

ARCHAEOLOGY IN JORDAN

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2016 AND 2017 SEASONS



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Cover image: Detail of wall painting from the Bayt Ras Tomb
(Orthographic photo: Soizik Bechetoille-Kaczorowski/Ifpo Amman)

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MAP OF SITES AND PROJECTS



INTRODUCTION

John D.M. Green, Barbara A. Porter, and China P. Shelton

The first edition of the "Archaeology in Jordan" Newsletter appeared in the *American Journal of Archaeology* in 1991 with the intention of presenting recent fieldwork conducted in Jordan to a broad academic audience. The series was initiated by the then ACOR director, Bert de Vries. From that time, the newsletter was published annually (1991–2008) and bi-annually (2010–2016) resulting in 22 editions published within the *AJA*, all of which are available as open content online. Subsequent editors after de Vries also came from ACOR or were closely affiliated. *AJA*'s regional newsletters are an integral part of its history, coming to an end in 2016. To continue this important tradition the *Archaeology in Jordan Newsletter*, or *AIJ* for short, is relaunched here as an open-access online publication through ACOR. It is intended to serve as a platform for recent archaeological and cultural heritage management projects. Official and complete reports from project directors continue to be published in the *Annual of the Department of Antiquities of Jordan (ADAJ)*.

This edition presents reports on projects that took place in Jordan between January 2016 and December 2017. As in prior editions, reports are generally organized from north to south by region (map on p. 1). In all, there are 50 projects with a wide range of periods and regions represented, and 89 listed contributors. There is a strong cohort of projects focused on prehistory in the Eastern Desert region of Jordan, the Early Bronze Age in various parts of the country, and numerous projects in the Petra region focusing on the Nabataean/Roman through the Islamic eras. While the number of projects being undertaken in Jordan has not changed much over the past decade, there has been a trend in recent years towards shortened or alternating seasons within smaller areas of excavation. This can be related in many cases to the financial and logistical challenges faced by project directors due to the combined impact of rising expenses and cuts in funding for research and grants. Nevertheless, major achievements continue to be made. Some key discoveries presented in this edition include the unusual Chalcolithic tailed ossuaries at Harrat Juhayra as reported by Sumio

Fujii, the discovery of marble statuary on the Petra North Ridge by Tom Parker and Megan Perry, and the report on the elaborate Roman era painted chamber at Bayt Ras by Jehad Haron and Claude Vibert-Guige (cover image). Notable also is the first report on maritime archaeology in the *AJAJ*, with the presentation of findings from the early Islamic harbor at ancient Ayla by Ehab Eid, Sawsan Al Fakhri, and Islam Sleim.

The editors recognize that all authors acknowledge the support and partnership of the Department of Antiquities (DOA) of Jordan. Due to the short length of these entries, many expressions of thanks and acknowledgment are omitted for the sake of brevity. During the time these field projects were undertaken, the Director-General was H.E. Dr. Monther Jamhawi, to whom all contributors expressed their thanks. Not all specific funding agencies mentioned by project directors are acknowledged for the sake of being concise. Of course every project relies on funding and support, often from their own institutions as well as from other sources. It is appropriate here to thank all who support these endeavors.

This newsletter was produced by ACOR and funded through the ACOR Cultural Heritage Fund and ACOR's Publication Fund. Layout and editing were finalized by freelance designer Jawad Hijazi and Starling Carter of ACOR. Samya Kafafi of ACOR compiled Arabic site and project names in the contents listing. The electronic version of this newsletter is intended to be easily accessible for those interested in knowing about current archaeological work in Jordan. Many projects have websites, and links are provided where possible. A considerable number of projects can also be found on Facebook. For more information on the projects, please contact the authors directly (see list on pages 100–101 for contact information). All figures are courtesy of the individual project directors unless otherwise noted.

For further information on AIJ and links to past newsletters, please visit: <https://www.acorjordan.org/archaeology-jordan-aij/>



Fig. 1. Ring cairn in the Jabal Qurma region, with its typical conical shape (Photo: Peter Akkermans)

The Jabal Qurma Archaeological Landscape Project seeks to examine settlement and subsistence practices in Jordan's north-eastern basalt desert from the Palaeolithic up to the present day, through survey and excavation in the Jabal Qurma region, some 30 km east of Azraq.

JABAL QURMA

Peter M.M.G. Akkermans

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Our surveys in the area have identified many hundreds of burial cairns of different shapes and sizes. Fieldwork in 2016 and 2017 focused on the excavation of a number of these cairns (cf. Akkermans and Brüning 2017). Investigation of cairns is not always easy. An unfortunate (predominantly modern) development is the very considerable looting of tombs. Other constraints relate to matters of skeletal preservation (often poor) and the palimpsest of contents resulting from the continual reuse of the tombs. Often the reuse could only be accomplished through disturbing or even obliterating older burials in the mounds. Hence, it comes as no surprise that the burials in the desert are often notoriously difficult to date. The earliest securely dated cairns in the Jabal Qurma basalt uplands belong to the late 3rd millennium B.C., while many more cairns date to more recent historical periods. The custom of constructing cairns for burial seems to have ended in the Jabal Qurma range around the 3rd century A.D., although many preexisting cairns received new interments long after that.

Basically there are three types of cairns: ring cairns, tower tombs, and cist graves. The ring cairns, up to 10 m in diameter and 2 m



Fig. 2. A partially intact tower tomb in the Jabal Qurma region (Photo: Peter Akkermans)

in height, had an oval, corbelled burial chamber in the center, surrounded by an outer ring of large basalt boulders. The area between the burial chamber and the outer ring was entirely filled in with basalt stones, giving these cairns their typical conical shape (Fig. 1). Inside the burial chamber were the skeletal remains of one or more individuals, often accompanied by some jewelry made of stone, faience, glass, bronze, or iron.

The second type consists of tower tombs: relatively monumental round structures up to 5 m in diameter and 1.5 m high, which differ from the other cairns by their distinct tower-like shape and their clear, straight facade made of large, flattened basalt slabs (Fig. 2). Each tower was solidly filled in with basalt boulders, except for the small, corbelled burial chamber covered with capstones in its center. Although in most cases the chamber had been breached, some human bones and grave goods (beads, earrings) were still in and around it. The towers tend to have large numbers of Safaitic inscriptions and petroglyphs in their immediate surroundings. A number of radiocarbon dates suggest a date for their construction between the 2nd century B.C. and the 1st century A.D., although they appear to have been reused repeatedly for burial in later periods.

The third type of cairn consists of rectangular cist graves, usually attached to tower tombs. The cairn graves were up to 2.7 m long, 1.5 m wide, and 1 m high, had carefully constructed dry-stone walls, and their interiors were entirely filled with rocks. Underneath the piles of stone were the skeletal remains of one or more individuals in crouched positions. Finds included necklaces made of colorful stone, glass paste, and shell, as well as rings made of bronze and iron. One cist grave had several Seleucid bronze coins, one of which could be securely dated to the reign of Antiochus IX (114–95 B.C.). Cist graves remained into use until the second century A.D.

REFERENCE:

P.M.M.G. Akkermans and M.L. Bröning. 2017. "Nothing But Cold Ashes? The Burial Cairns of Jabal Qurma, North-Eastern Jordan." *Near Eastern Archaeology* 80: 132–139.

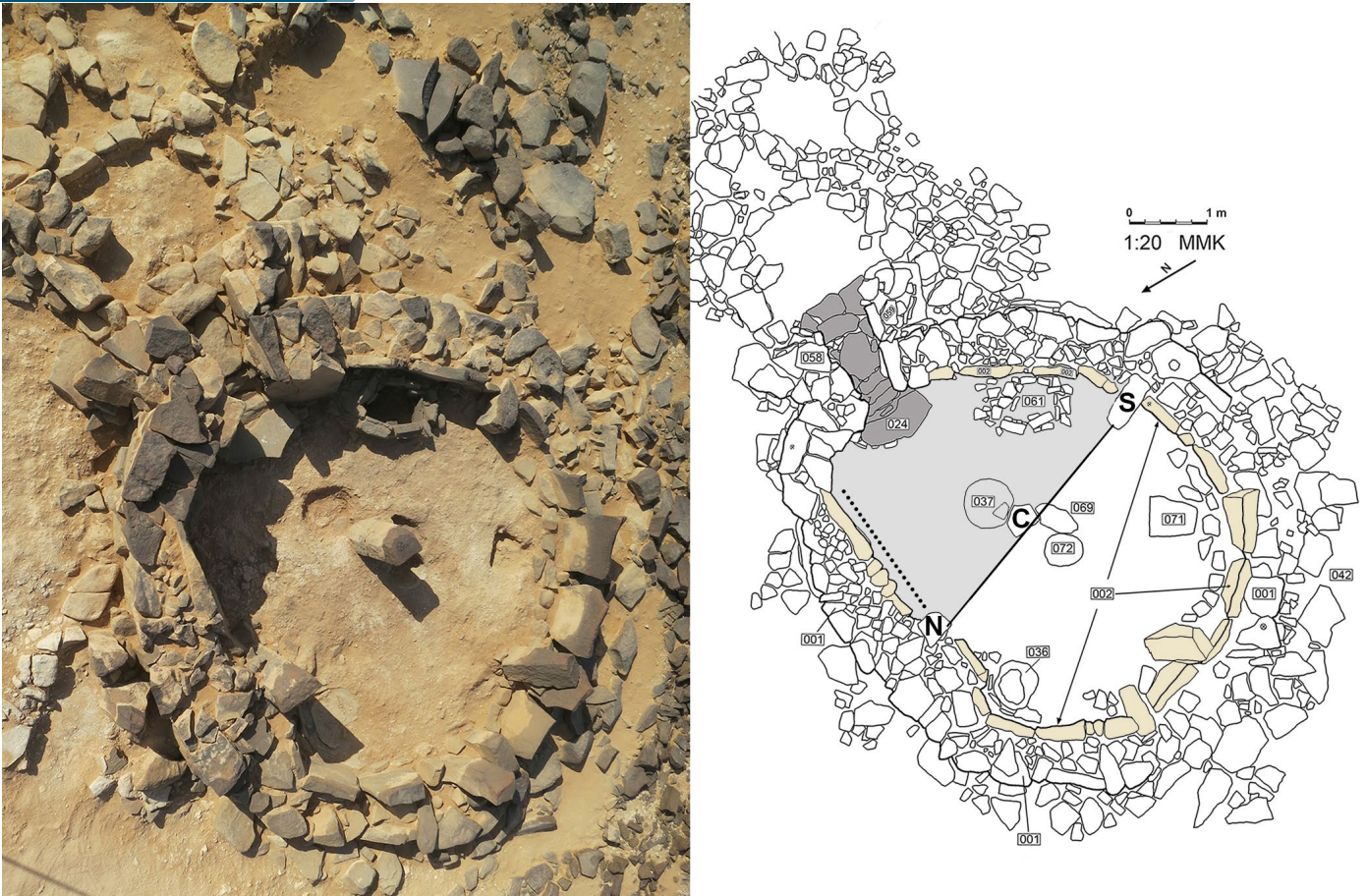


Fig. 3. Left: Overhead view of SS-1 at the end of the 2016 season (Photo: Y. Rowan and A. Hill). Right: Top plan of SS-1, showing various features including Phase 1 wall 001, Phase 2 wall 002 (tan shading), roofed area over the eastern half (light gray shading), and the doorway (dark gray shading) (Drawing: M. Kersel and G. Rollefson)

EASTERN BADIA ARCHAEOLOGICAL PROJECT

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During June 2017 the Eastern Badia Archaeological Project (EBAP) completed the excavation of SS-1, a 5 m diameter circular structure on the south slope of Mesa 7 in the Wadi al-Qattafi, some 60 km east of Azraq in the Black Desert. SS-1 experienced a history of intermittent occupation and renovation of several hundred years or more during the Late Neolithic period (ca. 6,900–5,000 calBC). Phase 1 consisted of a thick circular wall made of basalt slabs laid horizontally, possibly built during the earlier part of the Pre-Pottery Neolithic C (PPNC) period, although no datable evidence was recovered; it is possible that there was an opening to the north, later sealed, leaving a chord in the otherwise circular geometry of the building (dotted line in Fig. 3).

The interior of the Phase 1 building dug down into the bedrock, and several deep fire pits excavated along the northern wall reached depths of around 30 cm. Basalt slabs set on edge were placed against the inside of wall 001 (locus 002, in tan color in Fig. 3). It is not clear yet if this represents a second phase of occupation and renovation. A roof covered the eastern half of the building, possibly made of organic material that utilized beams that spanned the center of the building, resting on the northern, central, and southern pillars (light gray shading in Fig. 3), providing shelter over only half of the interior. This reconstruction is supported by the absence of weathering on flint artifacts in the roofed part and heavily patinated artifacts in the unroofed area. It is possible that during this occupational period two

nested plaster basins were made on the floor near the western wall (locus 036 in Fig. 3), and a plaster lined pit (locus 072) 55 cm in diameter and 24 cm was cut deep into the bedrock.

In a succeeding phase, dating to ca. 6400–6200 calBC (Rollefson et al. 2017: Table 1), a sporadic pavement was installed over the accumulated sediment above the bedrock floor. A doorway was created in the eastern wall leading down from ground level to a threshold stone (dark gray shading in Fig. 3). A hearth outlined by small basalt blocks (locus 061 in Fig. 3) against the wall had fires hot enough to severely crack the upright slabs of the 002 slabs.

The next phase followed another paving of the area under the roof, and it is probably at this time that abutments were added to the exterior sides of the doorway (loci 058 and 059), creating an early example of a "Georgian portico" feature. This appears to be the last major period of occupation, but the absence of radiocarbon dates leaves its duration unknown. In Phase 5 – probably in the first half of the 6th millennium B.C. – the roof no longer seems to have been in place, and the use of this structure was not intensive, as is shown by the limited number of artifacts, animal bone, and the absence of any hearths. Phase 6 represents the post-abandonment of SS-1, when the mound of collapsed walls and sediment may have been used to place a burial cist, now poorly preserved.

The character of SS-1 suggests it was not a dwelling, but instead served as a work place for the inhabitants of five to six smaller structures surrounding it (Fig. 4). Looting after 2016 has shown these structures to be rooms about 2.5 x 1.75 m in size, suitable as sleeping chambers for a group of kin-related households. This configuration might indicate a social structure not witnessed elsewhere in the region. Much more excavation and analysis must be undertaken before this question can be resolved.

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Rollefson G., Y. Rowan, and A. Wasse. 2014. "The Late Neolithic Colonization of the Eastern Badia of Jordan." *Levant* 46(2): 285–301.

Rollefson G., A. Wasse, Y. Rowan, M. Kersel, M. Jones, B. Lorentzen, A. Hill, and J. Ramsay. 2017. "The 2016 Excavation Season at the Late Neolithic Structure of SS-1 on Mesa 7, Black Desert. *Neo-Lithics* 2/17: 19–29.

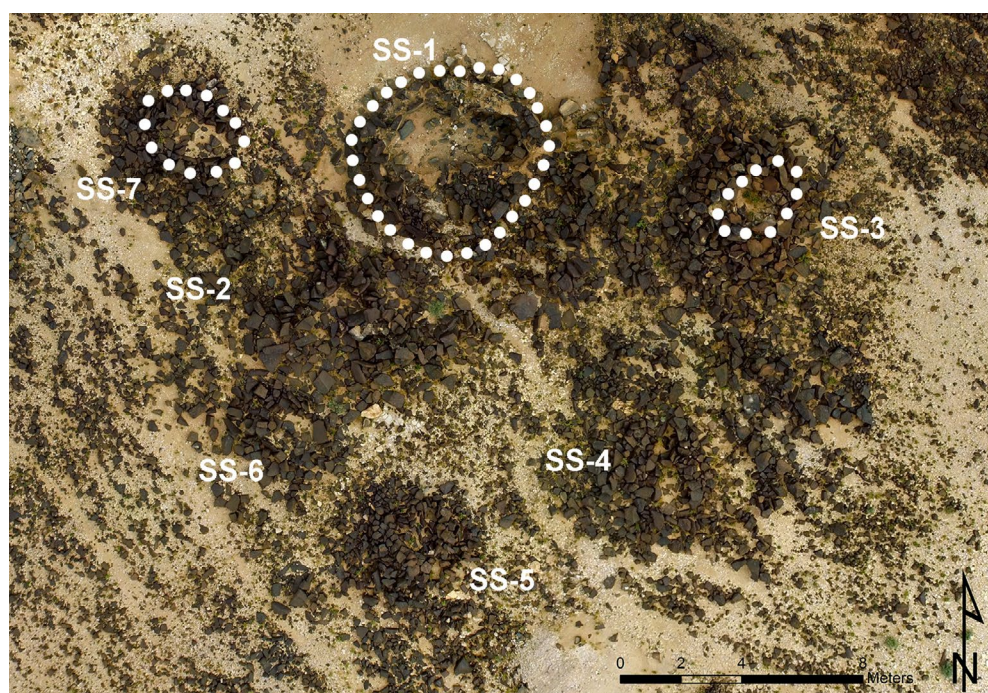


Fig. 4. Overhead view of the SS-1 cluster; SS-3 and SS-7 were looted in the post-season, revealing small elliptical buildings, possibly functioning as sleeping rooms (Photo: A.C. Hill)

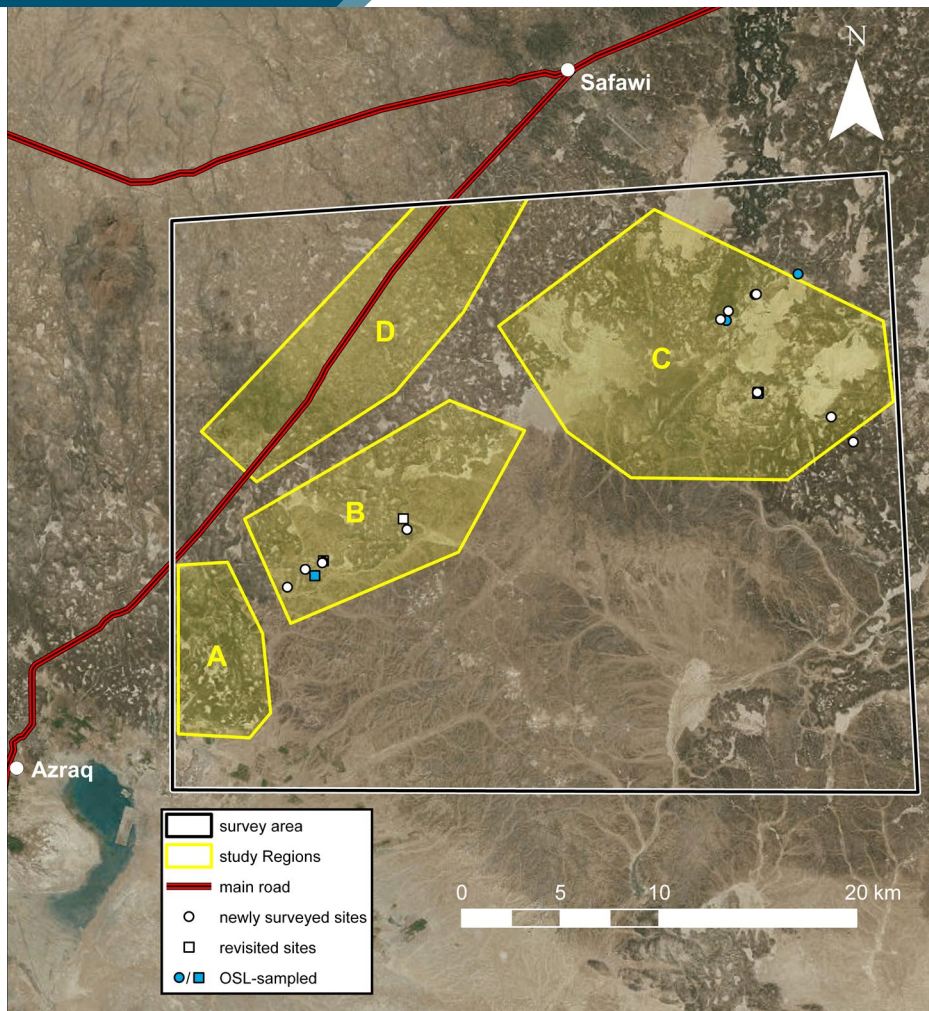


Fig. 5: Aerial image indicating the area of the survey, which comprises over 1,000 km² between the towns of Azraq and Safawi

The Western Harra Survey Project is investigating late prehistoric settlements, from the Late Neolithic to the Early Bronze Age (7th millennium–early 3rd millennium B.C.), in the arid harra region of northeastern Jordan—the so-called Black Desert. The research area covers a rough square of over 1,000 km² between the towns of Azraq and Safawi, divided into four targeted regions selected for detailed fieldwork investigation (Fig. 5). These regions are representative of the different types of landscape found in the harra: A) undulating steppe carpeted by a dense layer of basalt blocks; B) large wadi (valley) systems surrounded by pockets of basalt outcrops; C) large *qe'an* (mud flats) within areas otherwise similar to A; and D) basaltic hilly areas crossed by small wadis. The aim of the project is to give a holistic picture of the region's past human landscape through a diachronic approach to the study of settlement systems and socio-economic activities, according to the environmental context and available resources. This is being carried out with an emphasis on material dating evidence and the categorization of site types through comparisons with their appearances on satellite imagery from a remote sensing investigation that identified nearly 2800 sites and structures.

Following a first survey in 2015, a second short fieldwork season was carried out in September 2017. We investigated 20 basalt features—especially those known as “wheels” and “encircled enclosure clusters”—to be able to more precisely specify the properties of these site forms. The preliminary lithic study identified large quantities of raw material in Region B, and

WESTERN HARRA SURVEY PROJECT

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Fig. 6. Probable ancient 'stepped' pathway found during surveys

showed that while some of the sites contain material of the Chalcolithic/Early Bronze Age, the majority were at least first occupied during the Late Neolithic (Imad Alhussain, pers. comm.). These conclusions are currently being synthesized with the ongoing OSL dating of sediment samples that were taken at five different sites using a process recently successfully employed at Wisad Pools (Athanasas et al. 2015). By collecting from both "wheels" and "encircled enclosure clusters", any clear difference in dates between the two site types should be identifiable, tying into one of this project's main goals of enabling rapid dating of sites across the wider region by remote sensing.

Additionally, the 2017 season's work emphasized the natural environment and the identifying of off-site features related to landscape building. We focused on methods of traversing the harra, a crucial issue as travelling in the region is made difficult due to the dense cover of basalt boulders. Apart from the open spaces of the qe'an (singular: qa'a) and the corridors made by wadi valleys, paths need to be created in order to allow for easy and speedy travel. We identified several such paths, clearly arranged by the deliberate moving of basalt boulders. Some are several kilometers long while others are very short, for example from a site to a nearby qa'a or wadi. In this case, paths up or down slopes seem to be arranged with some kind of "steps" (Fig. 6). We believe these paths to be ancient, possibly contemporaneous to the visited sites in some cases. Their study will be a priority of the next season, as well as investigating sources of raw material and continuing the OSL sampling methodology by collaborating with Dr. Dimitri Vandenberghe of the University of Ghent Geology Department.

REFERENCE:

Athanasas, C.D., G.O. Rollefson, A. Kadereit, D. Kennedy, K. Theodorakopoulou, Y.M. Rowan, and A. Wasse. 2015. "Optically stimulated luminescence (OSL) dating and spatial analysis of geometric lines in the Northern Arabian Desert." *Journal of Archaeological Science* 64: 1–11.

Project website: www.facebook.com/WesternHarraSurvey



Fig. 7. Location of three structures identified in the Early Epipalaeolithic deposits of Kharaneh IV (image from 2013 excavation season)

KHARANEH IV

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In 2016, the Epipalaeolithic Foragers in Azraq Project (EFAP) conducted excavations at Kharaneh IV, located approximately 1 km south of Qasr Kharaneh in the Azraq Basin. The archaeological sequence at Kharaneh IV spans the Early and Middle Epipalaeolithic (approx. 20,000–18,600 B.P.), and contains dense deposits of lithic and faunal material. The site is approximately 21,000 m², making it the largest Epipalaeolithic site in the Levant. Kharaneh IV was originally surveyed by Andrew Garrard and Nicholas Stanley-Price and subsequently excavated by Mujahed Muheisen in the 1980s. Research by EFAP at Kharaneh IV set out to further explore the deposits reported by Muheisen and continue the analysis of this site. Excavations at Kharaneh IV in 2008–2010, 2013, and 2015 were the first stages of work by EFAP to reconstruct the nature of prehistoric (Late Pleistocene) occupation of the site and reconstruct the local palaeoenvironment (Maher, et al. 2016). At the end of the 2010 season we discovered two hut structures, which are among the oldest evidence of habitation structures in the Levant. In 2013, we returned to the site to map and excavate one of these hut features, Structure 1, and discovered a potential third structure during the course of these excavations (Fig. 7). Excavations from 2015 to 2016 focused on exposing, mapping, and initial excavation of Structure 2.

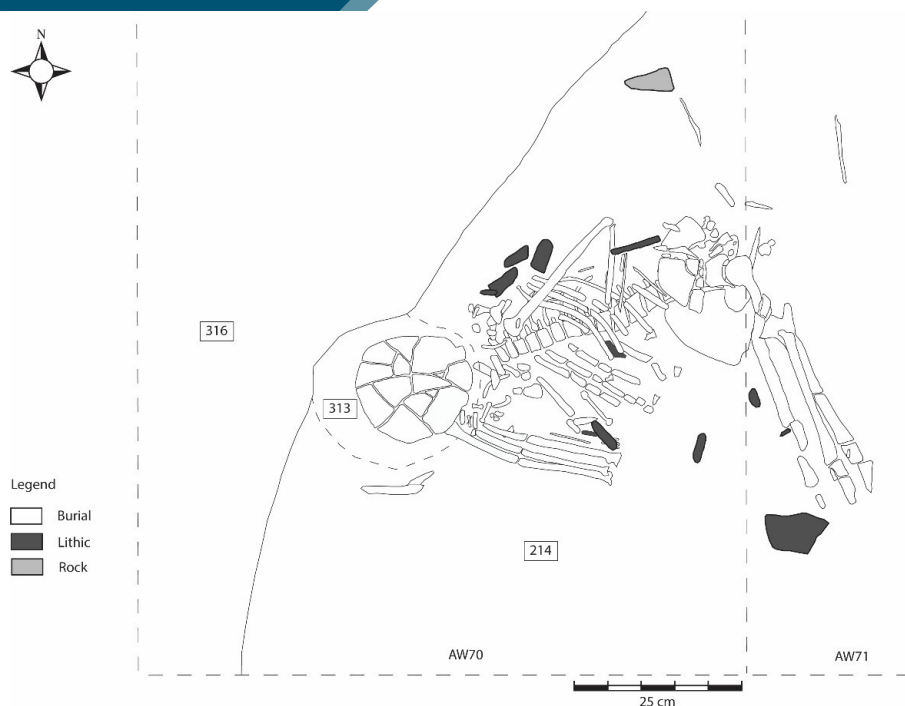


Fig. 8. Female burial within Structure 2 at Kharaneh IV

Excavations during the 2016 field season uncovered the western boundary of Structure 2, exposing the complete structure (minus the southern boundary, which is disturbed by rodent activity). The deposits associated with the structure show that it was burned after abandonment and was subsequently capped with a sandy yellow/orange sediment with a low artifact density. Deposits with a low artifact density are rare for the site, suggesting that these deposits are not part of an occupation area but represent sediment that cap or close the hut structure, intentionally brought to the site. Underneath the orange sandy deposit is an organic-rich, burnt dark brown sediment. These burnt deposits are similar to the ones discovered at the top of Structure 1 and are thought to represent the burnt superstructure of the hut.

While excavating, a human burial was discovered in association with Structure 2 (Fig. 8). The burial was found just under the organic-rich deposits of the burnt superstructure, suggesting that the body was placed on the floor of the structure prior to burning. The interred individual is an adult woman, placed in a flexed position, oriented with her head to the west. The position of the burial within the structure suggests a meaningful connection between the inhabitants of Kharaneh IV and the built environment.

The unique site of Kharaneh IV raises numerous interesting questions for future research, particularly regarding the intensity of occupation of large Epipalaeolithic sites prior to the Natufian period. The excavation of Kharaneh IV will help us understand how the changing landscape during the Late Pleistocene affected land-use and settlement patterns during the Epipalaeolithic period (c. 20,000–16,000 B.P.). The massive size of the site, as well as the presence of huts and human burials suggests that Kharaneh IV was a significant place within the landscape during the Early Epipalaeolithic. Future excavations will continue to explore the use of indoor and outside spaces, the nature of habitation at the site, and how Kharaneh IV fits into broader patterns of social interaction across the Levant.

REFERENCE:

Maher, L. A., D.A. Macdonald, A. Allentuck, L. Martin, A. Spyrou, and M.D. Jones. 2016. "Occupying wide open spaces? Late Pleistocene hunter-gatherer activities in the Eastern Levant." *Quaternary International* 396: 79–94.



Fig. 9a. Mushash 163, sounding 1-South, Structures 2 (to the right) and 3 (to the left), view from the east (photo: Th. Urban). Fig. 9b (inset). Sounding 1-South, arrow-shaped stone (photo courtesy of DAI / K. Bartl)

The Early Neolithic site of Mushash 163 is located about 40 km east of Amman on the western edge of the northeastern Badia. It was discovered in autumn 2012 as part of the Qasr Mushash Survey project and excavated in the years 2014–2017.

