THE HASHEMITE KINGDOM OF JORDAN

# ANNUAL OF THE DEPARTMENT OF ANTIQUITIES OF JORDAN

## Volume 56

AMMAN
2012

**Annual Subscription**
20 Jordanian Dinars (For Hashemite Kingdom of Jordan)
30 US Dollars (Elsewhere, plus registered mail fees)



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**Address**
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*For monographs:*

Peacock, D. P. S.

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

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# In Memoriam
# John Basil Hennessy
# (1925 - 2013)

*Alan Walmsley*

John Basil Hennessy, universally known to family, friends and colleagues as Basil Hennessy, was a pillar of Jordanian archaeology and a passionate supporter of the country and its people. Australian by birth, Basil spent most of his academic life as a lecturer and later professor at the University of Sydney. A highly respected scholar of Middle Eastern archaeology, especially the Chalcolithic and Bronze ages, he was a meticulous excavator, inspiring educator, and a skilled mentor. A sports champion, he was well known for his openness, warm nature and good humour. Basil was the recipient of numerous honours during his lifetime, notably his appointment as an Officer of the Order of Australia (AO) in 1990.

Basil was born on the 10th of February 1925 in Horsham, Victoria, Australia. He was the eldest son of Thomas Hennessy and his wife, Nell (nee Poultney). He was educated at Villa Maria and St Patrick's College in Ballarat, during which time his life-long interest in sports was fostered, becoming a school athletics champion especially in shot-put and hammer-throw, and later at university a keen player of Australian Rules football.

Basil's education was delayed by the Second World War, during which in 1942 at just 17 he was deployed to New Guinea and, after the war, to the Northern Territory capital of Darwin as a navy radio and radar technician. After he was demobilized in 1946 and, like many of his generation, inspired by the pioneering and progressive Australian archaeologist Vere Gordon Childe, he enrolled in Anthropology at the University of Sydney on a returned soldier's scholarship, commencing his studies in 1947. In the following year Basil became one of the first undergraduate students in the then newly established Department of Archaeology headed by Dale Trendall and James Stewart, the latter a specialist in Cypriot archaeology.

*1. Basil on the veranda of the Pella dig house, early 1980s. Photograph by the late David Balderstone (courtesy of Sue Balderstone).*

Following graduation in 1950, Basil headed to the Middle East, becoming the inaugural student scholar at the then newly established British School of Archaeology in Ankara. So began his life-long engagement with the archaeology, people, and places of the east Mediterranean and Middle East. Yet, unlike many before him, Basil's interests in the region transcended the mere functional and academic. In addition to his passionate love of archaeology, he also became a loyal and understanding friend of the diverse peoples who live there, and by which he set a high standard that his students were to envy and try to emulate.

Basil's early travels in the 1950s sharpened his archaeological skills and expanded his interests. He joined the excavations at Myrtou-

Pighades (Cyprus) under the direction of Joan du Plat Taylor, and then was to direct the excavations at the Bronze-Age cemetery site of Stephania (Hennessy 1964). Both excavations received substantial funding from the Australian Institute of Archaeology, based in Melbourne. In 1952, new opportunities presented themselves when he joined the late Dame Kathleen Kenyon on the first season of her seminal excavations at Jericho, which turned out to be a profoundly life-changing experience. In a vigorous intellectual and professional environment, and tutored by the Kenyon-trained "Jericho pickmen" (Palestine's equivalent to the skilled excavators from Quft in Egypt), Basil's life-long commitment to the archaeology of Jordan and Palestine was nurtured. After an academic disagreement with Kathleen Kenyon, Basil was to trek some 20 kms from Jericho to the critically important Chalcolithic site of Tulaylāt al-Ghassūl on the east bank of the Jordan River with the sole intention of returning with evidence in support of a cultural transition between the Neolithic and Chalcolithic periods – a view not shared by Dame Kathleen. Find that evidence he did, and out of this instance of Basil's driving determination and a strong belief in the overriding value of hard archaeological evidence was born his keen interest in Tulaylāt al-Ghassūl. The large-scale excavations he subsequently led in 1967, 1975, and 1977 (two seasons) were to transform not only our understanding of the site, but the origins and development of the Chalcolithic period more generally.

Returning to Australia, Basil joined the Department of Archaeology at the University of Sydney, firstly as temporary lecturer (1954-55, 1957) before his appointment as a full-time lecturer (1958-61). Among the students at Sydney were Kay Prag (Wright) and David O'Connor, and to them he was "revealing a whole new world to Australian students; not just an academic discipline, but a social landscape. He was a model of clarity in his presentations, spoken, written and graphic" (Prag 2001). During this time he was to marry Ruth Shannon and start a family of son David and daughters Sarah and Linda; henceforth the family become a defining part of his life.

As the post-WW2 age saw the rise of the professional archaeologist, rather than those of private means, academic qualifications became increasingly necessary. At the suggestion of Dame Kathleen Kenyon, Basil and his family moved to England in 1962 so he could study for his doctorate at Magdalen College Oxford under Dame Kathleen's supervision, graduating DPhil in 1964. His thesis, inspired by the Jericho work, was published in a highly regarded book, *The Foreign Relations of Palestine during the Early Bronze Age* (Hennessy 1967). Shortly after completing his doctorate, Basil and the family moved to Jerusalem, then under Jordanian administration, where he became Assistant Director and then Director (in 1966) of the British School of Archaeology. Under his directorship the British School moved to a stately building in the Sheikh Jarrah neighbourhood, where it is still located today (although appropriately renamed the Kenyon Institute). While director Basil ran an active field program. He continued the major, multi-period excavations at the Damascus Gate in Jerusalem, begun by Crystal Bennett in 1964 at the request of the Department of Antiquities of Jordan (Wightman, Hennessy, and Bennett 1989); undertook his own project at the Late Bronze Age temple at (the old) Amman Airport, Marka, that after an unpromising start turned up trumps (Hennessy 1966, 1985, 1989; Prag 2001); and in January to March of 1967 led his first season at Tulaylāt al-Ghassūl (Hennessy 1969). After the Israeli occupation of Jerusalem and the West Bank in June 1967, Basil found a way to conduct limited excavations at Samaria/Sabastiyah in the following year after complex negotiations with all parties.

Given the complexities of the situation on the West Bank after occupation, and with Australia calling, Basil departed Jerusalem in 1970 to return to the University of Sydney, firstly as the Edwin Cuthbert Hall Visiting Professor in Near Eastern Archaeology and, from 1973 until his retirement in 1990, as incumbent of the fully-endowed chair dedicated to, under the terms of the bequest, the study of the "Archaeology and Mythology in the Ancient Middle East, namely, Palestine, Egypt and Asia Minor" (which was taken to include Cyprus). Middle Eastern archaeology at Sydney had fallen into the doldrums with the unexpected death in 1962 of Jim Stewart, the founding professor, leaving Basil the massive task of rebuilding Australia's sole

centre of teaching and research in the archaeology of the Middle East.

For Basil, the Sydney position opened up the option of returning to Jordan and continuing the work at Tulaylāt al-Ghassūl, brought to a sudden end by the June War of 1967. His primary intention was to probe the site with deep trenches down to sterile base levels where the earliest – and hopefully late Neolithic deposits – would be found. Also on the agenda were excavations at a large ceremonial centre (which had only just avoided being incorporated into a mine field that truncated the west third of the site, laid after the June 1967 War), and the opening of long strip trenches between two of the low mounds that characterized the site with the intention of identifying possible changes in the landscape (publications: Lovell 2001; Seaton 2008). The real challenge, however, lay in how to restart work at the site in 1975. In the mid-1970s, the south Jordan Valley was a remote, barely occupied area still under military control due to the tensions that followed the June 1967 War, and setting up and supplying a dig camp at Tulaylāt al-Ghassūl near the north shore of the Dead Sea posed major logistical challenges – water, food, and shelter all needed to be brought to the site from a great distance. In the 1975 season, the small team commuted daily from Amman, but this greatly impeded progress. As a result, a decision was made to set up camp at the site. Through Basil's close friendship with staff in the Department of Antiquities, fostered since his Jerusalem days, and the active support of the then Crown Prince of Jordan, HRH Prince El Hassan bin Talal, seemingly insurmountable obstacles were overcome one by one. The two 1977 seasons saw the team happily encamped at Tulaylāt al-Ghassūl, with a pack of cards, the stars, and the lights of Jericho as nightly companions. The once a week luxury was Friday night in Amman at the building of the British School near the University of Jordan, which served as a branch office of the Jerusalem School under the direction of Crystal Bennett. With Tulaylāt al-Ghassūl, Basil demonstrated the absolute importance of networking with and gaining the confidence of local authorities and international teams alike, at which he was a skilled master.

Joining Basil at Ghassul in 1977 was Anthony (Tony) McNicoll, a fellow Australian known to Basil from the Jerusalem days, who had recently been appointed to a lectureship at Sydney University with the task of broadening the spectrum of archaeology subjects taught there. While Tony's primary interest lay in the Classical and Medieval periods in the Middle East, he also brought knowledge of the many new approaches increasingly expected in archaeology, and had already applied these to his work in Turkey and Afghanistan. There was a natural, infectious rapport between them and, while they did not always agree, out of this bond there grew in the wide salt plains of Ghassul a visionary archaeological project, a project both multi-disciplinary and multi-period in scope focussing on the expansive site of Tabaqat Fahl (Pella) in the north Jordan Valley. A field trip in early 1977 to Tabaqat Fahl on a cold and overcast day during the Tulaylāt al-Ghassūl season confirmed that the site was ideal in every way for a project intended to span from Neolithic times to the Middle Ages; one that had every possibility of building a continuous social, economic, and cultural sequence from the earliest of human settlement to the beginnings of modern times in the southern Levant.

Beginning with the enormously challenging first field season during the northern hemisphere winter of 1978-1979, which would have never happened without the unwavering support of the former Director-General of Antiquities Dr Adnan Hadidi, Pella quickly grew into Australia's premier archaeological project in Jordan. In scale and scope the Pella excavations, undertaken in the early years in partnership with Wooster College in the USA, were many times that of

*2. Basil and the Tulaylāt al-Ghassūl team inspecting Pella, probably February 1977.*

Tulaylāt al-Ghassūl, and kept growing. Spurred on by Basil, the research expanded almost exponentially to address an almost infinite number of cultural, economic and historical questions, many barely addressed at the time work started at Pella. Similar to Jericho, the large archaeological mound at the centre of the site had, at its southeast base, a perennial spring that gushed out wonderfully fresh water into a valley below. It was at this location Basil chose to position a deep trench to cut into the side of the mound with the intention of capturing, in one major location, a representative cross-section of Pella's significant archaeological periods. In its original manifestation the deep cut did not identify all of Pella's phases, but it was a strategic start, uncovering major features such as a section of a massive multi-phase Bronze Age mud-brick circuit wall, part of a Late Bronze Age administrative building and a major domestic quarter spanning Byzantine and early Islamic times, dramatically destroyed in an earthquake of 749 AD. Of the finds from the cut, the ivory-panelled Pella Lion Box stands out as one of the finest Bronze-Age objects ever found in Jordan. From the outset work also extended to the cemetery fields around Pella that produced outstanding Bronze Age, Roman and Byzantine finds, the pride of which now grace the museums of Jordan. In this work during the 1980s the Department of Antiquities representatives took a leading role, especially the then Chief Inspector of Antiquities in Irbid Mr Sultan Al Shreideh who discovered many tombs including the extraordinarily rich Tomb 62 (some 2,000 objects) while assisting the project in countless other ways. As the number and ambitions of the Sydney University students at Pella expanded during the eighties, Basil and Tony gave the most promising students the opportunity to build their careers by incorporating other promising areas in the Pella project: the densely occupied summit of Tall al-Ḥuṣn and a spectacular Natufian site near Wādī Ḥammah (Edwards 2013), for example. Work also began in earnest on the specialist collections, such as glass and coins (Sheedy, Carson and Walmsley 2001).

Together, Basil and Tony ran a dig that was the envy of other missions in Jordan. At the meal table in an expanding dig house, snippets of conversations could be heard on widely diverse topics such as geomorphology, the beginnings of agriculture, archaeozoology, Greeks and Hellenism, coins, Bronze Age architecture and cuneiform libraries, radiocarbon dating, Byzantium and early Christian churches, archaeobotany, pottery (a lot of that), Iron Age temples, stratigraphy and context, Romans and urbanism, flint tools, settlement in Islamic times, glass and stonework – to name only some of them. The atmosphere was eclectic and electric. As already noted, it took a much larger team to tackle this myriad of research topics, an expansion made possible by adequate funding from Australian government research bodies and the Australian National Gallery in Canberra. While the work was hard and the pressures intense (at times), the stars and card games still entertained us, now upgraded with evenings of song with Tony on the guitar. Sadly, the sing-a-longs barely survived the early death of Tony in 1985. Basil was left with a huge project, enormous commitments in Jordan and, notably, a growing band of young archaeologists whose future careers relied upon its continuation; yet, he did not flinch in assuming responsibility for the Pella project even if it meant months in Jordan, year on year, until his retirement.

Not just in the esoteric field of archaeology, but also in other realms, the Australian presence was rapidly growing in Jordan during the 1980s, with Basil putting his considerable diplomatic skills to good use when meeting ambassadors, politicians, government officials, academics and businessmen of Jordanian, Australian and other nationalities. Australians based in Amman were generous in their support, such as the Balderstones (David, a prominent Australian journalist, and Sue, an architect most adept in archaeological planning) as well as successive ambassadors at the newly established Australian Embassy in Amman, such as Richard Gate, the first resident ambassador to Jordan (1982-1985), and Bob Bowker (1989-1992). Basil's stately persona allowed him to mix freely with the top levels of the social and political elite, resulting in numerous high-level visitors to the Pella excavations including HRH Prince El Hassan and, on the 25th of January 1987, Australia's then Prime Minister Bob Hawke who remarked that it was "extremely satisfying to me Basil, to see here in such a practical way a group of Australians

is working in association with the Jordanian Government and people to do work which is, I think, immeasurable in its value" (Hawke 1987). He pledged $30,000 a year to support research, and vegemite (a savoury Australian spread) for the team.

An inspiring teacher and critical researcher in both a university and field environment, Basil instilled in his students, and those of others, the utmost importance of questioning and contesting even core beliefs in Middle Eastern archaeology. For the unavoidable friction Sydney students were to experience in openly questioning the views of senior colleagues, Basil ensured his charges were well prepared through a rigorous program of lectures, seminars and assignments at Sydney. Then when matters did come to a head, he was unwavering in his support. Basil also recognized the importance of attracting funds to assist students in their studies, especially as access to British sources dried up during the 1970s. To that end, Basil was instrumental in setting up The Near Eastern Archaeology Foundation at the University in 1986, which today offers public outreach programs and, through generous bequests and private donations, travel grants to worthy postgraduate students.

Basil was the recipient of a number of prestigious awards and honours during his lifetime. He was a Fellow of the Society of Antiquaries London, elected as Fellow of the Australian Academy of Humanities in 1982, was appointed Officer of the Order of Australia (AO) on Australian Day (26 January) 1990 for "service to archaeology and to international relations", appointed as Emeritus Professor by the University of Sydney in the same year, and was honoured by the Senate of the University with the degree of Doctor of Letters *(honoris causa)*, conferred at a ceremony in 1993. On New Year's Day in 2001, Basil was awarded the Centenary Medal "for service to Australian society and the humanities in the study of prehistory and archaeology". A Festschrift in honour of Basil was published in 1995 (Bourke and Descoeudres 1995), and a volume of studies by Australian scholars was dedicated to Basil and the people of Jordan on the occasion of Sydney University's hosting of the Eighth International Conference on the History and Archaeology of Jordan in July 2001 (Walmsley 2001). Basil's life has been remembered in obituaries and tributes, including an obituary written by his children and published simultaneously in *The Age* and *The Sydney Morning Herald* (D. Hennessy and L. Hennessy 2014), a tribute by Linda Hennessy (2013) in the *Journal of the Australian Institute of Archaeology*, an obituary in *The Times* newspaper (Anon. 30 November 2013), an obituary in the journal *Levant* by Stephen Bourke (Bourke 2014) and an appreciation by Craig Barker in Sydney University's *Muse* (Barker 2014). On the 18th of February 2014 a service in memory of Basil's achievements was held in the Great Hall of the University of Sydney in the presence of HE Mrs Rima Ahmad Alaadeen, Jordan's Ambassador to Australia. Family, friends and colleagues attended and, along with other speeches, they heard a heart-felt eulogy delivered by Dr Bob Bowker, Australia's former Ambassador to Jordan. Of Basil, Bob said "His natural graciousness, honesty and kindness; his respect for others and his down to earth approach represented values which strengthened Australia's reputation wherever he worked. He was genuinely admired, respected and valued among the Jordanian people, from the palace to the villagers with whom he mixed. His honesty, his sense of fair dealing, and his complete professionalism were his trademarks".

Basil Hennessy is survived by his wife Ruth and children David, Sarah, and Linda.

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# In Memoriam
# Klaus Schmidt
# (1953 - 2014)

*Lutfi Khalil, Jörg Becker, Lee Clare, Ulrike Siegel*

Prof. Dr. phil. Klaus Schmidt, prehistorian, director of excavations at Göbekli Tepe, and co-director of the Jordanian-German cooperative project ASEYM (Archaeological Survey and Excavations in the Yutum and Magass Area), passed away on 20th July, aged 60.

Klaus Schmidt was born on 11th December 1953 in Feuchtwangen, Franconia. From 1974 to 1983 he studied prehistoric archaeology, classics, and geology-palaeontology, first in Erlangen and subsequently in Heidelberg. It was during his time in Heidelberg that he came to participate at excavations headed by his university professor Harald Hauptmann at the site of Norşuntepe, in the Turkish Upper Euphrates region. In 1983 he obtained his PhD, his doctoral thesis focusing on the lithics from this site (Die lithischen Kleinfunde vom Norşuntepe). In the same year, he was awarded the travel scholarship of the German Archaeological Institute. Between 1986 and 1995, Klaus Schmidt was research associate at the Institute of Prehistoric Archaeology (Institut für Ur- und Frühgeschichte) at the University of Heidelberg, and research fellow of the German Research Foundation (Deutsche Forschungsgemeinschaft).

Between 1983 and 1991 he became involved with research in an area that would later be inundated by the waters of the Atatürk reservoir, more specifically the Early Neolithic settlement of Nevalı Çori, again under the direction of Harald Hauptmann. It was the experience gained from working at this site which would influence the rest of his working life. For the first time, at Nevalı Çori, excavations revealed a special type of building that was furnished with fantastic imagery which provided unprecedented insights into the mind of prehistoric peoples living in the

9th millennium BC. This period is synonymous with a developed stage of the Early Neolithic, in which, in the course of several hundred years arable farming and animal husbandry emerged, a process which would eventually culminate in our modern lifeways.

In 1999, following completion of his habilitation thesis, entitled 'Functional analysis of the Early Neolithi Settlement of Nevalı Çori' (Funktionsanalyse der frühneolithischen Siedlung von Nevalı Çori), Klaus Schmidt was awarded the status of *Privatdozent* at the University of Erlangen-Nürnberg. From 2001 he was advisor (*Referent*) for Prehistoric Archaeology of the Ancient Near East at the Orient-Department of the German Archaeological Institute in Berlin. In 2007 he was appointed honorary professor at the University of Erlangen-Nürnberg.

The stylized T-pillars and sculptures discovered at Nevalı Çori motivated Klaus Schmidt to search for other similar sites in the Southeast Turkish province of Şanlıurfa. In addition to the discovery of Early Neolithic sites in the plain, east of Şanlıurfa (Gürçütepe), he also visited the higher lying site of Göbekli Tepe, which

had been detected many years previously in the southern foothills of the Taurus Mountains. His important impulses for the interpretation of this site number among his greatest scientific achievements. The discovery of fragments of Early Neolithic sculptures, and the location of the site, led him to conclude that this was no 'ordinary' settlement site, but what appeared to be a 'ritual centre' belonging to complex hunter-gatherers. It was only in the course of several subsequent transformation processes leading on from this stage that crop cultivation and animal husbandry would eventually evolve. In the last two decades of fieldwork, under the direction of Klaus Schmidt, excavations revealed buildings with richly adorned pillars and sculptures dating to the 10th and 9th millennia BC. Especially the earliest, monumental enclosures make this a site of unique importance for the study and evaluation of neolithisation processes and associated symbolic worlds. In addition to numerous scientific contributions, it is his book 'Göbekli Tepe: A Stone Age Sanctuary in South-Eastern Anatolia', (translated into several different languages), and written for the much wider audience, which has contributed to the growing popularity of this site, making it and Klaus Schmidt known well beyond the scientific community, and stimulating scientific discussions enormously.

In addition to his work at Göbekli Tepe, Klaus Schmidt co-directed the ASEYM Project in the Aqaba region of Jordan, where he undertook excavations together with Jordanian colleagues at the Chalcolithic-Early Bronze Age sites Hujayrat al-Ghuzlan and Tall al-Magass. His excavation methods and archaeological astuteness culminated in important research results which have significantly improved our picture of prehistoric settlement in the Gulf of Aqaba. Mention should also be made of his scientific contributions relating to the study of materials from Predynastic Egyptian sites in the Nile Delta.

With the passing of Klaus Schmidt, we have lost one of our most eminent archaeologists. Through his foresight and his openness for alternative ideas and approaches, he enriched and enhanced scientific debate. He has provided us with the foundations for many years of research to come. His time spent in Turkey led a close bond with the country and its people. Nevertheless, throughout his life, he remained faithful to his Franconian home, frequently returning there to find peace and relaxation from his otherwise very active everyday life. Researchers the world over are mourning the loss not only of an international renowned and revered colleague, but also an inspiring teacher, and a loyal and faithful friend.

The German Archaeological Institute will always remember him with greatest gratitude and appreciation.

*Lutfi Khalil, Jörg Becker,*
*Lee Clare, Ulrike Siegel*

# KHIRBAT AS-SAMRĀ ANCIENT CEMETERY: THE 2011 EXCAVATION SEASON

*A. J. Nabulsi, M. Baraze and A. Husan*

The eleventh season of excavation at the ancient Khirbat as-Samrā cemetery was carried out between 9th September and 11th October 2011 at the Site A and Site E areas of the old cemetery, located within the modern village of Rawdhit al-Amir Muhammad in Mafraq district. The methodology employed was that described in previous reports (*ADAJ* 51-53). During the 2011 season, the excavation team obtained good results and made numerous observations, many of which are subject to ongoing investigation. This report describes the results of the 2011 excavations, while providing further information on a few case-studies that reflect the main results of this long-running project.

**Site E Excavation**

Following the 2009 excavation at Site E, a long strip of land between a small building and the adjacent modern street to the north was left unexcavated for technical reasons (Nabulsi 2010). Subsequent results, including unpublished $C^{14}$ dates, indicated that this part of the site might contain pre-6th century AD burials and may have been located at the boundary of the "Quartier Gréco-Arabe" (Savignac 1925: 117, Pls II-III), the potentially earlier Roman cemetery.

In 2011, it became possible to excavate this part of Site E. The 2009 grid was extended so that 200m² of the available area could be explored; 26 tombs were identified and excavated **(Fig. 1)**. Except for Tomb 564, all tombs excavated were disturbed. There appeared to be no significant variation between the tombs excavated at Site E in 2009 and 2011, although a few observations could be made.

In square F4, the eastern ends of adjacent Tombs 561 and 562, which contained adult buri-

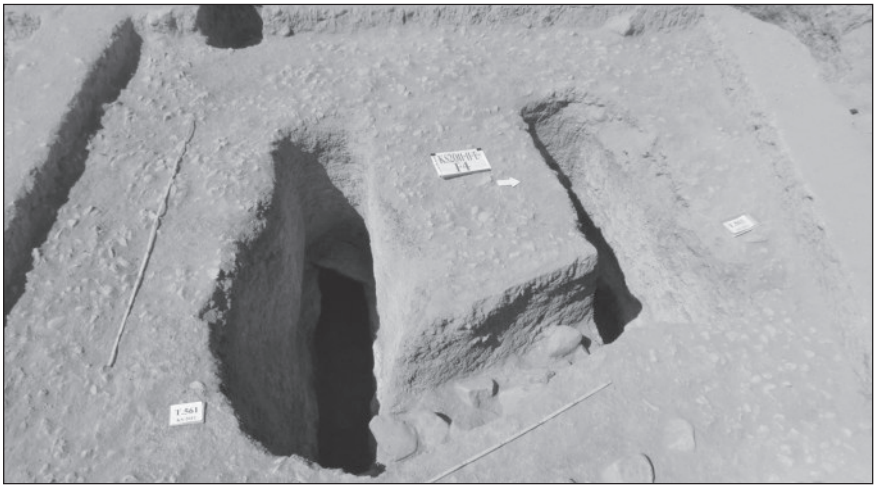
*1. The 2011 excavation at Khirbat as-Samrā cemetery: Site E (foreground) and Site A (top background) from the east.*

als, were 'connected' by a trench *ca.* 60cm wide and 80cm deep. The trench floor was lined with a row of rough, natural stones of various sizes **(Fig. 2)**. The trench and row of stones could be seen in the sections of the opposing tomb walls. There was no superstructure on the surface and no extension of the structure to the sides. So far, no plausible explanation for the function or intent of this constructed 'link' between the two tombs has been found, but its presence might indicate a relationship between the burials, or at least that the burials were contemporary.

*Tomb 583*

A variety of objects were found in this part of Site E, whether as funerary deposits, offerings or personal items. Most significant were the finds from Tomb 583, which provide new information on observations from previously excavated tombs in this cemetery. The tomb was a typical vertical shaft tomb with a closed burial chamber (Type II; Nabulsi *et al*. 2009: 167-168). It was disturbed at least once before excavation, although two basalt covering slabs were still in their original position at either end of the tomb. The tomb dimensions of 190 x 55 x 161cm were in accordance with its contents, i.e. the bones of a juvenile human burial. At the western end, at a depth of *ca.* 120cm, the southern shoulder was broadened at the level of the second covering slab to form a small concave niche, 30cm high and 25cm deep. Two glass flasks (*unguentaria*) and three plaster figurines were found in this earth-filled niche, slightly displaced from their original position **(Fig. 3)**. Small niches and deposits outside the burial chamber have been previously observed in a few other tombs in the cemetery. During the 2006 season, part of a glass vessel and a rounded plaster mirror frame were found with a large shell at the edge of the last (eastern) covering slab of Tomb 322. At the time, they were thought to have been displaced by later intruders. In Tomb 541 at Site A2, a near-rectangular niche, 20x30cm, was found in the western wall *ca.* 60cm below the modern ground surface (Nabulsi *et al*. 2011: fig. 2).

The two glass *unguentaria* found in the niche were blue-green in colour with minor surface deterioration **(Fig. 4)**. The larger vessel (KS-1868 [h = 107mm]) had toppled on to its side. It had a rounded body (diam = 58mm) and an almost unnoticeable short, flat base. The neck was approx. 60mm long and 19mm in diameter. It widened half-way up to form a wrapped, flaring rim 43mm in diameter. A 20mm long nozzle / spout, with a narrow (*ca.* 2mm) aperture, protruded vertically from the upper third of the body. The second, smaller *unguntarium* (KS-1869 [h = 54mm]) had a short, flaring neck and a rounded body (diam = 42mm) with no base or handle. This glass-type has been documented in a variety of sizes in the cemetery. The 'nozzled' KS-1868 flask is not a common type amongst regional Roman and Byzantine glassware. In a personal communication, C. Eger suggested that KS-1868 may be similar to a glass vessel reported by Hayes (1975: 91, no. 299, pl. 21), which dated to late 3rd or 4th century AD. Though their dimensions are close, there are differences at the base, in the position of the spout and at the rim.



*2. Site E, square F4 with deep, constructed stone link between Tombs 561 and 562.*


*3. Tomb 583 from above; arrow indicates position of niche in southern wall and its contents (in situ).*


*4. Two glass unguentaria (KS-1868; KS-1869) found in the niche in Tomb 583.*

Of the three plaster figurines found[1], two were broadly similar but of different size (KS-1865 [111 x 56 x 52mm]; KS-1866 [98 x 47 x 50mm]). Both figurines were in the shape of resting bird with folded wings and lowered tails, but without feet. Their main anatomical features were highlighted by lines of black paint. The heads had long beaks, decorated with 4 black circles drawn on the base, and moderate crests. The folded wings were marked with a bilateral depression applied by a small flat, blunt instrument, likely a spatula. The lowered tails were about a third of the figurines' total size. KS-1865 revealed a perforation just behind the neck and another in front of the tail; both extended to the base. The smaller bird figurine had only a central deep depression on the base. The two figurines appear to represent the local hoopoe (*Upupa epops*).

The third plaster object (KS-1867 [98 x 60 x 32mm]) appeared *in situ* as fish-shaped mirror frame with an intact central rounded mirror (diam = 35mm). Once lifted, the opposite side was found to be in the shape of a bearded man's head wearing a pointed cap, with a perforation near the pointed end. The main facial features were accentuated with black paint, though traces of other colours were also observed. This figurine consisted just of the head, as has been the case with all other objects with male representations discovered at the Khirbat as-Samrā cemetery to date. It should be noted that the KS-1867 figurine has similarities with Phoenician figurines depicting a male head wearing a pointed cap (e.g. Oggiano 2012: 6, fig. 1). While birds in general and hoopoes in particular were associated with different subjects (Orr 1939: 1419), the function and purpose behind the three plaster figurines from Tomb 583 remain uncertain.

A number of small objects were found inside the burial chamber with the fragmentary remains of a disturbed juvenile burial. Amongst these were rusty iron fragments and broken large stone beads with attachment marks evident on

1. The plaster figurines are currently under study; unfortunately no illustrations are available at the current time.

the rusty surfaces. It was possible to reconstruct these parts to form a three-element 'chain', attached through an iron disk, with an iron cross, the lower arm of which was adorned with four stone beads of different colours. This object (KS-1981; **Fig. 5**) had a total length of about 20cm - too large for a pendant or amulet, but possibly a 'ceremonial' cross. This interpretation could be extended to other objects, *viz*. the pointed iron rod (KS-1558) and attached bronze cross (KS-1559) found previously in Tomb 477 at Site E (Nabulsi 2010: 217). The cross indicates that Tomb 583 cannot be earlier than the late 6th century AD. The objects found both within and without the burial chamber of Tomb 583 are related, reflecting aspects of the local population's burial rites during the late Byzantine period in the cemetery under study. It is unlikely that the objects in the niche belonged to an earlier burial and were subsequently redeposited.

**Site A Excavation**

In 1993, a French team from the École Biblique in Jerusalem undertook test excavations at the Khirbat as-Samrā cemetery (Humbert 1993), in the eastern part of that area later designated Site A. As the French team was content with the results from the 22 tombs they excavated, the author of this report (who was involved in the 1993 excavations) continued to work at the site as a separate project focused on systematic excavation of the available cemetery area[2]. In 2011, it proved possible to return and excavate an area of 175m² at the western side of Site A, based on an extension to the north of the adjacent Site A1 grid **(Fig. 1)**. On excavation, this area displayed common features with the cemetery areas to the east and west.


*5. Reconstructed iron cross (KS-1981) consisting of three rods, a disc and the actual cross, decorated with stone beads and missing a fragment (arrow).*

28 tombs were excavated at Site A, although three were intact child burials in which the bone material had completely disintegrated. In three adult burials, the deceased were buried in an extended position but on one side, two facing north (on the left side) and one south (on the right side). These examples were more obvious 'side burials' than previously observed cases, e.g. Tomb 499 (Nabulsi *et al*. 2012: fig. 2). Recent studies have suggested different explanations for 'irregular' burial positions (e.g. Perschke 2012). Nevertheless, the 'side burials' in the Khirbat as-Samrā cemetery have to be considered as part of its diversity, possibly related to an as yet undetermined period or group.

The tombs at Site A contained fewer object than those at Site E, but were richer in organic objects such as leather, fabric (e.g. linen, cotton), wool and wood, as well as seeds. In Tomb 597, a substantial amount of fabric and fragments of a wooden plate were found between two adult burials, along with the remains of leather sandals or shoes at the eastern end.

Recovery of human bone in the Site A burials was hindered by modern root intrusions (from shrubs on the ground surface) that often ran through the shafts of long bones, i.e. at a depth of more than 2m. The excavators often had to cut through 1cm thick roots to free bones. This rapidly reduced the preservation of bone material, particularly of dorsally located skeletal elements, e.g. pectorals, vertebral arches. Modern village roads have recently been constructed at a higher level than the surrounding area. Consequently Site A, which previously occupied an elevated position, now becomes waterlogged during the rainy season, thereby increasing moisture in the deepest tombs and encouraging deeper root penetration. This observation emphasises how complex and random factors influence bone preservation in ancient burials, particularly in this region.

By the end of the 2011 season, the total number of burials excavated at the ancient Khirbat as-Samrā cemetery had increased to 614. In addition to the observations made and interesting objects recovered, important evidence concerning burial customs was obtained. The three long tombs with built walls (Nabulsi *et al*.

2. The University of Hamburg, Department (prev. Institute) of Human Biology team.

2011) suggest this type represents 1-2% of all tombs in the cemetery. There was also evidence for burials with and without a shroud, the use in some cases of wooden coffins and burial chambers being filled with earth prior to their closure, as well as for tombs with and without a sealed burial chamber.

**Acknowledgements**

The team would like to thank Nayef Naser al-Dughmy and Sameh Farhan al-Mashaqbeh for their freely-given permission to excavate on their property, as well as for their general support to the team. We would also like to thank our many colleagues in the Department of Antiquities of Jordan for their valuable advice and assistance.

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# ḤIJRA LEADEN URN INSCRIPTIONS

*S. Timm, A. Abu Shmeis and A. Nabulsi*

A salvage excavation in a Roman - Byzantine cave tomb at Ḥijra, *ca.* 10km south-west of ʻAmmān, has brought to light two leaden urns containing cremated human remains. One urn was spherical, similar to two found in 2001 in the Umm as-Summāq al-Janūbī cave tomb 5km away. The second had a gable-house form with ornamentations and two Greek inscriptions engraved on the outer surfaces. The significance of this find is indicated by the facts that: (1) it was a leaden urn, a material seldom used in Roman cremation burials; (2) until the recent 2001 and 2006 discoveries, human cremation burials – regionally documented from the 13th-8th centuries BC and particularly from the Roman 1st century BC to 2nd / 3rd century AD – had hardly been reported from Jordan (for details on cremation burials and their regional distribution see Abu Shmeis and Nabulsi 2009: 513-514; Timm *et al*. 2011: 175-176); (3) funerary inscriptions are primarily attested on Nabataean, Roman and Byzantine tombstones, and inside or outside burial chambers as *nefesh* or epitaphs, but seldom on ossaria; (4) inscriptions on leaden plates were only known from '*defixiones*' texts, e.g. in Syria (Jordan 2001: 13, 25-27; Hollmann 2011: 158, 163), while leaden ornamented coffins were well documented from this region (e.g. Avi-Yonah 1930).

## The Leaden Urn

The urn, registered as Ḥijra-Urn4, was found at the front of the arched Loculus 7, one of ten *arcosolia* occupied by inhumation burials in the collapsed Ḥijra cave tomb. It was made from a single lead sheet, *ca.* 2mm thick, folded into the form of a 325x158x200mm gable-house. The front and back sides of the lid were decorated with engraved floral motifs, depicting olive branches or palm leafs and a pomegranate (**Fig. 1a**). One of the triangular sides had an engraved four-line Greek inscription (Urn4-T1). The 'box' part of the urn revealed a second, three-line Greek inscription (Urn4-T2) engraved on the narrow side opposite the first inscription (**Fig. 1**). The urn was filled with fragments of burned human bones that smelled smoky and perfumed, evidently after being embalmed in scented oils, traces of which were found in the urn alongside charcoal and a few plaster fragments. Despite their condition, the bones were evidently from a single male individual with an estimated age at death of 50-60 years.

## The Inscriptions

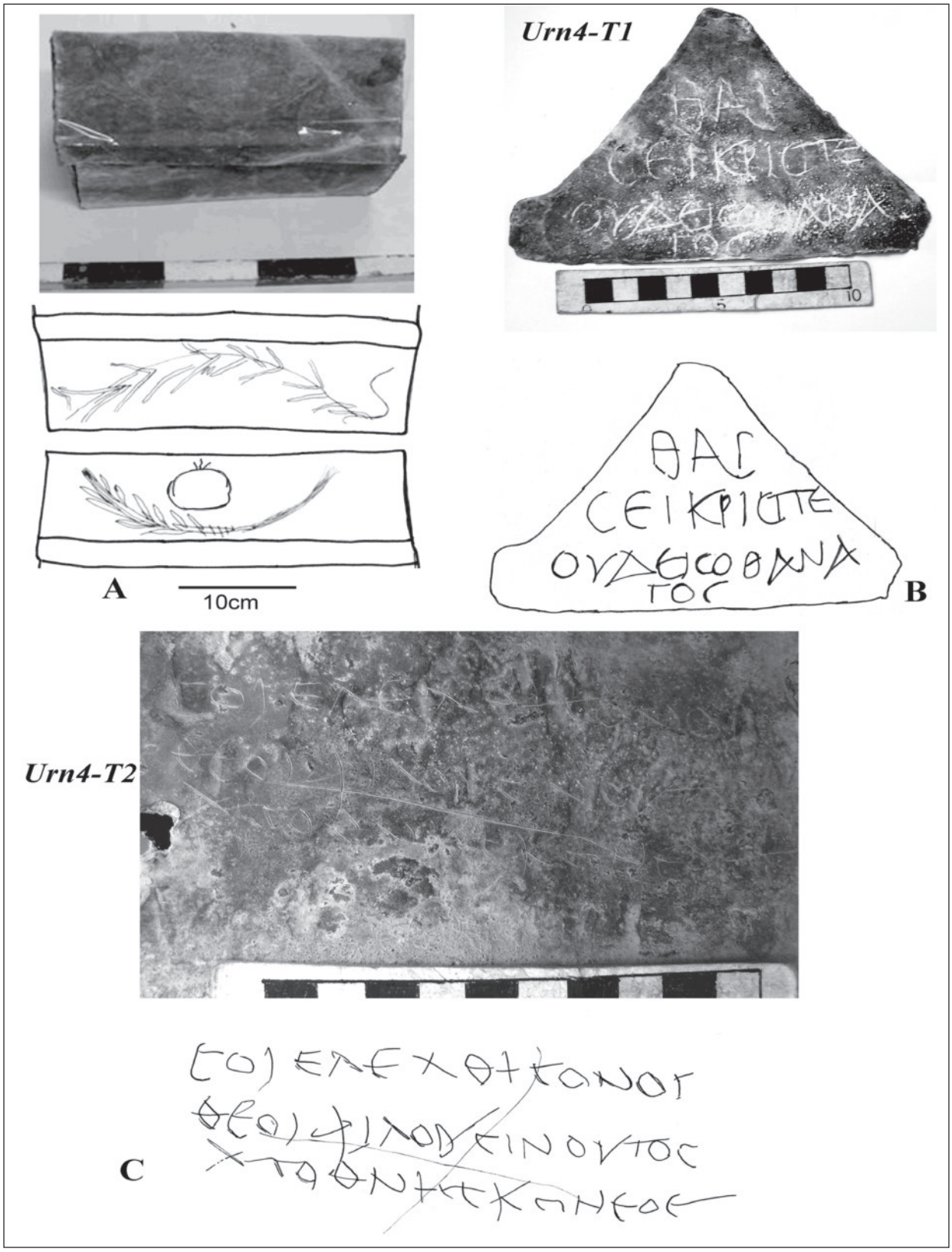
*Urn4-T1 Inscription*

The text was engraved with a sharp instrument and covered the triangular lid's side (13.5x15.8cm). The letters of this four-line inscription decrease in size from about 15mm in the first line to less than 8mm in the fourth and lowest line (**Fig. 1b**). The text reads:

| | |
|---|---|
| ΘΑΡ | *Θάρ* |
| CЄIKPICΠЄ | *σει Κρίσπε* |
| ΟΥΔЄICǪΘΑΝΑ | *οὐδεὶς <ἀ>θάνα* |
| ΤΟC | *τος* |

This can be translated as: "*Courage Krispos, nobody is immortal*".

The formula "Θάρσει... οὐδεὶς ἀθάνατος" is well documented – with some variation – on many tombstones from different burial sites in Jordan, dating to between the 1st and early 4th centuries AD (e.g. Mittmann 1970; Gatier 1986, 1998; Maimaris and Kritikakou-Nikolaropoulou 2005). Regionally,




*1. Ḥijra-Urn4 and its inscriptions: (a) the urn and lid decoration; (b) Urn4-T1 inscription and (c) Urn4-T2 inscription (note different cm scales).*

the cited name Krispos (in the vocative), like the Latin Crispus, is attested in the male as well as the female form Krispina (Mittmann 1970: 166; Strubbe and Bakker 1999: 632, 635).

*The Unrn4-T2 Inscription*

This three-line text covers most of the 12.3x15.8cm urn's side. It is a longer text than that of Urn4-T1, but with generally smaller engraved letters (6-8mm). Some letters appear to be deformed, *viz*. alpha (α), epsilon (ε), eta (η), theta (θ), iota (ι), lambda (λ), nu (ν) and the greatly variable omicron (ο). These variations are possibly related to the nature of the material upon which the inscription was applied (lead). Two diagonal lines across the inscription are irrelevant later 'scratches' (**Fig. 1c**). The inscription reads:

| | |
|---|---|
| COIELEXΘHONOI | σοὶ ἐλέχθη ὃν οἱ |
| ΘEOIΦIΛOYCINOYTOC | θεοὶ φιλοῦσιν, οὗτος |
| ΑΠΟΘΝΗCKEINEOC | ἀποθνῄσκει νέος |

This translates can be translated as: "*To you is said, whom the Gods love dies young*".

The text is a well-known citation from Menander's (342-292 BC) comedy (Jäkel 1964) that was frequently used in Greek and Roman tombstone inscriptions and dedications (e.g. Latimore 1862: 259-260; Vérilhac 1982: 225-227). However, the Urn4-T2 text differs from the 'normal' citation in having an added "οὗτος " at the end of the second line, a variation that disturbs the metre but has recently also been found on an urn from Philadelphia in Asia Minor (Petzl 2007: 274-275, nr 1912 Z. 10f). To date, no comparable finds are known from Jordan or the wider Near East, with the exception of Turkey as described above. Compared to similar Menander citations reported elsewhere, the Urn4-T2 inscription is probably no later than the 4th century AD. Dating the text more precisely remains difficult.

**Discussion**

The style of the inscriptions and ornaments found on Ḥijra-Urn4 appears crude and unprofessional. This becomes evident when it is compared with other inscriptions written on leaden surfaces found elsewhere, e.g. Antioch (Hollmann 2011: 156, 163). As argued above, both Greek texts were likely inscribed before the 4th century AD. Although the pottery found in the cave tomb dates to between the 1st and 6th centuries AD (Abu Shmeis and Nabulsi 2009), the urn itself and its contents can only be dated to the time before Roman cremation burials were replaced by inhumations in the late 2nd / early 3rd century AD, perhaps as a result of 'oriental' influence (Toynbee 1971: 50; Morris 1992: 31-34). The form of the engraved letters suggests that the Urn4-T2 inscription was applied with a different instrument to that used to apply the decoration on the urn lid and the Urn4-T1 text, and may have been done by a different person. The inscriptions could have been engraved at the same or a different time.

Taken as a whole, the circumstances of the find suggest that the Urn4-T1 inscription was a funerary dedication to Krispos, whose cremated remains were kept in the urn. The Menander citation on the urn includes the attribute "young". This appears unsuitable for the 50-60 year old deceased. It might have been contemporary with the first inscription, written by the same or another person – using a different instrument – as a 'literary' lamentation regardless of the age of the deceased. Another possibility is that the citation was subsequently applied to the urn as a dedication to an adjacent inhumation burial in the cave tomb. In view of the immense financial and material resources required to carry out a Roman cremation burial, it seems likely that the urn was a subject for secondary use. Therefore, inscription Urn4-T1 is probably contemporary with the leaden urn itself, very likely within the 2nd century AD. The uncertainty about T2 only allows it to be dated to between the 2nd and 4th centuries AD.

There are indications that Ḥijra cave tomb was used as a place of burial and frequented over a long period of time by a single group, possibly from the nearby site of Khirbat Ḥijra located to the north-west (Abu Shmeis and Nabulsi 2009: 517). This is supported by pottery evidence and the observation that the two examined inhumation burials were embalmed after the soft tissues of the deceased had decayed.

Recent discoveries in the greater 'Ammān area (Abu Shmeis and Nabulsi 2010) indicate

that Roman cremation burials were more frequent in *Provincia Arabia* than previously thought. This practice reflects a strong Hellenistic cultural influence and / or affiliation amongst more affluent local groups. The case of Ḥijra-Urn4, particularly with its Menander citation, is a demonstration of these cultural influences amongst a local group residing in the heavily Romanised *Philadelphia* region.

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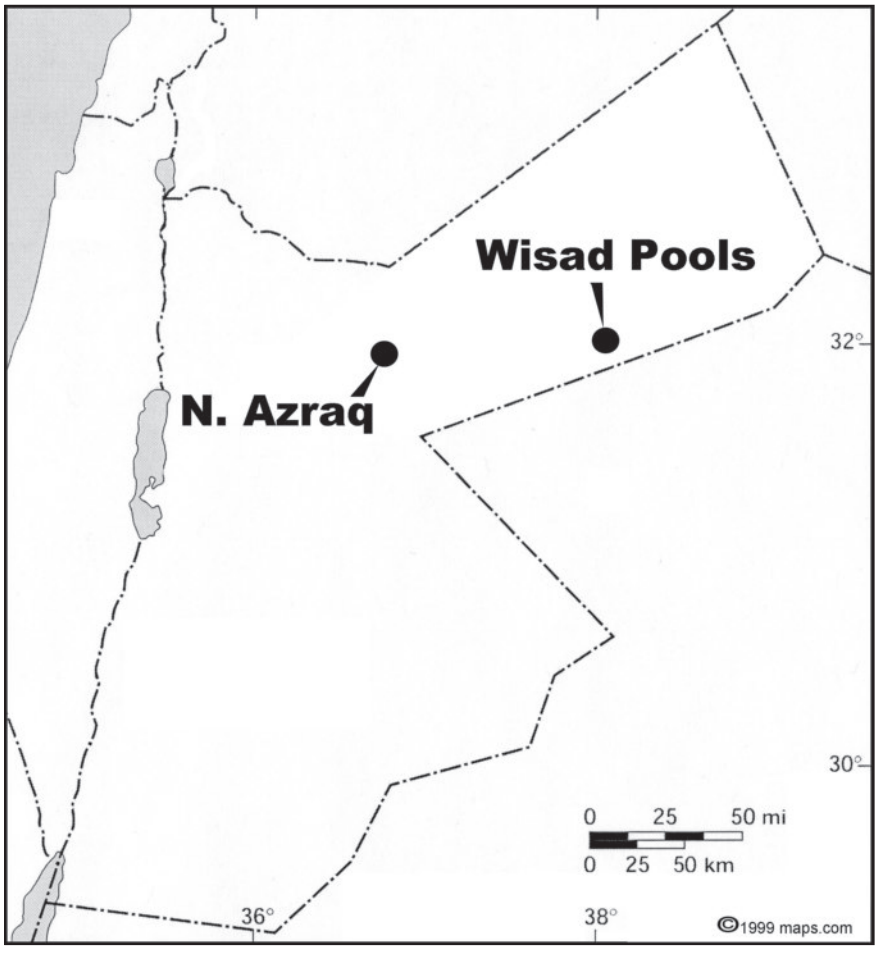
# THE 2011 SEASON AT WISĀD POOLS, BLACK DESERT: PRELIMINARY REPORT

*G. Rollefson, Y. Rowan, M. Perry and Wael Abu-Azizeh*

**Introduction**

Wisād Pools (**Fig. 1**) lie approximately 100km ESE of Azraq, consisting of a series of natural basins in a short (*ca.* 1km) *wadi* that leads from one plateau to another lying only 8-9m lower in altitude. Locally, the terrain includes low hills and numerous extensive *qī'ān* (Ar. "mudflats") that collect surface runoff when precipitation in the winter rainy season pelts the denuded, hard-packed silts and basalt blocks. Regionally, the landscape is characterized by a Late Miocene flood basalt cover (hence the name 'Black Desert') overlying undifferentiated (or at least unnamed) Middle to Late Eocene limestone formations and perhaps the Early Miocene Qirma calcareous Sandstone formation (Rabb'a 2000).

Although known to local *bedouin*, to Jordanian, Saudi and Syrian hunters, and to re-

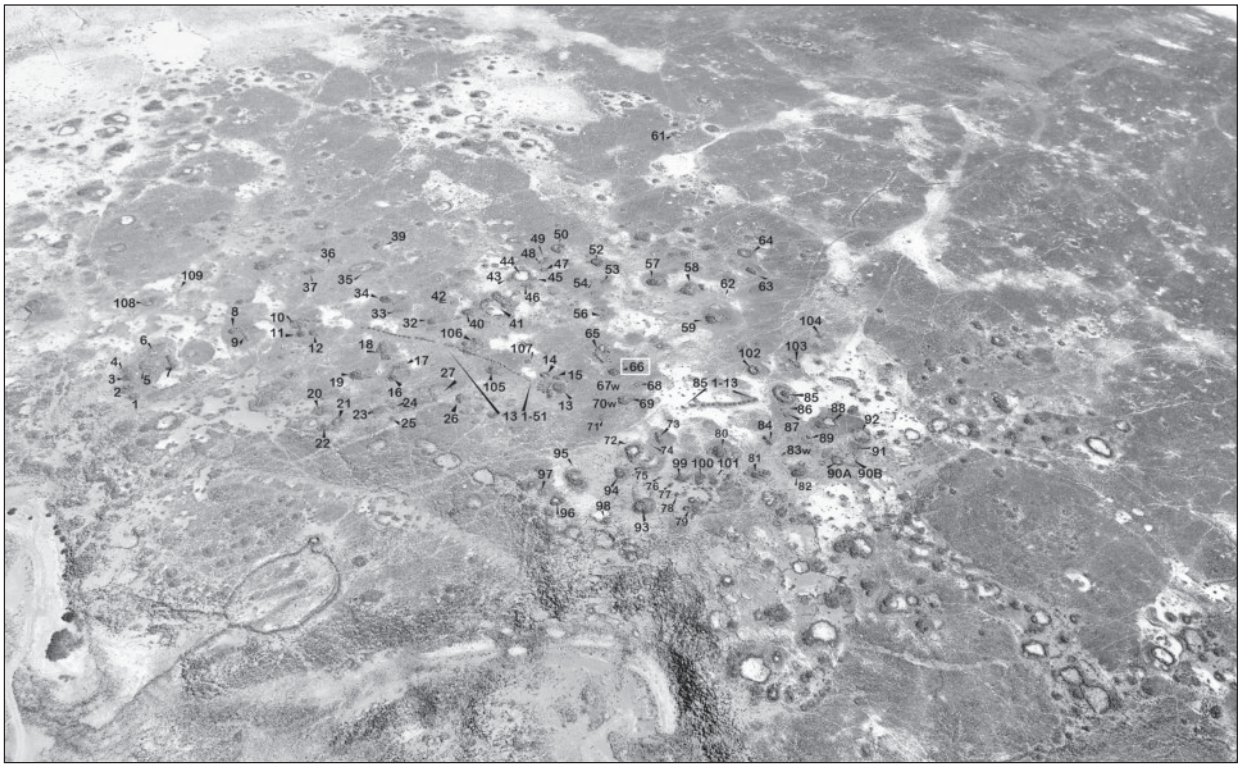



*1. Location of Wisād Pools in the Black Desert of eastern Jordan.*

searchers concerned with desert ecology for many years, the archaeological character of the Wisād Pools area was not acknowledged until 2002 when a survey included a stop at this concentration of prehistoric archaeological remains (Wasse and Rollefson 2005). Subsequent surveys and mapping followed in 2007, 2008 and 2009 (cf. Rollefson *et al*. n.d.a), and in 2011 we undertook continued mapping as well as limited excavation of structures that were densely distributed over an expanse of *ca.* 1.5x1.0km.

There are hundreds of structures (**Fig. 2**), all constructed of local, naturally rectangular, basalt slabs and more irregular blocks. The structures fall into several major types, including: (1) large multi-chambered tumuli (as evidenced by looting), (2) smaller, lower mounds that also appear to be mortuary in nature, (3) impressively massive towers, sometimes with attendant 'chains' or 'tails' of smaller (*ca.* 1x2x1m) chambers or basalt piles of various lengths, (4) what appear to be open-air buildings with interior features suggesting non-residential (ritual?) functions, (5) 'lanes' or pathways outlined by small basalt boulders that continue for tens of meters but do not have obvious origins or destinations, (6) small and large enclosures with walls of basalt boulders and slabs collected from the interiors of the enclosures, exposing floors of accumulated light-colored silts in the process, (7) probable residential compounds with interior structures that may represent dwellings, animal enclosures and storage facilities, (8) circular platforms (*ca.* 2-4m diameter) that perhaps represent either burials or work / storage areas, and (9) lines of adjacent rectilinear chambers (each *ca.* 2x1x1m, from four to eight in a line), which may have been storage features for pastoralists who visited the location on a regular basis. Overall, we interpreted the site as being an enormous necropolis with occasional visits by pastoral groups, which may have had no direct relationship to mortuary activity.

