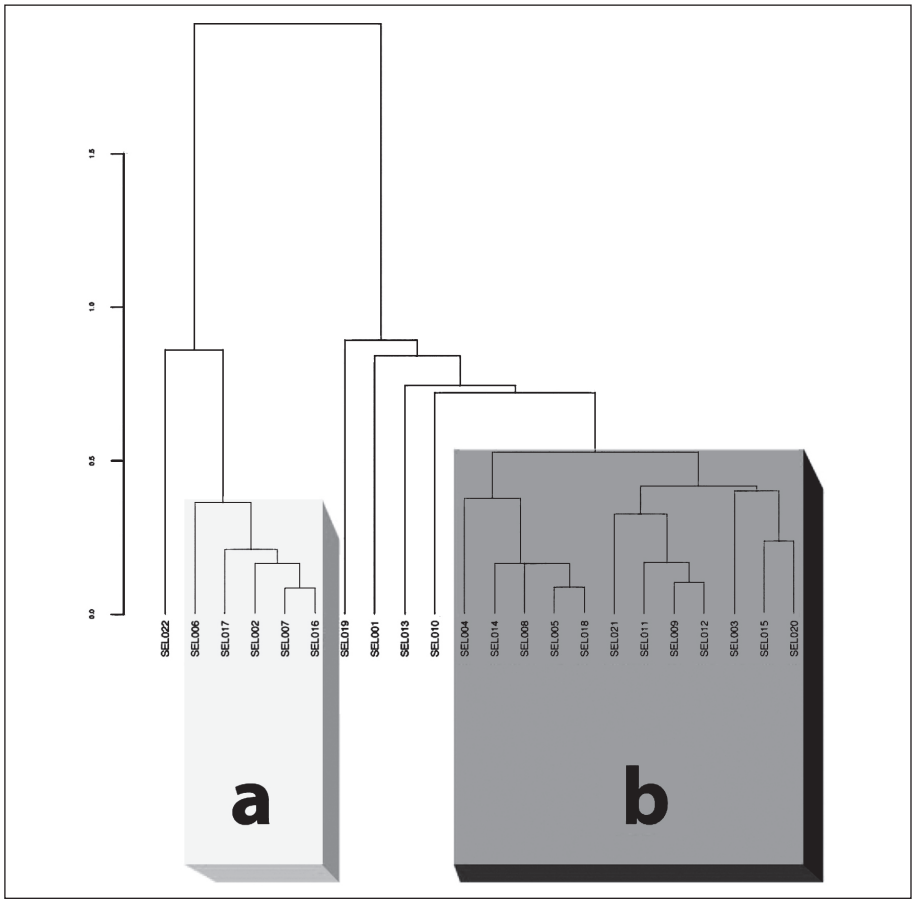
The site has yielded 20 wood samples belonging to branches from House 1 (layers 5, 6 and 10). Taxonomic identification of wood remains must be carried out by the preparation of xylological slides or by direct observation. In this case we performed direct observation by fragmenting a small piece by hand, taking care not to affect the wood remains. From each sample, we obtained three wood anatomy sections that permitted us to describe the cell structure. The wood fragments were observed using a metallographic reflected light microscope with dark and light fields, at magnifications of ×50, ×100, ×200 and ×500 (Olympus BX41). A digital microscope HIROX was used for taking images. For the identification we also used wood-anatomy atlases.

The wood remains were in an excellent state of preservation and were identified as *Juniperus* (juniper), a genus that comprises a large number of shrub or small-tree species living in different areas. In the area under consideration the most common is *Juniperus phoeniceae*, which is well adapted to dry-steppe environments.

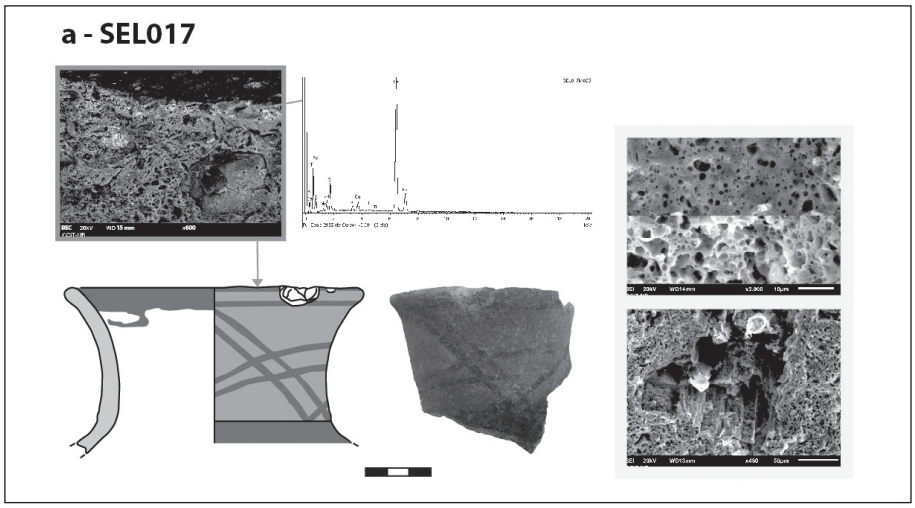
Further analyses of the morphology and dendrology showed modification patterns that may be related to the use of wood in structures (**Figs. 7-10**).

Inscription of Nabonidus

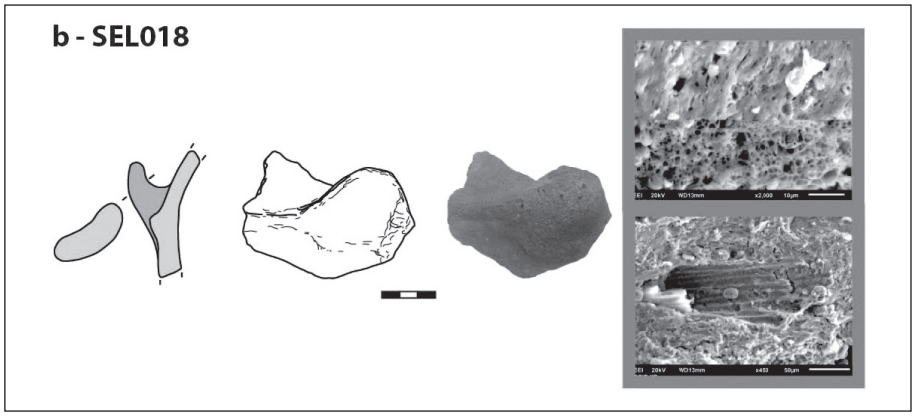
On the eastern slope of the promontory, just



4. Main groups of pottery from House 1.



5. Group A sample SEL017.

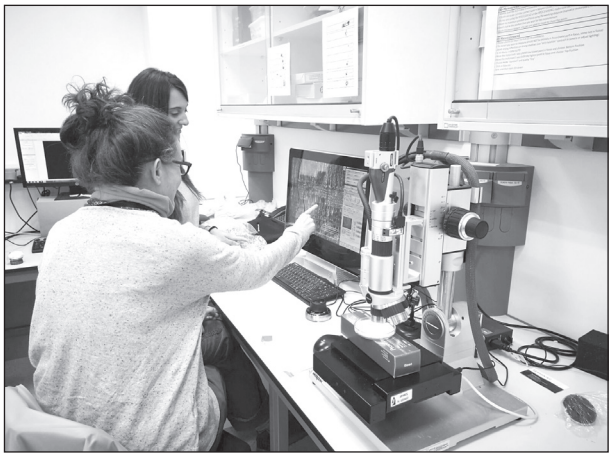


6. Group B sample SEL018.

southeast of the main stairway leading to the summit and about 120m from the ground, there is a carved relief framed by a niche. The relief depicts a standing human figure facing right. Three symbols are displayed in front of the figure: a moon, a solar disc and a star (**Fig. 11**). The figure holds a long staff in his right hand, while the left hand is lifted to the mouth in the well-known Mesopotamian gesture of prayer. The figure wears a long robe and a kind of conic crown or cap, the characteristic attire of a Babylonian monarch. Fragments of a cuneiform inscription can be seen to the right of the king, below the three symbols and on the right side of the relief. The human figure has been identified as the Babylonian king Nabonidus (556-539BC), because the relief resembles other representations of this king on stelae (Dalley and Goguel 1997) and because the inscription clearly refers to him (Schaudig 2001: 544). This monument is the only firm evidence of Babylonian presence in southern Jordan during the Iron Age and, at the same time, is a clear indication of as-Sala's importance during that period (Bienkowski 2014). It also suggests that the area was under Babylonian administration at some point during the reign of Nabonidus, although we cannot conclusively confirm this.

Water-Management Systems

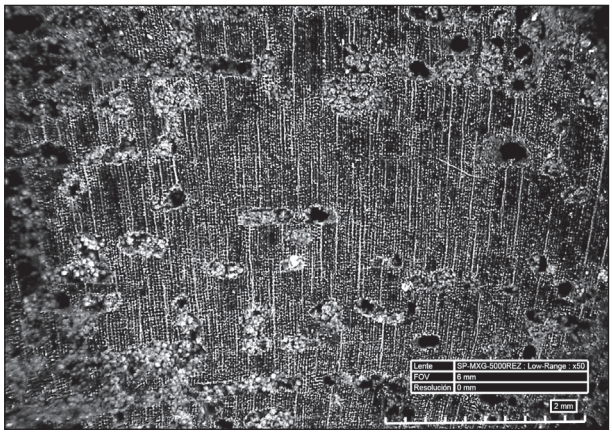
The archaeological survey carried out at the site of as-Sala' in 2015 and 2016 revealed a complex and sophisticated hydrological network at the top of the settlement. A great diver-



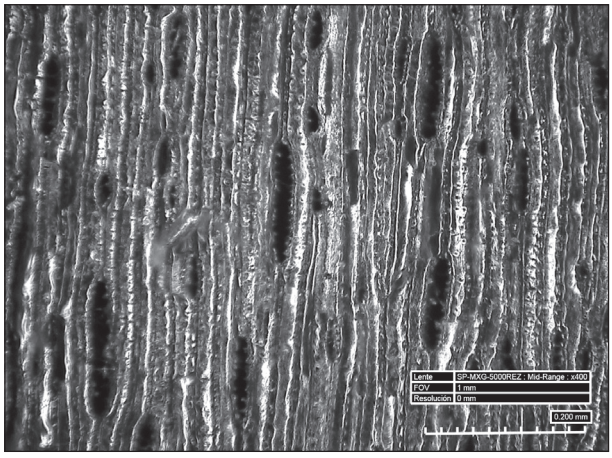
7. Digital microscope (HIROX) image from the IPHES technology laboratory; image shows radial section of one of the samples.

sity of water structures has been documented; these were carved into the sandstone and designed for the collection, storage, transport and distribution of rainwater.

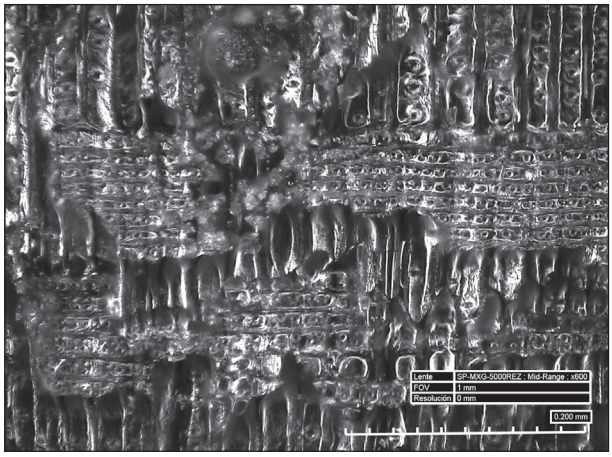
Most of the documented hydraulic structures are cisterns (**Fig. 12**), canals (**Fig. 13**) and - to a lesser extent - pools (**Fig. 14**) and sedimentation basins (**Fig. 15**) (see also **Fig. 16**).



8. Cross-sectional view showing the tracheids of and alterations to the wood cell structure.



9. Tangential section showing short uniseriated rays.



10. Radial section showing cross fields with cupressoid ray pits.

All structures were identified and described in the course of the total-station archaeological survey. The hydraulic structures were individually numbered, contextualized with regard to the different areas of the site, and linked to architectural arrangements. We also related the location of water structures to the topography and geology of the site in order to identify the general hydrological network. All identified water structures and their contexts were photographed.

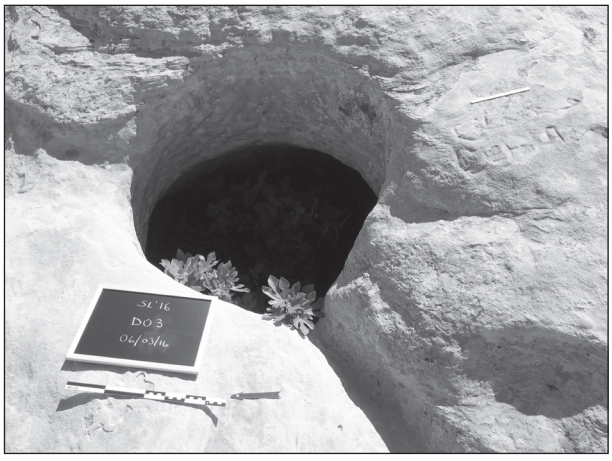
Study of the management of the as-Sala‘ hydraulic resources is still ongoing and forms part of R. Marsal’s doctoral thesis at the University of Barcelona.

Dental Remains

Dental remains belonging to five individuals were recovered from four graves. There are three adults, aged from 25 to over 40, and two children of around four years old at the time of their death (**Fig. 17**). There is scarce evidence of dental pathology. However, linear enamel



11. Inscription of Nabonidus.



12. Cistern D03 with two canals.

hypoplasia and slight to moderate dental calculus were recorded, in both the posterior and anterior teeth of adult individuals.

The adult individuals showed high occlusal dental wear, with molar enamel and dentine worn away in a concave pattern (A). The enamel is not sufficiently well preserved for detailed dental micro-wear analysis. However, under ESEM (Fei Quanta 600), occlusal and labial surfaces show antemortem enamel chipping (B), diet-related striations (C) and pits (D). The presence of dental calculus, the absence of dental caries, and the macro and microwear dental features are indicative of a diet with abrasive and hard (intrinsic and extrinsic) items, compatible with a farming lifestyle (**Fig. 18**).

Faunal Assemblage

The faunal assemblage recovered during the archaeological excavations comprises 302 specimens from eleven archaeological layers (**Fig. 19**). It is completely dominated by ovicaprines (**Fig. 20**): six young and eight adult individuals were identified. Most of the animals



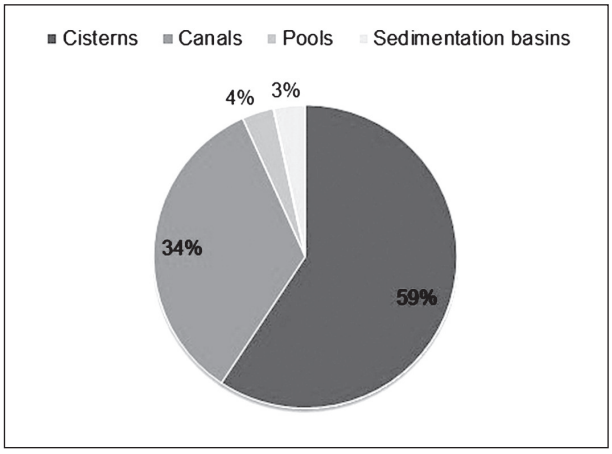
13. Canal C84.



14. Pool D61.



15. Sedimentation basin D112 with cistern and canal.

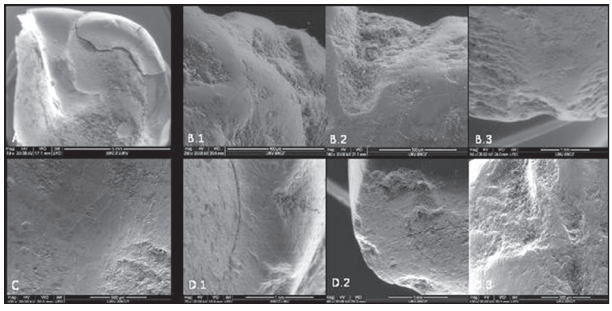


16. Proportions of the types of hydraulic structure found at the site.

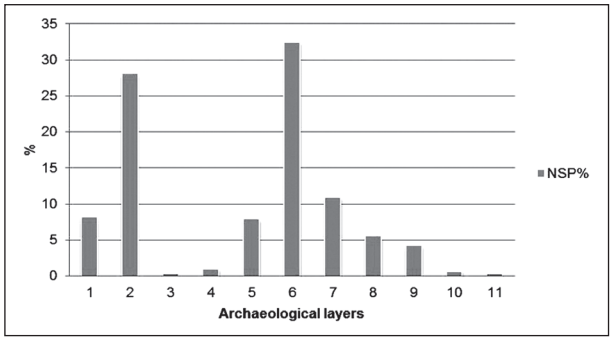


17. Grave at as-Sala'.

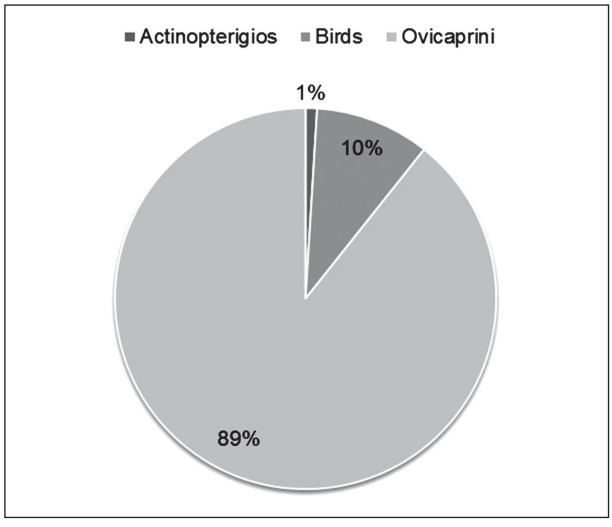
were killed after roughly two years of age. The high number of adults also suggests that the animals were mainly used for meat, although they may have been kept for their milk and wool as well. Secondary consumption of birds and, to a lesser extent, fish has also been observed (**Figs. 21-23**). As regards anatomy, the most common elements are the cranial skeleton and limb bones. The bird remains could not be identified taxonomically. However, in view of the chronology of the site and its location, one would expect the remains to be of domestic chicken (*Gallus gallus domesticus*). In addition, fish remains belonging to the class *Actinopterygii* were found, although their specific taxa could not be established. In sum, within this faunal assemblage the primary meat and protein sources come from ovicaprines, supplemented by small birds (for their meat or eggs) and, to a lesser extent, fish.



18. ESEM (Fei Quanta 600) images of dental remains.



19. Faunal remains according to archaeological layer.

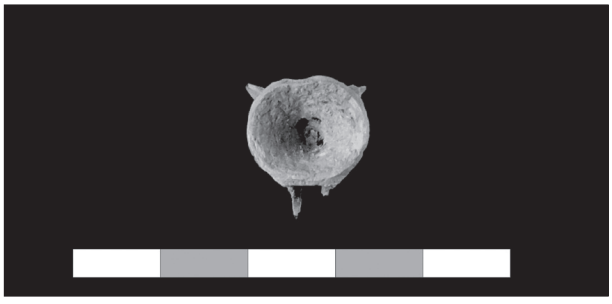


20. Taxonomic identification of faunal remains.

Conclusions

as-Sala‘ is a site in the aṭ-Ṭafīlah area with an astonishingly rich archaeological legacy and an imposing geomorphological heritage. Its extent, the presence of many architectural structures, the surface finds and its general layout bear witness to its enormous archaeological potential. The presence of many water-storage and water-management structures, as well as dwellings and fortifications, make it a unique site for studying the economic use and social relevance of water management on the Edomite plateau. With the information provided by surface surveys and radiocarbon analyses, we can affirm that as-Sala‘ was indeed occupied during


21. Hemimandible of a young ovicaprine.


22. Vertebrae of Actinopterygii.


23. Maxilla of an adult ovicaprine.

the Iron Age, Nabatean and Roman periods, and Mediaeval, Mamluk and Ottoman periods (12th-17th centuries AD). The topographic study and preliminary survey demonstrate the enormous potential of as-Sala‘ for contributing to our understanding of the past on the Edomite plateau and for helping us to solve questions regarding settlement patterns, water-control systems and economic activity.

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ROMAN ANTIQUITIES FROM AL-QUNAYYAH, JORDAN: AN ADDITION

Romel Gharib and Julien Aliquot

A series of Roman antiquities from al-Qunayyah were presented by us in the previous issue of the Annual of the Department of Antiquities of Jordan (Gharib, Aliquot and Weber-Karyotakis 2017). The purpose of this note is to complete our report with the publication of a newly found altar. The monument was incidentally discovered in the autumn of 2017, when clearing an old house in the part of the village located on the right bank of Wādī al-Zarqā', *i.e.* in the area where the other antiquities were found earlier. As a preventive measure, it was moved east of the village to the summit of neighbouring Jabal al-Muṭawwaq. It is an altar 130cm in height, 60.5cm in width and 61cm in depth (**Figs. 1-2**), made of hard limestone and composed of a nearly cubic shaft (48×43×42cm) placed on a moulded base and topped by a 52cm high crowning formerly adorned with stylised leaves at each of its four corners. The top surface is carved in the shape of a large and shallow cup, which suggests that the monument was used to pour libations and to offer sacrifices. A short Greek dedication is engraved on a face of the shaft in 2.5-3cm rounded letters (**Fig. 3**). It reads as follows:

Ανουνος [Ου]αελ-
ου εὐξάμενος
ἀνέθηκεν.

Translation: "Anounos, son of Ouaelos, dedicated (this altar) in fulfilment of a vow."

The donor's name and the name of his father are Hellenised Semitic names. Both were common in Provincia Arabia under Roman rule (for the first, *e.g. IGLS* 13/2, no. 9816; 14, nos. 50, 418; 15, 246, with Wuthnow 1930: 23; Harding 1971: 206, s.v. *ḥnn*; for the second, *IGLS* 13/2, no. 9869; 14, no. 178; 15, no. 212; Gatier 1998: 400, no. 107; *I. Jordanie* 5/1, nos. 13, 349, 608, with Wuthnow 1930: 91; Harding 1971: 632, s.v. *w'l*; Sartre 1985: 225; Negev 1991: 23; Sar-



1. Inscribed altar from al-Qunayyah: front side (photo Jean-Baptiste Yon 2018).



2. Inscribed altar from al-Qunayyah: back side (photo Jean-Baptiste Yon 2018).

tre 2007: 224-225). The shape of the letters (especially the epsilon and theta with a dot instead of the middle bar, and the small theta above the line) goes well with a dating in the first or second century AD.

According to its provenance, the altar probably comes from the same place of worship as the inscribed altar published in our first report. This new discovery encourages further research in al-Qunayyah. It now seems more than likely that the place was the site of a rural sanctuary in Roman times.

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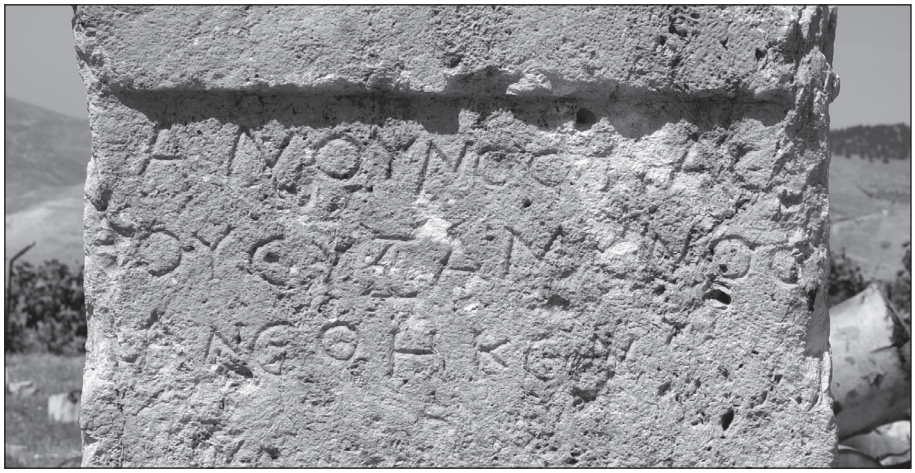

3. Inscribed altar from al-Qunayyah: Greek dedication (photo Jean-Baptiste Yon 2018).

Abbreviations

I. Jordanie: Inscriptions de la Jordanie (IGLS 21). Paris; Beirut.

IGLS: Inscriptions grecques et latines de la Syrie. Paris; Beirut.

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THE ROLE OF LEGISLATION IN PROTECTING CULTURAL HERITAGE IN JORDAN

Sata' Masa'dah

Abstract

This study aims to investigate the strength of Jordanian antiquities law in protecting cultural heritage by analyzing the judgments of selected cases. Access to these cases was gained by means of www.qistas.com.

Jordan is famous for the diversity, uniqueness and depth of its cultural heritage starting from the Palaeolithic to the end of the Ottoman period. Because of this richness and the location of Jordan near the Holy Land the archaeological interest in Jordan began in approximately1878. Christian missionary or individual archaeologists played a major role in documenting and protecting many archaeological sites in Jordan and Palestine (Alawneh *et al.* 2012).

During the Ottoman rule, the authorities recognized European interest in the cultural heritage of the Ottoman Empire, especially in the Levant. Antiquities law was improved to organize and protect antiquities within the Ottoman heartland, although few if any steps were taken to protect the cultural heritage of the Arab area. Indeed, and the façade of al-Mushattā palace was gifted to the German emperor during his visit to the area (Maafi 2009). During the British Mandate, all archaeological work was managed and held by foreigners. The director of the Department of Antiquities (DoA) was British and many of the schools working in the area had a biblical background, without any interest in the history of the indigenous people (Maafi 2009). Jordanian cultural heritage is the main components of Jordanian tourism, in recognition of the economic potential these archaeological assets hold (Strategy 2014-2018). The Ministry of Tourism and Antiquities (MoTA), by its Law No. 22 for the year 1988, plays an important role in developing and presenting this legacy for tourists Integration between stake holders and the existence of an appropriate and applicable legislative system is an essential aspect of cultural- heritage management the importance of legislation (Ababneh *et al.* 2016). Demas (2002) has emphasized and administrative structures for heritage management. The is article is the first study to examine real cases after the judgments were announced by the court. It aims, (1) to discover how the implementation of antiquities law can prevent violations and attacks against cultural heritage, (2) to examine the gaps and the weak points in the current law to avoid them so that these can be closed, and (3) also to consider the importance of stakeholder integration the protection of cultural heritage.

Methodology

In order to conduct this study, twelve archaeological cases from across Jordan are reviewed and examined, in order to assess the extent to which judgments are with the antiquities law. Access to these cases was gained through the Qiastas database (https://qistas.com), a huge data base of Arabic legislations and judgments.

we want to that heritage is available for future research, education and public interpretation, we need laws to preserve it. Until the beginning of the twentieth century, Jordan was under the Ottoman rule. In 1923, the subsequent British Mandate Ottomans recognized the European established the department of Antiquities in order to protect ancient sites and to conduct excavation and conservation work in the country at that time (Harding 1967). A second legislation for protecting antiquities was issued in 1925 (Alawneh *et al.* 2012).

After independence, excavations were conducted by Jordanian archaeologists, with the Annual of the Department of Antiquities of Jordan being launched in 1950., Following the Arabization movement started by the late King Hussein, by which British officials were dismissed from government, the first Jordanian director for of the Department of Antiquities was assigned., After 1967, biblical and foreign institutions started to move to Jordan (Alawneh *et al.* 2012).

After 1970, national archaeologists started to work in Jordan and a Jordanian school of antiquities was established. These archaeological work was led by local archaeologists, and constituted a national narrative counter Israeli discourse concerning the biblical history of the region (Maafi 2009). Antiquities Law No. 21 for the year 1988 identifies antiquities as any moveable or immovable objects that date from before 1750AD and any part added to that object or rebuilt after that date, in addition to moveable or immoveable objects that date after 1750AD and which the Minister requests to be considered an antiquity as published in the Official Gazette, as defined in the Law of Antiquities. Also, Article 3 of the law gives the Department the rights of execution, appraisal, administration, protection, maintenance, repair, preservation, beautification and display.

In the case of Iraq and Syria, antiquities and heritage are unified in one law with anything more than 200 years old being considered an antiquity, which is thus is managed according to antiquiaties and heritage law. According to MEGA- Jordan (the national heritage - documentation and management system [(www.megajordan.org]), that is to say a GIS-basedn inventory and management system for antiquities in Jordan there are more than 14,429 archaeological sites in the country. This huge number of a sites all over the country places more pressure and responsibilities on the department, as it the only responsible body for managing and protectin this huge legacy with its limited human and financial resources (Fakhoury 2014). The tourism law gives the Ministry of Tourism the authority to designate tourism sites, a designation which may overlap with antiquities sites (USAID Jordan Tourism Development Project). Strategic objective no. 3 of the 2014-18 strategy for the management of Jordan›s archaeological heritage focuses on the presence and enabling of an institutional and legal environment for archaeological heritage management. In this context, there should be redistribution in of roles between the DoA and MoTA which gives the former the right to control archaeological heritage resources and to coordinate with different government institutions regarding development planning (*e.g.* the USAID-funded) economic growth through sustainable tourism project).

The 2007-10 strategy for the management of archaeological heritage in Jordan highlights the need to improve the legislations governing heritage management in order to remove gaps, overlaps or ambiguity, and notes that the Department of Antiquities regulations should cover planning and development (JTDP -SIYAHA).

Jordanian cultural heritage has been divided into two parts, in the recent part being termed ‘heritage’ and the distant past ‘archaeology’ (Abu Khafajah 2012). The is separation has been attributed to many reasons, including colonization (Ottoman; British) neglected the contemporary history (Abu Khafajah 2012). Another interpretation is that the separation served the interests of political elites in government. Furthermore, there hasn’t been any pressure placed on the government from the Members of Parliament or academics to amend the antiquities law to include the material post-dating 1750AD, and in any case it›s not a government priority. evidence the elimination of archaeology from the lives of present-day the Jordanian citizens is the subordination of the Department of Antiquities to the Ministry of Tourism and not, for example, to the Ministries of Education or Culture (Abu Khafajah 2012).

Abu Khafajah top-down system, considering local contexts and the intellectual and emotional interaction between local people and archaeological sites in Jordan. SWOT analysis of the management of the Jordan heritage demonstrates that there are many weaknesses facing the antiquities’ management in Jordan, such as like: The overlaps, gaps and ambiguities in legislations, the lack of an integrated heritage site management system, and heritage conservation not being a national economic priority (SWOT ANALYSIS. YARMOUK).

Uzomoka (2014) concluded that colonized countries such as Australia and Czechoslovakia were late in protecting their cultural heritage, but in the case of - for example - Sweden and Denmark this process began as early as the 17th and 18th centuries, withy cultural- heritage legislation becoming nationally recognized. , He also emphasizes the importance of public education to regarding cultural heritage. Increasing of investments in Jordan has put a great deal of pressure on high urban cultural heritage, especially that which is post- dates 1750AD. not protected by the antiquities law owing to the absence of an effective and integrated legislative on frame work to: (1) prevent the violation of archaeological sites, (2)to protect the traditional urban fabric, and (3) stop the demolition of the traditional building's (MoTA legal frame work).

Discussion

According to Antiquities Law No. 21 for the year 1988, antiquities are defined as:

"Any movable or immovable object which was made, written, inscribed, built, discovered or modified by a human being before the year AD 1750 including caves, sculpture, coins, pottery, manuscripts and other kinds of manufactured products which indicate the beginning and development of science, arts, handicrafts, religions, traditions of previous civilizations, or any part added to that thing or rebuilt after that date."

In this definition we can see that that cultural heritage is divided between antiquities and heritage, while in the other Arab countries like (*e.g.* Syria; or Iraq) any object more than 200 years old is considered an antiquities'. In order to deal with the shortcomings arising from this separation, the ministry of MoTA issued the Law for the Protection of Urban and Architectural Heritage No. 5 for the year 2005 in order to protect historical buildings and the urban fabric post-dating 1750AD.

In practice, it has been difficult to use these laws there was difficulty to movable cultural heritage more recent dating 1750AD, especially when it is difficult to prove that the object is older than in the aforementioned case of the two copies of the holy Quran.

The establishment of the Department of Antiquities was coeval with the establishment of the Emirate of Transjordan in 1921. However, the fact that the first law wasn't issued until 1925 suggests that t protection of the cultural heritage wasn't a national priority. Indeed, it should be developed to face the economic and urban development that the kingdom has witnessed.

Reviewing the antiquities law shows that in Article 26 there is no gradation of punishment's All the violations and attacks against antiquities and cultural heritage face a single penalty, to the law. "A punishment of not less than one year and not more than three years imprisonment and a fine not less than three thousand dinars, in proportion to the value of the antiquities, shall be imposed." In the contrast, under Syrian antiquities law some punishments reaches 20 years in prison.

There is a lack of seriousness and sympathy with transgressor in the implementation of the penalties stipulated in the Jordanian antiquities law. This may relate to weaknesses and gaps in the current law that don't reflect the importance or value of cultural heritage.

Managing archaeological sites and world heritage sites is another important issue. The guide lines for managing world cultural heritage advises that the management of these sites should involve the local community in order to meet their needs - with the participation of all stake holders in the governance of these sites (ICCROM2014). In the case of Petra, a Jordanian icon and national treasure, the law should ensure that the needs of the local community are met and that education is offered to help with site protection and to reduce negative activities within the site.

The law designates the Department of Antiquities as the responsible body to protect and manage cultural heritage and to spread archaeological and cultural awareness between local communities support of that objective (ARTICLE 3). However, it doesn't explain how the spread of awareness might be achieved. Furthermore, there aren't any written regulations that reflect a national policy for cultural- heritage restoration and conservation except the 2015 regulations for archaeological projects in Jordan (DoA 2015).