MUSHASH 163

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German Archaeological
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The results indicate the site as a settlement of the late PPNA (9800–8600 calBC) and early PPNB (8600–8200 calBC) with traces of a later settlement phase of the late PPNB (7500–6900 calBC) and/or the early Late Neolithic period (6900–6400 calBC).

Mushash 163 is a rather small settlement of 60 m east–west x 45 m north–south in size, located about 200 m southwest of the Early Islamic site of Qasr Mushash. Geomagnetic prospections in 2013 revealed more than 30 round structures. During the short field seasons six trenches were opened. Altogether, remains of eight buildings were uncovered. In the beginning, work concentrated on the soundings 1-North and 1-South in the northern part of the settlement. Here, a total of three circular structures were partially exposed, of which no. 1 and no. 2 belong to the semi-subterranean building type which has walls also deepened into the natural soil. Structure 3 is situated stratigraphically above these two houses. The building has a small corridor-like gangway in the south, which is connected to another, only partially preserved round or oval structure. The interior of Structure 3 includes several upright standing stones, of which an arrow-shaped stone in front of the western interior facade is the most striking feature (Fig. 9).

In sounding 2, the western part of another semi-subterranean building was recorded, and in sounding 3 a pit was uncovered. Sounding 4 has very complex architecture, consisting of several interconnected semicircles. Several upright standing stones in an east–west aligned row mark this complex and may have served as a substructure for a roof (Fig. 10). On the southern edge of the area, a burial in a flexed position was covered by a row of stone slabs. Two small stemmed cups and a pestle made of basalt were found outside the grave close to the head. According to two radiocarbon analyses, the burial dates to the 2nd/3rd century A.D., i.e. to the Roman period. In sounding 5, two phases of use could be documented. The younger level consists of several small semicircles of unworked stones, the older level is characterized by the negative impression of a large circular building. This was originally cut deep into the virgin soil, but apparently at a later date the stones of this building were removed. The entire area of the original wall was filled with black ashy soil.

The finds are mainly characterized by large quantities of silex flakes and a number of tools. Among them, small projectile points of the Khiam and Helwan type form the most abundant groups. Two flint daggers from the surface indicate a Late Early Neolithic (LPPNB) to Late Neolithic reuse of the site.

The faunal remains consist mainly of bones of gazelle, cattle, equids, canids, and felines. The palaeobotanical finds include tamarisk, pistachio and gramineae (grasses). According to previous analyses, all animal and plant species are wild forms.

The previously available radiocarbon data are consistent to ca. 8900 and 8300/8200 calBC. This period has so far been documented at very few sites (such as Wadi Jilat 7). The results of the work in Mushash 163 therefore form an important supplement to the current state of knowledge. Whether the site was a temporarily used hunting station or a permanently populated place, is a question that must remain open for the time being.

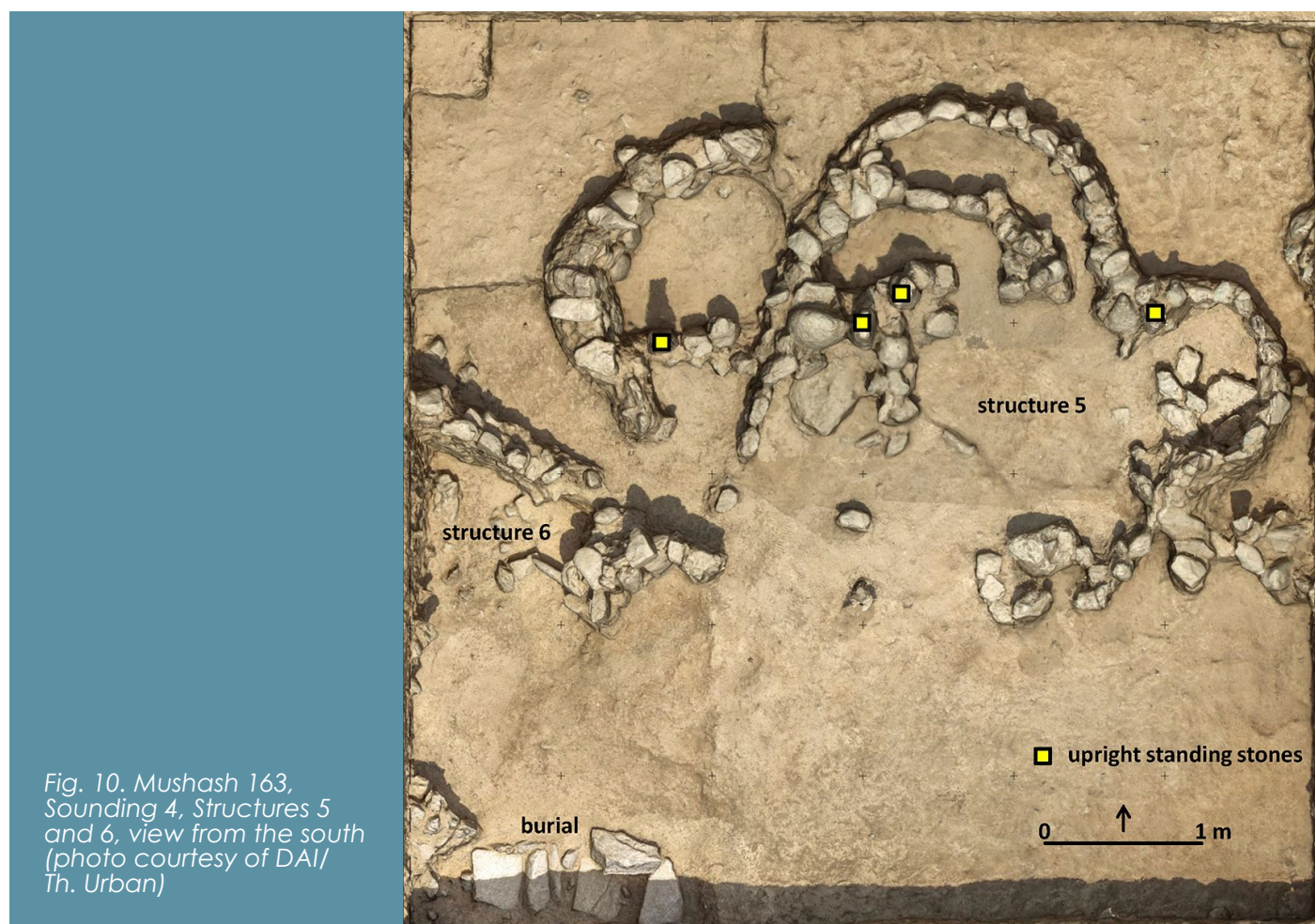


Fig. 10. Mushash 163, Sounding 4, Structures 5 and 6, view from the south (photo courtesy of DAI/ Th. Urban)

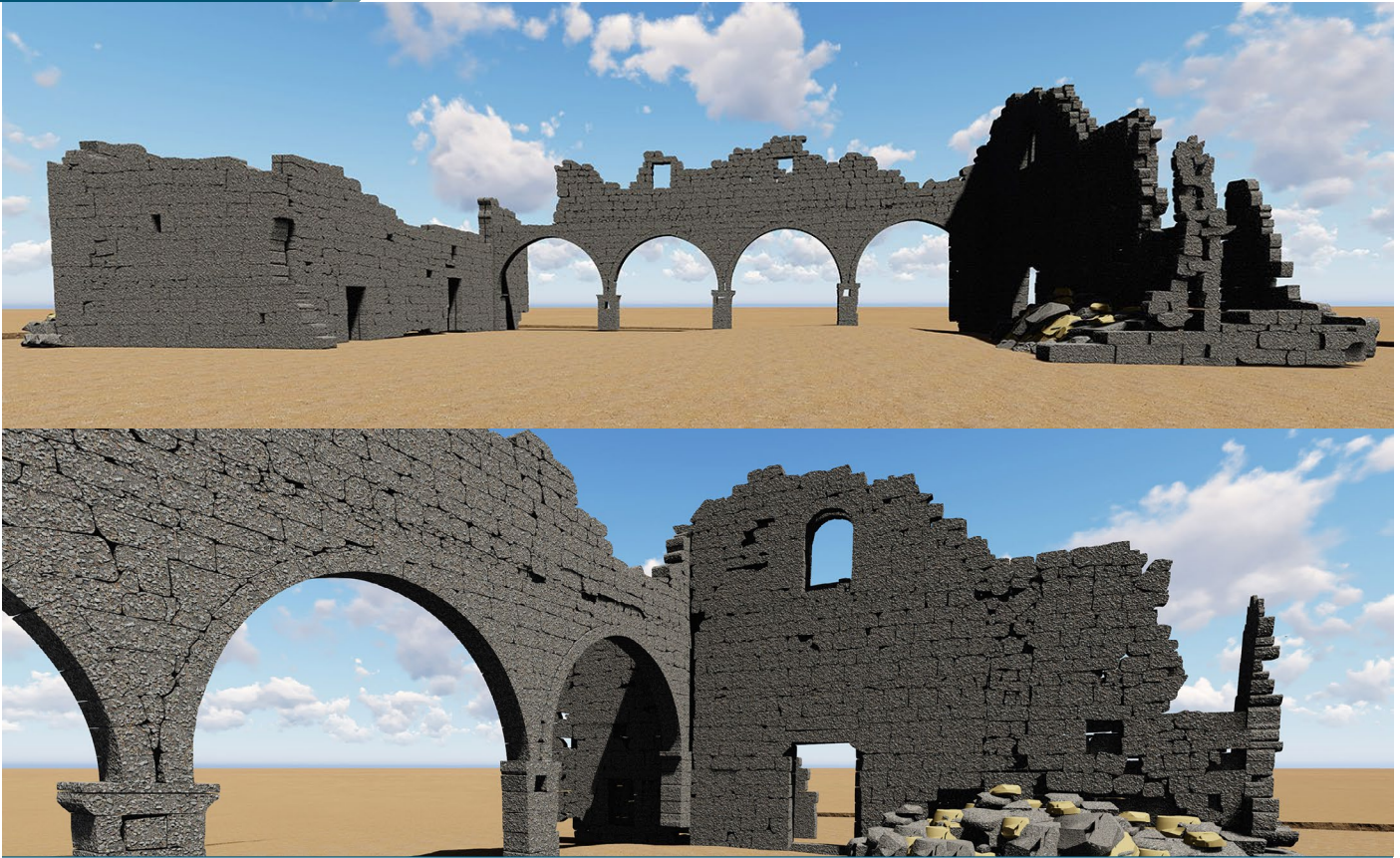


Fig. 11. West Church 3D Rendering (Graphics by Mais al-Hadad and Dana al-Farraj)

UMM EL-JIMAL

Bert de Vries

Calvin College

This report presents the field project results of the Umm el-Jimal Archaeological Project (UJAP) between 2016 and 2017. This work was conducted in partnership with USAID SCHEP; the Pax Foundation and Gerda Henkel Stiftung; NORAD – Birzeit and Bergen Universities; and the Clean Water Institute of Calvin College.

The Interpretive Trail, a continuous loop linking the West Entry Park to the Interpretive Center, was completed. 20 of 33 point-of-interest signs were designed, locally produced, and installed.

The West Entry Park, located between the Commodus Gate and the village business center, planned as a bridge between community and antiquities, was prepared by preliminary archaeological study and clearing of collapse debris. Khammash Architects created the design using green space to integrate archaeological elements into a peaceful retreat for residents and tourists.

The UJAP began preliminary work on comparative study, conservation, and presentation of three churches—West, Southwest, and Julianos—including C14 analysis of mortars, documentation of stratigraphy, and stone-for-stone 3D rendering of the West Church (Fig. 11). Through a Memorandum of Understanding, UJAP also advised the Department of Antiquities in its conservation activities in the Cathedral.

Preparations for the Interpretive and Hospitality Center at House 119 included planning the museum, design by Khammash Architects, and agreeing on division of responsibility between the Ministry of Tourism and Antiquities (structural repairs) and the UJAP (build-out

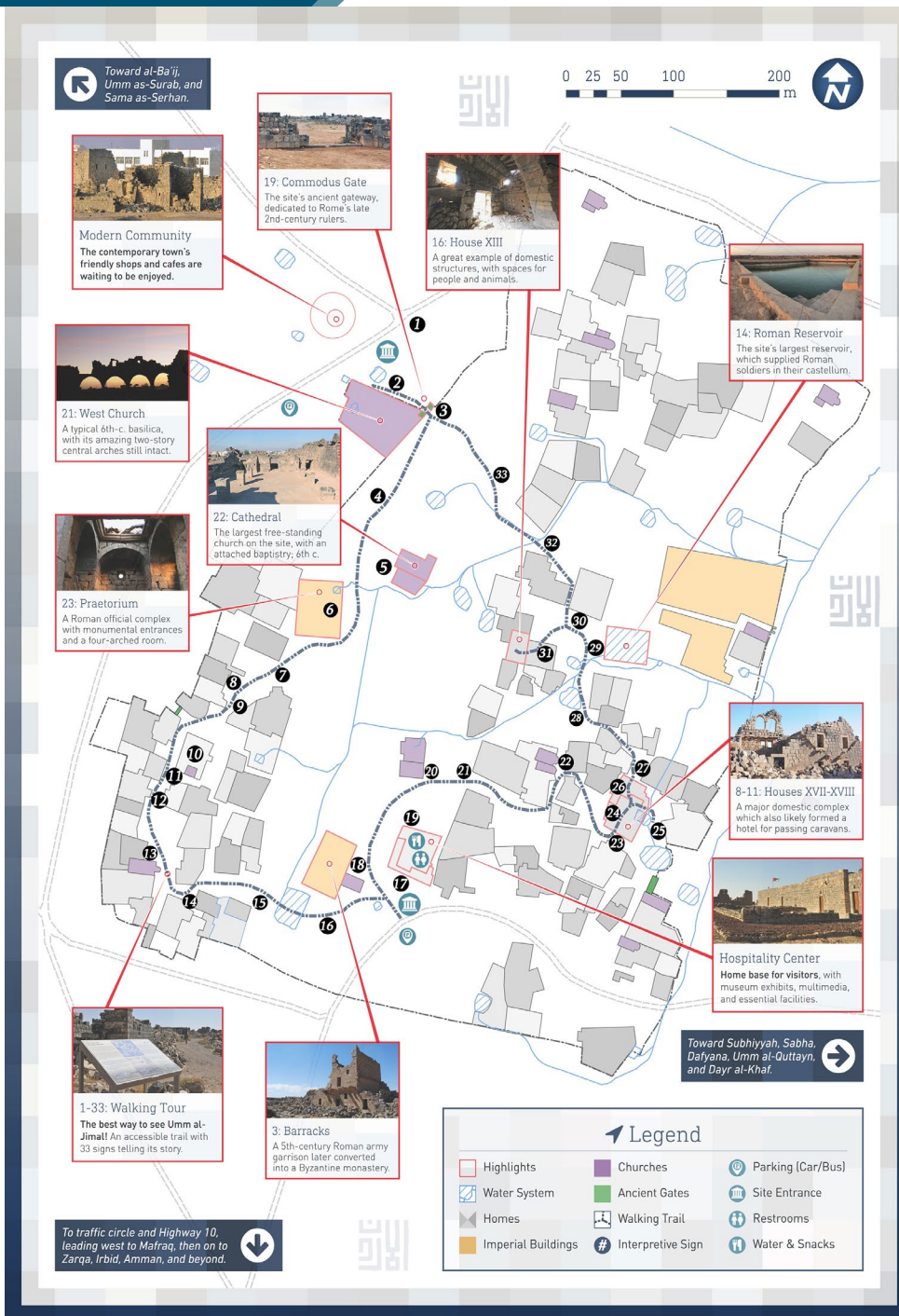


Fig. 12. Umm el-Jimal foldout Brochure Map (map created by R. Linnaea Cahill)

of museum and hospitality facilities). A replication of the Anastasios Decree, reproduced from originals at Qasr Hallabat and Umm el-Jimal by technicians working with Thomas Weber, was installed on a purpose-built wall in the museum inscription garden.

For the Ancient Water System Reactivation Project, begun in 2014 to supplement municipal water, five reservoirs were cleared and prepared for reuse. Complete hydrological field studies and hydraulic design were launched in partnership with the Clean Water Institute of Calvin College, and a Digital Elevation Model was created from drone photographs by Mars Robotics of Jordan. Preliminary activation included the irrigation of municipal green spaces.

Conservation, as part of the USAID SCHEP Project, included training of local employees as site managers whose certification enabled continued employment by the Department of Antiquities. Production of signs included training in content writing and graphic layout; comprehensive design that meets display, durability, and vandalism-resistant standards; and printing, manufacture, and installation—all done locally.

Three Jordanians with architecture degrees were trained in archaeological and heritage work, including documentation of ancient structures, graphic and facility design, and construction oversight. They continued to assist after their training and now have extensive professional dossiers.

The UJAP held community interest meetings to plan the incorporation of Hand by Hand Heritage, a local company for the performance of site management, tourism services, and heritage-themed microbusinesses. For that and water reactivation, the UJAP administered a community interest survey in the fall-winter of 2017–2018.

UJAP tourism promotion for Ministry of Tourism and Antiquities included preparation of the main Umm el-Jimal Site Visit Brochure in English and Arabic (Fig. 12). The UJAP also participated in after-school heritage teaching for Jordanian and Syrian refugee school children. Initial workshops were held to prepare for the writing of a Site Management Plan and assembly of a World Heritage Monument Inscription Dossier. Articles on plaster analysis by Dr. Khaled al-Bashaireh appeared in technical journals (Al-Bashaireh 2016), and Elizabeth Osinga defended her University of Southampton Ph.D. thesis on the ceramics and stratigraphy of the House XVII–XVIII Complex (Osinga 2017).

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Project website: <http://www.ummeljimal.org/>



Fig. 13. Findspot SUQ 476. Overview, rock shelter in the survey area of the Yarmouk Forest Reserve (photo courtesy of DAI Orient-Department/Hartl-Reiter)

GADARA/UMM QEIS HINTERLAND SURVEY

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The Gadara/Umm Qeis Hinterland Survey was initiated in 2010 by the German Archeological Institute. The project focuses on a systematic survey and reevaluation of archaeological and historical sites in the hinterland of ancient Gadara, ranging from Palaeolithic to recent times (Bührig 2015). The survey area is approximately 40 km² and bounded by the Yarmouk valley in the north and the Wādī al-‘Arab in the south. In the west, the survey area extends to the plateau Ard al-‘Alā and to al-Mansūra in the east. The north-eastern survey area is part of the Yarmouk Nature Reserve, established by the Royal Society for the Conservation of Nature (RSCN) in 2012.

The survey deals with questions of settlement topography, landscape use and subsistence strategies. Around 530 sites have been surveyed to date. The main goal of the investigation is to set the ancient city complex of Gadara in relation to the environment and resources in its hinterland. Settlement dynamics and changes in climate of the region from Palaeolithic to modern times are also being clarified.

The first field campaigns produced evidence of Palaeolithic, Neolithic, Hellenistic-Roman and Islamic settlement traces as well as significant new findings on traffic routes, water management systems, quarries, agriculture and economic land use as well as the sacral significance of the settlement catchment area.

The 2016 and 2017 campaigns were concerned with the processing of material, documentation, and short site visits. Fieldwork centered on the analyses of the stone tools. The survey yielded a huge amount of lithic artifacts deriving from several hundred open-air sites and caves. Based on typological criteria, the artifacts date to different periods within the Palaeolithic.

In 2016/17 we evaluated the stone tools from the survey. The first assessment of the lithic material was that settlement in the surrounding area of Gadara/Umm Qeis began in the Early Palaeolithic and continued probably into the Neolithic. The main purpose of assessing the lithics from the survey was to identify artifact types and their chronological depth and to determine the potential for further artifact analysis.

Selected studies in cooperation with the Natural Sciences Department of the German Archaeological Institute (DAI) serve to clarify methodological approaches to climate research and environmental archaeology with particular emphasis on anthropogenic influences. The dendrochronological investigations carried out by Karl-Uwe Heußner in the surrounding oak forests not only documented their growth curves, but also resulted in an age determination of the recent Tabor oaks within a range of 120 to 250 years. Reinder Neef and Harald Kierschner carried out the first floristic vegetation surveys in the Gadara/Umm Qeis region and the Yarmouk Forest Reserve.

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Project website: www.dainst.org/projekt/-/project-display/115540



Fig. 14. Stone artifacts from the 'Gadara/Umm Qeis Hinterland Survey'. a. backed bladelet (medial fragment), findspot SUQ 38; b. pointed blade with bilateral retouch, findspot SUQ 38 (© DAI Orient-Department/Hartl-Reiter).



Fig. 15. Re-sampling selected fields near Abila

One much debated, but still open question is whether and how ancient field systems and agricultural practices can be reconstructed in the landscape. Soils and sediments can geochemically store information about past human activities, while strongly varying amounts of material culture (mainly pottery) on current fields in Jordan very likely testify to certain human activities of the past (e.g. manuring).

A proposal funded by the German Research Foundation (DFG) and Fund for Scientific Research (FWF) conducted intensive, systematic archaeological surveys in the hinterlands of Gadara/Umm Qeis, Abila of the Decapolis, and Umm el-Jimal. These were accompanied by systematic collections of soil samples, both from the surface of the surveyed agricultural fields and olive groves, and from soil and sediment profiles associated with the surveyed areas. Results confirmed the premise that fields around these three sites resemble largely stable land surfaces, although some short but intense periods of sedimentation occurred in the 6th century A.D. and during the Little Ice Age, between the 16th and 19th centuries A.D., which were probably caused by heavy rains and earthquakes.

Preliminary results of the 2014 survey around Abila suggest that a rather complex pattern of material culture is present on the fields, but certain patterns are clearly discernible. For example, biomarkers of pig excrements show a very strong correlation with pottery distribution on the fields, indicating that the (mainly classical, i.e. Late Roman and Byzantine) pottery is connected with specific manuring related to pigs, and/or with pig herding. In order to better understand this complexity, the spatial resolution of soil sampling on selected fields was improved during a short field season in 2017. While the collected pottery had been recorded at a resolution of 50 m, such a level of detail was not yet available for soil samples due to limits of lab analysis capacities. During the re-sampling, soil samples were taken at a resolution of 100 m for certain parts of the transects that had been surveyed earlier.

NORTHERN JORDAN PROJECT

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Fig. 16. Mosaic floor from the atrium of the Area G church (photo: CNRS)

ABILA OF THE DECAPOLIS

David Vila

John Brown University

Abila was a Decapolis city 12 Roman miles east of Gadara (Umm Qeis). The site evidences its most substantial occupation in the Late Roman, Byzantine, and Umayyad periods. However, since the 1980s stratified remains have been excavated indicating nearly continuous occupation from the Early Bronze to the Abbasid periods (with some reuse of the site in the later Islamic eras as well).

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 habitations extended east and north on Tall Abil; (2) to continue the excavation of two Byzantine churches (Areas G and E) in preparation for publication, and for better presenting the churches for tourism; and (3) to excavate a presumed "market-place" in the area adjacent to the basalt road in Area B.

Area AA represents the history of Tall Abil from the Early Bronze to the Abbasid periods. Along the northeast side of Area AA, a fortified wall was uncovered and traced down 2.30 m, but the bottom of the structure was not reached. Further excavation and study during our 2018 season of excavation will hopefully yield evidence of the use of the structure and the possible dates of construction. At present, pottery findings seem to indicate a date of construction during the Hellenistic period, although more excavation is needed for firmer dating.

In addition, work was completed in Area AA Square 5, where excavation was halted at what we believe is 60cm above bedrock, based on findings in an adjacent previously excavated

square. Pottery from the lowest excavated levels dated to the Early Bronze Age, including Khirbet Kerak ware.

After a hiatus of 12 years, three squares were opened in Area B, the "theater cavea," in an attempt to locate a presumed marketplace along the western ends of the black basalt road that runs through the area. Many well-constructed walls running perpendicular to the basalt road were located, but no floor surfaces were reached in 2016. Pottery finds ranged from the Late Roman through the Abbasid periods.

The Area G church is an ecclesiastical structure comprised of a three-aisled, single-apsed basilica with adjacent rooms located on the northeast end of Tall Umm al-Amad. The previous two seasons of excavations (2012 and 2014) focused on the uncovering of a room on the south side of the structure that may have served as diaconicon.

The 2016 season uncovered more of the space leading up to the church from the west, along with clearing of the diaconicon's western end. Three 4 x 4 m squares were opened west of the diaconicon and the narthex space leading to three entrances that open to the central nave and two side aisles. A final photo from Square 43, the central excavated square revealed a mosaic floor surface (Fig. 16).

In Area E, excavations were conducted on the north side of the area following the mosaic paved processional passage first exposed in 2014. On the northeast section of the area excavated in 2016, a large wall was encountered that joined with what appears to be an apse structure (Fig. 17). Further excavation will be needed to determine the exact nature of this structure, but with nearly 12 courses of stones in situ, this structure will likely give us important evidence into the nature of the occupation in Area E. At present excavators are suggesting that the apsed structure, adjoining the main sanctuary of the Area E church is a baptistry, since one has not yet been located in the Area E church.



Fig. 17. Eastern passageway along the Area E "baptistry" (photo: CNRS)



Fig. 18. The painted chamber and sarcophagus, prepared for conservation, restoration, and documentation

The town of Bayt Ras, located in northern Jordan, stands on the site of ancient Capitolias, one of the ten cities of the Decapolis League founded during the Hellenistic period. In November 2016, municipal work to expand a waste-water network led to the accidental discovery of a Roman-period tomb next to a boys' school (see Fig. 19). Scholars have related this structure with another burial chamber, discovered in 1973 underneath the school. The newly discovered tomb is a hypogeal structure with two burial chambers. The larger contains a large basalt sarcophagus which holds human remains (Fig 18). The most significant features of this tomb are the well-preserved paintings and inscriptions on the walls and the ceiling of the largest chamber, covering an area of approximately 62 m². Based on the inscriptions and wall paintings, the hypogeum was probably constructed and painted in the 2nd century A.D.

The original tomb entrance was apparently intact and blocked in antiquity. It was possible to investigate the tomb through the hole created during the accidental discovery, made in an area where the wall paintings had already collapsed. The Department of Antiquities of Jordan (DOA), in partnership with the Sustainable Cultural Heritage Through Engagement of Local Communities Project (USAID SCHEP), implemented by the American Center of Oriental Research (ACOR), Centre national de la recherche scientifique (CNRS), l'Institut français du Proche-Orient (IFPO), Italian National Institute for Environmental Protection and Research (ISPRA), and Istituto Superiore per la Conservazione ed il Restauro (ISCR), have been conducting cleaning, conservation, geological survey, and documentation

BAYT RAS

Jehad Haron

American Center of Oriental Research/USAID SCHEP

Claude Vibert-Guigue

Centre national de la recherche scientifique

of the tomb since April 2017. The authors acknowledge the contributions of Giuseppe Delmonaco (ISPRA team coordinator) and Giovanna De Palma (ISCR team leader) to these activities.

The walls of the painted chamber are without loculi. The basalt sarcophagus is adorned with two lion heads and an uninscribed tabula ansata, intended to bear the name of the tomb owner. Reused carved stones protect the lower part of the coffin. There is evidence of successive phases of use in the tomb, including access post-dating the Roman period. A lead pipe coming from the entrance wall continues in the southeast corner, at the height of a rock bench. A passage in the northeast corner leads to a vestibule. From there, a small wall opening leads to a space where bodies of the dead rested. The one-meter high and uninterrupted frieze running on three walls includes close to 230 figures, 62 tagged by inscriptions in Greek letters. On the south side appear a banquet scene, an enclosure wall, a long grape scroll, rural daily life scenes, and buildings. Towards the east, stands a central scene of prime importance: Zeus Kapitoliος enthroned is flanked by Tyches (Fortunes of the city and of Caesarea Maritima). Three Graces as well as a libation scene underline the god's authority. On the left side, workers are busy around tree trunks (see cover image for part of scene); on the right, are depicted in detail building activities requiring animal transport (camels). This theme continues on the north wall, which on its right side changes themes (libation scene, grouping of deities).

Many ancestral Greek deities intervene in circumstantial aspects: they banquet, they stand together, and they remind the viewer of the religious context of the activities conducted by the different corporations of workers for the Capitolias city inhabitants. The entrance wall presents two mythological tall figures, of which only the Nile River figure is preserved. The magnificent polychromy of the ceiling depicts five Nereids overlapping sea monsters in the company of cupids, around a compartmentalized composition (zodiac signs and planets). The central medallion reveals part of a quadriga (perhaps for Helios?). A painted rock cutting allowed for an object to hang. The open passage at the northeast corner has one tall figure holding objects, while above is a Nilotic scene.

The coexistence of Greek and Aramaic is rare, here enhanced by the workers tagged with words written in the Aramaic language, but transcribed in Greek. Gathered in a hypogeum, three main thematic elements—the landscape (myth foundation), the seascape (Nereids), and the astrological composition (zodiac)—make the Bayt Ras discovery unique.



Fig. 19. Urban Bayt Ras context of the discovery (ancient East Capitolias necropolis)



Fig. 20. General view of the Khirbet Fahl tell, looking NW. The Area XXXII South Field is center left on the tell edge, and the Area XXIII Central Field is center-right on the top of the tell.