Surface artifacts are generally rare across most of the site, although the top of 'Late Neolithic Hill' includes dense distributions of Epipaleolithic cores, tools and debitage, as well as highly concentrated clusters of Late Neolithic chipped stone artifacts that overlap Epipaleolithic chipping areas. To the north, near the uppermost pool in Wādī Wisād, looters working in a couple




*2. Numbers refer to structures mapped in 2009; the W-66 complex is indicated by a white rectangle in the center of this aerial photo (photo by David Kennedy).*

of areas have dug through Middle / Late PPNB chipped stone material in relatively high quantities also. But for most of the expanses between structures there is a light dispersion of usually small-sized debitage characterized by steep, broad, single-facet platforms. There are rare fragments of tabular scrapers usually associated with a structure. Taken altogether, this 'background noise' of debitage could have dated to the Late Neolithic, Chalcolithic or Early Bronze Age (or all three periods).

**The 2011 Season at Wisād Pools**

The goals for the 2011 season at Wisād Pools were essentially twofold: first, to continue mapping the structures spread across the *ca.* 1.5km$^2$ extent of the site and, second, to investigate the contents of backdirt in disturbed tombs at the site. For the first objective, we would use kite photography in conjunction with GIS methods (see below), which would permit a rapid means of registering structure locations relative to 1:50,000 maps of the area. For the second aim, we would excavate inside and outside tombs that appeared to have been looted in the recent and more distant past.

The latter goal proved to be more urgent than we had originally thought. When we arrived at the site on 1 June, the *Bādiyah* Police informed us that a looter had been digging in one of the tower tombs during the week before we arrived, as was clear to us as we approached the campsite – fresh backdirt cascaded down the side of a tower tomb.

A more pleasant, welcoming sight involved the rain that had fallen in the area in mid May. Water was present in all but the shallowest of the pools, including Pool #1 at the northern end of the *wadi*, which we had measured in 2008 and calculated to hold more than 2,000m$^2$. It was nearly full after two weeks of evaporation (**Fig. 3**) and there was still a considerable amount of water left in the pool when we closed the season at the end of June.

**Kite Photography (WA-A)**

Several factors combine to make kite photography a particularly useful method for desert archaeology. The specific environment of the arid regions is one of those factors. The *ḥammād* or *ḥarrah* landscape generally offers a flat and smooth surface, upon which poor vegetation cover aids the visibility of archaeological structures from the air. Moreover, the typically shallow sedimentation on desert sites makes it easy to identify the structures. However, from ground level – amidst the stones scattered on the desert surface – it is often difficult to understand the shape and layout of these structures, which appear clearly from high in the air.

Kite photography has already demonstrated its worth in the context of desert archaeology. The method was tested during a survey project in southern Jordan on small, ephemeral pastoral

*3. View towards the north-east of Pool #1, still nearly full two weeks after May rainfall (photo by G. Rollefson).*

encampments dated to the Chalcolithic / Early Bronze Age in ath-Thulaythuwāt area (Abu-Azizeh 2010). At Wisād, however, the method was implemented on a wider scale, involving the use of specific methods.

*Methodology*

The layout of the site and its huge extent required multiple aerial views to be stitched together using GIS, in order to create a high resolution mosaic image of Wisād. The different steps of this procedure are briefly outlined below.

Defining Coverage Strategy and Primary Areas

Two variables depend on the vertical height of the camera above the ground surface: (1) the resolution of the images and (2) the surface area covered by the images. In order to optimize the stitching together of the images, it was first necessary to define a standard altitude. Trials at the beginning of fieldwork demonstrated that an altitude of 300m (the maximum attainable by the kite) was the best compromise between image resolution and sufficient surface coverage.

The aerial photography during the 2011 season focused on two main sectors (**Fig. 4**). The first was located in the central core area of the site and aimed to complete the mapping work started during previous fieldwork seasons. It was roughly square, measuring *ca.* 550x550m (*ca.* 30.25 ha). It was divided into three distinct areas located around the excavation camp, *viz*. 'East Camp', 'West Camp' and 'Late Neolithic Hill'.

The second sector was located approximately 1km south-east of the central core area. It was laid out in order to provide complete coverage of the 'Neolithic Village' and measured *ca.* 250x150m (*ca.* 3.7 ha).

Establishing a Grid of Ground Control Points

So that post-fieldwork orthorectification of the images and georeferencing into a GIS product could be achieved, ground control points were necessary. These needed to be visible both on the ground and on the images. Small white plastic plates (25cm diameter) were therefore staked to the ground surface at 50m intervals, using a grid oriented east-west / north-south. This grid was laid out using a decameter and a compass, and each point location was recorded using a hand-held GPS device and a total station (**Fig. 4**).

Taking Vertical Aerial Photographs

Numerous kite flights were necessary to complete the aerial photography of each sector. Once the standard altitude of 300m was reached, the camera – which was suspended pendulum-fashion below the kite – was swept back and forth across the area in an S-shaped pattern with pictures being automatically taken every 10 seconds. A ground assistant located directly below the camera gave directions using walkie-talkies to ensure that the kite passed over each white plate. In this manner, almost 5,000 aerial photographs were taken across the two sectors.

*Processing the Images Using GIS*

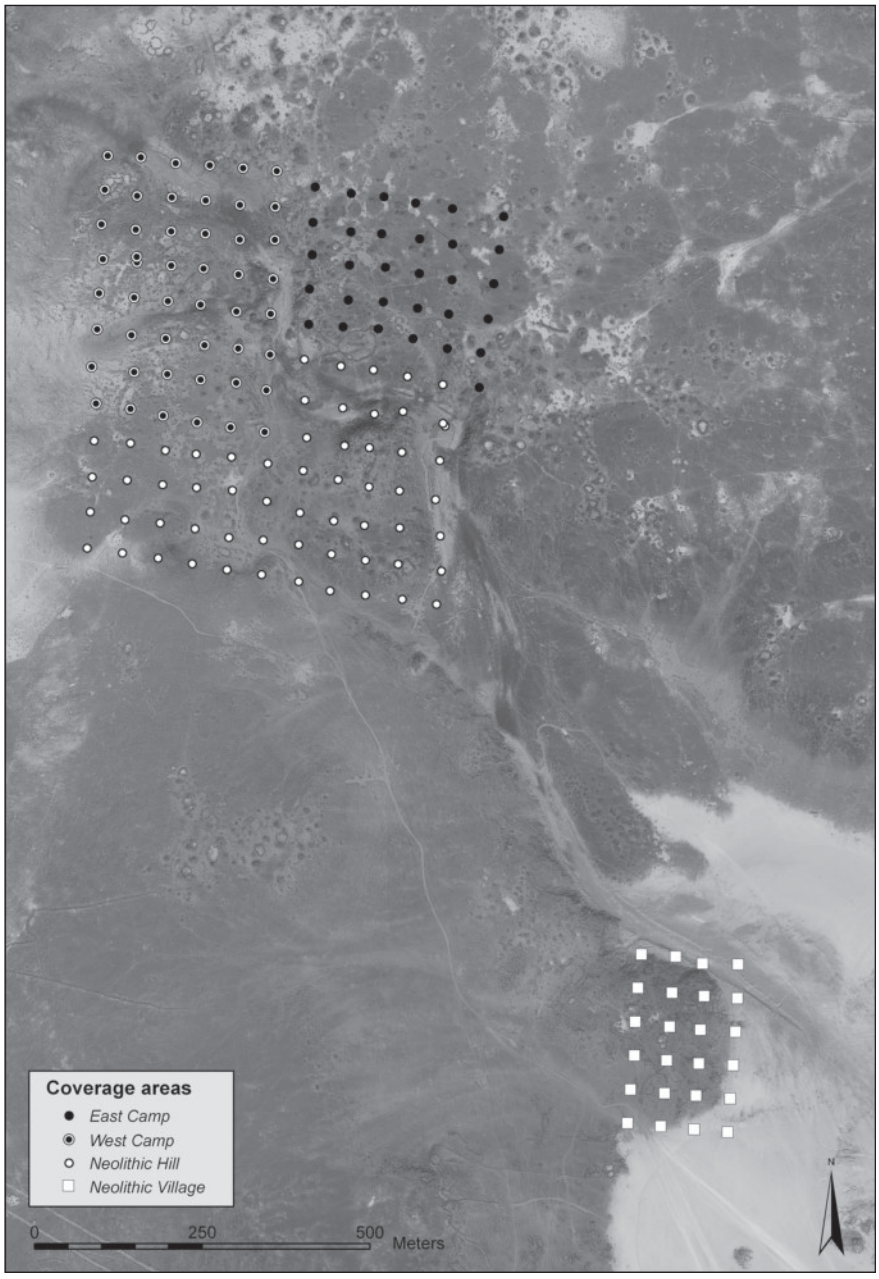
The first stage in the task of processing the aerial photographs, which is still in progress, involves careful selection of the best images from the huge quantity available. The quality of their assembly using GIS will depend on the verticality of the images, their resolution and their homogeneity. During this stage of the processing, the grid of ground control points will enable us to associate each plate visible on the images with its actual geographical location (using the Georeferencing Tool on ArcGIS software), thereby achieving primary georeferencing at an average accuracy of 3 to 4m. However, by using the QuickBird satellite imagery available on the project's GIS, the level of accuracy can be considerably improved to 2m, which is a very satisfactory result on a site as large as Wisād (**Fig. 5**). The ongoing processing work will eventually yield a high resolution, spatially accurate mosaic image which will aid in the documentation and mapping of the site.

**The Tower Tombs West of Wādī Wisād**

Although there are numerous structures west of Wādī Wisād, only 11 had been mapped prior to the start of the 2011 season (**Fig. 6**). All of the apparent mortuary constructions had been looted, and three of them – all tower tombs – were the focus of our investigations early in the season: W-110, W-117 and W-119 (marked in white at **Fig. 6**).

*W-110*

Although it was noted in earlier seasons that W-110 had been disturbed sometime in the past, it had been looted again the week before our ar-

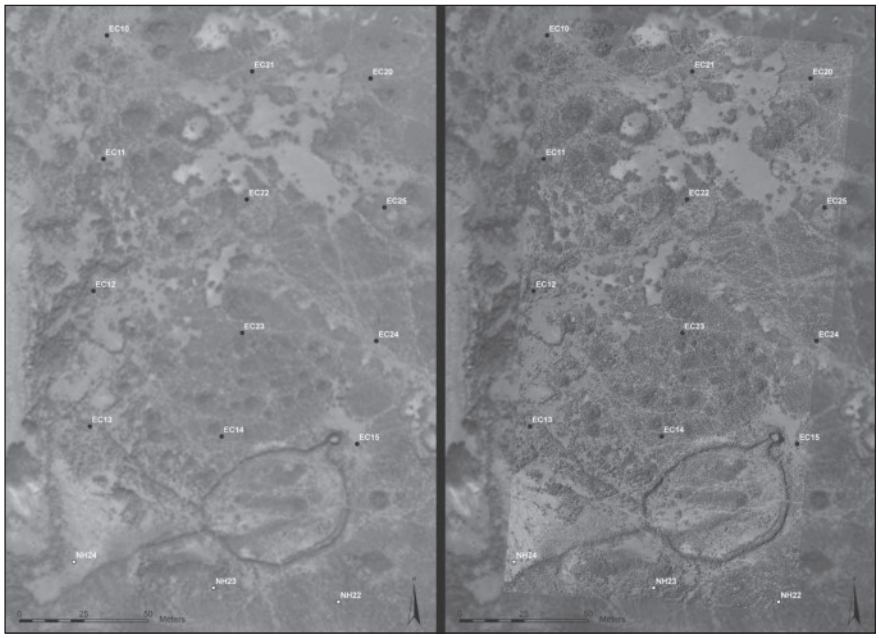



*4. General view of kite photography coverage at Wisād and ground control grids for selected areas (image by W. Abu-Azizeh).*

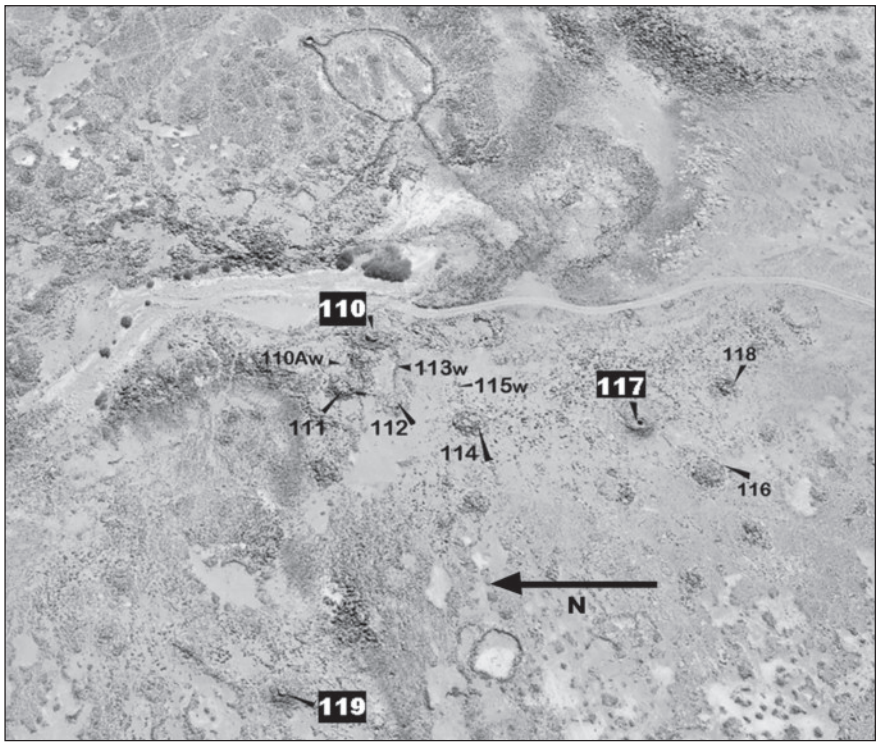
rival. The backdirt from this illegal operation was dispersed among the jagged blocks of basalt that had been thrown down from the top of the tomb, so it was not feasible to look through it to recover any bones or artifacts that may have been discarded by the looter. But there was still a considerable amount of disturbed and undisturbed aeolian sediment inside the tomb, so the decision was made to investigate some of the features of the tomb that had not been destroyed.

It was noted immediately that the looter was not interested in human remains, for on the rim of the tomb the looter had left a stack of bones, some still wrapped in ancient woven cloth. From the bones left by the tomb robber, at least three individuals were represented: two adults and a sub-adult.

The cylindrical tower was preserved to a height of approximately 1m (five courses of basalt blocks) with an exterior diameter of *ca.* 4.60m (**Fig. 7**). The tower was clearly constructed on an earlier platform or mound of basalt of undetermined age. Despite the confusion around the exterior of the tower caused by




*5. Kite photography georeferencing using ground control points and Quick Bird satellite imagery: (left) background QuickBird satellite image; (right) georeferenced aerial photography (images by W. Abu-Azizeh).*




*6. Location of the three tower tombs investigated west of Wādī Wisād (numbered in white) (illustration after photo by David Kennedy).*

tumbled blocks, it was evident that on the eastern side (facing 060-070˚, or ENE) there was an entrance chamber almost 2m long and just over 1m wide and high. The eastern end of the entrance chamber was blocked by a huge standing stone measuring 1.00x0.91x0.20m (with an estimated weight of 675 kg[1]). The chamber appears to be approximately 2m above the current ground surface west of W-110, suggesting that the chamber (and associated tower) are later additions to a previous construction, possibly a tumulus or stone platform that was, in turn, placed above a Late Neolithic dwelling (see below).

1.The density of a sample of basalt obtained from a nearby mesa was calculated to be 3.7gm / $cm^3$.

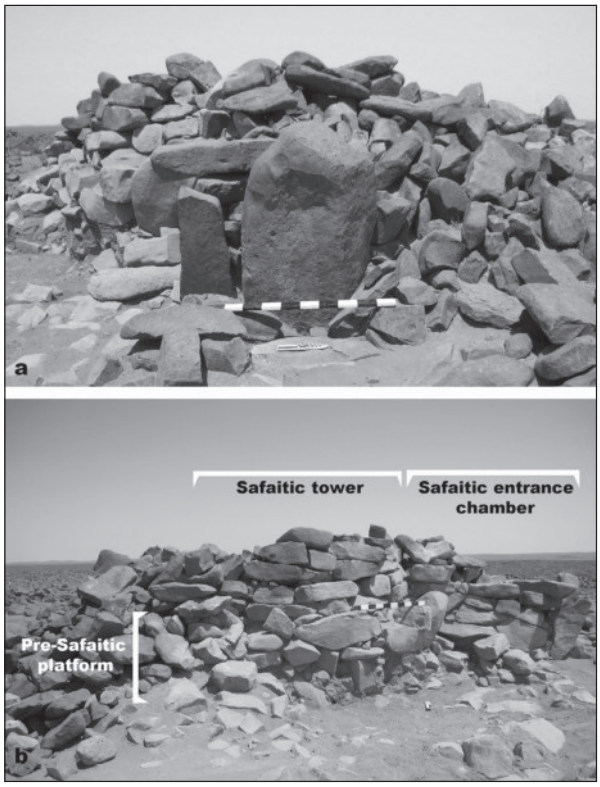

*7. Photo taken of W-110 in 2009 before damage caused by the 2011 looting; view to NNE (photo by G. Rollefson).*

Owing to disturbance by the looters, excavation of the interior followed arbitrary levels until an *in situ* deposit of very compact silt with ash lenses was reached. In this layer there were numerous animal bones as well as chipped stone debitage and tools that included Late Neolithic arrowheads, bifacial knives, truncation burins and drills on burin spalls. Conspicuous in the excavated sediments was a large basalt block measuring 1.15x0.54x0.33m (*ca.* 760kg); this was likely a pillar supporting a corbelled roof (**Fig. 8**; see W-66a below).

*W-117*

About 10m SSW of W-110 is another tower tomb, designated W-117; like W-110 it has a complex history. A circular tower preserved to a height of 1m (five courses of basalt blocks) was built atop a pre-existing stone mound or platform 1.20m high (also five courses in height). The tower had an exterior diameter of 4.60m and an interior diameter of 2.70m (**Fig. 9**). Abutting the eastern side of the tower and platform was an entrance gallery oriented precisely 090˚, or due

*8. View into the interior of W-110 showing the Late Neolithic surface at the bottom and the large standing stone above the north arrow (photo by M. Perry).*




*9. (a) View towards the west of the huge standing stone of basalt sealing the chamber into the tower at W-117; (b) view towards the north of the relationship between the entrance gallery, the tower and the earlier stone platform at W-117 (photos by G. Rollefson).*

east. The chamber was 2.30m long, 1.20m wide and 1.00m high (again five courses). The gallery was sealed at the eastern edge by a standing stone 1.28m high, 0.75m wide and 0.35m thick (*ca.* 1,240kg).

Again like W-110, W-117 had been looted at some time in the past, penetrating into the ground far below the surface on which the mound / platform was built. Unlike W-110, there was no evidence of a large pillar inside the excavation, nor were there any artifacts in the loose disturbed soil or backdirt that could be definitely associated with the Late Neolithic.

*W-119*

Approximately 90m WNW of W-110 are the remains of another two-phase tower tomb, designated W-119, with strong similarities to W-110 and W-117 (**Fig. 10**). The circular tower itself (*ca.* 3m diameter) was asymmetrically positioned on top of an earlier platform or mound. Another similarity at W-119 was an entrance chamber on


*10. View towards the north of W-119 showing the relationship between the tower and the earlier platform foundation (photo by G. Rollefson).*

the eastern edge of the tower and a sealing stone (albeit tumbled and partially covered by tumbled basalt).

As **Figs. 7**, **9** and **10** indicate, we have dated the towers at W-110, W-117 and W-119 to the Safaitic period (1st century BC to 4th century AD; MacDonald 1999). Our reasons for making this temporal ascription are manifold. First, the woven cloth associated with the bones left behind at W-110 is similar to textiles found with Safaitic burials (e.g. al-Salameen and Falahat 2009) and is in a state of preservation that is unlikely to be Late Neolithic, Chalcolithic or Early Bronze Age. Second, the presence of Safaitic inscriptions on some of the stones of the monuments at Wisād is confined to these three towers; no other tumuli or mounds appear to bear Safaitic writing, whether on the west or east banks of Wādī Wisād. Third, Safaitic inscriptions on other rocks are concentrated within the immediate vicinity of the western three tower tombs (13 inscriptions around W-110, 32 near W-117 and 44 within 15-20m of W-119). Fourth, rock art attributable to the Safaitic period is also clustered near the three towers in general association with the inscriptions. Exceptions to this evidence are two major rock art galleries opposite 'Late Neolithic Hill' on the northern and eastern edge of Wādī Wisād, although here Safaitic inscriptions are very rare. Fifth, additional clear evidence for reuse of earlier structures as foundations for tower tombs has been identified on mesas M-7 and M-9 in Wādī al-Qaṭṭāfī, as well as on mesas U-20 and U-22 in the Umm Nukhaylah chain of mesas. In these cases, Safaitic inscriptions and rock art are also restricted to the immediate area around the towers. Finally, none of the towers east of Wādī Wisād have Safaitic inscriptions on them, nor rock art nearby. Neither are any eastern entrance chambers sealed with a massive standing stone[2].

**The Late Neolithic House at Wisād Pools**

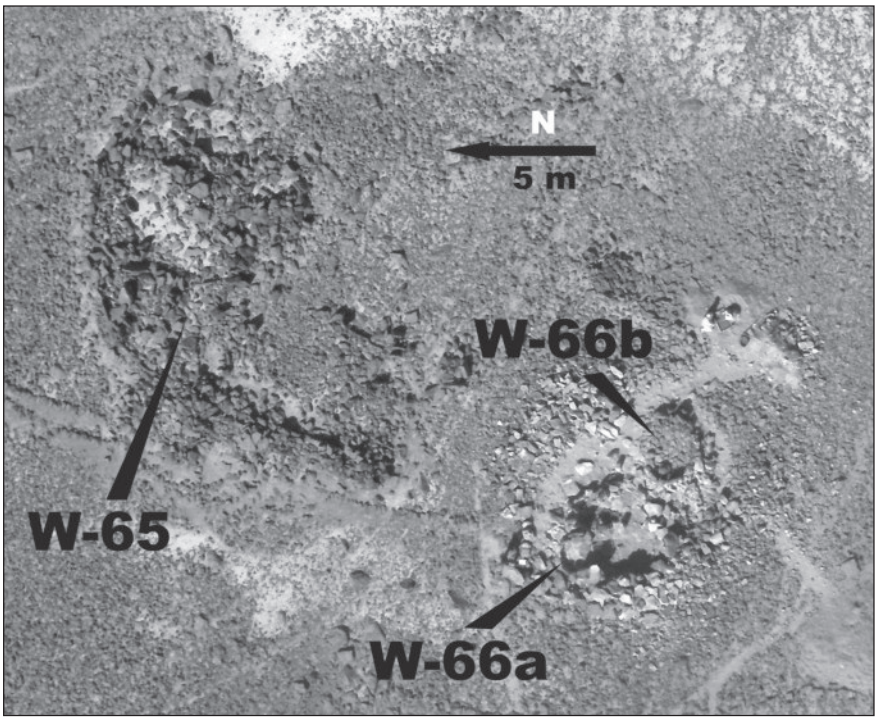
Based on research in other arid areas of the Levant and farther afield, much of the architecture seen at Wisād was deemed to reflect principally Late Chalcolithic or Early Bronze construction, especially the buildings that could be interpreted as mortuary structures (Steimer-Herbet 2004). There are certainly many points of similarity across much of the desert region (cf. Braemer *et al*. 2001, 2010). We selected several constructions we took to represent tombs that appeared to have been looted in the past. One of them turned out not to be associated with mortuary practices at all, and it was built much earlier than the Chalcolithic period.

W-66 was a building complex that seemed to all outward appearances to have been a low tower tomb whose ceiling had been disturbed by looters. The dimensions of the larger circular element (W-66a; **Fig. 11**) were difficult to assess owing to the collapse of many huge basalt blocks that were piled all around the virtually invisible exterior of the structure's wall. Adjacent to it on the eastern side was an even lower curvilinear platform (W-66b) paved with relatively small (*ca.* 30-35cm average maximum dimension) basalt blocks.

*W-66a*

The top of the complex was less than 2m above the present ground surface. Excavation of this unit revealed several phases of intensive occupation with intervening periods of little evident activity. The earliest phase represents a low circular or sub-circular one-room construction that incorporated a gypsum plaster floor, which lies 35cm below the modern ground surface to the west of the building (**Figs. 12 - 13**). The room measured *ca.* 4.25m from the western edge of the large basalt bedrock slab in the north-west part of the room to the south-east corner, although it may have been extended by almost a meter at a later time (see below). The floor included a plaster basin near the western side of the room. The

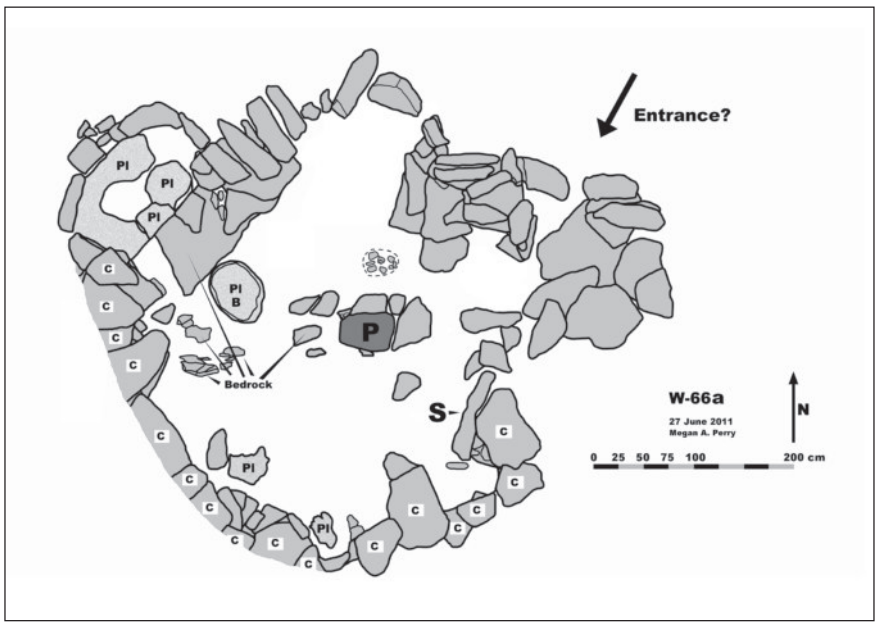
2.The eastern entrance gallery appears to be confined to the western part of Wisād Pools. To date, such features have not been seen anywhere else where Safaitic towers have been identified.




*11. Aerial view showing the relationship between W-66a and W-66b (photo by W. Abu-Aziezeh).*

basin was elliptical with a major axis of 58cm north-west / south-east and a minor axis of 44cm south-west / north-east. The plaster of the basin was about a centimeter thick, which matched the thickness of the floor plaster preserved in several patches near the southern wall of the room. The basin was probably simply a depression excavated about 5cm into the level floor surface and coated with plaster when the floor was laid.

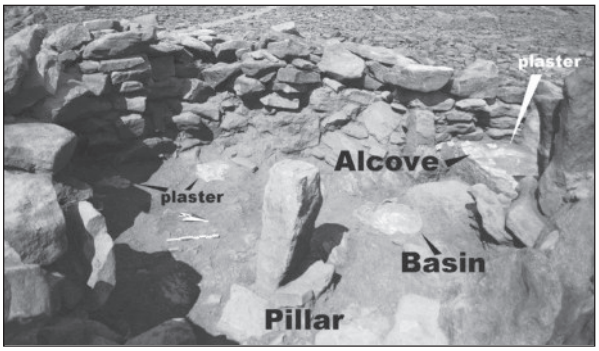
Dominating the center of the room was a large basalt pillar, measuring 1.02x0.44x0.30m, which weighed *ca.* 500kg. The western, southern and south-eastern walls show clearly that the construction here involved several straight wall segments consisting of stacked basalt slabs. Each segment was angled slightly in relation to its adjacent neighbors, so that the interior geometry (at least) was not curvilinear but polygonal. The height of the stacked slabs was approximately 0.50m, at which point the suc-




*12. Plan showing the initial use of W-66a: C = corbel stones; P = pillar; Pl = plaster; Pl B = plaster basin; S = anthropomorphic standing stone (drawing by M. Perry and G. Rollefson).*

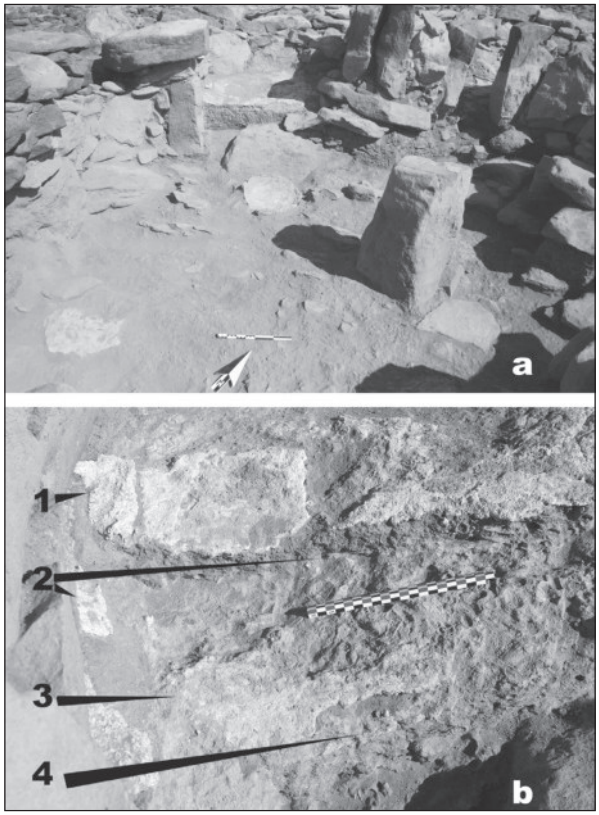
ceeding stones above were corbeled towards the center of the room, eventually reaching the central pillar that served as the primary support for the last corbeling stones. The corbelling stones were huge, measuring more than 1m in length in many instances, with widths that attained 0.80m; average thickness was 10-15cm, with estimated weights of up to a couple of hundred kilograms each (though some were much smaller). At the 'corners' of the segments of the polygonally arranged walls, there were occasional columns of smaller flat slabs stacked ostensibly in order to increase the stability of the corbeling (**Fig. 14**). The result of this design is that the inhabitants would have had to crawl about in the room, with a roof only 1m high at most, reduced to half that near the walls.

At the north-western edge of the room, and possibly added at a later time during the initial phase of occupation, there is an alcove measuring 1.5m south-west / north-east by 0.85cm north-west / south-east. Gypsum plaster was used to surface the floor of the alcove at least four times; the last plastering episode is 28-35cm higher than the floor level in the main room (**Fig. 15**). The alcove may have been an alteration to the original room during a later part of its first occupational phase. The alcove is set relatively far




*13. View to west of the interior of W-66a showing interior features including: (right) the plastered alcove, (left of the alcove) the plastered basin, (center) the pillar and remnants of plaster on the floor (photo by M. Perry).*

*14. Niche in the south-east part of W-66 showing the corbeled stones, the small supporting column and remnants of floor plaster (photo by M. Perry).*




*15. (a) View to the west of the plastered alcove (center top) (photo by M. Perry); (b) the four plastering episodes (photo by G. Rollefson).*


*16. View to the west of the pillar and anthropomorphic standing stone in W-66a (photo by G. Rollefson).*

from the pillar, adding a decidedly asymmetrical aspect to the structure.

On the opposite side of the room, there is a flat standing stone 0.93x0.90x0.10m (*ca.* 300 kg) standing against the eastern wall (**Fig. 16**). The top of this slab bears 'shoulders', although these are natural contours and not the result of intentional shaping. The stone now leans considerably to the west as a consequence of roof collapse; most likely the corbel leaning against the upper part of the standing stone in **Fig. 16** once rested on top of it. The base of the standing stone is at floor level, but it is possible this is a later addition to the room since it partially blocks access to the niche immediately behind it.

There was no dense accumulation of ash or fire-cracked rock inside the structure during this phase of occupation. However, there was a light concentration of charcoal and ash from a restricted area on a circular bed of cobbles just to the north of the pillar. If the occupation of the structure was seasonal, as one would predict if patterns of precipitation were anything like modern ones, the small hearth may have furnished some heat and light during the winter nights.

The end of the earliest phase of habitation is marked by the accumulation of sediments atop the floor, after which there is no longer any use of gypsum plaster. Layer 5, which is practically devoid of stones, may have been accumulating over the original floor before abandonment, but after about 20cm of sedimentation the structure appears to have begun to deteriorate. Layer 5 is characterized by dense concentrations of cemented beetle pupation chambers, suggesting a sustained interval of abandonment. Lithics and animal bone are relatively rare; only two ground stone objects were recovered from this layer. In Layers 4 and 3, cobbles and boulders of around 35cm maximum dimension appeared throughout the room, with handstones, grinding slabs and chipped stone tools densely dispersed throughout the layers. Moreover, in both layers there were frequent masses of caprine and equid-sized animal bone. Layer 2 yielded less bone and tools, although a cache of nine pestles of differing sizes, as well as a huge handstone, were placed in the upper reaches of the niche at the right in **Fig. 14**.

Layers 2 through 5 indicate that there were occasional uses of the shell of the structure of indeterminate duration. During these sojourns, the northern side of the building was probably altered considerably. The area to the north-east of the axis, from the standing stone at the eastern wall to the northern wall of the north alcove (**Fig. 12**), did not yield any evidence of the wall structures and corbel arrangements noted for the first phase(s) of use on the other half of the structure. In fact, many of the on-edge slabs at the periphery of the northern and eastern sides of the building suggest they may originally have been corbel slabs that were part of the initial occupational phase. The erect stones on this side of the structure are at least 35cm (and occasionally up to 60cm) above the original floor. What had originally been a well-built lodging had become a work area for tool manufacture, butchering and plant food processing.

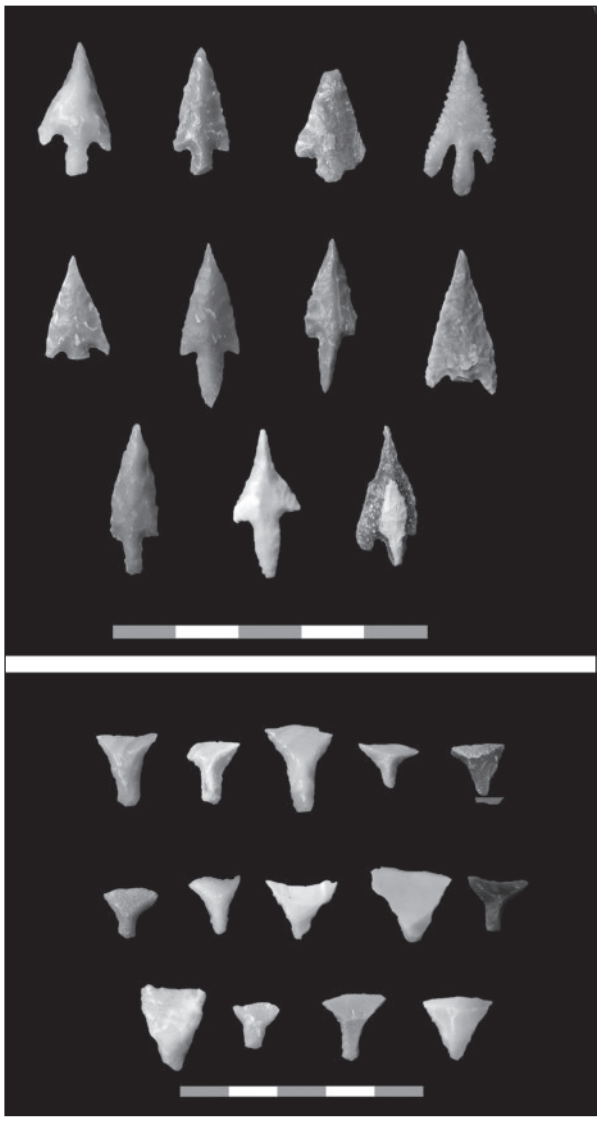
*W-66b*

Adjacent to and east of W-66a (we did not have time to determine the stratigraphic relationship between the two) is W-66b, a platform 3.25m in diameter and *ca.* 0.40m high, except for three larger standing stones (0.40-0.75m high, 0.40-0.70m wide and 0.10-0.20m thick) on both the eastern and western edges. The axis of the central stones of the two trios of stones was somewhat north of true east. The platform consisted of several layers of small (25x15x5cm) flat stones placed on top of each other. Removal of the northern and western sectors in arbitrary layers indicated that the platform was probably a work area (much debitage and many chipped stone tools, though rare animal bone), which may also have served to store goods above ground level during the rainy season.

During the removal of the layers of stones,

a large basalt slab (0.98x0.37x0.10m) was found lying horizontally in a north - south direction directly over a small triangular arrangement (sides *ca.* 0.60x0.75x0.80m) of small flat stones. Excavation within this delimited area encountered only sterile soil to a depth of 25cm.

As mentioned, the precise stratigraphic relationship of the platform with the larger W-66a structure has not been determined, but in view of the typological character of the artifacts (particularly arrowheads), W-66b at least overlaps the use of one or more of the phases of W-66a. There was no indication of the use of fire in any part of the platform.

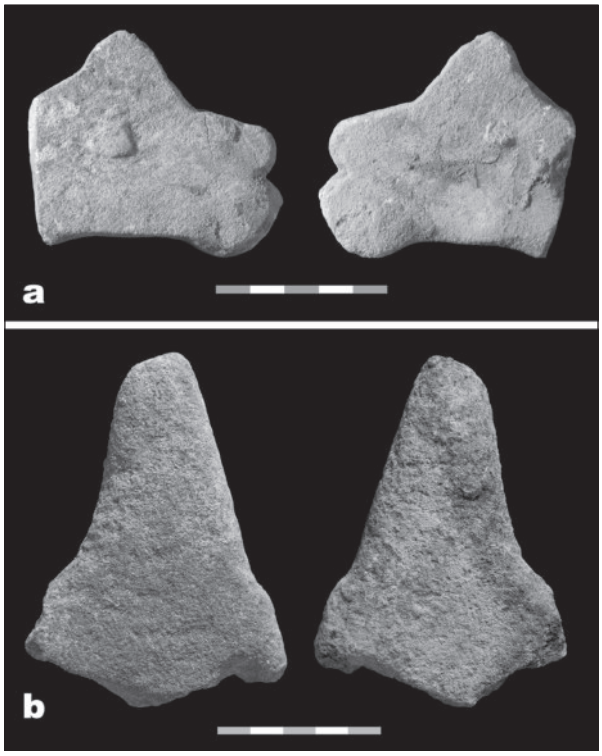


*17. Late Neolithic arrowheads from W-66a and W-66b: (above) Haparsa and Yarmoukian points; (below) transverse arrowheads (photos by G. Rollefson).*

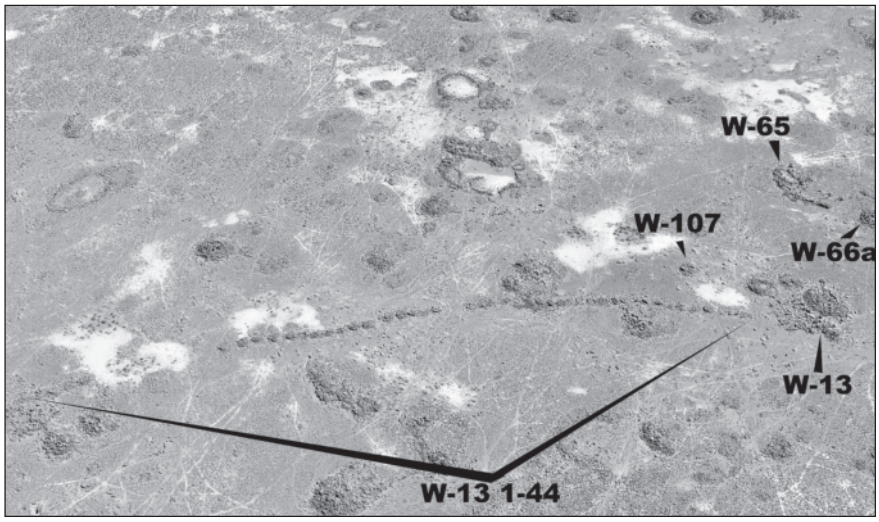
*Artifacts*

To date, there has been no opportunity to undertake intensive investigation of any of the chipped stone, ground stone, sherds, faunal remains or small finds from the W-66 complex. Nevertheless, from the recovered *in situ* artifacts, it is clear that we are dealing with an early part of the Late Neolithic.

In terms of ceramics, an excellent example of a Yarmoukian herring-bone incised and painted fragment that included a handle was found, virtually identical to one from ʻAyn Ghazāl (Kafafi 1990: fig. 10), though other sherds remain to be examined. We retrieved more than 40 *in situ* arrowheads from within W-66a and W-66b, all of them Haparsa, transverse or other Late Neolithic types (**Fig. 17**). Based on this information, one can conclude we are dealing with a period in the earlier part of the Late Neolithic, between 6,500-6,000 cal BC. Tens of thousands of pieces of debitage (including retouch flakes and debris) were recovered from the sieving of sediments through a 5mm mesh. There are also two figurines, one of an exotic fine-grained sandstone that might represent an ovicaprid or even a dog, and another of very fine-grained basalt not known in this re-




*18. Late Neolithic figurines from W-66a: (a) mammal; (b) anthropomorphic.*




*19. Location of W-13, W-65, W-66a and W-107 and their relationship with each other (after a photo by David Kennedy).*

gion that could be a stylized human (**Fig. 18**). Faunal remains became very abundant in Layers 3 and 4. Although we are awaiting detailed analysis, caprines, gazelle and equids all appear to be present (Dr A. Wasse, pers. comm.). Beads of both Dabba marble and malachite were also found throughout the structure, as was a broken bladelet of dark speckled obsidian notched bilaterally at the base, very similar to the proximal end of a Helwan point.

**Other Structures**

*W-13-8*

Structure W-13 is a tower composite of considerable complexity, involving a rectilinear tower, a platform to the west on which several features were built of upright stones, and a long 'chain' of at least 44 rectilinear chambers stretching generally towards the west in a long, shallow convex arc (**Fig. 19**). Chamber 8 (counting from W-13 to the west) measured 1.85x1.65m and was built of basalt slabs up to 0.83m long standing on end or on edge, unlike almost all the other chambers which were constructed by piling basalt slabs horizontally. The interior of the chamber had a shallow accumulation of aeolian sand and some rubble that lay on an original sandy, gravelly surface upon which there was a considerable amount of undiagnostic debitage. This surface overlay a sandy silt layer in which a small hearth was exposed, a feature that appeared to continue under the northern edge (and was thus earlier than) the chamber's north side. The function of the chamber(s) remains unclear, but its use as a tomb appears to be excluded, although it might conceivably have functioned as a cenotaph.

*W-65a and W65b*

About 15m north of W-66a is a complex architectural compound, designated W-65, that includes several paved 'rooms', a row of abutting rectilinear chambers (similar in size to those of the W-13 chain [and hollow as determined by looking through spaces left by looters]) and several small rectilinear features made of basalt slabs standing on end. The slabs of W-65a measured from 0.71x0.53x0.11m to 0.70x1.12x0.18m. W-65b is similar in construction and located 1.5m north of W-65a. Its slabs are 0.75x0.49x0.09m to 0.70x0.51x0.13m. Excavations to below the bases of the wall stones encountered only sterile sediments, so work ceased.

*W-107*

W-107 is an open, circular structure preserved to a height of four courses of stone slabs. The outer diameter is 3.50m and the inner diameter 2.77m. The entire interior was covered with basalt blocks, which were removed completely to expose the original surface. Sediments were excavated in the northern half to a depth of 1.01m, at which depth bedrock was reached and the structure abandoned.

*W-121*

Approximately 125m SSW of W-66 is a small, open oval ringed with relatively small stones set on end or on edge, with a prominent standing stone at the south-west end. The exterior of the feature measured 2.49m north-east / south-

west and 1.98m north-west / south-east; interior measurements were 2.03x1.50m. At 25cm below the modern ground surface and at the base of the standing stone there was a burned area *ca.* 5cm thick and 30cm in diameter. The rest of the fill within W-121 was culturally sterile to a depth of 35cm below the surface (and the base of the stone wall).

**Discussion**

The research undertaken so far at Wisād Pools has figuratively and literally barely scratched the surface of this enormous site. Nevertheless, a couple of important conclusions can already be drawn concerning patterns of use. First, not all of the structures at Wisād are prehistoric, at least not in the classic use of that term. The Safaitic tower tombs indicate that the seasonal rainfall and subsequent water storage in the pools at Wisād continued to attract visitors to the area well into the classical periods. (And numerous small tumuli with orientations suggesting Muslim burials indicate that this is true even into modern times).

The functions of the buildings at Wisād Pools (and in many other parts of the eastern *bādiyah*) are not intuitively obvious in many (perhaps most) cases. This is especially true for the smaller structures such as W65-a and b, W-107, W-121 and even the impressive 'chain' of chambers extending out in a single line from W-13 and other towers at the site. In these cases, the frequently expressed observation that pastoralists leave precious little material culture behind as clues to past activities holds true, and there may be little we can do to resolve the frustrating problem.

The most remarkable result of the 2011 season, however, was the exposure of the dwelling at W-66a. The four plaster episodes in the north-west alcove of W-66a indicate that there were repeated visits to the building in its earliest manifestation. The five or more centimeters of silt accumulation between the plaster layers suggest there may have been relatively extended periods of absence, perhaps coinciding with prolonged periods of decreased rainfall that would otherwise have fed into the pools of the *wadi* (cf. Rollefson *et al*. n.d.b). The use of gypsum plaster on the original floor and several times in the alcove is curious, since gypsum plaster has no waterproof qualities that might have been desirable during the rainy season. Perhaps it was simply an attempt to provide a brighter interior to an enclosed structure whose basalt-formed interior would have been dismal?

At this point in our analyses, the only reports of early use of corbeled roofing comes from the EB I site of Khirbat al-Umbashi (Braemer and Sorins 2011; Braemer *et al*. 2010) and the MB site of Abū Sunaysilah, near Saḥāb in Jordan (Lamprichs 1996). However, in these cases the buildings were long and narrow, and incorporated several pillars as corbel supports. Nevertheless, W-66 appears to be a model that dwellers of the Black Desert found to be effective shelters that would span several thousand years of use and modification.

Of particular interest is the simple fact that W-66a was not just a tent foundation or a simple hut, but a well-constructed, permanent (in the sense of durability) building for long-term use, even if that term was interrupted occasionally by climatic vagaries that made return to the specific location impossible during some periods in which precipitation was lacking. The collapse of the sturdy structure also raises the possibility that there may have been one or more tectonic events during the latter part of the 7th millennium, and that later visitors were content with using the shell of the southern part of the building as part of a more ephemeral shelter for tool-manufacturing and food-processing.

In any event, one must confront the climatic models that indicate a severe decrease in rainfall around the 8.2 kya 'event' (e.g. Weninger 2009 and references therein). These suggest that a sudden decrease in temperature and precipitation may have resulted in intercontinental deterioration of environmental conditions sufficient to cause widespread abandonment of Late Neolithic settlements from eastern Europe into the Levant. The information from W-66 does not, in itself, indicate sufficiently that the 8.2 kya 'event' didn't occur, but there is the possibility that the effects witnessed in the coastal regions of the Mediterranean may not have pertained to the same degree farther inland. The proxies used for paleoclimatic reconstructions come almost exclusively from the coastal / Mediterranean areas of the Levant, and we suggest they may not be entirely applicable to the interior areas. We agree whole-heartedly with Braemer and Échallier (2004) that the landscape we see today through-

out the Black Desert has been influenced by anthropogenic factors (especially overgrazing and fuel-collecting) rather than by climatic change alone. What we have recovered from W-66 indicates that the Late Neolithic residents had ample resources to support large-scale investments of labor to construct permanent dwellings, even if they would only be used on a discontinuous basis. The landscape we see today in the Black Desert is one of dismal and bleak expanses of basalt and sand, but this is not what our Neolithic ancestors enjoyed.

**Acknowledgements**

We are grateful to the Department of Antiquities for the opportunity to undertake the research and to Mr Wesam Talal, our departmental representative, who was of invaluable assistance. We also express our appreciation to Margaret Du Bray and Ian Kretzler, Whitman College students who were exemplary in the field. And finally, we express our gratitude to Dr Barbara Porter and the personnel of the American Center of Oriental Research in ʻAmmān for their invaluable support, as well as to visitors who helped to relieve the monotony of our meager diet during the season. Principal funding for the project came from Whitman College, the Oriental Institute of the University of Chicago and the co-authors.

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# PRELIMINARY REPORT ON THE SEVENTH (2011) SEASON OF EXCAVATIONS BY 'LA SAPIENZA' UNIVERSITY OF ROME AT KHIRBAT AL-BATRĀWĪ, UPPER WĀDĪ AZ-ZARQĀ'

*Lorenzo Nigro and Maura Sala*

**Introduction**

A seventh season of archaeological excavation and restoration was carried out by the 'La Sapienza' University of Rome expedition to Jordan[1] at the Early Bronze (EB) Age site of Khirbat al-Batrāwī[2], located on the northern edge of the modern city of az-Zarqā', in May-June 2011. The excavations were funded by 'La Sapienza' University of Rome[3], the Italian Ministry of Foreign Affairs[4] and the Italian Ministry of University and Scientific Research.

Khirbat al- Batrāwī, a major fortified town of EB II-III date (**Fig. 1**), functioned as the central place of upper Wādī az-Zarqā', being located at a strategic crossroads connecting the desert and steppe with the Jordan Valley (Nigro 2009, 2010, 2011, 2012). The site has presented a unique opportunity to study the earliest Jordanian civilisations. By means of systematic restoration, it is gradually becoming a tourist attraction, illustrating a rarely preserved historical period, *viz*. the 3rd millennium BC.

*1. Khirbat al-Batrāwī: general view of the EB II - III triple fortifications on the northern side of the site from the north-east.*

During the 2011 season, activities were focused on the restoration of the EB II-III main city wall on the northern slope of the *khirbat* (Area B North) and on the excavation and restoration of the EB IIIB public building erected within it (Area B South), known as Palace B.

**Aims of the Seventh (2011) Season**

The aims of the 2011 season of archaeological investigation and restoration at Khirbat al-Batrāwī were as follows:

(1) Excavation of the EB IVB village, in Area B South;
(2) Excavation in the EB IIIB Palace B, including (a) completion of destruction layer F.1054 in pillared hall L.1040, (b) destruction layers F.1124 in storeroom L.1120 and F.1128 in hall L.1110, and (c) corridor

1. The 'La Sapienza' University of Rome team during the seventh (2011) season included: L. Nigro, director; M. Sala, field director; L. Caiafa; C. Fiaccavento; D. Ghigi; G. Merli; V. Pierini; V. Tumolo; P. Vitolo and S. Tricoli (restorer). The representative of the Department of Antiquities, who provided much useful assistance in the field, was Romil Gharib.
2. Lat. 32°05' N, long. 36°04' E (Nigro 2006: 233-235, fig. 1; Nigro ed. 2006: 16-22, maps 1-6, plan I).
3. The expedition wishes to express its thanks to all DoA personnel for their invaluable support, as well as to the academic authorities of 'La Sapienza' University of Rome; the Rector, Prof. Luigi Frati; the Dean of the Faculty of Humanistic Sciences, Prof. Roberto Nicolai; the former Director of the Department of Sciences of Antiquity, Prof. G.L. Gregori; and the present Director, Prof. E. Lippolis, who have all supported the expedition.
4. The authors would also like to thank the Italian Embassy in Amman, in the persons of the Ambassador, HE Francesco Fransoni, Dr Stefano Stucci and Dr Natalia Sanginiti, for their co-operation, and the Italian Ministry of Foreign Affairs, Directorate General for the Promotion of the 'Country System' (DGSP), Office 6.

L.1050 (F.1126) lying between the eastern and western pavilions of Palace B;
(3) Restoration of the eastern pavilion (west wall) of Palace B (building B1), excavated between 2006 and 2009;
(4) Starting restoration of the western pavilion of Palace B, including pillared hall L.1040, excavated between 2009 and 2011;
(5) Further restoration of the Broad Room Temple in Area F (circular platform and west side).