List of Antiquities Cases with Associated Court Judgments

The case	Date and area	Court judgment	Antiquities law
Destroy or disfigure antiquities. The owner of Hala restaurants in Jerash moved antiquities and built it on another place	30/4/2014 Irbid	Irresponsibility Innocent was charged for violation against antiquity and not for destroying ,disfiguring or separating antiquities and the expert in his report proves the destroying of antiquities.	Article 26_» 22 « a- A punishment that is not less than one year and is not more than three years imprisonment and a fine that is `1`not less than three thousand dinners. And for the cost of the antiquities, shall be imposed on anyone who: Destroys, ruins or disfigures any antiquities including any change of their features, separating a part thereof, or transforming them.
Trade in antiquities 2 persons were having ancient Ottoman copies of the holly Quran	9/4/2006 ‘Ammān	Not guilty The expert cannot prove that its dated between 1500-1700 to consider it as archaeological object even its very important and precious. This is because of the gap and the separation of the law between antiquities and heritage.	- Trades in antiquities, assists, participates in, interferes with or incites others to do so.
Prospects for antiquities	19/1/2018 Aṭ-Ṭafīlah	Irresponsibility	Prospects for antiquities without obtaining a license by virtue of this Law.
Handing antiquities to the department	24/9/2017 aṭ-Ṭafīlah	Irresponsibility The expert said that the objects are not with high archaeological value and they can be found on the roadside and in wades near archaeological sites or inside them without any need for digging or excavating	Refrains from or is in default of handing over the antiquities which he discovered or came across to the Department, whether or not he holds license, within the prescribed period of time.
Trade in antiquities Archaeological objects’ were found in a yellow taxi in ‘Ammān	29/6/2005 ‘Ammān	Innocent They department experts’ report did not prove that the driver was trading in antiquities. And the judge didn’t charge him for acquisition antiquities	Trades in antiquities, assists, participates in, interferes with or incites others to do so , - Moves or disposes of any antiquities in violation of this Law including hiding or smuggling them.
Violation against antiquities The owner of hala restaurant destroy and moves antiquities from its original place	23/3/2014 Jarash	Innocent Even though the department expert and the witness proves that he moved and destroy the antiquities but the court did not charge him for destroying or disfiguring antiquities	- Destroys, ruins or disfigures any antiquities including any change of their features, separating a part thereof, or transforming them.
Prospects for antiquities. 17 persons were caught by the site’s guard excavating in archeological site	13/9/2006 al-Karak	Innocent The guard had changed what he said that he didn’t saw them working inside the site.	The Directorate of Archaeology should not be asked for permission for their activities.

Stealing Antiquities The suspect an iron digger from Irbid museum	28/3/2012 Irbid	Innocent The witnesses heard but didn't see the suspect doing it	Article 26-8 - Steals pieces of antiquities.
Prospects for antiquities Two persons were caught excavating and digging inside one house	9/1/2018	Irresponsible The place where they were caught is not considered as an archaeological site according to the Jordanian antiquities law Without depending on a report from an expert person in the department.	Article 26 -1 The Directorate of Archaeology should not be asked for permission for their activities.
Pay compensation for land using	3/6/2015	Agreed	Article 5 d- The ownership of the land will not entitle the landlord to own the antiquities present on its surface or in its subsurface or dispose thereof nor shall it entitle him to prospect for antiquities therein. e- It is permissible to appropriate or purchase any real estate or antiquities which the Department's interest requires the appropriation or purchase thereof
Destroys, ruins or disfigures any antiquities including any change of their features in the case a young man from Petra was caught by Petra park guard fixing a metal door and window in the entrance of one of the caves inside Petra archaeological site. The bedoul people believes that they own these caves and they have the right to use them as they were born there even though the government ask them to leave the site and gave them a land outside Petra to build houses	Petra 2017	The person admitted that he was guilty and he was punished according to the antiquities law - A punishment that is not less than one year and is not more than three years imprisonment and a fine that is not less than three thousand dinners. But the judge stopped the implementation according to the case conditions and the history of the person.	Article 26_» 22 « a- A punishment of not less than one year and not more than three years imprisonment and a fine not less than three thousand dinners, in proportion to the value of the antiquities, shall be imposed on anyone who: Destroys, ruins or disfigures any antiquitiesincluding any change of their features, separating a part thereof, or transforming them
Two persons were caught trying to steal antiquities from Petra archaeological museum, according to the case the two boys were seen by the museum employee near on show case and they were hiding something inside their clothes, but when he checked nothing was stolen from the museum.	Petra 2018	They were punished according to Principles of criminal trials and not to the antiquities law .the antiquities law talks about who steel antiquities and there is nothing about trying to steel antiquities.	Article 26_» 22 « a- A punishment of not less than one year and not more than three years imprisonment and a fine not less than three thousand dinners for whom who steal antiquities

Conclusion

From the above discussion we can observe that there is a lack of seriousness in implementing the law to protect the antiquities, the despite cultural heritage being a national priority at the highest level. The Department of Antiquities with its limited human and financial resources can't manage and protect this vast legacy alone. It should be raised to Ministry level, so that antiquities and the heritage can be brought under one umbrella and one law. The law should be revised in light of court judgments to remove any drawbacks, fail points of failure or, weaknesses, and to ensure holistic site management that is integrated with the local community meets their needs. The law should include the national polices to spread cultural awareness, as well as the procedures and guide lines for restoration and conservation of heritage sites. The law must require that any building permission issued at the governorate levels is signed off and approved by the relevant antiquities directorates, to ensure the protection of the archaeological sites and the establishment of proper buffer zones around them.

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JABAL JUHAYRA, 2015-2016: EXCAVATIONS OF THE LAYER 3 (PRE-POTTERY NEOLITHIC B) SETTLEMENT

Sumio Fujii, Takuro Adachi and Kazuyoshi Nagaya

Introduction

Our long-term research project in southern Jordan (JBPP [the Jafr Basin Prehistoric Project]) is focused on tracing the process of pastoral nomadization on the arid margins of the southern Levant. Towards this goal, we have conducted comprehensive investigations at a dozen archaeological sites - varying in both date and character - since the reconnaissance survey in 1997. A series of research outcomes was recently synthesized in the form of the 'Jafr chronology', which has enabled us to outline the key episodes in a sequential way (Fujii 2013).

Since March 2014 the project has proceeded to Phase 5, the prime goal of which is to develop the detail of the Jafr chronology and offer further insight into the formation processes of *badia* society in southern Jordan. We selected several promising sites towards this goal. Jabal Juhayra, our main concern here, was the second target following Tor Ghuwayr 1-3, a composite Early Bronze Age burial field on the northern fringe of the Jafr Basin (Fujii, Adachi, Yamafuji *et al*. n.d.). The excavation started in September 2014 and was completed with the fifth season in June 2016. The first two seasons dealt with the Layer 2 encampment dated to the Late Neolithic/Chalcolithic transitional (hereafter LN/Chalcolithic transitional) phase (Fujii 2015; Fujii, Adachi and Nagaya 2018). This report summarizes the research outcomes of the Layer 3 (Pre-Pottery Neolithic B [hereafter PPNB]) settlement that was intensively excavated over the subsequent three seasons.

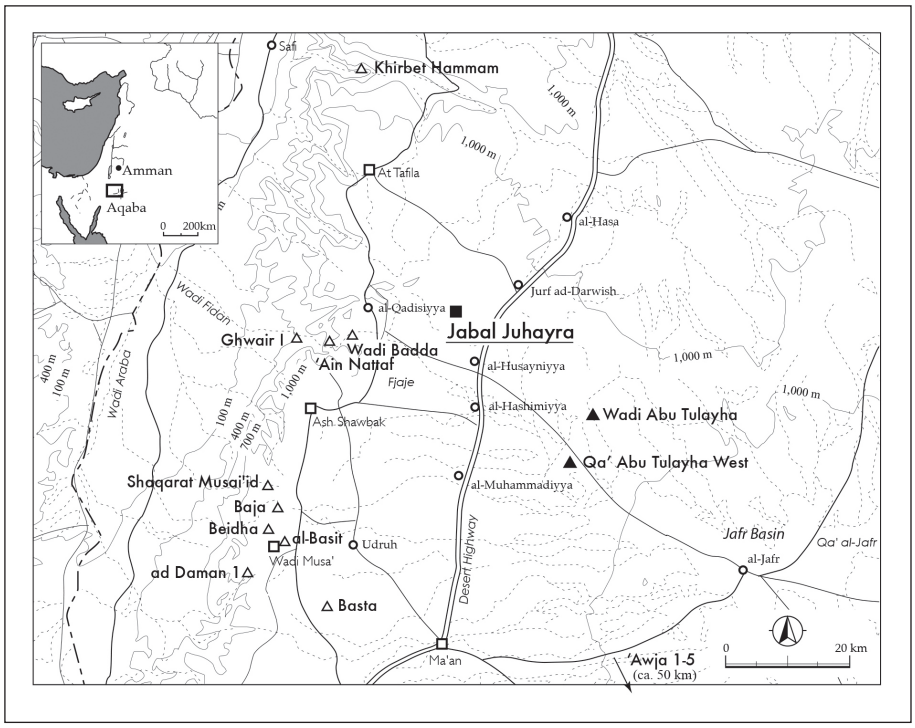
The Site and Site Setting

Since the reports cited above refer to this issue in some detail, no repetition is needed here. We would like to re-emphasize the following two things, however. One is the intermediate character of the site setting. Jabal Juhayra is situated in a transitional zone between the sedentary cultural sphere to the west and the steppe desert to the east, which is probably the reason for its eclectic character mentioned below (**Fig. 1**). The other is its unique site topography. Unlike contemporary sites in and around the basin, the site is located on the scoria slope of an isolated volcanic hill (**Fig. 2**). This peculiar topographic condition is one reason for unique features such as rockshelter dwellings and rock-cut cisterns that characterise the PPNB settlement.

The Excavations

As mentioned above, the first two field seasons dealt with the Layer 2 (LN/Chalcolithic transitional) encampment. We clarified its overall picture and stratigraphy in Area 1 and defined its southeastern limit in Area 2. In addition, we set up Areas 3 and 4 to examine the character of a robust masonry wall that was slightly exposed on the lower part of the northern slope. The surface cleaning in Area 3 attested the northern extension of this robust wall, but test excavation in Area 4 failed to find any clear evidence for its southward extension.

The subsequent three seasons addressed a comprehensive excavation of the underlying Layer 3 settlement (**Fig. 3**). The third season, which took place in June 2015, was focused on the full-fledged excavation of Area 3 and revealed that the robust masonry wall briefly examined in the second season was a part of a stone-built barrage belonging to the Layer 3 settlement. In addition, we newly opened Area



1. Jabal Juhayra: site location and surrounding sites.

5 behind Area 3 and found several rock-cut cisterns belonging again to Layer 3.

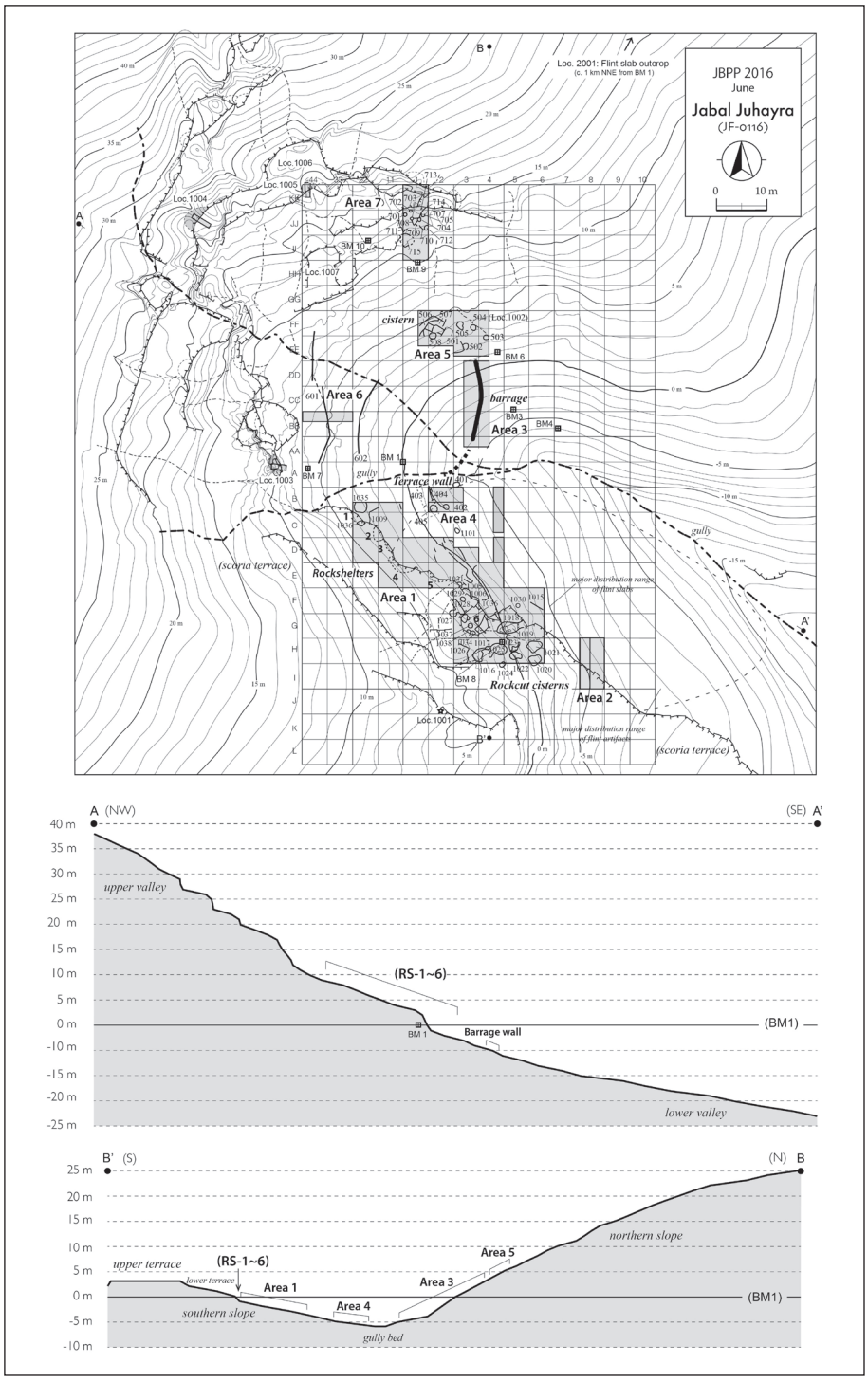
The fourth season in August-September the same year began with an enlarged excavation of Area 4 that had been tested in the second season. Again, no clear evidence for the southern extension of the barrage wall was attested, but two terrace walls belonging to the Layer 3 settlement were found instead. Then, we newly set up Area 6 to examine the stratigraphy of two large terrace walls exposed in the upper valley and, at the same time, enlarged Area 5 to trace the westward extension of the rock-cut cisterns discovered in the third season. After these operations, we addressed an extensive excavation in Area 1 that constitutes the main body of the Layer 3 settlement. The excavation showed that the six rockshelters were used as dwellings in Layer 3 as well, and that they were associated with a few dozen rock-cut cisterns and several terrace walls. Subsequently, we opened Area 7 in search of the northern counterpart of the Layer 3 rockshelter settlement in Area 1 and found several small features.



2. Jabal Juhayra: aerial view of the site (looking W).

The fifth and final season in June 2016 was devoted to complementary works aimed at examining the details of the Layer 3 settlement. To begin with, we addressed an enlarged excavation of Rockshelter 6 in Area 1. This continued excavation was intended to scrutinize its western part - which had remained buried under overhanging scoria rocks - but halfway the operation was abandoned again due to increasing danger. We then moved to Area 7 and enlarged it to confirm that several features excavated in the last season formed, together with newly found ones, a small-scale open-air sanctuary.

The excavated area of the seven major operation areas amounted to *c*. 900 square meters, and the excavated soil was roughly estimated at 200-300 cubic meters. The general site stratigraphy was described in the last report, and no repetition is needed. The only thing to be added is the stratigraphic correlation between the northern and southern slopes across a small gully flowing down the center of the site. In view of the commonality in soil property, C^{14} data,



3. Jabal Juhayra: site-contour map and elevations.

structural remains and small finds, it is safe to say that the stratigraphy of both slopes corresponds to each other. Thus, Layers 3-1 on the southern slope are equivalent to Layers 3'-1' on the northern one, respectively. It is needless to say that the scoria layers (*i.e.* Layers 5 and 5') and their weathered deposits (Layer 4 and 4') form a common foundation layer(s) for the Layer 3/3' settlement on both slopes.

Layer 3 Settlement: Structural Remains

The excavations revealed some sixty structural remains and small features, which were divided broadly into the following five types: (1) six rockshelter dwellings diagonally traversing the southern edge of Area 1, (2) a stone-built barrage stretching north to south in Area 3, (3) some thirty rock-cut cisterns dotted in Areas 1, 5 and 7, (4) several terrace walls found in Areas

1 and 4, and (5) a dozen small features scattered in Areas 1 and 7. What follows is an area-by-area overview of these structural components that constituted the Layer 3 settlement.

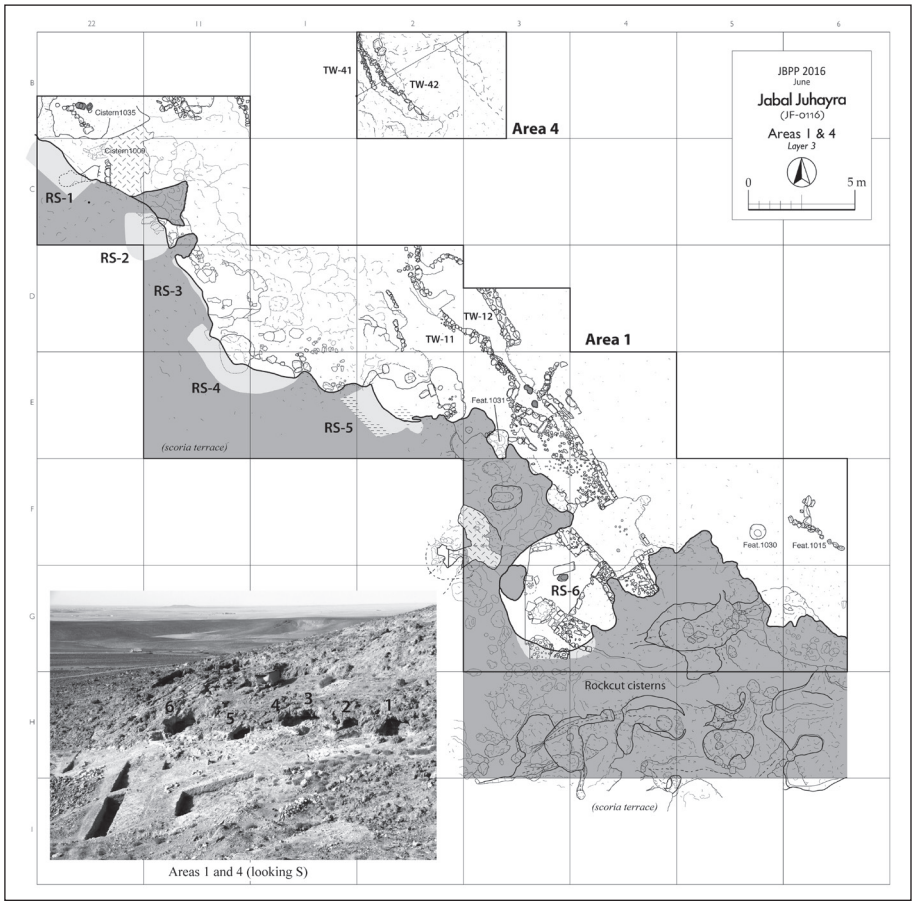
Area 1

Area 1 represents the core of the Layer 3 settlement, containing six rockshelter dwellings, several terrace walls, some twenty rock-cut cisterns and several open-air small features (**Fig. 4**). Overall, they were aligned along the scoria terrace to constitute a northeast-facing, elongated structural complex *c*. 40m in total length.

Rockshelter 6

What most attracted our attention was Rockshelter 6 at the southeastern edge of the complex. This large rockshelter incorporated a quasi-masonry rectangular structure measuring *c*. 6-7m in frontage, at least *c*. 8-9m in depth and *c*. 2-3m in estimated ceiling height (**Fig. 5; Fig. 6**). Unlike the Layer 2 structures, this built-in structure used standardized flint slabs *c*. 20-30cm long and *c*. 5-10cm thick as major construction materials, which were probably procured at layered flint outcrops exposed along a small *wadi c*. 1km NNE of the site. In addition, small flint slabs and scoria/basalt pebbles were also used as adjustment or filling material in the masonry walls.

What characterizes this rockshelter dwelling is its unprecedented construction method. Surprisingly, it was constructed by means of attaching masonry walls to the inner surfaces of the rockshelter, which had been modified in advance to a predetermined form. Thus it might be more correct to define it as a modified rockshelter associated with facing walls rather than a masonry structure incorporated into a rockshelter. However, the attachment of the facing walls was restricted to deliberately crafted rock-cut protrusions that took advantage of the irregular surfaces of the rockshelter, with the intermediate parts between any two adjacent protrusions being mostly left bare. (The only exception to this was the southern side of the front room, which was covered with a low masonry wall.) It is precisely for this reason why the masonry walls take on a patchy appearance.



4. Jabal Juhayra: plan of Areas 1 and 4 (Layer 3).

The floor utilized the exposed surface of the scoria bedrock layer (*i.e.* Layer 5), which was carefully pecked and ground down to produce a smooth surface. A few floor renewals were recognized in the middle room, indicating that the rockshelter was continuously used for a certain period. As for the roof, at least the rear half of the rockshelter dwelling was covered with scoria eaves when we started the excavation. It is because our excavation took place, removing the overhanging rocks, that the post-excavation rockshelter dwelling seemingly looks hypaethral.

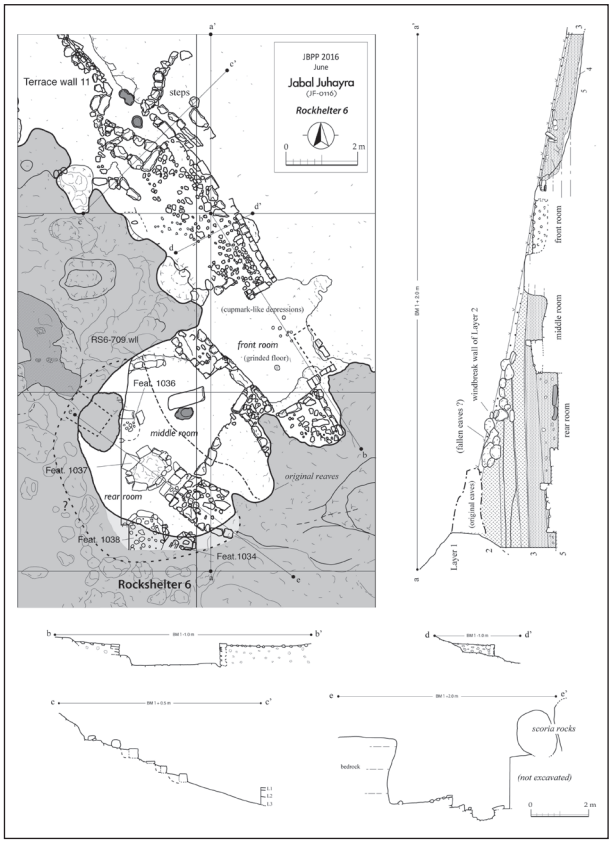
In terms of typology, the structure had a tripartite rectangular plan, being equipped with a gabled entrance and two pairs of buttress-like partition walls. (Only the observer's rear right wall remains to be attested owing to the increasing danger posed to the excavators.) Thus, it can be regarded as a rock-cut, built-in version of the 'pier-house' that was common at Middle to Late PPNB (hereafter M-LPPNB) settlements in the southern Levant (Byrd and Banning 1988). It appears that the constructors made every effort to create a pier-house within a rockshelter that was restrictive in various aspects, which highlights the extent to which the pier-house architectural tradition was deep-rooted in the PPNB southern Levant. Viewed in this light, the eclectic construction can be understood as a desperate attempt to resolve the differences between two incompatible components.

The details of the three rooms are as follows. To begin with, the front room measured *c*. 4m wide by *c*. 1.5m in floor depth, being equipped with a pair of carefully finished front walls (**Fig. 7: 1**). Since the observers' left wall was poorly preserved, the details of the entrance are unknown except that it opened to the northeast and was probably *c*. 1-1.5m wide. Several cupmark-like depressions *c*. 5-10cm in diameter were found on the carefully ground floor inside the entrance (**Fig. 7: 2**).

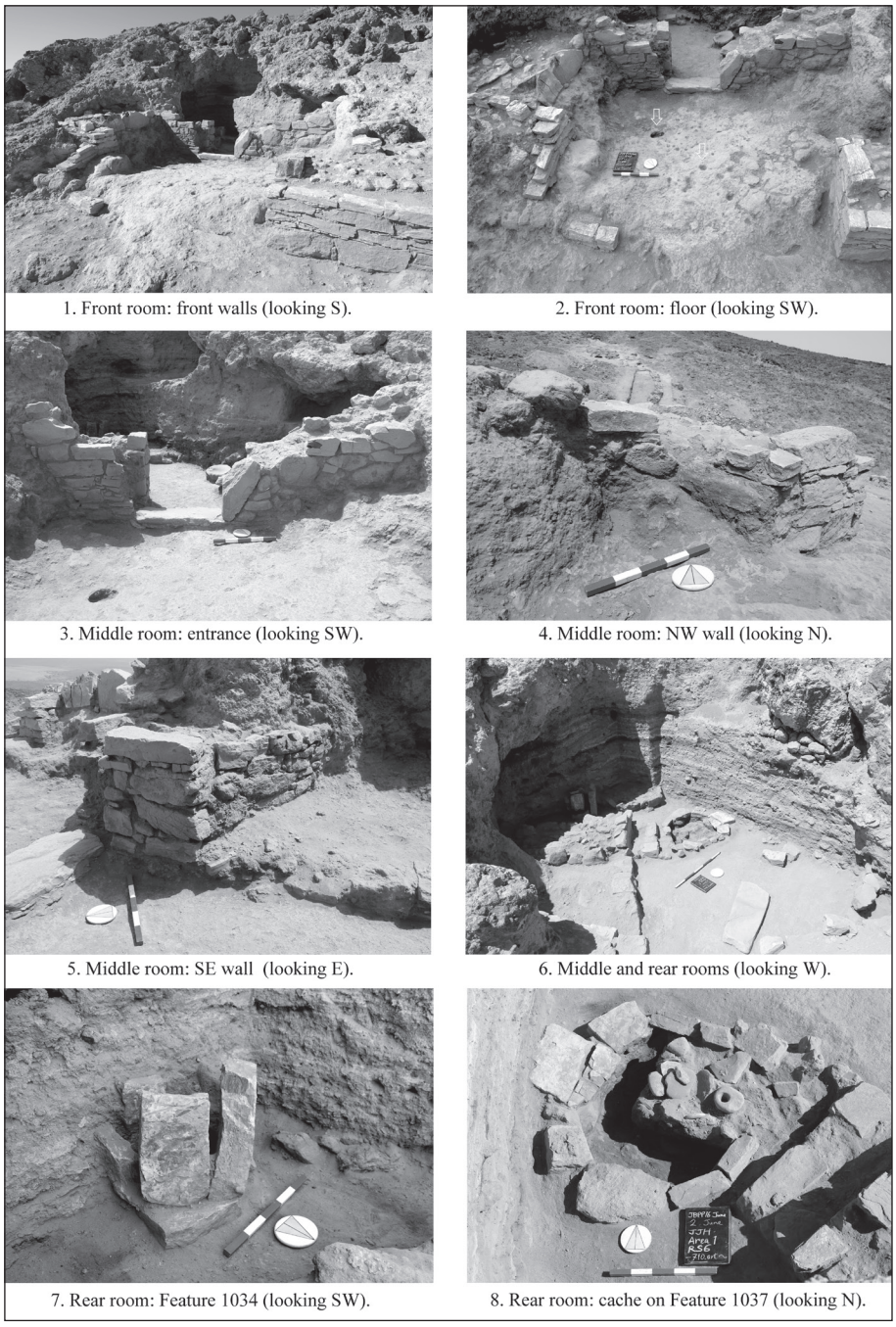
The second or middle room was slightly larger in size than the front room, measuring *c*. 5m wide and *c*. 2m deep. The doorway leading from the front room was fringed with a pair of upright gate stones and paved with a large threshold stone (**Fig. 7: 3**). Both parts used undressed limestone boulders. While the observer's right masonry wall was placed on a low rock-cut



5. Area 1: general views of Rockshelter 6 (looking SW or W).



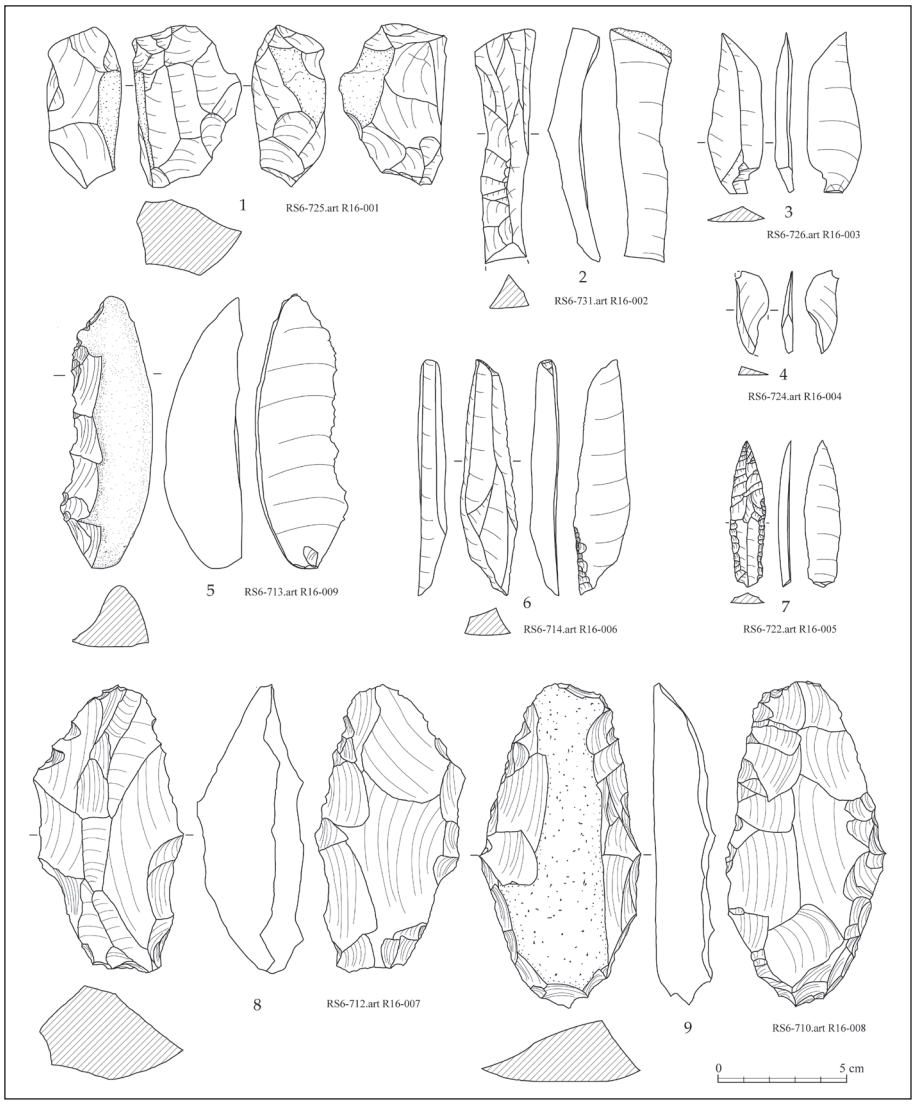
6. Area 1: plan and section/elevations of Rockshelter 6.



7. Area 1: close-up views of the three rooms of Rockshelter 6.

protrusion produced in advance (**Fig. 7: 4**), the left facing wall was attached so as to 'wrap' the lower half of a narrow rock-cut protrusion *c*. 1m high (**Fig. 7: 5**). This demonstrates that the constructors of the built-in structure adopted different methods flexibly depending on the situation. The floor was on two levels, with its southeastern half forming a small platform delimited with upright slabs *c*. 10cm high, two facing walls and the bare side surface of the rockshelter. Meanwhile, the other half of the room was integrated with the doorway to form a flat working space, where a basin quern and rectangular working table, both made of limestone, were placed side by side (**Fig. 7: 6**).

As mentioned above, the rear room has yet to be entirely excavated. A low masonry wall was found attached to a small rock-cut protrusion, but its northwestern counterpart remains to be attested because a huge overhanging rock is still in the way of excavation. The floor included two slab-lined hearths (Features 1037 and 1038) *c*. 0.8-1m in diameter and *c*. 0.2-0.5m in depth (**Fig. 7: 6**), with the former yield-

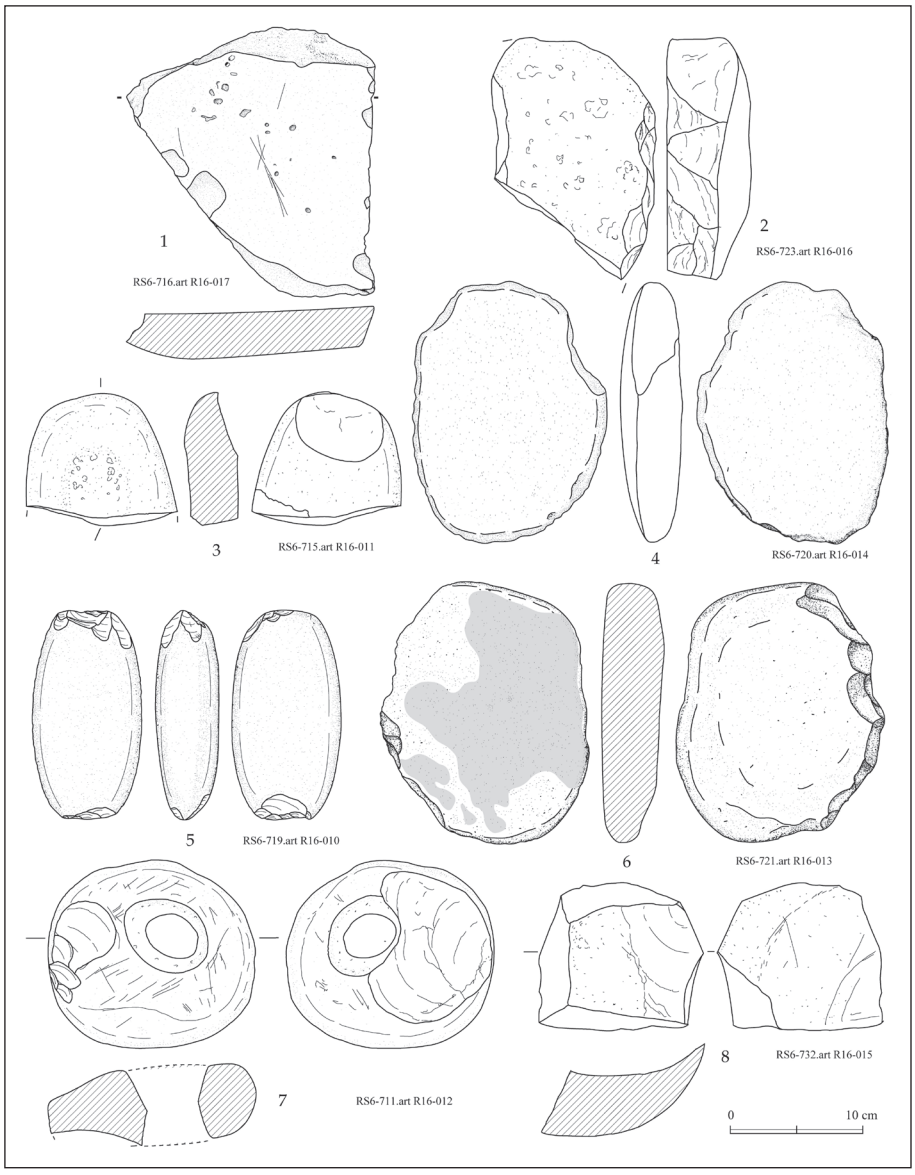


8. Area 1: cached artifacts from Feature 1037 in Rockshelter 6.

ing nine chipped flint artifacts (**Fig. 8: 1-9**), two flat quern fragments (**Fig. 9: 1-2**), five grinding slabs (**Fig. 9: 2-7**) and a stone-vessel fragment (**Fig. 9: 8**). All of these were placed in the top of the hearth fill and formed a cache-like concentration of artifacts (**Fig. 7: 8**). In addition, an upright slab-lined round feature (Feature 1034), *c*. 0.5m in diameter and *c*. 0.6m in height, was found in the southern corner of the room (**Fig. 7: 7**). Ashy deposits including burned pebbles were within it, but no artifacts were found in this case. Parallel examples of this unique feature are attested on the slope in front of the rockshelter (Fujii, Adachi and Nagaya 2017: fig. 7) and in the open-air sanctuary in Area 7 on the opposite slope (**Fig. 23**). Furthermore, the contemporary outpost of Wādī Abu Tulayha (Fujii 2008a: fig. 17) and the subsequent encampment of Khashm al-'Arfa (Fujii, Adachi, Yamafuji *et al*. 2013: figs. 4, 13-14) yielded similar features, suggesting that such types of small feature were standard for the Jafr Neolithic.