PELLA

Stephen Bourke

University of Sydney

Excavations at Pella (Tabaqat Fahl) took place in January and February 2017, the twenty-ninth season of Sydney University work at the site, and concentrated on three main areas, all previously worked (Fig. 20).

South Field (Area XXXII): In the deep sounding (Trench XXXIIBB) west of the Fortress Temple, excavations explored the Late Middle Bronze I period (ca. 1800 B.C.) foundational deposits of what seems likely to be a "Courtyard Palace" form of public structure, the exact function of which remains a matter of continued debate. In deep soundings below constructional surfaces, Early Bronze II (ca. 3000 B.C.) building remains of some grandeur were excavated, and in smaller soundings below these, deposits containing later prehistoric (ca. 5000–4000 B.C.) materials were encountered before excavations concluded.

In a long (10 x 2 m) exploratory probe (Trench XXXIIFF) into the northern face of the deep sounding northwest of the Fortress Temple, the northern monumental entranceway to the Iron Age Civic Building (see Fig. 21a for related object) was finally discovered some 7 m north of 2015 baulks. Structural remains include a long north–south border wall, flanked by rough stone paving and plaster flooring on its exterior (west) side, accompanied by a line of field-stone column bases positioned against the inner (east) face. These structural remains are likely to be part of the east end of a monumental entranceway into the Civic Building (Fig. 21b for related object), lying perhaps 5 m further to the northwest.

Central Field (Area XXIII): In the central mound area (Trench XXIIID), work continued on the Late Hellenistic town house excavations, removing the last Late Roman deposits before exposing another 5 x 5 m area of the Late Hellenistic phase of the very large town house, under excavation since 2011. Further evidence for the

extensive Hasmonean period (ca. 83/80 B.C.) destruction of the site was recovered. A deep sounding sampled two earlier phases of Seleucid (2nd–1st century B.C.) occupation, but no trace of Ptolemaic (3rd Century B.C.) occupation.

A new 5 x 7 m exposure (Trench XXIIIF) was opened about 15 m south of the main Hellenistic period exposure, to examine a large complex of buildings, long suspected of being related to the Mamluk-era mosque (Area XVII) excavated in 1982. This first exploratory trench aimed to date the outer south wall of the complex (visible on the surface), and to begin exploring the nature and sequence of the buildings within the complex. This season three walls (and two rooms) of one major structure (featuring collapsed arches) were examined, displaying three phases of construction and rebuilding, all dating to the Mamluk period, probably stretching over the 13th–15th centuries A.D. Finds included two decorated bronze spoons (Fig. 21c) and a pair of tweezers, and a complete small bronze “incantation” bowl, which together might be characterized as a “medical” toolkit. The complex might be seen as a hospice, dedicated to the welfare of travelers and the local populace.

Tell Husn East Summit (Area XXXIV): On the northeast corner of the Husn summit (Trench XXXIVF), work continued south of the 3.6 m thick mudbrick circuit wall explored in 2013 and 2015, concentrating on the lower two phases of Early Bronze I (EB I) architecture (ca. 3800–3400 B.C.), both pre-dating the circuit wall and associated rubble-stone platforms. The penultimate EB I phase of rectilinear architecture was built upon a huge east–west terrace wall, supporting a substantial multi-roomed dwelling. The earliest architectural phase proved to be apsidal (“sausage-shaped”) in form. While much of the interior of this dwelling remains under the standing west baulk, associated exterior work surfaces, pits, postholes, channels and clay features were exposed, many seemingly involved in olive processing. Below the EB IA deposits, traces of earlier Chalcolithic period occupation (ca. 4000 B.C.) were detected in deep pits cut into the bedrock.

The 2017 excavations on Husn extend the EB occupational sequence back to 3800 B.C., suggesting more than a millennium of EB occupation on the Husn east summit, much of it associated with massive stone architecture. Further work in the Middle and Late Bronze Age Palatial Residence, and in the Iron Age II Civic Building above it, illustrates both the longevity and sophistication of Pella during the Bronze and Iron Ages. The Hellenistic “town-house” excavations on the central tell underline the intensity of the Seleucid re-urbanization process in the Decapolis cities, and the sophistication of urban life during this period. Finally, the strength and importance of the Mamluk-era resettlement of Pella is underlined by the discovery of a hospice-complex, associated with the previously known mosque.

Fig. 21a (top). Gray-green steatite bowl fragment, featuring carved palmettes. From Iron II Civic Building destruction phase, ca. 850 B.C.

Fig. 21b (right). Rhodian amphora. From Hellenistic destruction, ca. 80 B.C.

Fig. 21c (bottom). Bronze Spatulae, featuring molded geometric decoration on handle. From Mamluk Building destruction, ca. 1350 A.D.





Fig. 22. Bone fishhook (RN 160365), phase 4, Wadi Hammeh 27.

The third of three planned fieldwork seasons for La Trobe University's "Ice Age Villagers of the Levant: sedentism and social connections in the Natufian period" project took place in November and December 2016. The research involved renewed excavations at the Early Natufian site of Wadi Hammeh 27 (Edwards 2013), dated to ca. 12,000–12,500 calBC, together with an associated program of scientific survey and sampling along the Jordan Valley. Reasoning that the accessible lower deposits of Wadi Hammeh 27 constitute one of the most important resources at our disposal for evaluating the establishment of settled village life in the southern Levant, the current project has aimed to expose significantly more expanses of the site's basal deposits than had the original 1980s investigations.

The site comprises four constructional phases, of which the upper phase 1 was the only one originally to undergo broad clearance. The new operations were positioned under the part of Structure 1 (phase 1) located in "plot XX F". In 2014 (the first season), excavations reached the phase 2 floor, revealing a series of circles, platforms and other constructed stone features. In 2015 (the second season), a new house was discovered in the underlying phase 3 (upper). This ran inside the line of the overlying Structure 1 but was about half its size and was oriented with a northward facing entrance rather than the westward-facing one of Structure 1. In 2016 (the third season), the basal floor of Structure 3 was revealed (lower phase 3).

Proceeding deeper again, the phase 4 deposits were cleared to the natural limestone substrate. It emerged that the area inside the arc of Structure 3's wall was studded with burial pits, so that it appears that the house was founded to commemorate these foundational burials. Outside (to the north) of the Structure 3 perimeter wall, a complex stone feature (feature 20 = F.20) appeared to mark the internal burials inside the house, reminiscent of the way that the stone-covered pit, F.16, was

WADI HAMMEH 27

Phillip C. Edwards

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found to mark the adjacent F.8 burial in the 1980s excavation of the 'XX F sondage'. Feature 20 was the fourth of a series of superimposed platforms which, along with a number of stone circles and other features on the exterior surface, were rebuilt through the entire lifetime of the settlement across some 500 years. Feature 20 had a large posthole in its center, and its capstones covered a deep pit filled with material (also like F.16). Three pits under Structure 3 yielded evidence of human inhumations. The major find was a burial (feature 29) containing two primary child inhumations: Homo 9, found overlying Homo 10. Human remains were also discovered in two other pits (F.32 and F. 35). The individual in feature 32 was laid to rest with a remarkable cache of long, gracile bone points, of a type not previously found at the site (Fig. 23).

Two other finds from the 2016 season stand out for their exclusivity. The first is a bone fishhook (RN 160278; Fig. 22) from phase 4. It is the first one found at Wadi Hammeh 27, in a bone artifact assemblage numbering over 550 specimens, and where fish remains do not occur. The second piece (RN 160420), an unfinished basaltic vessel, is interesting from a technological point of view. Amongst an assemblage of over 300 basaltic artifacts, it has provided the first sign that basaltic artifacts were made on-site at Wadi Hammeh 27 and not always imported as finished pieces.

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Fig. 23. Elongate bone point (RN 160365) from the Feature 32 burial pit (Phase 4, Wadi Hammeh 27)



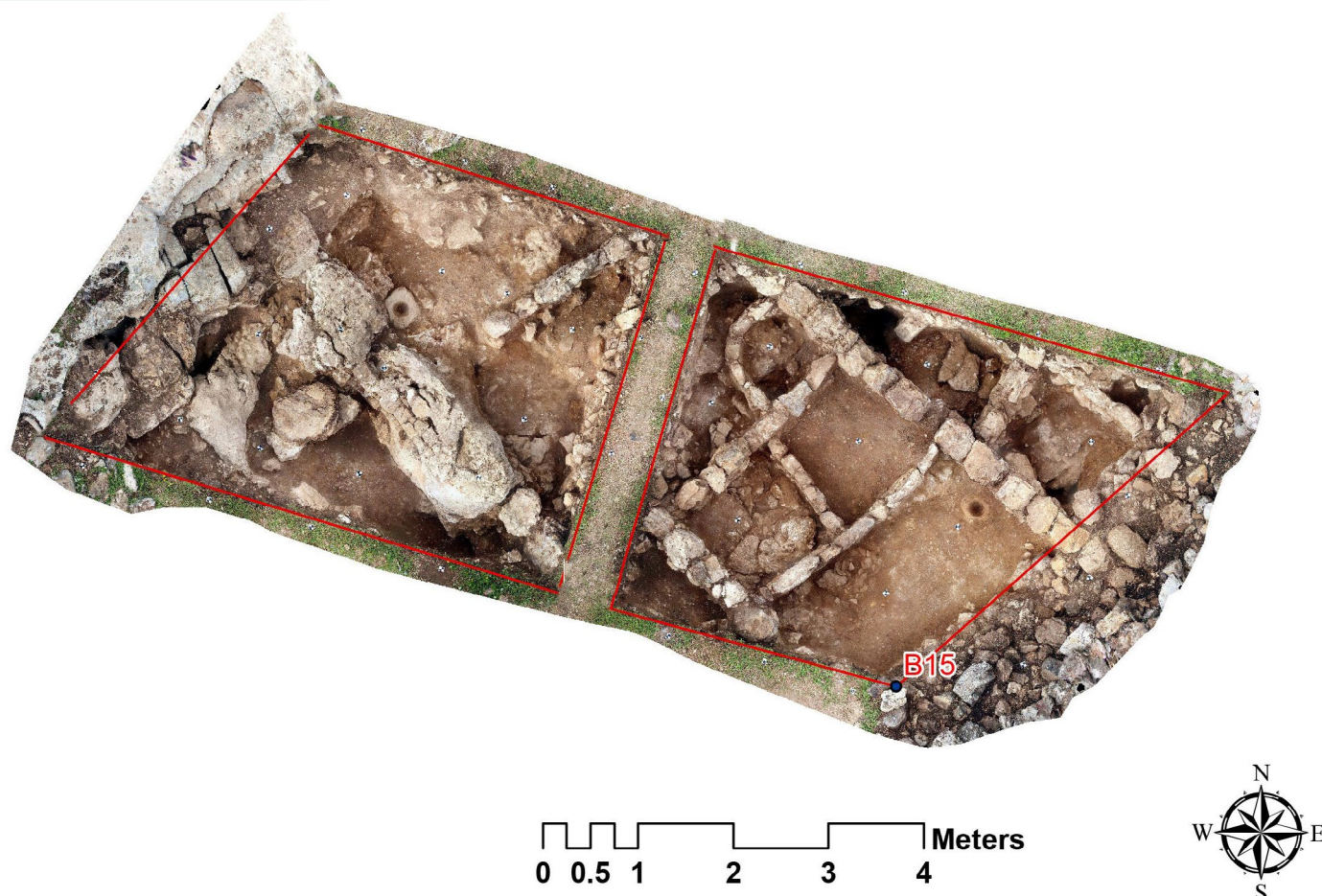


Fig. 24. Photogrammetry model of Trenches 200 and 300 (by Ehab al-Jariri)

KHIRBET UM AL-GHOZLAN

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The Early Bronze Age (EBA) IV site of Khirbet Um al-Ghozlan sits on a small knoll in the middle reaches of the Wadi Rayyan in north Jordan (UTM 749729E, 3588534N). Although only 0.8 ha in area, the site is surrounded by a distinctive enclosure built as a double row of massive blocks across the entry to the site, and a single row of medium stones around the rest of the steep-sided knoll (Fig. 25).

Palumbo (1990) identified Khirbet Um al-Ghozlan as one of several small, newly-founded, enclosure sites in the EB IV settlement landscape. Other examples include Jabal Ruheil, Dhahrat Um al-Marrar and Khirbet Meiyiteh. These are all small sites (0.5–1.5 ha) that are situated on defensible positions, and located in upland zones.

We suggest that these sites may have served as processing centers for upland fruit crops such as olive and grape, and were enclosed to protect seasonally-produced caches of high value commodities, such as oil and wine.

To test this hypothesis, a small team from the British Museum undertook excavations at Khirbet Um al-Ghozlan in February and March 2017. The project was initiated in response to the recent destruction of the northwest portion of the site by a bulldozer, including part of the enclosure wall.

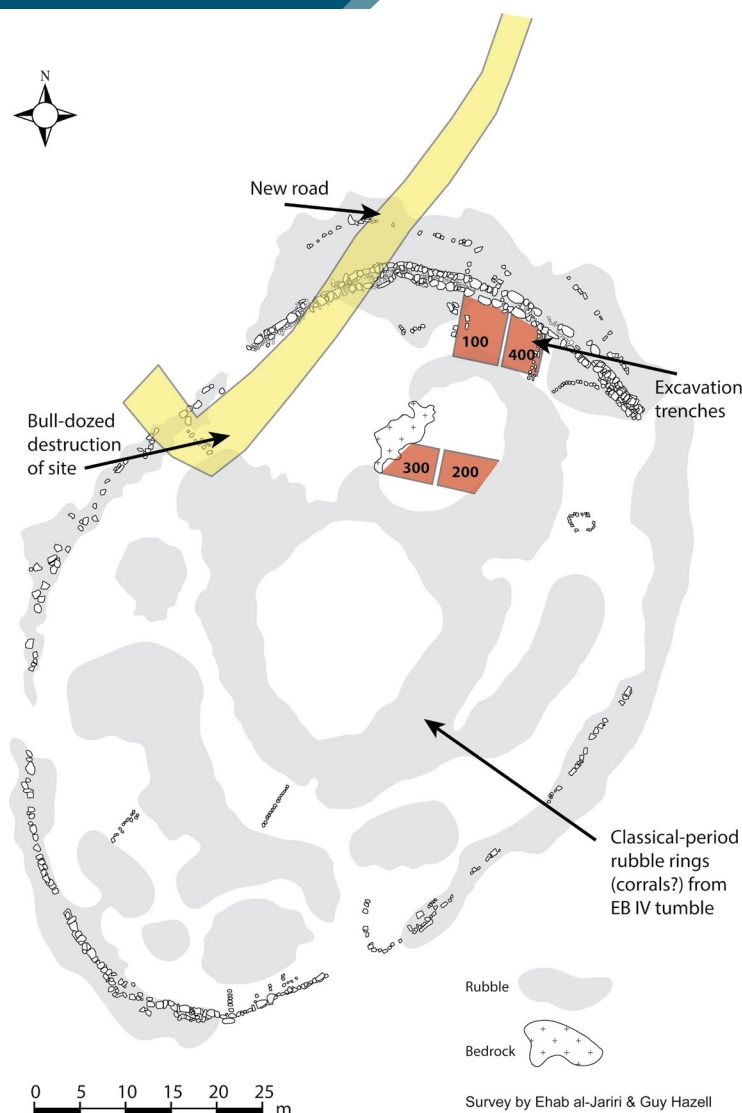


Fig. 25. Plan of Khirbet Um al-Ghozlan showing placement of trenches, area of recent destruction (Surveyed by Guy Hazell and Ehab al-Jariri)

Four trenches were opened in two areas. In Trenches 200 and 300, an architectural complex preserved several courses high was exposed against a bedrock shelf (Fig. 23). A curved bin and two adjacent square cells were likely storage features. Twelve in-situ store jars were found broken but mostly complete, as well as a spouted vat for decanting liquids.

Trenches 100 and 400 were opened against the inside face of the monumental enclosure. Two walls defined a rectangular area with a low, protruding bin. This area was probably an animal pen with a stone feeder trough. A deep, natural basin in an adjacent bedrock outcrop had been used as an EB IV dump.

Excavations indicate only short-lived occupation before the site was abandoned, leaving vessels in situ and walls in place. There is no evidence for architectural modification, and the complex contained only primary surfaces. No hearths or fireplaces were revealed, and deposits failed to produce ashy debris associated with domestic activity. Few animal bones were found, although the small assemblage contained mostly ovicaprid remains. The large ceramic corpus was dominated by narrow-necked and hole-mouth storage jars.

Few organic remains were recovered despite extensive flotation. However, by using scanning electron microscopy for the identification of species, C. R. Cartwright identified small fragments of charred olive pits, probably jift burned as fuel. In addition, all 14 wood charcoal samples were identified as olive wood (*Olea europaea*).

Together, these data suggest that the site may have been seasonally occupied when olive orchards were pruned and harvested on the surrounding hills, and enclosed to protect the cache of high-value oil before its distribution through nearby settlement systems. The implication is that so-called urban features such as fortification systems and specialized production were reconfigured within local settlement networks in the EB IV period, and may have even laid the foundations for the urban rejuvenation of the 2nd millennium B.C. Ongoing excavations are planned as a joint project between the British Museum and the University of Sydney.

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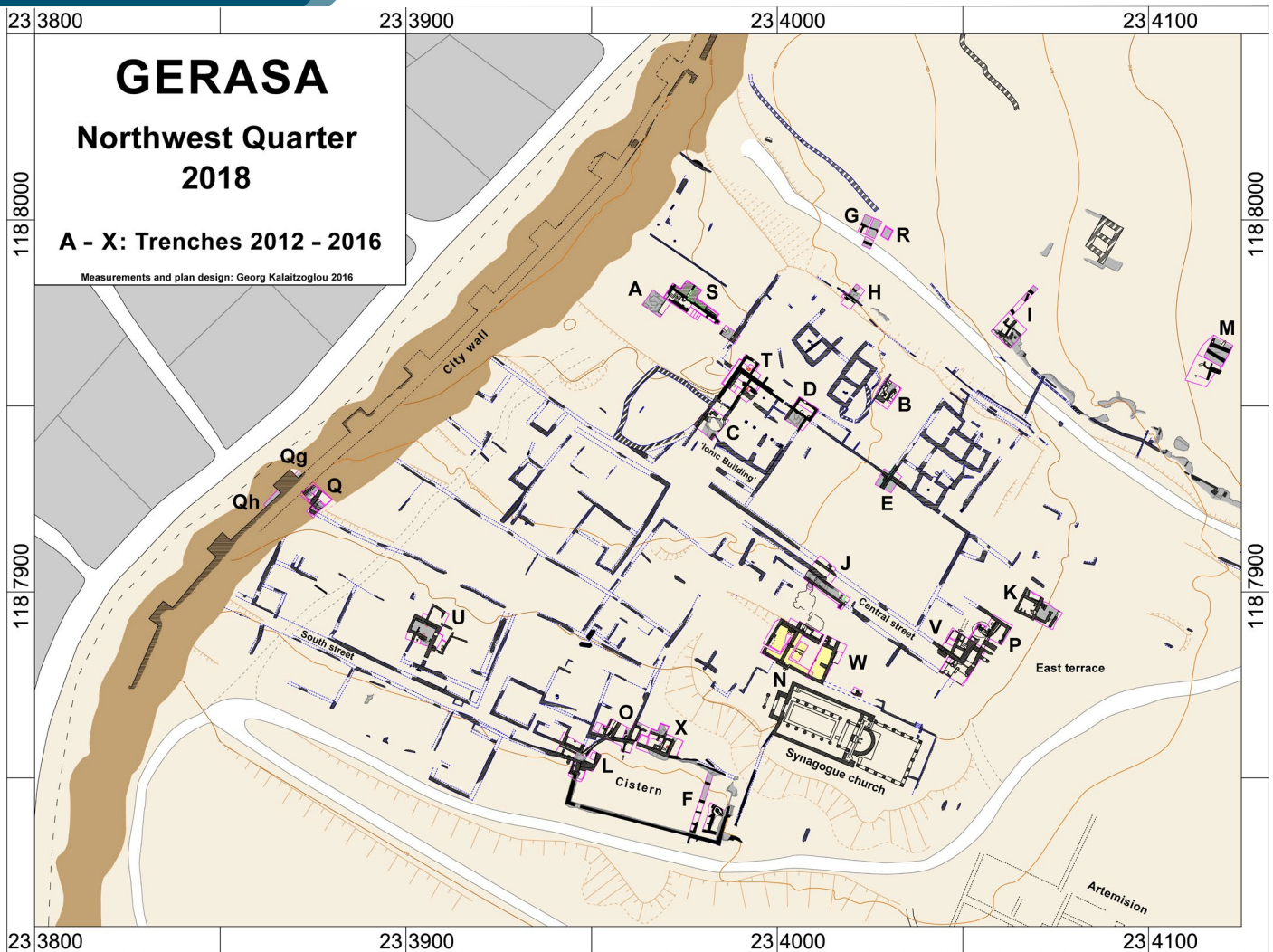


Fig. 26. Plan of the Northwest Quarter with all excavated trenches 2012–2016 marked (image courtesy of the Danish-German Jerash Northwest Quarter Project)

The work of the Danish-German Jerash Northwest Quarter Project, which has been ongoing since 2011, continued in 2016 and 2017 (see Lichtenberger and Raja 2017 for a summary). In 2016, a fieldwork season was undertaken between July and August and in 2017 a shorter study campaign was conducted with the participation of specialists. In 2016, Trenches S–X were excavated and preliminary reports are forthcoming (Fig. 26). Work focused on clarifying research questions that evolved around the mosaic hall on the south side of the Northwest Quarter, the large filled-in cistern on top of the hill, the early Islamic domestic contexts on the so-called Eastern Terrace, housing on the southern slope, as well as the Middle Islamic phases located on top of the hill.

One of the discoveries of the 2016 campaign was a Roman-period cistern in Trench S. A Roman-period building had stood on top of the cistern. The building and the cistern had been completely destroyed and intentionally backfilled at a later point in time. The building was a large monumental complex. The staircase leading down into the cistern held polychrome wall paintings underlining the importance of this structure. The intentional and careful closure of the complex shows that it must have been important. A sediment basin (Trench X), north of the large multi-phase cistern was excavated. This was connected

JERASH NORTHWEST QUARTER PROJECT

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with a concrete floor that had been partly excavated in 2015 (Trench O). The sediment basin is the oldest structure discovered north of the cistern, and it was reused in Byzantine times as the floor of a later building. These discoveries connected with water management clearly show that the Northwest Quarter developed much earlier than hitherto thought and that extensive building activity took place there already in the 1st century A.D.

On the south slope, Early Islamic housing (Trench U) provided insights into the Umayyad settlement in the Northwest Quarter. In contrast to the area next to the multi-phase cistern (Trench F) where all the Byzantine buildings were destroyed and intentionally backfilled, it is now clear that parts of the settlement further east remained in use until the earthquake of A.D. 749.

The continued excavation of the monumental Umayyad courtyard house (Trench V) on the east terrace yielded the southwestern part and the entrance of this Early Islamic building complex. The discovery of an earthquake victim in the Northwest Quarter also counts among the finds. The remains of a young person were retrieved from debris of collapsed walls and soil in the entrance corridor close to the door. Apart from this discovery, the destruction context offers insights into ceramic types and other objects used immediately prior to the destruction caused by the earthquake in A.D. 749. The continued excavation of the mosaic hall (Trench W) (Fig. 26) gave additional information about the construction of the hall, Umayyad re-use of the building, and the earthquake destruction. The excavated northwest corner of the Middle Islamic courtyard house (Trench T) attested to the multi-phase building history of this Middle Islamic edifice and was a further step in subdividing and refining the chronology of the material culture of the Middle Islamic period.

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Fig. 27. Photogrammetric plan of the mosaic hall (image courtesy of the Danish-German Jerash Northwest Quarter Project)

LATE ANTIQUE JARASH PROJECT

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The LAJP examines the southwest district of Jarash over the long durée with a primary research focus on the site's Late Antique and Early Medieval history (A.D. 300–1100). Previous field seasons included a survey in 2011 and geophysics study and excavation in 2015. In 2016, LAJP carried out a study season of mainly ceramic material retrieved from the excavation in 2015. In 2017, LAJP returned to the field to excavate five trenches and to carry out a survey, a finds study, conservation of metal finds (especially coins), and archaeobotanical studies. The following text summarizes selected highlights from 2017.

The focus of excavation in 2017 was on areas that could bring new information to our understanding of the city's water supply, street systems, and residential history. Trench 5 exposed the southwest corner of the area's main reservoir revealing several phases of construction and use. Most significant are a series of steps leading to a cave that predated the construction of the reservoir (Fig. 28). Our examinations so far suggest a caustic system (natural spring) in which water was retrieved manually via the steps. The ceramic assemblage associated with the



Fig. 28. Trench 5 showing steps leading to cave (left side of picture) and southwest corner of a Roman-period reservoir (right side of picture)

cave and steps suggest a construction date in the Hellenistic period. The staircase was blocked and backfilled in the early Roman period before the construction of the reservoir.

Trench 6 explored a north–south running street, which can be traced over 300 m from the triple-church complex to the hilltop in Jarash’s southwest district. Our excavation revealed that in the Abbasid period, the street was stripped to the level of its Roman period surface and two parallel east–west running walls blocked the southernmost extent of the street. These walls mark the second phase of encroachment—in Late Antiquity, residential structures were enlarged onto the street thus reducing its width from 8 x 4 m—but only in the Abbasid period did the street go out of use. The space between the two walls was used to dispose household rubbish, such as animal bones and broken glass and ceramic vessels.

The partial excavation of two residential structures (Trenches 7 and 9) confirmed that Jarash’s southwest district saw a major refurbishment after the earthquake in A.D. 749. Large quantities of ceramics dating to the Abbasid period were retrieved from Trench 7. The excavation of Trench 9 exposed a section of a room that went out of use after a devastating conflagration. The room comprised a stamped clay floor, stone walls, and a flat roof made from wooden beams that supported a thick layer of packed clay. The fire caused the beams to burn and the roof to collapse, thus sealing all material relating to the final use of the room. This material included thousands of carbonized lentils, wheat, barley, and a few figs and dates. The lentils were found in a large pile on top of a stone platform, which implies that they were kept in a sack that disintegrated in the fire. The grain and fruit were found in and around a ceramic vessel that was crushed by the weight of the collapsed roof. This bowl, along with a severely damaged oil lamp, is clearly Abbasid in date. Further analysis and dating of the carbonized material are currently underway.

Next season (2019) of the LAJP will focus on furthering our understanding of Jarash’s water supply and the extent and nature of the area’s residential usage over the *longue durée*.

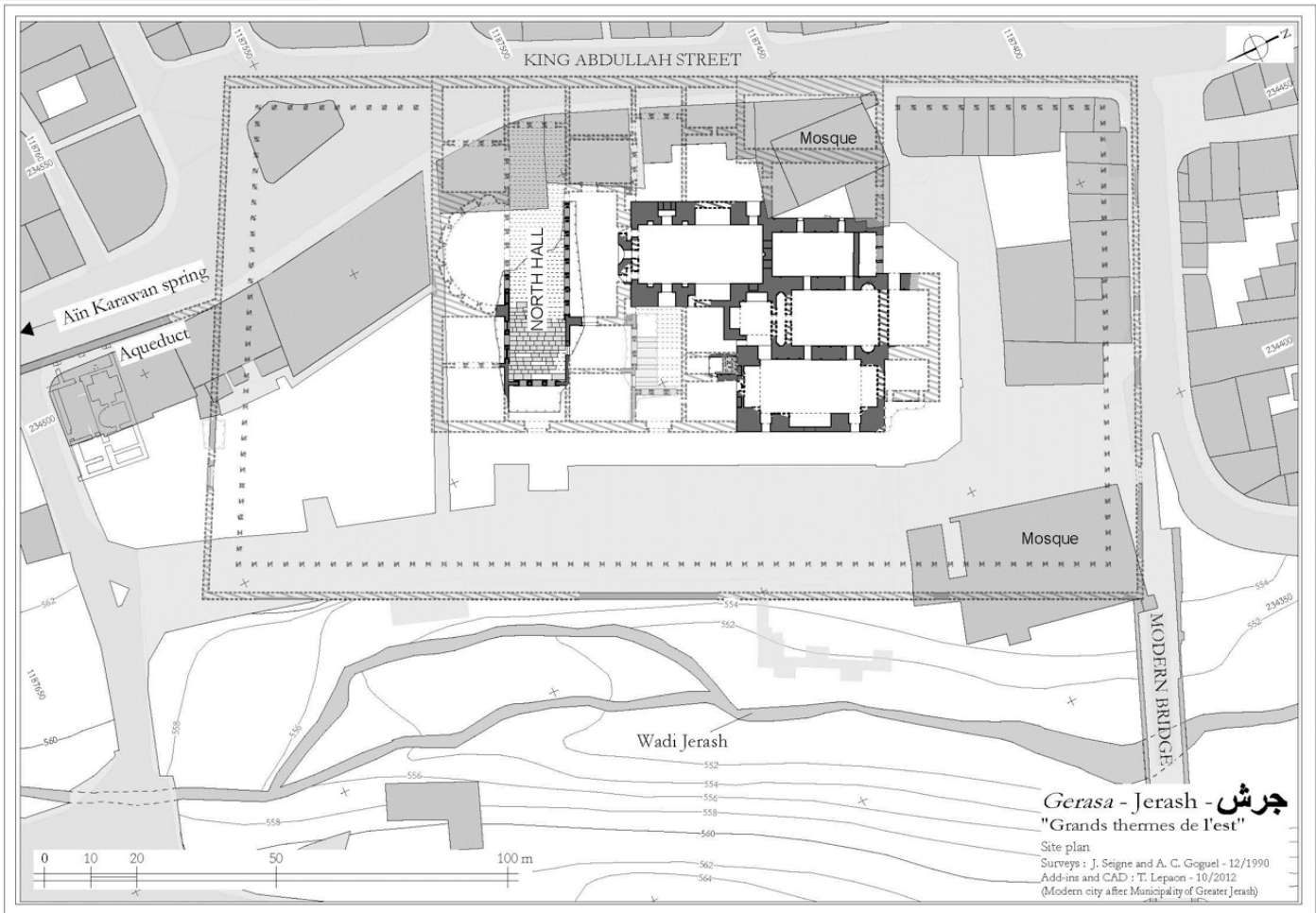


Fig. 29. Plan of the East Baths at Jarash

As one of the few Roman architectural monuments within the modern city of Jarash, the "East Baths" first attracted the attention of travelers in the early 19th century. During an emergency excavation by the Jordanian Department of Antiquities, the remains of a pillared hall with numerous inscriptions and marble statues adjoining the thermal baths came to light to the north. These finds gave rise to a three-year Franco-Jordanian-German excavation project in 2016, financed by the Gerda Henkel Foundation and the French Ministry of Foreign Affairs. The aim was to gain a better understanding of the statuary program of the large public bath and the adjacent pillared hall in the regional context of the Province of Arabia.