**Area B South: EB IIIB Palace B and the EB IVB rural Village**

Excavations in Area B South, just south of the EB II-III main city wall and street L.1060 running within it, continued during in 2011, expanding the area to the west (square BmII7) and south (squares BmII8, BmII9 [northern half], BnII8 and BnII9 [northern half]). In the uppermost layers, another portion of the EB IVB (Batrāwī IVB; 2200-2000 BC) village was excavated, exposing dwellings and domestic installations. Underneath, exploration of the western pavilion of the EB IIIB (Batrāwī IIIB; 2500-2300 BC) Palace B continued, exposing its southern extension (middle terrace).

*Stratigraphy of Area B South*

The 2011 excavations in Area B South confirmed the stratigraphic sequence established during the 2009-2011 seasons (Nigro and Sala 2010: 244-246; Nigro 2012: 146-167). This consisted of the uppermost erosion layer (Phase 1), successive stages of the EB IVB village (Phase 2), the layers of the EB IIIB city investigated within the EB II - III main city wall (Phase 3) and, finally, the earliest levelling fill that lay directly over bedrock and preceded construction of the Batrāwī IIIB buildings (Phase 4).

Phase 1 is represented by topsoil, a hard stratum of dusty soil containing roots and scattered stones. It accumulated over the long period of the site's abandonment following the end of the 3rd millennium BC.

Below the topsoil, Phase 2 groups all stratigraphic units related to the EB IVB occupation of the area (Activities 2a-2g; Nigro 2012: 147-157). In the squares investigated in 2011, only layers and structures associated with the construction, use and abandonment of the latest rural village were uncovered. These consisted of clusters of dwellings and open courtyards equipped with installations for storage and food preparation (Activities 2a-c), erected over a 30cm thick levelling fill of very friable, buff, sandy soil containing rubble and scattered small and medium stones (Activity 2d). In the northernmost square (BmII7), this latter fill concealed an earlier levelling fill (Activity 2g) associated with the initial campsite stage. However, in 2011 no structures belonging to this phase were brought to light, whether to the south or to the west.

The directly underlying strata belonged to Phase 3, which groups activities associated with the construction, use and destruction of the Batrāwī IIIB buildings (Activities 3a-d). These date to EB IIIB, the final phase of the EB II-III city. Activity 3a represents the final abandonment and destruction of the ruins of the EB IIIB buildings and is represented by layers of friable greyish and yellowish - brown sandy soil, with gravel, small and medium stones, ashy lenses and smashed mud-bricks (F.1094, F.1095, F.1096, F.1121, F.1122). Activity 3b consists of thick layers of destruction (F.1054, F.1124, F.1128), consisting of relatively friable reddish - brown soil, mixed with scattered small and medium stones, collapsed yellowish mud-bricks and plaster fragments, ash, charcoal and carbonised seeds, with evident traces of the fierce fire which destroyed the EB IIIB city. Activity 3c represents the use and modification of the Batrāwī IIIB buildings during EB IIIB. Activity 3d represents the construction of the EB IIIB buildings at the beginning the Batrāwī IIIB period.

A levelling fill consisting of a compact buff yellowish clayey soil and small stones (F.1156), laid between the bedrock and the floor of L.1040, represents the earliest activity detected in the area (Phase 4). This levelled the bedrock surface prior to the construction of Palace B and included EB II and IIIA ceramic material.

*Domestic Quarter of the Batrawi IVB Period village (EB IVB)*

In Area B South, further investigation of the EB IVB (2200-2000 BC) rural village that arose on the levelled remains of the EB II - III city in the last centuries of the 3rd millennium BC was carried out (Sala 2012). During the 2011 season, only the most recent occupational phase (2a-d)

was uncovered in this area. This suggests that the campsite (Nigro and Sala 2010: 244-247; Nigro 2012: 153-157, 193-201) was first erected over the ruins of the EB IIIB city in the centre of the area, in front of the blocked EB II city gate, and that the hamlet extended west and south only in its final stages, when it became a more coherent village. At least two units (L.1130, with circular platform B.1136, and L.1174, in BmII8 + BmII9) were uncovered, with a working area (L.1114 + L.1140) to the east (in BnII8 + BnII9) that hosted domestic installations for food preparation (platform B.1138, cist S.1113, mortar S.1111). Finds included an EB IV-type flint knife.

*The Early Bronze IIIB Palatial Complex Inside the Main City Wall*

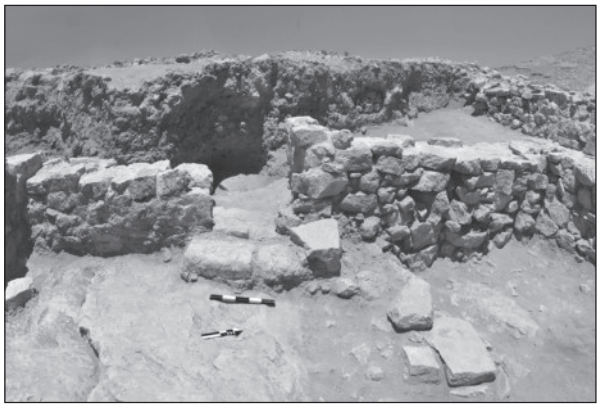
Further exploration of the EB IIIB buildings in Area B South revealed that Building B1 (excavated during the 2006-2009 seasons [Nigro 2007: 353; Nigro 2008: 151-159, 2012: 178-182]) and Building B3 (Nigro and Sala 2010: 248) were actually part of the palatial complex known as Palace B (**Fig. 2**), which was erected inside the main city wall in EB IIIB. The 'Palace of the Copper Axes', so named after the discovery of a cache of four copper axes in pillared hall L.1040 (Nigro 2010), consisted of two main wings, each composed of at least two rows of large rectangular rooms delineated by stone walls 0.8-0.9m wide. These are respectively known as the eastern (B1) and western pavilions (B3), with a passageway (L.1050) between them that served as the entrance to the eastern wing of the palace (the main entrance of the western pavilion was apparently to the west). During the 2011 season, excavation was focused on the western pavilion, which was buried under a 1.2 m deep stratum of destruction consisting of layers of smashed pottery vessels and other valuable objects (Nigro 2010: 71-110). Some architectural repairs or reconstructions were identified within the Palace, especially of the east wall of the western pavilion (see below), all of which were carried out in EB IIIB.

*2. Khirbat al-Batrāwī: general view of EB IIIB Palace B ('Palace of the Copper Axes') from the north-west; (foreground) the western pavilion (B3) with pillared hall L.1040.*

Pillared Hall L.1040

Excavation of pillared hall L.1040 was completed in 2011, revealing some interesting architectural features in square BmII7 (**Fig. 2**).

A major doorway (L.1150), 0.9m wide, opened in the middle of the western wall (W.1133). It was emphasised by a step on the inner side consisting of two large yellowish mud-bricks (**Fig. 3**) which adopted the cubit of 0.52×0.26×0.13m. Four pillar bases were arranged on the main east-west axis, along the edge of the bedrock which formed the floor of the higher southern half of the hall. Here, a drain cut into the bedrock crossed the hall from its south-east to north-west corners, possibly collecting rainwater in an underground cistern; four circular cup marks were also cut into the bedrock. The westernmost base (B.1168) was a rectangular limestone slab associated with a built-up installation flanking the door; the second (B.1166) was a flat circular stone; the third (B.1108) – with a roughly rectangular shape – was encircled by



*3. Khirbat al-Batrāwī: western entrance (L.1150) to pillared hall L.1040 from the east, with inner step made of two large yellowish mud-bricks.*

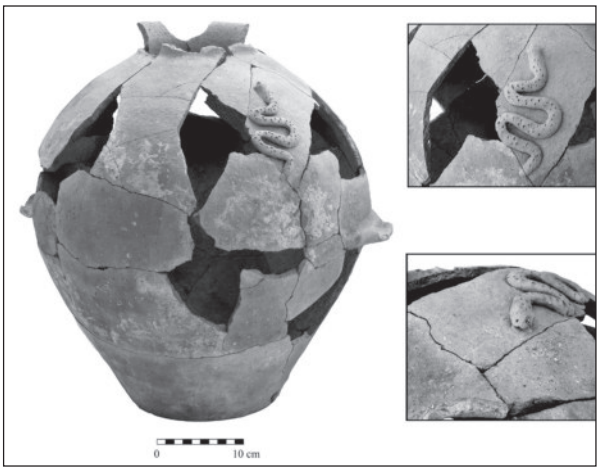
small stones; while the fourth (B.1106) – set into a circle of limestone chippings – had a roughly circular shape.

In the south-west corner of the hall, another huge pithos was recovered (1040/18) next to a square slab (B.1186), with a flint blade and some animal bones nearby (at least 20 similar large containers were recovered from pillared hall L.1040 in 2010 and 2011 **[Fig. 4]**). Between the south-west corner of the hall and door L.1150, the burnt traces of a wooden bench or shelf ca. 0.4m wide and 1.4m long were visible. A second door (L.1160), again 0.9 m wide, opened roughly in the middle of the southern wall (W.1101) of the pillared hall, leading to another major room (hall L.1110) located on an upper terrace to the south. It also had a step inside, consisting of a yellowish mud-brick similar to those of door L.1150. Just west of this step, a medium-sized jar was found with moulded decoration in the form of a snake applied to the shoulders (1054/4 [**Fig. 5**]). A third door (L.1158) opened in the south-east corner of the hall, leading south into a rectangular room (L.1120) oriented north-east - south-west. Another decorated vessel (1054/1) was found in front of this door, which was approached by means of a step in the protruding bedrock; this vessel was a medium-sized jar incised with *metopae* on the shoulders, separated by a herringbone motive in which a snake and a scorpion were respectively represented. Both animals are known from contemporary glyptics in Palestine; snakes are also attested to at the EB I sanctuary of Jabal al-Muṭawwaq in Wādī az-Zarqā' (Tresguerrez Velasco 2008, 2009: 78).

Finally, in the section between door L.1160 and the south-west corner of the pillared hall, beneath the foundations of wall W.1101 and in a layer with EB II pottery, a fragmentary Egyptianising palette (9.8x9.8cm) made of grey schist[5] with an engraved line and some oblique strokes (KB.11.B.100) was discovered.

Storeroom L.1120

A rectangular room was accessed from door L.1158 in the south-east corner of pillared hall L.1040. This elongated room, L.1120 (in squares BnII8 + BnII9 + BmII9), was 2.1-2.4m wide and 6.5m long, with several unusual installations (**Fig. 6**). Two stone circles flanked the eastern face of the north-east - south-west western wall (W.1149) which separated L.1120 from the hall to its west (L.1110). Two jars (one a hole-mouth jar) were aligned between these two installations, while the upside-down neck of a *pithos* emerged in the collapse layer (a second complete upside-down neck was found to the south). The eastern wall of storeroom L.1120 (W.1157 + W.1159) was also the eastern wall of pavilion




*5. Khirbat al-Batrāwī: jar KB.11.B.1054/4 with applied snake decoration, recovered from pillared hall L.1040.*

*4. Khirbat al-Batrāwī: restored EB IIIB pithoi from pillared hall L.1040.*

5. Mineralogical analyses of this object were conducted by Dr S. Mignardo (Dept of Earth Sciences, 'La Sapienza' University of Rome) and Prof. P.P. Lottici (Dept of Physics, Parma University).


*6. Khirbat al-Batrāwī: general view of the western pavilion (B3) of EB IIIB Palace B from the south, with hall L.1110, storeroom L.1020 and (background) pillared hall L.1040; (right) eastern pavilion (B1).*

B3; its northern section (W.1123) appeared to have been refurbished.

The southern part of storeroom L.1120 was at higher elevation compared to the rest of the space, being situated on an upper terrace of the bedrock. It was filled with a mixed layer of burnt plaster, collapsed bricks and charred wooden beams (of which samples were taken for analyses). This layer contained a series of pottery vessels, some of which, like a large squat vat (1124/9) and medium jar (1124/16), had presumably fallen from a shelf or balcony, the remains of which (wooden posts for a 0.35m wide structure) were detected along the western face of W.1159. Other jars, hole-mouth jars and red-burnished jugs (e.g. complete specimen 1124/36) were found on the emerging bedrock in this area. A notable find was a second basalt potter's wheel (KB.11.B.110 [**Fig. 7**]) which, along with the specimen recovered in 2010, testifies to the presence of advanced tools (Roux and de Miroschedji 2009) within the palace.

*7. Khirbat al-Batrāwī: potter's wheels KB.11.B.110 and KB.10.B.87, recovered from storeroom L.1120 and pillared hall L.1040.*

Hall L.1110

South of pillared hall L.1040 and west of room L.1120 (in squares BnII8 + BmII8 + BmII9), there was another huge hall (L.1110), with a central, roughly circular stone base (W.1163) and another slab or base (W.1183) against the western face of the east wall (W.1149); these may originally have supported the charred roof beams found just south of this alignment (**Fig. 8**).

Like pillared hall L.1040, hall L.1110 also had two different floor levels in its northern and

*8. Khirbat al-Batrāwī: general view of EB IIIB Palace B ('Palace of the Copper Axes') from the west; (left foreground) pillared hall L.1040; (right) hall L.1110 with seat B.1189.*

southern halves, corresponding to a step in the bedrock, with the pillars supporting the roof beams standing on the edge of the step (W.1163 actually had a built-up foundation of firmly placed regular stones).

The whole room was buried under a layer of burnt material (F.1128), which included wooden beams, fallen stones, collapsed mud-bricks and plaster, and – of course – a great quantity of pottery vessels and objects lying smashed on the floor or, in some cases, extending up into the destruction layer (**Fig. 9**).

Against the western face of wall W.1149, a square feature (B.1189) consisting of a vertical slab and a mud-brick, and – to the south – a vertical cut in bedrock may have been a seat or niche. Next to this feature and leaning up against its base, there was a small jar (1128/69) containing a four-string necklace consisting of *ca.* 630 beads of carnelian, bone, sea shell, rock crystal, copper and amethyst (**Fig. 10**)[6]. The jar was part of a row of eight medium-sized jars, which included hole-mouth and flaring rim jars, arranged in two east-west rows roughly in the middle of the hall, corresponding with the distinct east-west step in the bedrock crossing the room. One of the other jars contained a bone ring and a sea shell necklace or pendant, while two others had small cups at their base. Further clusters of smashed jars and other vessels were uncovered west, north and north-west of the central pillar. All of these finds were buried in a soft layer of ash, charcoal, charred wooden beams and broken bricks, while in the western section a large yellowish mud-brick, like those used as door steps in pillared hall L.1040, was visible.

North of the central pillar base, a flint core and a varnished wooden sickle incorporating a series of Canaanean blades (**Fig. 11**) were retrieved from the floor, along with several animal bones, a wooden tray and a bowl with an inturned rim. A second sickle of the same type was found north of feature B.1189. Roughly 1m to the north-west, a

*9. Khirbat al-Batrāwī: destruction layer F.1128 inside Hall L.110 from the west, with in situ smashed vessels and objects.*

copper axe (KB.11.B.120) was recovered from a small cavity in the floor, bringing the total number of such objects recovered from Palace B to five. This example was of the simple elongated type, with an expanded tang and carefully tempered fan blade (**Fig. 12**). Further to the north, in doorway L.1160, two jars were found in association with a small cylindrical cup / measure. Finally, an Egyptianising vessel (1128/76 [**Fig. 13**]) of the so-called 'lotus vase' type represents one of the most noteworthy finds from hall L.1110; it is a medium-sized example, of a type in use throughout the Early Bronze Age[7].

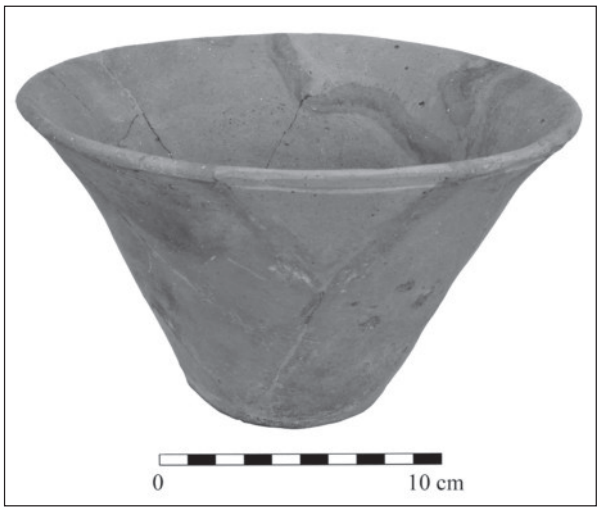
In the southern half of the room, on the bed-

6. The beads were analysed by Prof. Adriana Maras, Dr Michele Macrì, Dr Ombretta Tarquini and Ilaria Sacchetti; the necklace was restored with the help of Dr Ingrid Melandri.
7. The best comparisons are with Egyptianising vessels found in the cache from the level J-4 temple at Megiddo / Tell el-Mutesellim (Joffe 2000: 170-174, figs. 8.6, 8.8). However, this is not entirely satisfactory in chronological terms, as it dates to EB II. EB IIIB specimens similar to vase KB.11.B.1128/76 from Palace B at Khirbat al-Batrāwī have been found in Palestine in the EB IIIB Sanctuary A at 'Ai / et-Tell (Marquet-Krause 1949: pl. LII: 1534, 1536, 1541).


*10. Khirbat al-Batrāwī: four-string necklace KB.11.B.101 from hall L.1110.*

*11. Khirbat al-Batrāwī: destruction layer F.1128 inside hall L.110 from the west, with in situ smashed vessels and objects; (foreground) sickle KB.11.B.99; (in frame) two sickles, KB.11.B.99 and KB.11.B.114.*


*12. Khirbat al-Batrāwī: copper axe KB.11.B.120 from hall L.1110.*




*13. Khirbat al-Batrāwī: 'lotus vase' KB.11.B.1128/76 from hall L.1110.*

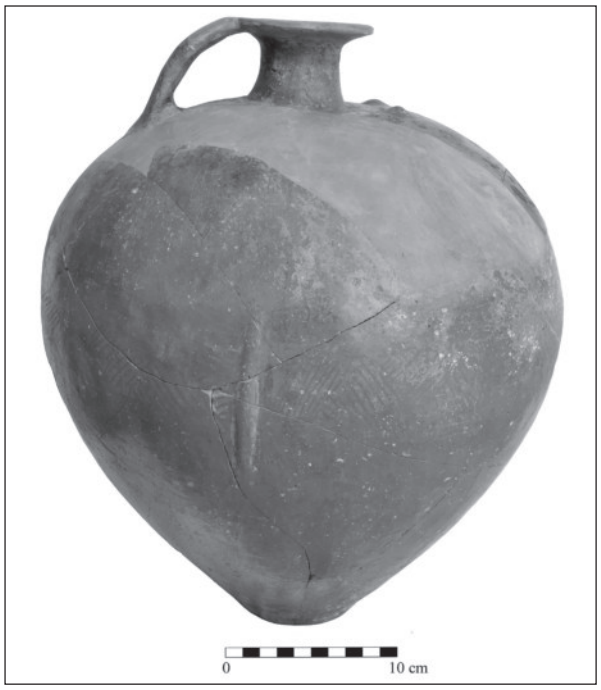
rock step, there was another concentration of pottery vessels, including a red-burnished jug (1128/49) characterised by a highly polished body with net-burnishing on the shoulders (**Fig. 14**). The southern side wall (W.1201) of the hall had a stone-built bench within a niche (B.1188); this hosted a *pithos* that was probably used as container for liquid, perhaps water.

Hall L.1110 turned out to have been one of the main rooms of the western pavilion. It was also probably entered from the west. Its architecture was characterised by the central pillar and monumental seat in the middle of its east side. Finds from the hall demonstrate how objects, vessels and personal ornaments were gathered together in this wing of the palace during the last hours of its existence, before the dramatic conflagration which put a sudden end to the history of the 3rd millennium BC city of Batrāwī.

**Restoration in Area B South**

During the seventh (2011) season, further restoration work was carried out in Areas B South and B North on Palace B and the EB II - III main city wall.

The stone walls of Palace B, usually preserved to a height of *ca.* 1m, were restored with ancient-style lime mortar, with this material being used on the upper parts of the walls. The structures of the eastern pavilion (B1), along with hall L.430 + L.1046, were completely protected, including its western wall W.439 + W.1049 and jamb / pillar W.1153. The structures




*14. Khirbat al-Batrāwī: red-polished and burnished jug KB.11.B.1128/49 from hall L.1110.*

of pillared hall L.1040 of the western pavilion were also protected; this included restoration of the central pillar bases and the jambs of doors L.1150, L.1158 and L.1160.

With regard to the main city wall, an additional length of this structure was restored, especially on its outer face where a section had collapsed in antiquity.

A major commitment for the expedition has been the restoration of more than one hundred ceramic vessels which were found in Palace B in 2011. Similarly, the mending and restoration of pottery and other objects recovered during the 2010 season has continued. This followed conservation of the four copper axes and dagger recovered last season. These went on display at the Musei Capitolini in Rome between February and April 2011, and are now a permanent exhibit at the National Archaeological Museum in ʻAmmān. Finally, the fifth copper axe (KB.11.B.120) and the four-string necklace recovered from hall L.1110 were studied and documented by mineralogists before being carefully restored.

**Conclusions**

The seventh (2011) season of excavation and restoration at Khirbat al-Batrāwī (**Fig. 15**),

*15. Khirbat al-Batrāwī: excavation and restoration work in EB IIIB Palace B (ʻPalace of the Copper Axesʼ) during the 2011 season.*

as well as the prompt publication of preliminary reports on the findings of the fourth, fifth (Nigro 2012) and sixth seasons (Nigro 2010), have demonstrated that this Early Bronze Age city, especially its palace and temple, provide a vivid illustration of Jordanian culture and society in the 3rd millennium BC. Further work is needed to restore, archive and study the findings from Palace B, as well as to clarify their historical significance and connections with other civilisations of the ancient Near East. Further excavations will be needed to complete this work, the context of which has been preserved by the fierce destruction that occurred at around 2350-2300 BC (as indicated by the radiocarbon dates available so far, with due allowance for the intrinsic problems of calibration) and the massive city wall which subsequently helped to retain the destruction deposits *in situ*. Forthcoming studies and analyses of archaeological, zooarchaeological and palaeobotanical material from the site will generate fresh sets of data concerning the palace and its economy. These will stimulate new interpretative and explanatory models aimed at shedding further light on this early urban civilisation of Jordan.

The ʻLa Sapienzaʼ University of Rome expedition has been able to rise to the challenges of these discoveries thanks to the kind and continuous co-operation of the Department of Antiquities of Jordan and the financial support

of the Italian Ministry of Foreign Affairs. Our deepest gratitude is expressed to both these institutions.

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# ANCHORITE CELLS AND DWELLING COMPLEXES ON AL-LISAN PENINSULA: PRELIMINARY FIELD RESULTS OF THE SWEDISH DEAD SEA EXPEDITION, 2009 AND 2011

*Richard Holmgren and Anders Kaliff*

**Introduction**

This preliminary report is based on the results of the Swedish Dead Sea Expedition (SDSE) on the al-Lisan peninsula in January 2009 and August 2011. The work included documentation of three hermitages (cells / dwelling complexes of anchoritic monks) registered during our earlier survey and complementary documentation of inscriptions (see Holmgren and Kaliff 1997, 2005). A further objective was the inspection of the part-excavated church / monastic centre (*coenobium*) of Dayr al-Qaṭṭar al-Bīzanṭī (JADIS no. 1907.007). Seasonal heavy rains, illicit excavations and tectonic movements are currently threatening the structures and exposed inscriptions. Furthermore, SDSE registered previously unknown graves in the immediate vicinity of Dayr al-Qaṭṭār al- Bīzanṭī. In 2008, we discovered some new looting pits on the plateau to the west of Dayr al-Qaṭṭār using Google Earth satellite imagery. During the field-survey, these turned out to be graves dated to the monastic period.

The fieldwork was professionally facilitated through the much appreciated help and effort of our representative Jamileh Abdel Latif Saleh Eshtewi from the Department of Antiquities office at Safi. We are grateful for all advice and assistance from the inspector at the same department, Jihad Darwish. We would also like to thank Mohammad Alzahran, curator of the museum at Safi, for useful assistance with a number of issues, not least for managing the finds from this and previous years which are now stored at the Lot's Cave museum at aṣ-Ṣāfī. Many thanks also go to Eyas Abusror in Amman, for helping us with important practical issues. The C-14 samples referred to in the text have been analysed for our project by Prof. Göran Possnert at The Ångström Laboratory, Tandem Laboratory, Uppsala University, Sweden.

The church and monastic centre at Dayr al-Qaṭṭar, along with nearby several cells and dwelling complexes, represent a monastic society organized in a pattern similar to the well-documented desert monasteries in Egypt and the Judean desert. The Judean desert and its fringes became the most important monastic 'center' in Palestine. This was the desert closest to Jerusalem, whose holy places were less than a day's walking distance away. Individuals of deep religious piety, as well as high intellect, were drawn here from all over the Christian world. A flourishing cosmopolitan society was therefore established in the desert as well as in the Holy City itself. Despite the proximity of settled lands, the desert monks adhered faithfully to the way of life they had chosen. The wild vistas of the desert were thought to provide a direct link with the divine (Patrich 1995: 6-7). Dayr al-Qaṭṭār and the hermit dwellings on the Lisan peninsula are located close to this core of monastic activities, in suitably wild and desert-like surroundings. No literary references to the *coenobium* known today as Dayr al-Qaṭṭār have been found, nor are there any references to any of the *laurae* in the vicinity. This is probably because the site has not yet been identified with any historical known monastery. In sum, the al-Lisān sites form a relatively large monastic complex. The various sites comprise a *coenobium* and a richly decorated and well-built church with at least one chapel, as well as other buildings. This monastic community is most probably mentioned in the written sources, but has not been properly identified. Besides the archaeological work remaining to be done on the al-Lisān remains, the task of identifying them is of great importance for our project.

**Dayr al-Qaṭṭar and the Hermitages on al-Lisān: *Coenobium* and *Laura***

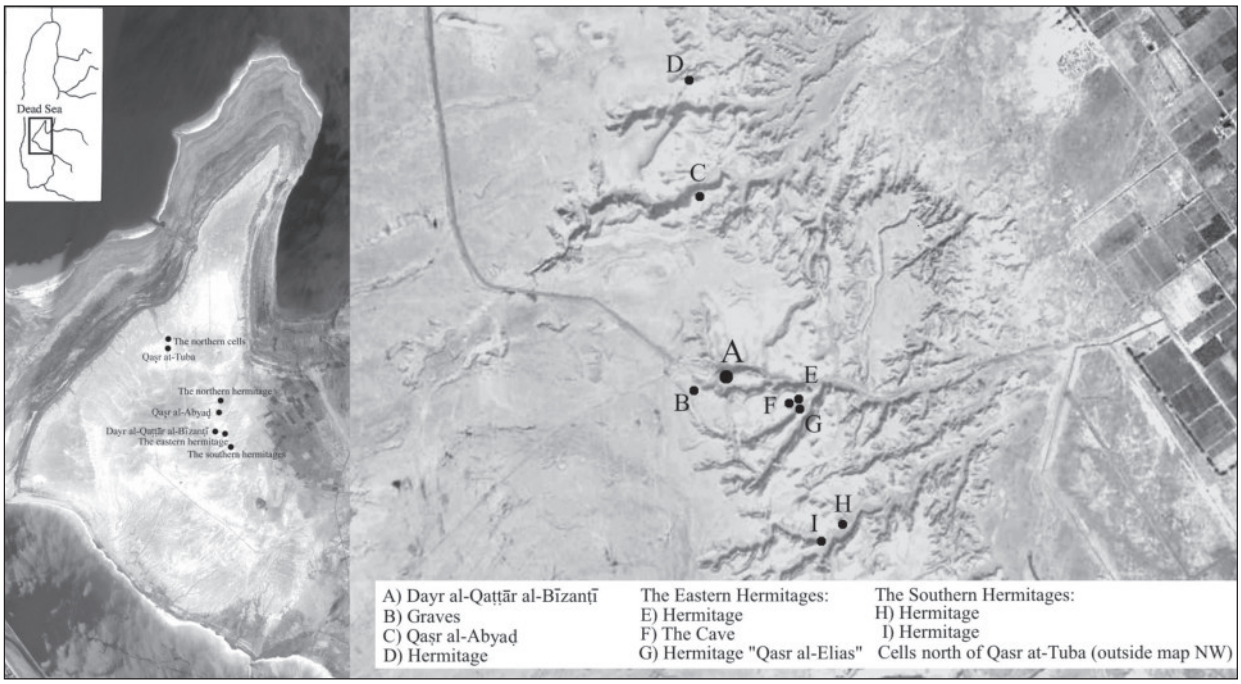
In spite of its much smaller scale, an Egyptian pattern can be seen in the monastic activities on the Lisan peninsula (see below) (**Fig. 1**). The anchorite cells are dispersed over a large area, being located in small rift valleys eroded into the Lisan marl up to 3 km from the center (Dayr al-Qaṭṭār). Some locations seem to form separate small *laurae*, like the area around Qaṣr aṭ-Ṭūba, although these clusters of cell and dwelling complexes were probably organized as a single community. The survey documentation of January 2009, together with our earlier surveys, covered a large area in the eastern and south-western parts of al-Lisān. The terrain, with its steep rift valleys and loose dust, is very hard to access. Erosion is a constant threat to the hermit cells because of the soft marl they are cut into. Rain, wind and earthquakes have damaged many sites and looting activities have also disturbed several units. This especially concerns those closest to the habitation and agricultural areas to the east. In this area, modern graffiti – cut into the soft, vulnerable marl of some cells – is especially regrettable because of the damage caused to invaluable inscriptions preserved from the Byzantine period.

The Swedish Dead Sea Expedition is an independent archaeological project, initiated in 1994 by the authors of this report, who are also co-field directors. The project was earlier associated with the Museum of Mediterranean and Near Eastern Antiquities in Stockholm, but is now linked to the Department of Archaeology and Ancient History at Uppsala University. As well as the documentation of Dayr al-Qaṭṭār al-Bīzanṭī, a further goal of the Swedish Dead Sea Expedition is to study the monastic society of the al-Lisān area from a long-term perspective (approx. 4th-12th century AD). Of particular interest is the date of and processes behind the establishment of the earliest anchorite dwellings, the development of the *laura* (or different *laurae*) on al-Lisān and the possible development and change of Dayr al-Qaṭṭār from a dwelling complex into the core of a *laura*, and eventually into a *coenobium*.

**Hermitages and Graves Documented in 2009**

*Graves*

About 200m east of Dayr al-Qaṭṭār al-Bīzanṭī, recent illicit excavations have revealed about 20 previously unknown graves. One-third of these human-sized rectangular pits show clear evidence of human remains. Although the re-




*1. Satellite image of the al-Lisan peninsula, with the major sites discussed in this paper marked respectively (National Imagery and Mapping Agency CNES / SPOT Image 2009).*

mains of a broken skull and two jawbones are present, most of the scattered bones seem to originate from other parts of the body. Two of the looting pits contained skeletal remains from several individuals; one burial deposit contained more than eight femoral heads, suggesting not only reburial of bodies, but perhaps also some kind of arrangement of the bones. It is likely that some sort of advanced equipment was used to discover the tombs. This would explain why some of the pits were empty of bones, i.e. where a rectangular space of loose soil misleadingly indicated the presence of a tomb. The loose soil might very well be the original burial place for skeletal remains subsequently buried in adjacent collective graves. A more thorough analysis of this site is necessary in order to better comprehend the function and content of the tombs discussed. However, it seems without doubt that these specific tombs are associated with the site of Dayr al-Qaṭṭār.

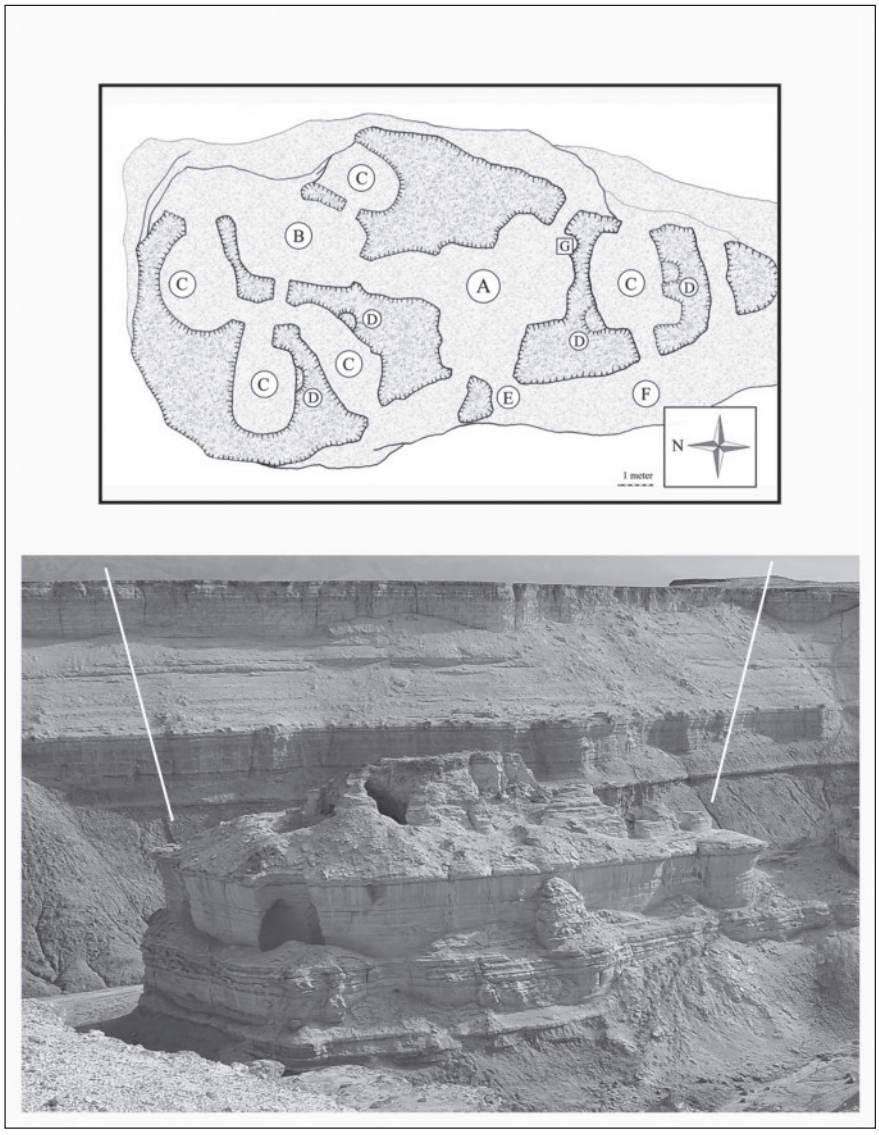
Two C-14 samples were taken from molars, but only one could be dated owing to the poor condition of the bone material. The sample yielded a most likely date of 540-600 AD (Ua-42728: 1 sigma, 68.2%), which is only slightly younger than the date from the previously studied crypt under the floor level of Dayr al-Qaṭṭār. A C-14 sample from another molar derived from the crypt beneath Dayr al-Qaṭṭār yielded a date of 410 - 540 AD (Ua-38855: 1 sigma, 68.2%). The contents of the crypt can also be understood as bone material collected from elsewhere in the area - most probably from burial sites in or adjacent to the hermit dwellings nearby. However, the site of Dayr al-Qaṭṭār could also be interpreted as having originally been a larger hermit dwelling, with the cell-like crypt being one of many rooms similar to 'Qaṣr Ilyās' and Qaṣr aṭ-Ṭūba, as discussed below. Further excavation in Dayr al-Qaṭṭār's substructures may confirm this.

*Eastern Hermitages*

The eastern hermitages are the closest dwelling complex to Dayr al-Qaṭṭār. The site is located in a small *wadi* approximately 300m east of Dayr al-Qaṭṭār – hence the name (Holmgren and Kaliff 2005). These cells, cut into the slopes of the nearby ridges, could form a small *laura* on their own. More probably, these hermitages should be interpreted as two adjacent dwelling complexes, one very large (referred to here as 'Qaṣr Ilyās') on two levels with several chambers and passages that have collapsed in recent years, and a smaller one consisting of at least two rooms, now partly collapsed. A more precise dating of these structures in relation to Dayr al-Qaṭṭār will be very important for gaining an understanding of the development of the monastic community. For a preliminary dating, see *Inscriptions and graffiti* below.

On a central ridge in the middle of the *wadi*, the larger of the above-mentioned hermitages, *viz*. 'Qaṣr Ilyās', was briefly documented in 2009. The structure is generously proportioned with a central space surrounded by several satellite cells. It is cut into the sediment in the typical al-Lisan manner; the greater part of the structure is still standing, although a large part of the superstructure has collapsed into the interior. In general, the site is in poor condition owing to natural erosion and geological activities affecting the soft laminated marl. The hermitage also shows evidence of recent illicit excavations. The southernmost part of this site was excavated and documented by SDSE in 1997. To avoid further damage, only the accessible parts of the site were documented in 2009. Beneath the debris of eroded material, but also scattered on the ground surface, quantities of building material and other items are visible. The passage between the different chambers has lancet-shaped sections with pointed vaults. This architectural feature and the high, central position of the site very much resemble the sites of Qaṣr aṭ-Ṭūba and Qaṣr al-Abyaḍ (Holmgren and Kaliff 1997: 333-336, 2005).

The estimated layout of 'Qaṣr Ilyās' was sketched in plan form. In terms of rooms A - C (**Fig. 2**), the structure was studied by analysing the walls above the loose marl and harder collapsed crust (*ca.* 1-1.5m deep). A larger central space constitutes the central core of the entire complex (A-B). Space A probably represents a chapel, accessed through an entrance (E) and further connected to the top of the ridge (F). Several satellite cells (C) are moreover connected to the central core, sometimes containing arched niches (D). The main entrance to the complex was most likely in its southern part, where ladders or now buried steps once gave access to the site. From the photograph below the sketch in **Fig. 2**, one




*2. A preliminary sketch of 'Qaṣr Ilyās', showing its distinctive layout (illustration SDSE).*

can see how the previously documented cell – containing the inscription *ELIAS* (hence our name for the site) – is situated on a lower level in the site's north-western corner. Whether this separate cell is connected to the rooms of the upper level has yet to be verified.

Traces of two large illicit excavations were found in two different rooms of the complex. The adjacent Greek inscriptions were not damaged, but the pits had partly disturbed the floor level of the hermitage. The latter was documented and the sides of the pits were cleaned in order to document the profile of the marl layers. No strata are visible in this hermitage, although a clear layer of bird excrement and collapsed roof or ceiling material (consisting of reed) can be seen about 10cm above the floor level. This suggests that the hermitage may have been abandoned before the start of the various collapse episodes. Each pit was backfilled to protect potential features and inscriptions. The layout of 'Qaṣr Ilyās' has many similarities with the sites of Qaṣr aṭ-Ṭūba and Qaṣr al-Abyaḍ, both documented by SDSE (see archaeological reports in *ADAJ* 41 and 49). A small survey was carried out around the site, during which scattered archaeological material and samples were collected. Frequent finds included pottery, bricks, strips of palm leaf and pieces of rope, as well as nut-shells, smaller bones and textile fragments.

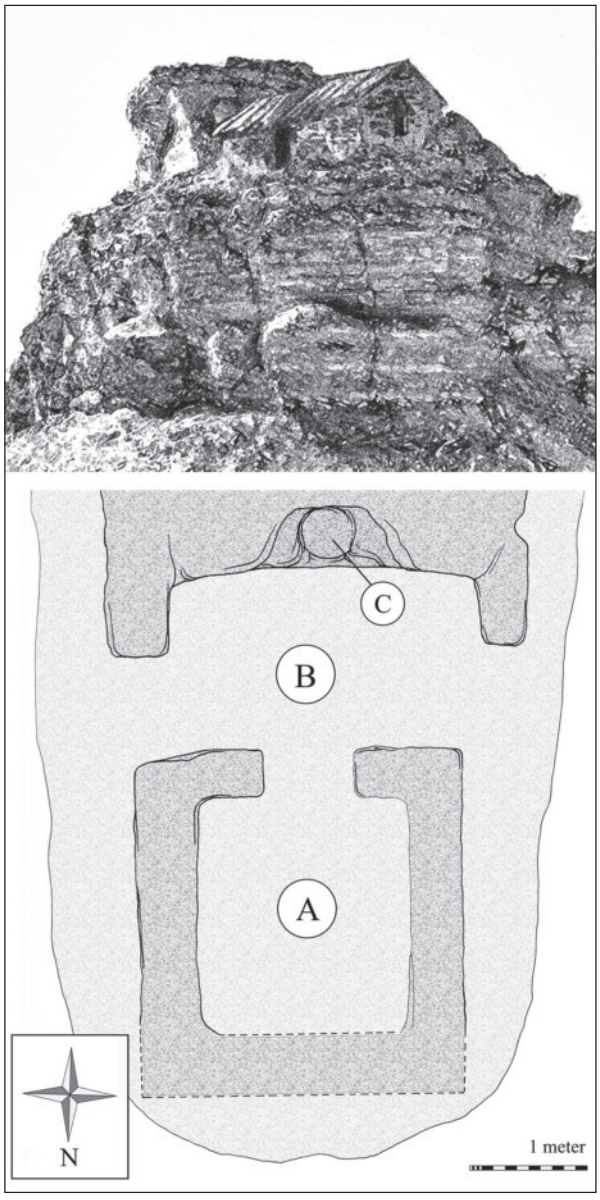
*Southern Hermitages*

In a separate *wadi* south-east of the 'eastern hermitage', two additional dwellings were

mapped. On entering a narrow part of the inner valley, a hill top facing the valley entrance has evidence for a smaller hermitage. The feature consists of one room, possibly with other minor features buried under fallen debris just north of and immediately outside the entrance. The structure consists of one semi-circular room approximately 3x2m with a maximum height of 190cm. Two opposing small niches flank the entrance; lower parts of the interior walls, up to 60cm above the floor level, are smooth and carefully cut into the marl. However, above that level the interior surface is uneven and very rough – almost as if some centimetres were deliberately removed from upper parts of the cell walls. Faint lines on the western wall, near the entrance, suggest the occurrence of inscriptions, which may have been deliberately removed from the rest of the interior.

About 100m further south, there is yet another hermit dwelling in the *wadi*. On a prominent hill top, the architectural plan of a two-space dwelling can be discerned. A relatively large room measures *ca.* 1.70x2m (room A) with a south-facing doorway. This room / small freestanding building is connected to another installation to the south. The latter consists of a niche-like feature with an elevated and round hollowed installation (C; possibly a *piscina* / *thalassidion*). This area, *viz*. the space between the room and the southern niche, is marked B on the sketch. The original height is impossible to determine, but the standing marl-walls are preserved up to a height of 0.5-1m. Fallen bricks and other building material, such as blocks made out of the Lisan 'crust', can be found in the valley bottom all around the dwelling. A preliminary reconstruction sketch of the entire complex and its appearance as seen from the valley bottom is at **Fig. 3**, complementing the plan.

Originally, the complex could not have been easily accessed owing to the narrow setting of the hilltop. Only narrow paths on both sides of the hermitage could have accessed the entrances on either side of space B. A ladder or similar might also have originally given access to the complex itself. It is too early to interpret the function of the site, but the unusual combination of a room built next to an installation of this type might suggest a place of worship such as a small chapel.




*3. One of the southern hermitages (marked I in **Fig. 1**). The illustration shows the plan of the hermitage (below) and a tentative reconstruction (above) (illustration SDSE).*

*Cells North of Qaṣr aṭ-Ṭūba:* **(Figs. 3-4)**

In the northern extension of the *wadi*, where Qaṣr aṭ-Ṭūba is situated, a number of cells are visible – primarily on the eastern side of the valley. Many of these cells are very small indeed, especially in terms of their height. The inner height of some cells does not exceed 1.5m, although they are man-sized (or more) in length and width. A few spaces could be interpreted as tombs, although no skeletal remains were found inside or in their general vicinity. During the period of the early hermitages, there are lit-

*4. Hermit cells north of Qaṣr aṭ-Ṭūba (photo SDSE).*

erary sources that describe the limited dimensions of hermit cells as deliberate. This would have been in accordance with rules put forward by Euthymius and other founders. Sometimes this caused complaints, with monks changing monastery because of too-small cells. Patrich refers to a detailed contemporary description of Theogonius' cell, near the Theodosius monastery, by Paul of Elusa: "But very small was the cell and it is so low that when you come in, if you do not take care, you will knock your head against the ceiling" (Patrich 1995: 126).

On the second level of cells facing the valley, one of the larger dwellings (?) has a cruciform-shaped plan with smaller cells or spaces attached to a main corridor. On either side of the entrance are two semi-circular spaces, each around 1 m in diameter. Further along the narrow corridor is a perpendicular north-south crossing section that constitutes the center of the entire complex. This section has semi-circular spaces about 2m in diameter at either end. The crossing section is about 8 meters in total length. Following the east-west corridor to its far end, there are two similar cells, one on either side.

The cells in this area are half-filled with al-Lisan marl; they seem to have been deliberately filled and were subsequently part-emptied, perhaps by illicit explorers. Alternatively, perhaps the half-filled spaces were originally made as cells, which were subsequently used as tombs and then excavated in ancient times so that relics could be gathered into communal ossuaries at a site of importance, most likely in crypts beneath Dayr al-Qaṭṭār al-Bīzanṭī.

*Hermitage North of Qaṣr al-Abyaḍ*

Another hermitage was also discovered and preliminarily mapped in 2009. Situated north of the previously documented hermitage of Qaṣr al-Abyaḍ, a similar construction was carved out of the marl. This newly discovered hermitage was, like its southern counterpart, located on the eastern edge of the white hilltops overlooking the flat landscape around the southern part of the Dead Sea. The hermitage is almost completely buried by the collapsed superstructure, but enough of the rooms can be seen to permit an estimation of its size and architectural plan. The site resembles Qaṣr al-Abyaḍ, in that it has a larger chapel-like structure oriented north-south which measures nearly 7m. A shelf-like feature is visible in the western part of this 'chapel' and, at the far north end, a circular room *ca.* 2m in diameter extends to the west. A small elevated compartment is attached to the latter room, facing north. At this point it is hard to determine the function of the hermitage, but it is interesting to see how the size and architectural plan are almost identical to that of Qaṣr al-Abyaḍ. The great quantity of inscriptions preserved at the latter may be matched at this newly discovered site. A third hermitage, similar but somewhat smaller, has also been sighted along this ridge but has unfortunately been lost for the time being owing to the complicated, winding valley systems.

Remarks

A good parallel for the al-Lisān hermitages can be found in the cells of the Gerasimus monastery (Dayr Hayla), which is located about 3.5km away. Here, the caves are cut into the soft marl

in much the same fashion as those at al-Lisān. A characteristic feature, also seen at al-Lisān, is a tunnel-like corridor running across the hill into which the dwelling complex is cut. As at the Lisān sites, the hermitages of Gerasimus vary in size and complexity. The most elaborate dwelling complex (Cave 3) may have been the residence of a more prominent monk. Here we find two living rooms and also two cooking stoves. This site and its features very much resemble those of Qaṣr at-Ṭūba. Other similarities include the rock-cut prayer niches, as well as engraved crosses and Greek inscriptions, which include singular names such as *Ioannes* (Patrich 1995: 128-130, see especially figs. 56-57).

In the larger dwelling complexes at al-Lisān, such as Qaṣr aṭ-Ṭūba and Qaṣr al-Abyaḍ (but excluding Dayr al-Qaṭṭār itself), prayer chapels have been identified. The larger hall of Qaṣr aṭ-Ṭūba, with its documented liturgical installations, shows clear evidence for such a function. This is also evident in the larger room of Qaṣr al-Abyaḍ. Palaeographic material and the artefacts and installations found, especially at the well-documented Qaṣr aṭ-Ṭūba, suggest a combination of a hermit dwelling and a place of worship (Holmgren and Kaliff 1997, 2005). The same interpretation probably also applies to the dwelling complex of 'Qaṣr Ilyās' in the eastern hermitage. At these, as well as at some of the smaller sites, there are also prayer niches. This combination of monks' cells and a prayer chapel is not unusual in early monasticism, with examples from Mar Saba and the Euthymius monastery (Hirschfeld 1993; Patrich 1995). There are several parallels documented at the great *laura* of Mar Saba, where remains of chapels or prayer niches were found in many dwelling complexes. These installations always constituted an integral part of the dwelling complex, with the chapels comprising a separate space next to the dwelling room. This is also the case at the al-Lisān cells and dwelling complexes. In the case of Mar Saba, it was assumed that each cell or complex included such a place of worship (Patrich 1995: 90-95). The hermit cell has also been discussed as a miniature church, where hermits celebrated the Eucharist in solitude. This was experienced as a corporate solitude in which the whole church participated. The saying of Evagrios of Pontus can be quoted in this respect: "The monk lives separate from all and united to all" (Lozano 1987: 145).

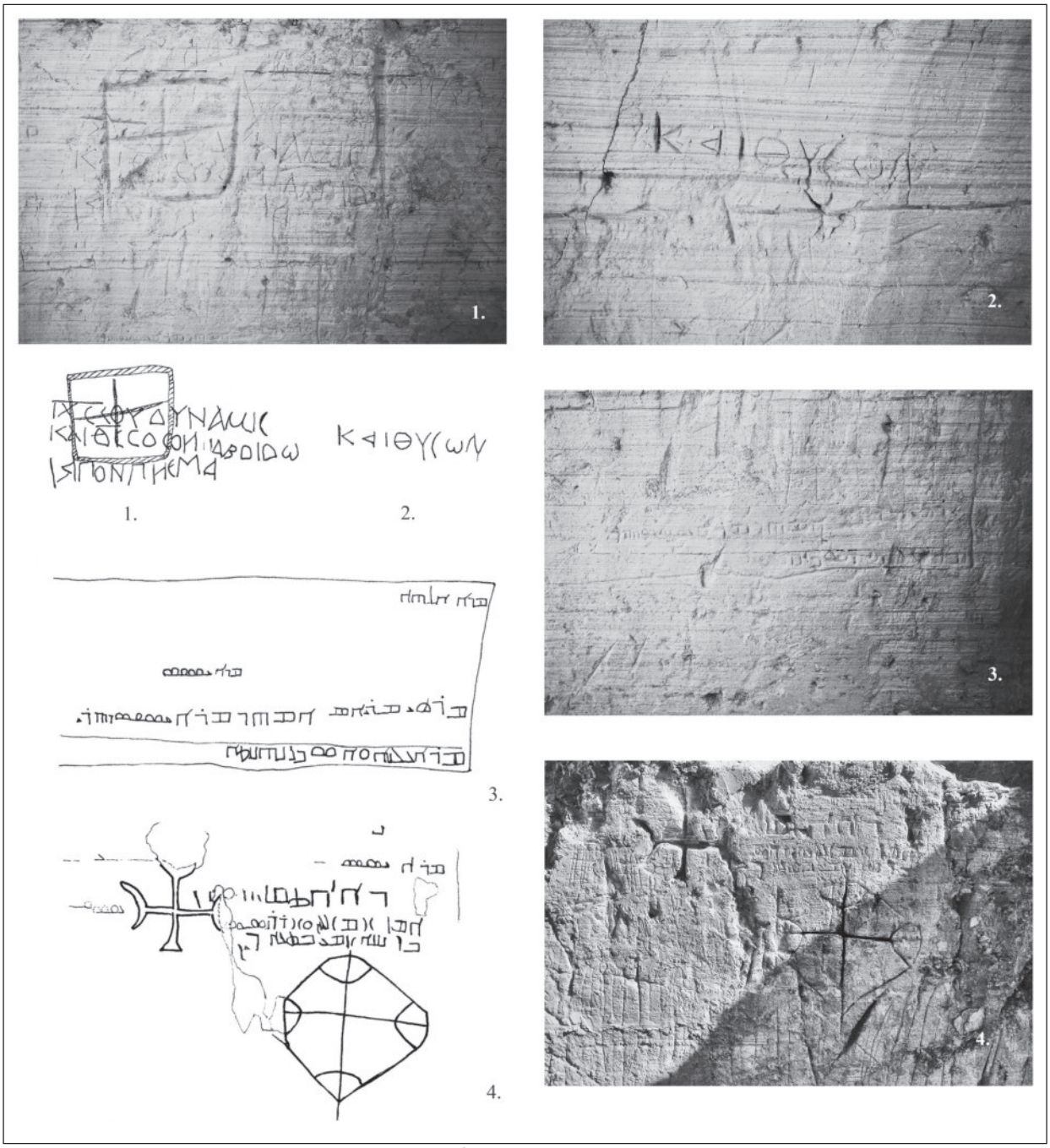
It is evident that several dwelling complexes were built according to a common plan, with certain variations depending on the location and size of the complex. There are also parallels with the great *laura* of Mar Saba, where the architecture and quality of the dwelling complexes, with water systems that collected rain water into cisterns, show that they were built by expert masons according a plan that was drawn up in advance (Patrich 1995: 106).