Rockshelters 5-1

The other five rockshelter dwellings were much smaller in scale and not associated with full-scale modification and a careful finishing process (**Fig. 10: 1**). Thus, they can probably be regarded as deteriorated forms of Rockshelter 6. Suggestive in this regard is a techno-typological sequence amongst them. Rockshelter 5 - nearest to Rockshelter 6 - was not only equipped with a short, freestanding masonry wall and a bare rock-cut protrusion in its entrance space, but was also partly paved with clay or scoria cement as described below (**Fig. 10: 2; Fig. 11:** lower). Although undressed basalt/scoria cobbles were used as wall materials instead of



9. Area 1: cached artifacts from Feature 1037 in Rockshelter 6.

standardized flint slabs, we can argue that this rockshelter dwelling retains the atmosphere of Rockshelter 6. Once again, a quern and large working table were found *in situ* on the floor near the entrance.

The combination of a short masonry wall and a bare rock-cut protrusion was present but barely recognizable at Rockshelters 4 and 3 (**Fig. 11: upper**), with the front wall of Rockshelter 2 being reduced to a pair of bare rock-cut protrusions (**Fig. 10: 3; Fig. 12**). Rockshelter 1 was devoid even of rock-cut protrusions, although two pairs of nested querns and grinding slabs were once again found near its entrance (**Fig. 10: 4-5; Fig. 12**). Such a techno-typological sequence probably represents a gradual separation from the PPNB architectural tradition within the sedentary cultural sphere. Given that the overlying Layer 2 encampment used the same rockshelters without adding any modification, an opposite sequence (*i.e.* the development of Rockshelter 1 towards 6) seems unlikely.

Terrace Walls

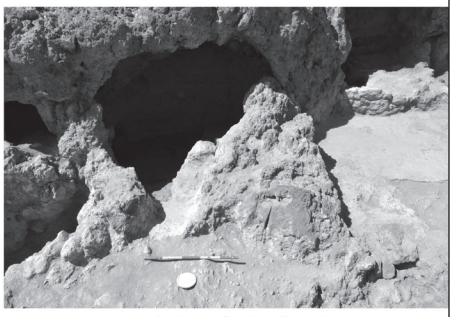
Several terrace walls were found on the relatively steep slope in front of the rockshelters, but most of them were poorly preserved and intermittent. The only exception to this was Terrace Wall 11, which created an anthropogenic terrace *c*. 8m wide, *c*. 5m deep and up to *c*. 0.7m high in front of Rockshelter 5 (**Fig. 4; Fig. 13**). The question is the specific use of this terrace. Similar terraces found at Dhra' have been



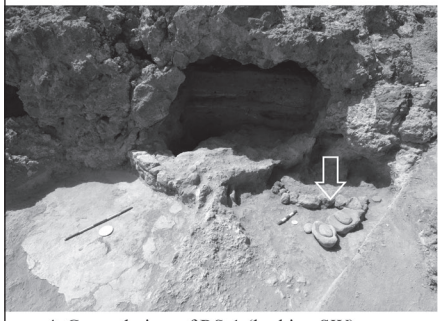
1. General view of RS-5~1 (looking SW).



2. General view of RS-5 (looking S).



3. General view of RS-2 (looking W).



4. General view of RS-1 (looking SW).



5. Nested grinding tools in front of RS-1 (looking SW).

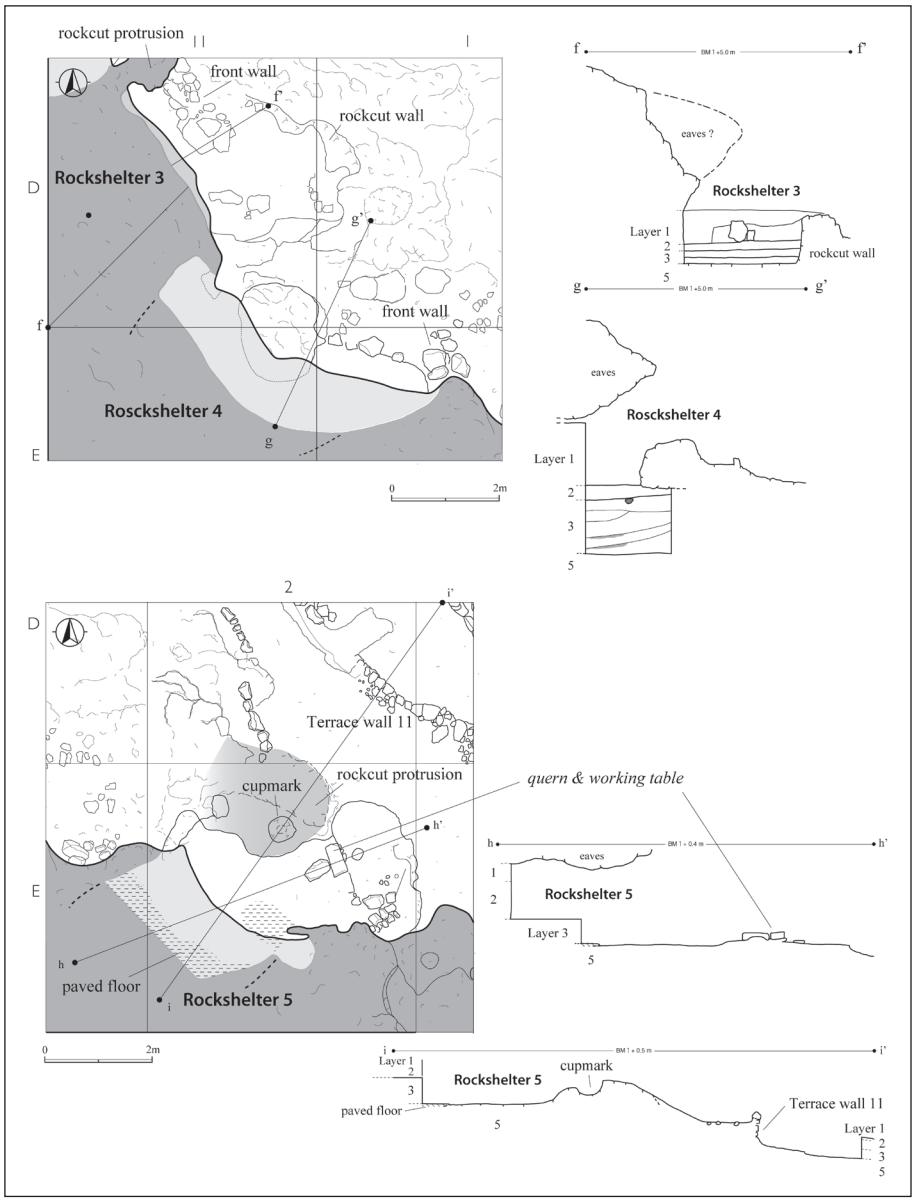
10. Area 1: general and close-up views of Rockshelters 5-1.

regarded as cultivated land (Kuijt and Mahasneh 1998), but it is still uncertain whether the same applies to this case.

Incidentally, the terrace incorporated stone-built steps *c*. 1-2m wide into its southeastern edge. A similar, albeit much larger-in-scale, example has been reported from Ghuwayr I, a contemporary settlement in the Wādī Faynān area *c*. 25km west of Jabal Juhayra (Simmons and Najjar 2003), suggesting that such steps were common to PPNB settlements established on a steep slope. A notched and grooved stone weight, a chronological marker of the Jafr PPNB, was found *in situ* on an upper step (**Fig. 32: 11**).

Rock-Cut Cisterns

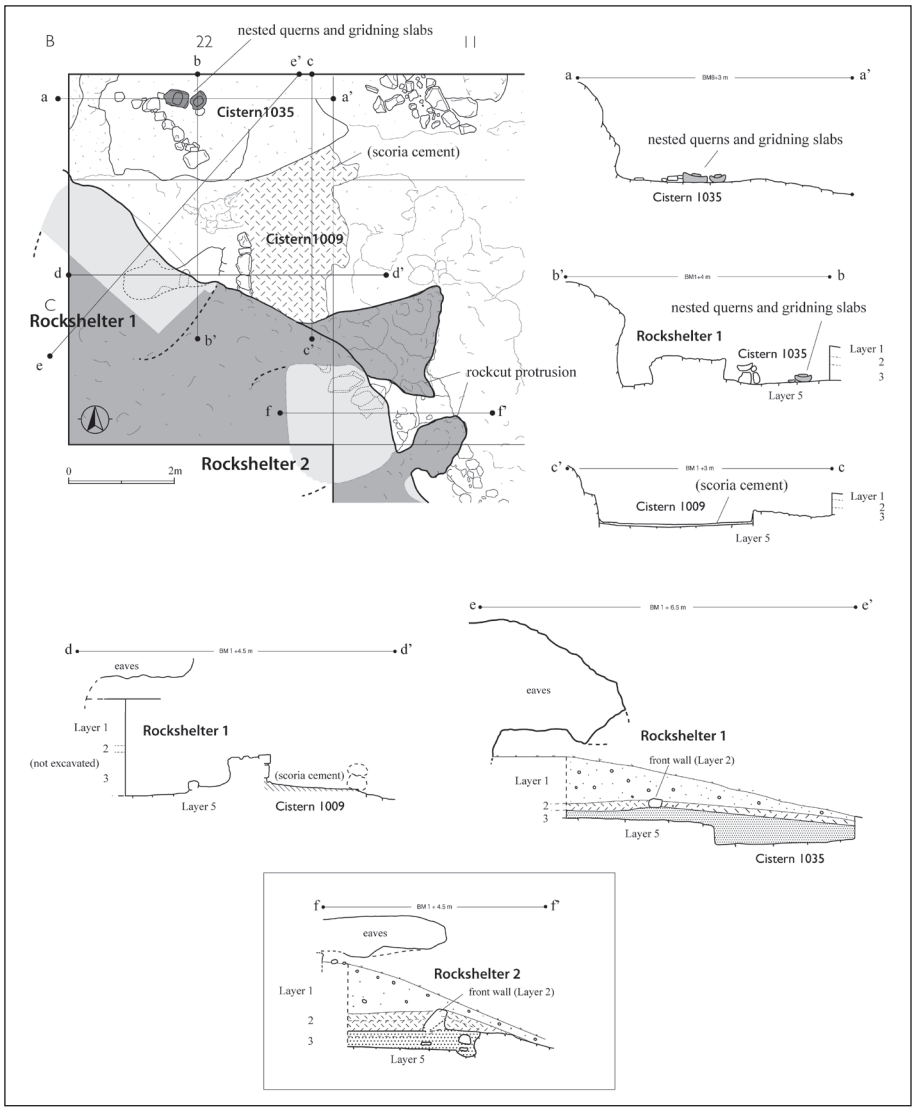
Some twenty rock-cut, mostly open-air cisterns were found in Area 1. Most of them were concentrated on a gentle scoria slope behind Rockshelter 6 (**Fig. 14; Fig. 15**), but a few large examples were also found on flat terrain in front of Rockshelter 1 (**Fig. 10: 4; Fig. 12**). They were divided into several types, including



11. Area 1: plans and sections/elevations of Rockshelters 5-3.

irregular depressions less than 1-2m in diameter (or longer axis) and less than 0.5-1m deep (**Fig. 15: 3**), cylindrical or bursiform pits *c*. 1m in diameter and depth, shaft-tomb-like hollows more than 1m in depth (**Fig. 15: 4-5**), and roughly square, tub-like facilities *c*. 2-3m across and *c*. 0.5m in floor depth (**Fig. 15: 2; Fig. 10: 4**). The cisterns behind Rockshelter 6 were primarily simple depressions or the pit-type examples, whereas those in front of Rockshelter 1 consisted only of the more developed, tub-type ones.

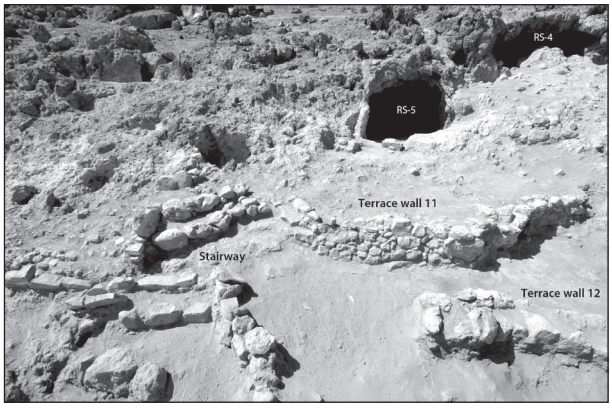
In terms of technology, the cisterns fell into the following three types: merely pecked examples, (pecked and then) carefully ground ones, and (pecked, ground and finally) floor-paved ones. It is needless to say that the surface treatment of the two latter types was intended to enhance the waterproof properties of the cisterns. While the small cisterns behind Rockshelter 6 were produced taking advantage of natural depressions and are simple in terms of both typology and surface treatment, the full-fledged cisterns in front of Rockshelter 1 were created by modifying the original topography to a considerable degree and were more carefully finished using scoria cement (*i.e.* Portland cement with minute scoria grains as major admixture). The maximum pondage of the simple cisterns is not more than 1 cubic meter, whereas that of the tub-type examples is estimated at a few cubic meters. Some of the small cisterns (*e.g.*



12. Area 1: plans and sections/elevations of Rockshelters 2-1.

Cisterns 16, 17 and 25) were not only equipped with a natural or rock-cut ditch for collecting runoff surface water, but were also connected with each other via a short channel and formed a small water-catchment complex to enhance water storage.

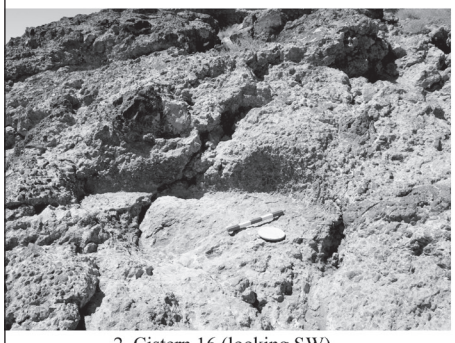
The question at hand concerns their chronological correlation with the adjacent rockshelter dwellings, but this is difficult to answer because most of them are exposed on the scoria bedrock layer and are, therefore, devoid of stratigraphic evidence - to say nothing of *in-situ* finds. A couple of exceptions were tub-type Cisterns 1009 and 1035 in front of Rockshelter 1, both of which were constructed on the upper surface of Layer 4 or 5 and, at the same time, were entirely buried by deposits of Layers 3-1 (Fujii 2015: fig. 8) (**Fig. 10: 4; Fig. 12: upper**). Furthermore, the floor of Cistern 1035 yielded two pairs of nested querns and grinding slabs as well as typical PPNB flint artifacts (**Fig. 10: 5**). Thus, at least these two cisterns demonstrably belonged to the Layer 3 rockshelter settlement. Nothing can be said about the simple cisterns



13. Area 1: general view of the features in front of Rockshelter 5.



1. Rock-cut cisterns behind Rockshelter 6 (looking NW).



2. Cistern 16 (looking SW).



3. Cistern 17 (looking SW).



4. Cistern 27 (looking W).



5. Cistern 27 (close-up view of ground floor)

14. Area 1: general and close-up views of rock-cut cisterns behind Rockshelter 6.

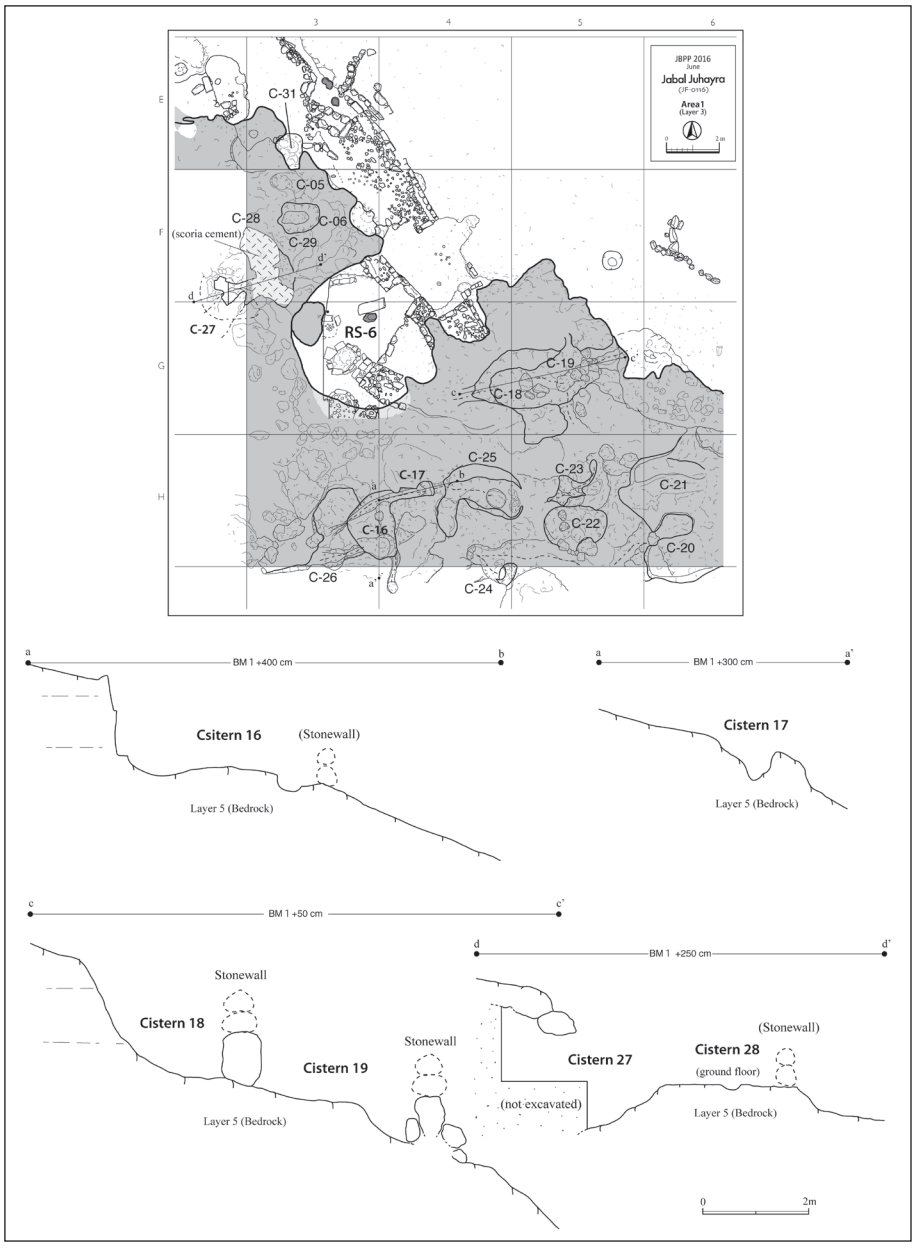
behind Rockshelter 6, but similar examples in Area 5 that are described below will provide stratigraphic evidence for their dating.

Small Features

A few small, upright-slab-lined features similar to Feature 1034 in Rockshelter 6 (**Fig. 7: 7**) were found on the slope in front of the rockshelter dwellings. Unlike the large, oval examples referred to in the last report (Fujii, Adachi and Nagaya 2017: fig. 14: 3-4), they belonged to Layer 3. Again, nothing other than ashy deposits was found within them. It appears that they were related to some ritual, but further scrutiny is required to validate the tentative interpretation.

Area 2

The second season's excavation had already proved that this area was not only devoid of structural remains but also scarce in artifacts. For this reason, no complementary operations took place during the subsequent three seasons.

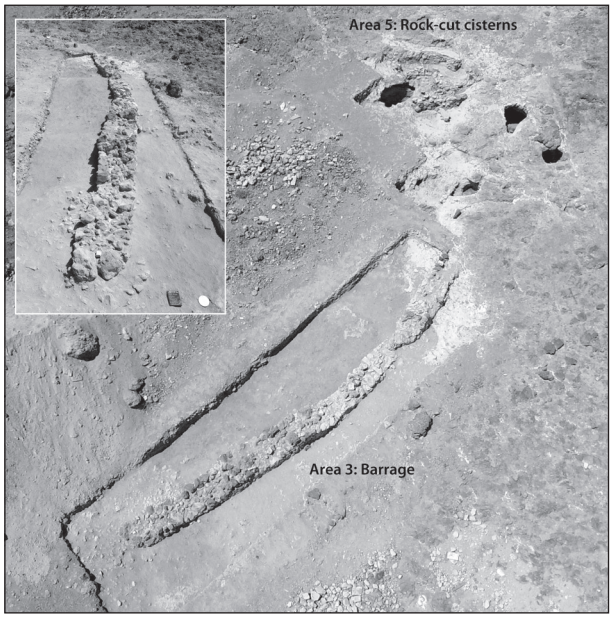


15. Area 1: plans and elevations of rock-cut cisterns behind Rock-shelter 6.

Area 3

As mentioned above, this elongated operation area was set up in the third season for the purpose of exploring the overall picture of the robust masonry wall that was slightly exposed on the northern slope. The excavation revealed that it was built on Layer 4' (thin yellowish silty clay deposits) or 5' (the scoria bedrock layer) and was covered entirely with Layers 3'-1' deposits (**Fig. 16; Fig. 17**). Thus, there is little doubt that it was coeval with the rock-shelter dwellings in Area 1. This chronological perspective was corroborated by a C_{14} date on charcoal remains from nearby floor deposits as well (**Table 1**). The excavation also showed that: (1) the robust masonry wall stretches downward from the middle part of the steep slope but is interrupted *c*. 5m short of the present gully bed; (2) it is constructed by a rubble-core, dry-walling technique using undressed or halved basalt/scoria cobbles up to *c*. 50cm long; (3) it measures *c*. 16m in preserved total length, *c*. 1-1.2m in width and up to *c*. 0.8m in preserved height, having a vertical interval of *c*. 5m between both preserved ends; (4) while the northern half of the wall is constructed with smaller cobbles, inferior in construction quality and slightly incurved toward the upstream, its southern half was almost straight and more carefully constructed using larger stones; (5)

the upper half can thus be regarded as a sort of a guiding wall to direct surface runoff water flowing down on the scoria slope; and (6) only the lower half represents the main body of the barrage.

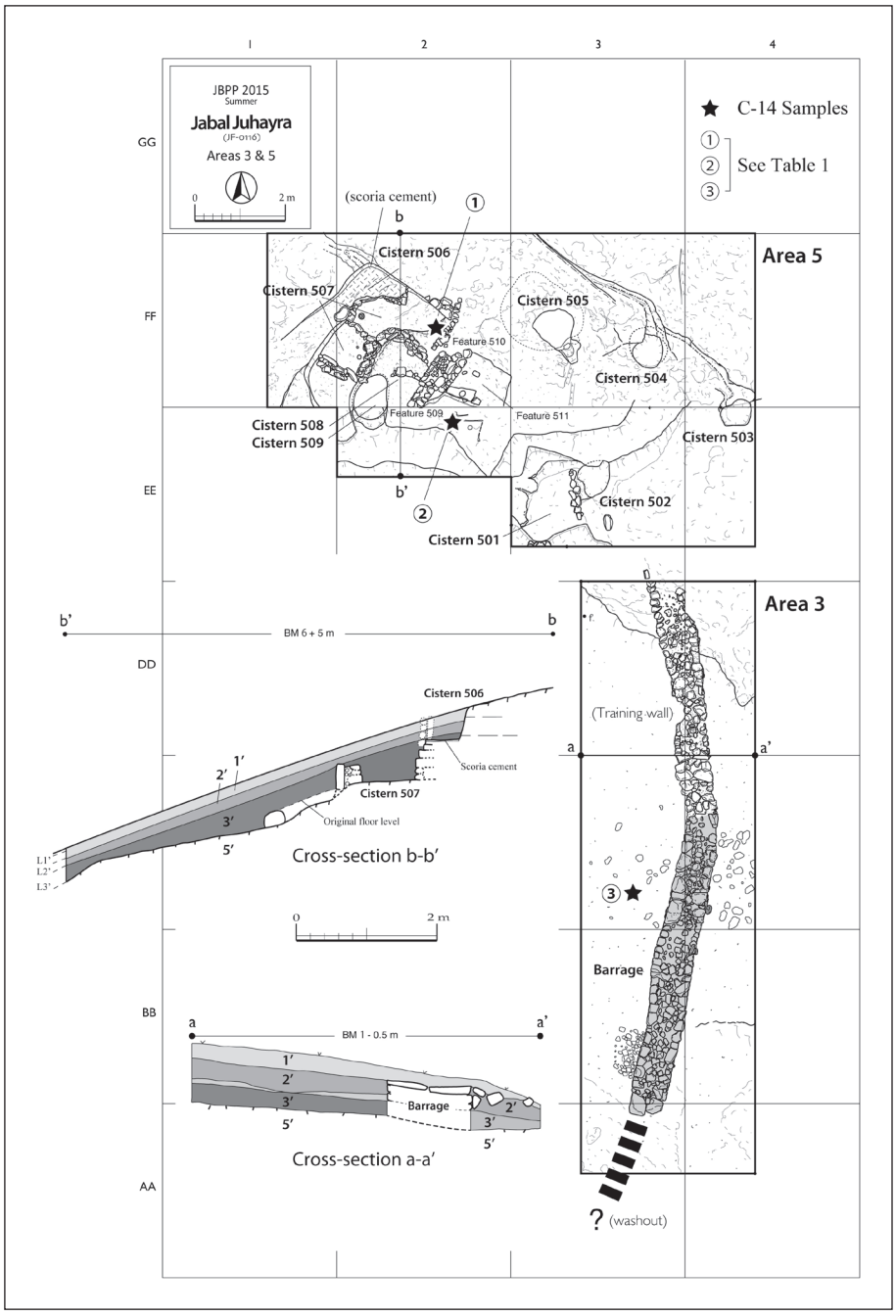


16. Areas 3 and 5: aerial view of the barrage and cistern system on the northern slope (looking NW).

The function of this masonry wall requires no further argument. Unlike the other masonry walls, only this wall is located immediately beside the gully (or, more precisely, near the confluence of two tributaries) and stretches orthogonally across the bed of the converged gully (**Fig. 3**). There is no doubt that the preserved wall alignment represents part of a small-scale barrage. The storage capacity of the main body of the barrage is estimated at a few dozen cubic meters. It seems most unlikely, however, that the barrage was intended for long-term water storage because, unlike the cisterns, no clear efforts to enhance waterproofing could be discerned. Even if fluvial deposits filled up the gaps between wall stones and thereby achieved a certain degree of waterproof effect, the use of the structure as an impounding dam is still doubtful. Further doubt is cast on such an interpretation by the fact that the main body of the barrage is fashioned in a relatively delicate form considering the strong sideways water pressure that might be expected. What then was the wall used for? A hint as to how the question might be approached was gained by the excavation at Area 4.

Table 1: Jabal Juhayra: C14 data from the Layer 2 and 3 settlements (as of July 2016).

Layer	Area	Feature/Square	Locus	IAAA-	Libby Age (yrBP)	calBC (2δ)	Remarks
2	1	RS-5	507_5	150202	5700±30	**4614-4457** (95.4%)	Rockshelter dwelling
	1	RS-6	505_2	143894	5760±30	**4700-4539** (95.4%)	〃
	1	RS-6	506_3	143895	5750±30	**4689-4521** (95.4%)	〃
	1	RS-6	601	150532	6050±30	**5027-4847** (95.4%)	〃
	1	RS-6	602	150533	6100±30	**5080-4936** (80.2%)	〃
	1	RS-6	603	150534	5930±30	**4848-4721** (93.2%)	〃
	1	RS-6	604	150535	6070±30	**5053-4896** (92.5%)	〃
	1	RS-6	605	150536	6180±30	**5219-5042** (95.4%)	〃
3	1	RS-3	603	151272	8840±30	8015-7791 (54.5%)	Rockshelter dwelling
	1	RS-4	612	151270	8150±30	**7190-7059** (83.6%)	〃
	1	RS-6	625	151268	8510±30	**7590-7527** (95.4%)	〃
	1	RS-6	626	151269	8430±30	**7574-7460** (95.4%)	〃
	1	RS-6	507_2	143896	8350±30	**7515-7342** (95.4%)	〃
	1	RS-6	734	160311	8470±30	**7584-7503** (95.4%)	〃
	2	RS-7	508_2	143898	8370±31	**7523-7352** (95.5%)	〃
	3	CC-3	210	150530	8290±30	**7467-7248** (85.1%)	Barrage (Fig. 17: ③)
	4	Trench	104_2	143899	8530±30	**7595-7535** (95.4%)	Small feature
	4	402	502	143898	8230±30	**7349-7126** (92.4%)	Terrace Wall 401
	5	EE-2	104	150531	8390±30	**7535-7422** (76.2%)	Cisterns 506/507 (Fig. 17: ①)
	5	FF-2	207	151267	8170±30	**7196-7065** (75.4%)	Cisterns 506/507 (Fig. 17: ②)
	7	JJ-1	104	151273	7250±30	6215-6050 (95.4%)	Open-air Sanctuary
	7	JJ-1	117	151274	8570±30	**7610-7539** (95.0%)	〃
	7	702	505	151275	8220±30	**7345-7123** (91.0%)	〃

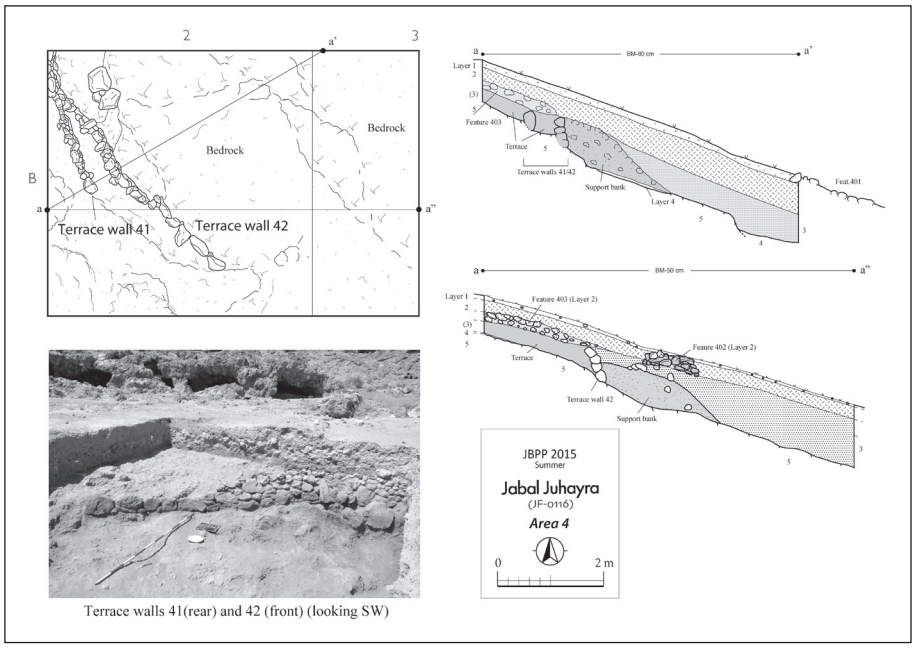


17. Areas 3 and 5: plan and sections of the barrage and cistern system.

Area 4

As mentioned above, Area 4 was set up to trace the southward extension of the barrage wall attested in Area 3, but no clear evidence for it was confirmed despite the relatively extensive excavation. Thus, it is conceivable that the south wing of the barrage wall, together with its central part across the gully, was entirely washed away by repeated floods or, possibly, was non-existent from the beginning.

What we found instead were two masonry terrace walls stretching in the NW-SE direction along the contour lines (**Fig. 18**). Small, undressed scoria/basalt cobbles were used as their construction materials. The upper wall measured *c*. 2m long and *c*. 0.3m in preserved height, whereas the lower one was at least *c*. 5m in length and up to *c*. 0.5m in preserved height. In terms of stratigraphy, both walls were based on Layer 4' or 5' and covered with Layer 3'-1' deposits. Of significance is the fact that they roughly overlapped the supposed extension line of the barrage wall, which possibly suggests that they were combined with the barrage-like



Terrace walls 41(rear) and 42 (front) (looking SW)

18. Area 4: plan and sections of Terrace Walls 41 and 42.

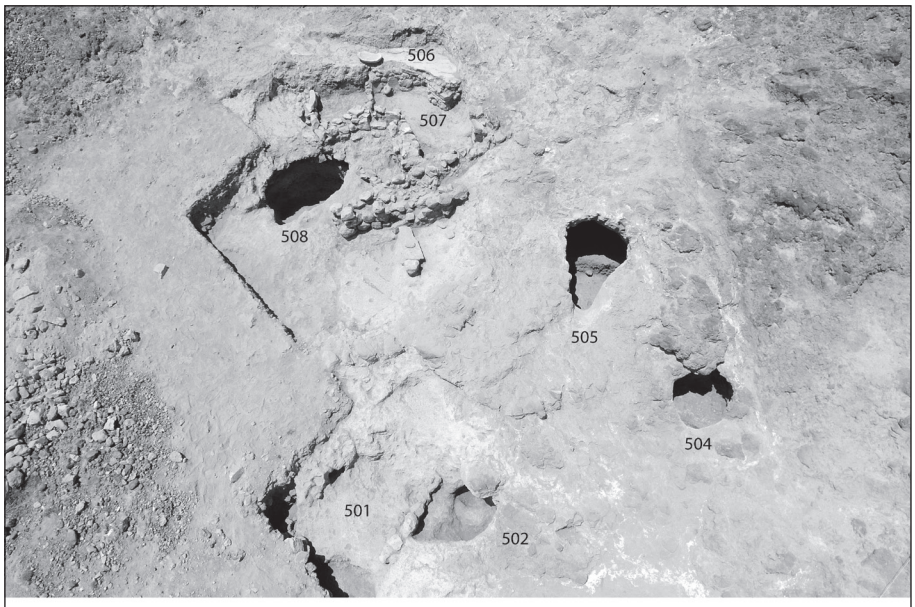
gully barrier to form basin-irrigated terrace fields. This is all the more likely because most of the Neolithic barrages in the Jafr Basin are known to have been constructed for basin irrigation (Fujii 2010b). Pollen/phytolith analysis of archived terrace-deposit samples kept in our local storage is expected to shed new light on this intriguing issue.