The excavations of the years 2016 and 2017 concentrated mainly on the exedra of the north hall and the space that formed the transition between the bathing facilities and the hall (Fig. 29). Beneath a thick surface layer at the then current level of excavations, which apart from very recent material was relatively poor in finds, a horizon of fallen, richly decorated architrave blocks emerged. On the basis of various indicators, the excavators interpreted this finding as a result of the severe earthquake of 749 A.D. After the recovery of these architectural blocks, various larger fragments of statues came to light in scattered depositions. Their collapse cannot be interpreted as

JARASH EAST BATHS

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a consequence of the natural disaster, as significant parts of the statues such as heads, limbs or bases were missing. Rather, it appears that the marble fragments had been deposited here as a hoard for further processing by burning into lime. The statue fragments were associated with Byzantine pottery. Below this layer, the paving of an original Roman swimming pool, consisting of large limestone slabs, was revealed. The connecting architectural elements between the thermal baths and the northern pillared hall consisted of a large water basin accessible from the west via a staircase with two inserted columns. The eastern section of the basin can no longer be studied today, as it lies beneath modern buildings, but if the north–south line running through the apex of the semicircular exedra of the northern hall is assumed to be the axis of symmetry, the total size of the rectangular pool was about 27 x 10 m.

The sculptural remains are of importance for Gerasa and the Provincia Arabia not only because of their artistic quality, but due to their iconographic themes and epigraphic information. The colossal torso (preserved height 2.08 m without head) of the naked Aphrodite (Fig. 30), carved from a block of Pentelic marble, is particularly noteworthy. The five-line Greek inscription on the plinth testifies that the statue was consecrated on A.D. March 20, 153/154 by a priest named Demetrius, the stepson of Asklepiodorus. More than 40 matching fragments of a figure carved from Dokimeion marble make up the near-complete figure of the naked standing Zeus (only the left raised arm and the right hand holding the bundle of flashes are missing). Thus, for the first time, a large-scale statue representing the main god of the ancient city of Gerasa has been recovered. Other torsos from the pool in the Eastern Baths show Asklepius, three of the nine Olympic muses, and a naked male god, as well as other mythological subjects.

The three-year research program will be provisionally completed in autumn 2018 with a combined excavation and restoration campaign.

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Fig. 30. Inscribed statue of Aphrodite found at the Jarash East Baths



Fig. 31. A crushed pottery bowl found next to the remains of a mudbrick building. In the left corner are the remains of a tabun (photo courtesy of Lucas Petit)

TALL DAMIYAH

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Zeidan Kafafi

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As part of the larger “Recycling the Valley” Project, the seventh season of excavations was undertaken at Tall Damiyah in September and October 2016. Tall Damiyah, a small settlement mound on the east bank of the Jordan River, reveals a continuous occupation history during the Iron Age in contrast to the broken histories at neighboring sites. During previous excavation work at Tall Damiyah, the remains of an Iron Age IIC sanctuary were encountered on the summit and it was proposed that this cultic place was used primarily by traders and travelers, even during unfavorable living conditions in the Jordan Valley (Petit and Kafafi 2016). This would explain the continuous occupation at Tall Damiyah, whereas other sites in the vicinity, like Tall Mazar and Tall Dayr ‘Alla, show occupational gaps.

Excavations in 2016 were carried out in three squares on the summit and aimed at investigating the southwestern corner of the sanctuary, unravelling its relationship with a domestic building located to the south, and studying older occupation phases. The area southwest of the sanctuary was unfortunately heavily disturbed by later burials and pits, making it hard to add new information to the already existing plan (Petit and Kafafi 2016: Figure 5). It is, however, clear from results encountered during previous seasons that this area was part of a street or courtyard between the sanctuary and the southern domestic building. Part of it was most likely roofed since several clay loom weights were encountered on the surface in 2016 (Fig. 32). The complete difference of the inventories of the two buildings is

intriguing. It is suggested here that the southern building was primarily used as a living area, whereas the main rectangular building on the summit was intended for cultic purposes. Some of the finds from this phase, such as an Iron Age I figurine, advocate that Tall Damiyah was also used as a cultic place before Iron Age IIC.

An important aim of the 2016 field season was to investigate occupational remains below the phase of the sanctuary, especially in the southern square. The uncovered courtyard layers with several tabuns point to a domestic function, at least of this part of the site. Most of the finds in these layers were extremely fragmented due to frequent trampling.

Below these series of courtyard layers, a fragment of a mudbrick structure appeared that suffered a major conflagration. The wall and associated finds, such as a typical Iron Age II bowl, were dated to the 8th century B.C. (Fig. 31). Excavations of these earlier levels will be resumed in 2018.

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Fig. 32. Loom weights on the surface southwest of the sanctuary (photo courtesy of Lucas Petit)



Fig. 33. View into the Wadi Shu'aib (towards south) with site of Khirbet Shu'aib/WS-006 visible to the right of the Mosque and Shrine of Nabi Shu'aib (photo by A. Ahrens)

The Wadi Shu'aib Archaeological Survey Project (WSAS) was initiated in 2016 by the Damascus Branch of the Orient Department of the German Archaeological Institute. Conducted under Alexander Ahrens, the project focuses on a thorough survey and reevaluation of all archaeological and historical sites in the Wadi Shu'aib, ranging from the Neolithic to Ottoman Periods, starting from immediately south of the city of as-Salt in the highlands down to the city of South Shuna (Shuna al-Janubiyya) located in the southern Jordan Valley.

During the two survey campaigns conducted in fall 2016 and 2017, a total of 27 archaeological sites were recorded within the wadi system. Some of these sites were already known to the scholarly community, but were never recorded and documented thoroughly, while the majority of sites prospected were hitherto unknown (Fig. 33).

Additionally, and as part of the Wadi Shu'aib Archaeological Survey Project, small targeted excavations were conducted in 2017 at the site of Tall Bleibil (Tall Bulaybil) located close to the alluvial fan of the Wadi Shu'aib in the eastern part of the Jordan Valley. In order to retrieve material for further analysis, especially radiocarbon dating, botanical samples were taken from a collapsed northern section of the tell at five different positions and elevations. The results of the radiocarbon analysis

WADI SHU'AIB ARCHAEOLOGICAL SURVEY PROJECT

Alexander Ahrens

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of three of these samples from the earliest levels accessible, all based on short-lived botanical remains (barley, *Hordeum vulgare*), show that the site was inhabited during the Iron Age period (Iron Age IIA/B), with older levels dated to the Early and Late Bronze Ages so far only attested in the pottery assemblage collected at the site during the survey. Additionally, a large mudbrick wall was found protruding from the collapsed section. This is presumably the settlement's city wall or a wall belonging to a larger building complex within the settlement, which seems to have been destroyed in a conflagration, dating to the Iron Age IIA period according to radiocarbon analysis.

The survey of the Wadi Shu'aib as well as the archaeological work at Tell Bleibil will continue in 2018.

Project website: <http://www.dainst.org/project/2824386>

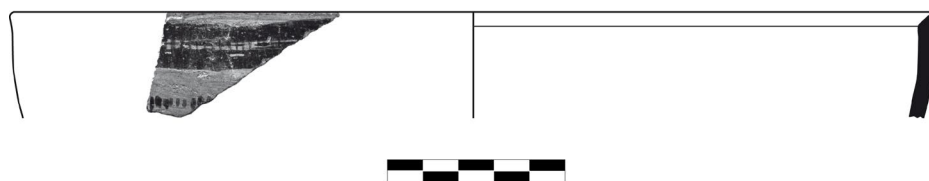


Fig. 34. Fragment of Cypriote White Slip II Ware ("milk bowl") from Tell Bleibil/WS-007 located close to the alluvial fan of the Wadi Shu'aib in the southern Jordan Valley (courtesy of the DAI, Orient Department; photo by A. Ahrens; drawing by B. Briewig and A. Gubisch)



Fig. 35. Dolmen 535 from the North. In front of the dolmen is the earth beaten floor (L. 1007) and the circular installation (I. 1006) are visible.

JABAL AL-MUTAWWAQ

Andrea Polcaro

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The fifth Spanish-Italian archaeological campaign to Jabal al-Mutawwaq was accomplished in May 2016, continuing the excavations of the Early Bronze Age I village and megalithic necropolis. Investigations focused on the Great Enclosure, a large semi-circular structure located in the eastern sector of the village (Area C), an area located in the northern part of the village (Area D) severely affected by modern agricultural works, and Dolmen 535, located on the mountain's southern cliff.

In Area D, two trenches of 2 x 5 m and 3 x 5 m were excavated, identifying a wall (W.161), oriented northeast-southwest, preserved up to 50 cm in width and built with a single row of stones. A hearth was discovered, built directly against the wall. This is similar to those found in the houses of the Early Bronze IA village. The pottery related to the structure is comparable to EB IA pottery discovered in prior campaigns in the village. One loom weight and a basalt vessel have also been recovered. The findings, together with the building technique of the wall and the presence of the hearth, suggest that the structures in the area are the remains of a dwelling dated to the EB IA.

Dolmen 535 was investigated after opening a trench of 10 x 5 m (Fig. 35). The dolmen appears to be one of the largest megalithic structures yet excavated at the site. Unfortunately, it was clear that the inner chamber of the structure has been already looted. The burial chamber (2.8 m long, 0.8 m wide and 2.27 m high) was composed of two lateral slabs, a floor slab and a capstone in limestone. The lateral slabs have two parallel lines carved at the mid-point of their height, suggesting an inner division of the chamber (Fig. 36). The dolmen was surrounded by an apsidal structure, circular at the back with two lateral straight sides. The

frontal side of the dolmen has two stone steps leading into the chamber, which is similar to several dolmens excavated in the 2012 to 2015 campaigns. In front of the entrance, a beaten earth floor (L. 1007) was discovered, apparently of the same phase as the use of the dolmen. In relationship with this floor a circular installation has been discovered to the south, denominated as I. 1006. The installation was filled with layer of sandy earth with a few animal bones collected on the top of it. The pottery coming from the installation and the associated floor can be dated to the EB IB–IIA and consists of few sherds, including from a fragmentary small hemispherical bowl with disk base and a red burnished carinated platter with inturned rim. The excavation stopped at the front of the dolmen in relation to these features, with the aim of continuing investigations in the area during future campaigns.

In Area C East, the Great Enclosure has been investigated along its northern limit with a trench of 15 x 15 m, reaching its northeastern corner against the delimitation wall of the stone structure (W.101), which in some parts is preserved up to three courses in height. The excavation along W.101 clarified its method of construction. It was built with large squared stone blocks laying directly on the bedrock, leveled in some points with layers of rubble and small stones. A few diagnostic sherds, such as flat bases of large hand-made storage jars (orange paste), were recovered in the foundation of wall W. 101, allowing us to date the construction of the Great Enclosure to the EB IA, the main period of use at the Jabal al-Mutawwaq village.

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Fig. 36. The inner chamber of Dolmen 535 from the South. On the lateral slabs the parallel carved lines are clearly visible.



Fig. 37. Blocked gateway L.860 and related features at Khirbet al-Batraway

Archaeological investigations and restorations undertaken by the Rome La Sapienza University Expedition to Jordan at the site of Khirbet al-Batraway, a rocky hill dominating the ford through Wadi az-Zarqa, continued in 2016 and 2017.

KHIRBET AL-BATRAWY

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The site was discovered in 2004 in the northern periphery of the city of Zarqa, and was systematically excavated and restored under the aegis of the Department of Antiquities of Jordan. Thirteen seasons (2005–2017) revealed an Early Bronze II–III (ca. 3000–2300 B.C.) major fortified center, characterized by impressive city defenses, domestic quarters, a temple and a palace, followed by an extensive Early Bronze IVB (ca. 2300–2000 B.C.) rural village.

The 12th and 13th seasons (2016–2017) of excavations and restorations at Khirbet al-Batraway were devoted to the exploration of the northern fortifications, displaced on four roughly parallel lines on the slope of the khirbat (Nigro 2012) and investigated in Areas B North and B South (Fig. 36). Batrawy's multiple city-walls represent a unique summary of the city's history, from its foundation at the eve of the 3rd millennium B.C. (EB II), to its first destruction due to a tremendous earthquake towards 2700 B.C., the following reconstruction (EB IIIA), then another destruction and final fire which destroyed the city around 2300 B.C. (EB IIIB). After an occupational hiatus, in the last two centuries of the 3rd millennium B.C. (EB IVB) a small rural village occupied the ruins of what was once a flourishing city.

In seasons 2016 and 2017, archaeological activities were focused on the investigation of the northwestern stretch of the Main Inner City-Wall (MIW), where the huge Northern Bastion (T.830) spanned it for more than 20 m. Inside the bastion, a blocked gateway (L.860) was identified in 2016, originally opened through the MIW, some 26 m west of Gate L.160 (Fig. 37). The eastern and

western jambs of Gate L.860 were buttressed by squared limestone blocks laid as headers and stretchers in the MIW. The gateway width (3 m) made it impossible to roof the passageway with a sole capstone, and this suggests that a wooden ceiling or a mudbrick vault was used. When the gate went out of use, apparently after the earthquake which hit the city towards the end of EB II, it was carefully closed by a massive wall (W.867), like Gate L.160, possibly to strengthen the MIW. A street, running inside the city-wall, was excavated in the 2017 season for a length of 14 m from the "Palace of the Copper Axes" westwards up to the area of Gate L.860.

The 13th season (2017) has revealed that a limited but substantial occupation in the Late Iron Age was also present on the westernmost spur of the site. A massive building, very badly preserved due to pillaging of blocks and erosion, was uncovered. This was possibly a tower or a keep, cutting through the MIW and Bastion T.830 at the western edge of the excavation area.

In the light of the results of 2016 and 2017, five major occupational periods have been distinguished on the basis of stratigraphy and associated architecture and finds, especially pottery seriation, as well as thanks to radiocarbon and physicochemical analyses on pottery and organic materials. Batrawy periods I–IV correspond to the major occupational phases of the Early Bronze Age (EBI–EBIV), while, a very limited occupation is represented by Batrawy period V with the keep in use in the Late Iron Age (586–333 B.C.). The chronological timeline, the monumental architecture and its extraordinary state of preservation, and the almost unique finds from the "Palace of the Copper Axes", make Batrawy an important reference site for the rise of urbanism in the Early Bronze Age of the southern Levant.

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Fig. 38: The eastern part of the Nymphaeum before (above) and after (below) finishing the buttress construction works (photo by Muath Khawaj)

AMMAN: THE ROMAN NYMPHAEUM

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The Restoration and Rehabilitation Project of the Roman Nymphaeum in Amman provides an example of innovative management practice and applied methods in the revival of urban heritage and serves as an approach towards sustainable heritage preservation (also see Al Adarbeh et al. 2017 and El Khalili 2016).

The Roman period Nymphaeum in Amman, considered to be the largest monument of its kind in ancient Provincia Arabia, had suffered from different deterioration factors that has affected its state of conservation. This led to the monument being considered locally as an example of visual pollution in downtown Amman. Through a joint project with the Hamdi Mango Center for Scientific Research at the University of Jordan, the Department of Antiquities, and the Greater Amman Municipality, it was possible to preserve large areas of the site which needed urgent restoration and conservation. The project (August 2014–March 2018) has been supported by the Ambassadors Fund for Cultural Preservation at the US Embassy in Amman, Jordan.

35 workers, technicians, and experts from the fields of conservation, cultural resource management, archaeology, tourism, and architecture were involved in the project and fifty on-job field training opportunities were offered for university students from fields of conservation, cultural resource management, chemistry, biology, tourism management, architecture, and urban planning. Students were mainly from University of Jordan, Hashemite University, University of Petra, and Jordan University of Science and Technology.



Fig. 39. 3D rendered model of the Nymphaeum, showing the main façade (rendering by Adel Mutawi)

Advanced documentation for the site and surrounding area was undertaken using a 3D Laser Scanner, contributing to drawings of plans, elevations and sections used to document the monument's state of conservation. Scattered architectural fragments at the site were numbered, photographed and drawn, and reorganized and presented in the site.

A comprehensive cleaning of the whole monument was undertaken with different mechanical techniques using low pressure water pumps to remove deposits accumulated on the façade due to air pollution. Tools including small brushes were used to remove crusts and external crystalized salts, as well as any plants and fungi on the stone surface. Chemical cleaning using wet bandages was used on some parts of the monument.

Consolidation included filling the joints of stone blocks with compatible mortar. In addition, chemical consolidation and suitable polymers were used for very fragile stones. For the first time in Jordan, nanotechnology was employed in the form of nano-calcium hydroxide injected in limited amounts into the stone. This penetrates and transforms the stone into calcium carbonate, consolidating delicate internal sections of the building. Some reconstruction of missing structural elements to safeguard the existing structure was carried out which enhanced its overall interpretation and presentation.

The project successfully safeguarded the internal environment of the site including removal of non-site related structures and visual pollution, cleaning the front area of debris, landscaping and installing terraces compatible with the site which proved to be effective during winter season. The open areas and part of the basin of the Nymphaeum were covered with gravel to provide a unified look, enhance visitor circulation, and limit the possibility of vegetation growth. Preparations were made for nine fully illustrated bilingual site interpretive panels, a 3D printed reconstruction model of the Nymphaeum, and online and promotion materials. In summary, this project is a new model for downtown Amman in the way it revives and transforms urban heritage into an open public space and provides opportunities as a cultural forum.

Nymphaeum team members and partners also included Monther Jamhawi and Asma Shahaltogh (Department of Antiquities), Ramadan Abdullah (University of Jordan), Yahya Al Shawabkeh (Hashemite University), and Carlo Bianchini (University of Rome "La Sapienza").

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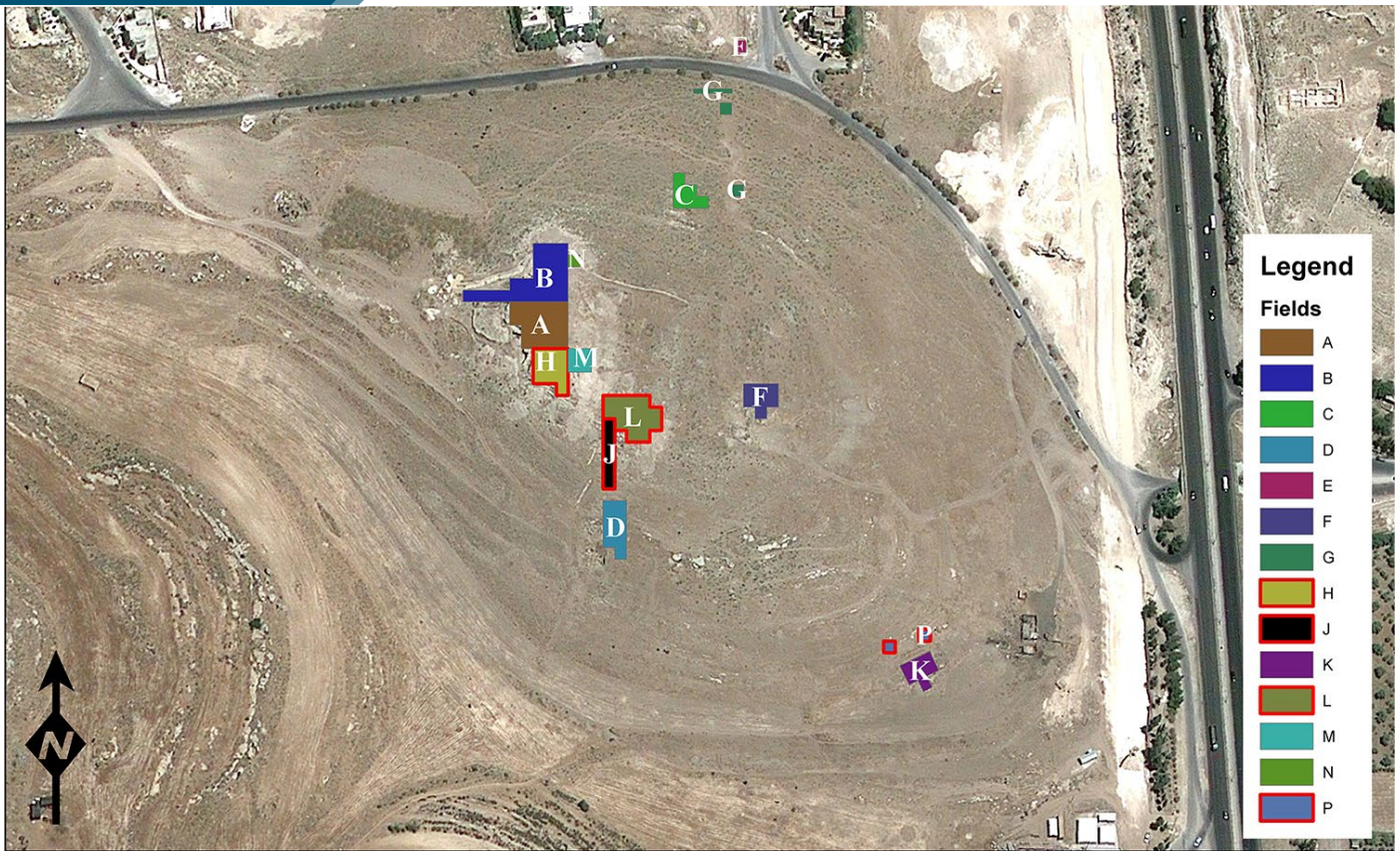


Fig. 40. Aerial image of Tell with Fields (by Matt Vincent)

The 2016 season of excavation at the Madaba Plains Project site of Tall al-'Umayri was focused on four field locations (Fields H, J, L, and P) (Fig. 40) and one hinterland survey location (Site 84). Due to ongoing land-ownership issues at the site, we have been unable to excavate beyond the 2016 season, although analysis of finds and preparations for publication continue apace.

Excavation at the southwestern corner of the 'Umayri acropolis in Field H succeeded in identifying the southern perimeter wall in that location, already suspected of lying beneath Stratum 6 Wall 2 and dating through several periods of reuse at least as far back as Stratum 12 (Fig. 41). In the process, this work exposed an important destruction layer from the end of Stratum 12 that sealed against the wall, helping excavators connect the well-known Stratum 12 western defense system with that along the southern slopes. The discovery of Stratum 12 remains here adds to our knowledge of the extent and nature of the occupation and destruction in a new area of the tell. Recovered artifacts and pottery, related to food storage and preparation, as well as textile production, attest to the domestic nature of the structure which was exposed by means of a small probe.

Elsewhere on the southern acropolis, in Field L, specific objectives for 2016 included attempts to locate and date more of the presumed perimeter wall in the southern portion of the field adjacent to Field J and to understand the Iron I stratigraphy nearby through the continuation of a probe begun during the 2012 season. The main goals of the 2016 season were largely

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met. Fragmentary remains of two large walls (15 and 16) were identified, with Wall 16 possibly being a perimeter wall dating to the Iron Age I. To the north of the wall several superimposed surfaces were uncovered, the earliest, likely from Stratum 12, representing a domestic area which contained one crushed jar on its side; at least four nearly whole pithoi in situ in the same area come from Stratum 10. Nearby to the east and from the Late Iron II Period, there appeared surfaces as well as a large circular stone-lined bin. Stratum 12 was also represented in several earth layers and some architecture in the eastern portion of Field L.

Excavation in a series of squares down the southern slope in Field J, begun in 2014, further established that the southern side of the tell was fortified in the Early Iron I Period (Stratum 12) with a packed-earth rampart, similar to that on the western side of the tell. Probes through the rampart down to bedrock in several locations revealed that it was not preceded by a Middle Bronze Age rampart as had been the case on the western side. An ash layer on the top of the Stratum 12 rampart may be the result of the massive fire that destroyed the site ca. 1200 B.C. A Stratum 6 rampart overlay the detritus of the Early Iron Age version.

Work on the southeastern shelf near the dolmen continued to ground-truth GPR data from 2013. Here, in Field P, excavation in the vicinity of two bedrock anomalies indicated by the GPR data did not reveal tombs but rather natural fissures and gaps in the limestone bedrock shelves. While some apparently domestic features were uncovered in Field P, most areas excavated to bedrock did not yield remains.

At Site 84, several of the best examples from 30 agricultural installations were cleaned and photogrammetry was conducted. These features represent utilization and increased exploitation of the agricultural landscape in the 7th and 6th centuries B.C.

Project Website:

www.mabadaplains.org/umayri/

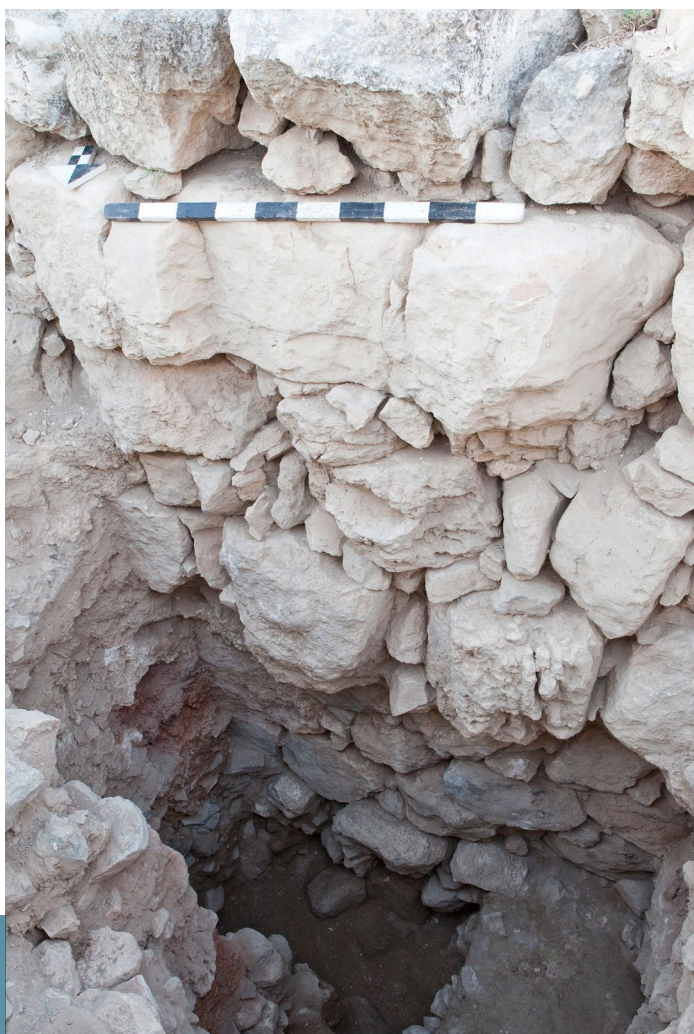


Fig. 41. Perimeter Wall in H 7K02 with Stratum 12 construction phase at the very bottom (photo courtesy of Douglas R. Clark)



Fig. 42. Fragment of an enameled glass beaker or bowl, with heraldic blazon and Arabic inscription (photo courtesy Felicitas Weber)

HISBAN CULTURAL HERITAGE PROJECT

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The 2016 excavation season at Tall Hisban took place over three weeks in May and June and focused on the western, northern and southern slopes of the tell. In addition to continued efforts at improving visitor access to the site and conservation of the standing ruins, the 2016 season was designed to address questions related to the history and development of the medieval Islamic settlement.

The well-preserved architectural remains of the farmhouses supporting the Mamluk-era castle, with their barrel vaults and beautifully plastered walls and floors, remain the most outstanding feature of the discoveries made in 2016. They are preserved in four fields, three of which were studied in detail this season, aided by photogrammetry and 3-D modelling.

Excavations on the southwest slope of the tell (Field O) have revealed a complex of four vaulted, single-roomed farmhouses, abutting one another and opening onto a shared, walled courtyard. One house was particularly well preserved, and a small storage space, partitioned in a corner and paved with octagonal flagstones of purple-hued flint, produced a quantity of imported glass and ceramics (Fig. 42). Extensive limestone detritus and flint debitage and worked flakes, the debris from stone working for house construction and apparent flint-knapping, were recovered from the courtyard. The structure's foundation trench was reached, confirming an Abbasid construction date. The house was reoccupied and rebuilt in the Mamluk period.