**Inscriptions and Graffiti**

The marl walls of the cells and dwelling complexes were plastered inside with lime mixed with straw. Many inscriptions on the walls of the chapels and dwelling rooms were covered with plaster in a later phase. This plaster has often fallen off the walls owing to erosion, thereby once again exposing inscriptions in Greek and Aramaic, together with different crosses and more enigmatic signs. Samples of organic material in the plaster have been C-14 dated in five different cases. The plaster provides a *terminus ante quem* for the inscriptions, but need not be contemporary as the inscriptions might be older. The dates obtained were relatively consistent, being between 380-540 AD (1 sigma, 68.2%).

In addition to the marl walls at Qaṣr al-Abyaḍ and Qaṣr aṭ-Ṭūba, as well as at eastern hermitages such as 'Qaṣr Ilyās', various inscriptions were documented. A more thorough analysis is underway, dealing with all the various inscriptions and graffiti present in the cells and hermitages described in this report. This material will be examined in the context of the various rooms and their functional interpretation, after the necessary cleaning and excavation (e.g. see plan of Qaṣr al-Abyaḍ in Holmgren and Kaliff 1997). However, a more in-depth analysis of the inscriptions documented at Qaṣr al-Abyaḍ has already been presented in an excellent work by Émile Puech (Puech 2011: 91-93). These inscriptions mainly concern the Greek, Aramaic and Christian - Palestinian graffiti in (**Fig. 5**:**1-4**). This material is briefly presented here with English translations, along with parts of the detailed interpretations made by Émile Puech.

Inscription 1 depicts a rectangular panel, including a cross with three lines in Greek. Line 1: "Jesus Christ (is) your strength." Line 2: "And,




*5. Inscriptions 1-4 from Qaṣr al-Abyaḍ (illustration Émile Puech; photo SDSE).*

O God, save Abo / Aba, see!" Line 3: "And O Holy Spirit!"

The shorter Inscription 2 can be read as: "and sacrifice / offering a sacrifice / famous by a sacrifice".

Inscription 3 is interpreted as Christo - Palestinian Aramaic enclosed in a rectangular box. Its poor preservation means that only the last two of the original six – perhaps seven – lines can be read. The suggested reading for Line 1 is: "Lord God", with the beginning of Line 2 being: "Our Lord Jesus". The last two lines are fully preserved. Line 5: "Lady Mariam, mother of the Lord Jesus, protect!" Line 6: "Lord, allow us to enter because we have committed sin!"

Inscription 4, to the right of a smaller Greek cross and above a larger Greek cross within an angled square, presumably consists of three dif-

ferent entries with four preserved and readable lines.
Line 1: "… ? …"
Line 2: "Lord Jesus [ ]"
Line 3: "[L]ord, we beseech and be favourable!"
Line 4: "Really, listen to [me / us], and protect [us], O Jesu[s!]"
Line 5: "Really, look! Listen in the wilderness!"
Parts of the larger dwelling complex in the eastern hermitage of 'Qaṣr Ilyās' were already visible during earlier fieldwork, but the full extent of the site was only revealed after erosion of the site from 2002 onwards. The documentation of wall inscriptions from three cells located on the lower level, which were previously interpreted as separate cells, has already been presented in the preliminary report covering the results from 1995 and 1996 (Kaliff and Holmgren 1997). Parts of these inscribed walls have unfortunately been damaged by modern graffiti during recent years. During SDSE's 2009 season, additional inscriptions and graffiti could be seen on exposed walls protruding from the collapse at 'Qaṣr Ilyās'. Present is an inscription of the Greek letters *XP*, a common abbreviation of the name of Christ. Furthermore, an indistinct presence of the word φως (Gr. "light") can be traced. The word 'light' is sometimes connected to the monogram of Christ. Another commonly associated word is ειρηνη (Gr. "peace"), together with the first and last letters of the Greek alphabet. These four different inscriptions could all be interpreted as references to Jesus Christ and, as such, might represent traces of an early Christian presence. Other traces of Christian inscriptions / graffiti include a distinct cross in connection with a proper noun written in the dative, meaning "this place belongs to Fafeos". Perhaps the most elaborate graffiti is a depiction of a possible *navicula Petri*, a ship representing the Christian church.

Two different radiocarbon samples from the straw / plaster mixture that once covered the Greek letters XP (i.e. part of the plaster preserved on the wall below the inscription), have yielded consistent dates: 420-540 AD (Ua-38854: 1 sigma, 68.2%) and 430 - 540 AD (Ua-42725). Another similar date, of 380-530 AD (Ua-42727), comes from sooty plaster in the adjacent room to the north. Yet another, this time of 410-540 AD (Ua-42726), comes from one of the chambers in the southern part of the hermitage.

The relatively poor material finds from the hermitages, cells and chapels are representative both of the ascetic life of the monks and of the handicrafts carried out during the course of their daily work in the cells. The finds from the hermitages are generally similar (notwithstanding the papyrus find from Qaṣr aṭ-Ṭūba) and include fragments of pottery, strips of palm leaf, tufts of camel hair, fragments of rope, nut shells, smaller bones and textile fragments. Fragments of linen cloth and tufts of camel hair are both common finds. Camel hair was probably used by the hermits for clothing, a custom relating to John the Baptist who was in turn presented as the Prophet Elias *redivivus* by Jesus (Mt 17:12-13). Both John the Baptist and Elias were regarded as prototypes for the hermit life.

**Early Christian Monasticism: A Brief Background**

To better understand the reasons for the development of the various religious installations on al-Lisān, we need to consider both earlier and contemporary phenomena. In Palestine, the earliest phase of Christian monasticism has been dated to the early fourth century AD. The monastic movement spread and flourished during the Byzantine period (324-642 AD) and often continued into the Islamic and Crusader periods. One example is the Gerasimus monastery (Dayr Hajla), located between Jericho and Jordan. This monastic community was founded in 455 AD and was only abandoned after the Crusader period, notwithstanding the fact that the number of monks was reduced during certain periods. This site was rebuilt in more modern times and exists to this day (Murphy-O'Connor 1998).

Many monasteries were established in or around large cities, at holy places and at sites of pilgrimage, while others were in desert areas. The remains of monasteries have therefore been found in diverse areas. The first known monks in the region were Hilarion of Thavata who lived in the Gaza region, Epiphanius who settled near Eleutheropolis, *ca.* 50km south-west of Jerusalem, and Chariton who became the founder of monasticism in the Judean Desert. Chariton founded three *laurae* in the first half of the

fourth century: Pharan, Douka and Souka. The more organized monastic communities, characterized by a monastic center or *coenobium*, were established along the Jordan in *ca.* 455 AD when Gerasimus founded a *laura* surrounding a *coenobium* (Patrich 1995; Bar 2005).

The process by which the different early monasteries came into being was similar. The first monks installed themselves in a cave or hut in isolated solitude. Over the course of time, other monks joined them and different communities were formed. A hermitage is generally referred to as a 'cell' (κελλίον) in contemporary written sources. With donations from wealthy admirers or a legacy bequeathed to the founder, dwelling cells, a prayer house and water reservoirs were constructed. This was the case with the foundation of the Mar Saba monastery. Similar is the story of the establishment of the three *laurae* of Chariton, the *laura* of Euthymius, the *coenobium* of Theodosius and others (Patrich 1995: 61, 126). The founder, who was the leader of the group, determined whether it would be built as a monastery or, in the case of anchorites, as a *laura* (λαύρα, [Gr. "alley" or "lane", presumably referring to the narrow path that communicated between the monastic cells]), or even as a communal monastery or *coenobium* (κοινόβιον [Gr. "common life"]). Certain variations also existed between monasteries of the same type. A *laura* could also be changed later and rebuilt into a *coenobium*, as shown by the monastery of Euthymius (Khan el-Ahmar), one of the major monasteries of the Judean desert along with Sabas, Theodosius and Chariton. The *laura* with its church was completed in 428 AD and, after the death of Euthymius in 473, a *coenobium* was built at the site of the church, enclosing the founder's tomb (Hirschfeld 1993: 339-371). The Gerasimus monastery is an example of a different monastic type, built *ca.* 455 as a *laura* surrounding a *coenobium*. This shows that the two types of monastic community could be combined. Nevertheless, the specific features of each type are clear enough. In a *laura* the hermits lived during the week in dispersed cells situated some distance from each other. On Saturdays and Sundays they assembled in the church, located at the core of the *laura*, for communal prayer and a meal. In a *coenobium* the monks met daily in the church and dining room. In both types, the daily schedule was divided between prayer and manual labor. Also, recluses who lived alone in their cells could be found in the vicinity of a *coenobium* (Patrich 1995: 3-4). Although data on the size of the monastic population in Palestine is hard to come by, the monastic movement attracted many people from the early Byzantine period onwards. Patrich (1995) cites Cyril of Scythopolis, who in 516 AD counted the entire monastic population of Jerusalem and the Judean desert as 10,000 in total. Hirschfeld estimates that there were never more than 3,000 monks in the Judean desert (Hirschfeld 1992: 78-79), even after the expansion that resulted from the settlements of Sabas and his disciples, which greatly increased the number of monasteries. Earlier, the number of monks was much lower, with a reasonable estimate being *ca.* 1,000-1,500. According to Patrich (1995: 8-9), the number of monasteries in the Judean desert and on its margins was quite sparse until *ca.* 480, i.e. just six *laurae* and eight *coenobia*.

The monastic settlements of Lower Egypt are closest in structure to the *laurae* of Palestine and are therefore considered particularly valuable for comparative study. There is more written evidence from this area and its monastic communities were much larger. Here, there were two distinct types of monastic community: coenobite schools (*scholae coenobiorum*) and communities of anchorites (*congregations anachoretarum*). The *coenobium* was typically a novitiate stage before a life of seclusion, although some monks continued to live out their lives in the *coenobium*. The cells of the anchorites were often quite distant from each other and as such prevented the monk from seeing or hearing his neighbor. At Kellia (*ca.* 50 miles south-east of Alexandria) the cells of the settlement extended over a wide area, some of them as far as 5-6km from the church in the *laura* core. Archaeological remains indicate that the settlement eventually extended over an area *ca.* 22km long, including about 1,500 dwelling complexes with a few churches. By the end of the fourth century, before the settlement expanded, Kellia already had 600 monks. In another community of Lower Egypt, Scetis, a total of 3,500 monks lived in its four *laurae* during the mid sixth century. These numbers are unparalleled in the Palestinian *laurae*, which generally numbered only several dozen

monks. Even the great *laura* of Mar Saba was small in comparison with the anchorite colonies of Egypt (Hirschfeld 1992: 78-79; Patrich 1995: 11, 122 and references therein) (**Fig. 6**).

The education of monks was similar in the different monasteries of the Byzantine era. Novices lived in the *coenobium* cutting wood, carrying water, cooking and performing many other duties until they displayed their spiritual preparedness to practice a hermit's life. Also, monks in training were kept in the community until they had grown a beard and looked less youthful, lest they become a temptation to older monks in the *laura*. Monks who became 'perfect in God's eyes' were allowed to live in cells away from the *coenobium*. These anchoritic monks lived in seclusion for five days, eating only bread, dates and water. Part of their mission was to become free of any passion of the soul: anger, cowardice, lethargy etc. The anchorites – or cell dwellers – lived alone in their cells during the week but met in the church on Saturdays and Sundays. There were also recluses, however, who refrained from coming to the church and lived alone for years – up to several decades – in their cells. The labor of the monk in his cell included basket weaving, fashioning mats from palm fronds and calligraphy. In some communities, the monks also wove linen fabric, depending on the raw material available in the area. During the harvest season, monks also went into surrounding villages to work for wages given in kind. Such was daily life, more or less, in Egyptian communities such as Kellia and Scetis. This has parallels in the monasteries of the Judean Desert and Jordan Valley, even if the monasteries of Palestine were not centers for handicraft or agriculture in the manner of the Egyptian and some Syrian examples. Income from the sale of baskets woven by the monks,

*6. Qaṣr aṭ-Ṭūba on al-Lisān; a larger hermitage documented by SDSE in 1996 (illustration SDSE).*

along with other products, was only marginal at best. The charity of admirers was of vital importance, with donations being given in the form of various products or silver / gold coin. The economic existence of the Palestinian monasteries in the desert was therefore based on donations or bequests by admirers or pilgrims (Hirschfeld 1992: 102-111; Patrich 1995: 15, 194).

Pachomius (290-346 AD) is regarded the founder of coenobite Christian monasticism in Egypt, although monastic communities living an organized communal life of one sort or another existed even before his activities. He founded his first monastery in 323 at Tabennesi and, at the time of his death, no less than nine monasteries and two nunneries along the Nile were united within his community. According to Palladius, during his time in the area (389-399 AD) the Pachomian federation included many monasteries and numbered 7,000 monks. Even during Pachomius' lifetime it numbered 3,000 monks. The movement founded by Pachomius had a great impact and the rules and practice of his Egyptian monasteries spread far and wide. In the Pachomian monastic community, or *koinoia* (κοινωνία), the organizational and economic administration was in the hands of the *oikonomos* (οίκονόμος) or 'leader' of the main monastery. Each single monastery had also an *oikonomos*, who was assisted by a deputy (*secundus*). There were also groups of monks of special status, *viz*. *maiores* (πατέρες). These took an active role in the Sunday liturgy and included older, more experienced monks and / or those who excelled in virtue. The monks in each monastery were divided into houses. Each week a different house provided – in rotation – necessary services such as cooking, serving food, cleaning, hospitality, caring for the sick, church services and so on (Chitty 1966: 22-28; Rousseau 1985: 112-13; Patrich 1995: 19).

A wall surrounded a Pachomian *coenobium* and its structure resembled that of a military camp (Chitty 1966: 22). In the wall, there was a gatehouse and next to it a guest room. Additional buildings included an assembly hall for prayer, a dining hall, a kitchen, a bakery and a hospital, as well as a storehouse for food and tools. Work played an important part in the life of the monk and in the economy of the monastery. This was the difference between Pachomian and Antonian monasticism, in which the monks performed only light work in their cells. In Pachomian monasteries there were also various workshops. Palladius mentions many types of craftsmen, including tailors, metalworkers, carpenters, swineherds, camel drivers, gardeners, bakers, basket weavers and book copyists. According to Pachomian rules, the monks were not to practice excessive mortification or fasting; labor was more important, although there was a degree of freedom of choice in these matters. This differed from contemporary monastic life in Syria that displayed extreme forms of mortification. Besides longer periods of fasting, compared to Egypt, there was a tendency towards corporal suffering and self-destruction of the body. Such suffering could be expressed through winding chains around the body, exposing the body to wild beasts and the ravages of weather, vertical binding of the body or confinement to a narrow vertical space in order to force an erect posture that prevented normal sleep. Examples also include the choice of an extremely limited and isolated living space, e.g. on top of a tall column (Patrich 1995: 20-22 and references therein).

The Basilian rules are of special interest to Palestinian monasticism, since its leaders were often natives of Asia Minor, where Basilian monasticism prevailed. The church father Basil was born in Cappadocia in 329 / 30 and is known as one of the 'Three Cappadocian Fathers', along with Gregory of Nazianzus and his brother Gregory of Nyssa. They were all three influential theologians, loyal to the decisions of the Council of Nicaea and opposed to what was condemned as Arian heresy. Basil regarded monasticism, expressed through communal coenobitism, as the only proper way of life for a Christian. The *coenobium* was supposed to be a community of modest size, housing around 30-40 monks. The organization was simple. The brotherhood was headed by the *proestos*, who was to be as a father to the others, obeyed by everyone. A deputy aided him in administration. The elder and more experienced monks enjoyed special status in the community. Everyday life was a combination of prayer and work. Recommended labors included weaving, shoemaking, construction, carpentry, tin-smithing and agriculture. The educated and capable were permitted to devote themselves to the study and reading of scriptures. Basil

preached a moderate form of asceticism and moderation in fasting. Excessive asceticism was perceived as false pursuit of glory. Basil's teaching greatly influenced the monastic movement in Palestine, especially coenobitism (Patrich 1995: 28-31).

**Discussion**

There are examples of anchorite settlements – *laurae* – that sprang up around *coenobiae*. One example of particular interest to Dayr al-Qaṭṭār and its surrounding hermitages is the anchorite *laura* known as 'The Cells of Choziba', which developed at a distance of about 1km from the Choziba *coenobium* (Monastery of St. George) in the Judean desert. At the same time there are other examples, such as the *coenobium* of Theoctistus, where no such settlement developed outside the *coenobium*. The anchorites in Choziba maintained a laurite way of life in their cells, while the *coenobium* served them as a *laura* core. As at Dayr al-Qaṭṭār, some monastic cells are located much closer to the *coenobium*, while the main cluster is some distance away. As at Dayr al-Qaṭṭār, burials have been identified just outside the *coenobium* (Patrich 1990, 1995: 124-125).

Dayr al-Qaṭṭār may have been constructed as a *coenobium* from the very beginning, in parallel with the Gerasimus monastery. However, it is more likely that it was only converted into a *coenobium* some time after the first hermits settled in the area. If so, the site of Dayr al-Qaṭṭār would already have been functioning as a *laura* core during the earliest phase of the al-Lisan *laura*. The presence of cells at the very site of Dayr al-Qaṭṭār, apparently covered by the later buildings and surrounding walls of the *coenobium*, might also indicate that this location was the earliest anchorite settlement in the area – a place which attracted more and more hermits to gather in the vicinity and eventually establish a *laura*. Eventually, the core of the *laura* was changed into a *coenobium*. From at least the early 6th century onwards, possibly even earlier, Dayr al-Qaṭṭār had all features of a *coenobium*, even if the dating and interpretation of the different features and buildings remain uncertain owing to limited excavation at the site and in the surrounding cells to date. On the basis of a preliminary examination of pottery and finds, the earliest phases at Dayr al-Qaṭṭār could date back to the 4th century (Holmgren and Kaliff 1997, 2005). A comparison can be made with the monastery of Gerasimus, which consisted of several buildings, *viz*. the church, the monks' cells, a kitchen, a refectory and storerooms. Surrounding the *coenobium* were 70 hermitages that made up the *laura* part of the community. The hermitages were either small cells or rooms cut into the soft lake deposit of Wādī an-Nakhīl, as mentioned above (Hirschfeld 1992). The interpretation of the crypt at Dayr al-Qaṭṭar (documented during the 1996 excavation) is in line with the interpretation of the site as an earlier cell or dwelling complex for one or more hermits, which was later converted into a *coenobium*. Possibly the cell and / or tomb of the founding father was then incorporated into the church and later used as a burial crypt or ossuary (Holmgren and Kaliff 1997). In an early phase, the site might have been the core of a *laura* consisting of the various cells discovered during our survey of the surrounding area. This would be in line with developments at other contemporary sites. At Mar Saba, for instance, the *coenobium* (and present-day monastery) mark the core of the *laura*, while the cells of the great *laura* extend along a 2km section of the Kidron valley. In this example, as at St Euthymius, the *coenobium* includes the tomb as well as the cell of the founding father, which is also a common pattern. A more detailed analysis of this possible development from *laura* core to *coenobium* at Dayr al Qaṭṭār requires further excavation. A more detailed investigation, including excavation, of Dayr al-Qaṭṭār will be crucial for interpretation of the monastic complex of al-Lisān as a whole. Thorough documentation and restoration of the site is of great importance to the project, not least because of the constant threat of increasing erosion and looting activities which are damaging the structures.

The historical identification of Dayr al-Qaṭṭār and the monastic community on al-Lisān is still enigmatic. We have previously suggested that Dayr al-Qaṭṭār might be identified with a bishopric mentioned in the 4th century named Sodoma. In the councillor list of the Council of Nicea in 325, Bishop Severus of Sodoma is recorded amongst the bishops of the province of Arabia. In the list of fathers gathered at the

Council of Chalcedon in 451 and at the Synod of Jerusalem in 518, the bishop of Sodoma is lacking but instead a bishop of Zoara turns up (Abel 1938: 198-201). The reading of Sodoma was challenged as early as the 1930s; it was suggested that Sodoma was a misspelling of Soadon. It has also been previously proposed that Sodoma refers to a general area around Zoara, rather than to the seat of a bishop. However, at the time when the existence of a bishop of Sodoma was questioned, the church at Dayr al-Qaṭṭār was not on the map. The problem concerning Bishop Severus of Sodoma might tentatively be solved by the identification of Dayr al-Qaṭṭār as a bishop's church. If this is the case, we would also have an identification of Dayr al-Qaṭṭār at least during its earliest phases. Nevertheless, this does not solve the problem of the historical identification of the monastic community. On the basis of archaeological evidence for its size and continuity, the *laura* of al-Lisan and its *coenobium* (Dayr al-Qaṭṭār) ought to be mentioned in more than one written source.

The identification of Dayr al-Qaṭṭār as Sodoma has received further support from the Finnish historian Joonas Sipilää (2005), who asserted that: "The argument is quite convincing, including the suggestive geology of the area and the Roman road passing south of it. The site does not appear to be dictated by economic considerations. Rather, it had a strict religious function in line with the tradition to mark out biblical events. The placing of the bishop seat of Sodoma on the Lisan Peninsula and, consequently, in to the province of Arabia solves the problem of Severus".

As a place of worship connected to Old Testament history, Dayr al-Qaṭṭār al-Bīzanṭī has a possible

parallel at Dayr 'Ayn 'Abāṭah, near Ghawr aṣ-Ṣāfī, which has been identified as the basilica of Lot's Cave according to Byzantine tradition (Politis 1992, 1993). It has previously been argued that the hermit communities on al-Lisān, including Dayr al-Qaṭṭār, were likewise built in connection with Old Testament traditions concerning Sodom and Gomorrah (c.f. Abel 1929: 248). An early date for the earliest church at Dayr al-Qaṭṭār is supported by Late Roman pottery found during the 1997 excavation, although further and more thorough analyses are required before this can be confirmed. Apart from the archaeological finds, an early date is also indicated by the Roman road passing near the site, which was mentioned by Alois Musil in his travel account of the late 19th century (Musil 1907: 164).

There is evidence pointing to Dayr al-Qaṭṭār as the location of the earliest and most important hermit site in the Lisān area. The earliest phase of the hermit community at al-Lisān can be dated to the early 4th century AD. The crypt of Dayr al-Qaṭṭār (Holmgren and Kaliff 1997: 329) is likely to be an early hermit cell, which was later incorporated into the church of Dayr al-Qaṭṭār and was used as an ossuary. This crypt might originally have been the cell of one of the

*7. Dayr al-Qaṭṭār al- Bīzanṭī in 2009, with the main site still under investigation by SDSE. The exact date of the substructure of the church is still uncertain. However, radiocarbon dating of the adjacent chapel's mosaic bedding yielded a date of 670-770 AD (Ua-38853: 1 sigma, 68.2%), while the wooden superstructure of the latest phase of the main building dates to 1,000 AD (photo SDSE).*

early anchorites settling in this area, who was later revered as a holy person. The tomb and / or cell of the founding father was often preserved and sometimes marked with a special building, or he was buried in the cave in which he had spent his life (Patrich 1997: 44). The shape of the crypt, which bears a clear resemblance to hermit cells in the vicinity, suggests that this might also be the case here (**Fig. 7**).

Dayr al-Qaṭṭār remained a monastery into the Early Islamic period – possibly up to the time of the Crusades – a phenomenon recognizable at several Byzantine sites (e.g. Kaegi 1992: 88). A C-14 date from wooden structures in the top layer, probably part of the most recent roof construction, came in at around 1,000 AD. This indicates that the latest church and associated monastic activities may have continued through the 11th and possibly into the 12th century. There is also a possibility that Dayr al-Qaṭṭār was turned into a Muslim shrine during its latest phase, or was used as a profane functional stronghold on the ancient road passing nearby. One such example, resembling Dayr al-Qaṭṭār, is the sanctuary of Saint Aaron (Jabal Hārūn), where a Christian place of worship was subsequently converted into a Muslim shrine (Fiema and Frösén 2008). The function of Dayr al-Qaṭṭār and the surrounding hermitages during the Islamic period still remains uncertain. A more comprehensive answer to this question requires further investigation at Dayr al-Qaṭṭār itself.

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# THE GREAT ARAB REVOLT PROJECT: 2010 AND 2011 FIELD SEASONS

*Neil Faulkner, Nicholas J. Saunders, John Winterburn, Cat Edwards and Susan Daniels*

**Introduction**

The Great Arab Revolt Project (GARP) is planned as a ten-year project to investigate the history and archaeology of the Great Arab Revolt of 1916-1918 **(Fig. 1)**. It commenced in 2006; earlier work is reported on in two successive ADAJ reports published in 2008 (covering the 2006 and 2007 seasons) and 2010 (the 2008 and 2009 seasons). A general introduction to the project, its organisation and its methods appears in the first of these reports.

The main focus of our first two field seasons was: (1) the Late Ottoman trench-fortress around Maʻān and (2) the Late Ottoman defences in and around Wādī Rutm Station, which lies approximately 60 km south of Maʻān on the Ḥijāz Railway.

The main focus of our second two field seasons was: (1) the Late Ottoman defences in and around Baṭn al-Ghūl Station, approximately 55 km south of Maʻān on the Ḥijāz Railway and (2) the Late Ottoman redoubts and Hashemite tribal army base at Wuhayda, approximately 18km west-south-west of Maʻān on the ʻAqaba road.

This report summarises the results of work in 2010 and 2011 on the militarised landscapes along two stretches of the Ḥijāz Railway as follows:

**The Northern Extent: Between Maʻān and ʻAqabat - Ḥijāz**

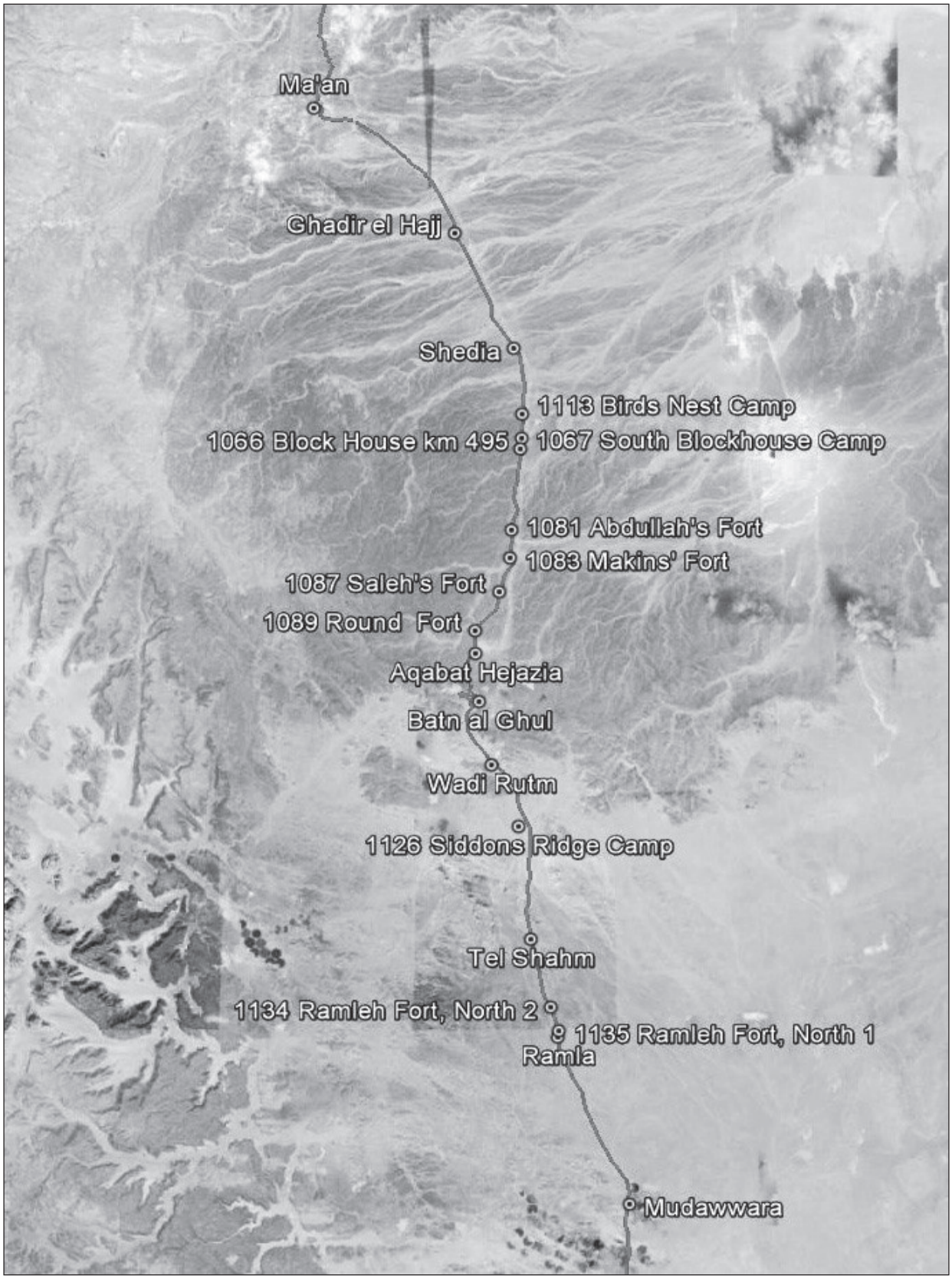
This includes work at the following locations: Ghadīr al-Ḥajj Station (15km south-east of Maʻān), ash-Shīdiyyah Station (26km south-east), Bird's Nest Camp (31km south-east), Railway Blockhouse (33km south-east), South Blockhouse Camp (33 km south-east), Abdullah's Fort (39km south-east), Mākin's Fort (41km south-east), Ṣaliḥ's Fort (44km south-east) and Round Fort (46km south-east).

**The Southern Extent: Between Wādī Rutm and Mudawwarah**

This includes work at the following locations: Saddūn's Ridge Camp (6km south-east of Wādī Rutm), Tall Shaḥam Camp (13km south), Tall Shaḥam Fort (13km south), Tall Shaḥm Station (16 km south), Ramlih Fort, North 2 (22km south), Ramlih Fort, North 1 (24km south) and Ramlih Station (24km south).

The academic leaders of the project are Neil Faulkner and Nick Saunders, both of Bristol University. They are supported by a field team, which during the 2010 and 2011 seasons included: David Thorpe (field director), Susan Daniels (project administrator and planner), Linah Ababneh (planner), Ali Baldry (photographer), Cat Edwards (site supervisor), Anna Gow (finds supervisor), Caroline Jennings (resident artist), David Spencer (site supervisor), Roger Ward (metal-detectorist and IT specialist) and John Winterburn (landscape archaeologist). The team was supported by several Jordanian colleagues: Fawzi Abudaneh (al-Husein bin Talal University), Zeyad Al-Salameen (al-Husein bin Talal University), Hani Falahat (Department of Antiquities), Abdullah Rawashdeh (Department of Antiquities), Mansour Shqiarat (al-Husein bin Talal University) and Saʻad Twaissi (al-Husein bin Talal University).

The 2010 field season ran from 24 October to 7 November and involved a team of 26 field-workers. The 2011 field season ran from 14 to 28 November and involved a team of 31 field-workers. This report covers both seasons, just as our previous reports covered the 2006 / 2007 and 2008 / 2009 seasons.




*1. Map showing sites investigated by GARP (copyright: 2012 Google Earth, 2012 Cnes / Spot Image, 2012 GeoEye).*

**The Northern Extent: Between Ma'ān and 'Aqabat - Ḥijāz**

*Ghadīr al-Ḥajj Station*

Ghadīr al-Ḥajj, at a distance of 15km miles to the south-east, is the first Ḥijāz Railway station beyond Ma'ān **(Fig. 2)**. It comprises a single, rectangular, Late Ottoman stone structure measuring 11.80m by 5.50m. The building is ruinous and only survives at foundation level. It lies west of the railway line and there is evidence for an underground cistern between the two. About 25m beyond the far western side of the building is a fairly well-defined breastwork-trench, angled and curving. Approximately 20 spent Mauser cartridges were metal-detected in this trench.

*Ash-Shīdiyyah Station*

Ash-Shīdiyyah, the second Hijaz Railway station south of Ma'ān, lies 11km south of Ghadīr al-Ḥajj Station. The present-day railway station comprises a complex of buildings probably dating from the 1960s. No evidence has been found for the original station buildings or the defences recorded as present in 1918.

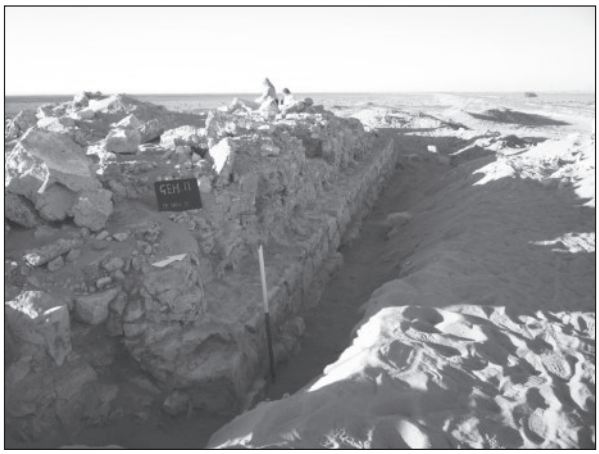
*Bird's Nest Camp*

This camp, 6km south of ash-Shīdiyyah Station, comprises at least 27 stone tent-rings, with at least two other possible tent-rings, 22 of which are arranged in two parallel, north - south lines **(Fig. 3)**. The tent-rings range in diameter from 3.85m to 4.80m.

The regular layout and standardisation of tent-ring diameter are typical and imply military activity. This is seemingly confirmed by the finds assemblage, which is Late Ottoman military in character.

Apart from a single linear trench 120m south of the camp, there is an absence of obvious defences around or near this camp, which may indicate that it accommodated construction workers during the building of the Ḥijāz Railway. On the other hand, it may be that it was indeed a wartime soldiers' camp, but that the associated defence-works have been lost to the obvious industrialised destruction of the landscape.

If the latter interpretation is correct, then Bird's Nest Camp would take its place in the line of intervisible defended posts between ash-Shīdiyyah and 'Aqabat-Ḥijāz Station.



*2. Ghadīr al-Ḥajj Station after the foundations were cleared (copyright GARP).*

*3. Birds' Nest Camp as tent-rings are cleared prior to planning (copyright GARP).*

*Railway Blockhouse*

This blockhouse, 7.8km south of ash-Shīdiyyah Station, is intervisible with Abdullah's Fort to the south. It lies approximately 12m west of the Ḥijāz Railway line. The rectangular structure, aligned north-south, was formed of three rooms. Each room contained either a window or a doorway. The window of the northern room revealed that metal bars had been placed across it vertically, implying a need for defensive measures prior to the outbreak of the Revolt.

All rooms contained well-constructed loopholes, probably contemporary with the original construction. This has not been a common feature of station buildings observed by the GARP team, though there are some parallels.

The remains of a concrete roof were present both *in situ* and as fallen debris on the floor of the structure. The presence of high loopholes and the remains of partially collapsed stairs indicate that the roof was easily accessible.

No surrounding features were observed. All rooms have been heavily disturbed by later ac-

tivity, including graffiti and illicit excavation.

*South Blockhouse Camp*

This camp lies 8.7km south of ash-Shīdiyyah Station on a low hill 180m west of the railway. It comprises three separate groups of stone tent-rings. The northern group contains at least 15 tent-rings, arranged in two parallel rows running north-south, with the individual tents slightly misaligned rather than directly opposite each other. All observable entrances were on the eastern sides, facing the railway. Approximately 30m west of the northernmost tent-rings was a small circular structure formed of a dry-stone wall, earth-and-gravel bank and outer ditch. It could not be dated, but it commands clear views in all directions and may therefore have been an Ottoman defensive position guarding the camp.

The middle group lay 130m to the south on the far side of a *wadi* and comprised at least 27 tent-rings. The middle camp is notable for its differences with the northern. Though it was also aligned north-south in two parallel rows, with a handful of outliers to the south-west, the tent-rings are formed of banks of small stones rather than rings of large stones. The rings are placed only 1m apart, in contrast to around 5m apart in the northern camp. Whereas the northern camp was finds poor, the middle camp yielded an abundance of metal-detected finds, including cartridges, buttons, coins and seals.

Within the south-western limit of the middle group was a larger tent-ring surrounded by larger fragments of natural stone which may have been used to hold down the ropes of the tent. The larger size of the ring might suggest either that the tent contained a person of rank or that it had a special function.

The southern camp was walked by the team but not investigated in greater detail. It was formed of at least 12 rings, aligned east-west, and may have contained a bread oven similar to that observed at Faṣṣū'ah Ridge Fort.

*'Abdullah's Fort*

Abdullah's Fort, 15.6km south of ash-Shīdiyyah Station, is intervisible with Railway Blockhouse to the north and Mākīn's Fort to the south. It comprises a breastwork-trench perimeter around a small, three-cell blockhouse with loopholed walls and a 'blast wall' at the entrance. The fort was originally visited and surveyed in November 2009. There is evidence that the structure was substantially damaged in October / November 2011.

*Mākīn's Fort*

This lies 18km south of ash-Shīdiyyah Station. It stands immediately west of the railway guarding a *wadi* and viaduct, but it also forms part of a line of visual communication, being intervisible with 'Abdullah's Fort to the north and Ṣaliḥ's Fort to the south. It is noteworthy that an iron-pointed wooden instrument leg was found at the site, quite possibly from a heliograph tripod.

Mākīn's Fort comprises a breastwork-trench perimeter formed of a stone wall and earth bank fronting a shallow scrape, and an internal blockhouse **(Fig. 4)**. The whole complex is located immediately above the *wadi*, such that the ground falls away steeply to the south. The blockhouse comprises a circular enclosure to the east, with an attached rectangular block to the west. The interior is subdivided by partition walls and the outer walls are loopholed.

The fort appears to be linked by stone-lined paths to observation posts to the north, and tent-rings, a cistern (and water channel) of uncertain date, a possible oven and a small blockhouse (also loopholed) to the east, the last three being on the eastern side of the railway. Various other certain and potential observation posts and tent-rings were also seen in the immediate vicinity.

The line of an original embankment can be seen immediately to the east of the present one, as can the mortared foundations of an original viaduct. However, the present viaduct appears to

*4. Mākīn's Fort with viaduct in background (copyright GARP).*

be Late Ottoman (though later repaired), so it is possible that the change of alignment dates from original construction or the war.

*Ṣaliḥ's Fort*

This lies 21km south of ash-Shīdiyyah Station and is intervisible with Mākīn's Fort to the north and Round Fort to the south. It comprises a sub-rectangular breastwork-trench perimeter wall of stone, gravel and sand around a two-cell blockhouse. The blockhouse measures approximately 10m by 7m and has an entrance on the eastern side covered by a 'blast wall'. Just beyond the perimeter wall and surrounding it is a *quincunx* arrangement of close-set pits (see Round Fort).

A short distance north-west of Ṣaliḥ's Fort is Ṣaliḥ's Camp, comprising eight definite tent-rings, two larger tent-rectangles and one or two other possible tent-rings in an area of extensive landscape damage.

*Round Fort*

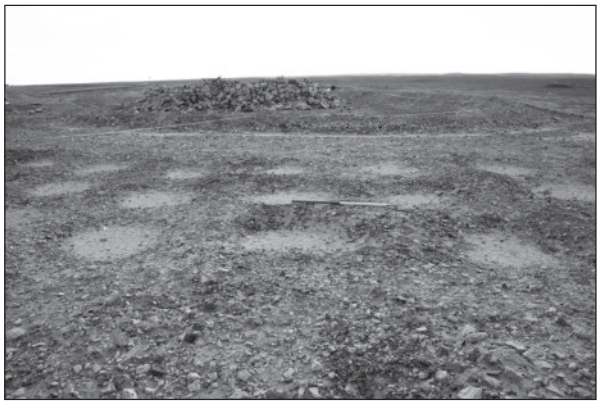
This lies 25km south of ash-Shīdiyyah Station and is intervisible with Ṣaliḥ's Fort to the north-east and 'Aqabat-Ḥijāz Station to the south-east. There is no direct line of sight between Ṣaliḥ's Fort and 'Aqabat-Ḥijāz Station, confirming the placing of military posts to facilitate (1) communication between one post and another and (2) direct observation of all sections of the railway line.

Round Fort comprises three elements: (1) a single-cell sub-circular blockhouse with an entrance to the east and a sunken stone hearth to the west, (2) a circular breastwork-trench forming a perimeter wall around the blockhouse and (3) a circular belt of *quincunx*-arranged pits, almost 100 in total, each one up to 0.5-0.7m across and 0.25m or more deep **(Fig. 5)**. These pits may have been 'ankle-breakers', perhaps originally with a caltrop, upright nail, metal spike, thorn scrub or similar in the base. Alternatively, they may represent the bases of the angled supports of a barbed-wire entanglement.

**The Southern Extent: Between Wādī Rutm and Mudawwarah**

*Saddūn's Ridge Camp*

This lies 5.8km south of Wādī Rutm Station. The site is a low north-south ridge, about 300m in length and 50m wide, located approximately 800m west of the Ḥijāz Railway. The site's location can be related to the commanding views it affords in all directions. There is a clear view to: Wādī Rutm Camp (on a high escarpment overlooking Wādī Rutm to the north-east), Black Mountain Camp (on a medium-sized hill to the north) and Tall Shaḥam Fort (on a medium-sized hill to the south).



*5. Round Fort showing the belt of pits (copyright GARP).*

The site comprises several distinct elements **(Fig. 6)**. At the northern end is a small fort formed of a circular breastwork, with a loop-holed wall of stone and gravel, a firing ledge behind the breastwork and a deep trench behind this. It may have contained a blockhouse, though any evidence for this has been destroyed by bull-dozing.

A zig-zag communication trench running along half the length of the ridge forms the second element, linking the northern fort with a third element, a horseshoe-shaped stone breastwork-trench – again with a firing ledge and a deep trench in the middle – located at the southern limit of the communication trench. There is

*6. Saddūn's Ridge Camp, showing the communication trench leading to the northern redoubt (copyright GARP).*

a step down into this bunker-like position, where a group of spent Mauser cartridges were excavated, apparently *in situ*.

The fourth element is a tent-ring encampment. Part of this was cut by the communication trench (and was therefore out-of-use at this point); up to six disused tent-rings were noted. The southern part, however, lies beyond the southern bunker, where some 19 tent-rings were observed.

In addition to the main elements, we also explored a probable latrine (north-eastern slope), a definite cook-house with two well-preserved hearths (south-eastern slope) and an enigmatic L-shaped part-enclosure (south-western slope).

*Tall Shaḥam Camp*

Tall Shaḥam comprises at least four distinct locations: from north to south, a tent-ring camp (Tall Shaḥam Camp), a hilltop breastwork fort (Tall Shaḥam Fort), a second tent-ring camp (unnamed) and Tall Shaḥm Station.

The camp comprises an avenue of two parallel lines of tent-rings, 19 in all, with three or more outliers. There appears to be reuse of existing prehistoric stone circles (hut circles?) in some cases.

*Tall Shaḥam Fort*

This lies immediately south of the camp on a medium-sized, steep-sided, rock-strewn hill which gives a clear view of both camps, the station and the *wadi*. In the middle of the site and at its highest point is a sub-square blockhouse. Platforms surrounding the structure had been cut into the rock. A short dry-stone perimeter wall with at least three 'sentry-posts' surrounds the whole.

*Tall Shaḥam Station*

The station lies about 2.4km south of Tall Shaḥam Fort. The single station building has been fortified and the position is covered by trenches.

*Ramlih Fort, North 2*

This feature lies 2.6km south of Ramlih Station. Located on rising ground east of the railway, Ramlih Fort is intervisible with both Tall Shaḥam and Ramlih Stations. It comprises a sub-rectangular enclosure, the surviving part measuring 13m north-south and 10m east-west, though the western extent has been damaged by bulldozing.

The perimeter breastwork-trench is formed largely of stone and upcast, with the slate-like local stone also used to form 11 well-constructed loopholes close to the level of the exterior ground-surface. On the north-western corner and towards the southern end of the surviving part of the western wall, there are semi-circular projections in the breastwork-trench.

The trench measures 1.50m across and the bank 2.0m across; the unfinished excavation revealed that the trench was at least 1.50m deep from the top of the ground-level loopholes, showing that the defenders could have stood inside their trench to deliver fire.

Inside the enclosure is a centrally placed circular bank, almost certainly representing an inner breastwork-trench. Inside this is a ring of stone, almost certainly the remains of an inner redoubt. The depth of the outer trench and the low-level siting of the loopholes make it likely that defenders in the inner breastwork-trench and redoubt could have fired over the heads of those along the perimeter.

A stone-lined path can be seen linking the railway and fort. Three external structures, two located close to the fort, were recorded to the east and south. These circular stone-walled structures were more substantial than tent-rings.

*Ramlih Fort, North 1*

This fort lies 540m north-east of Ramlih Station. It comprises a sub-rectangular fortification, 13m by 13m, with earth parapets and stone-wall revetments. The external walls survive to a height of 1.5m and are 1m wide.

*Ramlih Station*

This station lies 8.6km south of Tall Shaḥam Station and 15km north-west of al-Mudawwarah Station. The single station building was probably rebuilt in the 1960s. There is evidence for a perimeter trench system to the east of the building.

**Conclusions**

The investigation of two long stretches of the Ḥijāz Railway south of Ma'ān over two field seasons has confirmed the impression gained during earlier, more intensive investigations in

the crucial sector between them, which includes the precipitous Baṭin al-Ghūl escarpment. Thus, the distribution of defended posts along the line is designed to make them intervisible, so that signals could be passed down the line (by heliograph in the day and lamplight at night?), and to ensure that every stretch of the line was under direct observation (at least by day). This is testimony to the chronic and ubiquitous nature of the insurgent threat represented by the Hashemite Arab forces operating in the desert in 1917 and 1918.

This not only amplifies the impression gained during the first four seasons of the intensity of the war, but also adds rich detail about the character of the counterinsurgency effort necessary to defend the landscape. Crucially, we are witness to the archaeological imprint of imperial 'overstretch'. The imperative was both to keep the whole line under observation and to ensure that information could be relayed fast enough to facilitate a rapid response to attacks. This meant that the Ottoman Army was strung out in many small pockets, like beads on a necklace, thereby depriving individual posts of security through strength, as well as draining resources from (1) a more proactive counter-insurgency east of the Jordan and (2) from the defence of the trenchlines facing Allenby's army west of the Jordan.

In our first report, we concluded that the Great Arab Revolt Project had confirmed the huge potential of modern conflict archaeology in southern Jordan by revealing the survival of an extensively militarised landscape dating from 1916-1918 in the desert areas. We argued that the remains indicated a military response to a threat that was, on the one hand, dispersed and low-intensity but, on the other, chronic and pervasive. We further argued that this contrasted sharply with the experience of the First World War on the better-known Western Front.

Work during 2008 and 2009 confirmed the intensity of the Late Ottoman militarisation of the landscape. In particular, detailed work at Baṭin al-Ghūl has shown that the density of military remains earlier revealed at Wādī Rutm is not exceptional. Moreover, wider survey work (not reported in detail here) has confirmed that comparable densities exist along the entire stretch of Ḥijāz Railway between Maʿān and Wādī Rutm, and that other areas (e.g. the approaches to Maʿān from ʿAqaba) also bear a strong Late Ottoman military imprint. The impression grows of a large-scale counter-insurgency operation in southern Jordan between July 1917 and October 1918 – testimony to the effectiveness of the Arab military effort.

GARP is therefore contributing substantial new information and ideas to at least three distinct archaeologies: that of modern conflict, that of southern Jordan and that of desert movement and warfare. It is also revealing the potential which exists for the development of major new heritage tourism attractions in the region.

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# REPORT ON A GEOPHYSICAL PROSPECTION OF THE NORTHWEST QUARTER OF GERASA / JARASH 2011

*Georg Kalaitzoglou, Rudolf Knieß, Achim Lichtenberger, Dana Pilz and Rubina Raja*

## Introduction

In 2011, a Danish-German project to investigate the north-west quarter of ancient Gerasa / Jerash was begun (see report by Lichtenberger and Raja [this volume]). The project is funded by the Deutsche Forschungsgemeinschaft (DFG) and the H.P. Hjerl Hansen Mindefondet for Dansk Palæstinaforskning. The first season included an architectural field survey, geodetic survey and geophysical survey. The main aim of the project is the investigation of the urban layout of this quarter; on the basis of the results of the 2011 season, it is intended that excavations will continue for many years to come. Fieldwork took place between 5 and 19 September 2011, involving a joint team from Aarhus University and Ruhr University Bochum. The geophysical survey was carried out by Rudolf Knieß and Dana Pilz of the Berlin-based company Eastern Atlas.

The north-west quarter of Gerasa is the most elevated area within the walled city, being located on an extensive hill with some steep slopes. Almost the entire area is covered with stones and blocks of archaeological origin, up to 1m across. The bedrock, which is intermittently visible on the slopes, consists of karstic limestone. Archaeological structures related to buildings and terracing can be identified, consisting for the most part of limestone blocks.

The area was challenging for geophysical survey; the complex topography, steep slopes and uneven soil coverage made it impossible to walk easily across the terrain whilst maintaining the constant contact with the ground required by ground-penetrating radar (GPR). Furthermore, the archaeological features consist of limestone with similar geophysical characteristics to the underlying geology. Two methods, *viz*. magnetometry and GPR, were tested. In the event, it turned out that only a large scale geomagnetic survey would yield useful archaeological results. The Eastern Atlas MAG-DRIVE system was therefore converted so that the magnetometry sensors could be carried over the area (**Fig. 1**). Three small fields with little surface disturbance were also selected for GPR survey. In total, an area of almost 4 hectares was surveyed.

## Differential GPS and Data Positioning

Data positioning for the geomagnetic survey was achieved through differential GPS, using single frequency Novatel receivers. The system rover was attached to the magnetic array and carried over the investigated areas. A relative data accuracy of 0.1m can be assumed. For the positioning of the GPR data, the corners of the survey fields were recorded by GPS and then related to the geomagnetic data. For the precise overlay of archaeological and geophysical survey data, a local point adaption was applied. These images are available in Palestine 1923 / Palestine Belt projection and are easy to reproject into any co-ordinate system required[1].

## Geomagnetic Survey

Geomagnetic anomalies are caused by changes in the complex magnetic properties of

1. Transverse Mercator Projection and the Palestine 1923 geographical datum were used here. To comply with the local Jarash grid, co-ordinates had to be shifted 1.1m to the west. We thank the Department of Antiquities at Amman for helping us to obtain the relevant measuring points. We would also like to thank Thomas Lepaon (Jerash Archaeological Project, University of Tours) for information regarding the geodetic survey.

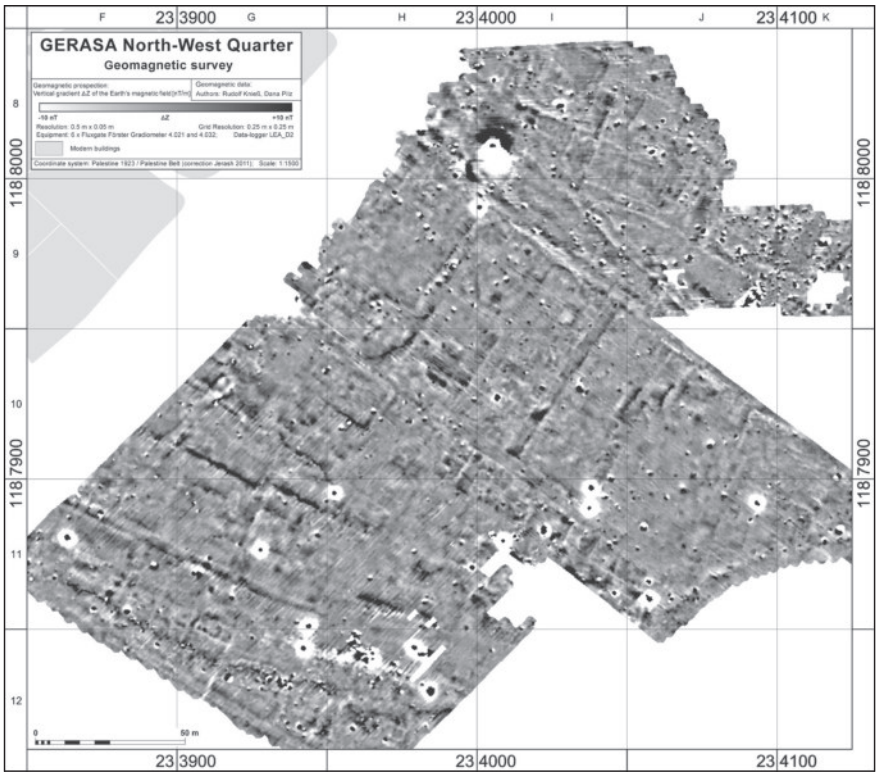
*1. The MAG-DRIVE geomagnetic system at work.*

the soil. The amplitude of the magnetic anomalies is determined by contrasts in magnetic susceptibility between archaeological structures and the surrounding soil, as well as by the volume and depth of the magnetic structure. Generally, iron oxides such as haematite, magnetite or maghaemite are carriers of magnetisation. These minerals are ubiquitous in the soil, in the form of microscopically small grains. As a result of microbiological processes, these minerals accumulate in pit and ditch fills, especially within organic materials. In the survey under discussion here, the main building material is limestone, which does not generally carry any iron oxides. Negative magnetometry readings can therefore be expected for subsurface archaeological structures. A second type of magnetisation is caused by fire. The amplitude of magnetic anomalies derived from thermoremnent magnetisation is usually noticeably higher than magnetic anomalies in unburned materials. Kilns and accumulations of pottery, bricks and tiles can often be detected on this basis. As geological and modern structures can produce strong magnetic anomalies which differ in shape and type, it is sometimes possible to distinguish between them. Furthermore, modern disturbance such as iron pegs (from previous archaeological surveys) and scrap metal on the ground surface can be identified as dipole anomalies of very high amplitude. For the geomagnetic investigations at ancient Gerasa, an array of six fluxgate gradiometer probes was specially built for the survey. The three-wheeled, MAG-DRIVE hand cart carrying the probes was modified to allow the array to be carried by hand (**Fig. 1**). Instead of the wheels, two wooden handles were attached to the system. This made it possible to cover wide areas and investigate steep slopes and areas of dense stone coverage. The probes register the gradient of the vertical component of the Earth's magnetic field with an accuracy of 0.1 nT (nanotesla). The measured gradient (i.e. the difference between two vertical sensors in a gradiometer probe) is insensitive to the large background fluctuations in the Earth's magnetic field and is only affected by the magnetisation of local anomalies in the ground.