Area 5

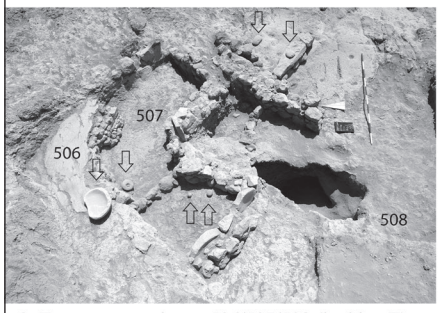
The excavation in Area 5 on the northern slope revealed a total of eight rock-cut cisterns. In terms of techno-typology, they could be divided broadly into two groups (**Fig. 19; Fig. 20**).

The first group consisted of pit-type cisterns, most of which were concentrated in the northeastern part of the operation area. These were further subdivided into cylindrical or bursiform examples (Cisterns 502-504 [**Fig. 19: 4**]) and shaft-tomb-like examples with a short, sloping approach and overhanging ceiling (Cisterns 505 and 508 [**Fig. 17: 5**]). The former were small in size, measuring *c*. 1m in diameter and *c*. 0.8-1m in floor depth, whereas the latter were slightly larger in scale, measuring up to *c*. 2m in diameter and up to *c*. 1.5m in floor depth. As with the rock-cut cisterns in Area 1 on the southern slope, most of these simple cisterns were equipped with a natural or anthropogenic ditch for collecting surface runoff water. What differentiated them from their southern counterparts was their standardized form and the more careful finishing of the floor, both of which lend them a more sophisticated appearance. In terms of stratigraphy, two examples (Cisterns 502 and 508) were cut into Layer 5 and, at the same time, were buried under Layer 3'-1' deposits. It follows that they constituted a part of the PPNB rockshelter settlement. Meanwhile, the other three cisterns (Cisterns 503, 504 and 505) were exposed on the scoria slope and were, therefore, devoid of such stratigraphic evidence. It is noteworthy, however, that one of them (Cistern 504) included a cache of more than five hundred homogeneous PPNB flint artifacts in its lower fill layers.

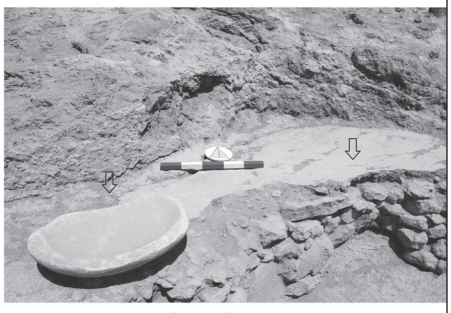
The second group occupied the southwestern part of the operation area, consisting of a roughly square tub-type cistern (Cistern 501) and a once again square, yet terrace type, composite cistern (Cisterns 506, 507 and 508). The former was *c*. 1.5m across and *c*. 0.4m in floor depth, being connected to a small pit-type cistern (Cistern 502) with a short stone wall intervening in between them. Its maximum pondage is estimated at *c*. 1-2 cubic meters. Meanwhile, the latter example was not only larger in scale but also very different in structure, being a three-tiered, composite cistern *c*. 3m on one side and *c*. 1.5m in vertical interval (**Fig. 19: 1**). The upper two cisterns were hook-shaped, whereas the bottom one (which occupied the dead space left by the two upper hooked



1. Cisterns in Area 5 (looking N).



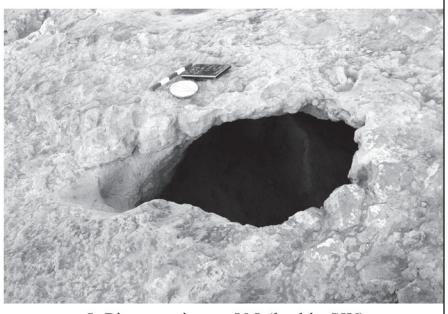
2. Terrace-type cistern 506/507/508 (looking E).



3. Scoria-cement floor of Cistern 506 (looking N).



4. Pit-type cistern 504 (lookig N).

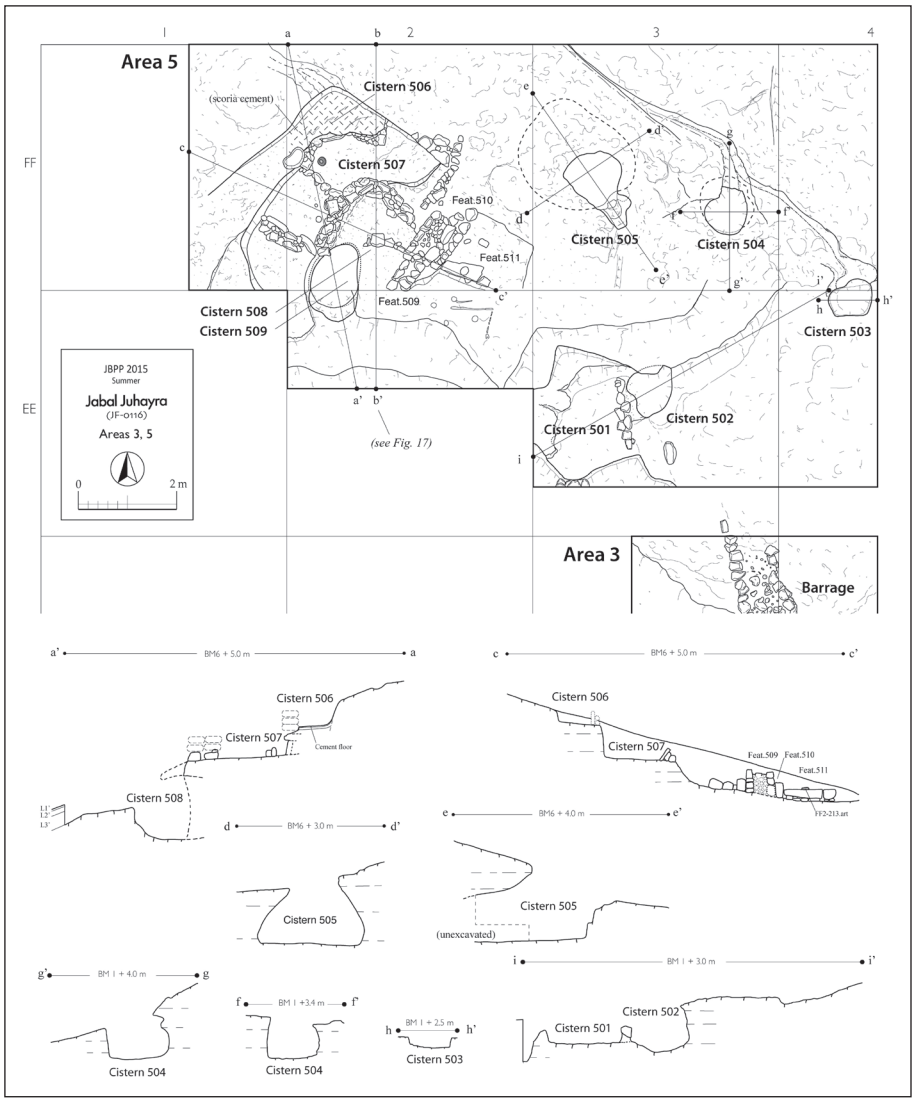


5. Pit-type cistern 505 (lookig SW).

19. Area 5: general and close-up views of rock-cut cisterns.

cisterns) was roughly square in general plan. Interestingly, this terrace-type, composite cistern was dug ('rotated') at a planar angle of 45 degrees to the surrounding scoria slope, which is an ingenious device for saving labor as well as coping with strong sideways water pressure.

The uppermost, hooked cistern was relatively well preserved, having two rock-cut sidewalls and a flat floor sealed with scoria cement. However, as with Cistern 1009 in Area 1, the hooked damming bank that presumably equipped the two lower sides was entirely washed out, excluding the foundation courses built on the edge of the middle terrace. A small aqueduct for taking in surface runoff water stretched from its northern corner towards the slope above. The maximum pondage of this cistern is estimated at a few cubic meters. The middle cistern had much in common with the uppermost one, except that it was slightly larger in width. Meanwhile, the lowest cistern (Cistern 508) still preserved a robust damming wall on its eastern side. In addition, a shaft-tomb-type cistern (Cistern 509) was dug into the southern floor of this cistern. This rather *ad hoc* feature might have been added to increase overall storage capacity,



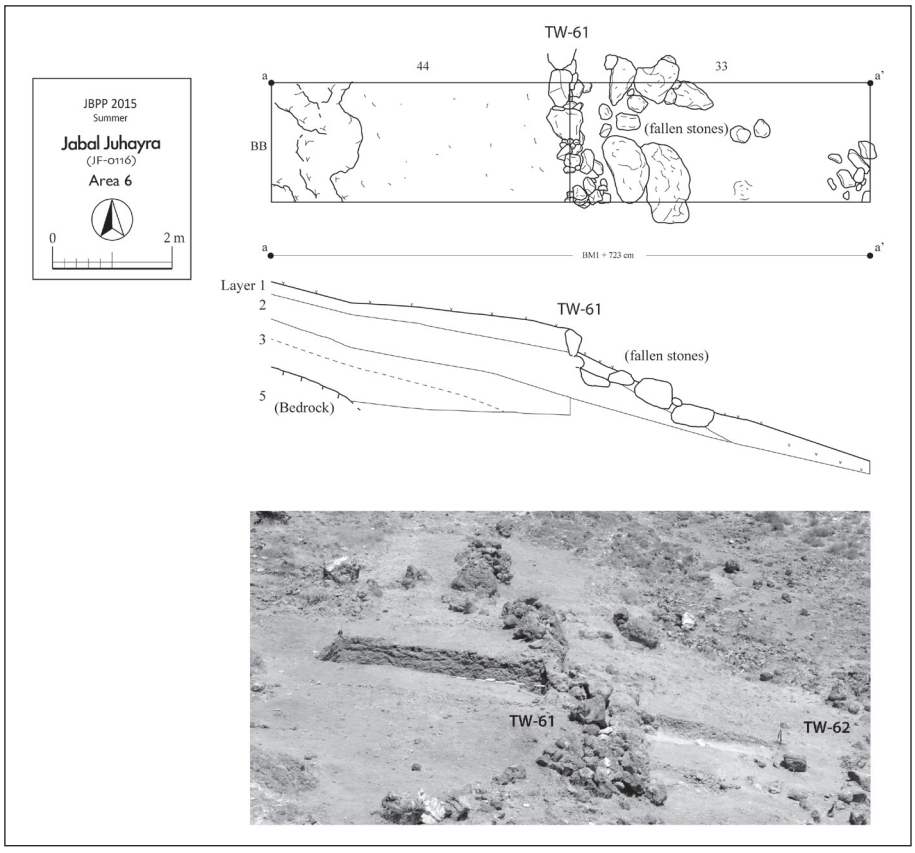
20. Area 5: plans and sections/elevations of the rock-cut cisterns.

or to compensate for lost capacity within the bottom cistern caused by erosion damage.

In terms of stratigraphy, this composite cistern was constructed on the bedrock layer and buried under Layer 3'-1' deposits. Thus, it demonstrably dates back to the PPNB. Once again, several grinding implements and a large working table were found here *in situ* on the floor or beside the lower damming wall, suggesting that some sort of kitchen work took place beside the water supply (**Fig. 19: 2-3; Fig. 30: 10; Fig. 31: 5**). It is needless to say that they resembled the groundstone artifacts found in the rockshelter dwellings on the opposite slope. Among others, an upright grinding tool with an off-center handle hole, which was found at the northern corner of the middle cistern (**Fig. 33: 2**), bore a strong resemblance to one of the cached artifacts in Rockshelter 6 (**Fig. 9: 7**). This fact, coupled with the stratigraphic correlation, highlights the contemporaneousness between the water-catchment system on the northern slope and rockshelter dwellings on the southern slope. Two C_{14} dates from the operation area also corroborate this interpretation (**Fig. 17; Table 1**).

Area 6

Two large terrace walls traversed the uppermost part of the valley from north to south (**Fig. 3**). We set up a 2×10m trench across the upper wall (Terrace Wall 61) and examined its stratigraphy (**Fig. 21**). As a result, it turned out to belong to Layer 1 and, therefore, had nothing to do with the stratified Neolithic settlement buried under Layer 3-1 deposits. No structural remains other than the terrace wall were found, but hundreds of PPNB flint artifacts were recovered - especially from lower fill layers. This



21. Area 6: plan and section of Terrace Wall 61.

fact suggests that an open-air flint workshop existed nearby, but we abandoned further excavation owing to time constraints.

Area 7

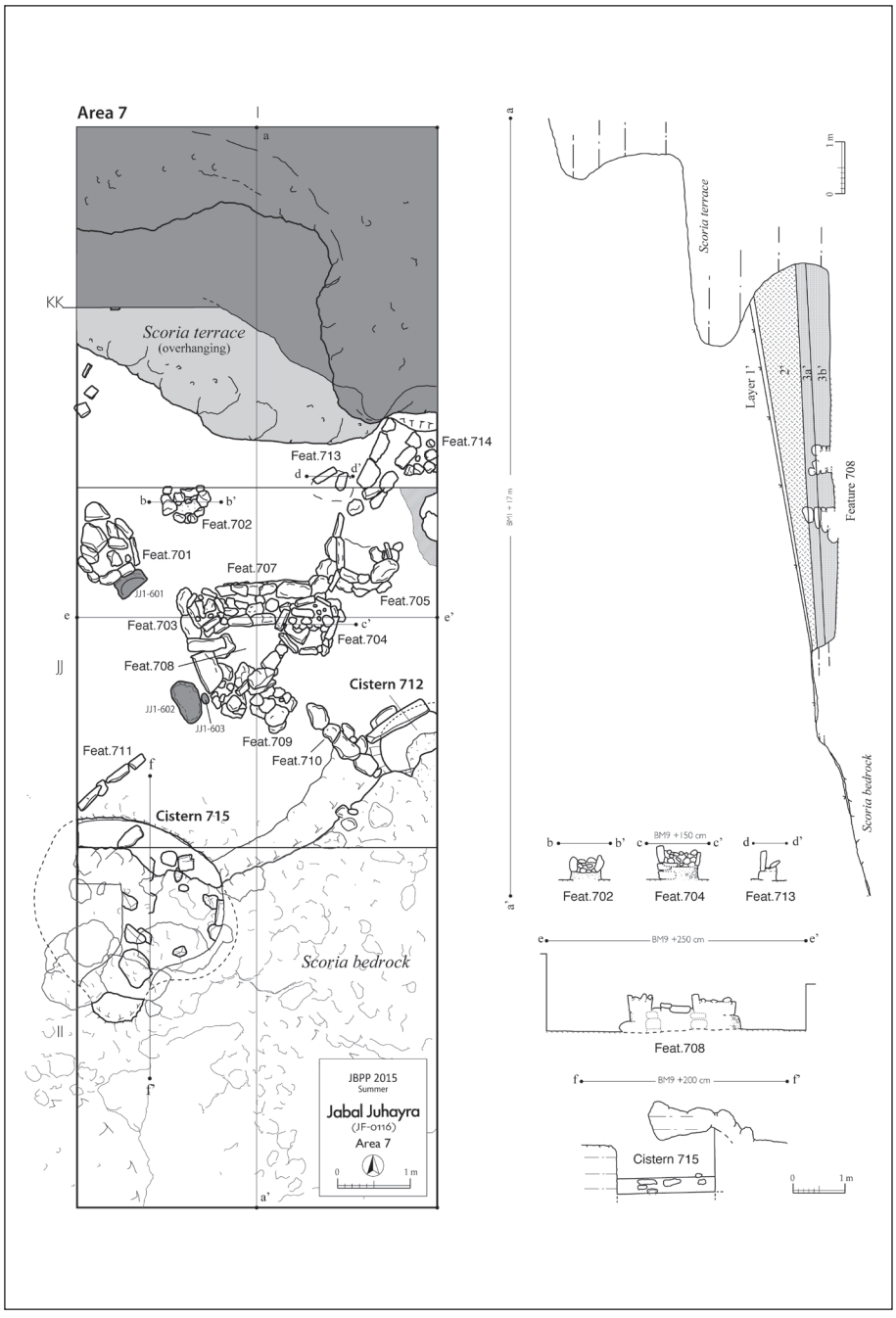
Area 7 was set up in search of the northern counterpart of the rockshelter dwellings in Area 1. However, what we confirmed was limited to several small features and two rock-cut cisterns only; no full-fledged structures were attested in the rockshelter (**Fig. 22; Fig. 23**). The former were concentrated in a flat, open-air space in front of the empty rockshelter, and consisted of a total of seven upright-slab-lined round features (Features 701-705, 709 and 713). Three of them (*i.e.* Features 703, 704 and 709) were connected to each other by means of three short masonry walls, forming a triangular complex *c*. 1.5m across (Feature 708). They belong to Layer 3' and can be regarded as outdoor versions of a similar feature found in the rear room of Rockshelter 6 (**FIG. 7: 7**).



22. Area 7: general view of the open-air sanctuary (looking NNW).

Meanwhile, the two pit-type cisterns *c*. 1-2.5m in diameter (Cisterns 712 and 715) were cut into the scoria bedrock layer (Layer 5') exposed in the southern half of the operation area and were subsequently buried under Layer 3'-1' deposits. Both of them were inferior in construction quality and resembled the simple cisterns behind Rockshelter 6 rather than the carefully finished cisterns in the neighboring Area 5.

It is our present interpretation that all features in this operation area are relatively early in date and roughly coeval with Rockshelter 6. It is possible that they belonged to a yet-to-be-identified early rockshelter dwelling(s) on the northern slope. Future excavation is expected to shed new light on the issue.



23. Area 7: plan and sections/elevations of the open-air sanctuary.

Supplementary Operations

In addition to the excavations descried above, we conducted the following supplementary operations as well. What we addressed first was an inspection of a dozen rockshelters at the head of the small valley (**Fig. 3**). No signs of Neolithic occupation were attested at the stage of surface survey, but we test excavated three of them (Rockshelters 1001-1003) just to make sure (**Fig. 24**). The results were as anticipated, and neither structural remains nor diagnostic artifacts were found. It also turned out that their



24. Rockshelter 1005: general view after test excavation (looking NE).

floor deposits are much thinner (up to *c*. 0.5m) than those of the rockshelters in Area 1. Both facts suggest that none of the rockshelters at the head of the valley were used as dwellings, at least in the Neolithic period. Seeing that no dung layer other than recent ones was confirmed, it is also unlikely that they were used as animal pens for the Neolithic rockshelter settlement. Incidentally, the intensive survey also located a few square, rock-cut cisterns *c*. 8-10m across and at least *c*. 1m in floor depth (*e.g.* Localities 1006 and 1007 in **FIG. 3**). These exceptionally large cisterns might possibly have something to do with a Roman or Islamic beacon station on the hilltop of Mt Juhayra, but further investigation is needed to tackle this interesting issue.

Another target of the supplementary operations was a small flint concentration (Locality 1001) found on a narrow scoria ledge *c*. 10m behind Rockshelter 6 (**Fig. 25**). We briefly examined it and confirmed that the flint concentration, *c.* 0.5m in diameter and *c*. 10cm thick, contained 27 irregular blades and 26 flakes including one calcite product. Neither core- and debitage-class products nor retouched tools were included. The absence of naviform core-and-blade components is suggestive of a post-PPNB date for the flint collection, while the absence of cortical knives implies a pre-LN/Chalcolithic date. In this sense, it might possibly represent a short stay between the two stratified Neolithic settlements.

In addition, we carried out a brief survey around the site and located a small-scale layered outcrop of cortical flint slabs (Locality 2001) at a point *c*. 1km northeast of the site (**Fig. 3**). As suggested above, there is a high probability that the outcrop served as a source of the standardized construction materials used for the facing walls of Rockshelter 6.

Layer 3 Settlement: Small Finds

The Layer 3 settlement yielded a huge number of artifacts, of which chipped-flint artifacts and grinding implements made of scoria or limestone were overwhelmingly predominant. Other artifacts included stone vessels, miscellaneous stone products, bone tools and shell/snail ornaments, but these were much less common. As in the case of the overlying Layer 2 encampment, the lack of artifact variety seems to suggest the involvement of a small-scale, high-mobility population group. Since the close examination of these small finds is still in progress, we will only give their category-by-category overview.

Chipped Flint/Calcite Artifacts

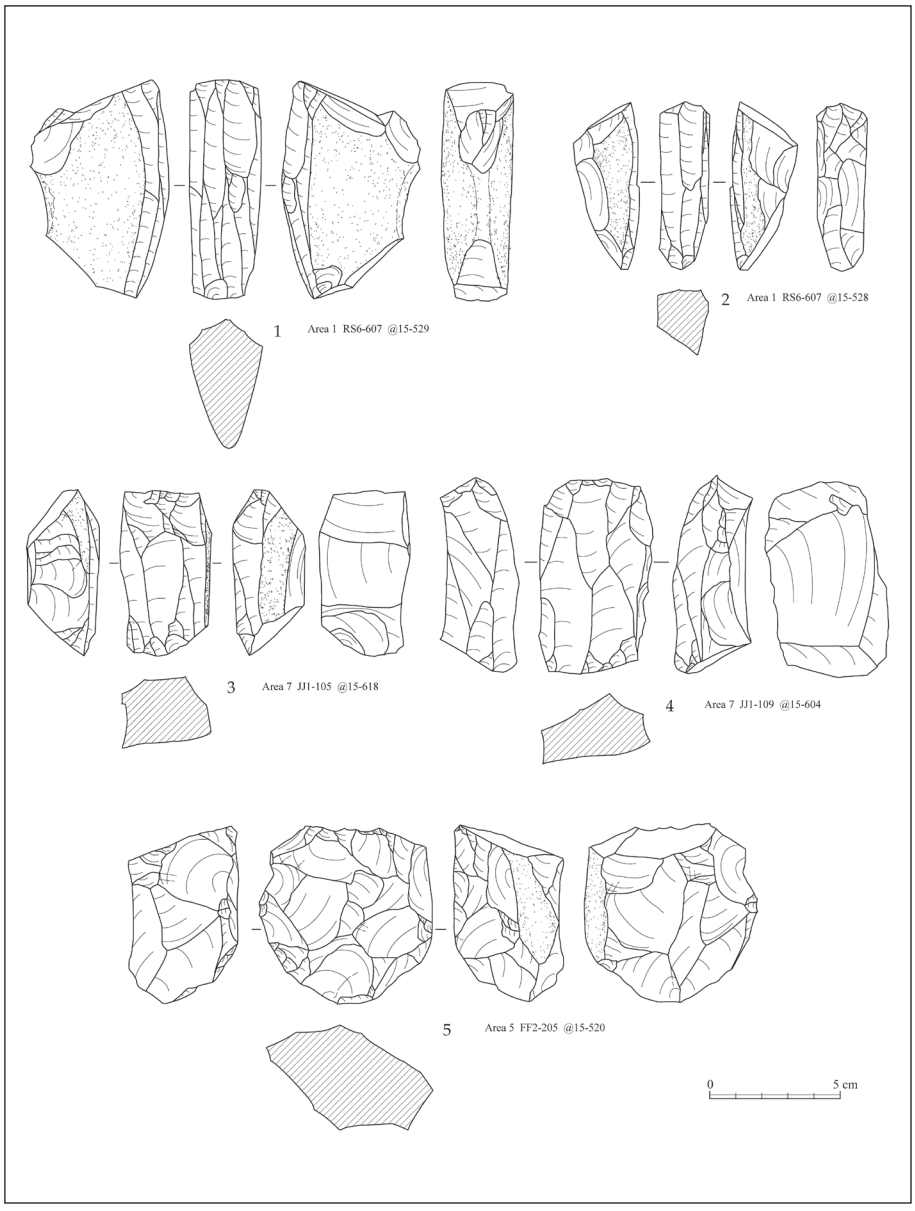
More than ten thousand chipped-stone artifacts were found in the Layer 3 settlement. The vast majority of them were made on high-quality Eocene flint, but several dozen calcite products were also included. No obsidian artifacts were found. The raw material of the flint products was probably procured from layered outcrops extending along the northern edge of the adjacent Jafr Basin, but the material source of the calcite products is still unknown.

The core- and debitage-class products centered around naviform core-and-blade components that mark the M-LPPNB flint assemblage in the Levant (**Fig. 26: 1-4**). Crested blades and core tablets related to them were also found frequently. Besides, single-platform blade or flake cores and change-of-orientation flake cores also occurred in small numbers (**Fig. 26: 5**). The existence of these core- and debitage-class products corroborates that most, if not all, of the retouched tools described below were produced within the settlement.

What characterized the tool class products was the predominance of hunting weapons, which broadly consisted of Badia points (**Fig. 27: 1-14**) and Amuq-type points (**Fig. 27: 15-25**). No typical examples of Jericho- and Byblos-type points were attested. Second commonest were drills (**Fig. 28: 1-7**), which were usually made on blades and equipped with a relatively long and robust tip. Other tool-class



25. Locality 1001: general view before excavation (looking S).



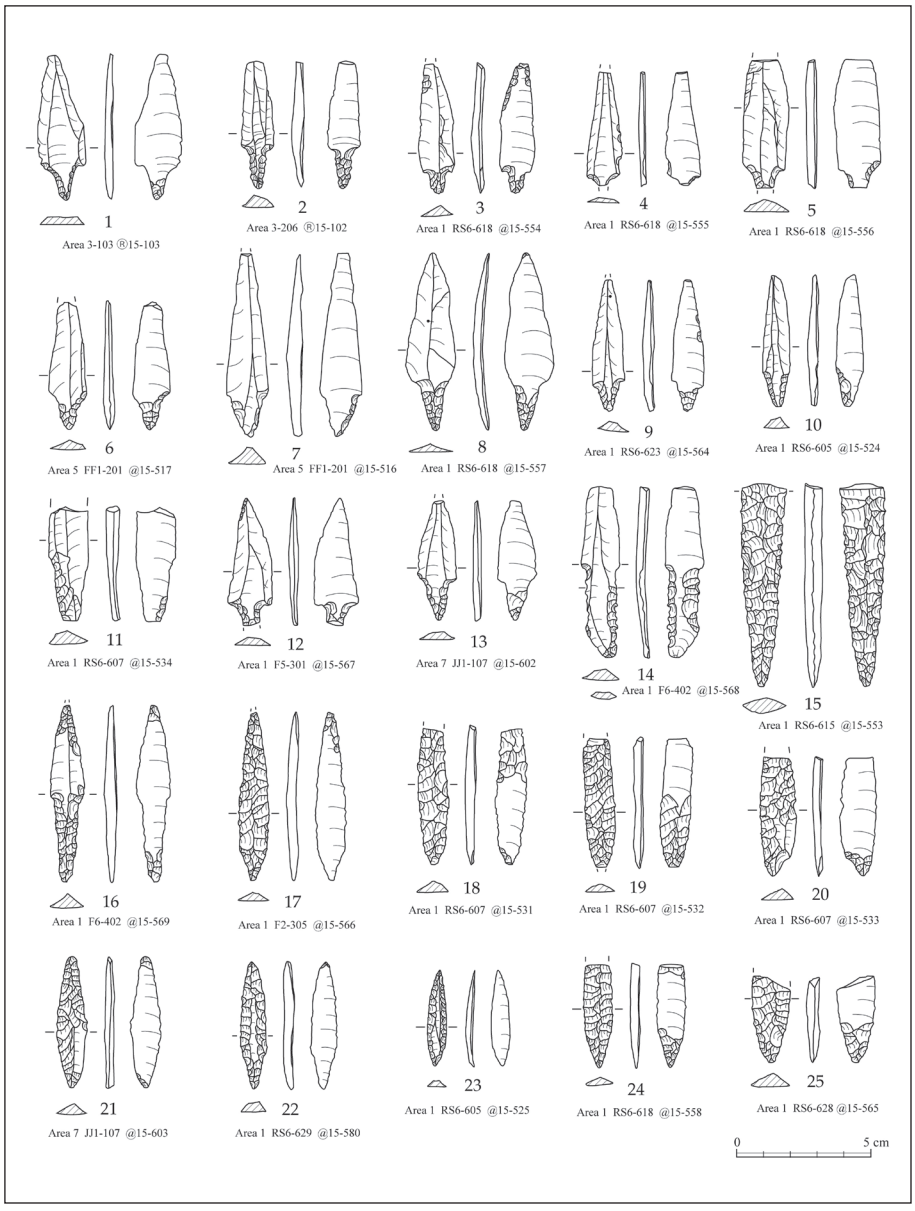
26. Jabal Juhayra: chipped flint artifacts from Layer 3.

products included serrated blades (**Fig. 28: 8**), angle or dihedral burins (**Fig. 28: 10-12**), notches/denticulates (**Fig. 28: 13**), side or end scrapers (**Fig. 28: 14),** elongated bifacial tools (**Fig. 28: 9**), cortical knives (**Fig. 29: 1**), and axes (**Fig. 29: 2**), but their frequency was much lower than the two major tool types. In addition, heavy-duty digging tools made of large flint flakes or elongated basalt rods were also attested (**Fig. 29: 3-7**). The basalt products had a length of up to *c*. 30cm and a weight of *c*. 0.5-0.8 kg, being equipped with a robust, chisel-like working edge at their distal end. They were probably used for digging the rock-cut cisterns and modifying the inner surfaces of the rock-shelters.

Grinding Implements

The Layer 3 settlement yielded eighty-three querns and fifty-two grinding slabs, all of which were made of limestone or scoria/basalt. The querns were dominated by large, oval, basin-type products *c*. 50-60cm long and *c*. 25-30cm wide (**Fig. 30**). Most displayed large flaking scars where their edges had been trimmed.

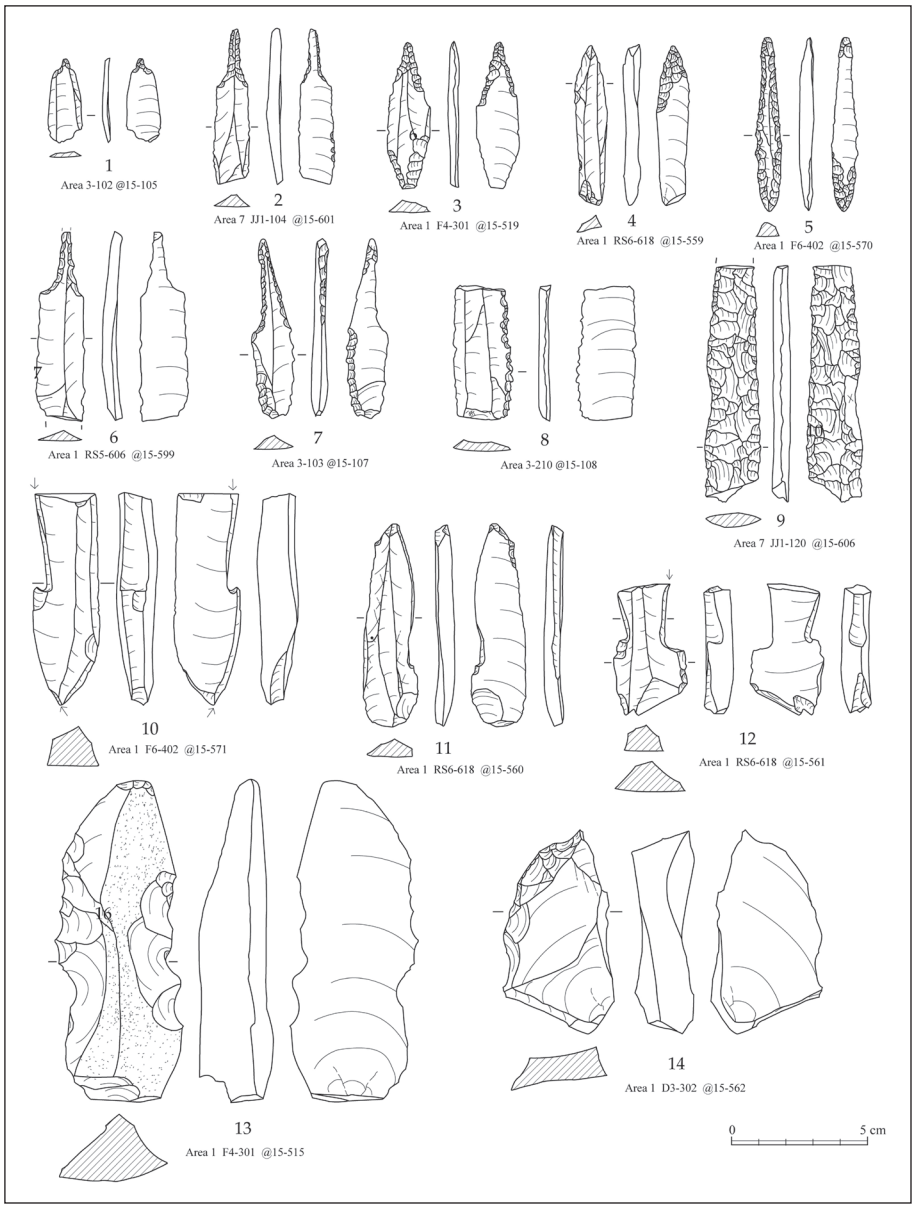
The grinding slabs, on the other hand, centered around relatively large, semi-rectangular products *c*. 15-20cm long and *c*. 12-15cm wide, but smaller, round to oval examples *c*. 10-15cm in diameter or length also occurred to a lesser extent (**Fig. 31**). The former are unique to the Layer 3 settlement at Jabal Juhayra and have no parallels at contemporary sites in the Jafr



27. Jabal Juhayra: chipped flint artifacts from Layer 3.

Basin known to date. (This fact will become important in discussing their specific use.) In addition, a stamp-like scoria product with a flat base and small knob handle also falls into this category (**Fig. 31: 9**).