Above the reservoir (Field B), excavation continued of a single

Mamluk-era structure, which incorporated components of a Late Byzantine house. Excavations in 2013 and 2014 revealed a stone-outlined pit with three complete jars—two handle-less jars of Syrian underglazed ware of the 14th century and a small, handle-less handmade jar. Residue analysis of the contents of these jars in 2017 documented their use as storage for olive oil and goat cheese, suggesting that one room of this structure in the Mamluk period was a pantry (Walker et al. 2017).

A series of parallel vaulted buildings, built downslope, cover the north slope of the tell near the garrison wall (Field M). Excavation of one of these structures was completed, and its changing functions and history of construction and use were clarified, aided by integrated zooarchaeological, archaeobotanical, and phytolith analyses. Built in the Mamluk period, on ancient walls, this building, in its latest phase, was used as a kitchen, with tabuns built against one wall. A large vaulted, subterranean structure was also discovered below this chamber, connected to a vast cistern.

Excavation of a large, isolated farmhouse in Field P, southwest of the tell, continued this season (Fig. 43). The foundation trench was reached, providing evidence of construction in the Late Byzantine or Early Islamic period, with heavy restructuring in the Mamluk period, and sporadic reoccupation throughout the Ottoman era. The structure includes a walled courtyard, with multiple installations and animal pens subdividing the space in the 19th century.

The Hisban Cultural Association held two cultural events in the garden at the site's entrance during the excavation season, in celebration of Jordan's Independence Day and the Thawra. Members of the Association, Municipality, and local families attended.

REFERENCE:

Walker, B. J., R. Bates, S. Polla, A. Springer, and S. Weihe. 2017. "Residue Analysis as Evidence of Activity Areas and Phased Abandonment in a Medieval Jordanian Village." *Journal of Islamic Archaeology* 4(3): 217–248.



Fig. 43. Farmhouse and courtyard in Field P (photo courtesy Nicolás Pini)



Fig. 44. Remains of an Iron Age tower at Khirbet al-Mukhayyat

The summers of 2016 and 2017 marked the second and third excavation seasons of the Town of Nebo Archaeological Project (TNAP). The town of Nebo (or Khirbat al-Mukhayyat as it is known today) is located at the western edge of the Madaba Plateau, overlooking the Dead Sea and the Jordan Valley. Prior archaeological research at Mukhayyat has focused on the Byzantine remains at the site. TNAP was conceived to address this lacuna and explore broader themes, such as pilgrimage, economy, and landscape, across multiple cultural and historical periods. The summer of 2014 marked our inaugural season of excavation at which time three fields were opened. Since that time, excavations have concentrated on Field B, on an artificial rise to the south of the acropolis, and Field C, located north of the acropolis.

Field B produced a number of interesting finds during the 2014 season and thus was also the focus of excavations in 2016 and 2017. The presence of monumental architecture prompted initial investigations in this area. This structure has now been identified as an Iron Age tower (Fig. 44), which would have been incorporated into the defensive system identified in other areas of the site. Additional evidence of Iron Age occupation has been uncovered in Field B, namely a series of surfaces and a small northeast–southwest wall.

There appear to be two distinct Hellenistic occupation phases in Field B. The earlier phase is defensive in nature and is associated

KHIRBET AL-MUKHAYYAT

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Fig. 45. Plaster installations surrounding the late Hellenistic miqveh

with the replacement of the masonry in the southeastern corner of the tower with large, well-cut ashlar blocks. The later phase appears to be associated with ritual activities. Since the 2014 season, over 40 intact cooking pots have been recovered from different fill layers in Field B. This ritual activity consisted of placing cooking vessels upright on the ground, regardless of the steepness of the slope. The soil that surrounds them contains a large amount of Iron Age pottery, suggesting that these cooking pots were intentionally buried using fill from earlier cultural levels in the surrounding area. These cooking pots may be associated with some type of ritual feasting activity that took place seasonally at the site.

Field C was the focus of excavations in 2014 and 2016. Initially, work began in the central part of Field C; however, it became obvious partway through the 2014 season that there were no structures or clear occupational levels here. Excavation activity then shifted to the western edge of Field C in hopes of exposing part of the site's fortification system. In addition to revealing more of the defensive wall, work in this area in 2014 succeeded in uncovering a plaster-lined, stepped ritual bath (or miqveh) dated to the Late Hellenistic period. Excavations in 2016 in the area surrounding the miqveh produced a number of plaster installations (Fig. 45) that may be associated with agricultural activities in this area. More of the Iron Age fortification wall was also found in this area.

TNAP's 2016 and 2017 seasons were an overwhelming success. We will return for a fourth season in the summer of 2019, when we will hopefully be able to answer some of the lingering questions that our excavations have produced.

Project website: www.townofneboproject.com



Fig. 46. Square B4 Probe, showing the Upper (Locus 5), and Lower (Locus 10) Pavements, and revetment wall (Locus 13)

TALL JALUL

Paul Gregor

Robert Bates

Paul Ray

Constance Gane

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Andrews University

The 2016 and 2017 seasons of excavation at Tall Jalul were conducted in May and June 2016 and June and July 2017 by faculty and students from Andrews University. The excavations were directed by Paul Gregor, along with co-directors Constance Gane and Paul Ray.

Field B, on the eastern edge of the tell, was originally opened in 1992. Two superimposed flagstone pavements were found, with the lower of the two pavements initially dated to the early 9th century B.C., and the upper pavement to the 9th/8th century B.C.

The purpose of these two seasons in Field B was to clarify the stratigraphy between the upper and lower pavements in order to provide a firmer date for their construction. Two large probes were opened in Squares B2 and B6, in 2016, with a third (in B4) in 2017, each supervised by Robert Bates. In two probes (B2 and B4), sections of the upper pavement were removed, and the soil excavated until the lower pavement was found. In the probe in Square B6, the lower pavement was removed, as its upper counterpart had been robbed in antiquity. In each probe, excavation revealed sections of a previously discovered revetment wall.

Due to the optical illusion of working on the side of the slope, and some occasional flat-lying stones, it was thought at the end of the 2016 season that there were at least three phases of



Fig. 47. Square B6 Probe, Jacob Moody, standing on Lower Pavement, operating camera on top of wonder pole with iPad app

pavement on the northern end of Field B. Further south, the probe in Square B6 underneath the lower pavement yielded considerable ceramic finds, but no evidence for additional pavements.

Between seasons it was discovered that the lower pavement, examined in the probes in Squares B2 and 6 were the same, being on a 6.5 degree (11% grade) slope, and that the lower pavement in Square B2 was located 0.40 m below the revetment wall, instead of sealing against it, as in Square B6. With the third pavement idea ruled out, a new probe, in Square B4, was opened in 2017 to help provide answers to this problem.

In the process of excavation, it was discovered that one of the stones of the upper course of the revetment wall was not fully supported by the course below, and was offset laterally, outward by 0.10–0.15 m, only supported by soil and chink stones. When the supporting soil was excavated, it was found that revetment wall changes direction by ca. 10 degrees east, resulting in its passing over the lower pavement in Square B2.

As in Square B6, it was found that the section of the lower pavement in Square B4 seals against the revetment wall, suggesting their contemporaneous construction. It also suggests 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. The ceramic evidence suggests that the lower flagstone pavement was built in Early Iron II, a date consistent with the material found previously.

Field W was opened in the 2010 season in order to explore the nature and function of a channel and reservoir discovered earlier. Seventeen squares have been opened and excavated between 2010 and 2017, with parts of the eastern, southern, and western walls and the floor of the reservoir exposed. On the basis of the ceramic evidence from where the eastern wall of the reservoir cuts the floors of an earlier building, it would appear that the structure was constructed during the 10th century B.C., with the earliest material on the reservoir floor indicating that it went out of use during the last part of 7th century B.C.



Fig. 48. Ottoman-period settlement in 2017

The Madaba Regional Archaeological Museum Project (MRAMP) is an American-Italian-Jordanian collaboration formed in 2015 and committed to establishing a new regional archaeological museum in the city of Madaba. The ultimate objective of MRAMP is to prepare the area of the Madaba Archaeological Park West, in downtown Madaba, as the location for a new museum in order to preserve and display archaeological materials from the numerous excavations in the Madaba region. Sponsoring entities of the project include the author-affiliated institutions, in cooperation with a large number of local and international stakeholders, including USAID SCHEP, implemented by ACOR.

Specific objectives include a number of archaeological and conservational interventions; repurposing of the current Madaba Archaeological Museum; identification of an extensive network of stakeholder groups; educational collaborations; and, most importantly, an intentional, pervasive commitment to community archaeology which recognizes cultural remains as a public asset to be protected and preserved for future generations.

Up to this point in time the project has mounted two successful seasons of excavation and clearing of debris accumulated in the Ottoman-period settlement since excavations ended more than 20 years ago. An initial pilot season took place in May 2016 and a second, follow-up season in May 2017, with at least one more planned for May 2018.

In 2016, work focused on re-exposing three major architectural

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structures aligned north–south and adjacent to the west wing of the Burnt Palace: Buildings 1 and 2 and Courtyard 3 (Fig. 48). The MRAMP team was confronted at the beginning with a dense jungle of grass and brush growing vigorously from the accumulated inter-seasonal debris since the Ministry of Tourism and Antiquities/ACOR excavations of the 1990s. Before and after photos reveal starkly the problems of neglect and the promise of cleaning and clearing; the change over two weeks was dramatic. The western portion of the settlement was left untouched by MRAMP until the next year.

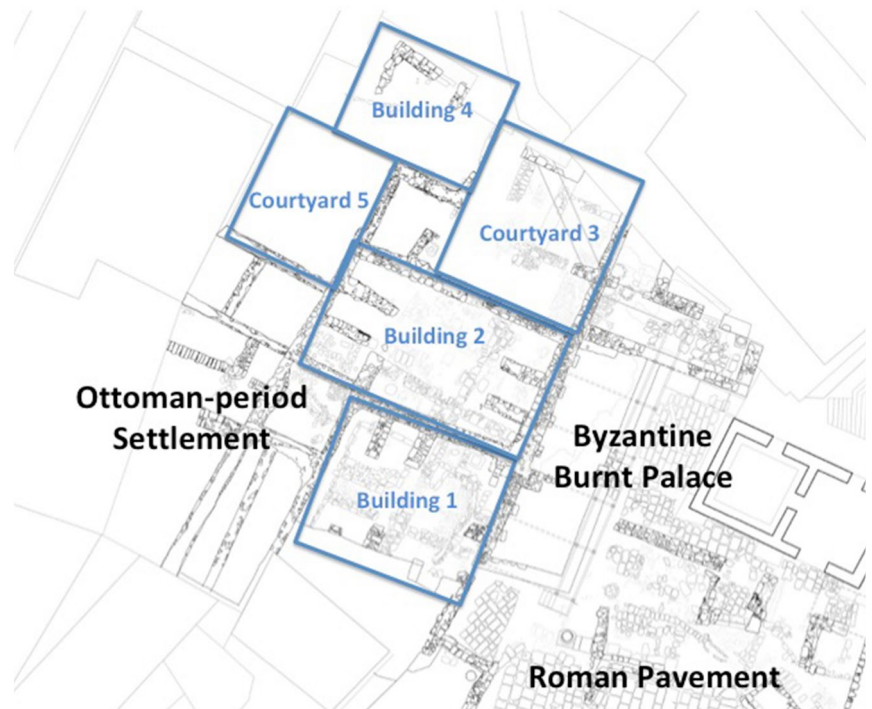


Fig. 49. Topographic map of Ottoman-period settlement with structures identified

The focus of the 2017 season was to continue cleaning operations and to document further the area of the Ottoman-period settlement (Fig. 49). In continuity with the work undertaken the previous season, the aim of these operations was to enhance the presentation of the area and further understand the superimpositions of the different exposed architectural phases. The team also expanded clearance activities to Building 4 and Courtyard 5.

As part of the design of MRAMP/SCHEP, training and capacity-building have been central components since the beginning. Examples include:

- Four workshops, two stretching into 2018. Mosaic conservation and stone wall consolidation constituted the 2017 components, both supported by the Center for Ancient Mediterranean and Near Eastern Studies (CAMNES) in Italy.
- The Italian National Council of Research (ITABC-CNR) supported laser scanning of the entire area in preparation for the work of architects, as well as geo-resistivity sub-surface mapping for anomalies.
- The Italian architectural firm Studio Strati of Rome prepared architectural plans of the park and created a 3D model of the future building.
- Numerous local workers and technicians were employed, many of them improving job-related skills in the field of cultural heritage preservation, with the support of USAID SCHEP.
- Local school children have visited the site to learn about the value of their heritage.
- Undergraduate and graduate architecture students from three universities—American University of Madaba, University of Jordan, and Hashemite University—have worked on academic projects related to the proposed Madaba Museum.
- An official launch in May 2017 attracted members from several communities: ambassadors, officials from the Madaba governorate and municipality, the Ministry of Tourism and Antiquities and the Department of Antiquities, descendants of late 19th century families who established modern Madaba, local business people, and other members of the community.



Fig. 50. Trench 3 (right) and Trench 4 (left) with features (picture is slightly distorted and pointing south)

MURAYGHAT

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The central knoll of Murayghat (Area 1) was intensively surveyed in 2016 and 2017. During that process 105 squares (10,500 m² or just over 1 ha) have now been surveyed, documenting the visible bedrock in 1:100 plans; while cup-marks and any other surface structures were documented in more detail. Over 40 cup-holes have been documented. There is a concentration of them along the edge of Wadi Murayghat, where in some cases groups of four and six have been found. They are usually around 15 to 20 cm in diameter and of widely differing depths.

The systematic survey of areas around Area 1 concentrated on Area 4 (Fig. 51), but included features in other parts of the site. Seven rock terraces form the slope up to the hilltop of Area 4. The fields of archaeological investigation are arranged along these geographical formations. The dolmens are situated along the terraces. The dolmens found in Area 4 consist of one floor slab, one or two side stones/orthostats at the long sides, one end stone at each short side (often missing) and a capstone. Most slabs (side, floor, and roof) are better smoothed on the inside of the dolmen, while the outside is weathered. The floor-slab as well as the blocking slabs at the entrances are much smaller than the orthostats and the capstones. Six small ancient quarries have been documented in Area 4, which are usually in the direct vicinity of a dolmen and indicate by their shape that the dolmen

slabs might come directly from them. On top of Area 8, structures have been recorded, including a tower. The tower most likely dates to the Late Antique period.

In Area 7 to the east, three collapsed dolmens and surrounding structures have been recorded. The dolmen L.7008 is one of the largest found so far at the site, with the side stones being 3.2 x 0.45 x 0.95 m (length, width, height) and 3.3 x 0.3 x 1.25 m. The inside chamber is 2.2 x 1.45 x 0.95 m and filled with soil and rubble. Close to the dolmen runs a wall of 8.5 m length, 0.85 m width and 1.7 m height, forming a large terrace for it. Two tracks run from Area 7 on the plateau down to Wadi Ma'in. These might have been ancient pathways running more or less parallel to the modern Ma'in road that replaced them. One of them leads close to the Early Bronze Age site WZM 01 in the Ma'in valley.

Trenches 3/3.2/3.3 had an excavated area of 65 m² and Trenches 4/4.2/4.3 had an excavated area of 64 m² (Fig. 50). The long, badly made Wall 7 was excavated in both trenches. Wall 7 is joined by curved Wall 11 in Trench 3 and runs over a large pit in both trenches. In Trench 3 other late, unsubstantial walls of the Middle Bronze Age, without connected surfaces were excavated, documented, and removed. The stone-lined pit, already excavated in 2014, is roughly contemporary with these MBA walls. The MBA walls were all above a surface (L.1701), which sealed the larger, more substantial Wall 14, which might date into the Eearly Bronze Age. This wall ends at a line of large, toppled orthostats (L.1723), which have not been completely excavated. In Trench 4, some late, very badly made walls joined Wall 7. Several double-faced, large walls (1, 15, 19) were further excavated, which seem to frame a large platform made from irregular boulders. All of these walls in Trench 4 were covered by at least one flooding event, which left particularly in the east of the trench a deep alluvium layer. Below Wall 1 a huge limestone block (with cup-mark and posthole) and a curved line of stones were excavated, which undoubtedly date to the Early Bronze Age.

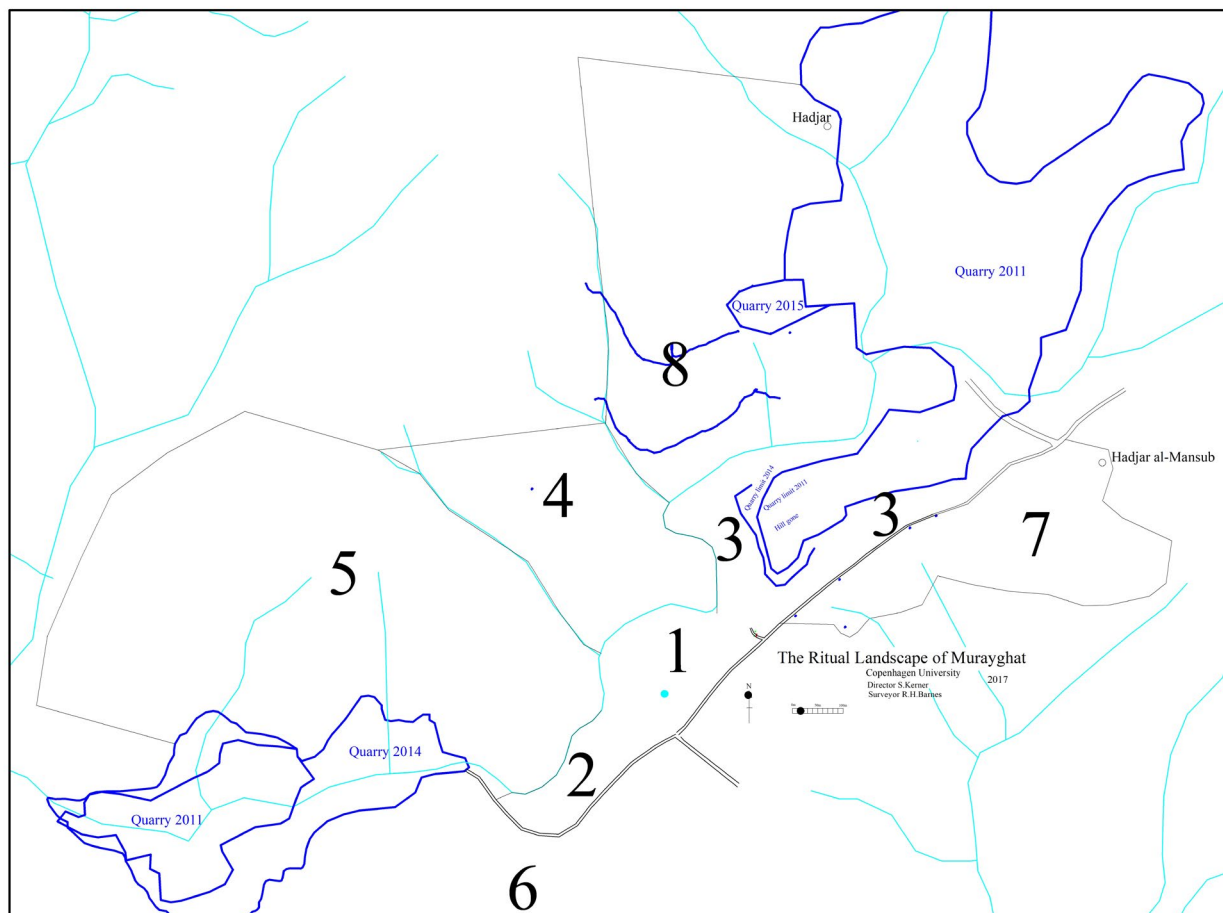


Fig. 51. Map showing investigated areas and locations of modern quarries at Murayghat



Fig. 52. Plan of Machaerus

The Hungarian Academy of Arts in collaboration with the Studium Biblicum Franciscanum has been conducting archaeological excavations and architectural surveys at the Herodian fortified city of Machaerus since 2009. During our eighth and ninth archaeological seasons, in September–October 2016 and in September–October 2017, among other important discoveries, we excavated and surveyed a previously unknown part of the royal citadel of Machaerus.

The original intention of the fieldwork was the uncovering of the uppermost streets of the Herodian lower city in Machaerus, and collecting additional architectural elements for our ongoing anastylosis project. We discovered outside the surrounding wall of the Early Roman fortress the previously unknown and lost part of the Herodian royal palace. We have revealed its northern wing together with the complete fourth tower of its fortification. In addition to this huge tower, we have excavated the two Herodian halls with a general quadrilateral layout next to the royal courtyard, that were erected between the huge Hasmonean fortification wall (on the northeastern side), and the Herodian wall of the Doric peristyle courtyard (on their southwestern side), in a ca. eight degree angle (Fig. 52). In addition to these, we have also revealed a third, previously unknown Herodian hall, with a concave-pentagon-layout, where we have discovered and fully excavated the remains of a Herodian ritual bath (miqveh).

MACHAERUS

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Inside the Hasmonean origin tower we completed the excavation of another previously unknown Herodian miqveh, the fifth found since 1968, but in a king-size degree in comparison to the previous ones. Such a monumental measure was only known previously on the West Bank of ancient Judea (Vörös 2017). This miqveh is the largest ever revealed in Transjordan (Fig. 53). One of the great discoveries of the 2017 excavation season was the unearthing of the previously unknown citadel-gate of the Early Roman garrison towards the lower city. Even though the service-gate has survived in a poorly preserved manner, the meeting point of the Hasmonean and (later reused) Herodian wall with the polygonal Early Roman surrounding wall, clearly indicates its original place. Similarly to the Herodian gate in the southeastern side of the southwestern bastion, the Early Roman citadel-gate used for its foundation the ruined Hasmonean wall.

The area of the 2016–2017 archaeological excavation seasons, that complemented each other and explored the last, unknown part of the Herodian citadel, was ca. 1,000 m². The area consisted of two-meter-high accumulated debris on average, but in some places the ancient detritus reached eight meters in height. The final report will be published in Milan (Edizioni Terra Santa) in 2019, as the 56th volume of the Jerusalem Collectio Maior series of the Pontifical Studium Biblicum Franciscanum and entitled: *Machaerus III: The Golden Jubilee of the Archaeological Excavations – Final Report on the Herodian Citadel – 1968–2018*.

REFERENCE:

Vörös, G. 2017. "Machaerus: A Palace-Fortress with Multiple Mikva'oth." *Biblical Archaeology Review* 43(4): 30–39, 60.

Project website: www.machaerus.org



Fig. 53. The monumental royal Herodian miqveh of Machaerus



Fig. 54. View of the EB III mudbrick horseshoe-shaped tabun at Khirbat Iskandar (photo by G. Kochheiser)

KHIRBAT ISKANDAR

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In view of the substantial rural Early Bronze IV occupation at Iskandar, the project has concentrated on investigating this enigmatic period, demonstrating that there was a high level of complexity and continuities of urban-like traditions with the preceding period. Excavations over several seasons have revealed a substantial EB III settlement with multiple phases and rebuilds of the fortifications. This report presents the results of our 2016 season in a summary of exposure-by-season objectives.

The latest (phase C1) EB III settlement on the mound was discovered under a massive destruction phase. Horizontal exposure of the latter revealed a central room, possibly a storage area, along with courtyard and ancillary buildings. To expose more of the earlier EB III (phase C2) phase, we reopened Square B1 at the NW corner of the mound in Area B where excavation had exposed a series of hearths in the western half of the square. In 2016, the eastern half of Square B1 revealed an activity area with an unusual mudbrick platform and a horseshoe-shaped tabun (Fig. 54). The mudbrick debris and ash across the area in association with the tabun and hearths appear to represent an extensive work area, possibly a kitchen.

To further investigate the fortifications on the western perimeter, we reopened Square B4A in Area B. In 2013, a new perimeter

wall (B4A006) was discovered abutting the NW corner of the tower, running parallel to and outside a later EB III/IV western perimeter wall (B2A053). In 2016, we determined that the remains of the new wall stand to a height of 1.75m, which with its 2m width represents a substantial fortification in the EB III Phase C. To further investigate the relationship between these two walls, we expanded Square B5A/5B downslope, where a segment of a major wall line was apparent. In the small area, results were ambiguous. To uncover further evidence for connections between EB IV Phases A–B and the fortifications (the later W.B2A053), we expanded with half a Square (B21A) to the west. While the season ended before we could clarify the relationship between the Phase B domestic area and the wall, it appeared that the upper Phase A domestic structures were built against the defensive line.

We returned to the Area C “gateway” on the southeast corner of the mound to test the three-phase EB IV stratigraphy that we articulated in Richard et al., 2010. To address this objective, we reopened Squares C6 and C8 on the eastern edge of Area C. In Square C6, we further exposed Phase 2 Wall 6039 as well as Phase 1 Wall 6034. A series of surfaces associated with these walls emerged, the pottery of which will be critical in determining whether or not Phase 1 is transitional EB III/IV. In Square C8 (extended to a full square), we uncovered Phase 3 walls and surfaces. Our excavation also confirmed the continuation of Phase 1–2 architectural features between C6 and C8, along with associated surfaces (Fig. 55). We are confident that the reexamination of the stratigraphic sequence will allow us to reevaluate the EB III/IV nexus at the site.

While the findings are preliminary, the 2016 season of excavation at Khirbat Iskandar exposed more of the EB IV and earlier EB III levels and helped further clarify the phasing in the fortifications during the Early Bronze Age.

REFERENCE:

Richard, S., Long, J.C. Jr., Holdorf, P.S., and Peterman, G. 2010. *Khirbat Iskandar: Final Report on the Early Bronze IV Area C ‘Gateway’ and Cemeteries*. American Schools of Oriental Research: Archaeological Reports 18. Boston: ASOR.



Fig. 55. View of the Area C Squares 6–8 with continuation of Phase 2 architecture, looking west (photo by G. Kochheiser)



Fig. 56. Aerial image with map overlay of site with Fields (image by Ian Jones)

The 2017 excavation season of the Balu'a Regional Archaeological Project focused on three field locations (Fig. 52). Excavation in Square 24.42 examined the context of the Qasr and attempted to provide new insights into the dating of its construction and use. Work in Square 25.62 reopened and expanded the excavation of an Iron Age house. A new excavation area, Square 41.31, investigated the fortification line dividing the upper city from its later, eastern expansion.

The goal of this season's excavation was to narrow the date of the large standing structure called the Qasr al-Balu'a. A 3 x 3 m probe was opened against the Qasr's north wall. A cobble and packed-earth surface was reached at about level with the surrounding area. A few Roman glass fragments and early Nabataean pottery sherds indicated an early 1st century A.D. Nabataean reuse of the structure and surrounding area. Excavation below this level revealed two east-west walls and several layers of earth debris covering and running up to the Qasr wall. Diagnostic pottery indicated Iron IIB as a probable period for the deposition of these layers.

Time limitations did not allow us to excavate to the bottom of the Qasr wall. The lowest layer excavated appeared to consist

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of destruction debris interspersed with charred wood and numerous animal bone fragments. This layer contained a quantity of pottery which was dated earlier than any of the other layers encountered in the 2017 season. Tentatively, it appears this debris layer, if not of secondary deposition, could provide a terminus ante quem for the construction of the Qasr, which would place its construction date no later than the Early Iron Age.

The excavators returned to Square 25.62 with the intent to expand the exposure of an Iron II domestic structure encountered in 2012. A major objective was to establish a date for the destruction of the building and to understand the phases of use represented by several surface layers encountered in the 2012 sondage. Two rooms were partially exposed with additional rooms indicated by an unexcavated doorway to the southwest and a passage to the east. The latest use-surface was cleared in all areas excavated of the 3 x 3 m area. A rectangular bin was located in the eastern room and two circular bins were in the western room. The latter room also had several pithoi crushed by the collapse of the dividing wall between these two rooms. The surfaces of these two rooms were constructed over a prepared plaster surface associated with the lowest level of the walls constituting this house.

An area of excavation was chosen to overlap with what appeared from the surface and GIS mapping to constitute a defensive wall that separated the upper city from the lower, eastern expansion. This seven-meter-wide wall probably served as the exterior wall prior to the Late Iron Age expansion. Excavation revealed three phases of fortification, all dating to the Iron Age II. The latest phase entailed the construction of towers along the destroyed or abandoned line of the earlier fortification wall. Excavation between two towers showed the seven-meter-wide wall to actually be two large walls in parallel with a space between them. The layout strongly suggests a casemate construction for Phase 2. The excavated portion of the casemate room produced 45 clay loom weights and a number of groundstone fragments. A third phase was indicated in a probe on the eastern external side of the east casemate wall. This probe extended more than 3 m down to the wall's founding level on bedrock and showed evidence of three phases of construction.



Fig. 57. Overhead composite image of Tawahin as-Sukkar (composite image by Q. Dasuqi)

GHAWR AS-SAFI

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Hellenic Society for Near
Eastern Studies

A main focus of the 2016 and 2017 seasons at Ghawr as-Sāfi was revealing more of the functioning of the sugar factory, the Masna' as-Sukkar (formerly called Tawāhīn as-Sukkar) on the northern and eastern sides. Excavations were made in a new trench (XXII) measuring 11 x 27 m encompassing a large northeastern part of the sugar factory (refining areas) as well as walls from the early 20th century Ottoman fort. The few finds recovered in these upper layers were primarily datable inscribed cartridge shells from the 1918 skirmishes between the Ottoman army and the Arab Revolt forces.