The results of the geomagnetic survey are presented at **Fig. 2**, with grey-scale values of ±10 nT which give a good overall impression of the features detected[2]. **Fig. 2** includes the survey boundaries and clear dipole anomalies (negative minimum and positive maximum) with amplitudes of more than ±50 nT, which are considered near-surface metal objects of modern origin. Large dipoles mostly result from large iron pegs remaining in the ground.

Promising results were obtained under current ground surface conditions. Looking closely at the data, it can be seen that – in addition to numerous archaeologically relevant anomalies – there are a number of heavily disturbed zones. These effects are mostly associated with

2. Grey-scale images are available in dynamic scales of ±5 nT, ±10 nT, ±20 nT, ±50 nT and ±100 nT.




*2. Map of the geomagnetic survey area, including grey-scale image with a dynamic scale of ±10 nT (nanotesla) and dipole anomalies (modern iron).*

very steep slopes or areas of high stone density. In these areas it was impossible to achieve the continuous perpendicular direction of the sensors needed for gradiometer measurements. Tilted sensors cause 'stripes' in the magnetic data. Furthermore, the array was carried at different heights over the ground depending on the topographic gradient. The presence of stone fragments on the ground surface also influences data quality. Despite these complicating circumstances, there are numerous clear anomalies in the geomagnetic data which are indicative of archaeological features. This is because of the care taken during the survey to record long profiles on substantial connected areas. The data show that steep slopes and the 'ridges' of the terrace system correlate with elongated positive anomalies in the geomagnetic data. As for the linear negative anomalies, the fact that both surface and subsurface structures are displayed in the data should be taken into account.

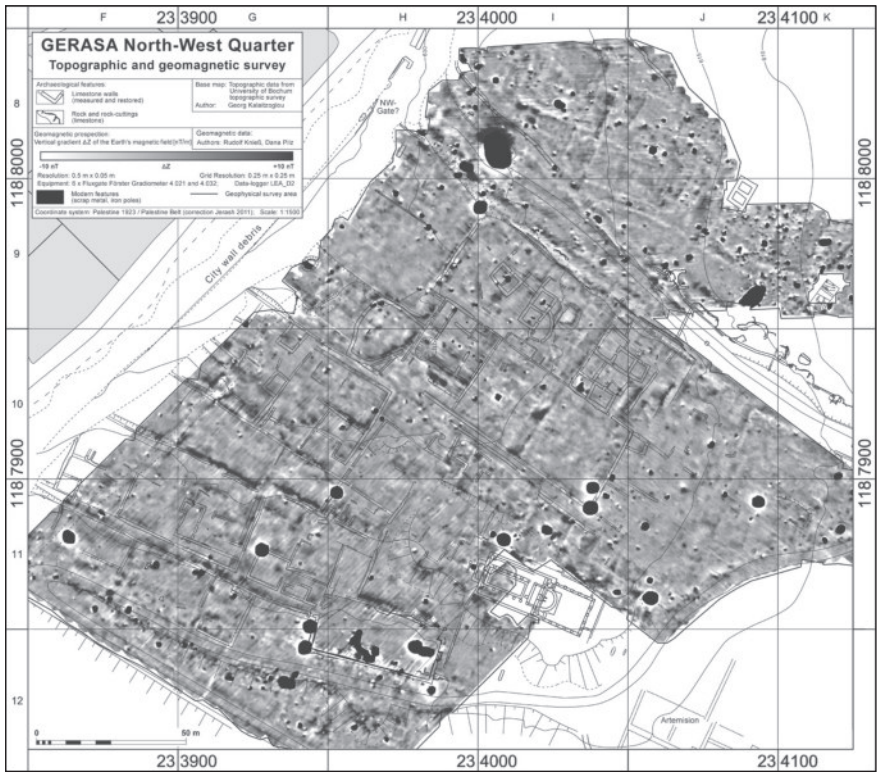
An attempt at archaeological interpretation was made on the basis of the grey-scale plots (**Fig. 3**). By including co-ordinates of visible surface structures, the interpretation can be refined further; even weak anomalies might indicate archaeological features. Owing to the complex ground conditions and presence of surface stones, only obvious structures were marked. These are shown at **Fig. 7**. With the exception of near-surface metal objects, the present interpretation distinguishes between two types of anomalies:

(1) Dark grey, *viz*. negative anomalies with amplitudes between –5 nT and –20 nT. These tend to represent linear features like walls or stone settings, but can also point to single stones. Negative anomalies are caused by diamagnetic and paramagnetic materials like limestone, which is the primary building material in this region.

(2) Light grey, *viz*. positive anomalies with amplitudes between +5 nT and +20 nT. These probably indicate pit and / or ditch fills, or backfills associated with collapse. In the southern part of the survey area these anomalies highlight the terrace system and also indicate steps in the terrain.

**Ground Penetrating Radar (GPR)**

Ground penetrating radar (GPR) works by projecting high frequency electromagnetic waves into the ground. The waves are reflected and refracted by different layers and features such as stones and walls. Analysing differences



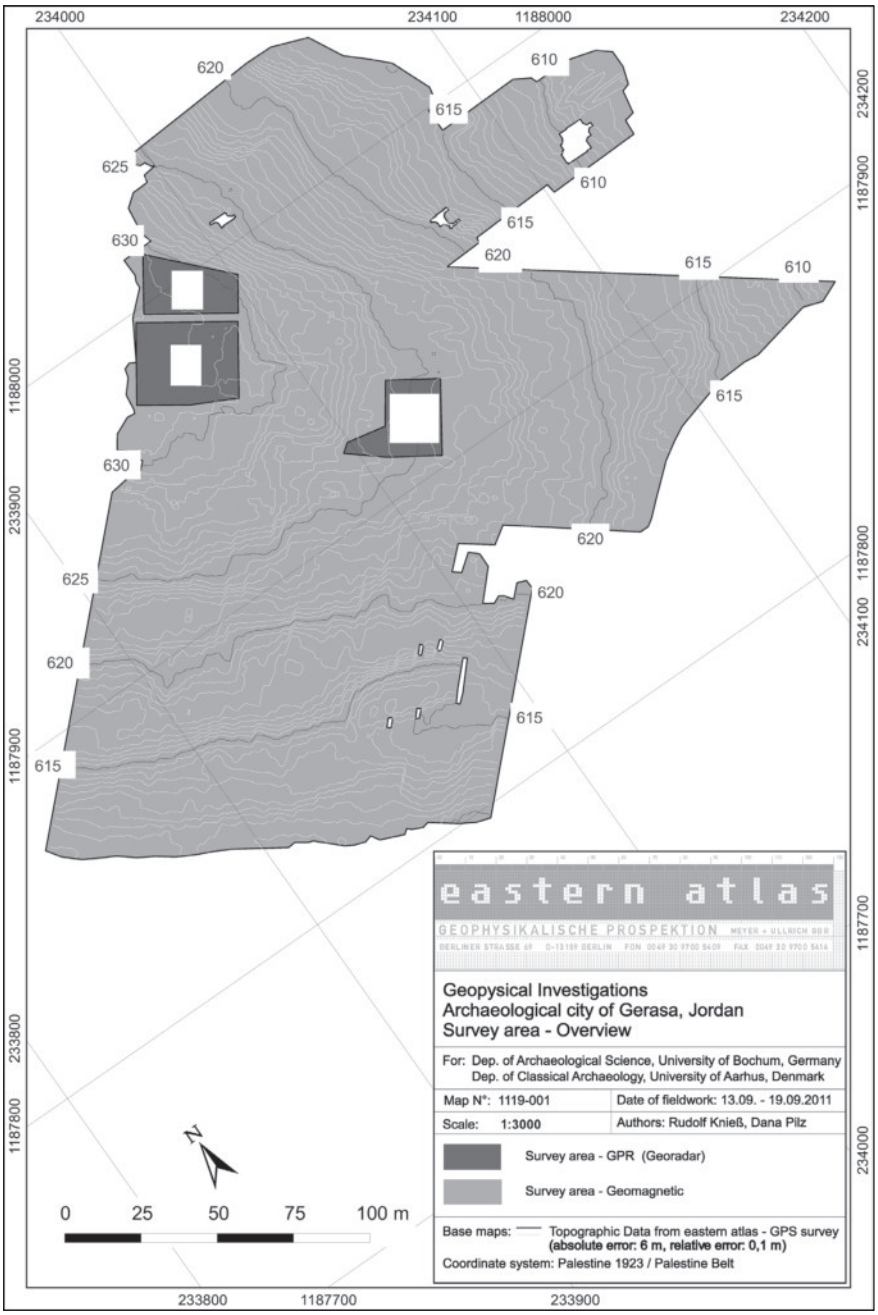

*3. Map of the geomagnetic survey area, including grey-scale image with a dynamic scale of ±10 nT (nanotesla), dipole anomalies (modern iron) and topographic features.*

in the travel time and amplitude of the electromagnetic waves gives information about the position, depth and specific properties of buried objects and layers. Spherical resolution and depth of penetration depend on the GPR antenna's frequency and the electromagnetic properties of the ground. As a rule of thumb, higher frequencies give better spherical resolution, but reduced ground penetration. At Jarash, an SIR-3000 GPR system with a 270 MHz antenna was used. Owing to soil conditions, the electromagnetic waves did not penetrate deeply and retained only minor reflections. Nevertheless, GPR was used at three small sites where geomagnetic data showed only a few archaeological features. The chosen fields were the flattest in the survey area and had comparatively few stones on the surface. The location of the GPR investigation areas within the geomagnetic survey area can be seen at **Fig. 4**.

For presentation and interpretation, the GPR data (vertical profiles) were converted to horizontal sections, i.e. so-called time slices. The data are displayed at three depth levels. Each section represents a time interval of 10 ns (two-way transit time). The physical layer thickness of *ca.* 0.50m results from an estimation of the average electromagnetic wave propagation velocity of v = 0.10 m/ns. This estimate of velocity is based on an analysis of reflection signals in the data and soil characteristics found on the site. The horizontal sections show the distribution of reflective objects and structures at different depths. Highly reflective structures such as fills or stones appear in black.

*Results*

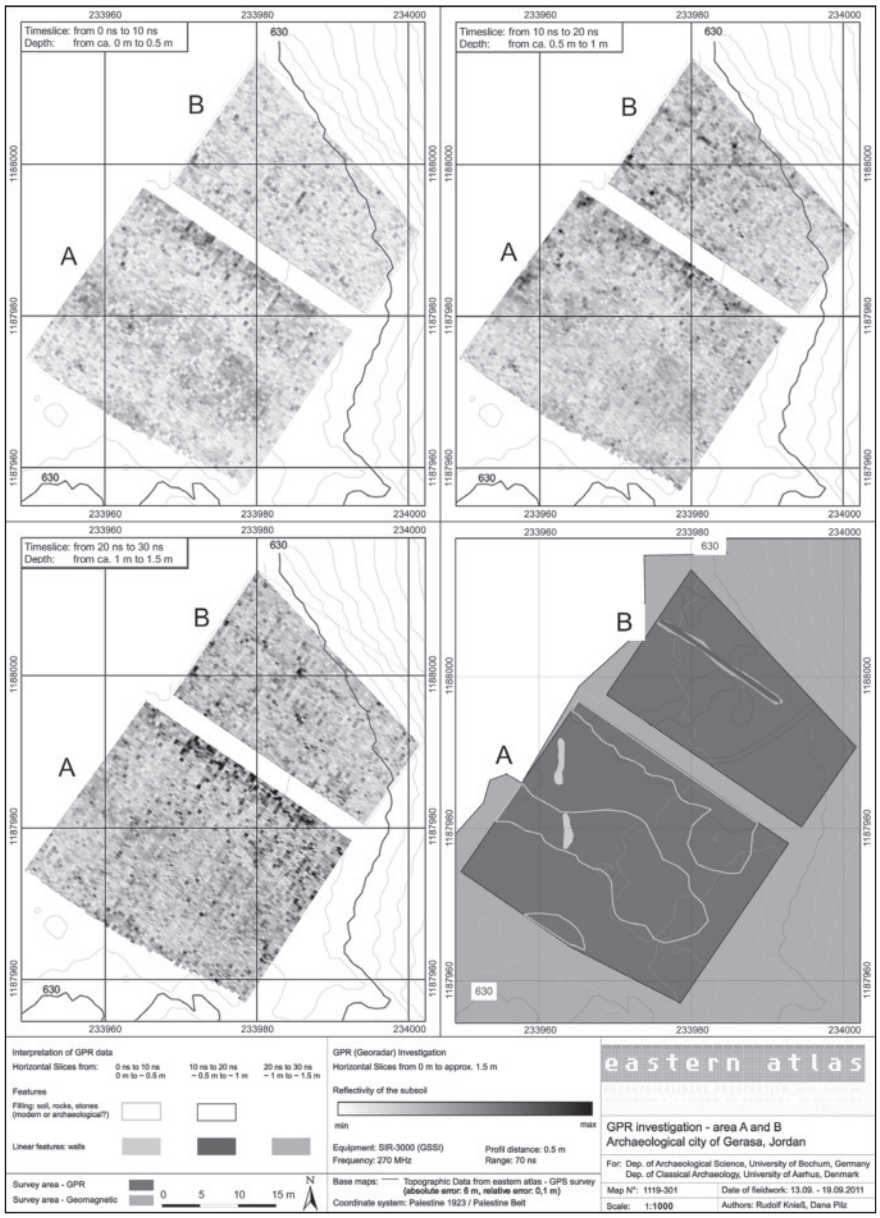
The GPR data are displayed in three depth levels from 0 m to a maximum depth of 1.5m, representing layers of 50cm thickness. The time slices and interpretation are found at **Fig. 5** for Areas A and B and **Fig. 6** for Area CD. Owing to the ground surface conditions, only small areas could be investigated by GPR. The electromagnetic characteristics of the archaeological features were akin to the soil, so their identification was nearly impossible. Stone fragments on the surface cause small black dots (marking areas of high reflectivity) to appear in the uppermost time slice of all investigated sites. This is due to antenna uplift being expressed as a multiple reflection. Additionally, it should be noted that the geomagnetic data display little evidence for archaeological features in the GPR areas.




*4. Geophysical survey area: overview with the georadar (GPR) areas.*

In Areas A and B, only weak, fuzzy differentiations of electromagnetic reflectivity can be determined. These most likely relate to modern fills, but this needs to be verified. Some weak linear indications may relate to walls. Area CD displays relevant reflection signals only between the depths of 0.5m and 1m. Two linear features are present, which correlate well with geomagnetic anomalies. These features possibly relate to walls or street structures. Less defined fuzzy areas were also noticeable and most likely relate to areas of debris fills.

The GPR data are not as clear and interpretable as the geomagnetic results. The soil conditions did not allow the electromagnetic waves to penetrate to sufficient depth and the physical properties of the structures of interest did not differ from the properties of the surrounding soil. Nevertheless, some linear features characterised by higher reflectivity were found in all three investigated areas, which may indicate stone settings or walls. In Area CD, they accord with the

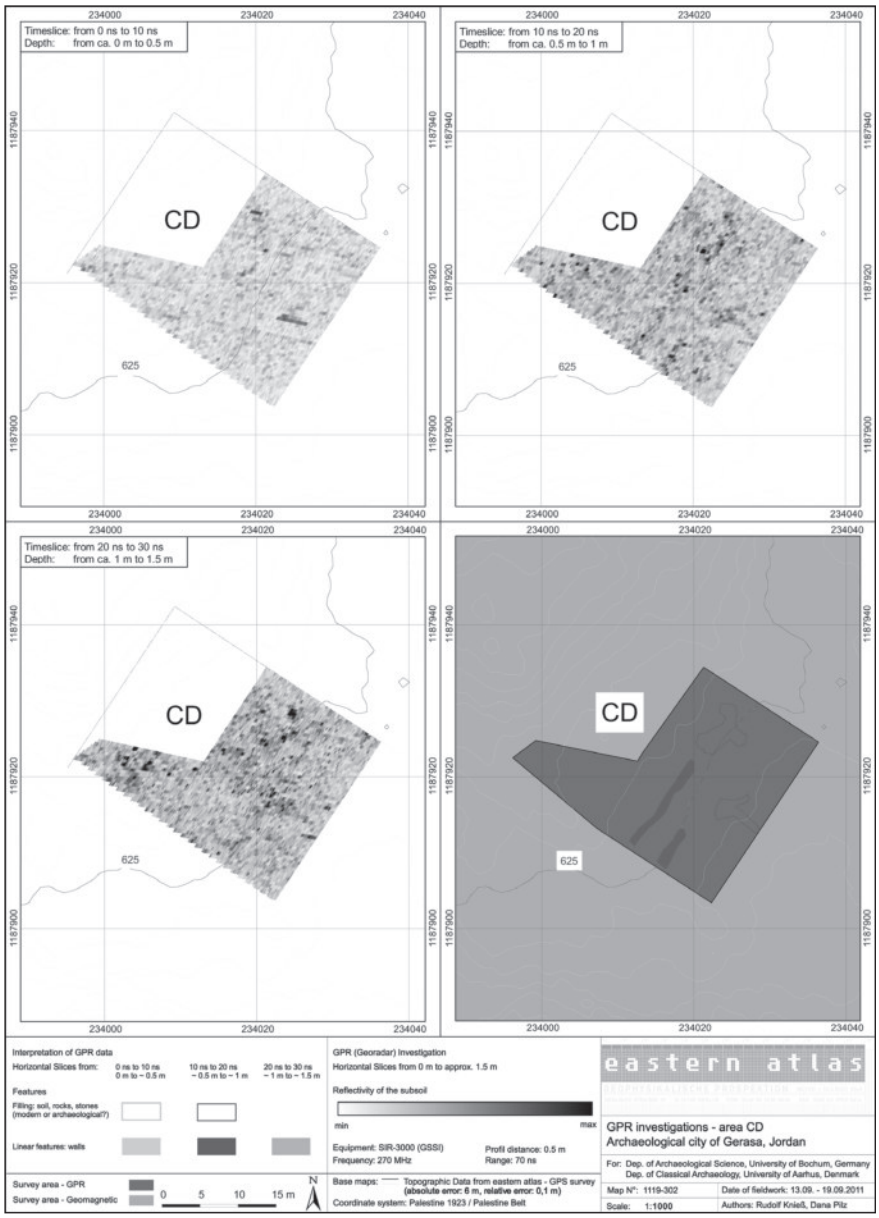



*5. GPR investigation: areas A and B.*

geomagnetic anomalies, whereas in Areas A and B they accord neither with the magnetic anomalies, nor with surface features. Finally, zones of debris fill – most likely of modern origin – were found in the GPR survey areas.

**Archaeological Interpretation**

The archaeological interpretation must be undertaken with due caution, because some effects (e.g. those produced by drainage systems or clay water-pipes) cannot yet be sufficiently differentiated. On the other hand, it is evident that pottery leaves distinct anomalies, as can be seen at **Fig. 7** (squares F-10 and G-10). There, the bulldozed soil located parallel to the track leading up the hill is full of pottery and gives a strong positive reflection. Although the magnetograms (**Figs. 2** and **3**) show several more anomalies, which seem to correlate with architectural structures, more precise interpretation will require further archaeological investigation. Comparison between the structures visible on the surface and the results of the geomagnetic survey is therefore based only on the most clearly defined features (**Fig. 7**) and focuses on methodologically relevant observations. For a better understanding of **Figs. 3, 7** and **8**, the surface structures measured by tachymeter are illustrated in black outline only.



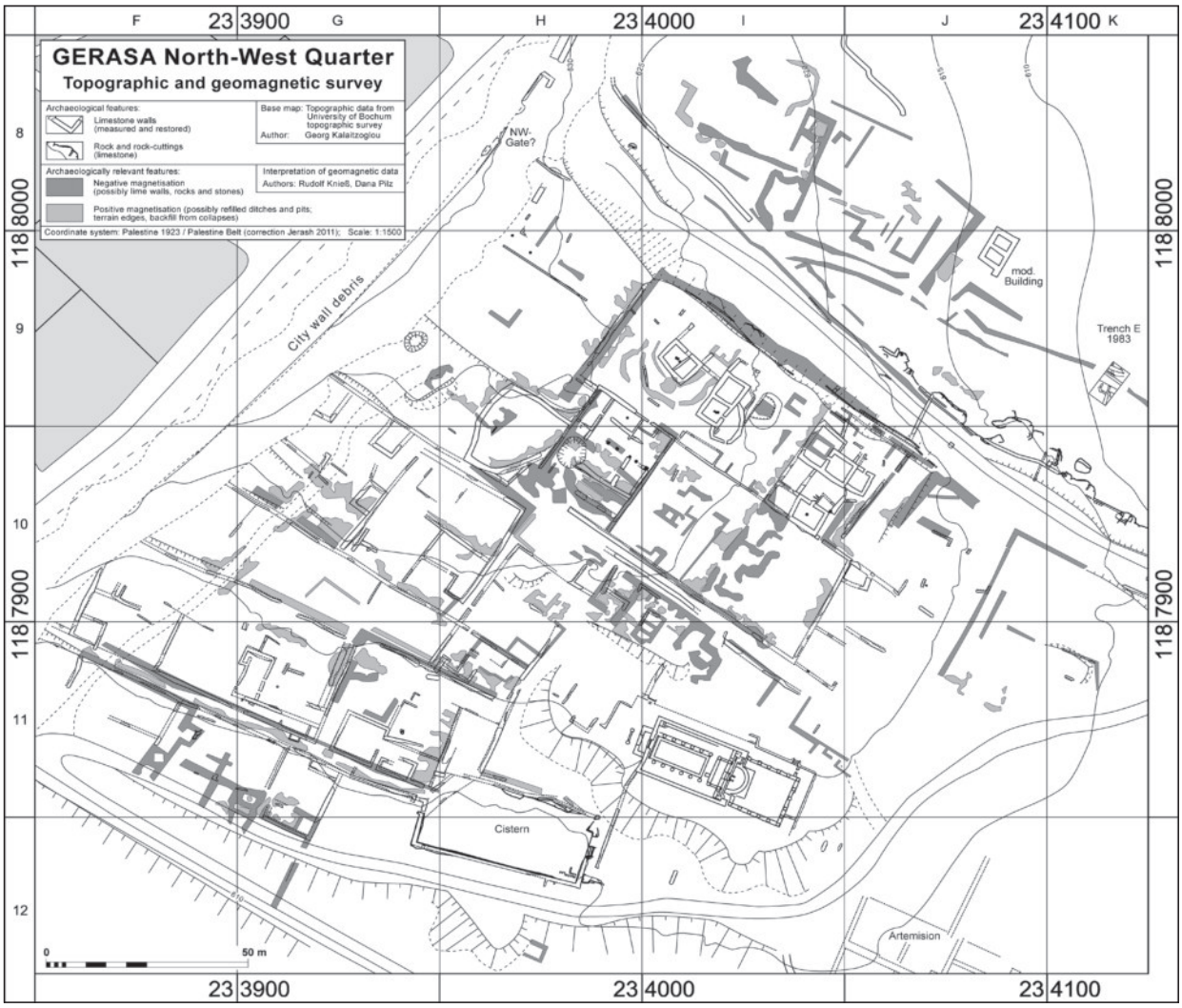

*6. GPR investigation: area CD.*

*Negative Conclusions*

Limited or negative conclusions are few and can be minimised with a combination of geodetic measurement and geomagnetic survey. Topographic effects are recognisable in the southern part of square G-10 (**Fig. 7**), as well as further to the south and south-west where a few anomalies occur between terraces as a result of the steep slope. The same is true for the eastern half of square H-11, where none of the measured walls and structures could be detected west of the Synagogue Church. Even the edges of the rock-cut cistern further south failed to yield a distinct anomaly. On the terrace north of the South Road (**Fig. 7**; squares F-10 / 11 to H-11), only a few anomalies – mostly fills or wall debris – were identified.

Even the low cliff behind the modern dirt road at the northern limit of the north-west quarter of the site yielded no coherent anomalies (**Fig. 7**; squares I-9 to K-10). As for the northern limit of the uppermost building terrace (**Fig. 7**; square I-9), there doesn't appear to be sufficient differentiation between the natural rock and the narrow retaining walls that could be measured with the tachymeter. In this area, the magnetogram displays only a clear linear anomaly.

In sum, the magnetograms display only por-




*7. Topographic map of the north-west quarter with the clearest geomagnetic features.*

tions of the walls and buildings preserved on the ground surface. This appears to be the result of low magnetic contrast caused by a lack of surrounding soil. In combination with terrestrial measurements, this could be assessed as a positive effect because the geomagnetic survey shows mainly subsurface features.

*Positive Conclusions*

In multiple areas, the results of the geomagnetic survey have aided completion of our surface plans. The geomagnetic survey filled some gaps in the terrace walls and, most importantly, identified previously unknown subsurface structures (cf. **Fig. 7**). Some of the main results are presented below.

In addition to the late Antique / early Islamic houses visible on the north terrace of the summit, some structures and obvious fills are visible both underneath and beside them (**Fig. 7**; square I-9). The structures on the same terrace with a north-east - south-west orientation probably belong to an older terrace layout (**Fig. 7**; square I-10). It is clear that these structures are situated underneath the late Antique / early Islamic houses, as they only partly correspond to the terrace layout. The distinct negative anomaly in a robbed pit on the north terrace (**Fig. 7**; southern end of square I-9) is most probably caused by a great monolithic altar of igneous rock lying within it[3]. Just to the north-east, a small room is recognisable which was not visible before and must therefore

3. Cf. fig. 8 in Lichtenberger and Raja (this volume).


*8. Satellite photo (Google Maps), showing Fig. 6 and the supposed course of the North Decumanus.*

be associated with an older terrace layout.

Under the so-called Ionic Building (**Fig. 7**; north-east corner of square H-10), massive substructures occur giving an impression of the original ground plan of this building. This area will be investigated during the 2012 season. It was a great surprise that the large courtyard to the south-east (**Fig. 7**; square I-10) contains structures of a different kind, as well as a possible street leading from the northern to the southern extents of the upper building terrace. This demonstrates that the layout of this terrace was altered more than once in its history. Not known before, as it was not visible on the ground surface, is a row of smaller and larger rooms behind a street lying to the south of the great rectangular courtyard (**Fig. 7**; squares H-10 and I-11). The series of rooms and houses continue along the street towards the east. This demonstrates that the hill was not completely covered with parallel terraces, but that the terraces followed the topography along its southern flanks and were reduced in size at their eastern ends.

At the eastern end of the hilltop, which is today littered with stones and debris that give no indication of ancient structures, interpretation of the magnetic features revealed another large terrace with sharp contours around the point where squares J / K-10 and 11 intersect. At the other end, near the ancient city wall, one can see the corner of a building under a recent football pitch (**Fig. 7**; square H-9). This structure, which is not visible on the ground surface and was not detected by GPR (cf. **Fig. 5**), is preserved under modern backfill; it will be explored during the 2012 season.

On the southern hill slope, the anomalies confirm the location of terrace walls and the retaining walls of the South Road. Further south (**Fig. 7**; squares F-11 and G-11), the geomagnetic survey gives a detailed impression of subsurface structures which can easily be interpreted as walls and rooms. These serve to complete the architectural plan of this terrace and also confirm that the terrace system does not end at the level of the modern dirt road[4].

At the northern edge of the summit, parallel to the modern dirt road, a long and narrow anom-

4. Cf. the wall in square G-12 (**Fig. 7**) leading down the hill; the southern hill slope was evidently completely built over with terraces.

aly was detected. This is the southern retaining wall of the main road used in modern times to enter the city area from the north-west[5]. While its southern retaining wall gives a clear reflection, the northern part does not - although it was measurable by tachymeter. The area immediately north of this road was only partly investigated in 2011. However, it already seems clear that this area was of great importance to the general character of the north-west district, because one of the main axes, *viz*. the North Decumanus, must have been located in this area. North of the modern dirt road, in the depression below the rocky ridge, two parallel anomalies with positive magnetisation lead in a smooth curve from east to west (**Fig. 7**; squares I-9 to K-9). These give the impression of a broad street, which in this area might be the North Decumanus. The unsurveyed area (cf. **Figs. 2** and **3**) marks Trench E, which was excavated in 1983 by an American - British team (Clark. and Bowsher 1986: 343-345, figs.1-3 and pl. I) and measured 5 to 10m. Although this trench reached bedrock 3.8-4.5m below the ground surface and yielded some walls and two columns (**Fig. 7**; square K-9)[6], the excavators did not believe they had found the remains of the North Decumanus. They assumed that the street would not follow a straight line from the North Tetrapylon to the North-West Gate and from the condition of the bedrock surface concluded that it had never been paved with stone (Clark and Bowsher1986: 345).

The excavations at the North Tetrapylon demonstrate that the Tetrapylon, Cardo and North Decumanus are not regularly arranged in relation to each other (Ball *et al*. 1986: 372, fig. 11). If the North Decumanus followed a straight line it must have crossed Trench E, as can be seen in **Fig. 8**. Only the northern edge of its course seems to correspond with some of the anomalies; it would cross the curving course of the thin parallel lines, which might therefore represent a more recent street at a higher level. However, the Decumanus would then have crossed some of the rock edges, which is less plausible. If the narrow line crossing Trench E can be identified with the narrow excavated wall, it would mean that the geomagnetic survey reached a depth of 3.2-3.4m below the ground surface (*ca.* 0.6-0.9m above bedrock), which would be surprising. In order to solve the question of whether the course of the North Decumanus takes both topography and rock formation into account, it will be necessary to ascertain the exact position – as yet unknown – of the north-west gate.

**Acknowledgements**

The team was supported by members of the Department of Antiquities throughout the season. We would like to thank Acting Director General, Fares A.K. Hmoud, for facilitating our work at Jarash in 2011. We would also like to thank Ahmed Shami and Akram Aiktoum from the Jarash Antiquities Department who supported us both scientifically and logistically. Our work was greatly facilitated by the kind support of Abdel Majjid Mjely and residence in the Archaeologists' Camp. We would also like to thank Jihad Haroun and Khalil Hamdan for friendly and professional advice and guidance. We would like to note that the German Protestant Institute of Archaeology in Amman provided considerable help; in particular, we would like to thank Dieter Vieweger, Jutta Häser and Nadia Shuqair. Finally, we would like to thank Louise Blanke, Thomas Lepaon, Jacques Seigne, Alan Walmsley and Thomas Weber for assisting us before, during and after the season.

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5. Cf. fig. 3 (BayHSTA BS-Palästina 1129a) in Lichtenberger and Raja (this volume).
6. For the time being it has only been possible to locate Trench E approximately on the plan; new mapping is planned for the 2012 season.

# ARCHAEOLOGICAL SURVEY FOR THE RED SEA DEAD SEA CONVEYANCE STUDY

*Isabelle Ruben and Eveline van der Steen*

Jordan, in common with most countries of the Near East, is facing an acute water problem. A rising population and the increased use of sweet water is depleting rivers and aquifers alike. One consequence has been the rapidly declining level of the Dead Sea, which threatens the long-term viability of both tourism and agriculture in the region. This problem is not new and various solutions for the problem have been suggested over the past 50 years.

In 2007 the World Bank, in co-operation with the governments of Jordan and Israel, and the Palestinian Authority, agreed to support a Study Program to investigate the viability of building a conduit to convey water from the Red Sea to the Dead Sea.

**Purpose of the RSDSC**

The overall purpose of the Red Sea Dead Sea Conveyance (RSDSC) is to take seawater from the Red Sea and carry it north to the Dead Sea basin. The water would then be used to restore the water level in the Dead Sea and, after desalination, to supply potable water to Jordan, Israel and the Palestinian Authority.

An intake would be established in the Gulf of ʾAqaba from which seawater would be conveyed along the Wādī ʿArabah. The conveyance would be either a tunnel through the hills to the east, a tunnel and open channel, or a buried pipeline along the valley floor. All three alignments lie entirely within Jordanian territory. The conveyance would carry the seawater for around 200km northwards and terminate just south of the evaporation ponds which now constitute the southern basin of the Dead Sea.

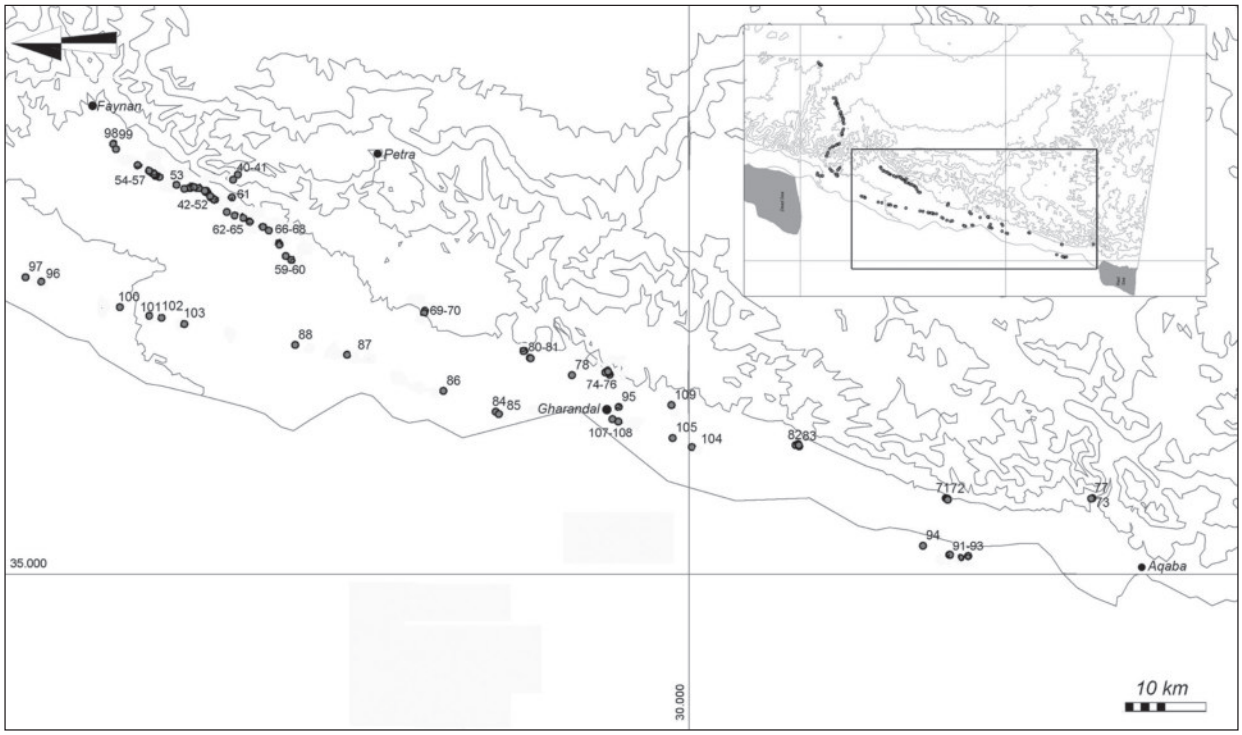
Freshwater conveyances would be constructed to take the potable water for Jordan from the desalination plant in the Dead Sea basin through the Ṭafīlah highlands to the southern outskirts of ʿAmmān.

As part of the overall environmental and social impact assessment for the RSDSC feasibility study, an archaeological survey of the areas that would potentially be affected was carried out in December 2009 and February and March 2010. This survey was conducted under the auspices of a consortium managed by the World Bank on behalf of the governments of Jordan and Israel, and the Palestine Authority, led by ERM, BRL and EcoConsult. The archaeological field survey in Jordan was carried out with the co-operation of the Jordanian Department of Antiquities (DoA), by the authors of this report, the invaluable DoA surveyors Jamal Safi and Tawfiq Huneiti, and additional team members from the DoA: Jihad Darwish, Sate Masadeh and Abdullah Rawashdeh. We are extremely grateful to the late Dr Khraysheh and to Dr Harahsheh and the DoA for their support and for providing the help of such an excellent team to carry out the survey.

**Area Covered by Survey**

The geographical extent of this project runs from the Gulf of ʿAqaba, along the entire length of the Wādī ʿArabah, to the southern end of the Dead Sea basin, and from there up through the Ṭafīlah highlands as far as al-Ḥasā (see **Figs. 1-2**).

This survey set out to cover as much ground as possible along the proposed routes of the RSDSC scheme, as conceptualised in the initial studies. On the ground, this meant attempting to




*1. Map of sites found in the Wādī ʻArabah.*


*2. Map of sites found in the Ṭafīlah highlands.*

look at all the areas that would be affected by each of the three possible schemes:

(1) A pipeline for sea water running more or less in the bottom of the Wādī ʻArabah near the border between Jordan and Israel, between Aqaba and the south end of the Dead Sea basin;

(2) Access points for tunnels running through

the lower part of the mountains forming the eastern margin of the Wādī ʻArabah;
(3) Two canal sections along the eastern margin of the Wādī ʻArabah;
(4) A sea water intake and pumping station in the ʼAqaba region;
(5) Sites for desalination and hydroelectricity plants, south of Fīfā;
(6) A pipeline route for sweet water from just south of the Dead Sea basin, through the Ṭafīlah highlands, to join the Desert Highway roughly at al-Ḥasā.

Some stretches were not surveyed: in the mountainous area they were mainly those isolated places that were too time-consuming to reach, or too steep to walk; in the Wādī ʻArabah, they were mainly areas of continuous dunes and the large mudflats. One of the options, for a pipeline along the bottom of the Wādī ʻArabah, runs very close to the Jordan / Israel border, and in order to access this alignment arrangements were made with the military authorities.

**Methodology**

*Survey Techniques*

In order to cover this vast area in the limited time available, one of the following survey techniques was adopted depending on the terrain and the ʻshapeʼ of the area to be covered:

(1) Systematic walk-over survey;
(2) Drive-over survey;
(3) Targeted sample survey.

The ʻshapeʼ of the areas to be covered consisted of either a long narrow right of way for the proposed 220m canals and pipeline conveyances, or blocks of land designated as sites for construction of various elements of the scheme (e.g. the pumping station, desalination plant etc.). The locations of work camps around tunnel access points were less clearly defined, and therefore the general area surrounding these points was inspected.

The long narrow stretches were walked with three to five people spaced, on average, 20m apart, thus covering a corridor of 80-100m. The blocks of land were sampled either by systematic walkover (when flat) or by targeted walkovers (in hilly or steep mountainous areas), also with between three and five people. In all cases, visibility of the ground surface was excellent.

*Site Recording*

Owing to time constraints, all sites found were rapidly recorded and photographed, but no artefacts were collected. Each site was located using a Trimble and a Garmin GPS; the site size was roughly estimated, its topographic location, present condition and, of course, details of the site type and what it contained were all recorded in the field. Where possible field identification of the pottery or flints was made in order to date them. Some items were photographed, and later shown to experts in the appropriate field, in order to confirm these field identifications. All this information was integrated into a project database.

All across the landscape there are many individual and small groups of stone piles that are usually assumed to represent graves. It was decided that groups of one to three graves would be recorded simply as a grave location, with minimal details (GPS location and some further details), whereas groups of four or more graves would be recorded as a cemetery site. This methodology was developed during the course of the survey, so that for the first two weeks (that is along the eastern and western ends of the eastern sweetwater conveyance line, between Ghawr Fīfā and al-Ḥasā) these individual graves were not recorded.

**Results**

A total of 137 new sites and 69 individual graves were located by the survey. They cover all periods and many types of sites, ranging from flint and sherd scatters, stone circles and enclosures to towers and agricultural installations, and many cemeteries. This project had the privilege of gaining access, with military permission and escort, to areas along the border in the bottom of the Wādī ʻArabah, an area that has never been surveyed systematically. Given the hot and difficult landscape it is interesting to note that there are a surprising number of sites, albeit small ones.

The majority of sites in the Wādī ʻArabah were graves and cemeteries, but some interesting enclosures were found, some in unlikely places, as well as some small groups of structures, ancient campsites with fireplaces, prehistoric flint quarry sites and concentrations, and two small Roman towers. Generally there was a very low or no background scatter of flints and virtually

none of pottery.

The sites in the mountains and hills from Ghawr Fīfā, across the Ṭafīlah highlands, and east towards al-Ḥasā were more varied and, as well as cemeteries, graves and enclosures, there were stone circles, agricultural sites, caves and rock shelters, and track ways. In the settled and agricultural highlands there was a relatively high level of background pottery sherds, mostly from the Classical period and earlier, and in the eastern steppelands, around Wādī al-Ḥasā, there was a background scatter of flints in many areas.

If and when the RSDSC scheme goes ahead, each of the sites recorded by this survey that lie within its path will need to be revisited, fully documented and excavated as necessary. If the alignments of the scheme are different from those that were surveyed, then the new alignments will need to be surveyed.

The catalogue of the sites recorded by the survey is presented below. The complete database for this survey is archived at the DoA.

The two maps (one for the Wādī ‘Arabah [**Fig. 1**] and the other for the highlands [**Fig. 2**]) show the numbered sites on a simple contour map of the area.

*Summary of Sites Found*

The sites are presented in the order in which they were found during the survey. Each site number is followed by UTM zone 36 co-ordinates and then the elevation in metres above or below sea level.

Site 1
E 0782673 N 03423092. 909m
Stone circle / enclosure, *ca.* 10x20m, open on one side, on a gentle sideslope. One stone high, one stone wide; partially cleared of stones inside. Small ‘wall’ projecting westwards. Flints in area around, probably Palaeolithic.
Site condition: Poor
Survey area: Fīfā to al-Ḥasā line

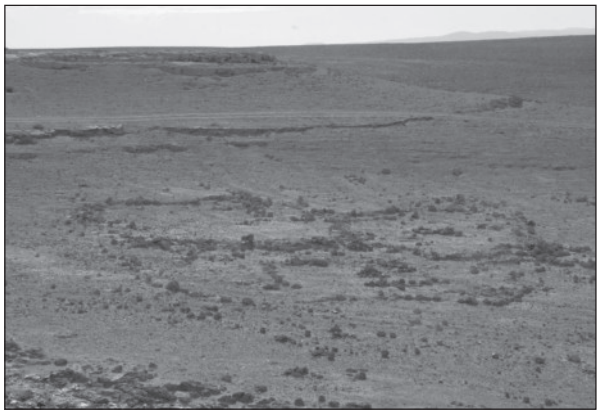
Site 2
E 0782562 N 3422929. 898m
Enclosure, roughly rectangular, *ca.* 21x18m, on a gentle hill slope. Wall made of basalt and limestone boulders 1 to 2 courses high. Inside is cleared of stones and there is a small stone ‘platform’ inside. A few flints and a few sherds found in area.
Site condition: Good
Survey area: Fīfā to al-Ḥasā line

Site 3
E 0782184 N 3422381. 960m
Cemetery of 15-20 scattered small graves across a hilltop. Graves made of large local limestone boulders, one stone high; roughly oval.
Site condition: Reasonable
Survey area: Fīfā to al-Ḥasā line

Site 4
E 0782019 N 3422011. 933m
Sub-rectangular enclosure near head of *wādī*, *ca.* 35x18m, on a gentle slope; about four internal divisions and some internal features (e.g. small, square wall). Made of single stone walls, one course high. A few flints and a few sherds found in area.
Site condition: Good
Survey area: Fīfā to al-Ḥasā line
**FIG. 3**: Site 4

Site 5
E 0782490 N 3422223. 905m
Tumbled, rectangular tower, roughly 6x4m, surviving to a maximum of four courses high (*ca.* 1.5m high) on north and west sides. It is surrounded by a low external wall measuring *ca.* 12x10m. Situated on a hilltop ‘nose’, there are good views all round. Probably Roman.
Site condition: Reasonable
Survey area: Fīfā to al-Ḥasā line
**Fig. 4**: Site 5

Site 6
E 0783431 N 3423498. 893m



*3. Site 4: enclosure with internal divisions.*

*4. Site 5: remains of a rectangular tower.*

Structure, *ca.* 2.5x2m, on an open plateau, one course high with possible entrance, and with fragments of column. A few sherds around.
Site condition: Poor, robbed
Survey area: Fīfā to al-Ḥasā line

Site 7
E 0765614 N 3413396. 1116m
Thin lithic scatter on flat hilltop, probably Palaeolithic, but also found a fan scraper, so could go to as late as EB. On gentle slope below is a large cemetery of unknown date consisting of a scatter of at least 80 graves spread across more than 100m; these are small round stone piles (1 to 1.5m diameter).
Survey area: Fīfā to al-Ḥasā line

Site 8
E 0764869 N 3413066. 1095m
Hilltop cemetery with 2 large graves, *ca.* 2m in diameter with a high stone pile on top, of local limestone boulders, about 12m apart, and another, less well-preserved grave further away. There may be others nearby. There is the ubiquitous flint scatter across this site and the general landscape around. Some Roman / Byzantine sherds were also found.
Site condition: Good
Survey area: Fīfā to al-Ḥasā line

Site 9
E 0764624 N 3412829. 1146m
D-shaped enclosure on hill slope 'nose', *ca.* 8x7m, with one side disappeared. Made of a single line of upright fossiliferous limestone slabs (many are slumped over). Background scatter of flints and some Roman / Byzantine sherds, which may or may not be associated with the enclosure.
Site condition: Good
Survey area: Fīfā to al-Ḥasā line

Site 10
E 0764209 N 3412756. 1157m
Small cemetery, on a hilltop saddle, with 4-6 scattered graves of local boulders at ground level. One is oval, about 2m long and oriented east - west, the others are more rounded. These could be recent burials.
Site condition: Good
Survey area: Fīfā to al-Ḥasā line

Site 11
E 0763544 N 3412796. 1150m
Small, probably square tower, *ca.* 3x3m, standing on a hilltop about 2m to the east of long wall (site 12) that forms one stretch of the Khaṭṭ Shabīb. Only one course of one wall remains, of roughly hewn rectangular blocks of local limestone for a length of *ca.* 3m. The few sherds around the tower are Roman / Byzantine, but cannot really be directly associated with it.
Site condition: Poor
Survey area: Fīfā to al-Ḥasā line

Site 12
E 0763634 N 3412588. 1153m
Long wall, visible for several kilometres, meandering across the landscape, often on ridge tops. This is one stretch of the wall known as Khaṭṭ Shabīb. Made of limestone boulders, mostly spread across a width of about 2-3m.
Site condition: Reasonable
Survey area: Fīfā to al-Ḥasā line

Site 13
E 0767144 N 3413976. 1081m
Rectangular enclosure, *ca.* 18x16m, on a hill slope beside a shallow *wadi*, with small rectangular 'room' in north-east corner that has two newer graves in it. Enclosure walls are tumbled and not complete. Background scatter of flints and a few sherds found.
Site condition: Poor
Survey area: Fīfā to al-Ḥasā line

Site 14
E 0766427 N 3413553. 1095m

*5. Site 17: natural rounded boulders forming the sides of a channel.*

Squarish structure, *ca.* 1.6x1.1m, on a hill slope; made of large limestone blocks (roughly dressed); completely robbed out. Down slope and 20m away is a short wall, *ca.* 8m long, made of upright limestone slabs that might be part of an enclosure. Background scatter of flints and a few sherds found.
Site condition: Poor, robbed.
Survey area: Fīfā to al-Ḥasā line

Site 15
E 0762220 N 3411985. 1173m
Hilltop site consisting of three large, robbed stone piles. One is probably a grave, completely robbed out, *ca.* 4x2m, made of limestone blocks. The second is a strange, round structure, external diameter *ca.* 7x6m, made of roughly dressed limestone blocks. It has been robbed out to reveal three courses of blocks and a slightly curved wall of blocks across the middle of the circle. 8m to the east is a robbed out and destroyed circular stone grave with a central rectangular cist. A few sherds found in area.
Site condition: Poor
Survey area: Fīfā to al-Ḥasā line

Site 16
E 0731884 N 3422734. -310m
Long, winding channel located in the flat, sandy bottom of the Dead Sea basin. Made of rounded boulders about 30-40cm wide. Width of channel itself is about 50cm. Mostly sanded up, but in a few places it seems that there is old mortar between the stones. Probably a relatively recent water channel system, to which site 17 must also belong.
Site condition: Reasonable
Survey area: Dead Sea basin

Site 17
E 0731057 N 3422895. -379m
Long, winding channel located in the flat, sandy bottom of the Dead Sea basin. Made of rounded boulders about 30-40cm wide. Width of channel itself is about *ca.* 30-40cm. Mostly sanded up, but in a few places it seems that there is old mortar between the stones. Probably a relatively recent water channel system to which site 16 must also belong.
Site condition: Reasonable
Survey area: Dead Sea basin
**Fig. 5**: Site 17

Site 18
E 0743364 N 3416557. 896m
Stretch of road / trackway on a hill slope defined by two parallel walls of tumbled stones about 1 m wide each. Road varies between 2 and 3 m wide between the walls. No sign of metalling or other road surface, just some stone clearance. Visible for a length of about 300m; destroyed at each end. There are no other visible traces of it here.
Site condition: Good
Survey area: Fīfā to al-Ḥasā line
**Fig. 6**: Site 18

Site 19
E 0741703 N 3417319. 850m
Structures on a hilltop covering an area of about 50x30m, but completely destroyed by bulldozer. Remains of large limestone boulders can be seen, a few look like they are still in line, form-

*6. Site 18: an ancient road or track.*

ing a wall. A few sherds, Classical and perhaps Iron Age.
Site condition: Destroyed
Survey area: Fīfā to al-Ḥasā line

Site 20
E 0741008 N 3417555. 693m
A series of small rock shelters and one cave (about 5x4m) on a ledge on a steep hillside, below a low cliff. In front of these is a modern wall then a flat area defined by an old wall made of limestone boulders. The cave is full of layers of sheep dung. There are a few sherds.
Site condition: Good
Survey area: Fīfā to al-Ḥasā line

Site 21
E 0739915 N 3418113. 412m
Small pottery concentration beside a shallow *wadi*, below a low cliff. Two types of pottery found: one hand-made red with incised criss-cross pattern, the other buff wheel-made large (water?) jar. Classical and Islamic date. This site might represent a temporary camp below the nearby track, site 22.
Site condition: n/a
Survey area: Fīfā to al-Ḥasā line

Site 22 A, B, C and D
E 0739975 N 3418263. 413m
Track winding across the hillside, about 1m wide. Can be followed for about 300m. Some sherds of Roman / Byzantine pottery found.
Site condition: Poor
Survey area: Fīfā to al-Ḥasā line

Site 23
E 0739801 N 3418118. 375m
Oval tumulus or grave, *ca.* 3x4m, on a flat area, with sherd scatter next to it. Pottery from Iron Age II and Roman period and one flint scraper.
Site condition: Poor, partly robbed
Survey area: Fīfā to al-Ḥasā line

Site 24
E 0734023 N 3416056. -40m
Circular enclosure, *ca.* 12x14m, with two small adjoining spaces on north side. Walls of boulders, *ca.* 1m wide and one or two stones high. Located on a flat area between *wadis*. Pottery was found, possibly EB IV.
Site condition: Good
Survey area: Fīfā to al-Ḥasā line

Site 25
E 0733143 N 3415280. -90m
Two small, roughly rectangular enclosures about 17m apart north - south, on a flat area between hills. The northern one, *ca.* 11x11m, has a small additional enclosure on north side, and a pile of rocks on the south side. Walls are tumbled, made of local sandstone boulders. The southern enclosure is larger, 14x14m but less well defined. Possible grave on north side. No surface finds.
Site condition: Reasonable
Survey area: Fīfā to al-Ḥasā line

Site 26
E 0732936 N 3414712. -19m
Cemetery with more than 20 graves spread across a plateau edge next to a *wadi*. Graves are mostly oval mounds of about 3x2m, some very eroded.
Site condition: Poor
Survey area: Fīfā to al-Ḥasā line