The frequency of grinding utensils, together with the occurrence of serrated blades and the probable existence of basin-irrigated terraced fields, suggests that exploitation of plant resources - including cereal plants - was among the major subsistence activities practiced at the Layer 3 rockshelter settlement. In fact, as noted above, some of the grinding implements were found *in situ* beside the large cisterns in Areas 1 and 5, implying that the processing of plant foods - probably including cereal grains - accounted for a significant portion of everyday life at the rockshelter settlement. It should be added, however, that a few flat querns retained red granules of probable scoria origin on their working surface (*e.g.* **Fig. 30: 12**). These were possibly associated with the production of scoria cement used for paving the floors of the tub- and terrace-type rock-cut cisterns. The same is true of the large, semi-rectangular grinding slabs, some of which might have been used in combination with the red-stained querns to produce the paving material. It is also highly probable that they were used independently for smoothing the uneven surfaces of the rock-cut cisterns and rockshelter dwellings. Seeing that they have a large working surface not always



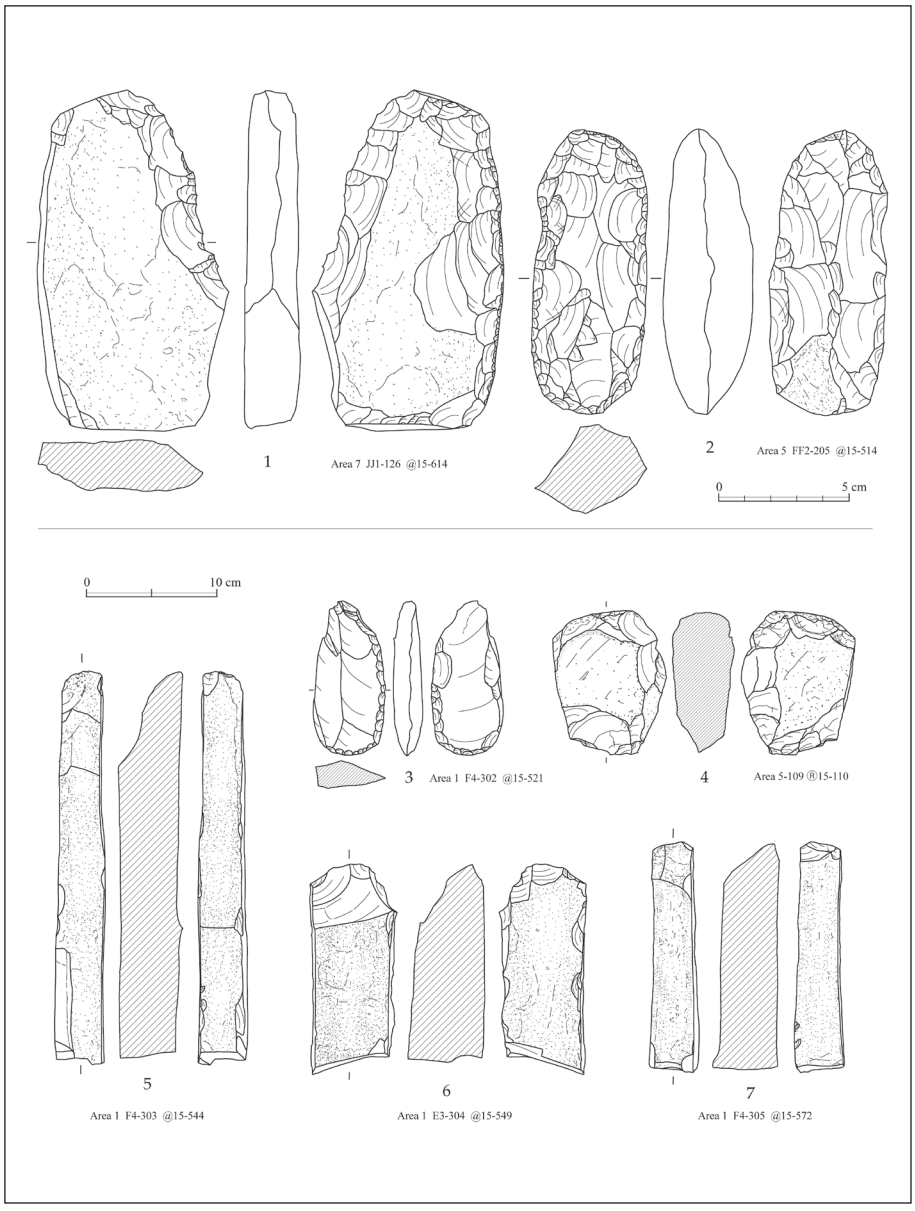
28. Jabal Juhayra: chipped flint artifacts from Layer 3.

fitting the concavity of the querns - and that they are limited to the rockshelter settlement of Jabal Juhayra - the latter interpretation might be more likely.

Stone Vessels

Stone vessels are the third most common artifact class, and twenty-seven products occurred in various contexts. They were divided broadly into small scoria/basalt products *c*. 10-15cm in diameter and large limestone products up to *c*. 50cm in diameter (**Fig. 32**). The frequency of pthe former can be understood as a phenomenon unique to the rockshelter settlement on the volcanic hill. Meanwhile, the latter products were probably produced using raw materials brought into the settlement. In terms of vessel form, the scoria/basalt products centered around small cups and shallow bowls, whereas the limestone products are limited to shallow basins with a gently incurved rim. The development of stone vessels is comparable with the Jafr PPNB outposts, including Wādī Abū Ṭulayḥah (*e.g.* Fujii 2008a: fig. 30).

In addition, the assemblage included a flint bowlet, a unique miniature vessel produced taking advantage of a natural shallow depression on a cortical flint slab (**Fig. 32: 8**). Though collected as a surface find beside Area 5, the occurrence of this unique artifact *c*. 6-7cm in diameter illustrates that the Juhayra Layer 3 settlement was incorporated into the extensive



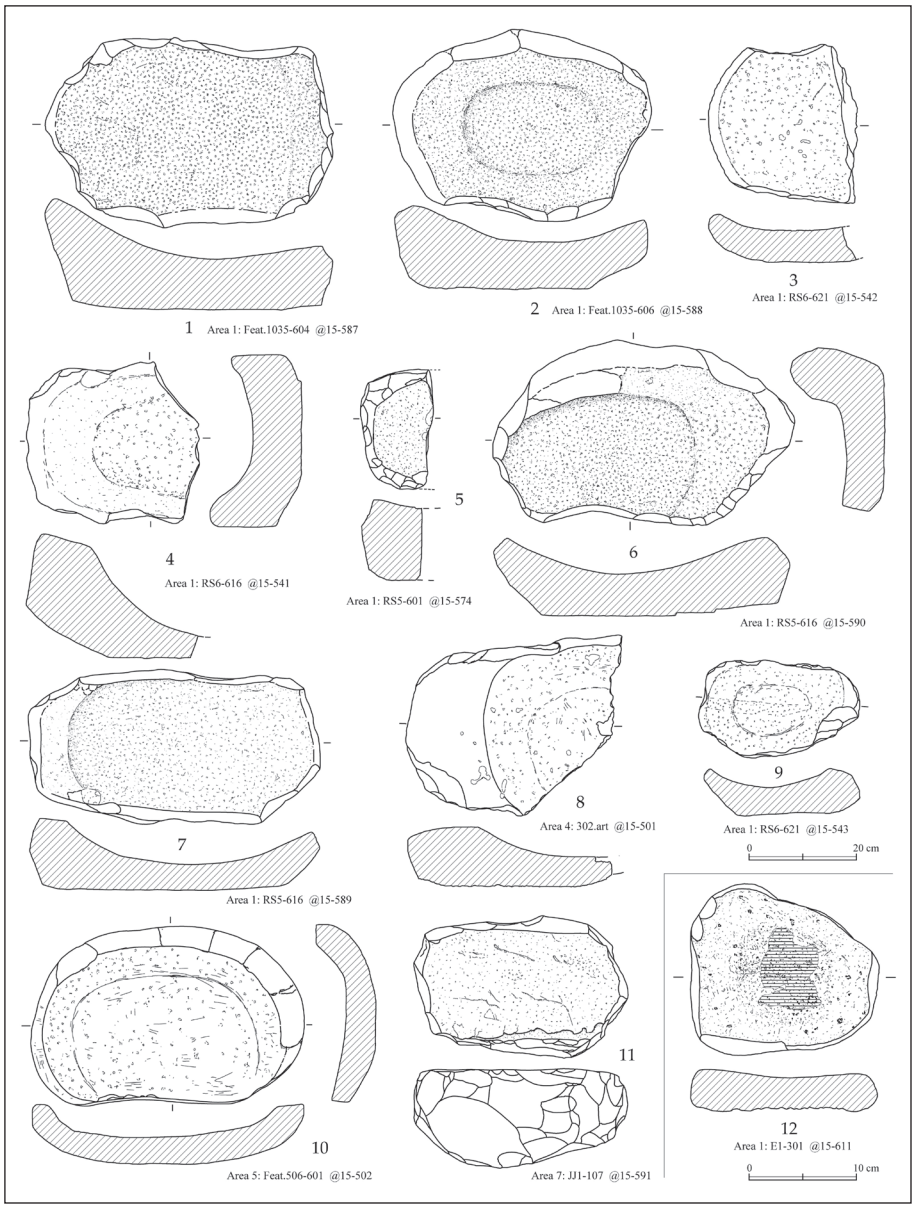
29. Jabal Juhayra: chipped flint/basalt artifacts from Layer 3.

trade network of the Late PPNB southern Levant (Fujii 2010a, 2012; Gebel 1999; Wilke *et al*. 2014). A similar, yet larger, scoria product was also found, but it is uncertain whether it falls into the same category (**Fig. 32: 9**).

Other Stone Products

Other stone products included a notched and grooved stone weight (**Fig. 32: 11**), a chronological marker of the Jafr PPNB (Fujii 2010b). This large basalt product has a length of *c*. 35cm, thickness of *c*. 10cm and weight of *c*. 27 kg. As described above, it was found *in situ* on the steps in front of Rockshelter 5. A petroglyph depicting a quadruped with a long curling tail, probably a cheetah or a panther, was added to the upper edge of one surface. This iconography was ~12cm long and produced by a pecking technique, both of which are characteristic of PPNB petroglyphs in the Jafr Basin (Fujii 2008b).

Also included in this category were three oval to semi-triangular limestone or scoria products with an off-center hole *c*. 5cm in diameter. They were relatively large in size, measuring *c*. 15cm in diameter or longer axis and *c*. 1.5-2 kg in weight. As described above, one of them was included in the cache-like artifact concentration found in the rear room of Rockshelter 6 (**Fig. 9: 7**). Meanwhile, one of the remaining two was recovered from a lower fill layer of Cistern 505 (**Fig. 33: 1**), and the other



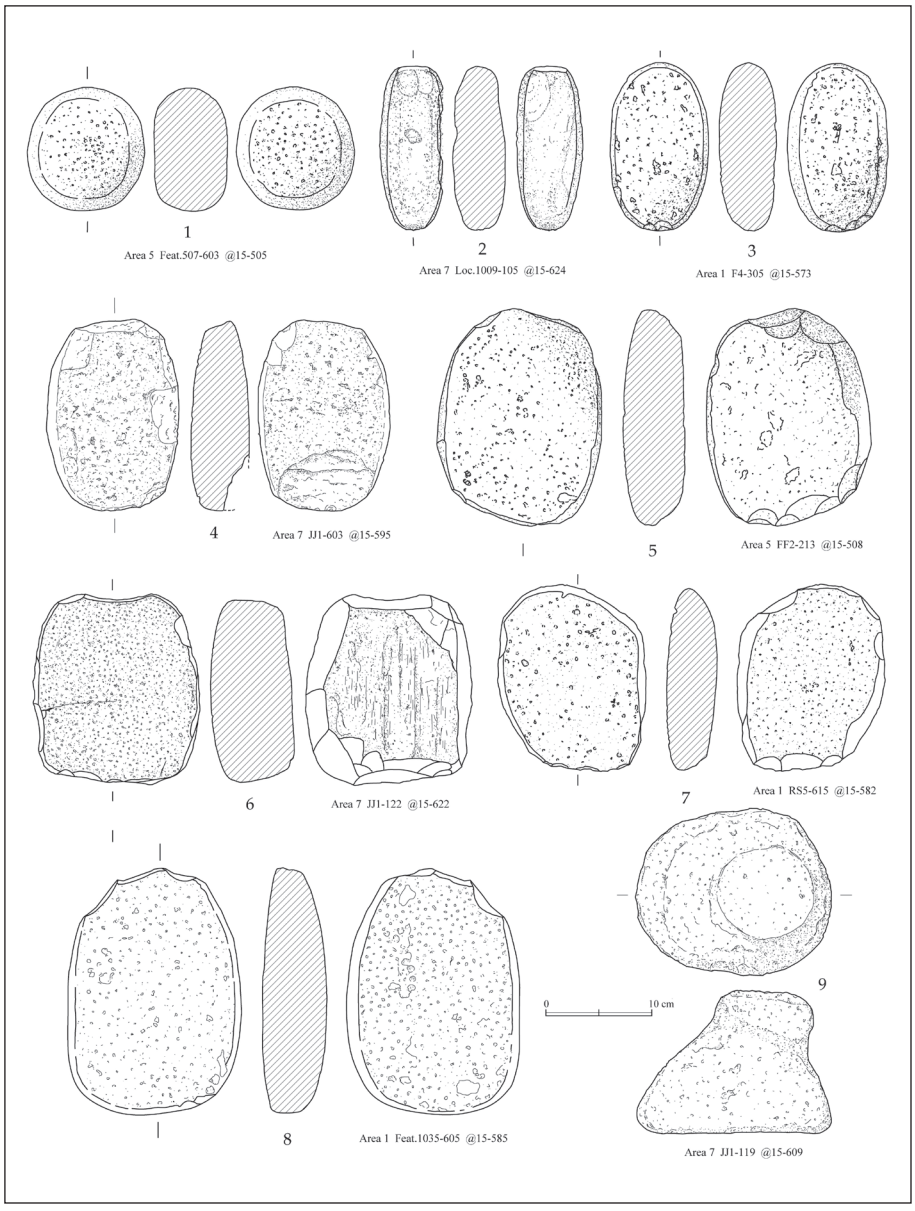
30. Jabal Juhayra: querns from Layer 3.

was found on the floor of Cistern 507 **(Fig. 33: 2**). Seeing that two of the three occurred in the context of water-catchment facilities, and that they retained use wear on their lateral surfaces, they are thought to have been used as upright smashing and/or grinding implements. Similar products have been reported from ‘Ayn Abu Nukhayla (Kadowaki 2014: fig. 17.5), a contemporary settlement in the Wād īRumm drainage basin.

In addition, several *ad hoc* whetstones made of sandstone or limestone also occurred (**Fig. 33: 3-4**). They measured *c*. 5-10cm long, having a rod-like appearance rather than a standard slab-like shape. As with the semi-rectangular grinding tools described above, they were possibly used for smoothing the uneven surfaces of the rock-cut cisterns.

Bone Tools

In contrast to the frequency of faunal remains, animal-bone tools were extremely scarce, being limited to a baton-like rubbing tool *c*. 5cm long (**Fig. 33: 5**), a tip fragment of a semi-rectangular spatula *c*. 2cm wide (**Fig. 33: 6**), a robust pointed tool *c*. 8cm long (**Fig. 33: 7**), and two slender awls *c*. 5-6cm long (**Fig. 33: 8-9**). Most of them exhibited remarkable sheen on their working surface(s) or edge(s), suggesting repeated use on a soft material such as leather. A scarcity of animal-bone tools is amongst the remarkable cultural traits of the



31. Jabal Juhayra: grinding tools from Layer 3.

Jafr PPNB, including Wādī Abū Ṭulayḥah (*e.g.* Fujii 2006a, 2006b).

Adornments

Adornments were even scarcer, consisting only of a very thin, button-like shell product with a hole *c.* 1cm in diameter (**Fig. 33: 10**) and a fragment of a cowrie shell (**Fig. 33: 11**). The scarcity of adornments is another characteristic of the Jafr PPNB.

Faunal/Botanical Remains

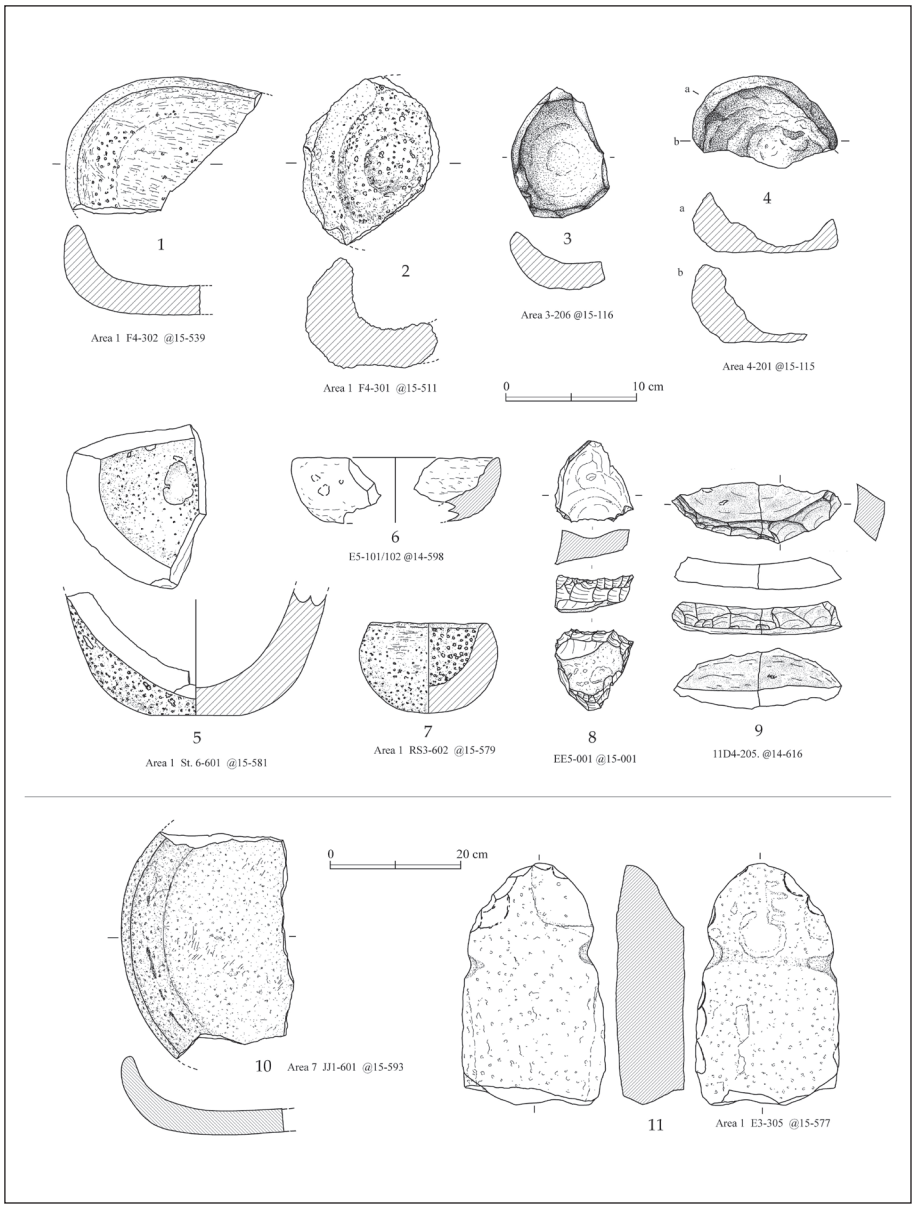
Hundreds of faunal remains were recovered from the Layer 3 settlement, especially the floor deposits of the rockshelter dwellings. Future archaeozoological analyses are expected to shed light on the exploitation of animal resources at, and the environmental conditions around, this unique settlement. In addition, several dozen liters of floor deposit and hearth fill were retained for archaeobotanical analysis.

Discussion

This series of excavations has shed light on the overall picture of the Layer 3 rockshelter settlement. To conclude, we will briefly discuss its general traits. We would like to point out in advance that the following perspectives are still tentative and need further verification.

General Profile of the Settlement

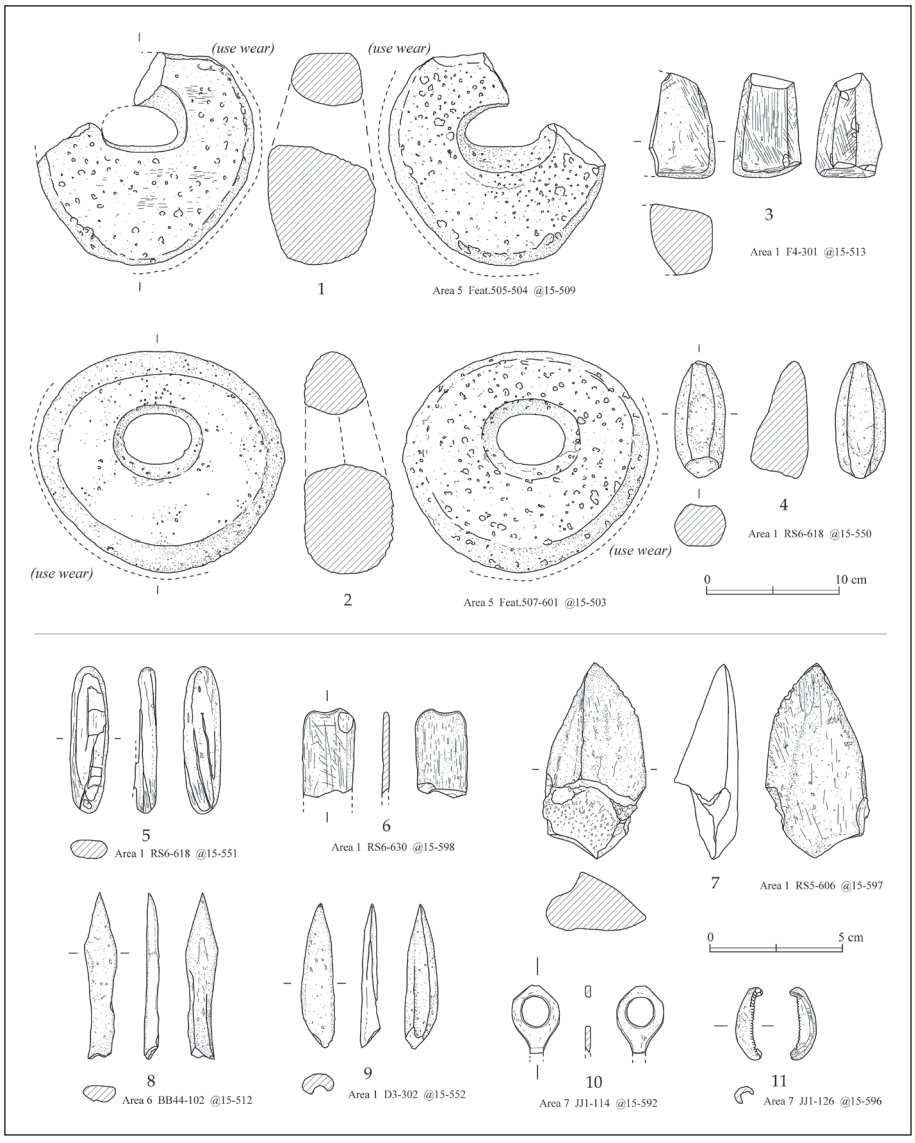
The Layer 3 settlement consists of the six



32. Jabal Juhayra: stone vessels and stone weight from Layer 3.

rockshelter dwellings in Area 1 and their ancillary facilities dotted over the seven operation areas, being roughly estimated at *c*. 0.5ha in total area. In view of the research outcomes in Areas 2 and 6, and Localities 1003-1005, it seems unlikely that the rockshelter dwellings extend beyond Area 1. Meanwhile, the terrace walls in Area 1, the rock-cut cisterns in Area 5, and the ritual features and cisterns in Area 7 are potentially more widely distributed than presently demonstrated. However, even taking that possibility into consideration, the fact remains that the composite settlement is small in scale. It is safe to say that the settlement represents an outpost, a standard settlement form of the Jafr PPNB.

The combination of an outpost-size settlement and barrage/cistern system has also been attested at Wādī Abū Ṭulayḥah (Fujii 2007a, 2007b, 2009, 2014) and Wādī Ghuwayr 17/106 (Fujii, Adachi, Quintero *et al*. 2011; Fujii, Quintero *et al*. 2011; Fujii, Adachi, Endo, Yamafuji *et al*. 2012, 2013). What differentiates the Juhayra complex from the other two is its unique topography, which lies behind its combination of features including rockshelter dwellings, rock-cut cisterns and terrace walls. In contrast, the other two complexes are located in the middle of the flat, flint-strewn desert (*hamada* in Arabic) and, for this reason, are marked by semi-subterranean masonry dwellings, similarly semi-subterranean cisterns,



33. Jabal Juhayra: miscellaneous stone products, bone tools, and shell ornaments from Layer 3.

and large-scale basin-irrigation barrages not associated with terrace walls. The coexistence of these two distinct types of outpost complexes illustrates that the PPNB population groups in the Jafr Basin coped successfully with the diversity of topographic conditions within their extensive territory. The unique character of the Juhayra complex can be understood in this context.

Dating

A dozen C_{14} dates are available for dating the Layer 3 settlement. Aside from two exceptions (IAAA-151272 and -151273), all of them converge on a limited time range around 7,500-7,200 calBC, indicating that the settlement dates to the first half of the Late PPNB (**Table 1**). The built-in pier-house and occurrence of diagnostic finds such as Amuq-type points and the flint bowlet support the results of the radiometric dating. In addition, the existence of the overlying Layer 2 (LN/Chalcolithic transitional) rockshelter encampment warrants the validity of the dating from another angle (Fujii, Adachi and Nagaya n.d.).

Thus, we can conclude that the settlement is roughly coeval with the other two Jafr PPNB outpost complexes referred to above. What is important here is that unlike the other two, it is located in an intermediate zone between farming communities to the west and desert outposts to the east. Thus, the settlement is expected to bridge the two distinct cultural zones and contribute to a comprehensive understanding of the initial process of pastoral nomadization in southern Jordan.

Intra-Site Architectural Sequence

The next issue is the intra-site structure/feature sequence of the composite settlement. This issue has two aspects: the chronological relationship between the northern and southern structural complexes, and the intra-complex structure/feature sequence. As for the first issue, there is no remarkable difference in C^{14} dates between Areas 3, 5 and 7 on the northern slope and Areas 1 and 4 on the southern slope. Thus, it is conceivable that the six rockshelter dwellings and the various features dotted on both slopes combined to form a unified settlement. As noted above, the commonality of small finds between both slopes also supports such an interpretation.

This is not necessarily to say, however, that every feature in the complex was constructed concurrently. It is possible that minor gaps intervened between them. Noticeable in this regard is the aforementioned techno-typological sequence of the six rockshelter dwellings, which suggested that the settlement began with the rock-cut, built-in pier-house in Rockshelter 6, proceeded through the eclectic Rockshelters 5-2, and ended with the simple Rockshelter 1 without any remarkable modification. Given this, it would follow that the rock-cut cisterns in Area 1 developed from the simple pit-type examples behind Rockshelter 6 toward the tub-type ones in front of Rockshelter 1.

Taken together, we can tentatively conclude that the Layer 3 settlement started with the combination of the rock-cut, built-in pier-house in Rockshelter 6 and the simple rock-cut cisterns behind it, then gradually shifted northwestwards, and ended eventually with Rockshelter 1, quite simple in itself but associated with the tub-type cisterns. The question is at what stage in this sequence the settlement was equipped with the barrage-and-cistern system on the opposite slope, but this is difficult to pinpoint. It is our present interpretation that the well-organized barrage/cistern system on the northern slope was added during, or possibly after, the second half of the rockshelter sequence.

Site Function

A key to approaching this issue is the seasonality of the settlement, but the research outcomes are ambiguous and admit various interpretations. The settlement is located on the arid margins and is very small in scale, scarce in artifact variety and centers around the more or less *ad hoc* rockshelter dwellings. From these viewpoints, we can define it as a temporary encampment that accommodated a small-scale, high-mobility population group. Nevertheless, it is also possible to regard it as a rather stable - not to say sedentary - settlement in view of the existence of the built-in pier-house, the construction of the full-fledged water-catchment facilities, and the development of heavy-duty stone products. However, seeing that such an eclectic character is shared with the Jafr PPNB outposts, an interpretative framework that places the terms ‘sedentary’ and ‘temporary’ in binary opposition might, in itself, be inappropriate in this case. Taking this into consideration, it seems reasonable to assume that the Layer 3 rockshelter settlement represents a fixed, yet seasonal, outpost used constantly every year.

Another important clue to site function is the character of subsistence activities. The research data are suggestive of an eclectic character in this aspect as well. While the predominance of projectile points in the tool kit highlights the importance of hunting activities, the frequency of grinding implements and occurrence of serrated blades imply that the exploitation of plant resources also played an important role in the site’s economy. Although detailed faunal data are not yet available, it is also highly likely that the rockshelter dwellers were engaged in livestock herding. In view of these considerations it would follow that, as evidenced at Wādī Abū Ṭulayḥah (Hongo *et al*. 2013; Nasu *et al*. 2010), the Layer 3 rockshelter dwellers at Jabal Juhayra directly - yet on a smaller-scale - transplanted the risk-mitigating, composite subsistence strategy common to their parent settlements into their outpost. In this sense, the settlement by no means represents an isolated encampment of desert dwellers. Rather, it should be regarded as a subsidiary outpost closely tied to a parent settlement to the west.

From the above, it is tentatively concluded that the Juhayra Layer 3 rockshelter settlement represents a fixed, yet seasonal, outpost of a small-scale population group derived from a parent settlement under the Mediterranean climatic regime. It should be added, however, that

the settlement's stability as a fixed outpost was not kept at the same level throughout its whole occupational history. In fact, the architectural sequence in Area 1 suggests that lifeways at the outpost gradually shifted from the relatively stable occupation represented by Rockshelter 6 towards more temporary visitations as suggested by Rockshelters 5-1. The *ad hoc* reuse of the same rockshelters by the Layer 2 inhabitants can also be understood as an extension of the same general trend. It is noteworthy that the site function of the Layer 3 settlement underwent remarkable change in its short occupational history.

Archaeological Implications

The Layer 3 rockshelter settlement has a few significant archaeological implications. To begin with, it has offered a final conclusion on the dating issue of the Jafr barrage-and-cistern system that was questioned by some scholars (*e.g.* Finlayson *et. al.* 2011: 203-204; Flohr *et al.* 2011: 123). What offered a breakthrough regarding this issue was the stratigraphy of, and C_{14} dates from, Areas 3 and 5, both of which clearly demonstrate that the Jafr barrage-and-cistern system dates back to the PPNB period. The occurrence of PPNB artifacts also corroborates the dating. Amongst other data, several querns and grinding slabs found *in situ* on the floor of Cisterns 506 and 507 in Area 5 highlight the fact that part of the water-catchment system was used as a food-processing place within the Layer 3 settlement (**Fig. 19: 2-3**). The same applies to Cistern 1035 in front of Rockshelter 1, where two pairs of nested querns and grinding slabs were found *in situ* on its floor (**Fig. 10: 4-5**). Similar objects occurred in the adjacent rockshelter dwellings, again indicating that both facilities were used in combination as part of a unified settlement. It also deserves consideration that the pit-type Cistern 504 in Area 5 contained approximately five hundred naviform core-and-blade components in its lower fill layers. The only regretful matter is that the central part of the barrage wall is entirely washed out and, for this reason, it was not possible to confirm the incorporation of stone weights and pillar sockets, a unique custom common to PPNB barrages in the basin (Fujii 2013: 63-67). Aside from this, accumulated evidence clearly indicates that the Layer 3 settlement was associated with a well-organized barrage-and-cistern system (Fujii 2016). There is no doubt that the settlement represents the third example of the Jafr PPNB outpost complex, following Wādī Abū Ṭulayḥah and Wādī al-Ghuwayr 17/106.

Second, the settlement has provided a key to tracing subsequent penetration into arid terrain. Our previous reports argued that the initial process of pastoral nomadization in the Jafr Basin is traceable through the gradual replacement of the PPNB triple set (*viz*. outpost, barrage and cistern) with the loose combination of a small encampment such as Khashm al-'Arfa (Fujii, Adachi, Yamafuji *et al*. 2013) and an open-air sanctuary such as Harrat al-Juharya (Fujii 2005), Qā' Abū Ṭulayḥah (Fujii 2000, 2002, 2003) and the 'Awja sites (Fujii, Adachi, Endo *et al*. 2013; Fujii, Yamafuji *et al*. 2012). However, this perspective was based on rather patchy datasets. The excavations at Jabal Juhayra have now shed new light on this long-standing issue. Although a two-millennium gap still intervenes between Layers 3 and 2, the stratified Neolithic settlement unexpectedly contains all five of the major components referred to above (*i.e.* PPNB outpost-size settlement, barrage and cistern on the one hand, and post-PPNB encampment and open-air sanctuary on the other). This has enabled us to bracket the episode at hand more tightly - at the same site. In fact, the techno-typological sequence of the six rockshelter dwellings and the existence of an overlying Layer 2 encampment have offered a glimpse into the gradual shift from parent-settlement-based transhumance, through eclectic lifeways, to full-fledged pastoral nomadism.

In addition, the Layer 3 settlement has shed new light on the issue of the parent settlements of the Jafr PPNB outposts. Our previous argument suggested that the Jafr PPNB outposts derived from sedentary farming communities to the west (*e.g.* Fujii 2013), but this was no more than an anticipation based on the interactive flow of materiel and artifacts between the two adjacent areas. The discovery of the built-in pier-house in the intermediate zone has corroborated anew that the initial pastoral transhumants in the PPNB Jafr Basin derived from a Beidha Layer 2 type settlement to the west.

Concluding Remarks

The excavations at the Layer 3 rockshelter settlement of Jabal Juhayra have revealed a unique Neolithic culture adjacent to the Fertile Crescent. Amongst other aspects, the built-in pier-house in Rockshelter 6 has bridged the sedentary PPNB and the Jafr outpost PPNB in many respects. In addition, the barrage and cisterns attached to the settlement have brought the issue of the dating of the water-catchment system in the basin to a final conclusion. It is no longer disputable that the Jafr outpost PPNB was sustained by such an advanced water-use technology.

Jabal Juhayra is a stratified Neolithic settlement exceptionally rare outside the Fertile Crescent. The transition from the Layer 3 (Late PPNB) settlement to the Layer 2 (LN/Chalcolithic transitional) encampment, together with the architectural sequence of the six rockshelter dwellings, illustrates the initial process of pastoral nomadization in southern Jordan. In this sense, the stratified settlement is expected to play an integrative role in bundling up patchy datasets collected previously in the basin, as well as bridging the two adjacent cultural zones. We would like to continue our efforts towards gaining a deeper understanding of this key site.

Acknowledgements

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PETRA NORTH RIDGE PROJECT: THE 2016 SEASON

S. Thomas Parker and Megan A. Perry

Introduction

This preliminary report summarizes results from the third season of renewed work on the Petra North Ridge conducted between 14 May and 21 June 2016, under a permit from the Department of Antiquities.