An arched bridge from the pressing chambers carried sugar juices in covered plastered channels with lead piping leading to Trench XXII where boiling and curing took place. Here, a series of collapsed arches were found with four sets of arch springers forming part of an arcade which were matched by another set of north-south running arches (Fig. 57). Much of this area had remnants of plastered flooring and in places what look like plastered benches, perhaps for placing sugar pots or vessels related to the sugar refining process. Many sugar and molasses pots were recovered during excavations of the area. Several fragments of copper vessels, probably from disused cauldrons were also found. Otherwise, few other finds were discovered. In a corner of a room was a disarticulated female burial with beads and a multi-colored glass bangle dating to the 15th

century A.D. This was similar to burials found in other parts of the sugar factory and gives it a terminus post quem. Further east, two fired brick-lined circular concave structures with their tops measuring 1.4 m and 1.1 m diameter respectively, and approximately 1.5 m deep were found, and these were evidently where the copper cauldrons (*dusut*) were placed to boil the pressed sugar juice. Immediately east of these were the stoke rooms, and east of these were dense dumps of ash marking the outer limit of the sugar processing area.

The main objective of Trenches X and XI at neighboring Khirbat ash-Shaykh 'Īsā was to try and locate the pottery kiln, for which there is ample evidence in the forms of pottery wasters and many kiln wall fragments.

Trench IX was excavated from Ayyubid-Mamluk and Abbasid levels down to the remnants of the mosaic floor of the church of Byzantine Zoara. Unfortunately, the pavement was not in very good condition as much had been disturbed during the Abbasid-period occupation. A door opening was revealed and some geometric patterns on mosaic, though the dedicatory inscription was damaged. Stabilization and conservation were carried out following excavations which unexpectedly revealed a cruciform baptistery in Trench VIII (Fig. 58).

Following previous surveys at Umm Tawabin, archaeological excavations were conducted for the first time in 2017. This large fortified hilltop site is strategically positioned above Ghawr as-Sāfi. At least four interior buildings (Forts A–D) and over one hundred stone circles and other associated features all enclosed by a ca. 2.5 km long wall were identified. Five trenches were made which confirmed a ca. 1st century B.C. to 1st century A.D. date for the hilltop citadel, though the stones circles and casemate walls below were more elusive.



Fig. 58. Plan of Byzantine-period Khirbat ash-Shaykh Issa

JUN 9 - THURS
 Area XI shaping up - but
 brick cross walls are a real
 problem to define.
 New area opened up where
 porcelain bowl was found
 yesterday - put Mark in
 charge.
 Numeish developing
 beautifully - town wall
 + cross walls - good
 stratigraphy - Jack doing a
 fine job.
 Expectant back in cemetery -
 J. Opie - C. cemetery - round
 shaft with stones like A1
 - Jack Hunted - 3 figurines along
 with beautiful group of
 transitional pottery from EB1A
 to EB1B incl. spouted bowl.

JUN 9 THURS
 - 2 figurines from A78 SW
 - 3 MORE FOUND IN G#2
 SHAFT TOMB - JACK HUNTED

Fig. 59. Scan of one page from Tom Schaub's pocket diary summarizing fieldwork on June 9, 1977 at Bab adh-Dhra' and Numayra. (Courtesy of the R. Thomas Schaub Papers).

Funded by a Wenner-Gren Anthropological Foundation Historical Archive Grant, and in cooperation with the Carnegie Museum for Natural History, we began curating the archives of the late R. Thomas Schaub, a long-time ACOR supporter. This crucial research facilitates our analyses and final publication of the Expedition to the Dead Sea Plain's (EDSP) legacy excavations at the Early Bronze Age (EBA) cemeteries of Bab adh-Dhra', Fifa, and Khirbat Khanazir. The archives contain excavation documentation (Fig. 59), Tom's personal and professional correspondence (Fig. 60), and historically significant photographs of fieldwork, laboratory, and Jordan's archaeological community from 1965 to 2015. Tom's papers offer a fascinating foray into the introduction of scientific and anthropological approaches to archaeology in Jordan, Palestine, and Israel. In excavating these archives, we organized records of fieldwork and analyses from excavated EBA cemeteries and townsites (Bab adh-Dhra' and Numayra). Color slides, black-and-white photographs, contact sheets, and negatives; top plans and profiles; maps; survey notes; correspondence about fieldwork and laboratory analyses; grant applications; and original artwork of reconstructions of life and death at these sites provide the essential background for a comprehensive publication of Tom's research. Much of the correspondence is between Tom and Jordanian colleagues,

EXPEDITION TO THE DEAD SEA PLAINS

Meredith S. Chesson

University of Notre Dame

Morag M. Kersel

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Sara Beramun

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Theresa Kyoo Young Kim

University of Notre Dame

Organizing and processing this archival collection is integral to a more complete understanding of the history of archaeology along the Dead Sea Plain in Jordan as well as Early Bronze Age small-scale urbanism. In 1973 Tom and co-PI Walter E. Rast adopted the New Archaeology's methods and theories to archaeological knowledge production and research design, devising the innovative EDSP to investigate the rise of EBA urban society with a distinctive focus on links between environmental and social systems. Tom's correspondence, research reports, and presentations chronicle their efforts to transform southern Levantine archaeology into an anthropologically grounded discipline. His research into EBA ceramic technology set new standards of excellence by combining petrographic and SEM analyses of fabrics with ethnoarchaeological studies of traditional potters working with and without wheel technologies. Like any bringers of change, Tom and Walt's research designs, methodologies, and theoretical approaches were not universally accepted, and preliminary glimpses into the correspondence reveal both skepticism and enthusiasm for processual approaches to understanding early urbanism in the EBA.

Project Website:

www.expeditiondeadseaplain.org





Fig. 61. General view of the tailed ossuary of HJH-204, looking southwest (photos by S. Fujii)

HARRAT JUHAYRA 2

Sumio Fujii

Kanazawa University

Harrat Juhayra is a collective term for the basalt foothills around Jabal Juhayra, an isolated (extinct) volcanic hill at the northwestern corner of the al-Jafr Basin, southern Jordan. General surveys undertaken following the excavations at the Pre-Pottery Neolithic B to Late Neolithic rock-shelter settlement at Jabal Juhayra located four extensive Chalcolithic burial fields on the eastern foothill. We designated them Harrat Juhayra 1–4 respectively and registered exposed stone-built features one-by-one as HJH-123 (i.e., Feature/Locality 23 in Harrat Juhayra 1).

The highlights of the continued excavation since June 2016 are tailed ossuaries (i.e., ossuaries equipped with an elongated, tail-like feature) found at the southern part of HJH-2. We excavated four of the five registered examples, where several radiocarbon dates corresponding to the Middle Chalcolithic were obtained together with a small number of grave goods, suggestive again of a Chalcolithic date. What follows is a brief introduction of HJH-204, the most well-preserved tailed ossuary.

The excavation revealed an L-shaped composite structure (that connects a trapezoidal rock ossuary and a tail-like feature at a right angle) under a low cobble mound (Fig. 61). The ossuary, measuring approximately 2.5–3.4 m wide by 7.4 m deep, and up to 0.8 m in preserved wall height, used upright basalt boulders for the foundation course and applied a stretcher bond, drywalling

masonry technique for the upper courses. A narrow entrance was incorporated into the middle of the eastern, gable-side wall, from which a corridor around 0.5 m wide stretched westwards. In addition, a total of 17 square to rectangular compartments were arranged roughly symmetrically on both sides of the corridor. Most compartments contained earth fill and were capped with stone slabs, under which a large amount of human skeletal remains were found in situ. Seeing that the cobble mound was only 1 m high, and that fallen stones around the masonry walls were unexpectedly scarce, this ossuary is thought to have been constructed as a low-walled, unroofed structure from the beginning. Meanwhile, the tail measured around 6.7 m long and was hooked at its distal end. Unlike the adjacent ossuary, this feature included neither interments nor grave goods. Thus, it can be interpreted as a symbolic attachment of the key structure, but its specific function is still unknown.

A preliminary anthropological analysis suggests that the minimum population of buried individuals is 19, and that they include five infants and/or juveniles, two young male adults, one young female adult, two mature male adults, two mature female adults, and one elderly person (Sakaue et al. 2017). Thus, the ossuary was probably used as an extended family tomb. Each compartment included interments, with the exception of the rear north one. The number of buried bodies varied depending on the loci from one to six. Most of the remains were disarticulated. Of interest is the occurrence of several metatarsals with clear evidence of kneeling facets, which probably means that these individuals were engaged in flour milling during their lifetime. In addition, a few skulls with traces of intentional piercing were also attested. Anthropological analysis now in progress is expected to shed light on the overall picture of the interment.

Meanwhile, grave goods were scarce considering the good state of preservation of the ossuary and the number of interments, being limited to a shell bracelet and one basalt pestle. The scarcity of grave goods is common to the other three ossuaries and, therefore, can be regarded as the norm of Chalcolithic burial practice in the Jafr Basin. In addition, although outside the ossuary, a figurine-like artifact 30 cm high was found beside the tail, sealed under the cobble mound. This unique limestone product was associated with a pair of headband-like bands in relief and a small, nose-like protrusion in its upper half. It bears some resemblance to a basalt torso found at Qulban Beni-Murra, a Chalcolithic burial field near the border of Saudi Arabia, suggesting some relationship between the two contemporary Badia sites.

Although badly disturbed by illicit digging, the other three ossuaries were very similar to HJH-204. Before excavation, we never imagined that such full-scale burial facilities were concealed under the seemingly barren basalt desert. The finding of the tailed ossuaries, coupled with that of the adjacent contemporary settlement, is expected to provide valuable insights into the Chalcolithic culture in the Jafr Basin which is thus far poorly understood due to the deficiency of basic information. We would like to pursue our studies toward a better understanding of this key site that bridges the Jafr outpost of the PPNB and the Jafr cairn of the EBA.

REFERENCE:

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Fig. 62. Shkarat Msaied Unit F (3D-model prepared by M. Kinzel)

Shkarat Msaied is an Early/Middle Pre-Pottery Neolithic B (PPNB) settlement located about 16 km north of Wadi Musa, close to contemporary sites such as Baydha. Since 1999, the site has been excavated by a team from the University of Copenhagen. Recent work has concentrated on the building structures in the southern part of the excavation area. The 2016 season aimed to continue the excavation of the central Unit F, where all but one of the burials were found so far (Kinzel et al. 2017). The season was meant to clarify stratigraphic relations in Unit F, excavate the human burials located in 2015, and check for additional burials within the structure.

This season most of this densely compacted roof collapse (Loc. 120.104; 120.135; 120.125) was removed and the floor of an earlier building phase (Loc. 120.120) was reached in most parts of the building. The lime plaster floor was well-preserved. The roof collapse was composed of mortar lumps, clayish material, small charcoal pieces, and small cobbles or small flat stones. A number of articulated animal bones were found in the western and southern part of the building, embedded in the collapse but partially associated with the actual floor surface. These bone concentrations are found mainly along the walls and "downslope." A plaster feature (Loc. 110.130) discovered in 2015 was exposed completely. Two symmetrically-placed small pits were found in the plaster floor (Loc. 120.119 and 120.122) which

PETRA: SHKARAT MSAIED

Moritz Kinzel

University of Copenhagen

contained grayish, ash material. A small stone box (Loc. 120.108), south of Loc. 90.120, contained a single initial flake from a core which was placed on a polished plaster surface.

Two additional child burials were also located (Loc. 120.105 & 120.131). Both sets of remains were articulated, but missing their heads. While the first (Loc. 120.105) was carefully placed in a small stone cist, the other was placed—comparable with one from 2015 (Loc. 110.126)—in a flat pit close to the northwestern wall segment of Unit F. Marie Louise Jørkov from the Forensic Institute of the University of Copenhagen was again in charge of the excavation and assessment of the human remains. During the work we reidentified one small burial cist excavated in 2005 (Loc. 120.114/90125) and identified a potential burial cist east of it, just below Loc. 120.110. A larger burial cist (Loc. 120.117) could be identified in front of the large orthostat. The burial was not excavated in 2016 due to limited time. In addition to the excavation work we continued our efforts to backfill the exposed structures to minimize weathering impact.

In 2017, a short study season was carried out at the Petra Museum to reexamine the stone beads from Shkārat Msaied. Mette Bangsborg Thuesen undertook her study of the site's bead material in the framework of her Master's thesis on stone beads from the PPNA site of Shubayqa 6. Some of the results will be published soon in *Neo-lithics* by Bangsborg and Kinzel. Also in 2017 we started an outreach initiative to promote research on Near Eastern Prehistory. In order to present the results of our project to a wider audience, we are currently producing a graphic novel in cooperation with the artist Nuka Godtfredsen. The story is based on finds stemming from Shkārat Msaied and neighboring sites, but will also incorporate an "archaeological" perspective showing how our interpretation may change the narrative of the story. It is planned to be published in English and Arabic.

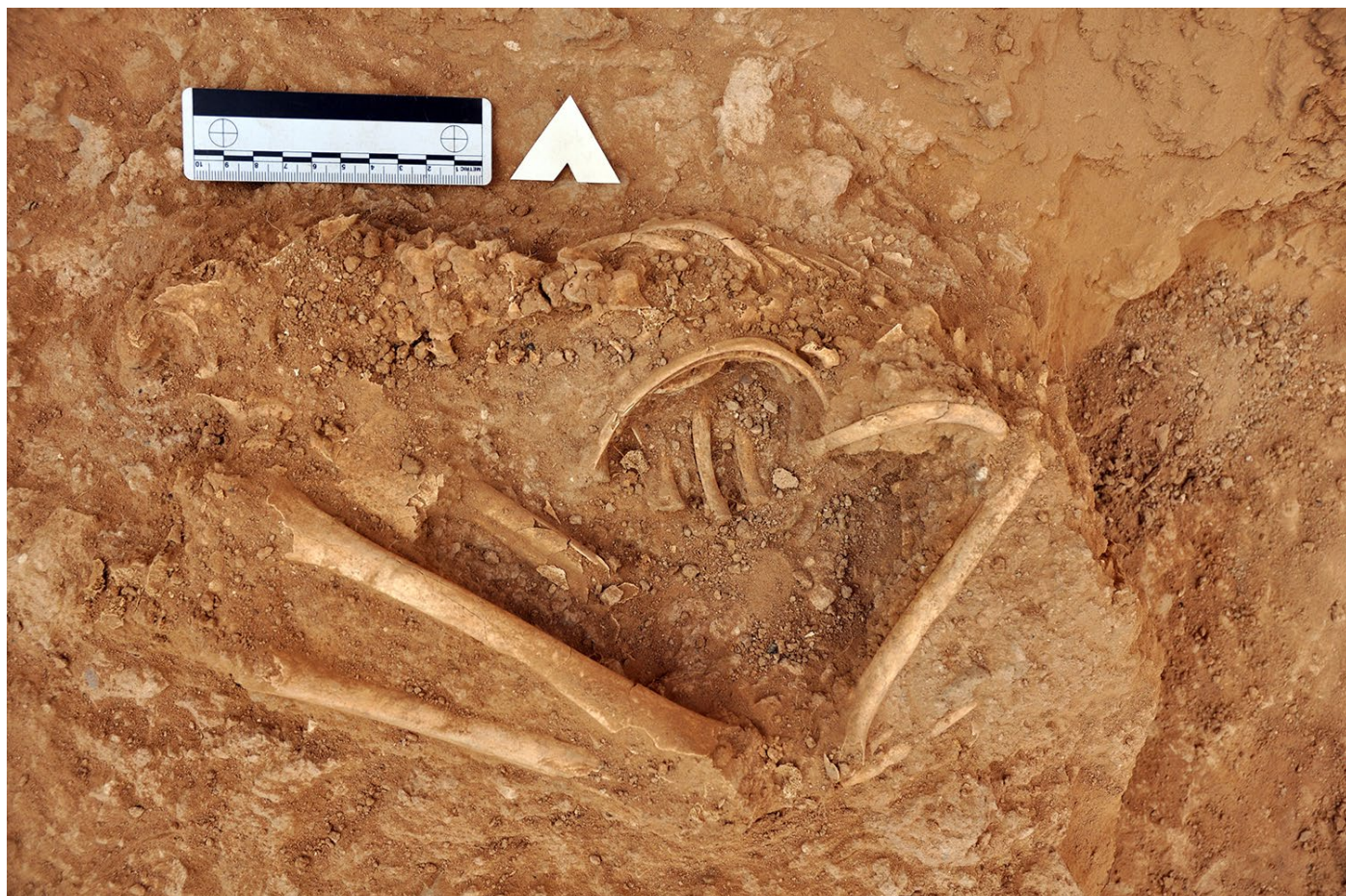


Fig. 63. Shkarat Msaied Unit F, child burial (Loc. 120.131) (photo by M. Kinzel, Shkarat Msaied Neolithic Project, University of Copenhagen)



Fig. 64. Wall with niche, Umm al Hamtha

PETRA: BA'AJA

David F. Graf

University of Miami

The Ba'aja project, conducted in June 2017, consisted of excavations in the vicinity of Ba'aja and a regional survey from Baydha, just north of the site. Ba'aja, which is around 10 km north of Petra, was previously highlighted by Manfred Lindner in the 1980s and 1990s, leading to excavations by the German Archaeological Institute from 1999 to 2010. These efforts did not discover evidence of Lindner's presumed "large Nabataean settlement." A visit to the site in 2016, however, suggested the potential of Ba'aja for Nabataean occupation was more extensive than indicated by the initial investigation, based on the large hydrological system on the adjacent massif associated with a few Nabataean inscriptions.

In 2017, with a team of ten, we began to explore the site and region for more evidence of the Nabataean occupation. Two areas were selected for excavation: (1) the area adjacent to the Ayyubid-Mamluk settlement in the north near the massif where the earlier German survey had discovered some Nabataean pottery and (2) at Wadi Umm Hamtha just 1 km south of Ba'aja, where some niches in a cliff's rock face with some adjacent ruins and a pottery scatter suggested a possible Nabataean farmstead.

Near the Medieval settlement at Ba'aja, the inspection of two adjacent Ottoman buildings revealed that they were constructed almost entirely of recycled Nabataean building stones with the typical diagonal dressing. A sondage between the buildings exposed mixed Nabataean, Roman, and Islamic sherds in the top soil, including some Nabataean painted fine ware. These finds suggest that a Nabataean settlement of some complexity and depth existed at the site, requiring more time and effort to explore than we had initially planned. For this reason, we shifted our focus to the ruins at Umm Hamtha, just north of the waste water treatment plant. It was immediately recognized that the six niches that were initially presumed to be "cultic" were rather

the springs of arches for a structure built against the rock face, based on parallels with other such "niches" elsewhere in the area (Fig. 64). A series of four sondages were plotted where the hypothetical adjoining wall would have been constructed in order to demarcate the outlines of the building. Trench 2 revealed a well-constructed parallel wall ca. 4 m from the rock face and about 0.70 m wide—evidently the supporting opposite wall for the arches. Most of the ashlar blocks of the wall and the arches had been removed. The pottery produced by the sondages included Nabataean fine ware, bowls and a lamp, with evidence of a subsequent Roman and Byzantine occupation. The building was a 12 x 4 m structure with no discernible dividing walls and a single doorway. The primary function of the building appears to have been agricultural storage. A horizontal channel ca. 20 to 30 cm wide cut into the rock face above the arches evidently prevented water from draining directly onto the structure.

During the regional survey, between Baydha and Ba'aja, we encountered other such apparent Nabataean farmsteads scattered across the landscape. Their origins were signaled by adjacent Nabataean inscriptions, betyls, and nephesh. But the most remarkable discovery across this limited region was several dozen wine presses cut into the protruding bedrock (Fig. 65). All evidence indicates their origin to be Nabataean, and these are thus to be added to the 50 or more wine presses already discovered between Baydha and Petra. The impressive hydrological system of the Ba'aja Massif, the scattered Nabataean farmsteads, and the numerous wine presses in the environs suggest that this was prime Nabataean agricultural real estate created in this dry, desolate landscape.



Fig. 65. Wine Press at Khirbet Makata



Fig. 66. Sampling sediment from a profile in the monastery garden of Jabal Haroun



Fig. 67. Dust accumulated in the remains of a trichinium on Jabal Farasha near Petra

A still unsolved question of soil development and landscape change in the Middle East is the question of loess deposition during the Holocene. While large sediment bodies were deposited in the Negev during the Pleistocene, they are missing from the Holocene and it is unclear whether this is related to erosion or reduced dust supply. A geoarchaeological approach was applied to sediments in the remains of ruins and ancient terraces in the vicinity of Petra, funded by the German Research Foundation (DFG), and building on earlier results of the Finnish Jabal Haroun Project (FJHP) as the Petra Region Geoarchaeological Survey (PRGAS).

Soils of the terrace remains around Petra are characterized by strongly varying types and amounts of pottery. Their geochemical properties, pollen, phytoliths, and biomarkers are studied which allows the investigation of these sediment bodies as environmental archives. In order to compare the evidence from Petra with the better-studied ancient runoff farming systems in the Negev, a comparative survey was conducted near the site of Horvath Haluqim (Sede Boker).

First results largely confirm the project's initial premises: while intensive (probably irrigated) gardening was carried out close to structures as the monastery of Jabal Haroun, other, more remote terraces may have served primarily for flood control. Sediments are largely of aeolian origin and could represent the so far missing Holocene loess. The systematic comparison of different ruin types (cisterns, ruins, terraces) as potential traps of aeolian dust suggests that contrary to initial expectations, cisterns are the most problematic archive as they have been cleaned repeatedly, in particular during their time of use—and later re-uses—lead to complex stratigraphic sequences. Ruins, in contrast, seem to represent excellent archives. This means that the debris which is usually removed as quickly as possible may represent an environmental archive worth studying.

PETRA REGION GEO-ARCHAEOLOGICAL SURVEY

Bernhard Lucke

FAU Erlangen-Nürnberg

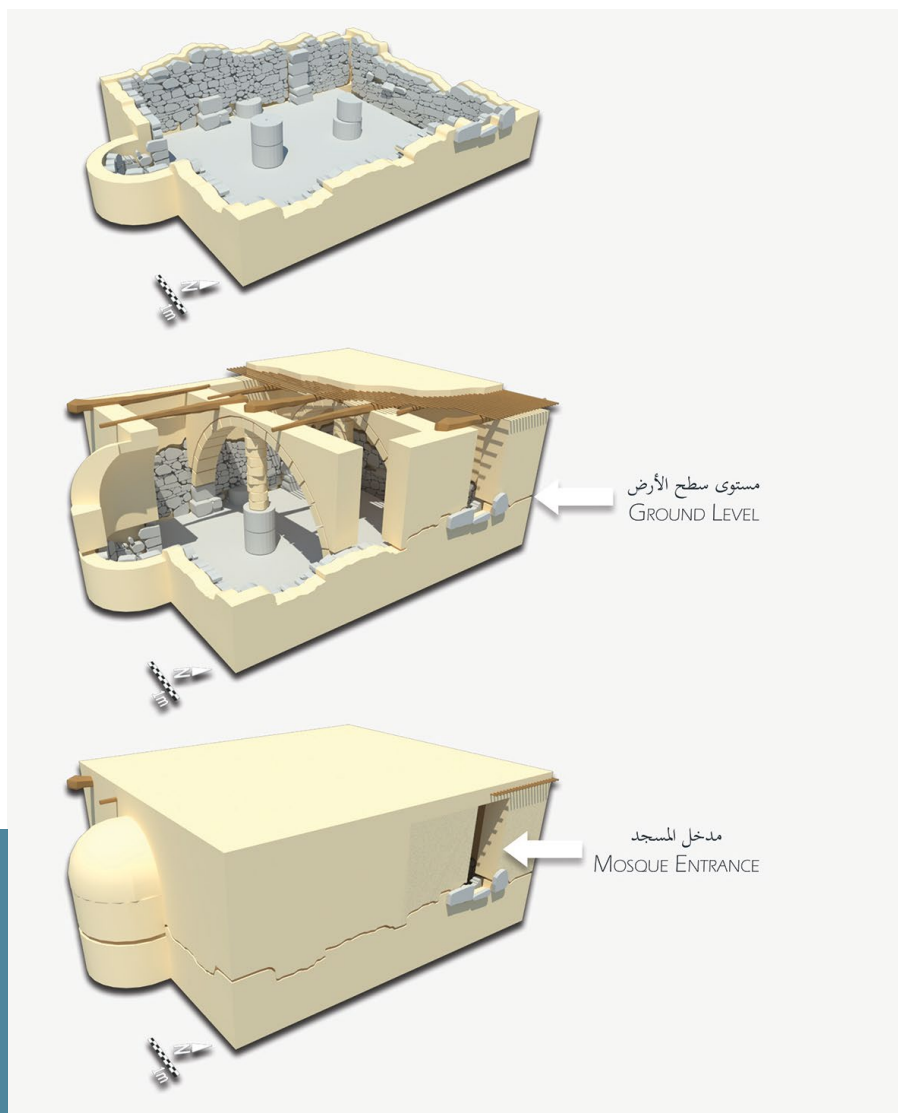
Paula Kouki

University of Helsinki

Nizar Abu-Jaber

German Jordanian University

Fig. 68. A tentative reconstruction of Mosque 2. From above: the excavated structure; a reconstruction of the upper part of the building; a reconstruction of its exterior (Reconstruction by Qais Tweissi on the basis of the team's study of the structure's walls)



PETRA: ISLAMIC BAYDHA PROJECT

Micaela Sinibaldi
Cardiff University

The site of Islamic Baydha corresponds to Khirbet at-Baydha, about 7 km north of ancient Petra's city center. The site was settled at least from the Nabataean to the Ottoman period and even remained in use until quite recently. The Islamic Baidha Project, led by Micaela Sinibaldi and affiliated with the Council for British Research in the Levant, was launched in 2014. Here we report on the 2016 and 2017 seasons (the third and fourth seasons of the project; see Sinibaldi 2016 for the first two seasons).

The Islamic Baydha Project consists of excavations, surveys, conservation, training and outreach, and is part of the broader Late Petra Project, also led by Micaela Sinibaldi, which aims at understanding settlement in the Petra region during the Islamic period, a still largely neglected era in the history of Petra. This broader project has provided solid evidence that Petra and its surrounding region was not abandoned after the Byzantine period. Instead, settlement shifted to areas with better opportunities for water and agriculture. The site of Islamic Baydha holds the most substantial and accessible evidence for Islamic-period settlement in the Petra region, and focuses on the relationship between the Baydha and Petra hinterlands and the Petra valley during the Islamic period.

The village under current investigation includes a large number

of clustered habitations and two mosques, dating mostly to the Late Islamic period (Mamluk/Ottoman). Particularly valuable in the context of this research are two mosques, which are currently the only ones identified and excavated in the region. They have been the focus of the work in seasons 2016 and 2017. Following a study of village habitation and the beginning of work at the two mosques in the 2014 and 2015 seasons, the team focused its efforts in seasons 2016 and 2017 on the excavation of the two mosques. Mosque 2 has now been completely excavated and recorded, and a 3D model of the building has been created (Fig. 68). The mosque, which is in a remarkable state of preservation, has been reconstructed as spacious enough to contain up to about 40 worshippers at one time. It was probably destroyed by an earthquake. The building reused part of a former Nabataean colonnaded structure and was therefore accessed by several steps down. It is built with techniques still in use locally until very recently. Mud mortar bonded its non-rectilinear walls, themselves made of reused and very diverse building elements. The roof, probably made of wooden beams and mud, was supported by two arches running east–west, abutting two central pillars made of column drums reused from an earlier Nabataean building. The mosque is now ready for site conservation and presentation.

Excavations at Mosque 1 have also revealed very interesting finds. While its building style and architecture are very similar to that of Mosque 2, there are differences between the two buildings. Mosque 1 has different proportions and its two arches run north–south. This may be due in part to the fact that the mosque was built on a number of earlier buildings, including one which can be clearly attributed to the Nabataean period. The most interesting discovery was, however, the presence of red-painted plaster covering large areas of the interior walls of the mosque, an important element for reconstructing the decoration of mosques of this period (Fig. 69).

These last two seasons of the project included a study of the local modern material culture in order to better understand the evidence excavated. Finally, it also included the training of archaeologists from Jordan and the United Kingdom, and, like every season, a special day was dedicated to visits by schools from the Petra region.

REFERENCE:

Sinibaldi, M. (2016), "The Islamic Baydha Project, seasons 2014 and 2015," in G. Corbett et al., *Archaeology in Jordan, 2014 and 2015 seasons*, *American Journal of Archaeology*, 120.4, 660.