Site 27
E 0734063 N 3416140. -32m
Stone circle, one stone wide, 4x4m. On gently sloping plateau above a *wadi*.
Site condition: Poor
Survey area: Fīfā to al-Ḥasā line

Site 28
E 0731020 N 3412406. -46m
Small cemetery on a small ridge next to a *wadi* with about 13 burials, about four of which appear to be children. Oval stone piles, defined by a ring of stones, with gravel and small stones in-

side, *ca.* 2x1m and oriented east-west.
Site condition: Good
Survey area: Wādī ‘Arabah

Site 29
E 0731516 N 3412528. -40m
Cemetery, 20 or more graves spread across a flat, low area between the hills. Graves are round or oval stone piles, generally small. Roman / Byzantine pottery nearby.
Site condition: Poor
Survey area: Wādī ‘Arabah

Site 30
E 0731367 N 3412071. -49m
Small cemetery with about ten old, very disturbed graves on a small *wadi* terrace between the hills. Some Roman and possibly Byzantine pottery around.
Site condition: Poor
Survey area: Wādī ‘Arabah

Site 31
E 0731573 N 3412900. -36m
Cemetery and campsite with ten or more small, circular to oval stone heaps, widely scattered across a flat area between hills. Tent clearance patches, and pottery: possibly Chalcolithic, EB IV, IA, Roman, Byzantine and Nabataean, plus one basalt grinder fragment.
Site condition: Reasonable
Survey area: Wādī ‘Arabah

Site 32
E 0731734 N 3412266. -45m
Cemetery of two oval graves, on a narrow flat area between the hills, next to a *wadi*. Graves are low stone piles. Some Roman pottery found nearby.
Site condition: Reasonable
Survey area: Wādī ‘Arabah

Site 33
E 0734713 N 3410763. 225m
Complex of simple structures, small stone circles, graves and a sherd scatter of Roman pottery on a flat area, *ca.* 40x40m, bordered by two *wadi*s. Possible stone square 8x8m. Also a modern *bedouin* campsite that includes stone platforms. Possibly one complex with nearby site 34.
Site condition: Poor

*7. Site 34: enclosure with annexes.*

Survey area: Wādī ’Arabah

Site 34
E 0734728 N 3410716. 231m
Sub-rectangular enclosure, with internal dimensions of 11x13m, and with less well preserved annexes on north and east sides, on a flat area between hills. Wall is *ca.* 1m wide, made of large local boulders, one to three stones high. Wall seems most substantial on north side. Slightly higher than site 33, and possibly one complex with it. Roman sherds found around area.
Site condition: Good
Survey area: Wādī ‘Arabah
**Fig. 7**: Site 34

Site 35
E 0734130 N 3411234. 228m
Small sherd scatter, on a flat area next to a *wadi*. Pottery is Roman / Byzantine and Ayyubid / Mamluk. There are some possible graves.
Site condition: Poor
Survey area: Wādī ’Arabah

Site 36
E 0733580 N 3411743. 178m
Small cemetery with a few graves, one large, 3x3m with large boulders, roughly circular, with the actual grave in the middle. Robbed. Roman / Byzantine pottery around this grave and Chalcolithic pottery to the west of it. Flat area by the roadside
Site condition: Reasonable
Survey area: Wādī ’Arabah

Site 37
E 0730892 N 3412096. -68m
Two oval and two squarish graves on the slope, some stone piles and small possible walls /

structures on a *wadi* terrace and lower hill slope. Disturbed by bulldozer track. Pottery is Roman and possibly IA.
Site condition: Poor
Survey area: Wādī ʻArabah

Site 38
E 0730849 N 3411887. -88m
Thin pottery scatter on a *wadi* terrace. Sherds are Chalcolithic / EB. Site has been disturbed by a bulldozer track; modern *bedouin* camp nearby.
Site condition: Poor
Survey area: Wādī ʻArabah

Site 39
E 0730958 N 3412457. -96m
Multi-period campsite, on a large flat area next to *wadi*, with cleared patches and rock piles. Pottery is Chalcolithic, EB and Roman.
Site condition: Poor
Survey area: Wādī ʻArabah

Site 40
E 0730012 N 3375040. 282m
Small lithic and pottery scatter, on a deflated surface on the top of an outcrop. Pottery is Nabataean / Roman, also some Palaeolithic flints.
Site condition: Poor
Survey area: Wādī ʻArabah

Site 41
E 0730245 N 3374828. 305m
Small cemetery with five or six circular graves, *ca.* 2x2m, made of ring of large local boulders, one or two stones high, with centre filled with smaller stones. On boulder-strewn alluvial fan at foot of mountains.
Site condition: Good
Survey area: Wādī ʻArabah

Site 42
E 0729868 N 3376517. 194m
Small cemetery with five roughly oval graves, made of rings and piles of local boulders. On boulder-strewn alluvial fan.
Site condition: Good
Survey area: Wādī ʻArabah

Site 43
E 0729871 N 3376629. 205m
Thin pottery scatter of Roman / Byzantine sherds and one circular grave, on boulder-strewn alluvial fan.
Site condition: Good
Survey area: Wādī ʻArabah

Site 44
E 0729969 N 3376882. 205m
Five contiguous enclosures: roughly circular and terraced. Each enclosure is demarcated by a wall of local stones and is cleared of stones inside. A few surface flints and tools, probably Chalcolithic / EB. Enclosures vary from 6x6 to 10x15m. Also, just across a small *wadi* is one robbed tomb, about 1 m high and *ca.* 5 x 5 m oval with an internal chamber of upright stones, 1x1m oval. Like site 51, this is a strange place to find enclosures, in the middle of a boulder-strewn alluvial fan.
Site condition: Good
Survey area: Wādī ʻArabah

Site 45
E 0730081 N 3377051. 204m
Small cemetery with 11 graves, consisting of oval stone piles dispersed across the boulder-strewn alluvial fan.
Site condition: Good
Survey area: Wādī ʻArabah

Site 46
E 0730210 N 3377298. 203m
Small cemetery with six or seven circular stone pile graves, *ca.* 3x3m, dispersed across the boulder-strewn alluvial fan.
Site condition: Good
Survey area: Wādī ʻArabah

Site 47
E 0730655 N 3377682. 205m
Wall, curving and crossing a small *wadi* within the boulder-strewn alluvial fan. About two courses high and 20m long, made of local boulders.
Site condition: Good
Survey area: Wādī ʻArabah

Site 48
E 0730736 N 3377905. 198m
Enclosure and five or more graves. Enclosure is a C-shaped wall about 10m long, made of local

boulders, one or two courses high, tumbled. Thin sherd scatter of Chalcolithic / EB I and Classical sherds. On the boulder-strewn alluvial fan.
Site condition: Reasonable
Survey area: Wādī ʻArabah

Site 49
E 0731151 N 3378711. 114m
Small cemetery with at least six circular graves or low stone piles, about 1.5m in diameter. On the boulder-strewn alluvial fan.
Site condition: Good
Survey area: Wādī ʻArabah

Site 50
E 0731222 N 3379418. 201m
Enclosure and cemetery with 20 or more graves – small ovals, about 1x0.5m – dispersed across the boulder-strewn alluvial fan. Thin scatter of Nabataean / Roman sherds. The enclosure is roughly circular, 7x7m, made of local boulders, one or two stones high, more or less clear inside. Also a small wall nearby.
Site condition: Good
Survey area: Wādī ʻArabah

Site 51
E 0731106 N 3379896. 202m
Enclosures and a cemetery with 15 or more graves – large and small stone piles, *ca.* 2x2m and 1x 0.5m – and a thin scatter of Nabataean / Roman sherds. The enclosures are a series of four terraced enclosures in a row. Each one is about 12x20m, made of local boulder walls and cleared of stones inside. There is only a slight change in level from one enclosure to the next. There is a thin scatter of Chalcolithic / EB and Classical sherds. Just north of the enclosures is a long wall that turns through 90 degrees. Like site 44, the middle of a large boulder-strewn alluvial fan is a very strange place to find enclosures.
Site condition: Good
Survey area: Wādī ʻArabah
**Fig. 8**: Site 51

Site 52
E 0731027 N 3380419. 202m
Enclosure and a cemetery of four or more small stone pile graves. The enclosure is on the side of a small *wadi* within the boulder-strewn alluvial fan. It is about 20x20m, made of local

*8. Site 51: cleared terraced enclosures on the boulder-strewn alluvial fan.*

boulders and clear inside. A few Nabataean / Roman sherds found around.
Site condition: Good
Survey area: Wādī ʻArabah

Site 53
E 0731557 N 3381617. 213m
Small cemetery on the boulder-strewn alluvial fan, with four or more circular and oval graves, *ca.* 1x1m - low stone piles. Seems to be very old, the graves are in poor condition.
Site condition: Poor
Survey area: Wādī ʻArabah

Site 54
E 0732208 N 3383602. 203m
Small cemetery, with five circular graves, *ca.* 1-1.5m diameter, of large boulders on the boulder-strewn alluvial fan. Two more graves found about 50 m further north.
Site condition: Good
Survey area: Wādī ʻArabah

Site 55
E 0732528 N 3384250. 209m
Enclosure and cemetery on the boulder-strewn alluvial fan. The enclosure is *ca.* 17x14m inside; the walls are about 1m wide of tumbled boulders, nothing inside. A very few flint flakes were found. The cemetery consists of ten graves scattered around the enclosure. Graves are low, circular stone piles, *ca.* 1x1m.
Site condition: Good
Survey area: Wādī ʻArabah

Site 56
E 0732983 N 3384798. 220m

Enclosure and cemetery on the boulder-strewn alluvial fan. The enclosure walls are not in very good condition and are made of local stones. It is 20x20m and is cleared inside. There are six later graves, in or on the enclosure and around it and possibly some small structures.
Site condition: Reasonable
Survey area: Wādī ʻArabah

Site 57
E 0733154 N 3385156. 213m
Small cemetery and flint scatter on the boulder-strewn alluvial fan. The five graves are low, round stone piles, *ca.* 2x2m. There are a few flakes and used flakes, probably Epipalaeolithic and later.
Site condition: Good
Survey area: Wādī ʻArabah

Site 58
E 0725726 N 3369175. 219m
Small cemetery with seven or more graves, *ca.* 1.5-3m in diameter, circular stone piles, on the boulder-strewn alluvial fan.
Site condition: Good
Survey area: Wādī ʻArabah

Site 59
E 0724450 N 3368389. 216m
Small cemetery with six or more graves dispersed on the boulder-strewn alluvial fan, consisting of round stone piles from 1-3m in diameter. A few Nabataean / Roman sherds and a few flint flakes found.
Site condition: Good
Survey area: Wādī ʻArabah

Site 60
E 0724082 N 3367256. 221m
Small cemetery with five or more circular graves, *ca.* 2m in diameter, on the boulder-strewn alluvial fan. A very few flint flakes found.
Site condition: Good
Survey area: Wādī ʻArabah

Site 61
E 0728750 N 3375383. 201m
Small cemetery with seven round, high stone pile graves between 2-4 m in diameter, dispersed in the boulder-strewn alluvial fan.
Site condition: Good
Survey area: Wādī ʻArabah

Site 62
E 0728411 N 3373811. 198m
Small structure on a stony, dissected alluvial fan. It is 3x3m with only two sides remaining standing, made of standing stones. The southern half of structure is collapsed and covered by a later grave.
Site condition: Reasonable
Survey area: Wādī ʻArabah

Site 63
E 0728220 N 3373452. 185m
Flint concentration on the lowest foothill along the eastern Wādī ʻArabah margin. The site covers an area of several hundred metres, spread across the whole hill and its base, where natural flint occurs. Mostly large, heavily patinated flakes, dated Late to Middle Palaeolithic. Probably a quarry site, since there are very few tools or used flakes.
Site condition: Good
Survey area: Wādī ʻArabah

Site 64
E 0727859 N 3372744. 188m
Small cemetery on a low hill spur, consisting of six graves, all robbed out. Some human bones beside one of them.
Site condition: Poor, robbed.
Survey area: Wādī ʻArabah

Site 65
E 0727688 N 3372448. 183m
Flint scatter and one sherd, spread across several hundred metres on the lowest slopes of the lowest foothill and at its base on the floor of the Wādī ʻArabah. Mostly flakes, so could be a quarry site, dated perhaps to Late Neolithic.
Site condition: Good
Survey area: Wādī ʻArabah

Site 66
E 0727008 N 3370419. 202m
Pottery scatter, consisting of a few Nabataean / Roman sherds, and temporary campsite, on a dissected alluvial fan at the foot of a small hill.
Site condition: Reasonable
Survey area: Wādī ʻArabah

Site 67

E 0726658 N 3369760. 212m
Enclosure, measuring *ca.* 6x6 m, roughly oval, with a few flakes and Nabataean / Roman sherds around, in a flat area between two hills. Nearby, to the south, there is a wall or grave at the foot of a hill.
Site condition: Poor
Survey area: Wādī ʻArabah

Site 68
E 0726407 N 3369534. 217m
Circular enclosure, 6m in diameter, on the lower slope of small *wadi*. It is cleared of stones inside; the walls are *ca.* 1m thick and up to three stones high, of local limestone rocks. There is one stone pile grave nearby to the south.
Site condition: Good
Survey area: Wādī ʻArabah

Site 69
E 0719212 N 3351945. 343m
Small cemetery, consisting of six contiguous graves on a narrow ridge top. The graves vary from 1 to 1.5m in diameter and are made of low stone piles of local limestone. Very few flint flakes found around.
Site condition: Good
Survey area: Wādī ʻArabah

Site 70
E 0718335 N 3352339. 288m
Pottery scatter of Nabataean / Roman sherds and temporary camp, at the foot of a sandstone cliff, on the edge of a wide, flat area. One or two flint flakes also noted.
Site condition: Reasonable
Survey area: Wādī ʻArabah

Site 71
E 0701211 N 3290449. 336m
Possible wall, surrounding a small hilltop at the very bottom of the mountain. Made of local granite boulders of different sizes and covered in natural granite gravel. The ʻwall' is about 15m long going around hill. No finds, probably not a site.
Site condition: Reasonable
Survey area: Wādī ʻArabah

Site 72
E 0701169 N 3290253. 353m
Circular structures on a hill spur at the foot of the mountains. They are five or more small stone circles, 1-3 m in diameter, made of local granite boulders. Some have only a few stones in the middle, others have a lot of stones; possibly a cemetery.
Site condition: Good
Survey area: Wādī ʻArabah

Site 73
E 0701512 N 3273258. 255m
A group of about 20 circular structures and enclosures spread along a narrow terrace on a steep hillside, above a steep, narrow *wadi*. The structures vary in size from 3-6m in diameter and are made of local granite boulders; some are cleared in the middle and at least one has what seems to be a standing stone in the centre. Most are contiguous with one another. There area also a few, more isolated, rectangular structures with walls several courses high. No finds. Site 77 is on the opposite side of the narrow *wadi* (to the west).
Site condition: Good
Survey area: Wādī al-Yutum
**Fig. 9**: Site 73
Site 74
E 0713096 N 3330106. 295m
Flint and sherd scatter on the top and slopes of a dissected plateau between the mountains, above Wādī Gharandal. These hills are the remains of lacustrine deposits (see D. Henry *et al*. 2001), with some natural flints occurring on the surface. The flint probably dates to the Middle Palaeolithic and the sherds are Nabataean / Roman.
Site condition: Poor, deflating
Survey area: Wādī ʻArabah

*9. Site 73: one of the enclosures with what appears to be a standing stone in the centre.*

Site 75
E 0713290 N 3330245. 295m
Extensive flint scatter on a hilltop and slopes with natural flints. Probably served as a quarry site for flints. One hand axe and two Levallois points were found. Same landscape as site 74. The flint probably dates to the Middle Palaeolithic.
Site condition: Good
Survey area: Wādī ʻArabah

Site 76
E 0713346 N 3330631. 296 m
Flint scatter on a hilltop and slopes in same landscape as site 74. Many very large flakes and cores of heavily patinated flint that might be Epipalaeolithic to Neolithic in date. Also one or two later graves on the hilltop consisting of small stone piles of limestone boulders.
Site condition: Good
Survey area: Wādī ʻArabah

Site 77
E 0701500 N 3273400. *ca.* 260m
A group of about four circular structures or enclosures, varying in size, some walls surviving to several courses high. Made of local granite boulders, they are clear of stones in the middle. On a sloping hill spur, opposite site 73.
Site condition: Good
Survey area: Wādī al-Yutum
**Fig. 10**: Site 77

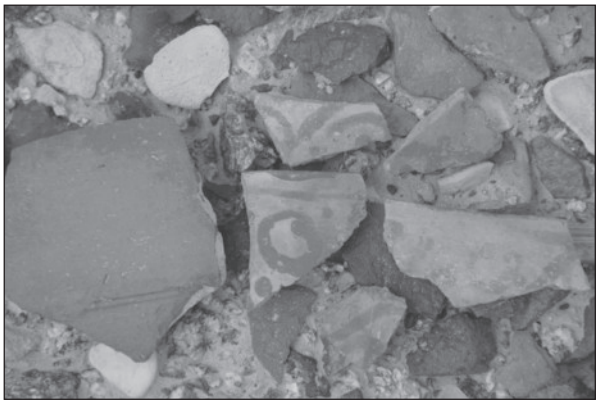
Site 78
E 0712963 N 3334561. 224m
Dispersed flint and sherd scatter on the stony plain of the Wādī ʻArabah, between moving sand dunes. Probably dating to the Late Neolithic / Chalcolithic.
Site condition: Poor
Survey area: Wādī ʻArabah

Site 79
E 0715338 N 3340178. 232m
Enclosures and graves, stretching from a small, steep *wadi* round to a flat area (the top of an alluvial fan at foot of mountains). The small terrace or enclosure walls are of local granite stones, about 5x10m; mostly cleared of stones inside. Also six or more stone pile graves around the enclosures. There is a very thin scatter of pottery of many periods (Chalcolithic, BA, Roman). This might be site SAAS no. 223 (Niemi and Smith 1999: 802).
Site condition: Reasonable
Survey area: Wādī ʻArabah

Site 80
E 0714627 N 3339526. 118 m
Small cemetery, with 14 or more graves, consisting of circular stone piles on the sides of a small *wadi*. Some are robbed; also some sherds (Chalcolithic, EB, Nabataean / Roman, Byzantine).
Site condition: Reasonable
Survey area: Wādī ʻArabah

Site 81
E 0714585 N 3339439. 113m
Pottery scatter consisting of a few sherds, including some painted, fine Edomite sherds. On a slightly dissected alluvial fan.
Site condition: Poor
Survey area: Wādī ʻArabah
**Fig. 11**: Site 81

*10. Site 77: structures and enclosures on a granite hill spur (photographed from site 73).*



*11. Site 81: painted pottery sherds on the site.*

Site 82
E 0706318 N 3308188. 152m
Small cemetery on the lowest foothills and the top of the alluvial fan. It contains two large graves: one rectangular 5x3m external 3x1m internal, robbed; another is a 3x3m stone pile. There are two or more small graves, 1.5m diameter.
Site condition: Poor
Survey area: Wādī ʻArabah

Site 83
E 0706205 N 3307733. 165m
Small cemetery with five large circular stone piles, *ca.* 3x3m, on a hill slope above a *wadi*. The uppermost grave with a short 'tail'. One sherd was found, possibly EB.
Site condition: Good
Survey area: Wādī ʻArabah

Site 84
E 0709054 N 3343425. 246m
An oval enclosure in the bottom of Wādī ʻArabah, on the lower slope of low hills, surrounded by desert pavement. The enclosure is *ca.* 6x3m, with a wall of tumbled local grey, cherty limestone, more or less cleared of stones inside. Four stone piles graves are nearby, two are robbed.
Site condition: Poor
Survey area: Wādī ʻArabah

Site 85
E 0708675 N 3342507. 253m
Small cemetery of five dispersed graves consisting of small stone piles, some quite high, of local grey cherty limestone; on a low ridge top.
Site condition: Poor
Survey area: Wādī ʻArabah

Site 86
E 0711076 N 3349620. 225m
Thin scatter of heavily weathered (with desert varnish) flint flakes and one core, amongst the flat desert pavement in bottom of the Wādī ʻArabah. Possibly of Palaeolithic date.
Site condition: Reasonable
Survey area: Wādī ʻArabah

Site 87
E 0714501 N 3360103. 184m
Dispersed cemetery with more than five graves, and ancient fireplace and a thin flint scatter on both sides of a shallow *wadi* and adjacent hilltop. The graves are low stone piles. There are very few flakes, which are heavily weathered with desert varnish. The ancient fireplace consists of a round patch of small, burned stones, *ca.* 1m in diameter.
Slopes of shallow *wadi* and hilltop
Site condition: Poor
Survey area: Wādī ʻArabah

Site 88
E 0715410 N 3367097. 143m
Enclosure on the top edge of *wadi* bank. It is about 4x4m internally; the wall is about 90cm wide, made of large boulders, and one course high. Possible grave at the top of the enclosure and a thin flint scatter nearby, of weathered flakes.
Site condition: Poor
Survey area: Wādī ʻArabah

Site 89
E 0695330 N 3287704. 41m
Enclosure and small cemetery in the bottom of the Wadi Arabah, at the very bottom of an alluvial fan, beside a shallow *wadi*. The enclosure is *ca.* 4x4m inside, and its wall, *ca.* 1m wide and only one course high, is made of local granite boulders. A few flint flakes around, but no natural flint. Also a small cemetery with five or six graves of low granite stone piles dispersed in the area.
Site condition: Reasonable
Survey area: Wādī ʻArabah

Site 90
E 0695115 N 3288613. 80m
Enclosures, small cemetery and flint scatter in the bottom of the Wādī ʻArabah, at the very bottom of an alluvial fan, beside a shallow *wādī*. The northern 'structure' is rectangular, *ca.* 4x2m, indistinct, made of local granite stones. 5m to the north is a circular enclosure, *ca.* 3x3m inside; the wall is one or two stones wide and one course high. The cemetery consists of five low stone pile graves. There is also a thin flint scatter with very few retouched flakes, but no tools; also two Chalcolithic sherds.
Site condition: Reasonable
Survey area: Wādī ʻArabah

Site 91
E 0695274 N 3289140. 80m
Cemetery consisting of six graves in the bottom of the Wādī ʻArabah, at the very bottom of an alluvial fan, beside a shallow *wadi*. The southernmost one is oval, oriented east-west and looks more modern. The others are circular stone piles, *ca.* 1m diameter.
Site condition: Good
Survey area: Wādī ʻArabah

Site 92
E 0695383 N 3289327. 92m
Tower in the bottom of the Wādī ʻArabah, at the very bottom of an alluvial fan, beside a shallow *wadi*. It is tumbled but still stands about 2m high. One face of the south wall is visible at the top, made of partly dressed granite boulders and traces of the other walls can be picked out of the rubble. The tower measures 5x5m inside. The modern military has sunk a cement barrel in the top and built some walls on and around the original tower. There are a few Nabataean / Roman sherds and a few flint flakes around. Good views all around. Probably part of a chain of towers, including site 94 to the north and perhaps somehow connected with Rujum Ṭabā further north.
Site condition: Reasonable
Survey area: Wādī ʻArabah
**Fig. 12**: Site 92

Site 93
E 0695432 N 3289923. 125m
Cemetery of four graves consisting of large, high stone piles of mixed boulders in the bottom of the Wādī ʻArabah, on a rise beside a shallow *wadi*.
Site condition: Good
Survey area: Wādī ʻArabah

Site 94
E 0696309 N 3293035. 85m
Tower in the bottom of Wādī ʻArabah, between moving sand dunes. It is about 3m high and 7x6m inside; the top of the north wall is visible, consisting of partly dressed granite boulders. The modern military has put a barrel in the top (number 15), and has built some walls on and around the ancient, tumbled tower. Just to the south is a low, L-shaped wall of small stones, about 10x10m. Much pottery around, from Nabataean / Roman, Byzantine and early Islamic times.
Site condition: Reasonable
Survey area: Wādī ʻArabah
**Fig. 13**: Site 94

Site 95
E 0709834 N 3329004. 227m
Pottery scatter and temporary camp, in the bottom of the Wādī ʻArabah between moving dunes. The sherd scatter was found in two areas, separated by a sand dune. Pottery included one almost complete painted Nabataean bowl and other large fragments in one area, and in the other was a pot drop of a dark grey, wheel-made pot. There are ancient fireplaces of small piles of burnt cobbles, and four or five flint flakes.
Site condition: Reasonable
Survey area: Wādī ʻArabah

Site 96
E 0721005 N 3396835. -89m
Sparse scatter of flint flakes, nothing retouched, and one sherd, Classical? On desert pavement exposed between low dunes in the bottom of

*12. Site 92: remains of a tower.*

*13. Site 94: remains of a tower.*

Wādī ʻArabah, on the broad alluvial fan of Wādī Fidān.
Site condition: Reasonable
Survey area: Wādī ʻArabah

Site 97
E 0721662 N 3398865. -87m
Cemetery of nine or more graves dispersed in the bottom of the Wādī ʻArabah on the broad alluvial fan of Wādī Fidān, consisting of low circular and oval stone piles of sandstone and limestone boulders. Also a sparse scatter of flint flakes around, and ancient fireplaces of burnt cobbles.
Site condition: Good
Survey area: Wādī ʻArabah

Site 98
E 0735419 N 3388809. 221m
Structure consisting of two parallel walls, 5m long and 7m apart, situated on shallow *wādī* slope, just above a broad *wadi* bottom. The walls are visible at ground level, but may go down for some depth. They are of undressed local boulders, double faced. There are a few small, Classical period sherds nearby.
Site condition: Poor
Survey area: Wādī ʻArabah

Site 99
E 0735309 N 3388603. 157m
Cemetery of 30 or more low circular stone pile graves, 1-2m in diameter. Some are robbed. Situated on the lower hill slope of an outcrop hill, south of Faynān.
Site condition: Reasonable
Survey area: Wādī ʻArabah

Site 100
E 0718836 N 3387728. 5m
Cemetery of six small, circular stone pile graves spread along a ridge top. Also a very thin scatter of flakes and one Chalcolithic sherd.
Site condition: Good
Survey area: Wādī ʻArabah

Site 101
E 0717850 N 3384065. 30m
Cemetery of six circular stone pile graves. Three large ones 3x3m spread along low ridge top; three small ones 1.5m diameter, grouped together.
Site condition: Good
Survey area: Wādī ʻArabah

Site 102
E 0718017 N 3383193. 46m
Circular enclosure, about 18m diameter, on a hill slope. Walls of local boulders, about 1 m wide, tumbled. Mostly clear of stones inside enclosure. A few flint blades and flakes, but no tools were found around and one large, circular stone pile grave 30m north.
Site condition: Reasonable
Survey area: Wādī ʻArabah

Site 103
E 0717346 N 3380595. 57m
Wall / enclosure consisting of an L-shaped indistinct wall, 10x15m, made of local boulders on a gentle hill slope. A few flint flakes and blades but no tools found around and two large, circular stone pile graves nearby.
Site condition: Poor
Survey area: Wādī ʻArabah

Site 104
E 0705683 N 3319633. 164m
Cemetery, ʻroad' and fireplaces in between big dunes in the bottom of Wādī ʻArabah. The ʻroad' is a 3.5m wide and *ca.* 85m long pavement of local granite and sandstone boulders on a narrow ridge of sand between the big dunes. There are also natural boulders and cobbles around and it is not clear if this is a man-made ʻpavement' or a natural fluke of erosion. At the south end of it is one stone pile grave. On the open sand below the north end is a group of seven stone pile graves (2x2m) and circles of stone (3x3m). Further north still are three more graves. Throughout are small circles of stone less than 1 m in diameter = ancient fireplaces (?) and a thin scatter of flint flakes. This whole area seems to be a campsite and / or a sacred place of some sort.
Site condition: Good
Survey area: Wādī ʻArabah
**Fig. 14**: Site 104

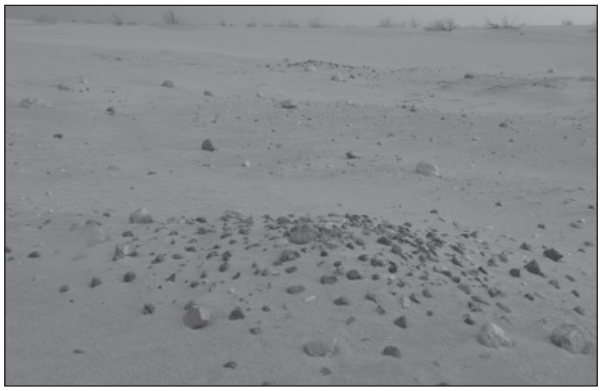
Site 105
E 0706790 N 3322640. 193m
Wall or dam that is a line of stones 1m wide and 40m long, running across a shallow dip between dunes in the bottom of Wādī ʻArabah. Made of

*14. Site 104: possible road (?).*

local granite and sandstone boulders.
Site condition: Reasonable
Survey area: Wādī ʻArabah

Site 106
E 0708118 N 3328194. 165m
Two fireplaces consisting of small heaps of burnt cobbles with at least three pot drops of Chalcolithic pottery, between dunes in the bottom of Wādī ʻArabah.
Site condition: Good
Survey area: Wādī ʻArabah

Site 107
E 0708352 N 3329041. 182m
Five fireplaces consisting of small heaps of burnt cobbles, *ca.* 1m diameter, and one small circle of stones. Also a few flakes found around, between dunes in the bottom of Wādī ʻArabah.
Site condition: Good
Survey area: Wādī ʻArabah
**Fig. 15**: Site 107



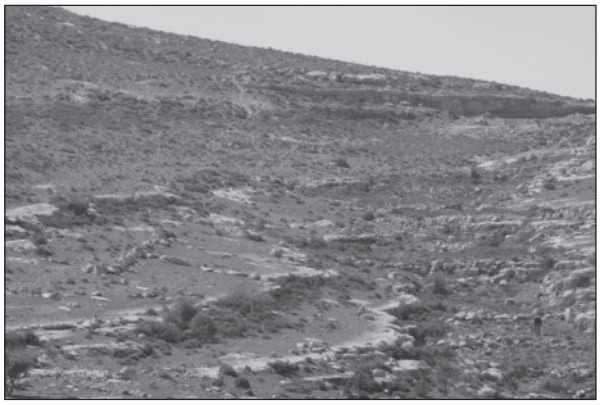
*15. Site 107: ancient fireplace (burnt cobbles) eroding out of the sand dunes.*

Site 108
E 0708565 N 3329738. 211m
Five or more fireplaces of small heaps of burnt cobbles, and a few pottery sherds, between dunes in the bottom of Wādī ʻArabah.
Site condition: Good
Survey area: Wādī ʻArabah

Site 109
E 0710131 N 3322810. 251m
Multi-function site, including stone circles, graves, fireplaces and flints. There are two stone circles, 3x3m, of local boulders, cleared in the middle. The one on the top of the hill is not complete. There are at least four stone pile graves dotted around, and fireplaces of burnt cobbles and very small stone circles (0.5m diameter). There are flints scattered all around, but few dense concentrations. The top edges of this low hill are covered in small boulders, like paving or the unfinished foundations of a structure - perhaps a fort? Alternatively, they may be natural, as there is no Classical-period pottery at all. Indeed there is very little pottery of any period. This may be a multi-period campsite on a small hill at the very foot of the mountains overlooking the bottom of the Wādī ʻArabah.
Site condition: Reasonable
Survey area: Wādī ʻArabah

Site 110
E 0730576 N 3420200. -220m
Thin pottery scatter, with at least five different pots (Nabataean / Roman / Byzantine), and one flint flake. Possible grave nearby. Located on the very edge of drop down to Dead Sea basin, there are stunning views northwards to the Dead Sea basin.

*17. Site 116: cross-wadi walls; (centre right) D-shaped enclosure.*



*16. Site 114: (left) low wall of upright boulders; (in wadi on right) cross-wadi walls.*

Site condition: Reasonable
Survey area: Wādī ʻArabah

Site 111
E 0730655 N 3421517. -318m
Pottery scatter and two small fireplaces (ash rings), on soft sandy marl at the foot of the hills that form the scarp of the Dead Sea basin. Pottery is Nabataean / Roman / Byzantine.
Site condition: Reasonable
Survey area: Wādī ʻArabah

Site 112
E 0745663 N 3411743. 1250m
Small, L-shaped structure of upright limestone slabs, *ca* 3x3m, on a hill slope.
Site condition: Poor
Survey area: Fāfā to al-Ḥasā line

Site 113
E 0745551 N 3412477. 1215m
Two threshing floors with partial walls around them, *ca.* 30x2m altogether, on a flat area on a hillside, above a deep *wadi*. Some flint and pottery around, perhaps IA.
Site condition: Reasonable
Survey area: Fīfā to al-Ḥasā line

Site 114
E 0745432 N 3412451. 1223 m
Six cross-*wadi* walls in a steep, narrow side *wādī*, 15m wide. Each wall is about 60cm high and consists of three courses of local limestone boulders. There is a thin pottery scatter of Chalcolithic and IA sherds, and a few flint flakes. There are some low walls of large, upright limestone boulders on the natural terrace on the hill slope above to the south. Probably an agricultural area, which may be connected with sites 113 and 115, about 100m to the north-east.
Site condition: Good
Survey area: Fīfā to al-Ḥasā line
**Fig. 16**: Site 114

Site 115
E 0745446 N 3412524. 1229m
Three adjoining rectangular structures on a hill slope; the walls are one course high (30cm) in the top ʻroomʼ and 60cm high in bottom ʻroomʼ, and 30cm wide. The top ʻroomʼ is 5x6m, the middle and lower ʻroomsʼ are 10x7m. The pottery scatter is IA. Perhaps associated with sites 113 and 114.
Site condition: Good
Survey area: Fīfā to al-Ḥasā line

Site 116
E 0745316 N 3412633. 1230m
Enclosure and cross-*wadi* walls in a narrow side *wadi*. The enclosure is D-shaped, *ca* 15x17m, but is not complete and abuts the cliff face. The wall is preserved up to 1 m high. The two cross-*wadi* walls are 1m high, 23 and 30m long. Pottery scatter of Bronze Age sherds.
Site condition: Reasonable
Survey area: Fīfā to al-Ḥasā line
**Fig. 17**: Site 116

Site 117
E 0745103 N 3413025. 1212m
Rock shelters and three terraces in front of a slightly overhanging cliff on a hillside. One is a wide terrace (20x25m), the other two are narrower. The big terrace wall is 2.1m high. Modern

sheep dung and Chalcolithic pottery sherds were found on the big terrace.
Site condition: Reasonable
Survey area: Fīfā to al-Ḥasā line

Site 118
E 0745076 N 3413076. 1198m
Fifteen cross-*wadi* walls, between 20cm and 1m high and 8-15m long. They are 8-10m apart, down a narrow side *wadi*.
Site condition: Good
Survey area: Fīfā to al-Ḥasā line

Site 119
E 0744450 N 3414565. 1070m
Short stretch of a double-faced wall on the side of a low hilltop. There may be more of this structure below the surface. The visible wall is 7m long by 1m wide and two courses are just visible. It is made of large local limestone blocks. There is a thin scatter of Chalcolithic / EB sherds around.
Site condition: Good
Survey area: Fīfā to al-Ḥasā line

Site 120
E 0744270 N 3414988. 1001m
Cemetery, of more than 20 large stone heaps, some up to 5x5m, dispersed around the hill slopes. Some have a circle of stones visible, forming the outer edge. Also some stone clearance piles, on the edge of, or in, ploughed fields. Thin scatter of pottery throughout, Chalcolithic, BA and Classical, as well as some flint flakes and one lunate.
Site condition: Good
Survey area: Fīfā to al-Ḥasā line
**Fig. 18**: Site 120

*18. Site 120: one of more than 20 large stone heaps; a grave (?).*

Site 121
E 0744235 N 3415263. 1001m
Roughly rectangular enclosure, *ca.* 20x18m, on a low hilltop saddle. The wall is one stone wide, made of local limestone boulders, but only two walls are clear. There is a background scatter of sherds and flints. This site lies at the north end of cemetery 120.
Site condition: Poor
Survey area: Fīfā to al-Ḥasā line

Site 122
E 0749980 N 3410002. 1359m
Possible standing stone, of local limestone, 50cm high, 50x40cm. Surrounded by a vague ring of small stones, 2m in diameter. The stone is placed at the edge of a limestone outcrop on the side of the hilltop.
Site condition: Good
Survey area: Fīfā to al-Ḥasā line
**Fig. 19**: Site 122

Site 123
E 0750091 N 3409961. 135m
C-shaped wall, *ca.* 10x10m, made of rough local limestone boulders, on a hill slope beside a low bedrock shelf. There is also a straight wall 11m long and some Chalcolithic pottery around.
Site condition: Poor
Survey area: Fīfā to al-Ḥasā line

Site 124
E 0750175 N 3409770. 1252m
Large site with multiple walls and enclosures of local limestone blocks, mostly standing upright, one stone high and one stone wide. There are four adjoining enclosures, 10x10m, on the edge of the slope, one containing a rock-cut tomb

*19. Site 122: possible standing stone.*

with two chambers. There are other enclosures up the slope and a long, curving wall connects to another set of enclosures to the north-east. Just below this northern end, the limestone bedrock forms low cliff, part of which is a rock shelter (8x10m). The site is on a gentle hill slope above a small *wadi*, which has some cross-*wadi* walls in it. There is a scatter of Chalcolithic / EB pottery throughout.
Site condition: Good
Survey area: Fīfā to al-Ḥasā line
**Fig. 20**: Site 124

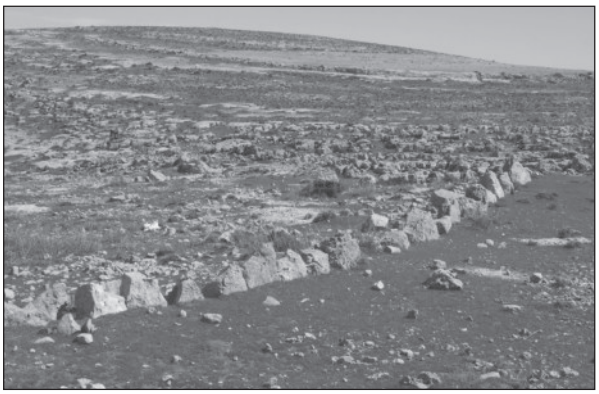
Site 125
E 0750460 N 3409978. 1362m
Sub-oval enclosure on a hilltop, with incomplete wall, about 60m across the widest part. There is a modern ploughed field inside. The wall is of local limestone boulders. There are two shallow natural caves at south end, and a short (2m) stretch of wall of large roughly dressed limestone blocks nearby, and a scatter of Chalcolithic, EB and Classical sherds.
Site condition: Reasonable
Survey area: Fīfā to al-Ḥasā line

Site 126
E 0750713 N 3410027. 1332m
Sub-rectangular enclosure on a hill slope, with two adjoining rectangular rooms (3x3m) at the north-west end and four circular enclosures (3x5m) on the south side. There is also a long wall coming down the hill slope to the south-west and another to the east and two large stone pile graves to the south. Further north, below the bedrock ledge are five more small circular enclosures (3x3m).
Site condition: Reasonable
Survey area: Fīfā to al-Ḥasā line
Site 127
E 0751685 N 3409649. 1280m
Basalt boulder wall exposed for a length of 10m across a small *wadi* bottom, made of massive boulders; further upstream is a small section of a similar wall across the *wadi*. Also there is a possible wall higher up the slope.
Site condition: Poor
Survey area: Fīfā to al-Ḥasā line

Site 128
E 0752733 N 3409192. 133m
Two caves in a limestone bedrock ledge. They are rounded inside, with pick marks visible on the walls. One is about 4x4m and filled with sheep dung, the other is filled almost to the top. They do not appear to be tombs, but perhaps were used as shelters.
Site condition: Good
Survey area: Fīfā to al-Ḥasā line

Site 129
E 0755361 N 3409300. 1361m
Complete circular stone enclosure, *ca* 25x25m, of basalt boulders on a low hill saddle. The wall is *ca.* 1m wide and the circle is clear inside. On the east side is a large tomb, robbed, to expose a square chamber, 1x1m, made of three huge blocks on three sides, and two smaller ones on the fourth side. Pottery (EB) and flint scatter.
Site condition: Good
Survey area: Fīfā to al-Ḥasā line
**Fig. 21**: Site 129

Site 130
E 0755269 N 3409074. 1400m
Walls and cemetery of 15 or more large and small



*20. Site 124: one of the walls of large upright boulders.*

*21. Site 129: circular stone enclosure.*

stone pile graves dispersed across a hilltop and slope. There are at least three long, low walls running down the east slope of this hill, possibly drainage walls (?) that are common enough on hill slopes in this district. Thin scatter of BA sherds and flints.
Site condition: Good
Survey area: Fīfā to al-Ḥasā line

Site 131
E 0758190 N 3409938. 1323m
Cemetery of 20 or more stone piles, dispersed across a hillside. Made of flint boulders, some are in ploughed fields and could also be stone clearance cairns. Background scatter of flints and sherds.
Site condition: Good
Survey area: Fīfā to al-Ḥasā line

Site 132
E 0756596 N 3409461. 1323m
Cemetery of 12 or more large stone pile graves of flint boulders dispersed across a hill slope.
Site condition: Good
Survey area: Fīfā to al-Ḥasā line

Site 133
E 0760690 N 3410856. 1167m
Structure and cemetery in a *wadi* bottom and slope. The structure is badly robbed / bulldozed, but amongst the rubble the remains of two parallel walls, 6m apart, are visible; they are well built of roughly dressed blocks at least three courses high. A few Roman sherds were found. Also ten or more stone pile graves around on the hillside to the north, one of which is robbed.
Site condition: Reasonable
Survey area: Fīfā to al-Ḥasā line

Site 134
E 0759928 N 3411092. 1079m
Cemetery of six or more stone pile graves and a small scatter of background flints, on a shallow *wadi* terrace and hill slope.
Site condition: Good
Survey area: Fīfā to al-Ḥasā line

Site 135
E 0759811 N 3410833. 1136m
Natural cave in a limestone ledge on a hillside. It is used, with a now buried wall across the mouth. Inside it is filled with sheep dung. Also there is a possible terrace in front of the cave, *ca.* 10x10m. A few sherds of Mamluk pottery were found on the terrace. This cave is below the multi-period site of Khirbat al-Oran, and could well be associated with it.
Site condition: Good
Survey area: Fīfā to al-Ḥasā line

Site 136
E 0764492 N 3413938. 1139m
Large, square tower on a hilltop, beside a track. Tower measures 5x5m inside and the walls are *ca.* 1m thick, made of roughly dressed limestone blocks, standing to a maximum of three courses high. The tower is surrounded by a ground-level wall about 1.5m away. Also, adjoining the outer wall is a curved wall and a small (3x3m) room. A few sherds were found nearby.
Site condition: Poor
Survey area: on access track to the Fīfā to al-Ḥasā line

6Site 137
E 0767088 N 3415055. 1122m
Square tower, on a hilltop, 4x4m, of roughly dressed limestone blocks. Inside has been reused for burials. A few sherds, probably Roman, were found nearby.
Site condition: Poor
Survey area: on access track to the Fīfā to al-Ḥasā line

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# THE DHĪBĀN EXCAVATION AND DEVELOPMENT PROJECT'S 2009 SEASON: FIELD L EXCAVATIONS

*Benjamin W. Porter, Bruce E. Routledge, Danielle S. Fatkin, Katherine Adelsberger, Alan Farahani, Andrew Wilson and Warren Schultz*

Tall Dhībān is located approximately 70km south of ʻAmmān (**Fig. 1**). While devoid of modern settlement, the mound is immediately adjacent to the contemporary community of Dhībān (Porter *et al*. 2010: fig. 1). The site is well-known, both from the discovery of the Mesha Inscription in 1868, as well as for the pioneering excavations of the American Schools of Oriental Research from 1950 to 1953 and again in 1955 and 1956. Fred Winnett, William Reed and Douglas Tushingham concentrated their soundings in the south-east corner of the site, exposing an Iron Age fortification system, Nabataean temple, Byzantine church, and Early and Middle Islamic dwellings (Winnett and Reed 1965; Tushingham 1972). William Morton conducted an additional three seasons in 1955, 1956 and 1965, concentrating on Dhībān's acropolis (Field L) and north side (Field H) (Morton 1989). Archaeological excavations at Dhībān ceased for nearly 35 years until Jordan's Department of Antiquities initiated an excavation and restoration program in 2002 (al-Mahameed 2003). The DEDP began their work in 2004 and have conducted four seasons of excavation so far (Porter *et al*. 2005, 2010; Fatkin *et al.* in press).[1]

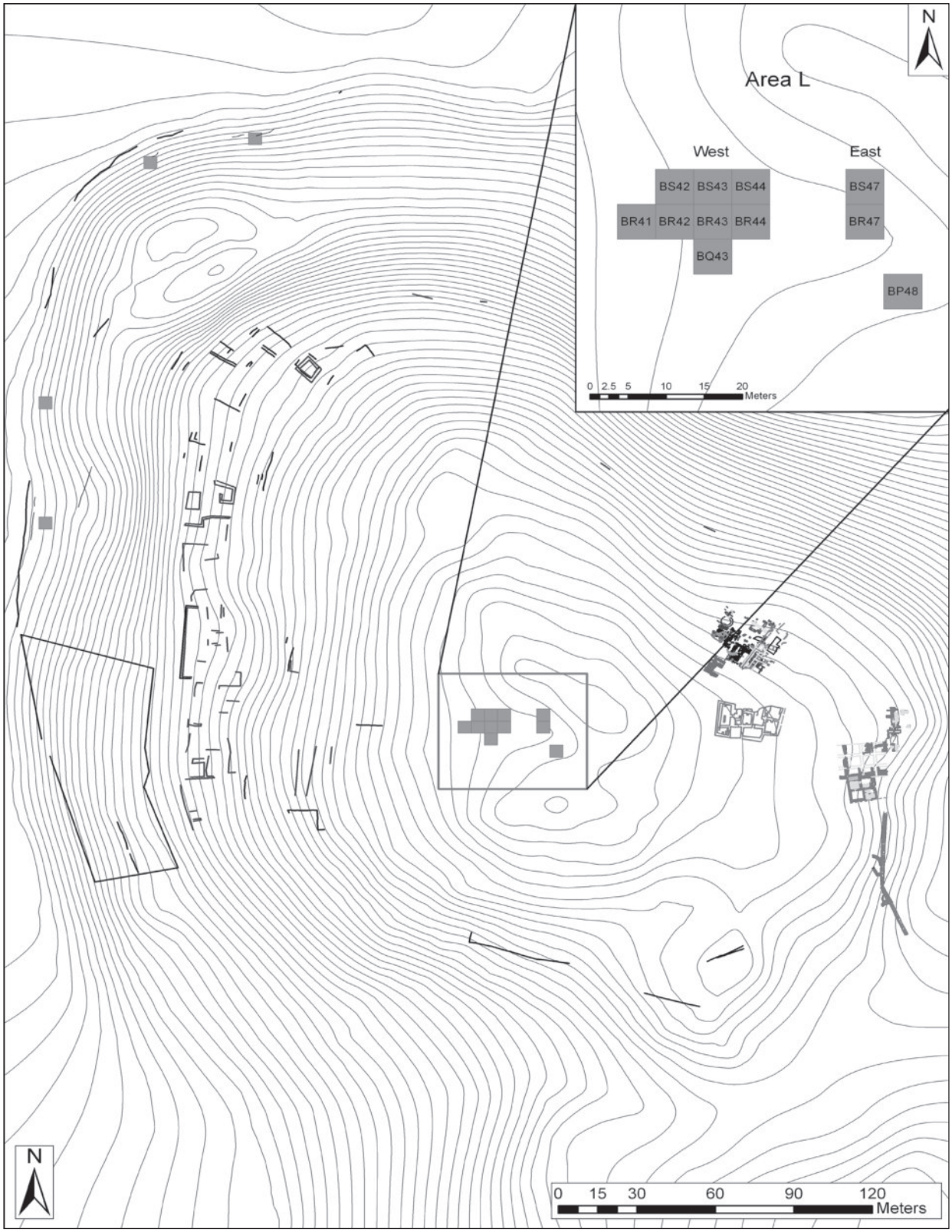
This research suggests Tall Dhībān was settled intermittently from the end of the Early Bronze 1b period (*ca.* 3100 BC) until some point late in the Middle or Late Islamic Periods (late fifteenth or early sixteenth century AD).[2] Particularly prominent in these excavations were the later Iron Age (900-600 BC), the Nabataean period (140 BC-106AD), the Byzantine and Early Islamic periods (*ca.* 400-800 AD) and the Middle Islamic period (*ca.*1250-1600 AD). This work also showed that architectural elements from these periods were well preserved and accessible by limited excavation. However, architecture visible on the surface of the site is in relatively poor condition owing both to G. Lancaster-Harding's removal of a significant number of above ground walls and arches in 1949 (Winnett 1964: 11) and to the lack of post-excavation conservation on the part of earlier excavators.

The DEDP's primary goals for the 2009 seasons sought to continue the exploration and documentation of the site's ancient remains, while pursuing the research objectives developed in previous seasons (Porter *et al*. 2005, 2010: 10).[3] Throughout the season, the project concentrated on four objectives:

(1) Finalize the topographic map (**Fig. 2**) and architectural survey of the site, concentrating on the western slope where several buildings are still preserved on the surface.
(2) Continue excavations in Area L, where *in situ* cultural levels from the Iron Age, Classical, and Islamic periods are preserved.
(3) Conduct a random unit square survey of the site to determine the size of the settlement in different time periods.
(4) Collect environmental and geological data to help determine the relationship between the settlement and the surrounding environment.

1. For a complete project bibliography, see www.dhiban.org.
2. For a recent synthesis of Dhībān's settlement history, see Porter *et al.* 2007.
3. For a list of participants in the 2009 season, please visit www.dhiban.org. In both seasons, essential assistance in Dhībān was provided by Firas al-Kawamlah (now of the Ministry of Social Development); twenty residents of the Dhībān area were hired to work at the site.


*1. Map of west-central Jordan with an emphasis on Dhībān and the Dhībān Plateau (prepared by A. Wilson).*



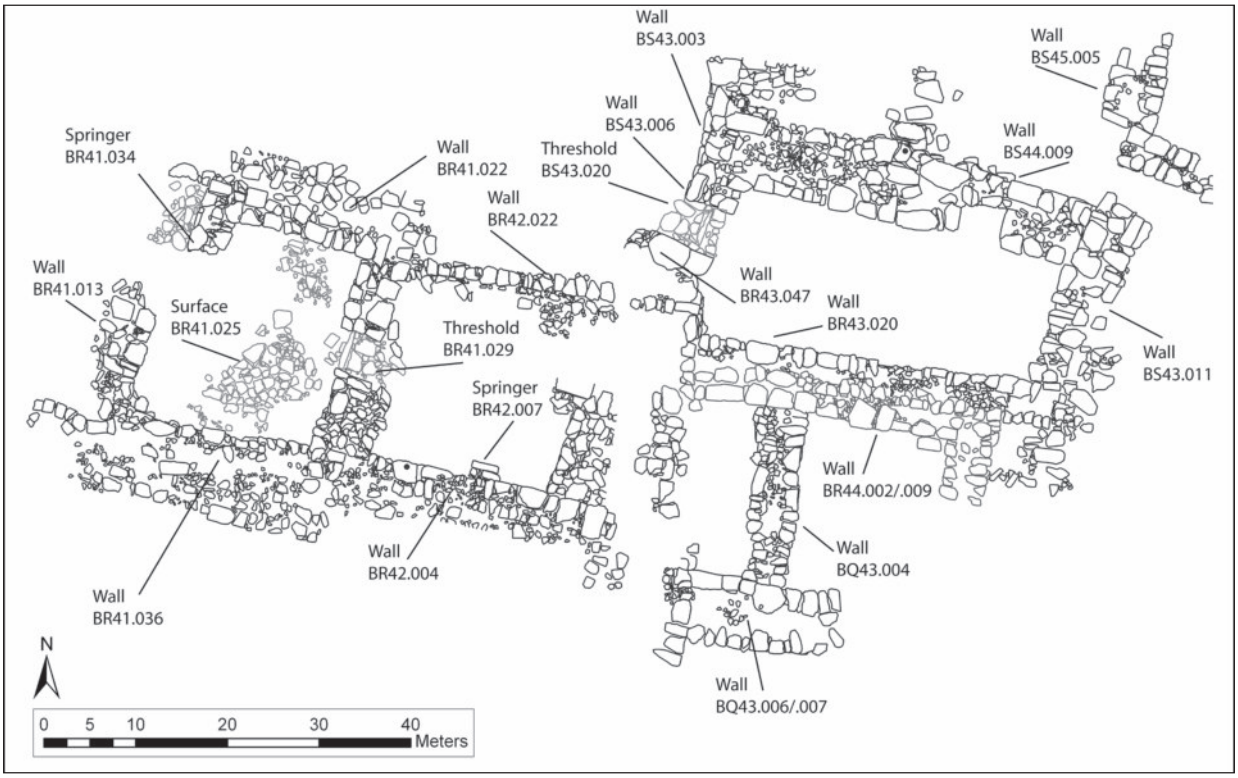

*2. A topographic map of Tall Dhībān overlaid with architecture visible on the surface or excavated in previous campaigns. The inset map displays the Field L units that are discussed in this report (prepared by A. Wilson).*

All objectives were achieved during this season. The outcomes of objectives (1) and (4), respectively supervised by Andrew Wilson and Katherine Adelsberger, are reported in a separate *ADAJ* report (Fatkin *et al*. in press). Objective (3) will be discussed in a forthcoming publication. This report describes the outcome of objective (2), the excavations in Area L East and West, and presents new radiocarbon dates, numismatic evidence, and site preservation and development activities.