Personnel

Senior staff included S. Thomas Parker (co-director and ceramicist) and Megan Perry (co-director and bioarchaeologist), Jennifer Ramsay (assistant director and archaeobotanist), Russell Gentry, Sophie Tews and Jessica Walker (area supervisors), James Cayton and Qais Twaissi (draftsmen), Melissa Price (conservator), Heidi Rosenwinkel (small finds registrar), Emily Sussman (assistant osteologist), Sarah Wenner (ceramicist), Craig Harvey (assistant ceramicist), Thad Wasklewicz (spatial analyst), Kailey Adams (assistant spatial analyst), John Rucker (geologist), Riyadh Majali, Muhammad Tweissi, Basil Halasah and Muhammad Mubarak (Department of Antiquities representatives). Trench supervisors were Jordan Karlis, Jana Lanier, Christopher Mansfield, Gabryel McBaine, Jonathan Parker, Akacia Probst, Mallory Provan, Alex Garcia-Putnam and John Rucker. Amie Goerlich and Tara Stanko served as assistant trench supervisors. Students included Rebecca Biggerstaff, Jennifer Bumgardner, Sana Chowdhry, Adam Connell, Sydney Grice, Michelle Heeman, Pamela Klasova, Sarah Luther, Victoria Maatta, Danielle Maerlander, Andrew Martin, Nikki Nix, Dennis Paone, Devin Pescara, Gregory Reynolds and Benjamin Tim. Dakhilallah Qublan served as foreman of about twenty local workers.

Project Goals

Since 2012, the Petra North Ridge Project has explored the living spaces and burial places of an apparently non-elite segment of Petra. The 1st century BC/AD tombs and Nabataean and Late Roman (1st to 4th centuries AD) domestic structures on the northern sector of the ancient city have clarified many aspects of the relatively under-excavated ancient site:

- The health and quality of life of the Nabataeans during the city's 1st century AD florescence is being explored through analysis of human skeletal material within the tombs;
- Nabataean concepts of death, burial and commemoration around the turn of the millennium;
- The participation of Nabataean and Late Roman inhabitants in local, regional and international markets through excavating domestic complexes from this period;
- The construction and chronology of Petra's city wall and its relationship to the contraction and expansion of the city's northern limit in the Nabataean through Byzantine periods.

An additional key component of this project is to minimize excavation-related landscape impact through:

(1) completely filling tomb shafts upon completion of excavation to protect their interiors and prevent accidents; (2) backfilling excavation trenches to preserve exposed architecture until full-scale conservation and presentation of the site at the end of the project; (3) allowing the Temple of the Winged Lions Cultural Resource Management (TWLCRM) project to utilize our sifted soil for filling sand bags to assist that project after each season.

Previous Research

The Petra North Ridge Project began in 1998 with excavations directed by Patricia M. Bikai of the Ridge Church, the Blue Chapel complex and two 1st century AD tombs uncovered beneath the Ridge Church (**Fig. 1;** Bikai, Perry, and Kanellopoulos 2020). The project continued under the direction of Megan A. Perry until 2010, when S. Thomas Parker joined as project co-director (see Parker and Perry 2013, 2014 for previous ADAJ reports).

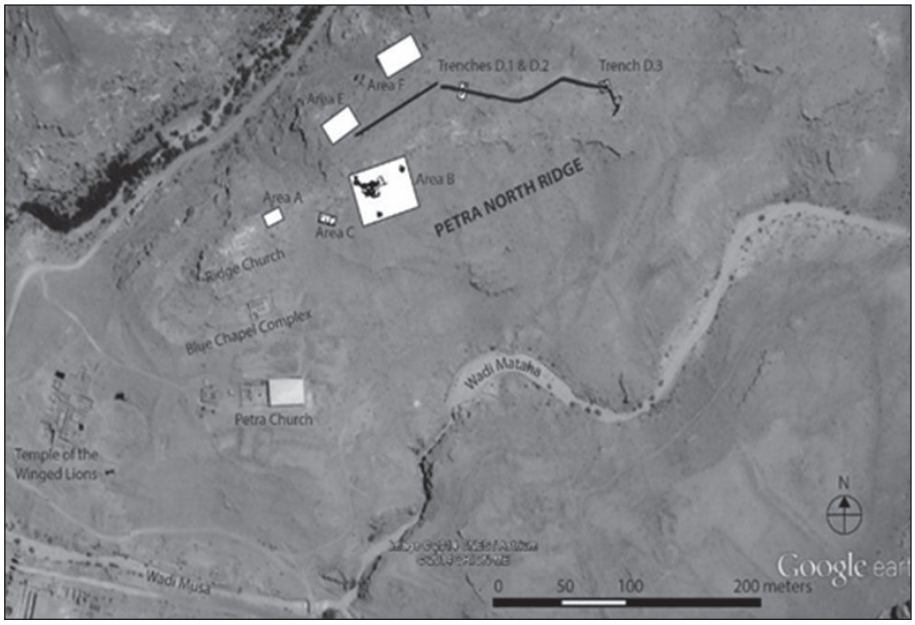
In 2012 and 2014 the project excavated six 1st century BC/AD tombs (B.4, B.5, B.6, B.7, B.8 and B.9). One of these (B.8), was never used for mortuary purposes, apparently due to geological instability. Analysis of the skeletal remains evidenced pathological bone lesions indicative of disease, malnutrition or other physiological stressors (Canipe 2014). It also included documentation of bony changes at muscle attachment sites to understand habitual activity patterns (Stanko 2018), in addition to isotopic analysis of diet (Appleton 2015). In addition, the spatial contexts and patterns of commingling of the skeletal remains in addition to mortuary artifacts were unpacked to reveal Nabataean mortuary behaviors (Perry 2017, 2018, in press).

The explorations in 2012 and 2014 of two domestic complexes along the city wall in Area A (A.1, A.2, A.3 and A.4) and Area D (D.1 and D.2), revealed that these structures were abandoned and partially razed for the construction of the city wall in the late 1st or early 2nd century AD. During the same seasons, excavation of a domestic complex in Area B (B.1, B.2 and B.3), along with the Area B tombs mentioned above, indicated that it was constructed in the early 2nd century AD - almost immediately the tombs went out of use - and was utilised until the mid-4th century AD. The complex seemed to have been abandoned before massive collapse of its walls, perhaps due to the 363 earthquake or its related aftershocks. In addition, a domestic complex in Area C (C.1, C.2, C.3 and C.4), excavated in 2014, was also founded in the early 2nd century and continued in use until a catastrophic destruction, also likely due to the 363 earthquake.

Results from the 2016 Season

Mortuary Contexts: Areas B and F

Area B was opened in 2012 on the North Ridge to achieve two separate goals: (1) to investigate apparent domestic structures (completed in 2014); (2) to excavate rock-cut shaft tombs interspersed among the domestic structures. As noted above, five tombs were excavated in 2012 and 2014. Tomb B.7, located along an exposed bedrock ledge near the top of the ridge, contained a doorway that led to an adjacent tomb. The spatial link between these two tombs identifies them as a continuous mortuary space, making excavation of the unexplored tomb (identified as B.9) necessary to truly understand B.7's mortuary context.

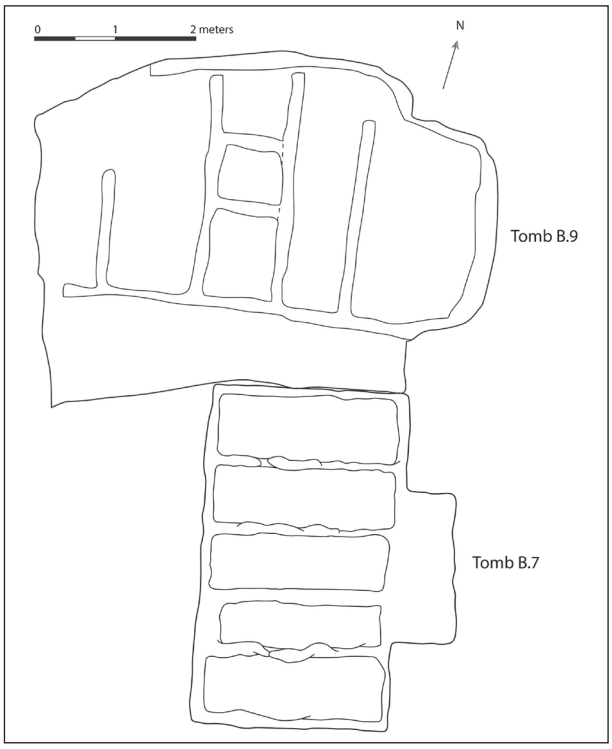


1. Google Earth image showing location of excavations in 2012, 2014 and 2016.

Tomb B.9

The bedrock surface of Tomb B.9 had been modified, likely as part of construction of the rock-cut feature. The surface had been flattened and a small bench-like feature was cut into the rock wall to the northwest. The shaft opening contained ledges for placement of capstones, some of which were found collapsed into the tomb shaft. In addition, a small wall alignment slightly overhanging the tomb opening was uncovered and excavated in the northern corner of the shaft opening.

As with previously excavated tombs, the shaft and most of the chamber of Tomb B.9 was filled with successive layers of naturally deposited silt and sand along with episodes of dumping (or tomb disturbance). Locus B.9:3, a largely naturally deposited stratum, contained a large amount of well-preserved ceramics that likely came from dumping activity. The lowest naturally deposited silt and sand layers overlay a series of *ca* 30cm-deep and 15cm-wide channels cut into the floor of the chamber (**Figs. 2-4**), evidence of the 'trench and wedge' quarrying technique identified at other locations in Petra (Rababeh 2005: 59-65). Thus, construction of B.9 stopped for unknown reasons, with approximately 40cm left to remove to match the floor level of Tomb B.7.



2. Floor plans of B.7 (excavated in 2014) and B.9 (excavated in 2016) showing the 'trench and wedge' channels remaining in the floor of B.9.



3. Openings from Tomb B.9 into to Tomb B.7 (excavated in 2014) and floor channels.



4. Floor of B.9 chamber showing 'channels'.

Area F Tombs

Another research question addressed in 2016 was whether or not tombs outside Petra's early 2nd century AD city wall continued in use after its construction. All of the tombs in Area B clearly went of use in the late 1st/early 2nd centuries AD, contemporary with the wall's construction. Two tombs (F.1 and F.2) were excavated outside the city wall in newly designated Area F, situated on the southern side of Wādī at-Turkmāniyyah, on the northern slope of the North Ridge (**Fig. 5**).

Tomb F.1

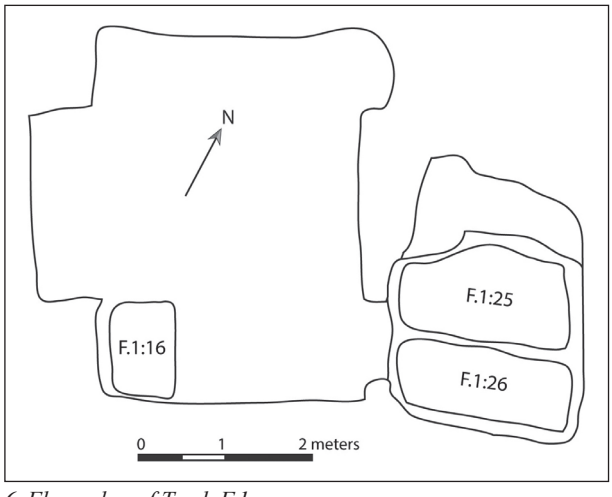
This is a large tomb containing a main central chamber along with a back chamber separated by a section of friable sandstone (**Fig. 6**). Similar to other tombs at Petra, the chamber had been filled for most of its history by natural fluvial and aeolian deposits. The undisturbed nature of fine striae representing these deposits

suggests that the tomb had been undisturbed in recent history, a supposition also confirmed by the lack of human skeletal material in any of the chamber fill. However, some lower layers contain elements that indicate the tomb was not only left open, but had experienced some human activity after its mortuary use (**Fig. 7**). Two naturally deposited strata contained the articulated skeletons of dogs, two *ca* 50cm above the chamber floor, and another - a puppy - *ca* 20cm above the chamber floor. The first two dogs were found in association with one complete and another nearly complete Late Roman cooking pots. Associated with the third dog was a complete iron sword that extended from the shaft into the chamber, sitting upon *ca* 20cm of sand. This sword (RO# 1746) has been tentatively identified as a *spatha*, a sword from the Late Roman period. Why and how this object ended up within the tomb remains a mystery, but clearly it is not associated with the earlier mortuary activities in the tomb. It also is not clear whether the dogs fell into the tomb and died there, or were placed there postmortem by humans. However, dog skeletons were found in abundance in Tomb B.7 in 2014, and more articulated dog skeletons were found associated with mortuary features of Tomb F.1.

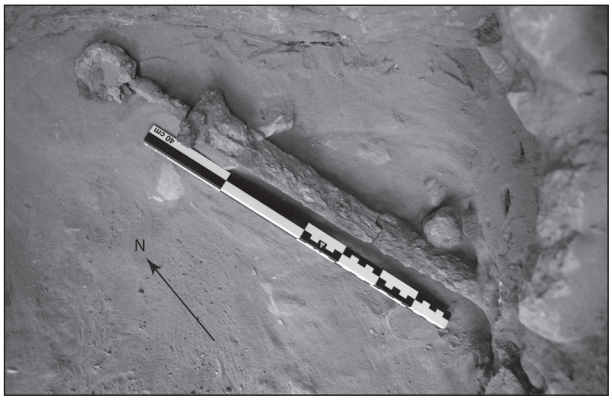
Tomb F.1 had two main areas for the disposal of human bodies. The first was a rectangular floor shaft in the northwestern portion of the chamber (Locus 16), with the second consisting of two floor shaft graves in the chamber's back room (Loci 24 and 25). The Locus 16 shaft contained successive layers from which were recovered the commingled remains of at least ten individuals intermixed with items for personal adornment (earrings; rings; beads), complete lamps and other ceramic objects, such as a hand-molded camel vessel (RO# 2187) (**Fig. 8**).



5. Area F showing Tombs F.1 to the left and F.2 to the right (view to the southwest).



6. Floor plan of Tomb F.1.



7. The Late Roman spatha in situ in the tomb shaft; note the sword extends into the chamber baulk.



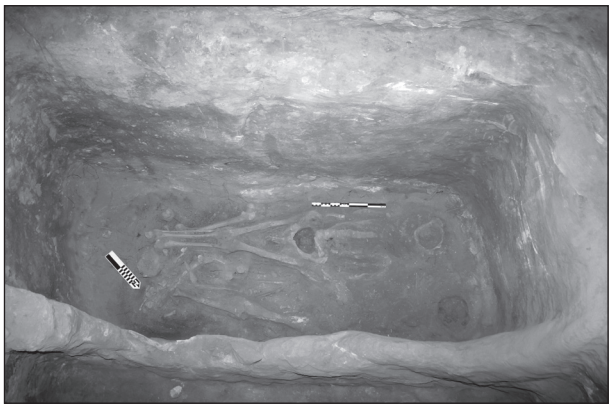
8. Commingled remains in Locus 16 of Tomb F.1 with gold earring in situ (indicated by arrow).

The two shaft graves, Loci 24 and 25, in the back of the tomb had originally been covered with capstones that had since fallen into the two graves, likely due to the collapse of the friable sandstone separating the two (**Fig. 9**). Underneath capstones in both Loci 24 and 25 were dog skeletons that in turn overlay human burials. In this case, the provenance of the dogs is less clear, and their position under the capstones suggests they may have been purposive. The eastern floor shaft grave (Locus 24) contained the commingled remains of at least four individuals intermixed with artifacts including disintegrating wood, nails and decorative studs, all indicative of a coffin.

The western floor shaft grave (Locus 25) contained three successive articulated burials (**Fig. 10**). A seven- to nine-year-old child (Individual #3) was placed first in the grave, followed by an adult of ambiguous sex (Individual #2) and an older adult female (Individual #1). Portions of Individual #2 were displaced by the placement of Individual #1 in the grave. There were a few items such as beads and possible earrings found within these floor shaft graves. All evidence from the tomb suggests that it was in use for mortuary purposes during the 1st century AD, and remained a place for the disposal of items (*e.g.* the *spatha*; dead dogs) until at least the 4th century.



9. Fallen capstones over grave shafts F.1:24 and F.1:25 in Tomb F.1.



10. The multiple articulated burials in Locus 25 in Tomb F.1.

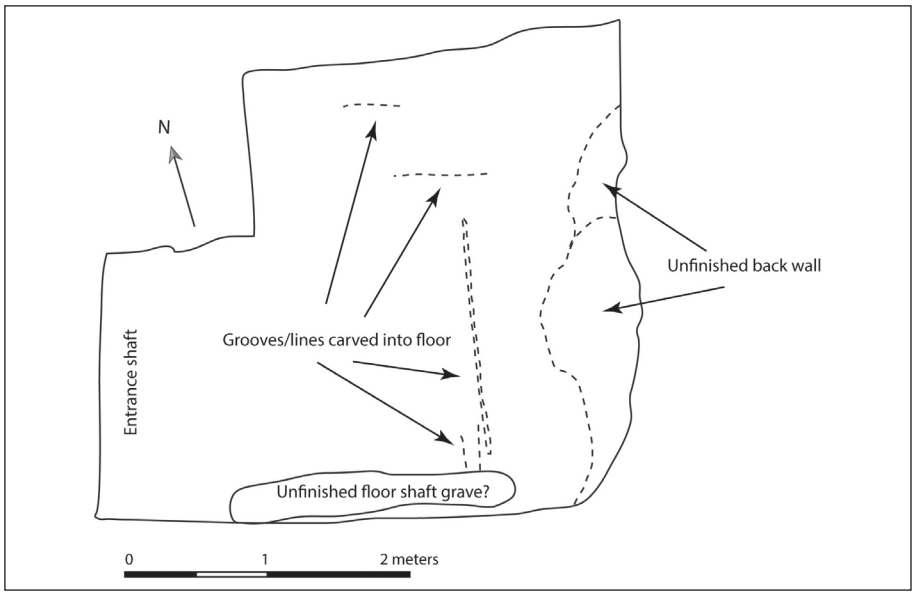


11. Tomb F.2 shaft along with the water channel and small rock-cut basin.

Tomb F.2

The second tomb explored in Area F was located on a bedrock outcrop just below Tomb F.1. The shaped bedrock plateau into which the tomb shaft was carved contained a water channel for diversion of runoff from the chamber opening, in addition to a small rectangular basin (**Fig. 11**). Similar to the other two tombs excavated this season, the shaft and chamber in Tomb F.2 was filled primarily with naturally deposited strata, with two strata (Loci 4 and 20) showing turbation and a pit feature that may be evidence of human intrusion within the tomb. These disturbed layers yielded the majority of artifacts from this tomb.

Removal of the chamber fill revealed numerous etchings and grooves carved into the floor and wall of the tomb chamber, and a narrow channel (Locus 28) running along the western chamber wall (**Fig. 12**). Nine hand bones and two leg-bone fragments, the only human skeletal material from this tomb, were found within this channel. Likely these were accidental intrusions into the tomb. The grooves (which seem to mark out the placement of future mortuary features), channel (which has an unfinished/uneven edge) and an unfinished back corner indicate that this tomb was never completely constructed, and for unknown reasons was abandoned before being used for mortuary purposes.



12. Floor plan of Tomb F.2 showing the grooves and etchings possibly indicating later funerary features and the possibly incomplete floor shaft grave.

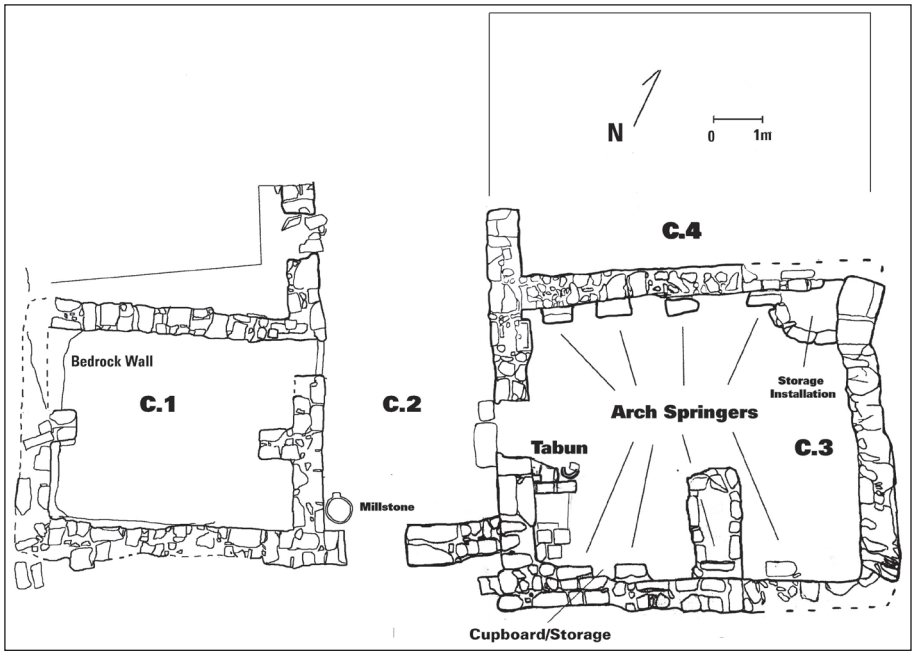
This could indicate that the family who commissioned the tomb decided not to complete the project for monetary or other reasons, or that these shaft-chamber tombs in Petra were produced *en masse* and then sold to local residents. The developer might also have run out of money or lost a consumer base in Petra, and was thereby dissuaded from finishing the tomb.

Domestic Contexts: Areas C and E

Area C

The success in Area B in 2012 in investigating non-elite residential structures led us to explore the neighborhood further in 2014. To this end, an area with visible wall lines southwest of Area B was selected for excavation as Area C (**Fig. 13**). The ultimate goal in this area was to expose the entire horizontal layout of a single, non-elite domestic structure and, in so doing, contribute to the limited knowledge of Petra's non-elite population as well as domestic architecture in Nabataea generally and Petra specifically, both areas of relative scholarly neglect (Parker 2016).

In 2014 four trenches (C.1, C.2, C.3 and C.4) were laid out side-by-side. Excavation of the structure from topsoil to bedrock in C.1-3 revealed scant Early Roman/Nabataean remains in small pockets directly overlying bedrock in two of the three trenches, suggesting that at



13. Plan of Area C: the Late Roman house.

least some, if not all, of the Area C domestic complex was initially constructed in the Early Roman/Nabataean period. However, subsequent analysis (including a coin dated 113-114 from the first occupation overlying the lowest floor in C.1) now suggests that the complex was more likely founded in the early 2nd century, *i.e.* right after the Roman annexation of AD 106. The complex was remodeled during later occupation and went out of use after suffering significant damage, presumably in the 363 earthquake. Subsequent collapse and abandonment debris accumulation filled the rooms of the complex to the modern ground level.

Excavation continued in Area C in 2016 in order to complete clearance of the balks left within rooms C.1 and C.3 to recover more occupational evidence. The complex was entered via a doorway in C.2 through a common southern wall shared by all three spaces (**Fig. 14**). From the C.2 central space, doorways in its west and east walls gave access into rooms C.1 and C.3, respectively. In 2016 we also continued to excavate C.4 and extended trench C.2 northward to determine if an east-wall wall closed off access to C.2 to the north. Such a wall would have made this central space a courtyard, whereas its absence would rather suggest that C.2 was in fact a central corridor between rooms C.1 and C.3.

Excavation in C.1 (*ca* 4m E-W × 3m N-S) completed removal of its eastern balk, exposing a pier serving as an arch springer in the middle of its east wall, corresponding to that projecting from its west wall discovered in 2014 (**Fig. 15**). This west wall incorporates bedrock rising upslope to the north, thus reducing the number of stones in each course as the bedrock rises towards the north. The northwest corner of the room is formed by its north wall abutting the bedrock extension of the west wall. Excavation also exposed the doorway giving access to the room from the C.2 corridor. Some walls in C.1 preserved plaster along portions of their faces. An oven built against the north wall and associated artifacts excavated in 2014 clearly suggested the domestic function of this room.

Excavation in both C.4 and in the northern extension of C.2 failed to find any such east-west wall, suggesting that C.2 in fact served as a central corridor rather than as an enclosed courtyard for the complex. But excavation also revealed another doorway in the western wall of C.2, north of C.1, suggesting the presence of another room farther up the slope of the ridge



14. The central corridor (C.2) at the end of excavation in 2016. Near the southern entrance to the complex is a basalt grinder visible near the top of the photo. Also visible are the doorways from the corridor into the C.3 room (on the left) and C.1 room (on the right). At lower right are stone steps leading to a doorway into a third room (unexcavated). View to south.



15. The C.1 room after complete excavation. The newly exposed pier on the east wall (seen on the left of the photograph) corresponds to the matching western pier on the right (exposed in 2014). The entrance to the C.2 corridor is visible at the lower left of the photograph. View to west.

(**Fig. 13**). However, there was too little time to investigate this room, which was choked with tumble like all other spaces within and without the complex.

Under the massive tumble in the eastern balk of trench C.1 was an occupation layer resting over a beaten-earth floor which appears patchily across the room. The primary occupation level was covered by *ca* 0.20m of leveling fill below *ca* 0.20m of Late Roman occupation horizon. Both earth *loci* contained material dating to the early Late Roman period.

Previous excavation in 2014 of the room in trench C.3 yielded Late Roman artifacts at its lowest levels. Its architectural features include a plastered niche in the south wall. The niche, apparently a cupboard, was constructed between two plastered piers that served as arch springers. The cupboard includes ceramic tiles plastered into the sides for three shelves. It was clearly used right up until the destruction of the room, based on a 4th-century cooking pot found nearby which had apparently fallen from one of the shelves in the final destruction.

Excavation in C.3 in 2016 included removal of its western balk and the extension of the trench to its eastern wall to facilitate complete clearance of the entire room. Excavation this season revealed two additional sets of arch springers (giving a total of four sets) that once spanned the room from north to south (**Fig. 16**). The entire C.3 room was thus much larger than that in C.1.

Excavation also revealed a curved wall built against the northeast corner of the room, apparently serving as a storage installation (**Fig. 17**). In the southwest corner of the room, another storage installation, floored with ceramic tiles, was located against the west wall. Just to the north of this installation was an oven (*tannur*), comprised of three ceramic jars placed upside down with their original lower body removed and then one set inside another. The oven was filled with ash which was removed for flotation analysis (**Fig. 18**).

As seen in C.1, a thin layer of soil, patchily preserved, had been laid over bedrock within this room. Overlying this original floor was a sequence of thin occupation layers, the latest pottery from which was early Late Roman (2nd century). Occupation continued through the 3rd and early 4th centuries, ending once again with massive deposits of tumble, likely from the 363 earthquake. However, it appeared that one or more of the arch springers in this room stood for some time after the seismic event, as



16. The C.3 room after complete excavation. The four arch springers are visible against the north wall in the top of the photo. The doorway giving access to the central corridor (C.2) is visible on the left. View to north.



17. Storage installation in northeast corner of room C.3. Its walls rested on bedrock. The plastered face of the room's east wall is visible above the meter stick. View to NE.



18. The oven (tannur) composed of three nested ceramic jars is visible right above the smaller meter stick. The larger meter stick rests on a wall which separates a bench (to right of the oven) and a storage installation (behind wall). The cupboard with ceramic shelving exposed in 2014 is visible in the upper left of the photograph, all in room C.3.

the western portion of the room witnessed some squatter occupation within the ruins followed by significant evidence of dumping within the room, all still within the late 4th century.

Finally, excavation continued in trench C.4 in 2016 as work in 2014 had not completed removal of the overlying tumble. Again, the primary goal was to locate the northern end of the building. Complete removal of the tumble (again dated by associated pottery to the mid- to late 4th century) revealed two soil layers of apparently natural accumulation, along with a round stone press and a few other artifacts, overlying bedrock (**Figs. 19-20**). The evidence suggested that this was an exterior space outside the domestic complex.

Overall, it appears that the Area C domestic complex was built early in the Late Roman period, *i.e.* the early 2nd century, with occupation extending - at least in some areas - to the mid- to late 4th century. An area-wide deposit of dense architectural collapse debris suggests that, like the domestic structure excavated in Area B in 2012, the complex in Area C was destroyed in an earthquake, likely the well-documented seismic event of 363.

Area E

In an attempt to find possible Nabataean domestic structures outside (*i.e.* north) of the city wall, Area E was opened this season (see **Fig. 1**). To get a clear image of the different features visible on the surface, we first cleared the vegetation from the surface. We then conducted a LiDAR scan and photogrammetry of the entire area. This revealed a series of walls running E-W but no cross walls extending N-S. We thus opened three excavation trenches (E.1-3) laid out north of the city wall in an area with several visible E-W wall lines. Trenches E.1 and E.2 were laid out immediately adjacent to one another. Both E.1 and E.2 originally measured 7.5m N-S×2m E-W, separated by a 2m baulk. This common baulk was later removed in order to elucidate architectural features between the two trenches. Just to the west was trench E.3, which measured 5×5m.

Additional architecture, including several N-S walls, began to appear immediately after removal of topsoil (**Fig. 21**). The first stratum under topsoil consisted of a series of ashy soil layers, probably the result of periodic episodes of dumping. Apart from a few modern and obviously intrusive artifacts, the latest pottery from these layers was uniformly Early Byzantine, primarily 4th century. The ashy deposits were especially thick in the southern sector of trench E.1.

Removal of the dump layers revealed a complex series of walls and other architectural features in all three trenches. The southern end of trench E.1 contained a well-preserved hypocaust system with about a dozen columns (*pillae*) still *in situ* (**Fig. 22**). The *pillae* were constructed of ceramic tiles of varying shapes and sizes (round, rectangular and square). The *pillae* rested on a tile sub-floor. The original elevated floor was not preserved but was likely also composed of flat ceramic tiles. Built into the western wall was an *exedra*. The hypocaust room was entered through a doorway in the northern wall and formed part of a bath.

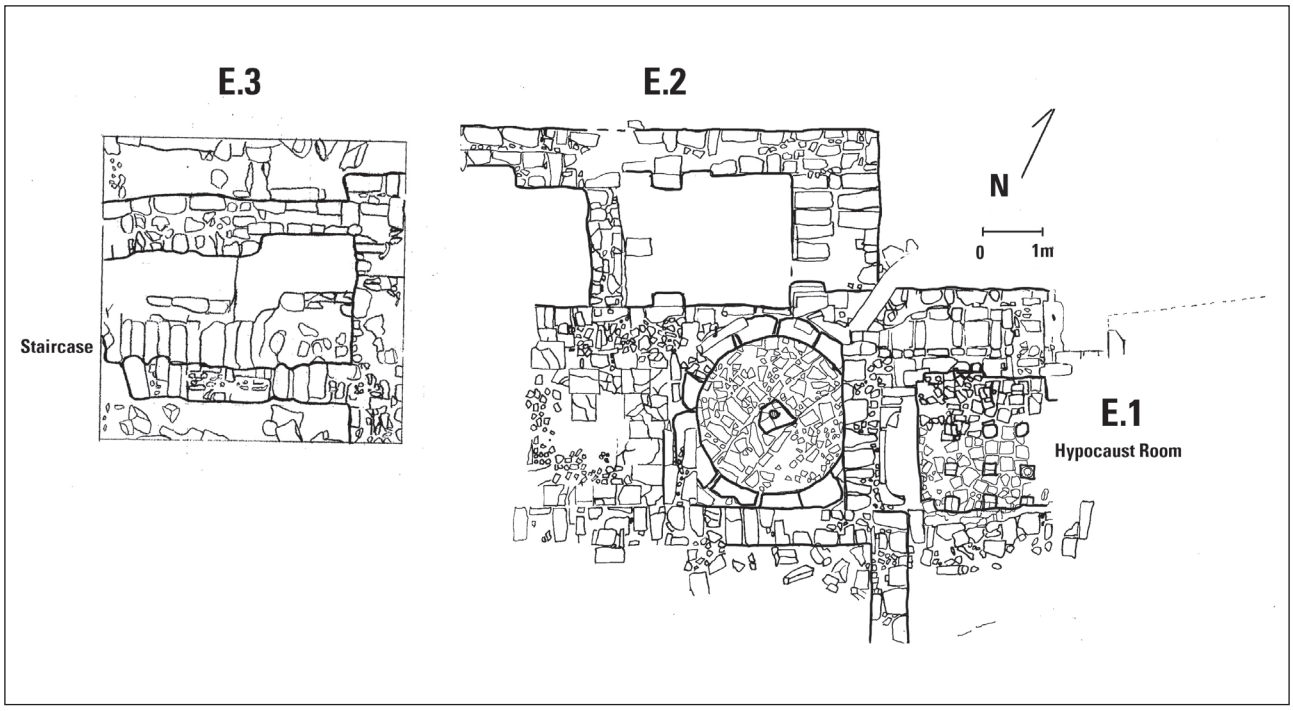
Immediately adjacent to and west of the



19. Trench C.4 at the end of excavation. Note the massive tumble in the balk on the left of the photograph, which almost completely filled this trench. The western wall of the corridor which extends into trench C.2 is visible on the right of the photograph. View to south.



20. Sandstone press (found upside down in situ) in trench C.4.



21. Plan of Area E.

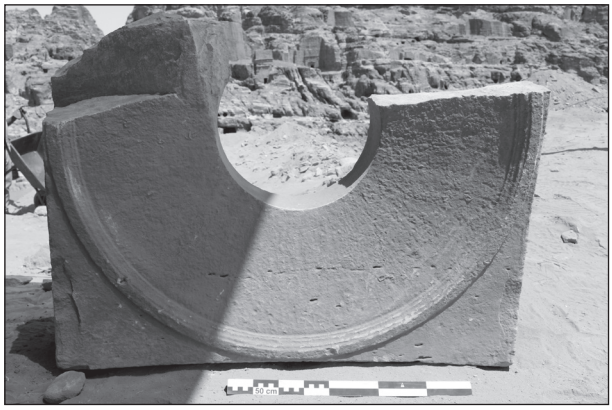


22. Bath of Area E; the hypocaust room is visible in the foreground with its exedra in the center of the photo. The circular structure (possible laconicum) is visible near the top of the image. View to west.

hypocaust room was another room in trench E.2 which enclosed a circular wall built over a flagstone pavement. In the center of the room was a small hole, apparently opening into a drain which extended from SW to NE under the pavement. The drain emptied into a space just north of the hypocaust room in trench E.1. The soil excavated around the exit of the drain contained an unusually large number of sherds of ceramic *unguentaria* or perfume bottles. The circular structure in E.2 is tentatively identified as a *laconicum*, or dry sweating room of the bath. The discovery just outside the room of a large limestone block with a portion of a circular hole suggested that the room might have been covered by a conical roof with a circular opening (*oculus)* at the top (**Fig. 23**).