Fig. 69. Working on exposing the painted plaster along the walls and mihrab of Mosque 1

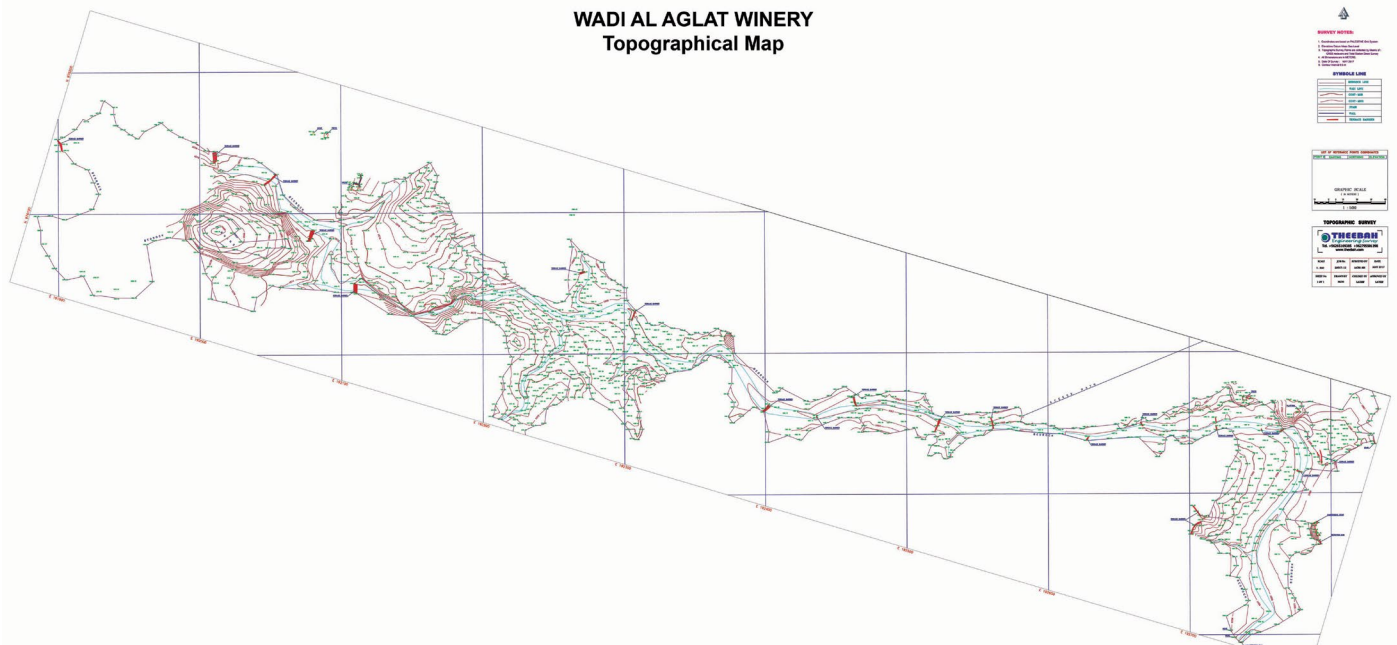


Fig. 70. Topographical map of Wadi Aglat, original scale 1:500 showing the location of all archaeological remains recorded (Drawing by Abdel Atheef Dhibeh). For a high-resolution version of this image, click [here](#).

A detailed archaeological survey in Wadi Aglat, located nearby and to the West of Baydha, was implemented from April to June 2017. The entire area of Wadi Aglat was mapped (Fig. 70) and all visible archaeological remains recorded. The survey revealed the existence of an extensive winery over the full extension of the Wadi Aglat from the western inlet to the eastern outlet and from the northern to the southern cliffs. Before the winery could be set up, the outlet of Wadi Aglat into Wadi Baydha was completely barred by a dam of solid masonry with a height of 4.9 m. The construction of the dam led to the natural deposit of the soil sediments required for the plantation of the vines; hence, Wadi Aglat in its topography became a largely artificial, man-made landscape. Upon the complete accumulation of the sediments, the entire area was terraced for the planting of vines and a sequence of 21 terrace barriers in total was erected to dam up the runoff water to the level of the plantations. The terrace barriers in the upper western part of Wadi Aglat had an original height of around 6 m and led to the accumulation of huge sediments creating an extensive, even area for cultivation (Fig. 71).

On top of a hill overlooking the wide and even upper part of Wadi Aglat, the ruins of a large farmstead could be identified, and this most probably served as the administrative and logistic center of the winery. Two huge wine presses, one each located in the eastern and the western parts of the wadi, allowed for efficient processing of the grape harvest. The eastern press was first mentioned by Zeyad Al-Salameen (2004, 176). Hydraulic installations such as retention dams, water channels, and cisterns in close proximity to the wine presses assured a sufficient supply of runoff water for the needs of wine production.

PETRA: WADI AGLAT

Ueli Bellwald

Independent Scholar

In conclusion, the newly discovered winery in Wadi Aglat is one of the most elaborate models of agriculture by terracing in the Petra area, and furthermore it bears witness to long-term planning and investment in the field of agricultural production. Estimations have shown that the accumulation of the sediments upstream of the main dam and the construction of the terrace barriers would have taken around 30 years. The entire surface for the cultivation of vines, created through terracing of the wadi bed, finally covered an area of 5 hectares, which would produce an annual yield of around 30,000 liters of wine.

As the winery in Wadi Aglat is exclusively accessible from Baydha by a monumental, rock-cut stair-case, it is obvious that the winery and the rock-cut tri- and biclinia in Baydha have to be seen as connected. The co-operation of the Wadi Aglat Winery Project with the Ba'aja Survey Project of Miami University, directed by David Graf, has shed new light on wine production by the Nabataeans and its socio-economic aspects. As the wine production is concentrated in the Baydha-Ba'aja area, and considering the long-term planning and investment inherent to an undertaking such as the establishment of the Wadi Aglat winery, the wine production was most probably a royal monopoly with a governmental director as superintendent, equivalent to the Praepositus Vinorum of the Roman Emperors. His offices and his residence could well have been in the luxurious mansion excavated by Patricia Bikai on the elongated rock outcrop just to the east of Siq al Barid (Bikai et al., 2008).

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Fig. 71. Panoramic view of the upper, western part of Wadi Aglat from North. At the bottom in the center one of the major terrace barriers with an original height of 6 m may be seen. To the right of the terrace barrier the enormous accumulation of sediments is still visible, despite the erosion having taken place after the earthquake of A.D. 749 (Photo by U. Bellwald).



Fig. 72. View of Umm Saysaban House 2 from the south

PETRA: UMM SAYSABAN

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The 2016 Umm Saysabān excavation took place in September and October in cooperation with the Naturhistorische Gesellschaft Nuremberg (NHG). The excavation of the Early Bronze II settlement was continued. The soundings of House 2 (Fig. 72) made in 2011 on the middle Plateau were reopened, so the excavation of the whole house was completed. House 2 (3.20 x 6.25 m) was badly preserved, and the western wall had completely disappeared due to erosion. The entrance was probably originally located on the eastern side. Structurally, it is a typical Early Bronze Broad Room house. One of the newly discovered and excavated buildings east of House 2 was the small building 250 (Fig. 73). 300 m outside the settlement to the east, a small sondage in a singular round house (5.60 m diameter) was carried out, yielding evidence that it too was built and used during the Early Bronze Age II. In both buildings the remains of fragmented store jars and a few stone lids for these store jars were found.



Fig. 73. View of Umm Saysaban House 250 from the east



Fig. 74. Facade of the ad-Deir Monument, Petra, with the 2017 final erosion clearances of about one-half of the Great Circle in the foreground. The façade dimensions of the ad-Deir Monument are: 46.77 m wide by 48.3 m high. The Great Circle is almost exactly 60 m in diameter—a massive water pool in the desert acting as both a quarry and catch pool to protect the monument (photo by AMPP / C. Finlayson).

Beginning in 2013, The Ad-Deir Monument & Plateau Project (AMPP) was tasked by the Jordanian Department of Antiquities and the Conservation Office of the Petra Archaeological Park to address the seasonal erosion negatively impacting the ad-Deir Monument on the ad-Deir Plateau. Subsequent UAV/drone imagery combined with a GPS Pedestrian survey of the entire plateau with MEGA form documentation enabled a triaged listing of the Nabataean structures that should be initially targeted for excavation and restoration. As part of this plan, three major Nabataean structures were identified for excavation, study, and restoration in order to revitalize their original roles as water control and catchment systems built by Nabataean engineers to protect the ad-Deir Monument complex. These included the northwest Temenos Slot Access Region to the ad-Deir Monument Courtyard, the Eastern Cisterns just to the northwest of the monument, and the Great Circle, a giant pool 60 m in diameter that protected the monument from the slopes running to the west of the building's massive façade (Fig. 74).

Test excavations were initiated in 2014 to confirm those project targets. Excavation and restoration efforts continued from 2015 through 2016 including the clearance of all debris from the upper story of the monument itself. A geological report regarding the condition of the façade of the monument was also completed in 2016 by a team of geologists from BYU and the Czech Republic

PETRA: AD-DEIR MONUMENT AND PLATEAU PROJECT

Cynthia Finlayson

Brigham Young University



Fig. 75. Closing levels in 2017 of Eastern Cistern B, which has a holding capacity estimated to be over 480 cubic meters. Its lower strata contain one of the largest collections of Nabataean pottery from a sealed context ever discovered in Petra, including many whole and partially complete vessels (photo by AMPP / B. Allardice).

who are specialized in sandstone. Additionally, isotope studies of the water seepage on the northwest cliff and lower wall of the Monument were undertaken. This study indicated that the water source is a spring inside the mountain from which the Monument was carved, and not from the modern-era Bedouin dam (built over a Nabataean structure) in Wadi Fatumah just to the northwest of the ad-Deir Monument itself.

The surprise event of the 2016 summer excavation season was the discovery of a massive cache of pottery dating from the 1st century B.C. to the Late Nabataean era at the bottom of Cistern B that apparently had been sealed by a cliff collapse during a probable earthquake event (Fig. 75). This may be one of the largest collections of Nabataean pottery and pottery fragments from a sealed context ever discovered in Petra and may also prove important to more firmly contextualize Nabataean coarse wares. Additionally, the Temenos Slot Region continued to produce one of the largest recoveries of Nabataean coins from archaeological contexts ever retrieved from within Petra—just over 500 coins by the end of 2017. Eighty-nine percent of these coins are from the mints of Aretas IV (9 B.C.–A.D. 40) and inclusive of his die series except for those coins produced with images of his mother. While it is often common to have 80 percent of all coins retrieved from excavations in Petra be those of this active Nabataean king, the presence of multiples of his die batches, the range of dates of these series, as well as recovered bronze slag fragments, possibly indicate that the ad-Deir Plateau was utilized by Aretas IV as a strategically secure storage area for his treasury during his wars with Judea. A few examples of the coinage of Aretas IV's successors were also retrieved in the 2016 and 2017 AMPP seasons indicating that the facility was in use until A.D. 106 and ended with the Roman annexation.

During the 2016 and 2017 work seasons, the Great Circle continued to be cleared and ancient earthquake damage to its natural bedrock carved inner wall repaired. The Outer Ring Wall, originally built of fieldstone and mud mortar, was encased in a protective field stone sheathing after its excavation.



Fig. 76a (left). Area of excavation at Site 15.

Fig. 76b (right). Unguentarium (RI 10) found in chamber loculus 15L5. Ht. ca. 17 cm

PETRA: WADI MATAHA

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The Wadi Mataha Project's 14th season took place in 2016. Two loculi, L4 and L5 within Site 15 (Tomb BD 676), located on the west side of the Wadi Mataha, were excavated. Chamber 15L4 is a rectangular chamber measuring 2.7 m (h) x 1.2 m (w) x 2.7 m (d), with a burial loculus cut into the floor measuring 2.3 m (l) x .7 m (w) x 1.2 m (d). The loculus had a lip for cover stones at a depth of 68 cm. This cover is approximately 70 cm in thickness and extends from the top of the loculus to just below the lip in the back. Human skeletal remains included an adult talus, cuboid, 2 phalanges, a metacarpal and fragments of tibia and vertebrae. No diagnostic bones to determine sex were found. Material remains included lithics, dark red Nabataean fine painted ware in both the soil and used as grog in the cement, a white stone carved head, an iron needle, a silver amulet, two shell beads, and a sandstone pounder.

Chamber loculus 15L5, measuring 3.02 m (h) x 1.24 m (w) x 2.68 m (d), also had in its floor a burial loculus measuring 2.10 m (l) x 60 cm (w) x 1.18 m (d). Human osteological material found inside included a calcaneus bone, a talus, 8 phalanges, 22 parietal fragments, 8 vertebrae fragments, three incisors, two canines, three premolars, and three molars with very little cusp wear, indicating an age between 25 and 30 years. One fragment of the ischium with part of a broad sciatic notch may indicate that the individual was female. The bottom layer of dark brown soil contained 1,763 pottery sherds as well as a complete unguentarium (RI 10) which was found on the bedrock bottom sitting upright against the west wall (Fig. 76a). Minimum vessel analysis indicates that these sherds came from at least 162 different vessels with no more than two sherds from the same vessel. This would indicate that the material was placed in the grave as votive offerings of sherds rather than as whole vessels. The pottery came from bowls, plates, cups, jars, juglets, unguentaria (e.g. Fig. 76b), store jars, and cooking pots. Nabataean fine dark red painted wares indicate a late 1st century A.D. date for the burial.

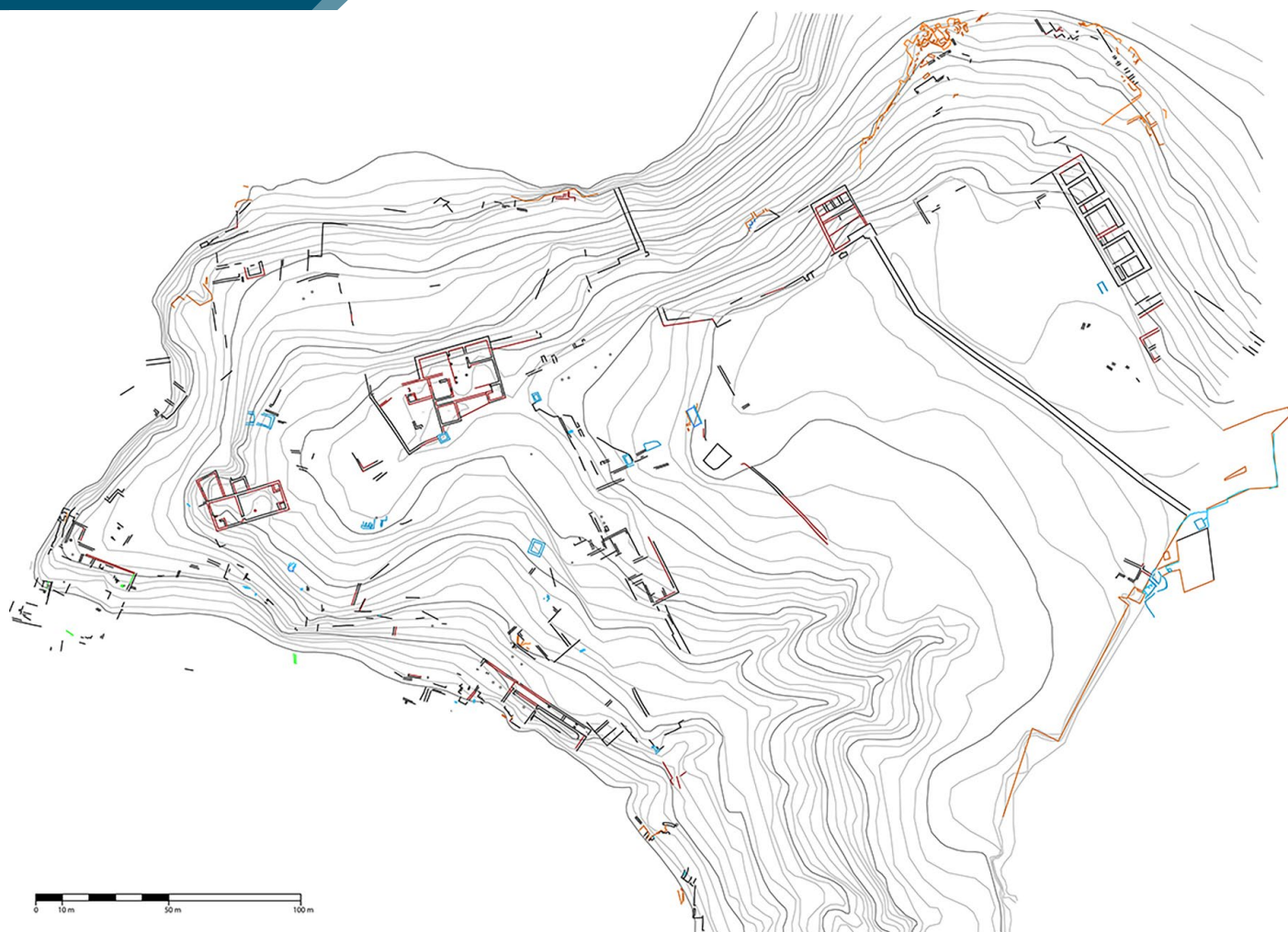


Fig. 77. North Eastern Petra Project: Plan of the area (M. Holappa/J. Falkenberg)

After six seasons of surveying (2011 to 2015), the North-Eastern Petra Project (NEPP) carried out fieldwork activities for the first time in fall 2016. The project conducted intensive surveying, mapping, and limited excavations at Rujm Umm al-Sunaydiq in the northeastern area of Petra, specifically between Wadi Mataha and Wadi Musa on the high hill overlooking the eastern end of the Colonnaded Street and west of the Palace Tomb. The site covers approximately 350 m east–west by 250 m north–south. Modern maps of Petra’s center feature almost no extant structures or ruins in this area, despite the fact that these are visible and significant in appearance, as documented by the NEPP survey during the past five years of fieldwork (Fig. 77).

2016 fieldwork concentrated on Structure 2, the largest and the most sumptuous building in the NEPP area. Specifically, excavations took place in Room 1 located in the northeast corner of that structure. Fieldwork activities included the removal of the stone tumble from the room’s interior in order to reach the floor level and a detailed documentation of all strata, artifacts, and architectural blocks located in the room as well as the description of the surrounding walls. The documentation included traditional methods as well as the use of EDM, photogrammetric documentation and modelling of extant remains (Fig. 78). Furthermore, a limited clearance of the stone

PETRA: NORTH-EASTERN PETRA PROJECT

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and soil material currently located on the northern slope of the room was made in order to ascertain the construction methods of the room and the entire structure.

Currently, the excavated Room 1 measures ca. 8.80 m (E–W) x 3.60 m (N–S) but it must originally have been larger, as the entire northern side has eroded away. The fieldwork results indicate that Room 1 (and apparently the entire Structure 2) was most probably constructed in the early 1st century A.D. and remained in use during the Nabataean and Roman periods. The room (and its upper story) turned out to be a luxuriously decorated space, including a flagstone pavement on the ground level and mosaic floors in the upper story, as well as painted wall plaster, opus sectile decoration, and architectural blocks of the highest decorated quality. Considerable amounts of tumbled stone inside the room indicate that it suffered two destructions, the first one probably being the A.D. 363 earthquake. Following that episode, the room was repaired and reoccupied, although seemingly on a more modest scale. A second destruction, at some point in the Byzantine period, terminated the occupation of Room 1. Generally, the results of the 2016 fieldwork season confirm the previously proposed interpretation of the NEPP architectural complex as a highly prestigious, residential complex, constructed in the early 1st century A.D., and probably related to the Nabataean royalty.

In 2017, no fieldwork was carried out in this area. However, the documentation of the architectural elements continued as part of the Ph.D project “Architecture and architectural decoration in Petra” by M. Dehner, who conducted extensive studies of the architectural findings in the NEPP area in March 2017. The investigations confirm the initial results regarding the importance of the NEPP area in general and Structure 2 in particular, which shows unique and spectacular decoration, reflecting its dominance. Further studies in this area combined with comparative studies in the city center of Petra promise comprehensive new insights and a better understanding of Nabataean freestanding architecture.



Fig. 78. Room 1 after excavation: 3D Model based on Structure From Motion Photogrammetry (image by M. Dehner)



Fig. 79. Google Earth image showing location of excavations in 2012, 2014, 2016

PETRA NORTH RIDGE PROJECT

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The third season on the North Ridge, which defines the northern edge of the city center (Fig. 79), was conducted in May and June 2016. The 2016 season continued excavation of 1st through 4th century domestic structures and tombs dating from the 1st century B.C. to the 1st century A.D. The discovery of two marble statues of Aphrodite led to a short 2017 study season to document and begin their conservation.

Three tombs were selected for excavation in 2016: Tomb B.9, connected to Tomb B.7 excavated in 2014 (Parker and Perry 2017), and two tombs were located outside of the northern city wall, F.1 and F.2. Two of the tombs excavated in 2016 had never been used for burial. Construction of B.7 was halted and the extant bottom contained channels cut into the chamber floor, evidence of the "trench and wedge" quarrying technique identified elsewhere in Petra. Tomb F.2's chamber was complete, but no receptacles for interment of the deceased were carved into the floor or walls.

Tomb F.1 contained two areas for disposal of human bodies: a rectangular floor shaft in the main chamber and two floor shaft graves in the back chamber. The former contained successive layers of the commingled remains of at least 10 individuals intermixed with jewelry, lamps, and a ceramic camel vessel. There were two shaft graves in the back, and the eastern floor shaft contained commingled remains of at least 4 individuals. The western floor shaft contained three successive articulated burials of a child and two adults. This tomb was used in the 1st century A.D.

Excavation in Area C continued the horizontal exposure of a domestic complex dating to the early 2nd century A.D., which was first explored in 2014. The complex was entered through a doorway in the southern wall that opened into a central corridor (C.2). Doorways in the west and east walls of the corridor gave access to rooms C.1 and C.3, respectively. The smaller C.1 room was originally roofed by a single arch springer; the larger C.3 room was once spanned by four arch springers and contained storage installations, an oven, and further evidence of domestic occupation. The complex went out of use after suffering significant damage, presumably in the A.D. 363 earthquake.

Three trenches (E.1–3) were established in Area E to explore the occupational sequence outside of the northern city wall. Excavation revealed an architectural complex of non-elite function (*villa urbana*?), including a bath with a hypocaust system and adjacent circular structure (*laconicum*, or dry sweating room?) dating to the 1st century A.D. The complex was abandoned in the early 2nd century, perhaps due to the construction of the adjacent city wall. In the early 4th century the complex was reoccupied until the A.D. 363 earthquake, and then witnessed extensive dumping, including two fragmentary (but largely restorable) marble statues of Aphrodite (Fig. 80).

In summer 2017, Mark Abbe of the University of Georgia began documenting the Aphrodite statues, which were housed in the conservation laboratory at ACOR. The statues still contain traces of pigments. UV, VIL imaging, and pXRF were used to explore polychromy and the elemental composition of the marble. The statues also have multiple ancient repairs, and the iron and bronze pins used for these reconstructions were assessed for future conservation, which will take place in 2018 and 2019 by Michael Morris.

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Fig. 80. Two fragmentary marble statues of Aphrodite in situ recovered from Trench E.3. View to west.



Fig. 81. The cella podium within the Temple before and after the application of a protective mortar capping (photos by Franco Sciorilli)

In 2016 and 2017, the Temple of the Winged Lions Cultural Resource Management (TWLCRM) Initiative—a collaborative project between ACOR, the Department of Antiquities of Jordan, and the Petra Development and Tourism Region Authority (PDTRA)—continued to focus on the conservation, preservation, and presentation of this temple in Petra.

In 2016, continued efforts were made to conserve the temple's walls and features exposed by the prior American Expedition to Petra (AEP). A team led by conservator Franco Sciorilli continued to clean the building's sandstone walls which were affected by salts. Gaps between the stones on the walls were filled using historically accurate mortar. Through this work, the building's front-facing architecture has been conserved.

In 2017, the conservation and local team, joined by engineering geologist Giuseppe Delmonaco, worked to preserve the temple's interior. A protective and reversible mortar capping for the cella podium surface and a cover for the open niche at the back were created to direct the flow of rainwater away from the podium. A specially designed brace system was created to support two leaning columns on the west side of the temple. Work also progressed on backfilling of the interior of the temple and a pathway providing safe access to the temple interior. An innovative glass sign that presents an "augmented reality" view of the temple interior was installed at the entrance of the temple, providing a new interpretive element for visitors.

In the Southwest Quadrant, work continued to stabilize and preserve the exposed architecture and rubble slope in much danger of damage and collapse since its exposure during AEP excavations. In 2016 the exposed architecture was fully documented and then covered with protective geotextile. The area was backfilled with alternating layers of soil and rubble, and large numbers of ashlar blocks from the temple. A buttress of sandbags filled with sifted soil from the AEP dumps was used to support the vulnerable rubble slope on the Southwest

PETRA: TEMPLE OF THE WINGED LIONS

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Council of American Overseas
Research Centers

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American Center of Oriental
Research



Fig. 82. Nearing completion of the backfilling in the SW Quadrant in December 2017 (photo by Jack Green)

Quadrant's north side. Sifting continued to yield artifacts from the AEP expedition dump piles. In 2017, backfilling work continued with the clearing of exposed geotextile and sandbags, followed by the addition of compacted layers of backfill imported from outside the Petra Archaeological Park. Over 100 cubic m of backfill was added during 2017, providing a gradient from the rubble slope southwards, allowing for improved drainage. The conservation team consolidated the rubble slope, providing channels for rainwater to be directed away from this area. By the close of 2017, our objective to provide increased stability, site safety, and suitable drainage, had been met.

A commitment to combining documentation, training, and research continued in 2017 through assessment of the site's main lapidarium, which consists of diagnostic architectural fragments from the temple. In 2017, Marco Dehner of Humboldt University, Berlin, undertook extensive rapid photo-documentation that will serve as a useful tool for documentation and preparation for conservation and reorganization efforts.

The TWLCRM Initiative continued to support community partners in training and to raise public awareness of the site and its preservation. Cooperation with a local partner, Sela for Vocational Training and Protection of Cultural Heritage, continued until summer 2017. During 2016, local team members Eman Abdessalam and Ahmad Mowasa, provided nearly 70 members of Petra's host communities with hands-on experience in essential documentation, conservation and documentation techniques. Their role as SCHEP site stewards helped facilitate the Experience Petra program, resulting in over 300 Jordanian school students taking part in hands-on educational activities at the site in Fall 2017. The TWLCRM Initiative acknowledges the contributions of former co-director Elena Ronza (until March 2017).

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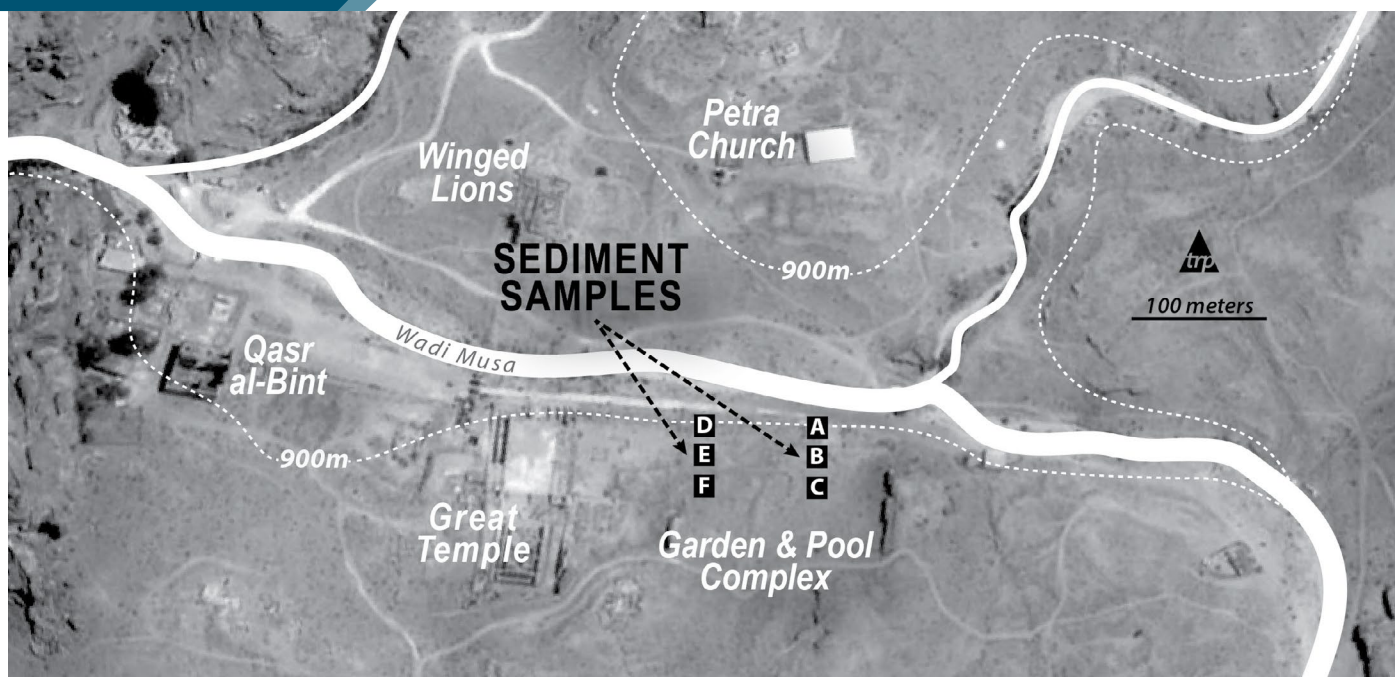


Fig. 83. Orthographic image of Petra's city center indicating some primary structures and the two collections transects away from the terrace separating Wadi Musa and the Colonnaded Street, from the Great Temple and the Garden-Pool Complex

PETRA: COLONNADED STREET FLOOD DEPOSIT ANALYSIS

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Although deserts are a result of low precipitation, they can sustain seasonal or episodic torrential flooding. Prior research revealed that Petra's city center was devastated in major flood(s) during the 4th and 5th centuries A.D. (Paradise 2011). Evidence supporting Petra's historic flooding included oversized meanders, perched flood sediments, current underfit channels and terraces, and missing street pavers suggesting mega-flood scale discharge. However, one of the strongest indications of palaeo-flooding can be demonstrated through distinct patterns of sediment distribution. As floodwater rises above its channel, high energy water mobilizes larger particles (boulders, pebbles, gravel) while slower energy water can only move finer sediments (sand, silt, and clay). As floodwaters rush downstream, they also rise and flow laterally creating distal environments. Within Petra's civic center, its primary road runs along the main watercourse, Wadi Musa, where boulders, pebbles, and gravel are commonly entrained, transported, and deposited along the wadi flanks during episodic flooding. During infrequent flood events, sediment-filled water actually deposits finer particles above the channel banks and terraces. It is this distribution of fine particles that is indicative of lateral, distal environments that flank extensive flooding (Leopold et al. 2012).