**Excavations in Area L West**

During the 2009 season, excavations in Area L West continued the work started in 2004 and 2005 (Porter *et al*. 2004: 204-212, 2010: 13-19). To summarize preliminary results, three seasons of excavation in Area L West have exposed clusters of structures on the east and west sides of the field oriented towards an open courtyard, or street, containing cisterns and a drain in the center (**Fig. 3**). Parts of at least two structures have been exposed on the west side of the open central area, while parts of perhaps three structures have been exposed on the east. Whatever the configuration at the time of construction, it is clear that this area experienced several alterations over the course of its occupation, before rock fall and colluvial deposits filled in the structures. These alterations, which include pitting, ephemeral *ṭābūn* and surface formations, as well as wall damage and makeshift repairs, are all expedient and piecemeal in nature. This suggests significant shifts in occupational strategies at Dhībān, perhaps indicating an extended period of economic stress and residential instability just prior to the abandonment of the Middle Islamic settlement. Given the importance of site abandonment to our understanding of the Middle and Late Islamic periods in Jordan, as well as the uncertainty surrounding both the relative and absolute archaeological chronologies of these periods, careful attention to stratigraphic detail in so-called 'post-occupation' or 'squatter' phases is essential for any progress to be made on the basis of archaeological evidence. These layers have therefore been prioritized in both fieldwork and analysis.

Excavations during the 2009 season generally support the stratigraphic phasing determined during the 2004 and 2005 seasons. However, the imposition of uniform phasing across units and




*3. Map of Field L West Phase 2 architecture*

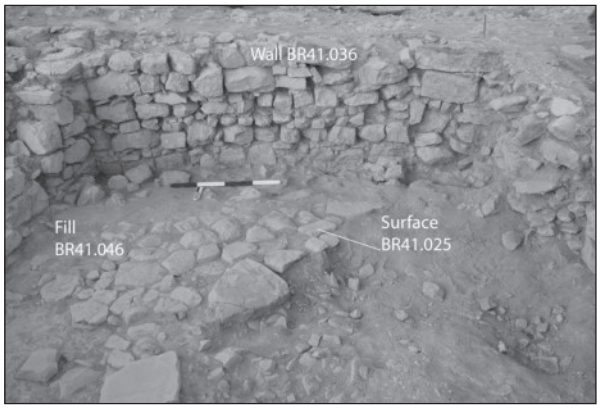
structures is an artificial convention maintained primarily for the purpose of exposition, as Field L is characterized by intensive and highly variable post-construction alterations. In general, rock fall, the one consistent deposit across the entire field, has been used to divide Phase 1 (rock fall and above) from Phase 2 (below rock fall to construction of visible structures). So far, Phase 2 has been divided into Sub-phases 2a and 2b, with 2b representing the first prepared surfaces encountered below rock fall, and 2a representing ephemeral occupational deposits positioned stratigraphically between Phases 2b and 1. As is detailed below, Phase 2a activity varies from unit to unit, ranging from the accumulation of debris compatible with post-occupation midden deposits, through active pitting and makeshift wall repair, to the construction and use of installations (e.g. *ṭābūn*, ephemeral surfaces, stone-lined bin or channel). Phase 2b is more substantial, a phase in which features were built on plaster or thick, beaten-earth floors.

*Phase 1*

Much as noted in previous reports (Porter *et al*. 2005: 207, 2010: 15), wherever excavation commenced, thick deposits of jumbled rock fall and fill containing artifacts of mixed date - up to the twentieth century AD – were encountered. In 2009, Phase 1 materials were excavated in Units BR41.035 and .037, BR42.001 and BS43.001, .002, .004, .005, .009 and .014.

*Phase 2*

In previous seasons, several Phase 2 walls associated with the Middle Islamic settlement were identified, but it was unclear in several places how these features might coalesce into discernable architectural units (Porter *et al*. 2005: 205, 2010: 15-19). The 2009 season greatly expanded the project's understanding of the relationship between Phase 2 architectural units first identified during the 2004 and 2005 seasons. Beginning with Unit BR41, on the far western side of Area L West, further excavation has revealed a clear architectural unit. This building is defined by Walls BR41.022 on the north, BR41.033 (= BR41.009) and BR41.032 on the east, BR41.013 on the west and BR41.036 on the south. The building was entered from the east via a doorway with a paved Threshold




*4. The north side of Wall BR41.036 and flagstone Surface BR41.025. This surface does not run up against the wall, but instead abuts Fill BR41.046, which in turn abuts Wall BR41.036 (photo by C. Morgan)*

BR41.029. The roof of this building was supported by a least one arch spanning the width of the room from north to south, as attested by BR41.034, a springer bonded to Wall BR41.022. Beyond the limits of the revised grid of 2005, the collapse of a portion of the western balk of 2004 revealed that Wall BR41.009 was probably part of a doorway leading west. If the interpretation of features visible in the section is correct, then excavations in Unit BR41 have thus far exposed one Phase 2b vaulted room, very close to 5x5m in area, within a multi-room structure. In 2009, soil deposits were excavated north of Wall BR41.036 in order to determine if flagstone Surface BR41.025 ran up to the wall. Surprisingly, it was determined that this surface does not run up against the wall, but instead abuts Fill BR41.046, which in turn abuts Wall BR41.036 (**Fig. 4**).

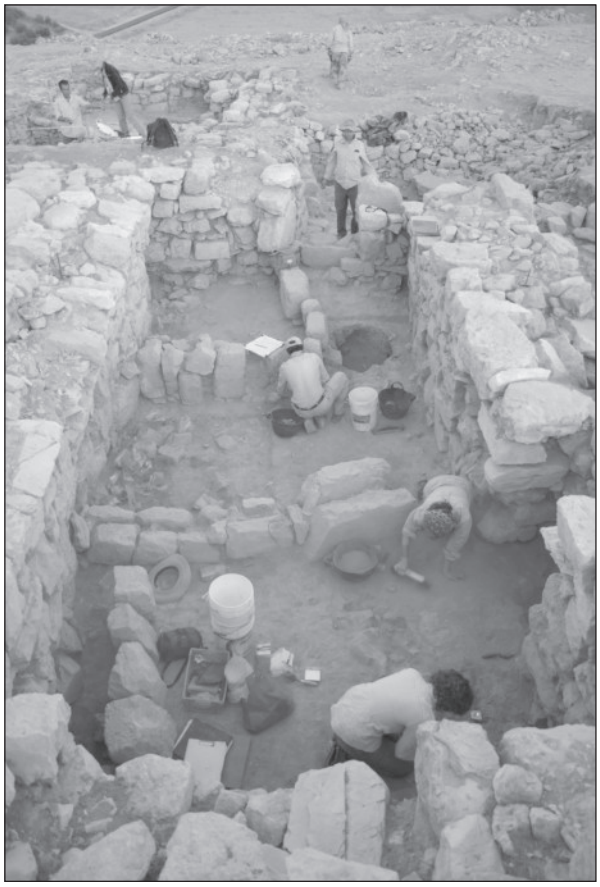
In Unit BR42, another architectural unit emerged, although its perimeter has not yet been completely defined. This architectural unit shares Threshold BR41.029 with Unit BR41, one of the only identified passages into the room so far. Wall BR42.004 defines the room's southern limit and is an eastward continuation of Wall BR43.036. Installation BR42.007 was attached to this wall and appears to have been a springer for a ceiling arch. The western edge of the room, south of the doorway, is Wall BR42.020. The northern perimeter of the room may be Wall BR42.022, which was made visible on the surface with some limited articulation. Future excavations in the northern half of Unit BR42 will

test this hypothesis. The investigation of soil layers was limited to the southern half of the unit. Fills BR42.002, .003, .005 and .019 were excavated until arriving on probable Phase 2a or 2b Surfaces BR42.011 and .021. These surfaces appear to have been cut in the eastern part of the unit.

The thick courtyard Surface BS42.058/036 that was identified in 2005 (Porter *et al*. 2010: 17-18) was further exposed in the eastern half of Unit BS43. Wall BR42.022 is the courtyard's southern boundary and Wall BS43.006 its eastern boundary. In prior seasons, Phase 1 and 2a materials were excavated in Unit BS42 above the Phase 2b courtyard surface. In 2009, a similar sequence was discovered. Phase 1 materials were assigned to Fills BS43.014 and BS43.007, while Phase 2a evidence was present in the form of two very large, adjacent, flat-lying stones that appeared at the bottom of Fill BS43.007. This structure was likely related to the ephemeral Phase 2a settlement activity found to its west in 2005 (e.g. Pit BS42.056) (Porter *et al*. 2010: 17). Beneath this structure, Fill BS43.019 eventually gave way to the Phase 2b Surface BS43.021 that equals Surface BS42.058/036 further west. Surface BS43.021 slopes upward as it approaches Wall BS43.006 but, 0.2m before the wall, the surface dips down to expose a lower course of the wall. This change may be due to animal burrowing along the west face of the wall. No excavations in or beneath the surface were attempted in 2009.

Embedded in Surface BS43.021 was the eastern extent of stone-lined Drain BS43.022, portions of which were identified in 2005 as BS42.062. South of the drain, 2 - 3 medium flat stones were found sitting in Surface BS43.021. These stones may be the start of a flagstone surface that could be investigated in future seasons. In order to understand this installation and surface completely, the northern half of Unit BR42 will need to be excavated. The excavation of Fill BS43.019 and Surface BS43.021 helped to partially define the relationship with Threshold BS43.020, the entrance to the barrel-vaulted building described below. It was discovered that the top of Fill BS43.019 ran up to the top of Threshold BS43.020, while Surface BS43.021 ran up to the bottom of the threshold. These relationships give rise to two phasing scenarios. Either Surface BS43.021 is in phase with the 2b surface inside the barrel-vaulted room (i.e. a person would need to step up to enter the room), or Surface BS43.021 is in phase with a yet-to-be discovered surface beneath the present 2b surface in the same room. If the latter scenario proves to be correct, Surface BS43.021 and its associated surfaces in Unit BS42 might have been constructed during an even earlier phase (2c?) and reused in 2b. The continued excavation of the barrel-vaulted room and threshold in future seasons will determine which scenario is correct.

Since 2004, a barrel-vaulted room has been excavated across Units BR43, BS43, BR44 and BS44 (Porter *et al*. 2005, 2010). In 2009, the room was further investigated down to the room's first prepared Phase 2b surface (**Figs. 5, 6**). The walls that define this room are, moving clockwise from Threshold BS43.020, Walls BS43.003, BS44.009, BR44.011, BR44.002/009,



*5. Excavation activity in the Middle Islamic barrel-vaulted room: Units BR43, BS43, BR44 and BS44 (photo by C. Morgan).*


*6. Overhead view of the Middle Islamic barrel-vaulted room (photo by B. Porter).*

BR43.020 and BR43.047. As of the 2009 season, the foundations of these walls had not yet been reached, although this is a goal for future seasons. Entrances into this room seem to have changed over phases. During Phase 2b, Threshold BS43.020 on the north-west was the only entrance into the room. At the north-east corner of the room, there appears to be an entrance in Wall BS44.009 that was in use during earlier phases of the building but was blocked during Phase 2b. More excavation will confirm this possibility. In 2005, the entrance to Cistern BS44.042's was discovered cut into the west end of Wall BS44.009 (Porter *et al*. 2010: 19), but no further revelations about its phasing were forthcoming in 2009.

Phase 1 of this room consisted of the typical topsoil and roof debris found throughout Area L West. Portions of this phase have been excavated in the eastern and south-western areas during previous seasons (Porter *et al*. 2005: 204-207, 2010: 18). Similar Phase 1 materials were encountered in 2009 in Fills BS43.004 and BS43.005, located above and to the south of Wall BS43.003. Phase 2a materials were found below these deposits in Fills BS43.010 and BS43.012, which possessed a different soil composition and contained more objects than above. In the eastern half of the room, most of the Phase 1 and some Phase 2a material was removed in 2005 (Porter *et al*. 2005: 205, 207, 2010: 17-19); the remaining deposits were removed in 2009. Phase 2b was characterized by roof and wall collapse interspersed with evidence for ephemeral settlement episodes. Fill BR44.017 was a typical collapse level with large ashlars and limited amounts of soil. In the north-east corner of the building, a fire installation (Fill BR44.16 in Installation BR44.018) cutting into Fill BR44.017 was exposed, containing a majority of charcoal. This feature was oval on the surface, but its interior shape was irregular, making it difficult to define its limits. Another fire Installation BR44.020, this time containing ashy material, was discovered in Fill BR44.019. Also irregular in shape, this feature contained several large *ṭābūn* fragments and appears to be the remains of an oven. A limited Surface BR44.022 of small cobbles was associated with this latter installation. Underneath this surface, Fills BR44.022, BR44.024, BR44.026 and BR44.027 were excavated down to the more substantial Phase 2b surface.

The Phase 2b surface is the most substantially prepared surface to be excavated from the Middle Islamic settlement. The first trace of this surface was found at the end of the 2005 season, in *ṭābūn* Installation BR43.025, but it was only partially excavated (Porter *et al*. 2010). In 2009, the top of the surface was completely exposed throughout the room as well as the installations that were built on and into it. The room's Phase

2b Surfaces included BS43.018 and BR43.048 in the western half, and BR44.035, BR44.038 and BR44.058 in the eastern half. Altogether, the surface was inconsistent across the room, with plaster preservation being best to the east. To the west, the surface consisted of beaten earth and some plaster. A high resolution data collection strategy was employed to collect macro- and micro-artifacts in order to identify activity areas. The surface was divided into a sub-grid of 10 x 10 cm squares and all objects and soil were collected for a depth of between 5 and 10 cm. The location of all objects was recorded using a total station, all floor material was collected for flotation, and phytolith, soil chemistry and micromorphology samples were taken from each sub-grid square. Analyses of these materials are currently underway at UC Berkeley and Knox College.

Four installations were built on and into the Phase 2b surface:

The first, Installation BR43.050 (Fill BR43.051), was a ring of medium-sized stones containing soil that was located in the room's south-west corner. The feature cut deeply into the surface.

The second, Installation BR43.049 (Fill BR43.040), extended out from the room's southern wall. It consists of four large, upright stones on its eastern face and probably one more a small distance away to the north-east. The construction method – with the uprights being propped up in part by small cobbles and chinks – closely mimics that of other installations in the barrel-vaulted room, especially Bin BR44.032 described below. Fill BR43.040 first consisted of many medium-sized stones, packed in such a way as to suggest a deliberate fill. These soon gave way to a loose, brown fill that contained very few artifacts. The base of the fill corresponded both with the bottom of the large upright stones and with an apparent continuation of Surface BR43.048 underneath the installation.

The third installation, BR44.039, consisted of 13 limestone blocks on a curvilinear north-south axis. The blocks range in size from 80cm x 30cm x 50cm to 5cm x 2cm x 1cm. These blocks run from the south wall to a point 50cm away from the north wall, with no clear function at either end. The channel between the two courses of blocks ranges in width from 23cm at the southern extent to 5cm between the large ashlars at the northern extent, with a depth ranging from 20 to 30cm throughout the gap. There is one blocking stone before the ashlars at the northern extent, but it did not appear removable and its function is not obvious. Fill BR44.037 in the center of the drain was sealed by a lining of flat rocks. There were very few objects in the interior and the entire fill was collected for flotation. The function of the drain is unclear. While it has the apparent shape of a drain or channel for water, it does not terminate in a storage feature like a cistern. The feature may have been used as a drain and then later used as a room divider in Phase 2b.

The fourth installation, Bin BR44.032, consisted of five large ashlars aligned vertically on an east-west axis. This unusual method of construction (vertical rather than horizontal alignment) implies that this bin was built to maintain a certain height rather than contain materials. The ashlars also had gaps between them, with little apparent attention to chinking or sealing these gaps, also implying that the bin was not made to contain materials. The ashlars were set on top of smaller, leveling stones, similar in construction to the other installations in the building. There were three layers of fill in the bin, the first being an ephemeral ashy Fill BR44.028 at the very top. This layer terminated with a flat stone lining. Below this was Fill BR44.036, consisting of mixed dirt and cobbles. This fill was a different color (5YR 4/2) and texture than the previous fill. Objects were relatively rare and there was a more concentrated matrix with daub, clay and charcoal inclusions. This fill terminated at Surface BR44.038. The bin's entire contents were collected for analysis.

One additional feature, Pit BS43.017 (Fill BS43.016), located in the north-west corner of the room, may be a purpose-built installation associated with Phase 2b, although an alternative origin as a later animal burrow could not be ruled out. The oval-shaped pit seemed carefully cut on its western and north-western sides, providing a clear section of the area's floor matrix. Although the point at which it cut the floor around the rest of perimeter was clear, the floor matrix was unfortunately ambiguous or absent to the south and east. This irregularity may be due to intensive burrowing activity, which seems to have been

particularly destructive on the southern side. The soil in the pit was very loose and clean, with an abundance of pottery. The bottom of the pit was easily recognized when a hard clay surface curving inward toward the center was reached.

In all Phase 1 and 2 contexts, stone, bone, ceramic, glass, botanical and phytolith samples were collected and processed for future analysis. Generally, Phase 1 contexts associated with topsoil and roof collapse revealed a mixture of ceramic vessel evidence dating to all periods of Dhībān's occupation, from the Early Bronze Age to the present day. Phase 2a and 2b contexts demonstrated slightly more homogeneity with regard to ceramic dating, with the majority of forms dating to the Middle Islamic period, followed by the Roman, Byzantine and Early Islamic periods. The latest Middle Islamic material tended to consist of handmade geometric painted wares, and the green and yellow glazed bowls that are diagnostic of the time period.[4] Although several sherds were recovered, none were completely restorable.

Within the barrel-vaulted room's Phase 2b surface, two objects of note were excavated. The first is a large handmade geometric painted jar that was broken and embedded in different areas of the eastern half of the room's Phase 2b surface. Unfortunately, not all of the pieces were recovered, but those that were indicate that the vessel was relatively substantial. The rim diameter is 28cm and only *ca.* 30 % of the rim, neck and body are preserved. The vessel's exterior was decorated with an elaborate vegetal and floral design in black pigment. The vessel is currently being restored and prepared for illustration.

The second object consists of two broken rim sherds of a single vessel, decorated with blue paint under a colorless alkaline glaze (**Fig. 7**). This incomplete vessel was also found imbedded in the Phase 2b Surface, this time on the western side of the room. The vessel is a deep curved bowl with a slightly carinated rim. The diameter is 21cm and 60 % of the rim was recovered. A blue line decorates either side of the rim. On the exterior, two vertical registers are

*7. Obverse and reverse of a rim sherd from a bowl decorated with blue paint under a colorless alkaline glaze (photo by B. Porter and K. Leu).*

preserved that contain horizontally arranged semi-circles. On the interior, a garland register of floral and vegetal designs is preserved. Based on parallels from other excavated contexts in the Levant (e.g. Karak, Ḥamiah) and Egypt (e.g. Fustat), Milwright dates the introduction of similar vessels to the fourteenth century AD, describing them as influenced by the Chinese porcelain that was in circulation at that time (Milwright 2008: 232-236). Radiocarbon dates from the building's Phase 2b surface corroborate this fourteenth century date (see below).

Altogether, excavations in Field L West in 2009 strengthened initial conclusions that the Phase 2b material reflects the end of the last substantial Middle Islamic settlement at Dhībān. According to the results of radiocarbon analysis discussed below, this phase should be dated to the late fourteenth or early fifteenth century AD. This *terminus post quem* makes sense in light of descriptions of the Mamluk empire's economic

4. The authors are preparing a full report on the Middle Islamic pottery corpus. See Porter et al. 2005: fig. 8 and Porter *et al*. 2010: fig. 10 for examples from previously excavated contexts. Similar vessels were found in the described contexts during the 2009 season.

de-intensification in Jordan that began in the late fourteenth century (Walker 2004). The ephemeral Phase 2a surfaces that followed the Phase 2b settlement speak of possible failed attempts to reoccupy the site during the end of Mamluk empire and beginning of Ottoman imperialism – a time of uneven political and economic transition throughout the Levant. Radiocarbon analysis (see below) places these ephemeral squatter activities in the sixteenth century AD. Phase 1, while greatly disturbed owing to erosion and recent activities, contains material culture spanning the sixteenth century to the contemporary period. These ephemeral objects (e.g. Porter *et al*. 2005: fig 9.3), lacking any association with architecture, are the result of occasional seasonal camping activities that occurred during the Late Islamic period.

While the project is gaining a better sense of Middle Islamic Dhībān's abandonment, there remains a lack of understanding regarding the Middle Islamic settlement's foundation. Questions still in need of answering include: When did settlement intensification begin? Did imperial demand or market command motivate the settlement's economic intensification? And what were the settlement's major industries? The project predicts that additional phases associated with the Middle Islamic settlement's foundation will be identified below the Phase 2b surfaces that can answer these and similar questions. At the end of the 2009 season, limited sampling below the Phase 2b surface revealed additional laminations. Furthermore, the tops of features and walls became apparent once the Phase 2b installations were removed following their documentation. These features are likely related to Phase 2c and will receive careful attention in future seasons.

**Excavations in Area L East**

Area L East refers to William Morton's original Area L trench (Areas LI - III) that was excavated primarily in 1956 and 1957 and has been left open until the present day. In this excavation area, measuring *ca.* 15 x 14 m, Morton uncovered a large building dating to the Iron II period, several walls from the Late Hellenistic / Early Roman period, and a substantial Middle Islamic residence. The results of Morton's excavations at Dhībān are largely unpublished (but see Morton 1989), but the field notes are in the possession of the DEDP, who are in the process of bringing Morton's excavation to publication. One of the DEDP's primary goals in excavating in Area L East is to clarify the sequence excavated by Morton in order to facilitate this publication.

As a result of being exposed to the elements for more than 50 years, the edges of Area L East are heavily eroded, with thick deposits of colluvial wash accumulated at the base of the slopes on all four sides of the trench. The primary goals here in 2009 were: (1) to clean up the bottom of Area L East in order to re-expose the Iron Age architecture that Morton left in the bottom of the trench and (2) to excavate the eroded slopes of Area L East in order locate the surviving edges of Morton's trenches, with the aim of identifying *in situ* deposits immediately adjacent to those excavated by Morton. Excavating such deposits would permit a better understanding of the area's stratigraphy in more detail than is possible from Morton's excavation notes alone. Additionally, because erosion affected the upper portion of the trench sections more than the lower sections, excavating slopes provides access to the earlier occupation layers at Dhībān more readily than is possible elsewhere on the site, where Iron Age and Late Hellenistic/ Early Roman deposits are overlaid by substantial Byzantine, Early Islamic and Middle Islamic evidence.

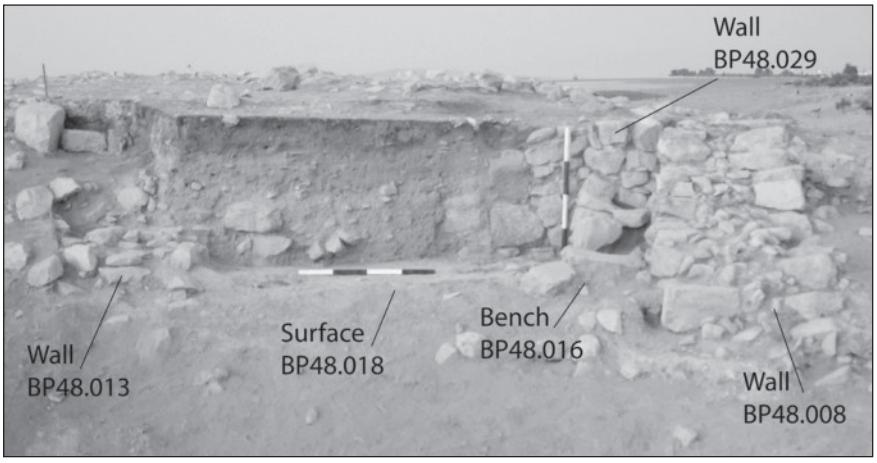
In order to facilitate these goals, a large scale clearance, cleaning and remapping of the walls remaining from Morton's excavations was initiated. While this was labor and time intensive, these efforts were rewarded by the re-exposure of Morton's Walls 8, 15, 16 and 17 (Morton 1989: fig. 13; Routledge 2004: fig. 8.1). These walls are all founded on bedrock and form a central rectangular room that is clearly part of a larger building. This was particularly evident on the west side of Area L East where excavations have traced portions of two additional Iron Age walls associated with this same building. Re-exposing the Iron Age walls excavated by Morton has achieved two things. First, it has demonstrated the general accuracy of Morton's architectural plans, which were integrated into a GIS base map during the 2009 season (Fatkin *et al*. in press). Second, it has provided the opportunity to consolidate a substantial Iron Age build-

ing for the purposes of site presentation. While the Mesha inscription indicates that Dhībān was an important site for the Iron II period in Jordan, there are at present very few remains from this period visible to visitors to the site. Over the next several seasons, the project hopes to change this situation by continuing to expose, consolidate and interpret this important Iron IIB building.

In 2009, excavation of the eroded slopes of Area L East was conducted in three units. The first was Unit BP48, located on the south side of the trench, near the south-east corner (**Fig. 8**). Unit BP48 was located at the top of the slope, incorporating level ground along its southernmost side. As this level ground was adjacent to one of the primary access routes to the excavation area, the southernmost 1.5m of the grid square were left unexcavated, resulting in an excavation area of 3.5m north-south by 5m east-west. This excavation area included an irregularly shaped 'step' along the southern section at the point where the level ground began to erode and the slope broke sharply. This 'step' measured 4m west - east and between 40-60cm south-north. It was 35-70cm higher than the rest of the unit and contained several loci that appear to have been removed by erosion elsewhere in the square.

The sequence of deposition is relatively straightforward in BP48. In the area of the 'step', Topsoil BP48.001 overlies two successive layers of very fine grained, ashy deposits BP48.004 and BP48.005; these seem to represent the accumulation of aeolian sediments after the site's abandonment. The end of the 'step' was reached beneath BP48.005. The remaining loci excavated in 2009 extend from the southern section at 1.5m north to the next break in slope at *ca.* 3m north. The first of these larger loci is Fill BP48.006/007, a soil layer visible beneath BP48.005 in the 'step' and traceable immediately below the surface to the north after vigorous cleaning. The exposed nature of the northern portion of this locus was illustrated by the fact that it was cut by Pit BP48.009/010, which contained the head of a twentieth century *tureya*. The excavation of BP48.006/007 exposed the primary architectural features of Unit BP48. This was a room defined by Walls BP48.008 and BP48.013 on the west and east sides of the unit respectively, as well as Wall BP48.029 to the south-which is partially visible in the section. To the north this room was truncated by erosion *ca.* 1.5m north of the southern section line. The western Wall BP48.008 was built as two rows of stone with rubble Fill BP48.003, a pattern already familiar from Middle Islamic architecture in Area L West. Wall BP48.008 is preserved for a length of *ca.* 2.85m. The bottom of this wall has not yet been exposed. At present it has a maximum preserved height of 1.45m. On the eastern side of the square a very poorly preserved Wall BP48.013 was uncovered. Wall BP48.013 is preserved for a length of only 1.2m and a height of just one course. It is of an uncertain construction pattern that may also be a double row with rubble fill.

Walls BP48.008 and BP48.013 define a room whose other primary feature, at least in its final phase of occupation, was a low Bench BP48.016 built against the eastern face of Wall BP48.008. This installation consisted of one course of rectangular, semi-shaped stones embedded in a foundation of mud and field stones. Bench BP48.016 abuts Wall BP48.008, which is




*8. Phase 2 architecture in Unit BP48, looking south (photo by C. Morgan).*

clearly earlier than this installation. Less clear is the relationship between Bench BP48.016, Wall BP48.008 and thick plaster Surface BP48.018, which represents the uppermost living surface in Unit BP48. This hard surface clearly seals up against Walls BP48.013 and BP48.029 and covers most of the uneroded portion of the unit. However, on the western side of the square, the relationship between this floor and both Bench BP48.016 and Wall BP48.008 is cut by a long animal burrow: BP48.011/015. The facts (1) that Surface BP48.018 was not evident beneath Bench BP48.016 when it was removed and (2) that there was no evidence for an intervening foundation trench between Surface BP48.018 and Bench BP48.016 suggests that the two were constructed together in the final construction phase of the room. This relationship, however, is not directly attested by stratigraphic evidence.

Surface BP48.018 consists of thick plaster ranging from 5 to 8cm in thickness. The top 5cm of this surface was divided into 1x1m sub-grid units. Soil chemistry, phytolith and micromorphology samples were taken from each sub-grid with plaster flooring covering more than 50% of its area. This meant that samples were taken from four sub-grids (13, 14, 18 and 19) out of the 25 possible in this 5x5m unit. In addition, all of the plaster surface was floated by sub-grid, with objects embedded in the top 5cm of flooring being individually point-provenanced by total station. The latest material embedded in this floor was diagnostic of the Middle Islamic period, providing a *terminus post quem* for the use of this surface and the final use of the Unit BP48 room. Whatever plaster surface remained after the top 5cm was removed was collected for flotation under the locus number BP48.020.

The removal of Surface BP48.018/020 and Bench BP48.016 marked the end of the 2009 season. Beneath Surface BP48.018, excavation ended on what could be another surface, consisting of a small area paved with flagstones embedded in plaster, provisionally identified as BP48.025. How this feature relates to the remainder of the unit is unclear, although it is evident that Walls BP48.008 and BP48.013 both continue below the level at which excavation ceased in 2009. When compared to excavations in Area L West, the occupational sequence in Unit BP48 was much simpler, lacking the evidence for ephemeral room use between the fifteenth and twentieth centuries. Most of the architectural collapse that is characteristic of Area L West's Phase 1 was eroded in Unit BP48, with the resultant exposed layers being disturbed by twentieth century activities. In terms of the phasing developed for Area L West, plaster Surface BP48.018 would represent Phase 2b. However, Phase 2a is not clearly attested.

The second unit to be excavated in Area L East in 2009 was Unit BR47, a small trench located along the west section of Morton's trench (**Fig. 9**). Excavations in an adjacent trench in 2005 (labeled L-Sect, or LII-III in Porter *et al*. 2010: 28-29, figs 15-16) revealed a sequence of pre-Middle Islamic occupation consisting mainly of pottery-rich Early Roman fills and some 2m of well stratified remains associated with Morton's Iron II building, including three successive plaster floors. In 2009 Unit BR47 was opened, which encompassed the area of the 2005 sounding (formerly designated as L-Section) and the slope immediately north of this area. Even before excavation, it was clear that the Unit BR47 slope was more heavily eroded than


*9. Field L East section, looking west (photo by C. Morgan).*

either L-Sect or Unit BS47 (see below), with no post-Roman deposits surviving within the excavation area. A substantial deposit of eroded slope wash, Fill BR47.001, was removed from this area. Upon removal, the western edge of Morton's original excavation trench was found. Unit BR47's final shape measured *ca.* 2.60m north-south and 1.65-2.0m east-west. The northern side of the unit ran along the middle of wall BR47.007, which effectively divided BR47 from unit BS47 to the north.

Unfortunately, it immediately became evident that even the *in situ* portion of this unit had experienced significant disturbance. =At the top of the slope, a very large and deep animal Burrow BS47.002 was found that cut through the uppermost soil layers, BS47.006 and BS47.008. Once this had been excavated and the area thoroughly cleaned it became apparent that the burrow itself was cutting into Foundation Trench BR47.019 for Wall BR47.007. In the south-west corner of the excavation area, between the limits of the 2005 sounding to the south and Foundation Trench BR47.019 to the north, a small 'island' of preserved Iron Age deposits was found with maximum dimensions of 1x0.60m. This Iron Age 'island' contained layers associated with the adjacent L-Sect trench of 2005 (BR47.003 and BR47.005 = L-Sect. 011).

Foundation Trench BR47.019 cut the preserved Iron Age layers and contained Fills BR47.006, BR47.008, BR47.009, BR47.010 and BR47.011, all of which seem to date to the Late Hellenistic/Early Roman period based on a preliminary analysis of their pottery assemblages. Pit BR47.019 seems to have been cut as the foundation trench for Wall BR47.007. All of the layers filling Foundation Trench BR47.019 contain a rather high density of ceramic vessels, especially in relation to other common artifact classes such as faunal remains. The layers of this trench are primarily distinguished by their inclusions. The lowest layer, BR47.010, is filled with large cobbles and small boulders. It clearly runs underneath Wall BR47.007 and was deposited before the wall was built, perhaps as an initial fill to level and stabilize the ground on which the wall was constructed. Abutting BR47.010 in a strip along the east side of the excavation area is Fill BR47.011, which is defined primarily by the presence of burned and ashy soil layers, and the absence of large cobbles similar to those found in BR47.010. Above Fill BR47.010 are Fills BR47.008 and BR47.009, which are distinguished by the presence (BR47.008) or absence (BR47.009) of a high density of coarse gravel and *ṭābūn* fragments. Fill BR47.008 runs directly underneath Wall BR47.007 and over Fill BR47.010. Fill BR47.008 appears to be the layer upon which the lowest course of Wall BR47.007 was laid. Fill BR47.006 overlies Fill BR47.008 and represents the latest fill of Foundation Trench BR47.019. Unfortunately, the truncation and disruption of this locus by the large animal Burrow BR47.002 makes it impossible to determine with confidence the surface level from which Foundation Trench BR47.019 was cut. There is no evidence for an Early Roman surface associated with Wall BR47.007 on its south side, but a possible surface is visible in section on the north side of this wall in BS47, as described below. Therefore, Unit BR47 may have been exterior to the building defined by Wall BR47.007. The removal of Fill BR47.010 revealed the bottom of Foundation Trench BR47.019. Excavation ended with Fill BR47.012, a thin layer of compact soil lying over an as yet unexcavated plaster surface that appears to be part of a sequence of superimposed plaster floors ending with Surface BR47.018 (see below). Fill BR47.012 was not completely excavated in 2009, but appears to be Iron IIB in date.

As noted, the 'island' of preserved Iron Age material on the south side of the excavation area continues the sequence from the L-Section sounding of 2005 (Porter *et al*. 2010: 28-29). Fill BR47.003 is a layer of very dense and compacted sediment containing boulders and large cobbles. This deposit is evidently the result of post-occupation collapse on to the last phase of occupation of the large Iron Age IIB building uncovered by Morton's excavations. Beneath this layer was Surface BR47.013, the first of the building's two plaster floors, which had a deposit of collapsed *ṭābūn* material lying on top of it, *viz*. Fill BR47.005. In this fill, a molded head of a bearded male figurine with prominent ears was discovered (**Fig. 10**). The figurine is a very close match with figurines found elsewhere in Moab, e.g. Khirbat al-Mudayna on Wādī ath-Thamad and Bālū' (Glueck 1934: 25, figs. 7a-b). Surface BR47.013 was a well made plaster

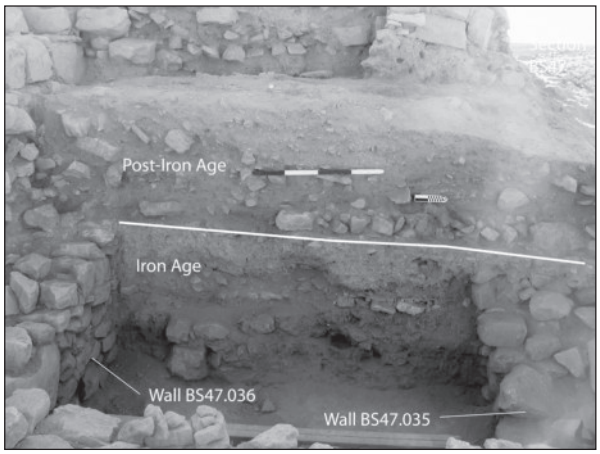

*10. An Iron Age IIB figurine excavated in BR47.005 (illustration by K. Leu)*

floor *ca.* 2cm thick, preserved over an area of just 80x40cm. Unfortunately, animal burrows ran under and through the floor to such an extent that phytolith and soil chemistry samples were not taken owing to the likelihood of contamination. Surface BR47.013 was laid over a foundation of flat, cobble-sized stones that provided substantial floor support. As in 2005, an earlier plaster Surface, BR47.018, was uncovered beneath the BR47.014 underflooring, with 40cm of fill (BR47.016, BR47.017) between them. Surface BR47.018 was thicker (3 - 4 cm) and better preserved than Surface BR47.013. As a result, soil chemistry, phytolith and micromorphology samples were all taken from the one sub-grid (11) where this floor survived. In addition, the first 3cm of this floor was floated and all of the artifacts embedded in the surface were point-provenanced. A preliminary analysis of the pottery suggests that the entire preserved Iron Age sequence in BR47 dates to the Iron IIB period. Excavation in BR47 ended with the removal of Surface BR47.018, but it is evident that a sequence of superimposed plaster floors, likely Iron Age in date, underlies BR47.018 and remains to be excavated.

The third unit to be excavated in Field L East in 2009 was Unit BS47, situated immediately north of Unit BR47 along the western edge of Morton's Area L trench. Excavation in this unit initially concentrated at the top of the slope, where a narrow strip (ranging from *ca.* 0.50 to 1.0m in width) of level soil along the western edge of Morton's excavation trench preserved uneroded portions of the later deposits. These deposits were primarily Middle Islamic in date and appear to represent what remains of the eroded eastern end of an as yet unexcavated structure lying mainly to the west in Unit BS46. Most of the excavated deposits lie between the two east-west oriented walls visible in the section. The Middle Islamic sequence begins with rockfall and is followed by fill layers. Although no prepared surfaces were identified in excavation or in the section, flat-lying pottery and stones suggest that the upper interface of a compacted Fill BS47.006 may have served as a surface for this room. Underlying BS47.006 is Fill BS47.014, which runs beneath Wall BS47.012. The presence of Middle Islamic pottery in this locus indicates a Middle Islamic foundation for Wall BS47.012. Beneath BS47.014 a major stratigraphic change was observed, with large quantities of Early Roman pottery embedded in a loose, pebble laden fill devoid of boulders or cobbles. At this point, excavations on the upper portion of the slope was suspended in order to focus on clearing the thick erosion deposits that overlay the eastern portion of BS47 at the base of the slope. This was a major earth-moving operation that took the remainder of the 2009 season.

Removing deposits of slope erosion that were up to 2m in depth in some places achieved two things. First, it re-exposed a number of major walls from Morton's excavations, especially his north-south Wall 8 and Wall BS47.036, which appears to have been truncated by the construction of Wall BR47.007. Wall BR47.007 was clearly built against and slightly over the top of Wall BS47.036. Second, it permitted the original western edge of Morton's trench to be traced and the section to be recut for a length of *ca.* 4m, with a height of *ca.* 2m.

The large north-south section cut in Unit BS47 exposed an interesting stratigraphic sequence that was documented but not excavated in the 2009 season (**Fig. 11**). A series of fill layers, a pit and rockfall overlay a thick plaster Surface BS47.028/029. This plaster floor seals against Wall BR47.007 and runs over the top of the earlier Wall BS47.036. At the northern end of the unit, it also runs above Wall BS47.035. Material collected while cutting this section suggests that deposits down to and including this plaster floor were Early Roman in date. Approximately 40cm below this upper plaster floor, a second plaster floor is visible in the section. This plastered surface has an underfloor foundation of flat stones, much like the Iron Age floors evident in Unit BR47, and was found to contain only Iron II pot-




*11. Profile of Unit BS47, looking west (photo by C. Morgan)*

tery when the section was cut. This lower plaster floor seals against Wall BS47.036 in the south and Wall BS47.035 at the north end of the unit, suggesting that these walls and floors formed a single room at some point, probably in the Iron IIB period. Beneath the stone foundation of this lower plaster floor is a stone built wall or installation (BS47.038) that has been bisected by the section on an oblique angle. At least two, and perhaps three, thin and discontinuous plaster layers that may represent successive floors run north from this wall/ installation and seal against Wall BS47.035. Again, pottery collected whilst cutting the section suggests that these earliest deposits also date to the Iron IIB period, although confident assessments must await the actual excavation of these deposits.

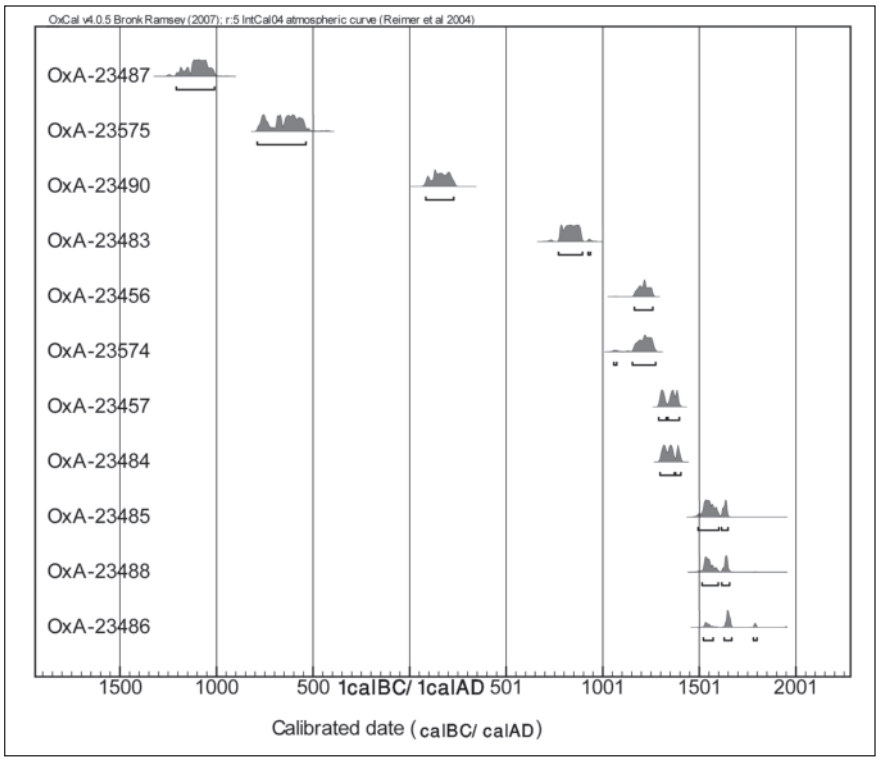
In summary, the preserved occupational sequence in Area L East consists of a large Iron IIB building with at least two and possibly three phases marked by thick plaster floors. This building appears to have been built on land cleared down to sterile marl. Excavations in 2009 did not dramatically change the DEDP's original assessment of the building's construction, use and abandonment during the Iron IIB period, *viz*. the late ninth and eighth centuries BC (Porter *et al*. 2010: 29). New radiocarbon dates (see below) from the 2005 L-Sect trench suggest an Iron IIB date that corroborates the relative date provided by ceramic vessel forms. Clearly, additional research on the building is required before more specific dates can be proposed. Cutting into and building over this Iron IIB structure are Late Hellenistic/ Early Roman walls with associated floors in Unit BS47. The final major construction phase is the building of Middle Islamic domestic structures that seal, rather than cut into, Early Roman layers. In future seasons, the project hopes to document the very thin Iron IIC and Byzantine/ Early Islamic cultural levels that are present in some (e.g. L-Section), but not all (e.g. Unit BR47) areas.

**Radiocarbon Analysis**

The dating of archaeological strata by radiocarbon analysis is an important aspect of the DEDP's research design. Radiocarbon samples consisted of short-lived annual cereal grasses (predominately wheat and barley) and wood charcoal obtained from flotation samples collected from excavated contexts. When possible, cereal grasses were chosen over wood charcoal in order to mitigate the effect of 'old wood' (Schiffer 1986). Sixteen samples were submitted to the Oxford Radiocarbon Accelerator Unit (ORAU) in 2010, eight from stratified cultural deposits in Area L East and West, and the remaining eight from the lowest paleoterrace adjacent to the *wadi* on the west slope. Eleven samples proved satisfactory for analysis; five were withdrawn by ORAU owing to insufficient sample size, all of which were from the paleoterrace. Therefore all eight samples from Area L were available for dating, whereas only three samples from the terrace were possible (**Table 1**; **Fig. 12**). All calendar dates are calculated with OxCal 4.0 using the IntCal04 calibration curve (Reimer *et al*. 2004).

On the paleoterrace, radiocarbon dates show that the colluvial sequence found behind the terrace appears to be stratified chronologically.[5] A sample of wood charcoal from a lower stratum (DM17.005) dates to 85-229 cal AD (2σ, 1856 +/- 26 BP, OXA-23490), while another charcoal sample from a stratum approximately 75cm above it (DM17.002) dates to 1524-1649 cal AD (2σ, 291 +/- 23 BP, OxA-23488). Although further sampling from each stratum could improve the accuracy of these dates, these initial find-

5. A discussion of these terrace features can be found in Fatkin *et al*. in press, in the section entitled Paleolandscape Assessment: Landscape and Hydrology.




*12. Results from radiocarbon analysis of organic materials excavated during the 2009 season (OxCal v.4.0.5 Bronk Ramsey [2007]; r:5 IntCal04 atmospheric curve [Reimer et al. 2004]) (prepared by A. Farahani).*

ings suggest that multiple, small-scale erosional events have been a recurring process in Dhībān's site-formation sequence, consistent with regular slope degradation over time. The observed sequence of coarse layers underlying thin soils within this sequence also supports the idea of regular slope wash, as opposed to large-scale slope failures, as the dominant erosional process at Dhībān. The construction of walls along the edge of this terrace may have been intended to stabilize soil throughout the occupational history of the site, allowing for the development of regular stratification within erosional sequences (Fatkin *et al*. in press).

The eight samples from Area L shed considerable light on dates for Dhībān's settlement episodes. The earliest date comes from a subfloor (L-Sect.020, SG 4.1) in Field L East beneath Surface L-Sect.018 that has been dated by ceramic evidence to the Iron IIB.[6] A barley seed from this flotation sample yielded an earlier date of 1209-1010 cal BC (2σ, 2907 +/- 26 BP, OxA-23487). One explanation for these competing dates is the possibility that materials from the early Iron Age were used to construct Fill L-Sect.020 below this surface to prepare for its construction. The early Iron Age date is strengthened further by the presence of early Iron Age ceramic vessels in the soil matrix (Porter *et al*. 2010: 30). Although this test does not permit a date to be assigned to the floor's construction, it does provide an insight into: (1) Iron II architectural construction techniques and (2) the possibility of an agricultural settlement in the early Iron Age. The next earliest date is also from a barley seed in a lower Surface L-Sect.024 (SG 4.1), yielding 789 - 538 cal BC (2σ, 2511 +/- 30 BP, OxA-23575). Although this is a broad date range - owing to the effect of the 'Hallstatt' Plateau (Kilian *et al*. 1995; van der Plicht 2004) - the earlier half of this range falls comfortably within the Iron IIb dating sequence, which accords with the ceramic evidence recovered in the floor.

Additional light has been shed on Dhībān's Middle Islamic settlement by testing samples from Phases 2a and 2b in the Area L West building complex. A Phase 2b ostensible Bin BR44.036 was sampled in the barrel-vaulted room, from the lowest point of the bin, yielding an anomalous date of 783-880 AD (2σ, 1190 +/- 24 BP, OxA-23483). This date in the Early

6. See Porter *et al*. 2010: 28-29 for a description of the stratigraphy and phasing of L-Section in Field L East.

**Table 1**: List of radiocarbon samples tested following the 2009 season.

| DEDP # | ORAU # | Square | Locus | Bag | SG | Type | Conventional Date (BP) | Calendar Date (1σ) | Calendar Date (2σ) |
|---|---|---|---|---|---|---|---|---|---|
| 1 | OxA-23456 | BP48 | 18 | 213 | 18 | Wheat seed | 832 +/- 24 | 1184 AD – 1252 AD | 1165 AD – 1260 AD |
| 2 | OxA-23457 | BS43 | 18 | 234 | 18 | Wheat seed | 626 +/- 23 | 1298 AD – 1391 AD | 1290 AD – 1397 AD |
| 3 | OxA-23483 | BR44 | 36 | 400 | | Wheat seed | 1190 +/- 24 | 783 AD – 880 AD | 772 AD – 937 AD |
| 4 | OxA-23574 | BS44 | 48 | 192 | 19 | Wheat seed | 825 +/- 37 | 1185 AD - 1259 AD | 1058 AD - 1275 AD |
| 5 | OxA-23484 | BR44 | 35 | 414 | 2 | Wheat seed | 605 +/- 24 | 1306 AD – 1396 AD | 1298 AD – 1405 AD |
| 6a | OxA-23485 | BR44 | 16 | 215 | | Charcoal | 306 +/- 23 | 1522 AD – 1644 AD | 1494 AD – 1649 AD |
| 6b | OxA-23486 | BR44 | 16 | 215 | | Charcoal | 263 +/- 24 | 1530 AD – 1664 AD | 1522 AD – 1799 AD |
| 7 | OxA-23575 | L-sect | 20 | 127 | 4.1 | Barley seed | 2511 +/- 30 | 770 BC - 553 BC | 789 BC - 538 BC |
| 8 | OxA-23487 | L-sect | 24 | 174 | 4.1 | Barley seed | 2907 +/- 26 | 1187 BC – 1041 BC | 1209 BC – 1010 BC |
| PT 4 | OxA-23488 | DM17 | 2 | 14 | | Charcoal | 291 +/- 23 | 1524 AD – 1649 AD | 1515 AD – 16458 AD |
| PT 5 | OxA-23489 | CJ8 | 2 | 14 | | Charcoal | 1.11 +/2 0.003 | MODERN | MODERN |
| PT 9 | OxA-23490 | DM17 | 5 | 17 | | Charcoal | 1856 +/- 26 | 126 AD – 215 AD | 85 AD – 229 AD |

Islamic period suggests a fair amount of sediment turbation within this structure, or deliberate backfilling using older materials from previous settlement episodes. Additionally, evidence from surfaces in the building complex supports the interpretation of the building's continued reuse on either side of the Mamluk's empire's boom and bust economy (Walker 2004). A wheat seed from a Phase 2b floor (BS44.018 SG19) yielded a date of 1058-1275 cal AD (2σ, 825 +/- 37 BP, OxA-23574), while two wheat seeds from two Phase 2b contiguous floors yielded dates of 1298-1405 AD (2σ, 605 +/- 24, OxA-23484, BR44.035 SG 2) and 1290 - 1397 cal AD (2σ, 626 +/- 23, OxA-23457, BS43.018 SG 18) respectively. These results strongly suggest that the building's use began in the early years of the Ayyubid/Mamluk empire – or perhaps even earlier – and continued until the empire's economic interests in the region declined. The Phase 2b surface described above therefore likely dates to the late fourteenth or early fifteenth centuries AD**,** and is probably the last substantial use of the building complex. A charcoal fragment from a much later Phase 2a *ṭābūn* installation (BR44.016) cut into this floor was dated to 1494 - 1649 AD (2σ, 306 +/-23, OxA-23484). These results confirm the date of the building's Phase 2a ephemeral settlement episodes in the latter half of the Middle Islamic and first half of the Late Islamic periods. Altogether, these new dates from the Area L West building complex accord with the results published in previous DEDP reports (Porter *et al*. 2010: 27-28).

## Numismatic Evidence

The coins found during the 2009 season (n = 7) were all made from copper and emerged from the excavation with heavy accretions of dirt and some significant corrosion (**Table 2**). The coins were subjected to a gentle, non-chemical cleaning process, which removed some of the accreted material, but not enough to make precise identifications possible in most cases. As a result, it is recommended that a chemical or electrical cleaning method be used on these coins to discover what further information may be revealed. No inscriptional or design markers were observable on five of the eight coins. One coin is clearly Islamic, but needs further investigation for a more specific identification. Coin 1B has *naskhī*-style Arabic writing on both faces, but it is not possible to decipher these legends.

However, two coins have strong indicators of Mamluk origin. Coin 2 (BR41.003.152) has two Mamluk indicators. The first is its method of production. As the four nodes on the coins perimeter indicate, this coin was struck on a flan that was in turn cut from a strip of molten metal. This method of coin production was quite common in the Mamluk sultanate during the eighth century AH/fourteenth century AD, albeit more commonly encountered with the silver coins. The second indicator is the trace remains of the interlocking six pointed star on one side. This framing device was quite common in the copper coins produced in the Syrian mint during the mid-eighth century AH/fourteenth centuryAD.