The northern sectors of trenches E.1 and E.2 were choked with large architectural blocks with evidence of collapsed arches, possibly once supporting the roof of a *cryptoporticus*, a covered corridor or passageway, although this must be confirmed by further excavation. Excavation failed to reach the bottom of this space in either E.1 or E.2 by season's end. The latest pottery from these tumble layers was also Early Byzantine.

To the west in trench E.3, exposure of walls revealed one central space (a room or passageway?)



23. Carved architectural fragment possibly once serving as an oculus in the roof of the putative laconicum in trench E.2. The stone was recovered from the adjacent trench (E.1).

and portions of two other rooms to the north and south (**Fig. 24**). Excavation of the central space revealed at its deepest level a cobble floor built directly over bedrock. Rising from this floor and built against the southern wall of this room was a stone staircase, completely preserved with five treads at its lower levels but with only its foundation of mortared rubble at higher levels. The staircase rose from west to east and likely continued into trench E.2 but this could not be confirmed without further excavation.

The complex appears to have been established in the 1st century AD. The style of architecture, richly painted frescoes, marble used as pavers and/or wall facades, hypocaust room and possible *laconicum* all suggest a non-elite function, perhaps as a *villa urbana* such as that atop az-Zanṭūr to the south of and overlooking the city center.

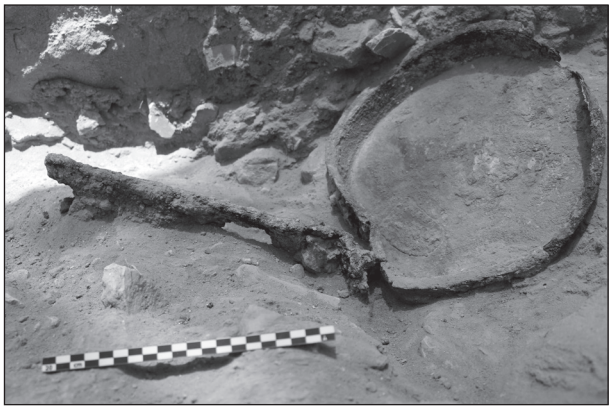
The complex was abandoned in the early 2nd century, *i.e.* the beginning of the Late Roman period. It is tempting to associate this abandonment with the construction of the city wall, which lies just to the south of Area E, in this same period. The abandonment seems to have lasted until the early 4th century, when portions of the complex were reoccupied and some new walls and other structures were built. This occupation ended in the late 4th century with evidence of architectural collapse, probably the earthquake of 363. The complex then witnessed extensive dumping, including two marble statues of Aphrodite (fragmentary but largely restorable [**Fig. 25]**), several metal artifacts (*e.g.* a bronze frying pan with its lid and iron handle [**Fig. 26]**) and 44 bronze coins. The latest coin dated to *ca* AD 367-383,



24. The staircase in trench E.3 is visible in the center of the image, flanked by two of the E-W walls. The cobble floor (laid directly over bedrock) is visible to the right of the stairs. View to west.



25. Two fragmentary marble statues of Aphrodite in situ, recovered from trench E.3. View to west.



26. Bronze frying pan from trench E.3 with its iron handle visible on the left side of the image.

providing a crucial *terminus post quem* for the deposition of the marble statues and other associated artifacts. There seems to have been no later occupation of the area.

Historical Conclusions

The 2016 season yielded more evidence of the Nabataean cemetery on the North Ridge,

which seems to have been in use primarily in the 1st centuries BC and AD. This period also witnessed construction of a more substantial complex, including a bath, which may be tentatively identified as a *villa urbana.* All these structures and the cemetery seem to have gone out of use around the turn of the 2nd century, about the same time as the construction of the city wall. The dating evidence currently available does not permit any closer dating, *i.e.* whether the city wall was erected by the Nabataeans just prior to the Roman annexation of AD 106 in an ultimately futile attempt to defend their capital or was constructed soon afterwards by the Romans themselves (Parker 2015). In either case, the city was now under Roman law which typically forbade interment of the dead within the city boundaries. This might explain the abandonment of the cemetery about this time. The domestic complexes previously revealed in Areas A and D, which were cut through by the city wall, were never reoccupied. But the domestic complexes in Areas B and C, both apparently founded soon after the Roman annexation of 106, continued to flourish through the 2nd and 3rd centuries and well into the 4th century. The Area E complex (the former *villa urbana*?) appears to have been reoccupied in the early to mid-4th century. A catastrophic destruction, likely explained by the 363 earthquake, ended occupation in both Areas B and E. Some limited occupation seems to have continued within one room of the Area C house for a little longer. Otherwise there appears to have been little subsequent occupation of any of these areas in the later Byzantine period, despite the well-documented complex of churches not far to the west on the ridge.

Post-Excavation Conservation / Protection Measures

This project is acutely aware of the need for protection and conservation of Jordan's cultural heritage, particularly the structures and features within the heavily-trafficked site of Petra. To that end, we backfilled excavation trenches 50-100% full to preserve the revealed structures by using dumps from these excavation areas, with the future goal of consolidation of the structures and appropriate signage to make them meaningful to visitors. Tombs B.9, F.1 and F.2 were completely backfilled using their own soil dumps, removing these features from the site.

Acknowledgements

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DOCUMENTATION OF ‘AYN SĀLIM NEAR THE ESBUS-LIVIAS ROAD

Mohammed Waheeb

Introduction

‘Ayn Sālim is located on the western slopes of Mādabā, with its nearby springs, the *tall*, the Roman road (Esbus-Jericho) and its watchtowers. The site disappeared from the pages of history after the Arab conquest in 636AD, after which no more pilgrims visited this ‘Ayn Nūn (Aenon) east of the Jordan river, adjacent to the southern bank of Wādī Ḥisbān and immediately north of the lower part of the famous Roman road.

Archaeological survey and excavations by the Department of Antiquities (DoA) of Jordan during 2001 revealed the presence of new architectural remains dated to the Iron Age II, Roman and Byzantine periods, as well as pottery sherds, grinding stones and white mosaic fragments scattered over a flat area of 10 acres on the way from the site of Jesus’s baptism up to Mount Nebo on the western slopes of Mādabā (MMC 1897).

Field Operations

There are a number of traditions that help us to identify ‘Ayn Nūn (Aenon) and Sālīm (Salem). One of these locates ‘Ayn Nūn on the eastern bank of the Jordan river, since we know from John 1:28 that John the Baptist was active in this region. Support for this comes from the Mādabā mosaic map, which has an ‘Ayn Nūn (Aenon) just northeast of the Dead Sea. “Aenon, where now is Sapsaphas” identifies with Wādī al-Kharrār, the place where recent archaeological explorations have found extensive early Roman-Byzantine remains in the Jordan valley, on the eastern side of the Jordan river, which have been dated to the period of John the Baptist (Waheeb 1998a, 1998b, 1999a, 1999b, 2002a, 2002b).

Another tradition locates Aenon in the northern Jordan valley, on the west bank some eight miles south of Scythopolis (Bethshan). Eusebius (265-340) places “Aenon where John baptized” eight miles south of Scythopolis, near Salem and the Jordan (Onomasticon 1904: 40; Joseph 1987). He lists various places in Palestine under the name Salem (Genesis 14:18). Only the first words of his text remain to us, but according to Procopius, who quotes him, he knew of “another village called Sālim in the plain of Scythopolis. It was called Salumias” (Onomasticon 1904: 152, Note 4).

Jerome translated Eusebius’s text concerning Sālim literally into Latin. He translates the words missing from the Greek text available to us as Procopius does, but adds once more the distance from Scythopolis: eight miles. About 390AD, he regarded Jerusalem as the Salem of Melchisedech. Then, in 398AD, he changed his mind and said: “Salem is a town near Scythopolis and it is still called Sālim. There they show you the palace of Melchisedech, the vast ruins of which indicate how splendid the old building must have been” (Ep. 73: CSEL LV 20 f; Ep. 108, 9 CSEL LV 314 [Here he thinks erroneously, in the year 404, that Jerusalem was at first called Jebus and then later Salem, This does not constitute a retreat to his former line of argument; he simply wishes to leave the city with this name, and now takes the residence of Melchisedech to be Scythopolis]). In those days the place was called Salumias, and also Salem. Such double names are not uncommon (Kopp 1963).

The evidence of the *Chronica* of 334AD is important because it is independent of Eusebius. According to this, Scythopolis is situated



1. Map showing the location of holy sites east of the Jordan river near Ain Salem.

"near the town of Salem where Melchisedech, priest of the most high God, reigned". Aenon is not mentioned but, along with the nearby Salem, was part of the territory of Scythopolis.

Egeria appears to have visited a place called Aenon: "Then I remembered that according to the Bible it was near Salem that holy John baptized at Aenon. There was a kind of pool in front of the spring at which it appears holy John Baptist exercised his ministry of Baptism" (Wilkinson 1977: 127, 1981). Egeria again separates Salem from the springs by a mere two hundred paces. At the top of the hill she found a church, while at the foot of the hill she saw the ruins of Melchisedech's palace. However, according to Holscher (1910: 24), Egeria's indication of distance did not agree.

Antoninus Martyr, after his description of the eastern side of the Jordan river in 570AD, states: "and near there is a city which is named Salamaida [he refers to Livias where al-Kafrayn and ar-Rāmah villages are situated]. In this place are hot baths which are called the bath of Moses (Tall al-Ḥammām) where also lepers are cleansed. And there is a fountain of very sweet water which is drunk as a cathartic and heals many sicknesses" (Antoninus 1896: 9).

Antoninus described the holy places close to the eastern bank of the Jordan in much more detail than any of the earlier pilgrims. The city of Salamaida was located at al-Kafrayn, which is around 500 meters north of 'Ayn Sālim on the eastern side of Jordan river. Without any tangible evidence supporting his claim, Tobler tentatively identifies Salamaida - which he takes to be a compound of Salem and Amatha - with Salem near Enon. The hot baths (that is to say the so-called bath of Moses) were identified with the pool of hot sulphurous water at Tall al-Ḥammām in the same area, north of 'Ayn Sālim and east al-Kafrayn village on the eastern side of the Jordan river. This is the same place which Picirillo connect with Livias, the plains where the hot baths known as Livias or Julias during the Roman period were located (Picirillo 1978, 1996).

Theodosius fixed the location of the baths, saying the city of Livias lies beyond the Jordan

twelve miles from Jericho, and that "[i]n this Livias Moses struck the rock with his rod, and the waters flowed out. Thence emerges a rather large stream which irrigates the whole Livias... there are the warm waters where Moses bathed, and in these warm waters lepers are cleansed".

The *Chronicon Paschale* (631-641AD) has Abraham crossing the Jordan after conquering the kings of the east at Damascus. Melchisedech greeted him there, for God had called him on account of his holiness "into the land beyond Jordan, to the town Salem, which I saw" (Kopp 1963:). The 'land beyond Jordan', means the west bank, for Abraham was coming from the east.

Later Albright investigated the hill near Salem and concluded the following: "The absence of Roman pottery proves that it is wrong to identify Tall ar-Ridra with Salumias of Eusebius or the Salem of John" (Albright 1895: 509). Albright suggests Umm al-ʻAmān to the south-east of ʻAyn ad-Dayr as the place of Aenon. Larange later found some ruins there, with a marble pillar (Albright 1895: 509) but no conclusive evidence.

Field Documentation

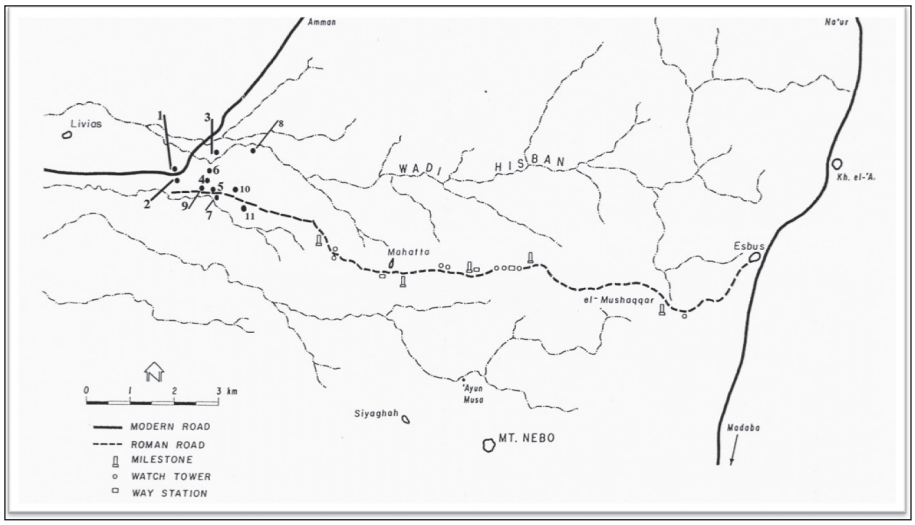
Turning again to the eastern side of the Jordan river, where two seasons of survey and excavation conducted by a DoA team between 2001 and 2002 - and more recent analyses of the excavated materials - have revealed architectural remains in several locations in the ʻAyn Sālim area just 6km east of the traditional Jordan river baptism site. The discovered remains dated from 900 BC to the 7th century AD [The excavations were conducted by the Department of Antiquities of Jordan and were headed by the author of this article. The survey covered the spring of Ain Salem and approximately 6 km2 of the surrounding area, including the lower parts of Wādī Ḥisbān as well as the Esbus-Jericho Roman road and Livias plains (modern villages of al-Kafrayn and ar-Rāmah)]. They had close links with the major site of Jesus's baptism near Wādī al-Kharrār, where identical material was found at the Maqbarat al-ʻAjājrah site. Nowadays the most visible site in this area east of the Jordan river is Tall ʻAyn Sālim, which stands immediately south of the lower part of Wādī Ḥisbān, close to the paved highway on the stretch of land leading westward to the Dead Sea shoreline. At the point where Wādī Ḥisbān enters the floor of the valley, the area was until 2002 private property, but after that it was subjected to extensive survey and excavation.

Excavations were concentrated on the *tall* (site No 4) and the watchtowers (site Nos 7, 10 and 11). The results revealed the presence of Iron Age II remains, with substantial remnants of human settlement being exposed on the western side of the site. The site was reused during the Roman and Byzantine periods, represented by the discovery of several types of building between ʻAyn Sālim and ʻAyn Sālim al-Fawara, just to the north of the Roman Esbus-Jericho road.

The Iron Age remains occupy the acropolis area of the *tall* and consist of square and rectangular rooms built of undressed limestone blocks. The Roman and Byzantine remains occupied an area of approximately 4 acres (the 'village site') on the flat area to the east of the acropolis. Several water channels were found on the surrounding plains which direct water from the springs to several gardens, agricultural fields and occasional courtyards near the Roman road. In addition, architectural remains occupied the flat areas to the north, on the edge of Wādī Ḥisbān between the above-mentioned two springs. Several caves related to ʻAyn Sālim were found here, some with carved stone steps that have survived until the present day. However, most of these remains have suffered severely from destruction caused by natural and human factors.

The recovered artifacts and details of construction suggest that the channels and water installations date back to the Early Roman period and continued to be used into the late Byzantine and Islamic periods.

Excavations at the adjacent sites (Nos 7, 10 and 11) (**Fig. 2**) yielded quantities of Roman-period pottery mixed with a strong presence of late Byzantine sherds - which relate to the continuation of settlement at ʻAyn Sālim, possibly as a station for pilgrims en route to Mount Nebo. Excavations at the small sites discovered on both sides of the Roman road indicate a function related to a final-usage period in the Byzantine era, possibly as watchtowers to con-



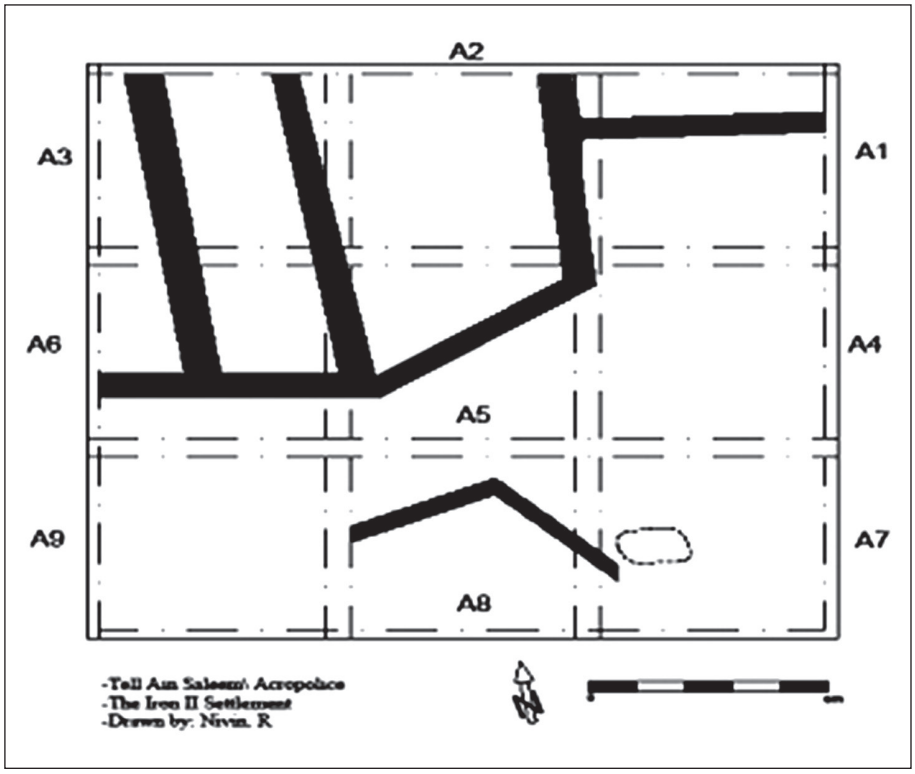
2. Map showing Ain Salem and the surrounding area: (1) Tall Iktanu; (2) Tall Al-Ḥuṣan; (3) Dolmen field; (4) Tall ʻAyn Sālim; (5) ʻAyn Sālim; (6) ʻAyn Sālim Fawara; (7) Watch tower; (8) Walls and canals; (9) Caves; (10) Watch tower; (11) Watch tower.

trol the Roman road and safeguard the pilgrim caravans coming from the west bank and site of Jesus's baptism. These towers have a strong connection with Tall Salem, which might have been used as a pilgrim station during the Byzantine period. In addition, we should take into consideration the well-known site Mahaṭaṭ al-Hujaj ('pilgrims' station') which exists to this day and is situated on top of the high mountain overlooking Ain Salem to the west. This pilgrim station was built 2km to the west, close to Mount Nebo and Moses' springs on the way to Esbus (Hesban).

Conclusion

The place Aenon near to Saleem is situated close to Mount Nebo and Moses' springs, while Mukāwir is not so far from the location where John was beheaded according to the Gospels. Also, Bethany Beyond the Jordan lies to the west of this site. All these sites support the assumed importance of the geographical area east of the Jordan river in the vicinity of the historical Esbus-Livias-Jericho road.

The recovered Iron Age II material and architecture at Tall 'Ayn Sālim gives a clear indication of strong connections with nearby hills



3. Top plan of excavation results at Tall 'Ayn Sālim.



4. Excavations at Tall ʻAyn Sālim (Waheeb 2001).

in the same area such as Tall Habasah, Matabba and ʻIrāq Al-Amīr (Waheeb 2017), which Prag has attributed to the same date.

According to Antoninus, "On that side of Jordan is the fountain where John used to baptize, from it to the Jordan is two miles. In the valley itself Heilas (Elijah) was found, when the raven used to bring him bread and meat. On the side of the valley live a multitude of hermits". Antoninus, among the earlier pilgrims, mentions the spot as Salamaida. In placing it opposite Jericho, he is more in accordance with Josephus, who says that Elijah travelled towards the south, than with old tradition (Antoninus 1896: 40). The name Salamaida was subjected to change and was later replaced by Livias.

As elsewhere on the plain of Livias, surveys and excavations have been carried out here. After leaving Bethany Beyond the Jordan, ʻAyn Sālim became the center of the baptist community for some time.

We do not know how the name was originally pronounced. Salem was the religious name it acquired after the Romans built the road there. Its original name lived on alongside the religious one. With regard to its linguistic root, Salamaida could be derived from Salem. Salamaida may well be a popular variant of this name, transmitted orally.

Early tradition clearly mentioned the Aenon and Salem of John 3: 23 as being in the region of springs lying close to Bethany Beyond the Jordan (John 1: 28). At this place, the voice of one crying in the wilderness must have sounded for a long time in the memories of the people.

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BAYT RĀS TOMB PROJECT

Jehad Haron, Ahmad Lash, Amjad Al-Bataineh and Nizar Al-Adarbeh

Historical Background

The town of Bayt Rās, located in northern Jordan, stands atop ancient Capitolias, one of the ten cities of the Decapolis league listed by Pliny the Elder. The human occupation of the city started in the first century BC (Lenzen 1988) and continued to flourish from the Roman era until modern times. According to numismatic data, the city was founded in 97/98 AD (Bowsher 2011). Many explorers and travelers have documented Bayt Rās over the years, including Seetzen (1806), Burckhardt (1812), Merill (1885), Buckingham (1816), Schumacher (1878-79) and Glueck (1951). Salvage excavations were conducted by the Jordanian Department of Antiquities in 1960 (Bowsher 2011), with surveys and excavations being carried out by Mittman in 1970, Vibert-Guigue in 1981 and Lenzen and McQuitty in 1988; excavations in different parts of the city were conducted by Lenzen between 1985 and 1987. Regular excavations have been carried out by the Department of Antiquities from 2002 onward (al-Shami 2002). The name of Bayt Rās is mentioned in many early Arabic sources, especially from the pre-Islamic and early Islamic periods, likely due to its reputation for producing wine (1983 البكري). In the Umayyad period, Caliph Yazid II lived in Bayt Rās (Lenzen 1992).

Discovery

In 1973 a painted tomb was discovered in the courtyard of the town's secondary school (Zayadine 1976). Close to the same school, another painted tomb was accidentally discovered in November 2016 during mechanical digging work to expand a waste-water sanitation network in the city (**Fig. 1**). The Department of Antiquities took the initiative to preserve this Roman-age hypogeum in cooperation with the USAID SCHEP[1], which provided financial and technical support. An international consortium



1. Site location (Google Maps).

1. SCHEP (Sustainable Cultural Heritage Through Engagement of Local Communities Project), implemented by ACOR (The American Center of Oriental Research) in Amman and funded by the United States Agency for International Development (USAID).

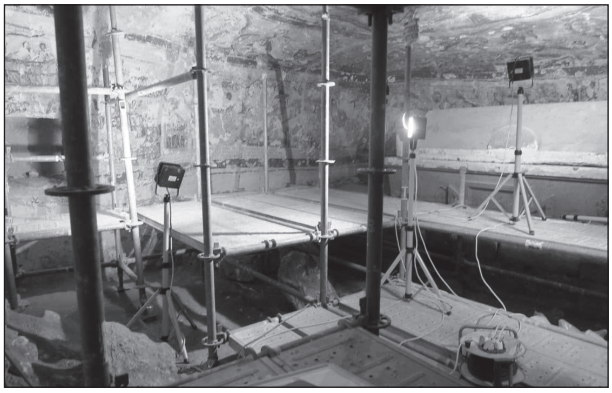
was formed to document and preserve this important discovery in the eastern part of the Capitolias necropolis. The consortium includes the DoA, USAID SCHEP and partners from Italy (ISCR [Istituto Superiore per la Conservazione ed il Restauro]; ISPRA [Istituto Superiore per la Protezione e la Ricerca Ambientale]) and France (CNRS [the French National Center for Scientific Research]; Ifpo [Institut français du Proche-Orient]). The consortium began fieldwork at the site in April 2017.

Site Management and Preventive Conservation

Owing to the accidental discovery of the tomb, it was necessary to take protective and preventive measures to safeguard it from changes to its microclimate after it was opened. The project adhered strictly to international best practice, following guidelines including the ICOMOS Principles for the Preservation and Conservation-Restoration of Wall Paintings (2003) [Ratified by the ICOMOS 14th General Assembly in Victoria Falls, Zimbabwe in 2003] and the Guidelines and Recommendations for the Conservation and Maintenance of Mural Paintings In Subterranean Environments (2015) [Adopted at the UNESCO Expert Workshop on Conservation of Mural Paintings: Access, Research, Conservation, jointly organized by the World Heritage Centre and Rathgen Forschungslabor in close co-operation with the Museum für Asiatische Kunst Berlin and ICOMOS Germany (Museum für Asiatische Kunst, Berlin, 2-4 June 2015)]. The project focused its early efforts on establishing good on-site work conditions for the consortium team members, combined with preventive conservation measures inside and outside the tomb area to ensure effective control and monitoring. The tomb was reopened by assigned DoA team members via the same opening caused by the infrastructure works that had led to its discovery. At the same time, a horizontal metal gate was installed to secure the tomb. As a result of its challenging location in the middle of a street, in front of a school gate, site security was a high priority. The DoA secured two caravans and six guards to safeguard the site and ensure proper monitoring, in addition to erecting fencing.

During the first part of the work in 2017, it was necessary to conduct a structural assessment and diagnostic survey inside the tomb to assess the situation of some observed cracks. This assessment was carried out mainly by Dr. Soizik Bechetoille-Kaczorowski (Conservation Architect, Ifpo); an initial report showed that the cracks were the result of different factors, but that these wouldn't prevent work in the tomb. As a result of this survey and assessment by CNRS, the DoA and ISCR, it was necessary to plan for the installation of a work platform and scaffolding inside the tomb, to protect any mural fragments on the ground until future excavation could be planned. The scaffolding was designed by Dr. Bechetoille-Kaczorowski in partnership with Dr. Mohammad el-Khalili (Conservation Architect, Hashemite University) and Amjad al-Bataineh (Director, DoA Directorate in Irbid). The DoA-assigned team members installed the galvanized scaffolding elements inside the tomb and mounted the platform as it was designed (**Fig**. **2**), thereby enhancing accessibility inside the tomb. In addition, the project installed humidity- and heat-monitoring devices to ensure proper monitoring of microclimatic conditions and reported them regularly to the conservation team.

In a later stage the project took additional mitigation measures, including closure of the school gate in co-operation with the Ministry of Education, to overcome the problem of cars passing over the hypogeum. The DoA also supported the installation of a surveillance system to enhance full monitoring and control. Based on a recommendation from the ISCR conservation experts, a light metal preventive shelter was installed to enhance control of humidity that could cause inappropriate microclimatic



2. Installation of scaffolding, July 2017 (C. Vibert-Guigue, CNRS-ENS-PSL).

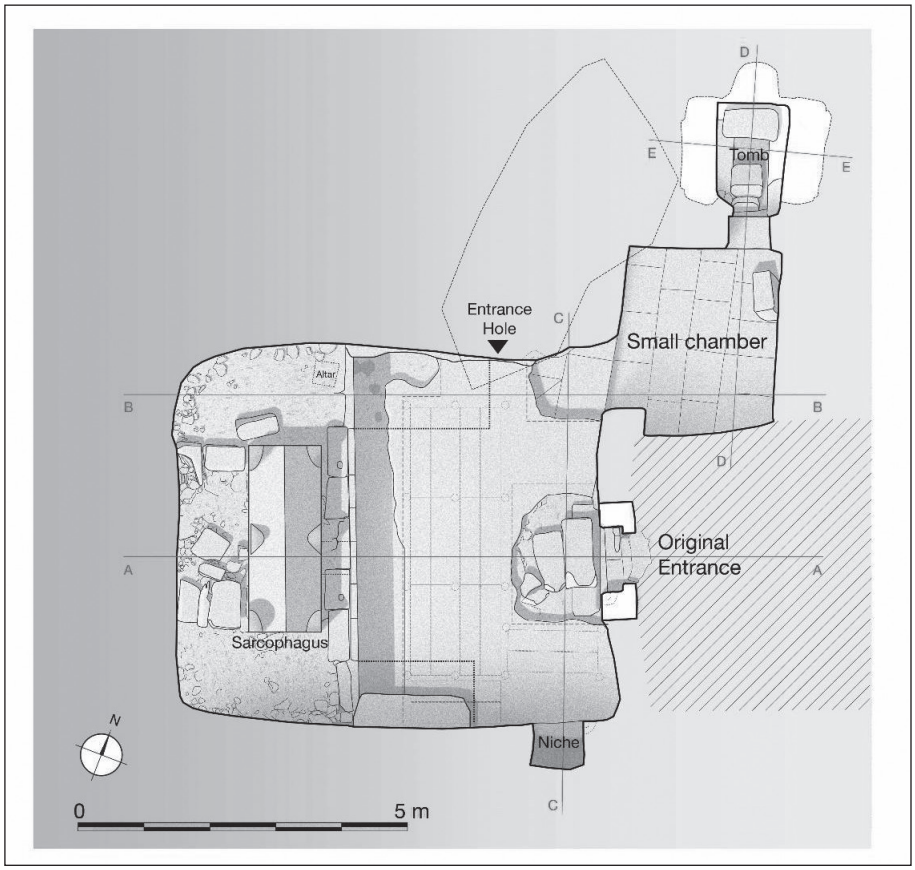
conditions, deterioration and biological attacks, especially during the missions' work periods. The cover was designed by DoA staff with SCHEP-team involvement.

Architectural Description of the Hypogeum Plan

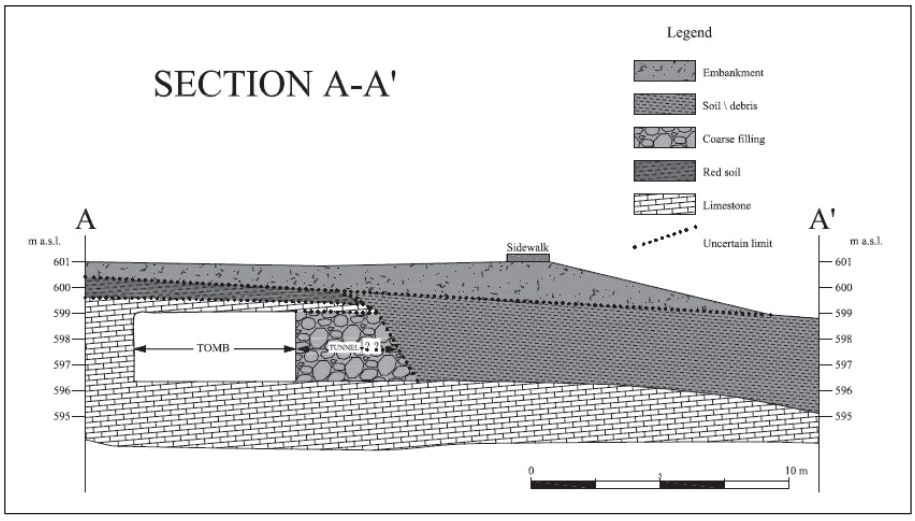
The hypogeum is carved into limestone bedrock, oriented approximately to the cardinal points (**Fig. 3**). It is in three parts. First, a painted room (I) which measures *ca* 6.7×5.7m. The floor is covered with an archaeological deposit composed of silty soil (mostly infiltrated by rain water) and stone elements, but likely also containing several smaller fragments of the wall paintings which have fallen from the ceiling over time, as well as other archaeological items connected with the use of this structure. A huge basalt sarcophagus was installed in the western part of the hypogeum, surrounded by masonry preserved as a platform. Here, some wall-painting fragments, pottery sherds (a kind of clepsydra) and an altar were carefully recorded. At its highest point, the ceiling rises *ca* 2.5m above this archaeological fill. Second, a narrow opening in the northeast corner of the painted room (I) leads to a smaller, square-plan room (II). Less high, it is covered with white plaster. Third, the north wall presents an opening giving access to a burial space (III). Rough masonry is employed for the door jambs and a larger hewn stone forms the lintel. Another stone is placed upon this element to close the gap between the lintel and the upper edge of the opening.

Geological Formation and Stability

Geophysical and geotechnical surveys were conducted by ISPRA [Istituto Superiore per la Protezione e la Ricerca Ambientale, special thanks to Eng. Giuseppe Delmonaco for the study] in two distinct phases of work. The area of the tomb and surrounding sites (particularly the nearby elementary school and Roman theatre) were investigated. A geophysical investigation - coupled with ground-penetrating radar (GPR) and geotechnical non-destructive techniques - was initiated in order to: (a) detect potential underground structures around the recently discovered cavity and in neighboring areas; (b) reconstruct the geological and geotechnical characteristics of the site; (c) establish



3. Plan of the hypogeum (Ifpo).



4. Geological section A-A' of the tomb and surrounding areas, oriented SW-NE (ISPRA).

a stability model of the tomb structure; (d) provide recommendations and advice to local authorities for the safe conservation of the tomb (**Fig. 4**).

Excavation inside the Hypogeum

From the moment of discovery, it was agreed to protect the wall paintings inside the tomb from any potentially destructive human or natural factors. Despite the importance of starting immediate archaeological rescue excavations, the decision was made to postpone any activities inside the hypogeum until the documentation and first-aid conservation missions were completed. The first part of the excavation was carried out in September 2018 by an Ifpo team [Ifpo (Institut français du Proche-Orient), thanks to Dr. Dominique Pieri, Dr. Jean-Sylvain Caillou, Eng. Soizik Bechetoille-Kaczorowski, Dr. Chiara Fornace, Dr. Joyce Nassar, Dr. Lucie Bidouze, Aven Al-Qatameen and Lucie Duvignac].

Three trenches were excavated in Room No I during this mission (**Fig. 5**). The first trench focused on the main entrance, the second trench was placed in front of the south part of the masonry wall, and the third by the north part of the same wall, in order to find the rest of the benches and original floor of the first phase. The main excavation targeted Rooms No II and III. As noted above, a small passage in the north wall of Room No II leads to a burial room (Room No III [arcosolia and pit tombs]). Here three depositions were observed (Graves 1 to 3): in the northeastern arcosolium (Grave 1), in the southwest arcosolium (Grave 3) and within the space between these arcosolia (Grave 2).

Grave 1

The fragmentary remains of six individuals were found scattered inside the burial, mixed with rock fragments that fell from the ceiling:

Individual 1 (perinatal, 10 lunar months) represented by the bones of the cranium, the mandible, a fragment of the right scapula, the right humerus, the right ischium, the left neural arches of the atlas and axis, some thoracic and lumbar vertebrae, and some right and left ribs (might belong to either Individual 1 or 2).

Individual 2 (perinatal, 11.1 lunar months) represented by one bone of the base of the cranium, some cervical vertebrae, the left and right clavicles, the left and right humeri, the left ulna, the left and right pubis.