Since research indicates that sediment and particle distribution from overbank flooding displays distinctive patterns, a sampling scheme was created to analyze grain size distribution above the wadi bank where catastrophic flooding has been speculated. Samples of surface sediments were collected above the bank of Wadi Musa across the terrace that separates the wadi channel from the upper floodplain below Petra's flanking rocky outcrops. Six one-kilogram samples were collected during summer 2016 across the south side of the terrace that flanks Wadi Musa above the Colonnaded Street. Three samples were collected at

roughly five meter intervals in two transects, orthogonal from the terrace ridge above the wadi toward the Garden and Pool Complex and the Great Temple.

Pebbles and gravel were separated from sediment samples using 10 mm and 5 mm screens. Then, a vibrating stacked set of eight sieves ranging from #10 (2 mm) to #100 (0.15 mm) was utilized to separate and distinguish the various grain sizes along the transect (Fig. 83). Each sieved sample was weighed separately to compare the grain size component to the total sediment mass. The particle components were then converted to the percentage of grain size for the total mass at each collection site (A–F).

The results are significant in that they revealed an increasing fine grain component (fine sand, silt, clay) farthest from the wadi (Fig. 84). Conversely, gravel and coarse sand comprised 65–70% of the samples collected nearest the terrace edge (A, D) while only 30–35% of the largest grain sizes were found farthest from the terrace edge. In essence, fine sand, silt, and clay comprised more than 70% of the samples collected farthest from the terrace edge indicating the distal edge of a palaeo-floodplain (He and Walling 1998).

These findings confirm conventional palaeoflood studies where high-energy environments (channel bank) entrain, transport, and deposit larger “grain sizes” (pebbles, gravel), while low-energy environments (distal) transport and deposit finer particles (sand, silt, clay). Distal areas of floodplains are characterized by larger components of finely-grained particles—the case along the channel terraces in Petra. This analysis confirms prior research that Petra’s city center may have been inundated and razed by catastrophic flooding in the 4th and 5th centuries. A pattern of fine particles increasing away from the wadi channel indicates a low-energy distal floodplain where lateral flooding (during a rare mega-flood) deposited the finest silt and clay particles high above the wadi and road, on the terrace of the Great Temple and the Garden and Pool Complex—indicating higher floodwaters than previously indicated.

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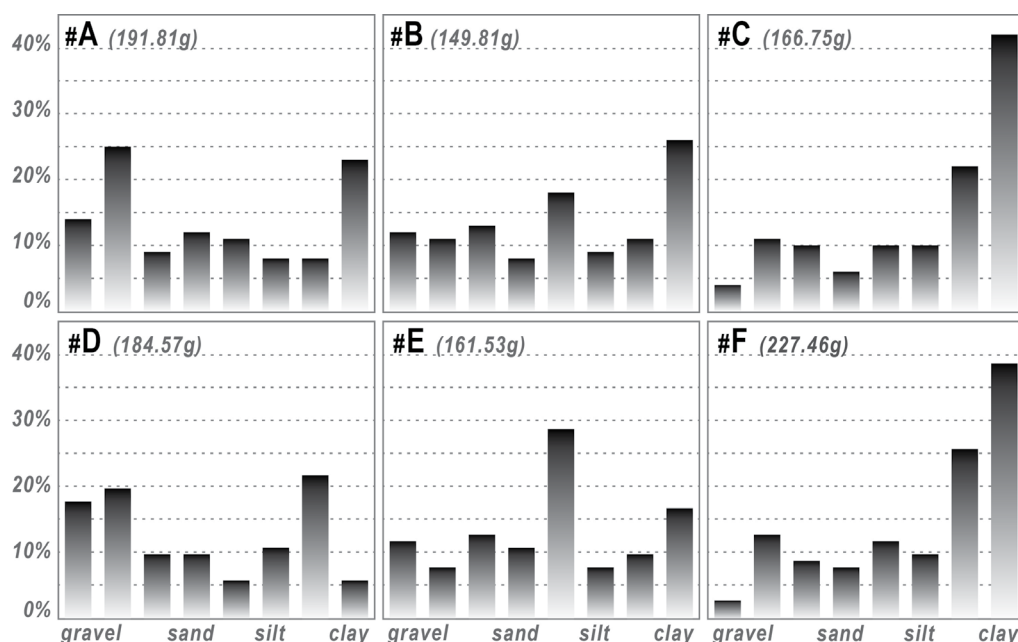


Fig. 84. These bar graphs illustrate the distribution of grain sizes from large (gravel) to fine (silt-clay) along the collection transect. The finer grain sizes were found to increase away from the wadi channel indicating a distal floodplain environment. This area of Petra above the Colonnaded Street—along the terrace that fronts the Great Temple and Pool-Garden Complex—was previously unidentified as a palaeo-floodplain.

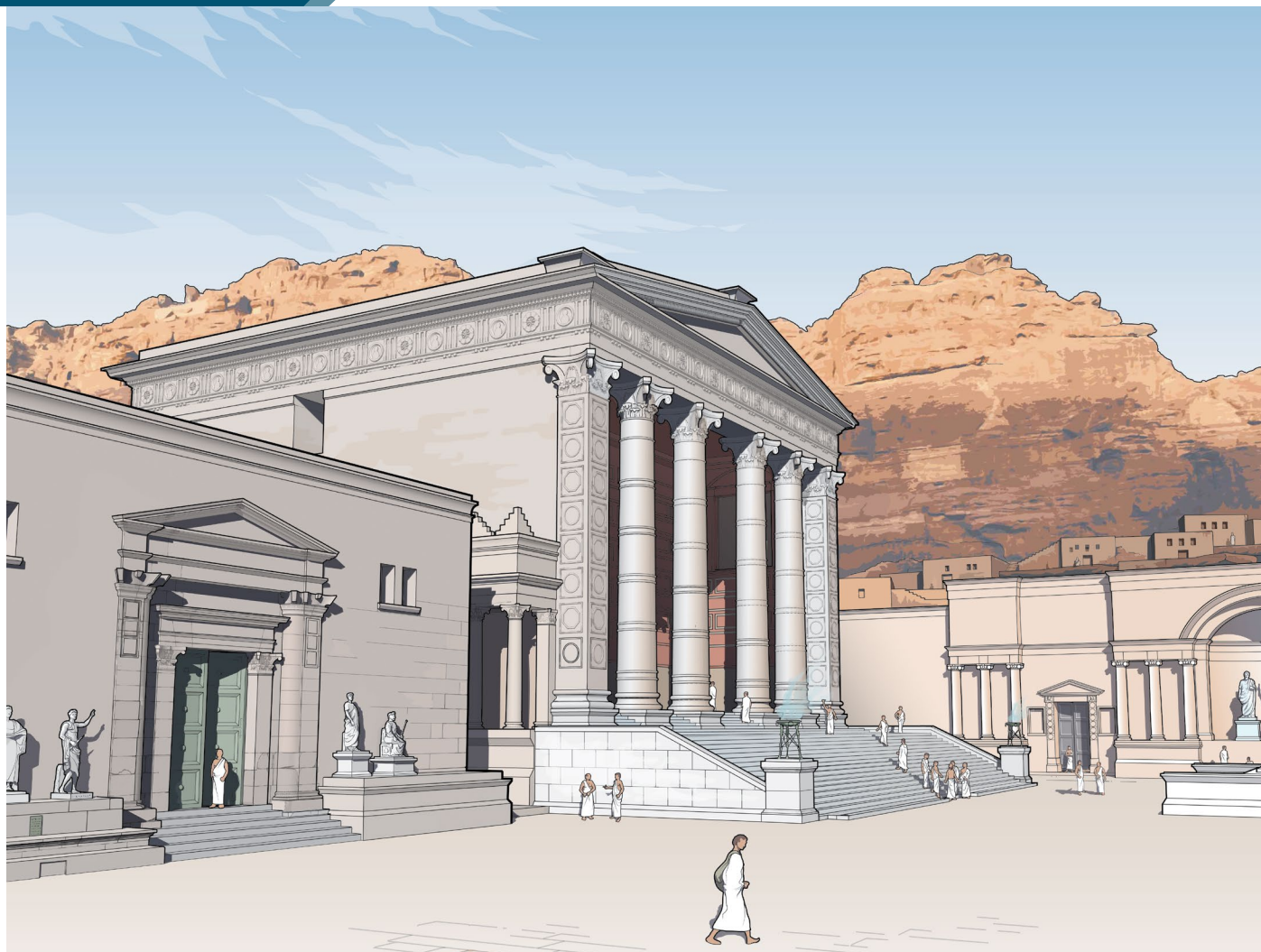


Fig. 85. Tentative reconstruction drawing of the Qasr al-Bint temple and adjacent buildings during the Roman period (Rendering by T. Fournet)

The excavation of the Qasr al-Bint area, conducted by François Renel since 1999, is part of the French Archaeological Mission of Petra, directed since 2013 by Laurent Tholbecq (Université Libre de Bruxelles), and before him by the late Christian Augé. The 2016 and 2017 seasons focused on the monumental staircase of the temple, partly documented by previous excavations, including Peter Parr during the 1960s and Fawzi Zayadine in the 1980s (Zayadine *et. al.* 2003), but it still produces valuable results concerning the chronology of the area.

For the recent periods, the most significant remains are related to an early Islamic reoccupation of the temple. They consist of a terrace wall, located on the monumental staircase of the temple, and of an impressive enclosure wall built inside the pronaos with massive reused dressed-stone and column drums (all of them part of the temple's upper parts). An important collection of locally handmade pottery from the associated layers could be dated, as a preliminary observation, to the 9th to 10th century A.D. This occupation could be related to a small graveyard previously excavated in front of the temple, and to other unexplained structures preserved inside the cella before 1970s preservation work.

PETRA: QASR AL BINT

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Concerning the monumental staircase itself, the excavation distinguished two architectural stages. The first stairs, built at the same time as or immediately after the temple's podium, appear to have been magnificently restored in white marble (Fig. 85). This refurbishment could be tentatively associated with the construction of the monumental Apse Building, northwest of the temple, during the second half of the 2nd century A.D.

The excavation also delivered elements concerning the early phases of the temple. In a deep sounding, made in a gap between the paving in the southwest corner of the pronaos, the foundations of the temple were exposed and, more significantly, pre-existing massive masonry was discovered underneath, directly resting on the bedrock. The size and strength of this masonry indicate that this substructure was probably designed to support a monumental building. The sherds found in the sand backfilling in those early foundations can be dated between 150 and 50 B.C. (Schmid's Phase 1).

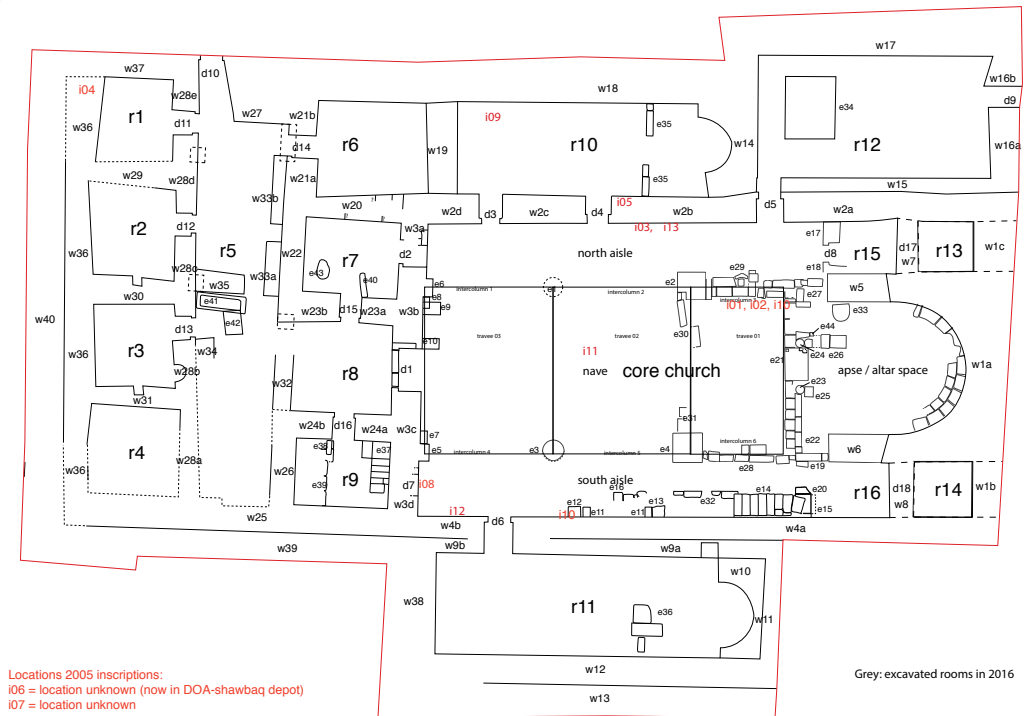
Excavations on the temple were complemented by a renewed architectural analysis conducted by Thibaud Fournet on the "B Building," a luxury Nabataean construction previously excavated by the French team east of the temple. This study has resulted in a reconstruction with two stories centred around a courtyard surrounded by a Doric portico, supporting a Corinthian gallery at the upper level, with screen walls adorned with colonettes (Fig. 81). Beside this sophisticated courtyard, the analysis of the monumental gate of the building, with imbricated Nabataean and Corinthian orders, revealed two main successive construction stages, and provided new insights into its successive functions within the Qasr al-Bint temenos.

On another note, preservation efforts were continued and intensified in 2017, in terms of a large presentation/valorisation project for the Qasr al-Bint area, which encompassed security, conservation, and interpretation.

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Fig. 86. Provisional layout with building sequences of the extramural church at Udruh. In red are the location of the 2005 inscriptions (Illustration by Frans Theuvs).



UDHRUH

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Udruh, a Late Roman fortress and Byzantine-Islamic town in Southern Jordan, surrendered to Mohammed's armies in A.D. 630. Historical texts and retrieved inscriptions make clear that this was not the end of its Christian community. After several years of research on the actively exploited 48 km² region around Udruh we have focused since 2016 on Udruh's extramural church, studying its architectural history, its inscriptions, and its changing conditions, together with historical texts in order to comprehend the site's religious transformation from Late Antiquity into the Mamluk period.

The extramural church of Udruh—still largely covered with the debris of centuries—was first explored archaeologically by the French Dominican monk Père L.-H. Vincent in the last decade of the 19th century. After that visit the church must have remained nearly untouched for another century, as can be seen in aerial photos taken throughout the 20th century. In 2005 major parts of the church were "cleared" of rubble, and walls were "restored" by the local representative of the Department of Antiquities. This was carried out as part of a program to make the archaeological heritage of Jordan more visible, attractive, and accessible to potential visitors and tourists. The quality of this work was not what archaeologists would expect today, and has resulted in the loss of essential archaeological information. Several parts of the church interior walls were plastered with multi-layered stucco containing thirteen Christian graffiti and inscriptions both in Greek and Arabic. Four of the Arabic Christian inscriptions were quite complete and could be dated on the basis of handwriting to the 13th and early 14th centuries (Al-Salameen et al. 2011, 234–237). Arabic-Christian communities were still living in Udruh until the early days of the Mamluk Sultanate, and in these times complex and intriguing bonds were formed between the authorities and different Christian groups (Pahlitzsch 2005). The last decades of the 13th century were used by the Mamluks to secure the defense of their eastern frontier against Mongol attacks (Walker 2013, 184–185). Mamluk reinforcements made at the north-western part of the Udruh fortress seem to underline this.

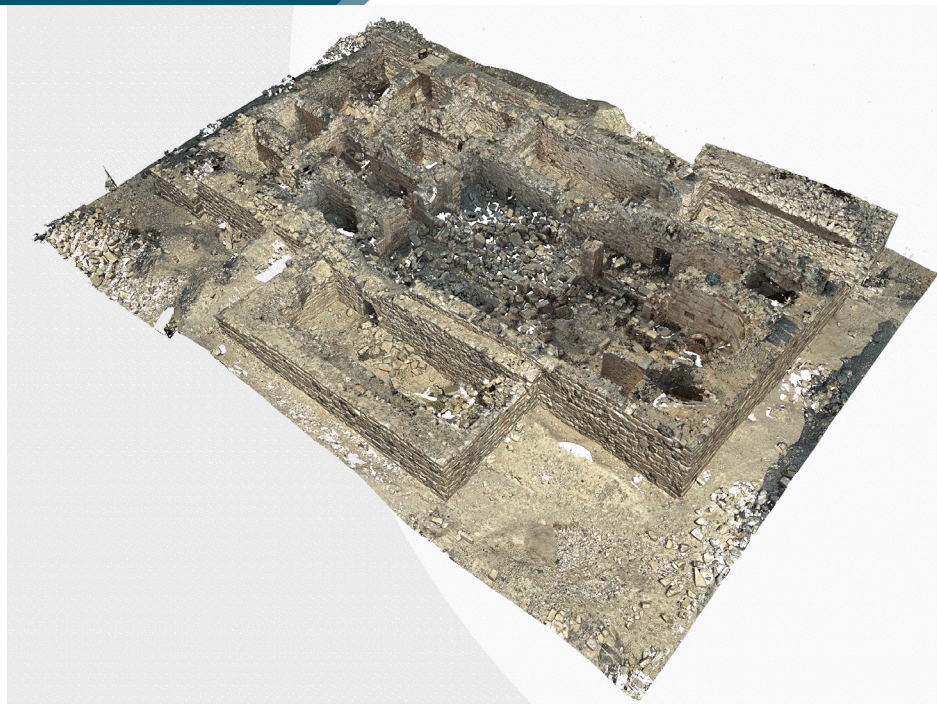


Fig. 87. 3D-reconstruction of the Udhruh Church, made by means of Leica P30 Laser-scan (Image by Maarten Sepers)

During our field campaigns in 2013–2015, we put some emphasis on measuring the walls and trying to get grip on the construction history of the church. This has resulted in a preliminary layout of the church, and its different phases (Fig. 86). We noticed a rapid deterioration of the monument as a result of children using it as a playground and continuous illicit digging, and decided the time had come for more intensive research. The research targets include small-scale excavations, examining the 2005 “clearance” spoil heaps, OSL and C14 dating, transcribing inscriptions, and making 3D reconstructions. Some parts of the church were untouched during the cleaning in 2008. Their excavation is one of the other aims of the project. We have focused in the last few years on the two pastophoria (R17–18), several parts of the core of the church, and the “connecting” walls to the southwestern corner tower of the Udhruh fort. The construction and several transformation processes over time have already become clear through the observed stratigraphy.

The 2005 spoil heaps, next to the church, were examined and sieved for small finds and architectural elements. These small finds gave some rough clues on the dating of the site. In order to date the individual building phases accurately, we took mortar samples from the walls and foundations. OSL-dating, but especially C14 dating of charred twig inclusions in these mortars, has resulted in solid dating of the different phases.

Nine inscriptions found in 2005, both in Arabic as in Greek, are still in the process of being transcribed, as are five new inscriptions retrieved during the last year’s field campaigns. In order to finalize the layout and phases, we have made both photogrammetry and laser-scan 3D reconstructions of the church and its vicinities, for comparison. Finally, a Leica P30 laser scan was used, which resulted in a 3D reconstruction of the current state of the church (Fig. 87). Since 2011, detailed pictures of the interior and exterior of the church have been made, which are used in our 3D models to monitor the ongoing process of deterioration and looting of the monument.

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Fig. 88. The 'Ayn Gharandal church facing North

The primary objective for the 2017 season at 'Ayn Gharandal was the excavation of a small apsidal structure first discovered in 2015 and tentatively identified as an Early Christian church within the Late Roman fort. Although the 2015 excavation revealed only the southern edge of this structure, its identification as a church was based upon the discovery of a raised apse accessed by a set of stairs flanked by a large sculpted stone with a set of notches and grooves for a chancel screen. The 2017 excavation areas were chosen with the goal of fully excavating the interior of the church, exposing its exterior walls, and determining how the structure, known to be secondary to the original construction of the fort, made use of and modified the existing architecture in its design and construction. In addition to meeting these objectives, the 2017 field season also discovered and excavated an ancillary room built on the church's north side, which provided access to the church through a doorway near the northwest corner in the church's north wall via a set of stairs. The north room was, presumably, associated in some way with the function of the church (Fig. 88).

Additional architectural elements of the church were originally identified during the 2015 season, including its southern wall with a bench running along the length of its northern interior face, piers in the southwest and southeast corners of the nave, a small section of the apse wall, and a second bench abutting the east interior face of the church's west wall. Expectations for the layout of the rest of the church were guided by these

AYN GHARANDAL

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previous discoveries and, for the most part, excavation of the church proceeded as anticipated, with a few surprises.

The wall of the apse was preserved up to 3 courses which rested on foundation stones and was constructed using both an exterior and interior row of cut stones between which was a rubble core composed of sand and small to medium cobbles. The exterior row is composed of square-cut blocks ca. 0.45 x 0.40 x 0.35 m in size, with smaller chink stones filling in the gaps created from the wall's curvature. The stones making up the interior were less uniform in size and shape (ca. 0.24 x 0.30 m), probably because they would have been plastered over as part of the decoration of the church's apse.

Given that only two to three courses of the apse wall are preserved, most of its stones were not found *in situ*, but rather as part of a large collapse event that extended outward from the apse. The collapsed stones were of varying sizes and qualities of dressing, reflecting their position as part of both the interior and exterior apse wall rows. Discovered among the collapsed stones and still in its relative position to the apex of the apse wall was a well-dressed, oblong, stone with a cross carved in relief on one side still bearing traces of red paint (Fig. 89). Comparisons with apsidal half-dome construction elsewhere in Jordan suggests that this stone was likely situated in the center top of the apse with its decorated cross facing the nave of the church.

The discovery of the doorway providing access to the church in its northwest corner answered the immediate question of how individuals entered the structure. The realization that an entire ancillary room had been built to the church's north side raised a host of additional questions, only some of which were answered with the excavation of this room. Although in terms of construction sequence it is clear that the church was built first and the ancillary north room second, it is unclear whether the north room was built immediately after the church or whether it represents a subsequent modification of the church.



Fig. 89. Cut stone with relief of cross from the apse



Fig. 90. The rock-art panel at Alameleh that shows a scene of camel herding along with Thamudic/Hismaic inscriptions. Note that the effects of cleaning on this panel following vandalism by spray-paint in 2016 (photo by Mohammed Dmoyan).

WADI RUM: COMMUNITY-BASED ROCK ART AND EPIGRAPHIC RECORDING PROJECT

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The Community-Based Rock Art and Epigraphic Recording project (CB-RAER) is part of the USAID Sustainable Cultural Heritage Through Engagement with Local Communities (SCHEP) Project conducted between March 2017 and May 2018. George Bevan, of the Department of Geography and Planning at Queen's University in Canada, and Kaelin Groom, of the School of Geographical Sciences and Urban Planning at Arizona State University, were co-directors. The goal of the project was four-fold: 1) to employ the Rock-Art Stability Index (RASI) to evaluate the rock-art panels in the Wadi Rum Protected Area (WRPA); 2) to use smart-phones as mobile GIS data-collectors in Wadi Rum to record RASI data; 3) to train local managers in the WRPA and students in both GIS and RASI data-collection; and 4) to improve to improve tourism by training of local guides in the rock-art heritage of the area. The CB-RAER project was undertaken with full awareness of a multi-year, ongoing effort by the Jordanian Department of Antiquities (DOA) to survey all cultural heritage in Wadi Rum. CB-RAER efforts were carefully focused not on surveying and recording new sites, but assessing panels in areas of high tourist traffic using RASI, a mature system developed by a multidisciplinary team from universities across the United States that can be easily learned by non-specialists in a matter of days. A final score out of 100 is the product of individual questions, all scored between 0 and 3, that rate various geological and human factors that impact the overall stability of a rock-art panel. These scores can later be used to guide a management plan for this UNESCO World Heritage site.

Four missions were planned for the project. The first in April 2017 trained the WRPA staff, who form the backbone of the project. They received training in RASI assessments, in mobile data-collection using the ESRI Collector mobile app, as well as editing the data in ArcGIS online. In addition, Dr. Zeyad Al-Salameen of Al-Hussein Bin-Talal University, a specialist in Nabataean archaeology and epigraphy, and Ibrahim Sadaqa, an independent scholar specializing in Thamudic/Hismaic epigraphy, provided training in the ancient history of the region and, most importantly, in the reading of the most commonly encountered scripts in the area (Fig. 90). In August 2017, the mission expanded efforts to create a documentation team made up of local students and guides, who received RASI training, as well as training in the Survey123 mobile app, that, because of its “form-centric” orientation, was more suited to routine RASI data collection. This app was made fully bilingual (English and Arabic) to ease use in the field by non-English speakers (Fig. 91). A third mission in December concerned itself with the training of 15 local guides in the so-called “Rock-Art Ranger” program. This program gave the guides an introduction to the geography and geology of the region, as well as best-practices for ensuring safe tourist interaction with rock-art panels.

TELUS 08:01 93%

My Survey

▼ **Site Setting (Geologically)**

Fissures independent of stone lithification (pressure release, calcrete wedging) *

☐ Not Present (0)

☐ Present (1)

☐ Obvious (2)

☐ Dominant (3)

Fissures dependent on lithification (bedding, foliations) *

☐ Not Present (0)

☐ Present (1)

☐ Obvious (2)

☐ Dominant (3)

Changes in textural anomalies (banding, concretions) *

☐ Not Present (0)

☐ Present (1)

☐ Obvious (2)

☐ Dominant (3)

Rock weakness (Modified Moh's Hardness: 0 = quartz/other three can't scratch; 1 = knife blade

✓

Fig. 91. The RASI collection screens in the Esri Survey123 app running in iOS and showing the fully bi-lingual capability (photo by George Bevan)



Fig. 92. Underwater archaeological surveying at Ayla in progress

The Royal Marine Conservation Society of Jordan (JREDS) has established the first underwater archaeological survey in Jordan, at the Islamic City of Ayla at the Gulf of Aqaba. The full name of the project is "Discover the Depth of Aqaba Marine Heritage Project." This pioneering effort will support the government of Jordan to fulfil their obligations according to the Convention on the Protection of the Underwater Cultural Heritage which was ratified by Jordan in 2001. The survey was part of USAID SCHEP, and was achieved with the assistance of two experts in underwater archaeology, Sawsan Al Fakhri from Jordan and Islam Sleim from Egypt.

Methods included a desktop survey where all available literature, images and resources were collected and analyzed. The field survey started in July 2017 with a preliminary visit where the team used snorkeling to identify the study area, in order to understand its characteristics and plan for the actual field working days. The site was divided into two zones (east and west) and the Jackstay method was applied where two divers laid two heavy jackstays parallel to each other across the bottom of the search area. The divers started at opposite ends of the movable jackstay and swam along it, each diver holding the line while searching the bottom visually or by touch on their side of the line until passing the other diver and reaching the other fixed jackstay (Fig. 92).

Results showed the presence of the port of the city of Ayla, which dates back to the Umayyad and Fatimid periods, based on the reading of pottery found during the survey. This port was

AQABA MARINE HERITAGE PROJECT

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the first Islamic maritime building in the history of Jordan. It revealed a structural system that characterizes this port in terms of diversity in raw material. In addition, an 8 m wide wave barrier extended in an arm-like form from the northwest to the southeast, running parallel to the coast for about 45 m then bending perpendicular to the beach, forming another "arm" 17 m (l) x 8 m (w) (see reconstruction, Fig. 93). This additional barrier was discovered and mapped using a hand-held GPS.

Moreover, a medium-sized limestone anchor, its dimensions around 0.60 x 0.45 x 0.30 m, was found, as well as pieces of iron of varying dimensions, covered with rust and sand deposits. Some types of iron knives and sheaths were found, along with a precision needle-like device, perhaps used for sewing sails. Iron nails of different sizes and small pieces decorated with gold, part of a costume piece, were retrieved. A gold coin from the Fatimid period, with Arabic inscriptions in three circular frames, was found above a mud layer. Bronze coins of different sizes and periods were also found in the water. Pottery fragments included samples of flasks, plates, and large pots dating from the Byzantine period to the end of the Fatimid period.

More research is needed, and conservation efforts have to be established.



Fig. 93. Virtual Reconstruction of Islamic Ayla, including the Sea Pier and Sea Gate (image courtesy of JREDS)

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