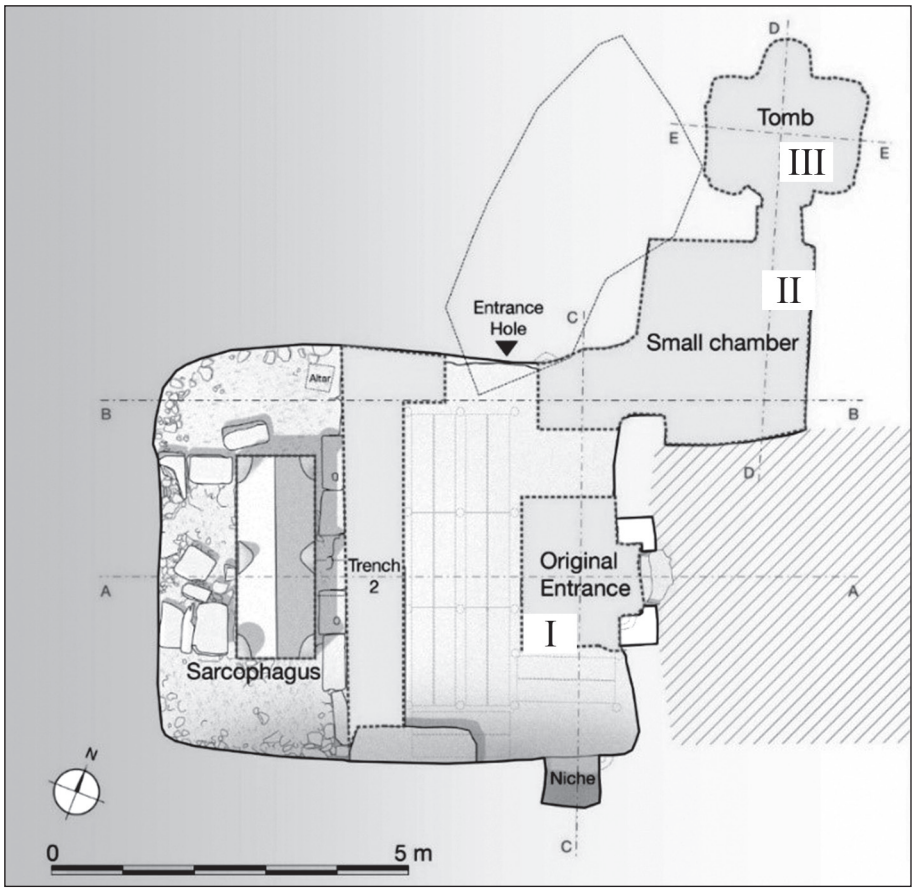
Individual 3 (infant) represented by a fragment of the atlas, the axis and the zygomatic.

Individual 4 (child, age category [1-4], [5-9]) represented by a fragment of the left radius.

Individual 5 (adult) represented by a fragment of the mandible, fragments of the left and right radii, some carpal bones, the 2nd right metacarpal and phalanges of the hands, a fragment of the right fibula, the right navicular bone, and the 3rd right metatarsal and some phalanges of the feet.

Individual 6 (child, age category [5-9], older than Individual 4) represented by some right carpals and the distal epiphysis of the right radius.

A bronze coin and 152 small iron nails were found with the burial remains. The small size of these nails (1cm long; head diameter between 5



5. Plan showing location of the trenches (Ifpo).

and 7mm) suggests that they came from shoes belonging to at least one of the deceased.

Grave 2

The platform between the two arcosolia revealed elements of the remains of four individuals (**Fig. 6**). These were covered by plaster fragments fallen from the ceiling. A terracotta oil lamp and three fragments of a small bone bracelet (most probably belonging to a child) were found with the bones.

Individual 1 (perinatal, 10 lunar months) represented by some cervical, thoracic and sacral vertebrae, and the left and right ischia.

Individual 2 (perinatal, 10 lunar months) represented by some vertebrae, the ribs and the right ischium.

Individual 3 (young child, age category [0]) represented by the left temporal bone.

Individual 4 (young adult under 30 years of age) represented by the left clavicle, two thoracic vertebrae and a 5th right metatarsal.

The Sarcophagus: Anthropological Methodology with Biological Study

The basalt sarcophagus found inside the tomb was studied in detail, drawn and partly documented by photogrammetry. It is distinguished from other contemporary examples by its huge dimensions (284cm long × 108cm



6. View of Grave 2.

wide × 113cm high; the cover is 283cm long × *ca* 110cm wide × 56cm high). The front side of the sarcophagus bears a decoration. Two lion heads are carved in high relief at each end, each holding a ring. A non-inscribed tabula ansata is partially visible in the center. Mouldings are cut on the upper edge and base of the sarcophagus. The other sides are not so well executed. The short sides are roughly carved; pick marks are still apparent. Most of the lower part of the sarcophagus is not apparent but we may posit that, behind, a long panel is carved in relief on the upper part - just under the mouldings - that continues slightly onto the short sides. The cover has the usual gabled form with four acroteria in quarter-round shape at each corner.

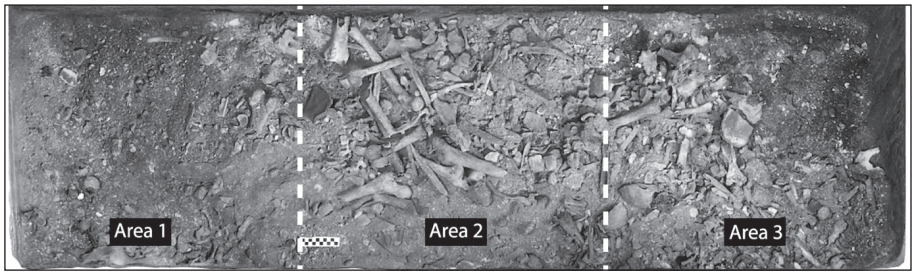
The excavation of the sarcophagus began with recording the state of the deposit (**Fig**. **7**), which consisted almost exclusively of scattered and comingled human remains. Each bone was identified and numbered, with the information corresponding to each bone being recorded on anthropological sheets. All of the other remains - rocks, plaster fragments *etc.* - were gathered and described. Samples were collected from the bottom of the sarcophagus where the remains of fabric and possibly wood were identified **(Fig**. **8**). Each level and zone was documented by photogrammetry.

The small bone elements, microfauna and small artifacts were then isolated. A second inventory of all the bones extracted from the sarcophagus was conducted. The bones were sorted and the minimum number of individuals in each deposit was determined. Different elements were matched to isolate the remains of individuals, and one bone from each individual was sampled for C14 analysis to date each different deposition. Additionally, one petrous bone from each individual was isolated for DNA extraction.

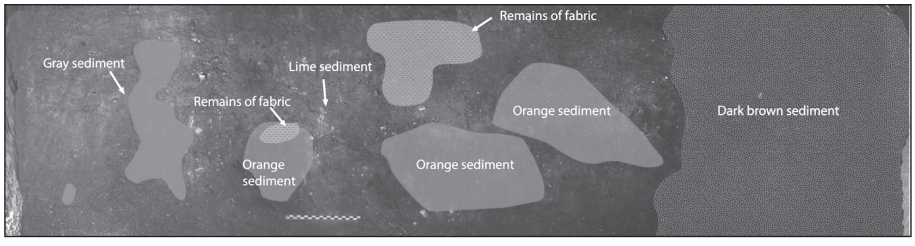
Osteology[2]

The remains of at least 24 individuals were recovered from the Bayt Rās hypogeum; ten individuals were found inside the sarcophagus of Room No I and 14 individuals in the small tomb (Room No III) opening off Room No II. All age groups are represented except teenagers, and both female and male remains are present. The high degree of disturbance observed within the burials prevented the team from fully analyzing the contents of the deposits and the funerary rites and items that accompanied the dead. In the small tomb (Room No III), the presence of ornamental artefacts (small bracelets and a ring) and clothing items (the remains of small shoes) show that the deceased - especially the younger ones - were adorned for their burials. In the sarcophagus, the remains of fabric indicate the probable use of a shroud or clothing for at least one of the deceased. A detailed analysis of fabric samples and the orange sediment around them will help to determine their characteristics. As for the dark brown sediment, an archaeoentomological analysis will help in determining its nature and whether it is evidence of a funerary installation made of a perishable material like wood.

Both the sarcophagus and small tomb are

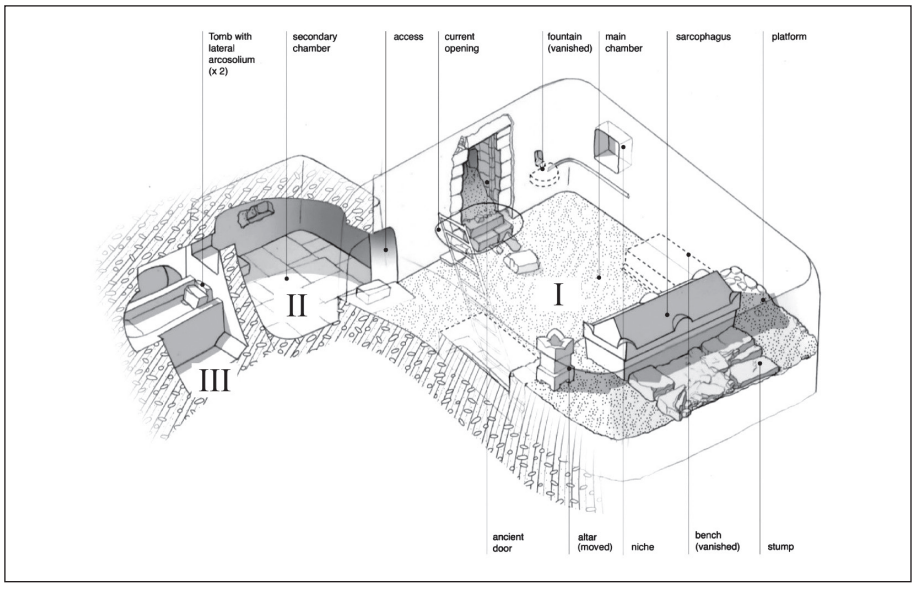


7. Overhead view of the space inside the sarcophagus (Layer 1) with three divisions.



8. Layer 5 showing the different sediments in the bottom of the sarcophagus.

2. The osteology study was carried out by Dr. Joyce Nassar and Dr. Lucie Bidouze, with the help of Aven Qattamen.



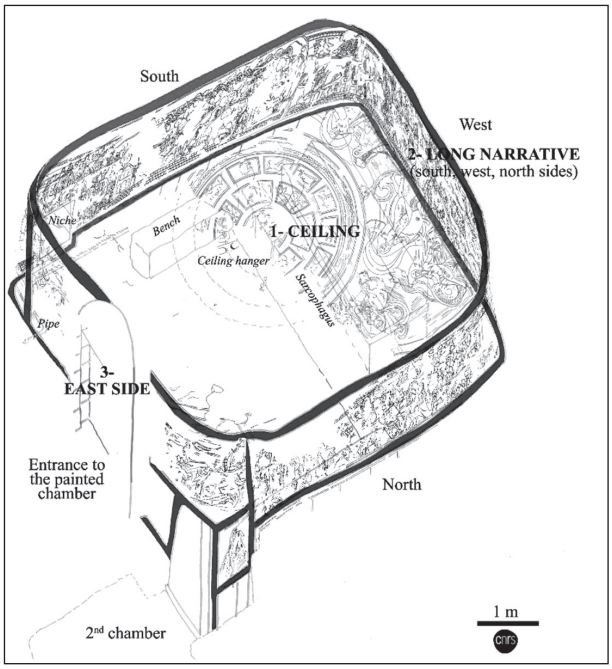
9. Isometric plan of the hypogeum's interior elements (Ifpo).

comingled cases displaying a high proportion of breakage. Thus, re-association of bones to distinct individuals was very challenging, making it difficult to complete a biological analysis to understand the profile of the Bayt Rās population and to study possible familial relationships between the deceased. Since dating of the deposits was impossible through archaeological indicators, C14 dating will help to determine the timeframe within which the different depositions were placed in the tomb.

Based on the initial results of the excavation, the Ifpo team created an isometric plan of the hypogeum interior in order to show the main elements of the tomb (**Fig. 9**).

Mural Paintings

CNRS [the French National Center for Scientific Research, with thanks to Dr. Claude Vibert-Guigue] has been leading the documentation of the fragile wall paintings within the tomb, which are in urgent need of intervention to document them in their context, including details at different scales as well as the iconography and inscriptions accompanying them. Photographs and drawings were made first to prepare for the description, analysis and finally interpretation of the wall paintings; close to 3,000 photographs have been taken during four work seasons (2017-2018). Many hand-colored drawings were completed to help analyze around 15 topics and 127 scenes, including almost 270 figures (**Fig. 10**). The ceiling depicts the signs of the zodiac and planets in a circular composition surrounded by Nereids on sea monsters, and putti (**Fig. 11**). The central medallion shows a frontal quadriga. A long, lively narrative composition (17m x 1.10m) runs along the three walls facing the entrance (featuring 152 figures, 66 divinities and 24 animals). A three-dimensional wall (enclosure wall), segments of walls and facades build character to the narrative where many trees and plants appear (**Fig. 10**). The long frieze shows a variety of human activities, in which Roman



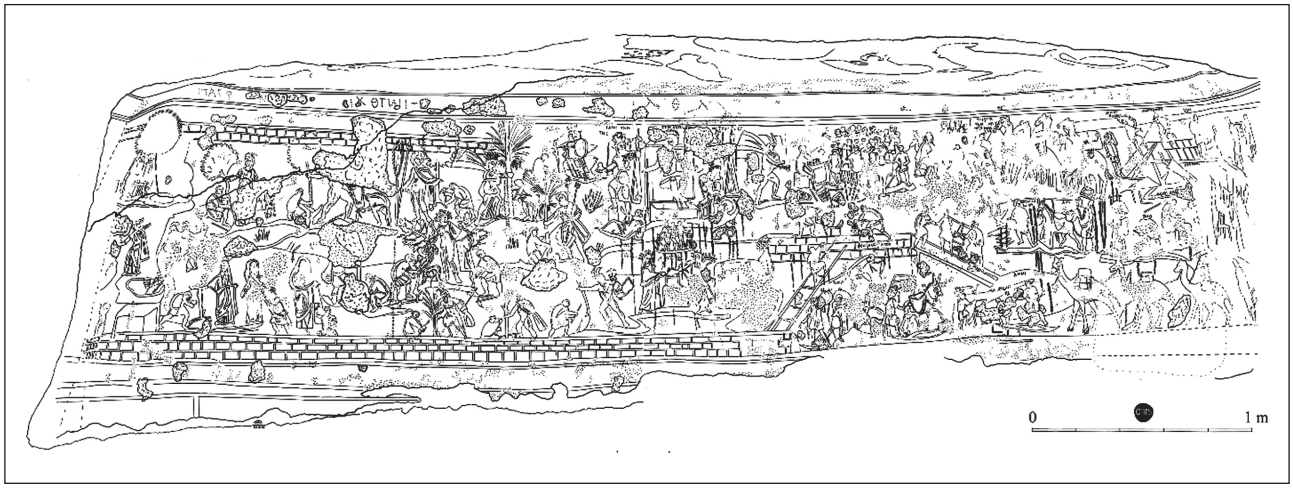
10. Axonometric view showing the main parts of the paintings, which have to be understood as a whole work of art made up of individual features (C. Vibert-Guigue, CNRS-ENS-PSL).

divinities or heroes take part. The side entrance (east) presents mainly Nilotic iconography and features connected to different functions (from left to right): a narrow passage to Room No II (here stands a servant holding a kind of cauldron), the tomb entrance and a lead pipe passing under a Nile god representation.

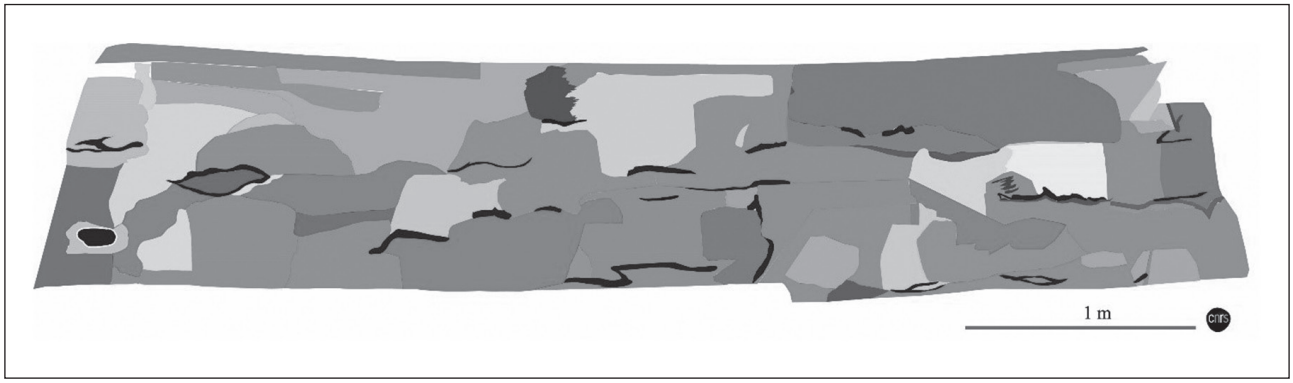


11. Detail of the ceiling with Nereids (C. Vibert-Guigue, CNRS-ENS-PSL).

Hand line drawings are elaborated (**Fig. 12**). The decor is very spectacular and includes painted elements of a type never seen before. For example, the background is made up of a patchwork of colors, which includes ground lines and water elements, giving the impression of a landscape with reliefs (**Fig. 13**). Building scenes reveal the painters' way of representing workers in action (**Fig. 14**). Two facades and one tower seem to be landmarks, as if the depiction was meant to be topographical. A series of color drawings were done using digital applications, beginning with the inscriptions, in order to represent their calligraphic aspect. A systematic inventory of the wall paintings will record and number all of the scenes, figures and labels. A catalogue will be produced which will present a picture, drawing and short description for each scene (**Fig. 15**).

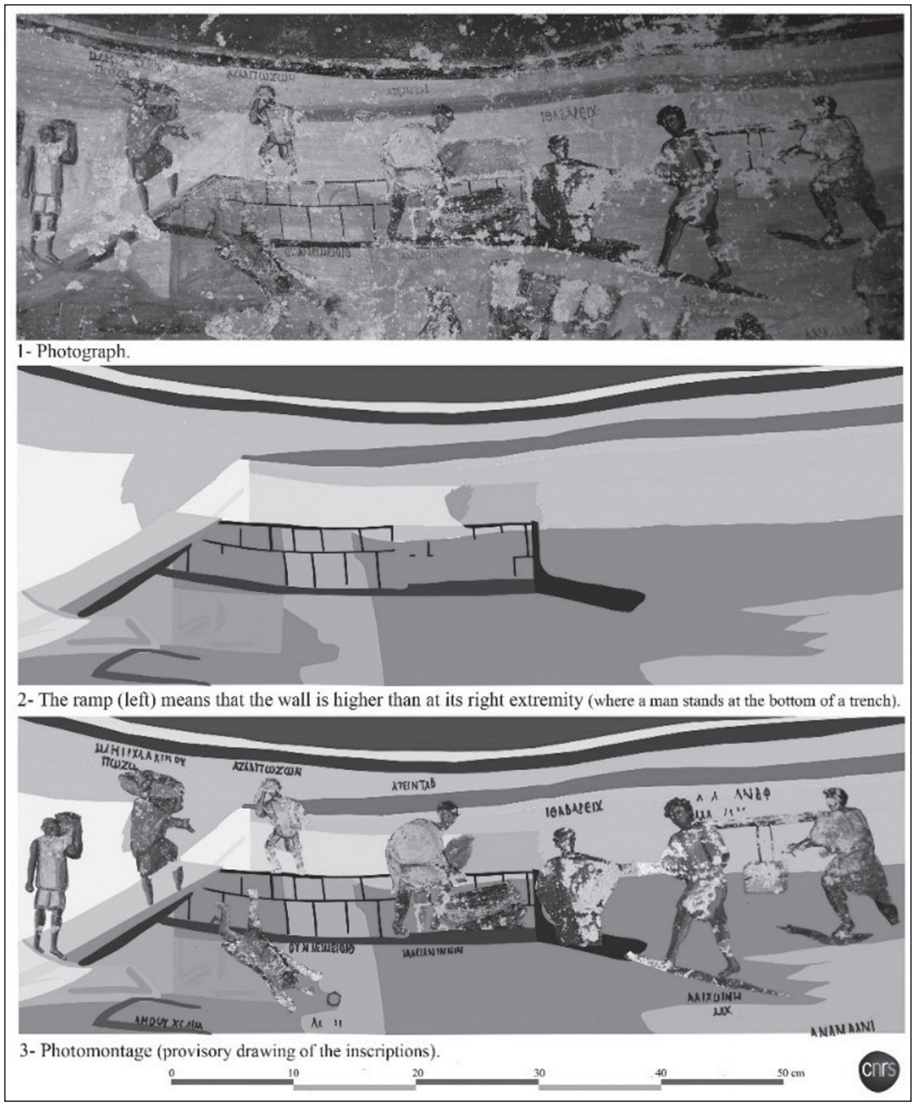


12. Preliminary line drawing of the west side (2017), overlaying the decor and state of conservation of the plaster. Elaborated with one orthophotograph (S. Bechetoille-Kaczorowski, Ifpo) and photographs of details focusing on the iconography (C. Vibert-Guigue, CNRS-ENS-PSL).



13. The colored background characterizing the narrative (C. Vibert-Guigue, CNRS-ENS-PSL).

3. The epigraphic survey was conducted by Prof. P.-L Gatier, Dr. Julien Aliquot and Prof. Jean-Baptist Yon (HiSoMA, IGLS Project, Greek and Latin Inscriptions in Jordan, Lyon University, CNRS, UMR 5189).



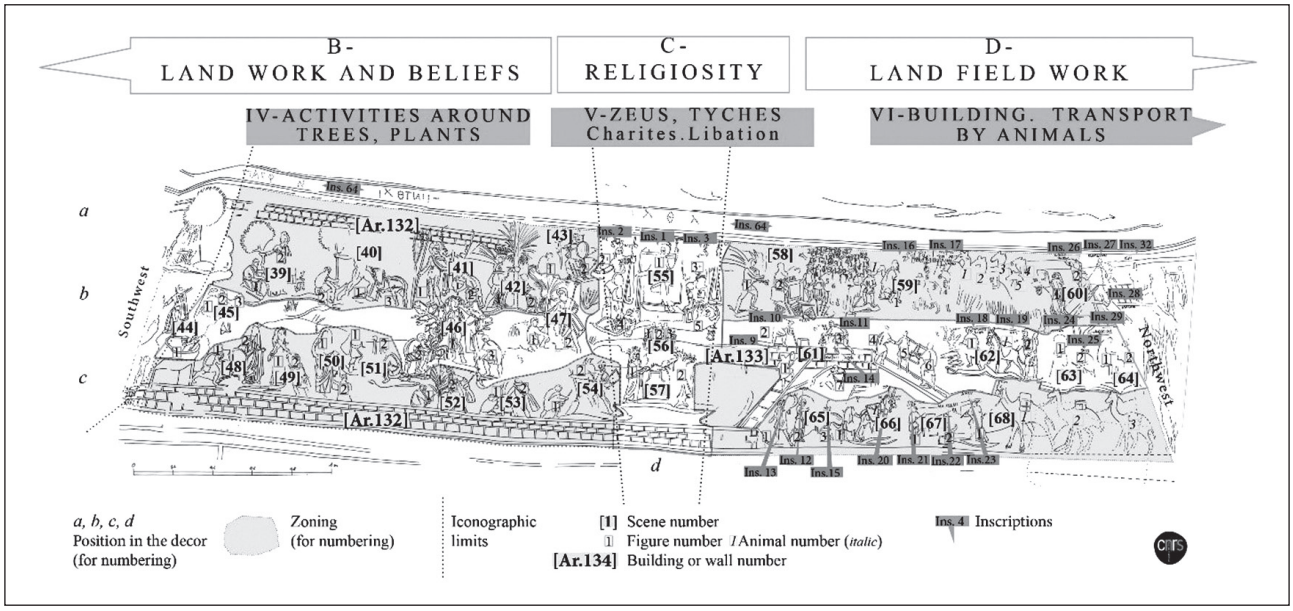
1- Photograph.

2- The ramp (left) means that the wall is higher than at its right extremity (where a man stands at the bottom of a trench).

3- Photomontage (provisory drawing of the inscriptions).

0 10 20 30 40 50 cm

14. The transparency between the background and masonry shows how the painter gave more importance to the hard work of the builders than to the masonry (provisional copy of the inscriptions) (C. Vibert-Guigue, CNRS-ENS-PSL).



15. Numbering of the elements will help in the preparation of a complete detailed catalogue, which will pave the way for further interpretation (C. Vibert-Guigue, CNRS-ENS-PSL).

Epigraphy[3]

The 65 inscriptions found on the painted wall are written in Greek and in a Greco-Aramaic language, but transcribed with Greek letters. This well-known phenomenon, known as 'allography', is exemplified in the Near East by the use of the Syriac alphabet to transcribe Arabic within Christian communities of Lebanon. This so-called *Garshuni* [Arabic writing using the Syriac alphabet] is explained as a way for Arabic-speaking communities to preserve their own culture and to keep their identity via their own self-defining script. The paintings can be divided into six panels (I-VI), which will help us to identify the link between these inscriptions. They trace the foundation of the Greco-Roman city of Capitolias, ancient Bayt Rās, at the end of the first century AD. The gods of Olympus, who preside over this process, come to help mere mortals, from whom tributes are received in return. The two panels on the south wall show the gods at a banquet (I), then a series of images of rural life that evoke an estate that preceded the city (II). On the west wall, the gods help men to cut down trees in order to clear the site of the future city (III). Three deities identified by Greek inscriptions are enthroned in the middle of the same wall (IV): Zeus Kapitolios (Jupiter Capitolinus), who gave his name to Capitolias; to his right the great Tyche (Fortune), guardian goddess of the city; and to his left the specific Tyche of Caesarea Maritima, the capital city of the province of Judaea (**Fig**. **16**). Details of the panel IV deities follow below:

1. On the left, a woman (Tyche = Fortune of the city) is standing, with her right foot on a stone and her left foot on a reclining, half-naked girl (the nymph of the water spring). Tyche holds a spear in her left hand, while in her right hand she bears what could be interpreted as the bust of an emperor. Letters above and on either side of her head. Height of the figure: 53cm. Letters 2cm.
   Μεγάλη Τύχη
   τῆς [πό]-
   [λε]ως
   Translation: "Great Fortune of the city".
2. A bearded god with a scepter in his left hand is seated in the middle. Height of the figure: 48cm. Letters: 1-2cm.
   Ζεὺς Καπιτώ[λιος]
   Translation: "Zeus Capitolinus".
3. On the right, a woman (Tyche = Fortune of Caesarea Maritima, the capital city of the Roman province of Judaea/Palaestina) is standing, with her right foot resting on a prow and her left foot on a swimming man personifying the harbor of Caesarea, called Sebastos. She holds a spear in her left hand. Height of the figure: 48 cm. Letters: 2cm.
   Τύχη Καισα-
   ρείας.
   Translation: "Fortune of Caesarea (Maritima)".

On the northwest corner and adjacent walls, the estate and the building of the city wall are shown in detail (V). Numerous images depict not only the carving of stones (**Fig. 17**), transport of materials on camels and mules, and architects and foremen at work, but also scenes of fights, accidents and even the payment of hauliers. There are quotes of sentences spoken by the characters, mostly in little scenes with two or more characters talking to each other. The narrative ends with a last panel showing the assembly of the gods and goddesses of the city (V).



16. Zeus Kapitolios between the civic Fortunes of Capitolias and Caesarea Maritima (CNRS HiSoMA).



17. Two stone cutters at work (CNRS HiSoMA).

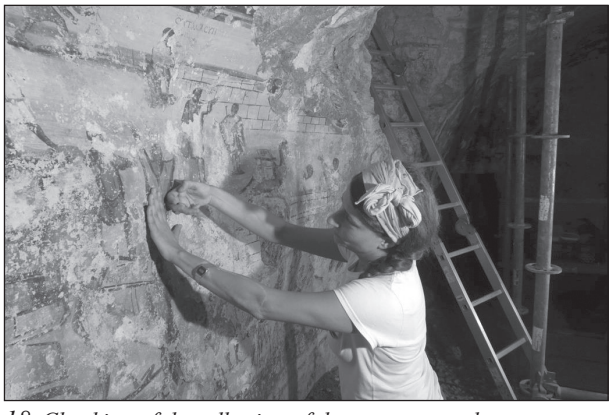
The use of the Aramaic language transcribed in Greek letters raises questions that are both linguistic and historical. Did the builder of the tomb choose to use the language that he was speaking (or that was spoken in the area) without being able to write it? It could be that this particular dialect of Aramaic did not have a written tradition, in contrast to other dialects (*e.g.* Nabataean, Hawrani forms of Aramaic *etc.*). The Greek alphabet may also have been used because it was the written language of power.

Mural-Painting Conservation (First Aid)[4]

Owing to the rarity and fragility of the mural paintings, the need for a rapid assessment of their condition was essential to evaluate their overall situation. Based on the results of this assessment, a responsive action plan was designed. Controlling the environment inside the hypogeum prior to any intervention was challenging. Starting in July 2017, three missions were carried out by ISCR in order to begin the process of preserving the mural paintings. The aim of the first intervention was to save and stabilize the wall paintings, in order to allow subsequent operations to take place inside the hypogeum according to a schedule. For this reason, the cleaning of the wall paintings' surfaces was undertaken only where necessary, to ensure the cohesion and adhesion of the materials (without fixing the salts). The cleaning of the surface has therefore been limited to cases of necessity; aesthetic preservation was not performed in this first campaign. During the initial phase of graphic documentation, a detailed photographic campaign was conducted, with the aim of defining the specific themes to make them recognizable and uniquely identified. The graphic documentation allowed for the immediate visualization and localization of technical data and conservation status, especially to assess the extent and location of conservation problems; conservation data sheets were completed. The methods of intervention and the materials to be used in the restoration work were carefully selected according to the particular conditions of temperature and humidity in the hypogeum. The use of organic substances (alcohols, natural resins *etc.*) was restricted because they could encourage the growth of biodeteriogens, since they are a source of carbon that can be metabolized (**Fig. 18**).

The paintings have two preparatory layers. The first, that which is in contact with the support, has a dark color; its thickness varies from 1 to 2cm and it presents a limestone matrix. The second layer, where paint is embedded, has a light color and is a few millimeters thick. This layer also has a limestone matrix. From observation of the superimposition of plaster layers it was possible to determine the order in which the paintings were executed. The vault was painted first, followed in succession by the north, east, south and west walls. The technique that was used most often was that of 'buon fresco', but it is often matched with areas or figures realised through 'a calce' (lime) technique or on an 'intonaco stanco' (tired plaster). In more than one area, mainly where the plaster layers join, superimposed painted layers can be found. A palimpsest - that is to say superimpositions of painted plaster - of second thoughts and preparatory drawings were found in the north-east corner of the north wall. These show a contextual reworking of the painting's execution, probably due to a change of mind on the part of the artist, while the wall's painting was being finished. The preparatory layer of this 'remake' is very subtle and for this portion, considering the degradation of the painted layer, 'a calce' (lime) technique was probably used.

As already observed during the work carried out in 2017, the current state of the tomb is the result of considerable stress, due primarily - in all likelihood - to the use of mechanical means



18. Checking of the adhesion of the preparatory layers.

4. The work was carried out by ISCR (Istituto Superiore per la Conservazione ed il Restauro) under the guidance of Giorgio Sobrà, helped by Marie José Mano; special thanks to Giovanna De Palma.

during the roadworks. Cracks are particularly extensive and generally affect all layers, from structure to painting. The plaster has come off in many areas, especially the vault which lacks its eastern portion entirely. Many are the lacunae and losses of the thin painted layer, because of sub-efflorescence and because of the execution technique used. During the intervention, micro-fills of some fractures and cracks was carried out to avoid leakage of the hydraulic premix injected. The edges of the plaster were also filled (**Fig. 19**).

Site Presentation and Public Awareness

Owing to the fragile nature of the site and the impossibility of public access, the project worked to provide different venues and tools for the public and professional community to learn about the results, and to give them a chance to see some scenes of the marvelous mural painting from the tomb. The project transformed one of the on-site caravans into a gallery equipped with a screen to present videos related to the history of the site and posters showing the progress of the work. Furthermore, SCHEP worked with a local company to design and produce a 3D panoramic tour using virtual reality (VR) technology. This panoramic tour is available at the gallery and at ACOR.

In an effort to spread public awareness about the importance of the tomb discovery and Bayt Rās as one of the cities of the Decapolis, the project conducted several awareness activities targeting two local schools for boys and girls. The activities focused on topics aimed at stimulating the pupils' ability to learn in an interactive way, in order to realize the importance of their heritage, and also created awareness manuals for schools covering aspects of the archaeology, history, geography and burial practices of the Bayt Rās tomb (**Fig.20**).

Conclusion

The name of the city of Capitolias was related to the supreme deity of the Roman pantheon, Jupiter Capitolinus. It is therefore no surprise to find this god seated on a throne in the center of the scene, surrounded by personifications of both the city itself and the capital of the province in which it was located, Caesarea Maritima and Judaea/Palaestina respectively. Like Jupiter-Zeus, the Fortune of Capitolias appears on the coinage of the city.

It is important to emphasize that there are three peculiarities that make the new Bayt Rās tomb exceptional, compared to other Roman tombs discovered in the Decapolis and the whole Near East. First, the abundance of representations: nearly 260 figures are accompanied by numerous scenes that compose a narrative arranged on three walls, on either side of the central painting where a sacrifice was offered by a priest to the deities of the city (Jupiter Capitolinus; the Fortune of Capitolias) and the provincial capital of Judaea (the Fortune of Caesarea Maritima). Second, the cohabitation and combination of Greek and Aramaic, the two main languages of the Roman Near East, are very rare phenomena. Here, the Aramaic language written in Greek quite naturally includes vowels, which is not offered by texts from the same period written in Aramaic characters. The inscriptions from the Bayt Rās tomb will thus provide a wide range of material for studies on this language and its evolution. Third, the historical analysis of the iconographic program



19. Filling the cracks.



20. Students from the local school coloring scenes from the tomb mural painting (CNRS, SCHEP).

compared to the Greek and Aramaic texts lead us to see in the Bayt Rās hypogeum the illustration of the foundation myth of the city at the end of the first century AD. This is a very unusual theme in ancient iconography. Although the main divinity of Capitolias was none other than Jupiter of Rome's Capitol, the new city was of Greek type, like the neighboring cities of the Decapolis. For all these reasons, the painted tomb of Bayt Rās is an extraordinary record of religious, political and social history, as well as an open window on to cultural interactions in a Greek city of the Roman Near East.

The information that can be obtained through analysis of the inscriptions and images will contribute to a deeper understanding of Roman urban planning and construction in the Levant and their origins during the first and second centuries AD, as well as providing insights into the identity of the local people who lived in northern Jordan under Roman rule. The initial architectural analysis of the hypogeum identified multiple historical phases. Future publications will reveal more about the site chronology and original functionality of the hypogeum.

Acknowledgments

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