**Table 2**: List of coins discovered in the 2009 season with their provenance, weight and size.

| No. | Unit | Locus | Bag | Weight (gr) | Size (mm) | Notes |
|---|---|---|---|---|---|---|
| 1a | BE46 | 3 | 85 | 3.36 | 17 | |
| 1b | BE46 | 3 | 85 | 2.91 | 20 | |
| 2 | BR41 | 3 | 152 | 2.03 | 15 | |
| 3 | BS43 | 1 | 23 | 0.67 | 11x13 | Broken |
| 4 | BS47 | 19 | 225 | 3.59 | 21 | |
| 5 | BE46 | 2 | 33 | 5.64 | 25 | |
| 6 | BR40 | 1 | 3 | 0.73 | 11 | |
| 7 | BS43 | 1 | 5 | 5.43 | 26 | |

Coin 4 (BS47.019.225) also has traces of *naskhī*-style Arabic writing on both sides. In the middle line of one side, the legend …*al-S(āliḥ) `Imad*… is legible. Along with the fabric, size and weight of the coin, this leads to a tentative identification as Type 290 from Balog (1964: 174). Balog identified this type as a dirham-type *fils*, since it has no decorative designs but only epigraphic legends. It is therefore possible that coins of this type were struck in Cairo, since this lack of decoration on copper coins seems to be a marker of difference between the *fulūs* produced by the Cairo mint as opposed to those struck in the Syrian mints. Neither Coin 2 nor Coin 4 was found associated with a surface and therefore they offer no new information that could substantiate the proposed dates for Phase 2.

## Site Preservation and Development

During the 2009 season, the DEDP made important contributions to Dhībān's preservation and future site development. The most significant actions included the consolidation of almost all excavated walls in Area L. The Department of Antiquities' Mādabā Regional Office managed the process, while the DEDP funded the purchase of supplies and technical labor from their research budget. Walls that were not consolidated were backfilled. The DEDP also funded the construction of a 2m high, unconsolidated barrier wall on the northern and eastern sides of Area L, with the aim of diverting herd traffic away from the trenches where future site development is planned. Site visits in 2011 determined that the wall had proved resilient and that only minor repairs are required from season to season. The DEDP remains dedicated to assisting the Department of Antiquities in their goal to develop the site for visitors.

## Acknowledgements

The DEDP wishes to thank the former Department of Antiquities director, Dr Ziad al-Saad, and his staff, particularly Ali al-Khayyat and Bassam al-Mahameed, for their assistance in coordinating research activities. Thanks also to the American Center of Oriental Research and the Council for British Research in the Levant for research support. The research described above was supported by Knox College, the American Philosophical Society, the Max Van Berchem Foundation, the University of California, Berkeley's Hellman Family Faculty Fund and the Archaeological Research Facility's Stahl Endowment Fund, the G.A. Wainwright Fund for Near Eastern Archaeology, and the University of Liverpool. Some data presented in this article will soon be available at Open Context (www.opencontext.org), a publically accessible data archive for archaeological research.

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# WĀDĪ AN-NUʻAYḌIYYAH 1: ANOTHER NEOLITHIC BARRAGE SYSTEM IN THE AL-JAFR BASIN, SOUTHERN JORDAN

*Sumio Fujii, Takuro Adachi, Hitoshi Endo, Masatoshi Yamafuji,*
*Yui Arimatsu and Kazuyoshi Nagaya*

## Introduction

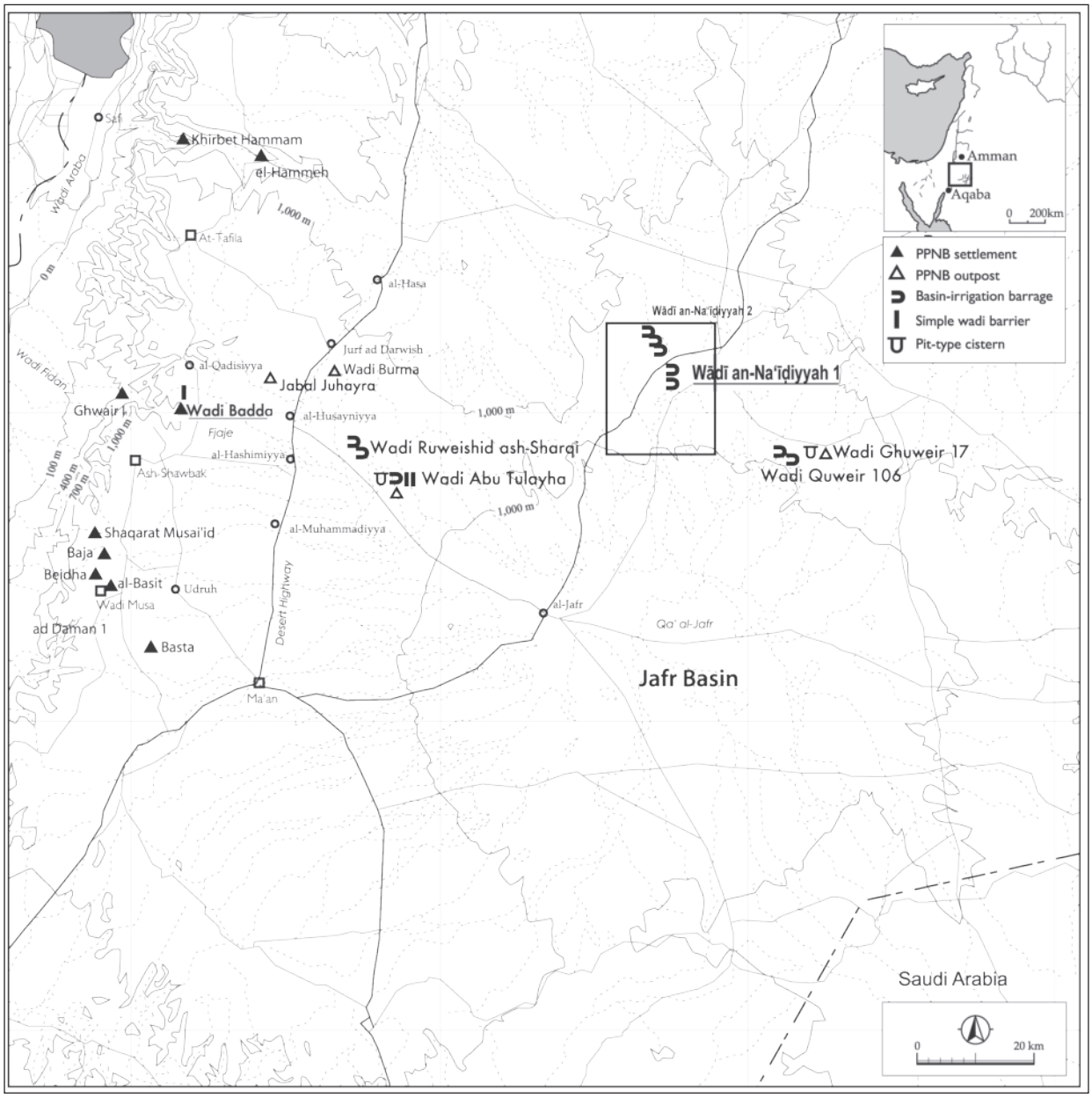
The Jafr Basin Prehistoric Project (JBPP), headed by the first author, started in 1995 with a view to tracing the process of pastoral nomadization in southern Jordan on the basis of archaeological evidence. The first and second phases of this long-term research project were conducted for twelve years, from 1997 until 2008, and addressed the establishment of a local chronology. For this objective, we excavated more than a dozen archaeological sites in the north-western part of the basin, our main research area. This series of investigations has enabled us to draw a rough sketch of a cultural sequence extending from the appearance of short-range pastoral transhumance in the latter half of the Pre-Pottery Neolithic B (PPNB), through a gradual shift into pastoral nomadism in the Pre-Pottery Neolithic C (PPNC) and the Late Neolithic (LN), until the establishment of fully fledged pastoral societies in the Early Bronze Age (EBA) (Fujii n.d.b: fig. 38).

The third phase of the project was designed on the basis of results from the PPNB agro-pastoral outpost of Wādī Abū Ṭulayḥa, which was continuously excavated in the latter half of the second phase (Fujii 2006a, 2006b, 2007a, 2007b, 2007c, 2008a, 2009; Fujii and Abe 2008). Our focus was on investigating the possible correlation between PPNB pastoral transhumance and the contemporary barrage system. The first field season, conducted over approximately two weeks between 13 and 24 September 2009, was devoted to a comprehensive survey of Neolithic water catchment facilities and neighboring agro-pastoral outposts. The survey suggested that the combination of the two components was the norm for the Jafr Pastoral PPNB and penetrated deep into the basin beyond the type-site (Fujii 2010a, 2010b). The second season took place for about three weeks between 14 September and 2 October 2010 and focused on rescue excavations at the Neolithic barrage site of Wādī Ghuwayr 106 and its neighboring outpost of Wādī Ghuwayr 17 (Fujii, *et al*. 2011; Fujii *et al*. 2011). The third and fourth seasons, our main concern here, was carried out for a total of six weeks between 4 and 29 September 2011 and 18 March and 5 April 2012. The target of the investigation was Wādī an-Nuʻayḍiyyah 1, another barrage system newly found in the northern part of the Jafr Basin. The investigation has provided further insights into the location, chronology, function and formation process of the Jafr PPNB barrage system as essential infrastructure supporting initial pastoral transhumance. This report briefly summarizes the investigation results from this unique extramural site.

## The Site and its Setting

The site of Wādī an-Nuʻayḍiyyah 1 was found for the first time in the summer of 2011, during investigations at Wādī Ghuwayr 17 and 106, lying *ca.* 20km south-east of that site. Like the Wādī Ghuwayr sites, it is located on a limestone plateau behind the escarpment that defines the northern edge of the Jafr Basin (**Figs 1-2**). The surrounding natural environment is harsh and no perennial natural water sources are available. Local vegetation is very poor and no traditional villages are present. For this reason, local land use has long been limited to seasonal pasturing.

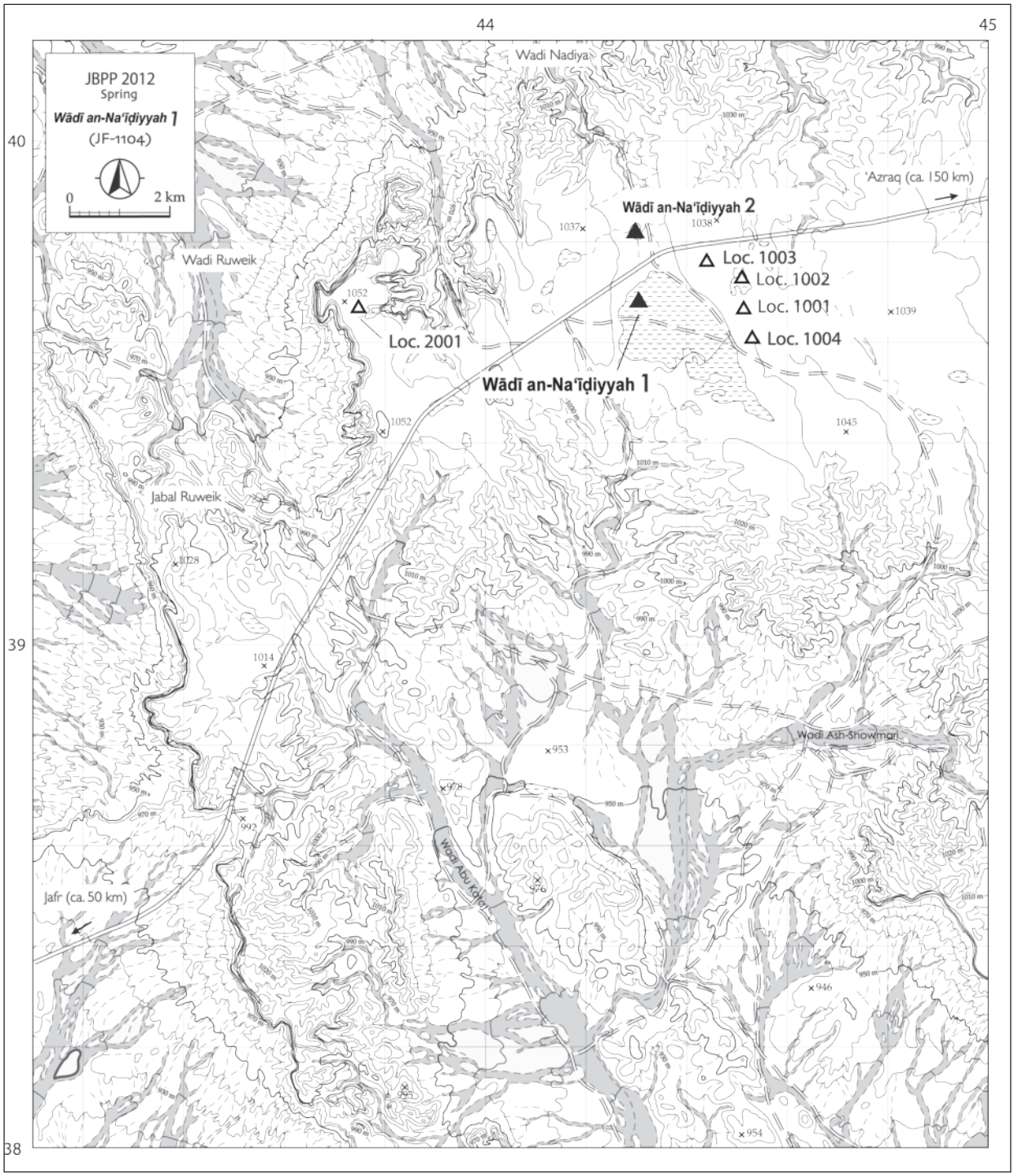
Wādī an-Nuʻayḍiyyah 1 is a simple, extramural site that consists only of two long freestanding stone-built walls (**Fig. 3**). It is isolated in the




*1. Wādī an-Nu'ayḍiyyah 1 and PPNB sites in and around the Jafr Basin.*

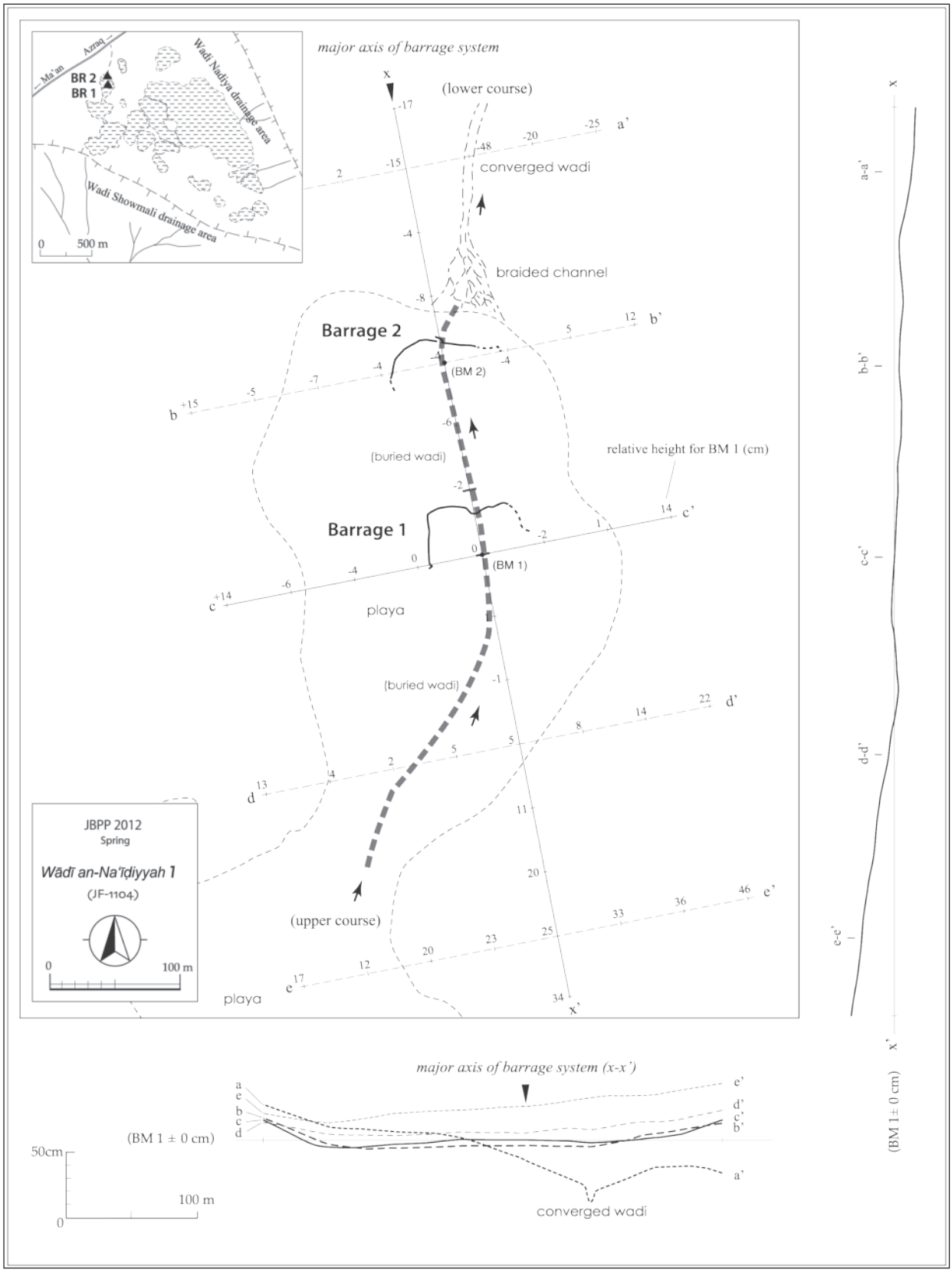
middle of a flint pavement desert (Ar. *ḥammād*) and appears not to have been associated with a neighboring settlement. However, as described below, four limestone and flint workshops (*loci* 1001-1004) are located nearby, suggesting the existence of neighboring encampments. In addition, another barrage site, Wādī an-Nu'ayḍiyyah 2, is situated *ca.* 1km lower down the same drainage system. Thus, we can argue that the barrage site of Wādī an-Nu'ayḍiyyah 1 is one of the major components of the Wādī an-Nu'ayḍiyyah site complex. Incidentally, Wādī an-Nu'ayḍiyyah flows northwards to join Wādī al-Ḥasā, one of the major drainage systems of the Transjordan Plateau. It follows that in terms of hydrology, the site belongs to the Wādī al-Ḥasā drainage system rather than the Jafr drainage system.

The two wall alignments occupy flat terrain in the northern half of an oval playa (Ar. *Qā'*) (**Fig. 4**). This playa, *ca.* 400m long and up to *ca.* 250m wide in terms of present surface area, is the lowest component of a semi-open playa system that forms the uppermost course of one of the headwaters of Wādī an-Nu'ayḍiyyah. Thus,




*2. Location of Wādī an-Nu'ayḍiyyah 1 and its surrounding topography.*

it follows that the two walls occupy the lowest part of the semi-open playa system, a location common to every PPNB barrage system known to date in the Jafr Basin (Fujii n.d.b; Fujii *et al*. 2011). A triangular braided channel is formed behind the lower barrage, *viz*. at the final outlet of the playa system, being followed by a small converging *wadi ca.* 3-5m wide and *ca.* 0.1-0.5m deep (**Fig. 5**). Both features are also common to the other examples, corroborating the suggestion that the Jafr PPNB barrage systems shared a number of common locational characteristics.




*3. Wādī an-Nu'ayḍiyyah 1: site plan and elevations.*


*4: Wādī an-Nu'ayḍiyyah 1: distant view of the site (looking north-east).*

*5. Wādī an-Nu'ayḍiyyah 1: distant view of the site (looking south).*

**The Investigation**

We adopted the same excavation methods used at the nearby barrage site of Wādī Ghuwayr 106. To begin with, we identified the main axis of the barrage system and established two arbitrary leveling points, BM-1 (*ca.* 1,026m; N 30˚41.689; E 036˚24.287) and BM-2 (*ca.* 1,026m; N 30˚41.771; E 036˚24.273), along that axis. Subsequently, we measured the relative elevations of the main axis and several perpendicular axes at 50m intervals, and plotted the outline of surrounding topographical features (**Fig. 3**). We then assigned serial numbers to the *in situ* wall remains of the two barrages at intervals of *ca.* 5-10m and produced general plans by plotting these marked points by plane table.

Following our previous investigations, we designated the two stone-built features as Barrage 1 and Barrage 2 in descending order of elevation, i.e. from the south to north. Barrage 1 was intensively examined by means of a total of six excavation areas (Areas 1-6) set up parallel to the major axis of the barrage system. The scrutinized wall sections totaled *ca.* 40m in length, equivalent to *ca.* 27 percent of the whole length of the barrage wall (*ca.* 150m). In addition, two trenches (Trenches 11 and 22) were opened to the north and south of the barrage wall for the purpose of exploring the location of a buried *wadi*. Barrage 2, on the other hand, was briefly examined with three small trenches. Excavated soil from the two features were not sieved owing to the extreme scarcity of small finds, but a small sample of basal deposits from Barrage 1 was collected with the aim of recovering any preserved organic remains. Several charcoal fragments and carbonized seeds were recovered by flotation and are now under analysis (Dr Hiroo Nasu pers. comm.).

The site stratigraphy was examined in every excavation area, as well as in a robber pit next to the west 'wing' of Barrage 1. It is summarized as follows (**Fig. 24**): Layer 1 – the surface layer – is *ca.* 5-10cm thick and consisted of light buff, slightly compact, silty sand deposits and a large amount of heavily abraded flint pebbles forming the present *Ḥamād* surface. Layer 2 is *ca.* 10-20cm thick, containing light brown, less compact, silty sand deposits and a small number of *Ḥamād* flints. Both layers covered the lower half of the barrage walls as subsequently deposited layers. (Layers 2a-2d are broadly identical to Layer 2 in terms of content, but point to thick fill deposits in an open-cut limestone quarry in front of the barrage wall.) Layer 3 consists of reddish brown, relatively compact, silty sand deposits *ca.* 30-40cm thick. The two barrages were constructed on the upper surface of this layer (often with a mud bank intervening in between). Layer 4 is a reddish-brown weathered limestone layer *ca.* 30-40cm thick and occasionally includes limestone cobbles and boulders, presumably from the open-cut quarry (**Fig. 12**). Layer 5 is a chalk layer more than 20cm thick, being extensively exposed at the base of the limestone quarry. This layer also includes high-quality limestone boulders, some of which were pulled off to leave small to large depressions at the base of the quarry. Such is our present understanding of the site stratigraphy, but further verification is needed to consolidate this tentative perspective.

**Excavation of Barrage 1**

Barrage 1 is located slightly to the east of the center of the oval playa, at a distance of *ca.* 250m from the present inlet of the playa and *ca.* 150m from its outlet (**Fig. 3**). It is constructed across the playa and opens toward the south-south-east. The barrage wall, *ca.* 150m in total length and up to *ca.* 0.4-0.7m in preserved height above the contemporary ground surface, spreads both 'wings' upstream to form a W-shape with a small protrusion at its center (**Figs. 6-8**). Seeing that fallen stones around the wall are very scarce, there would appear to be little difference between preserved and original wall heights. The playa surface in front of the barrage wall measures *ca.* 2-3 ha, which is the standard flooded area of the Jafr PPNB barrage (Fujii 2010c, n.d.b).

The barrage wall was constructed with a single row and up to three to five courses of undressed or partly dressed limestone cobbles and boulders *ca.* 30-80cm long. The central part of the barrage wall used halved cobbles and boulders, both of which were piled up with their fractured surface facing outward. Overall, the barrage wall was of high quality and relatively well-preserved considering that no clear evidence for clay mortar was confirmed. Of interest is the fact that three kinds of masonry techniques were used. The foundation course is usually constructed of upright boulders arranged in stretcher bonds. The middle courses, on the other hand, consist of cobbles piled up horizontally using the same stretcher bonds. The uppermost course uses smaller cobbles and a header bond technique. This eclectic masonry technique is shared by the PPNB agro-pastoral outposts as well as by contemporary barrages (e.g. Fujii 2007b: fig. 8, 2007c: fig. 6), suggesting that it was standard for stone-built structures in the PPNB Jafr Basin.

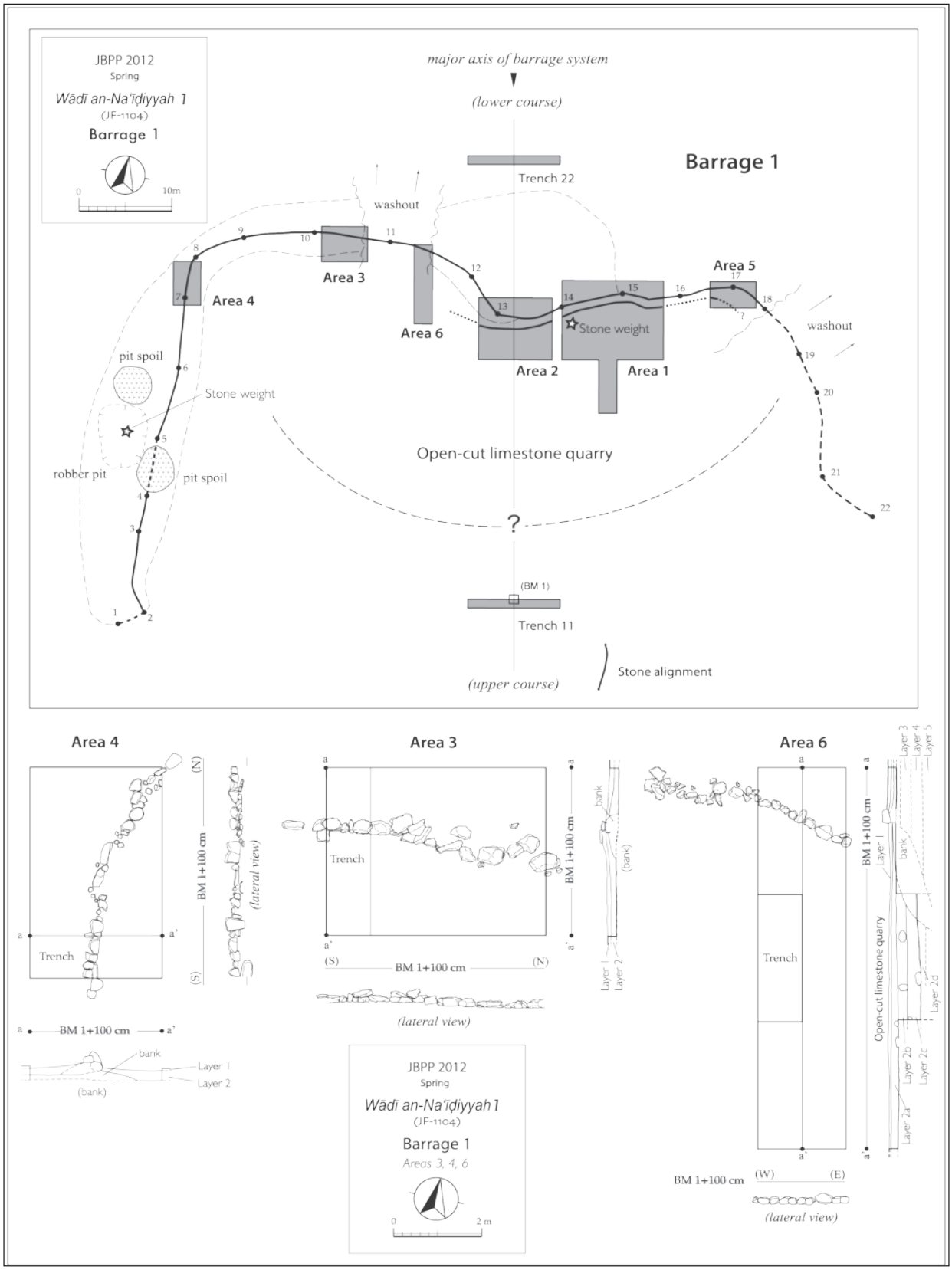
As with the lower barrage, the masonry wall of Barrage 1 was often supported by foundations and / or rear banks. Unexpected was the existence of a subterranean retaining wall up to *ca.* 1.2m high, which was constructed in front of the barrage wall (i.e. at the northern edge of the open-cut limestone quarry). This robust wall was probably intended to cope with strong sideways water pressure in order to prevent the barrage wall from collapsing. The discovery of such a robust revetment buried under the thick deposits in front of the barrage wall necessitates a re-examination of several previously investigated barrages in the Jafr Basin.

*Area 1*

Area 1 was established to examine the structure of a well-preserved wall section slightly to the east of the central protrusion of the barrage (**Figs. 9-11**). The excavation revealed a high quality masonry wall *ca.* 13m long and up to *ca.* 0.7m in preserved height, which was slightly outcurved in a downstream direction. It follows that the wall segment is combined with the central protrusion in Area 2 and, as a whole, describes a gentle S-shape. This is an ingenious device to disperse the strong sideways water pressure acting on the central part of the barrage. A small mud bank *ca.* 0.3m high and *ca.* 1m wide was confirmed behind the wall.

Of significance is the discovery of the subterranean retaining wall up to six stone courses or *ca.* 1.2m high. The wall ran parallel to the barrage wall, with an intervening rubble core *ca.* 1m wide between the two, thus forming a gentle double arc slightly out-curved towards the lowest course. The masonry technique of the revetment was of high quality with every course of construction material laid horizontally, occasionally using limestone rubble as adjusters. The revetment occupied the northern edge of the open-cut limestone quarry, which had been excavated down to the upper surface of Layer 5 or even beyond (**Fig. 12**). There is no doubt that the operation was intended to procure the good quality limestone cobbles and boulders present in Layer 4 and on the upper surface of Layer 5. As a matter of fact, the quarry base was uneven and still retained small to large depressions left by removed stones. The discovery of the open-cut limestone quarry in front of the barrage wall sheds light on the reason why the barrage occupies muddy ground without much in the way of exposed construction material, and why many of the limestone cobbles and boulders incorporated into the barrage wall are less weathered in comparison with other stones scattered around the site.

Also of interest is the origin of the fill deposits in the open-cut quarry. Unexpectedly, a small hearth (*loc.* 148/171) found between Layers 2d and 2e produced a C-14 date of 1266 ± 23 cal. BP [IAAA-113379]. Consistent with this date is the occurrence of an early Islamic gravestone




*6. Barrage 1: plans and sections / elevations (including Areas 3, 4 and 6).*

*7. Barrage 1: general view (looking south-west).*

*8. Barrage 1: general view (looking north-east).*

and a dozen contemporary plain ware sherds from Layer 2d in Area 2. As described below, the lower fill layers in Area 1 also yielded a few similar pottery sherds. These facts suggest that aside from the basal deposits (Layer 2e) and the fill deposits in the series of depressions, most of original deposits and pit-spoil in the open-cut quarry were washed away in floods after the early Islamic period. Incidentally, the same observation was made at Barrage 1 of Wādī Abū Ṭulayḥa (Fujii 2007b: 409-410).

Area 1 yielded a grooved stone weight from Layer 2b (**Fig. 34: 1**), a heavy-duty digging tool from Layer 2c (**Fig. 34: 7**) and a few early Islamic plain ware sherds (similar to the finds recovered in the neighboring Area 1) from Layer 2d. As discussed below, there is a high possibility that the two former artifacts derived from the original deposits in the open-cut limestone quarry.

*Area 2*

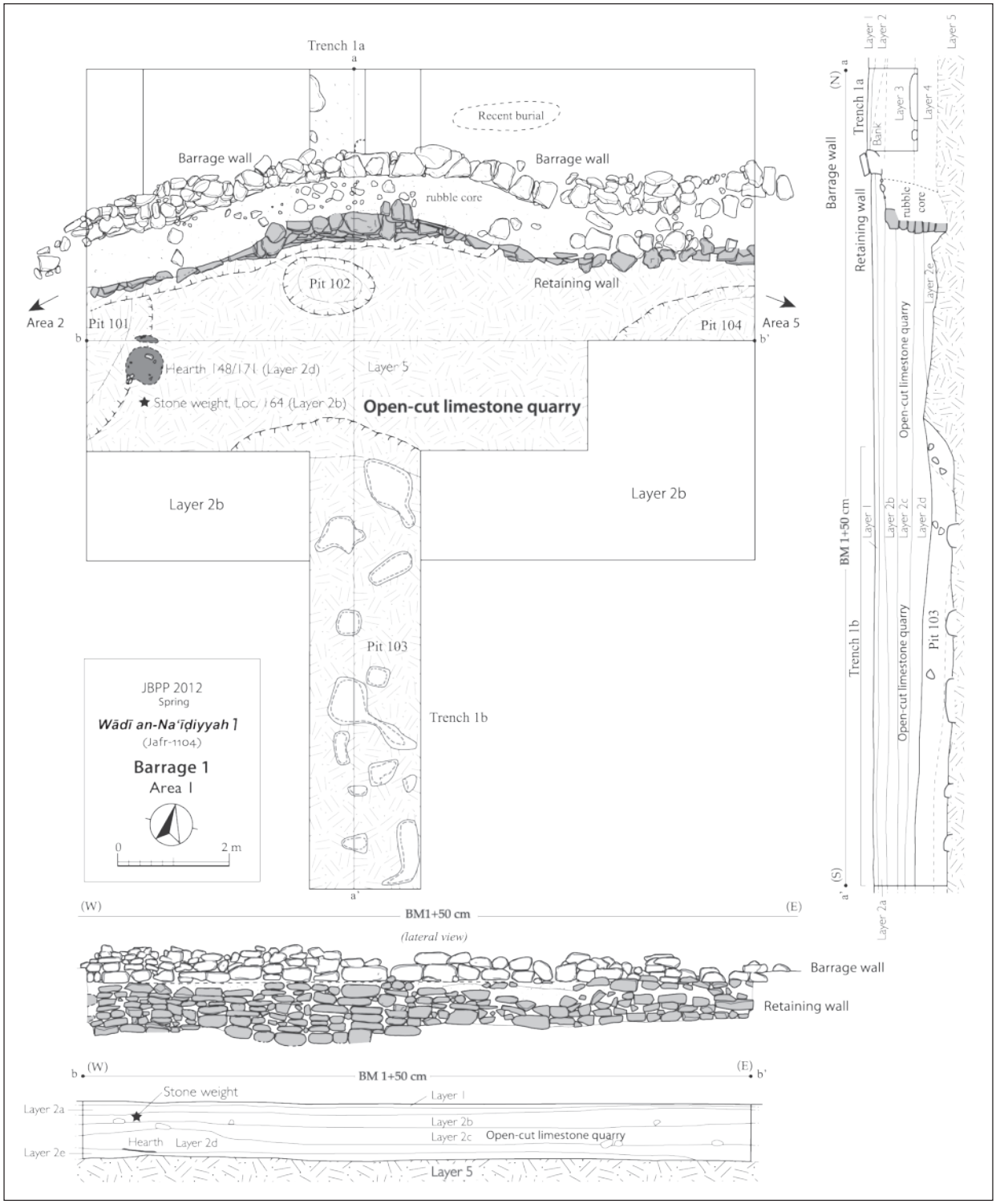
The operation in Area 2 examined the structure of the protrusion in the center of the barrage (**Figs. 13-15**). It was also protected with a revetment or robust subterranean retaining wall constructed at the northern edge of the open-cut limestone quarry. There is no doubt that, as suggested above, the central protrusion was combined with the slightly out-curving wall section at the neighboring Area 1 to divert the strong water pressure toward both sides. A similar device has been confirmed at most of the PPNB barrages known to date in the Jafr Basin (e.g. Fujii 2007b: fig. 9, 2007c: fig. 5; Fujii, Adachi *et al*. 2011: fig. 7), suggesting that they were constructed according to the same basic design.

It is inconceivable, however, that strong sideways water pressure acted on only one part of the barrage wall when we consider the flat topography in and around the playa. Of significance in this regard is the cross-section of Trenches 11 and 22 described below (**Fig. 21**). The existence of lenticular fluvial deposits (i.e. Layer 2') sandwiched between Layers 2 and 3 suggests that the central protrusion was constructed across a small *wadi ca.* 5-6m wide and *ca.* 20-30cm deep. If this is the case, it would follow that the present playa was formed after the construction of the barrage, probably as a result of its damming effect. As discussed below, this new perspective would provide valuable insights into the formation process of the Jafr PPNB barrage system.

An early Islamic gravestone and a dozen plain ware sherds were found in Layer 2d, a lower fill deposit in front of the central protrusion (**Fig. 34: 9-11**). As suggested above, their occurrence in the lower fill layer indicates that the original deposits in the open-cut limestone quarry were almost washed away by repeated floods after the Neolithic. One of the few possible exceptions to this is a small digging tool again recovered from Layer 2d (**Fig. 34: 8**). As with the similar artifact from the neighboring excavation area, there is a possibility that this stray find derived originally from the Neolithic quarry.

*Area 5*

This small excavation area was established to explore the eastern extension of the limestone quarry and revetment. Though not completed owing to time constraints, the limited deep sounding at the south-western corner revealed a stone alignment running parallel to the barrage wall (**Figs. 13, 16**). There is no doubt that this




*9. Barrage 1: plan, lateral view and sections / elevations of Area 1.*

robust wall section represents an eastern extension of the revetment attested to in Areas 1 and 2. It therefore follows that the open-cut limestone quarry extended at least as far as the eastern turning point of the barrage wall. The excavation also revealed a barrage wall up to four courses high, carefully constructed of halved limestone boulders. No artifacts were found.

*10. Barrage 1: general view of Area 1 (looking west).*

*11. Barrage 1: general view of Area 1 (looking north-east).*

*12. Barrage 1: general view of the south trench of Area 1 (looking north-east).*

*Areas 3, 4 and 6*

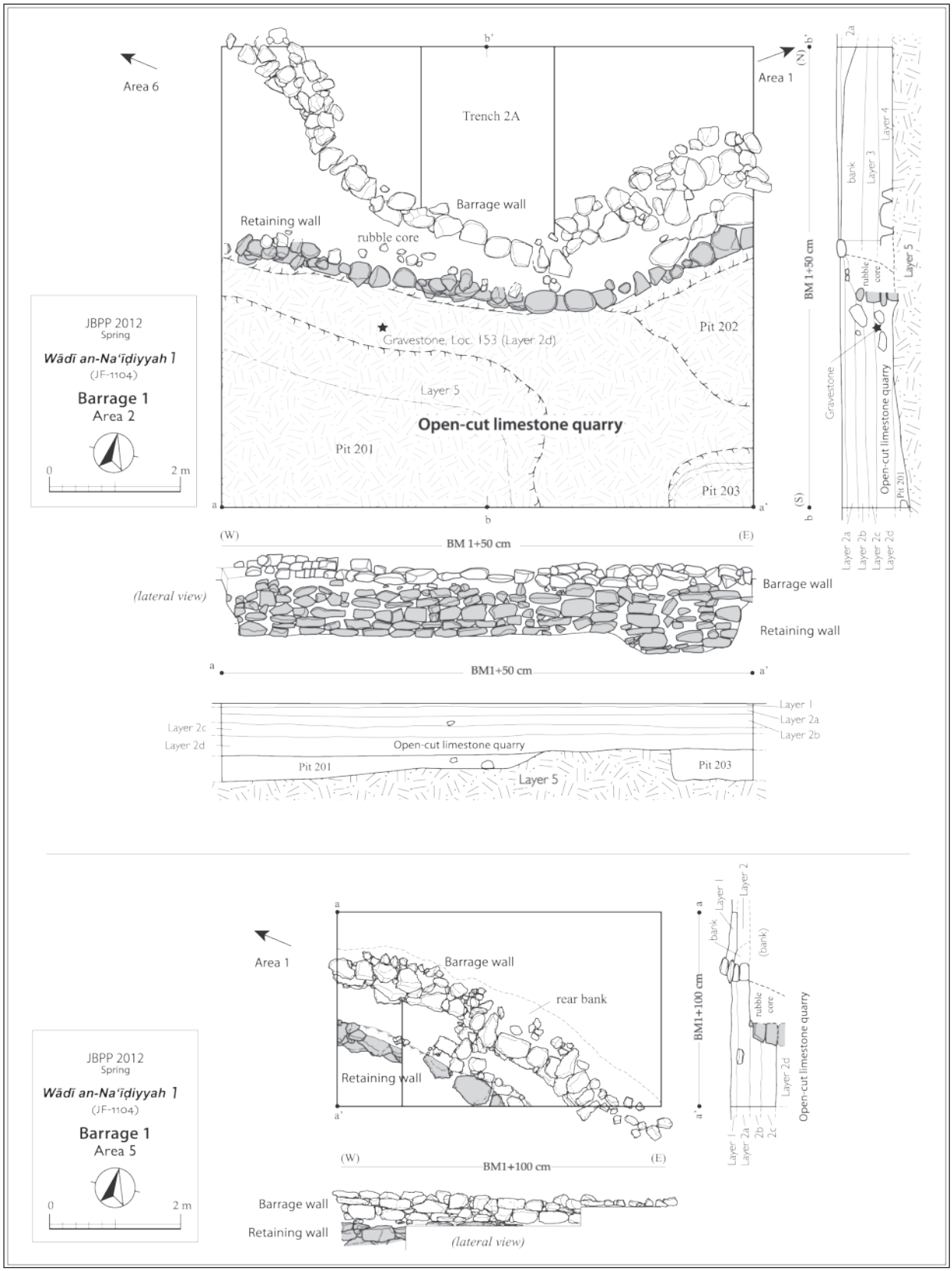
These three small excavation areas briefly explored the structure of the western half of the barrage. The limited excavations showed that it was much inferior in construction quality than the wall of the eastern half, being not more than a few courses high and constructed with smaller, less standardized limestone cobbles (**Figs. 6, 17-19**). This contrast suggests that the western half of the barrage was constructed as a simple barrier to retain a seasonal flood.

The same applies to the subterranean structure. Although the sub-trench set in the middle of Area 6 produced evidence for a western extension of the open-cut quarry attested to in neighboring Area 2, no clear evidence for the revetment was confirmed. What we found instead was a part of a mud bank that protected the front of the poorly constructed barrage wall. This means that the robust masonry revetment characteristic of the eastern half was replaced by the mud bank between Area 2 and Area 6. This is probably because this part of the quarry failed to yield any of the expected building stones. (As a matter of fact, the cross-section of the robber pit described below clearly indicates that no good quality building stones were present in the layers on the western half of the barrage.) The inferior quality of the barrage wall behind the bank may also be understood in the same context. Though not sufficiently explored in the other two excavation areas owing to time constraints, a combination of a non-productive open-cut limestone quarry, an inferior barrage wall and a front bank (instead of a revetment) appears to characterize the western half of the barrage. With the exception of several undiagnostic flint flakes, no artifacts were found.

*Stone Alignment*

A short stone alignment was found in the middle of the flooding area of the barrage, at a point *ca.* 13m south-east of BM-1 (**Figs. 6, 20**). Describing a gentle curve, it extended for *ca.* 5m roughly north - south. This feature was very simple in structure, being constructed of a single row and course of upright undressed limestone cobbles, partially supported by rubble. No artifacts were recovered around the feature.

Nothing can be said about the chronological correlation or otherwise of this feature with the neighboring barrage, except that the feature might once again be founded on the upper surface of Layer 3. The specific use of this unique feature is also unknown. A possible interpretation is that it represents a remnant of an embankment constructed along the buried *wadi*, but it appears too ephemeral for such a role. (It also casts doubt on the assumption that the similar example at Barrage 2 is far from the supposed




*13. Barrage 1: plans, lateral views and sections of Areas 2 and 5.*

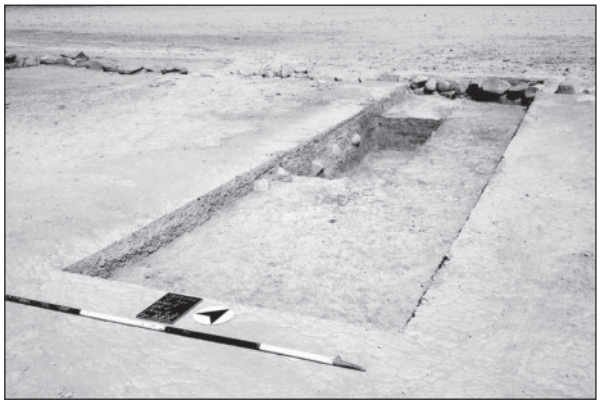
*14. Barrage 1: general view of Areas 2 and 1 (looking north-east).*

*15. Barrage 1: general view of Area 2 (looking north).*

*16. Barrage 1: general view of Area 5 (looking north).*

*17. Barrage 1: general view of Area 3 (looking north-west).*

*18. Barrage 1: general view of Area 4 (looking north-north-west).*



*19. Barrage 1: general view of Area 6 (looking north-north-west).*

position of the buried *wadi*.) Worth bearing in mind is an elderly workman's comment that local herders often still construct similar features as a water level gauge. According to him, this simple device enables them not only to know the water level of a flooded playa but also to guide their livestock so as not to get stuck in the mud. In view of the existence of a similar feature at Barrage 2 described below, this intriguing ethno-archaeological interpretation seems worth testing.

*Trenches 11 and 22*

Two long trenches were opened in search of possible evidence for the presence of a *wadi* that was likely dammed up by Barrage 1 (**Fig. 6**). Trench 11 was set up across BM-1 lying *ca.* 30m upstream of the barrage wall. Trench 22 was ar-

*20. Barrage 1: general view of stone alignment (looking south).*

ranged at a point 50m north of BM-1, or *ca.* 20m downstream of the barrage wall, again with the major axis of the barrage system at the center.

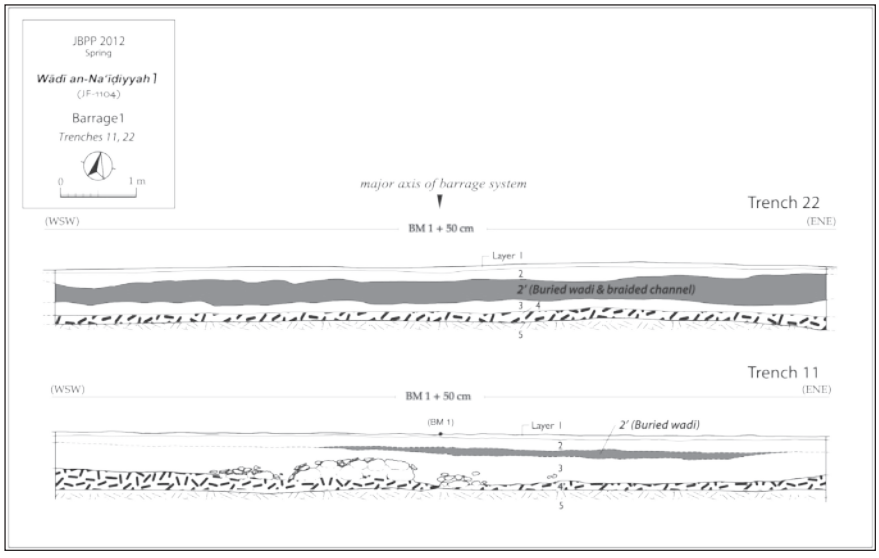
The deep sounding at Trench 11 confirmed that shallow fluvial deposits (Layer 2'), *ca.* 6 m wide and *ca.* 0.2-0.3m thick, were sandwiched between Layer 2 and Layer 3 (**Figs. 21, 22**). These probably represent the *wadi* being buried by the damming effect of the barrage. Given that the central protrusion of the barrage corresponded with this location, it would follow that a small stream flowed in a north-north-westerly direction taking an easterly course within the present playa (**Fig. 3**). This assumption, if correct, would explain the reason why the barrage system is located slightly to the east of the center of the present playa (newly formed through the damming effect of the barrage), and why its major axis is slightly off-center.

Trench 22 also yielded similar deposits between Layers 2 and 3 (**Figs. 21, 23**). However, it was much larger in scale (*ca.* 20-30cm thick and more than 10m wide) and, at the same time, conspicuously uneven on both its upper and lower surfaces. Seeing that the width of the buried *wadi* appears to be consistent between Trench 11 and the central protrusion of the barrage, it is most unlikely that the *wadi* suddenly became wider behind the barrage. A key to this enigma is the formation of a triangular braided channel behind Barrage 2 (**Fig. 3**), which suggests the possibility that these wide and uneven deposits represent a mixed picture of buried *wadi* and a braided channel newly formed behind Barrage 1, subsequently buried under similar fluvial deposits. As discussed below, this tentative perspective would contribute towards a better understanding of the formation process of the Jafr PPNB barrage system.

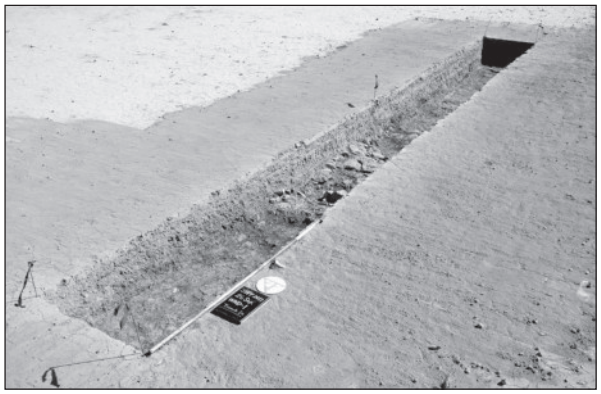
Incidentally, Trench 11 – to say nothing of Trench 22 – includes both Layer 3 and Layer 4. This means that the open-cut limestone quarry did not reach this area of the site. It follows that the southern edge of the quarry was located somewhere between the trench and the southern end of Area 1 (**Fig. 6**), a likely assumption when we consider the length of the two 'wings'.

*Robber Pit*

There was a large robber pit, probably dug by heavy machinery, beside the west 'wing' of the barrage. We partly cleaned its sections and examined the intact site stratigraphy outside the limestone quarry (**Figs. 24-26**). Since results of the

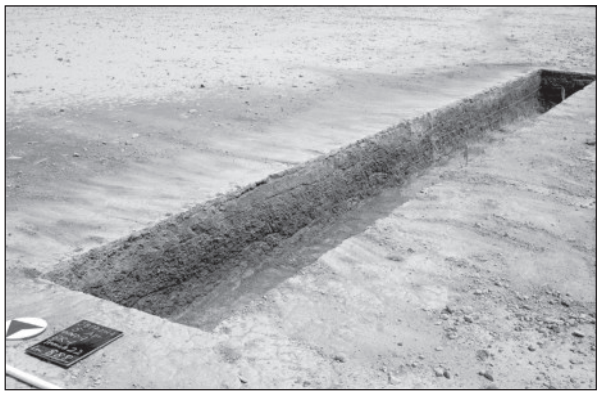



*21. Barrage 1: sections of Trenches 11 and 22.*

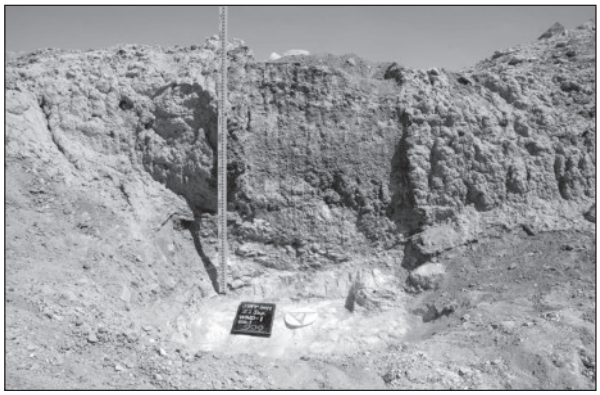


22. Barrage 1: general view of Trench 11 (looking north-north-east).

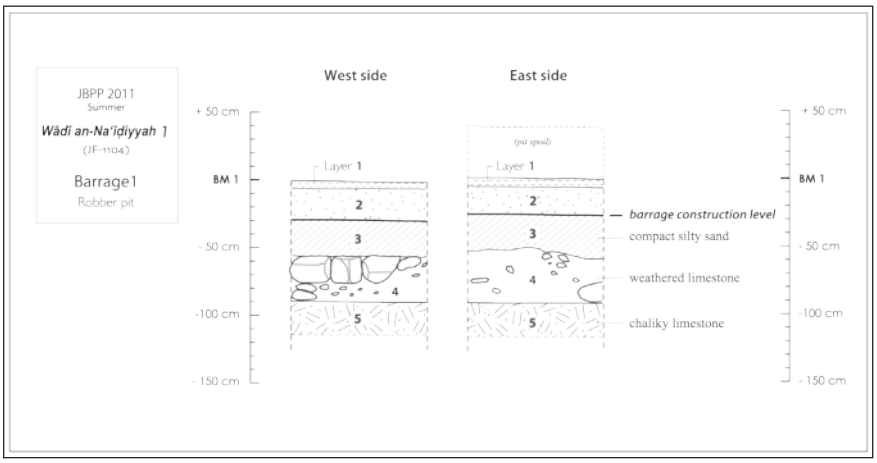
25. Barrage 1: general view of the western wall of the robber pit (looking south-west).



23. Barrage 1: general view of Trench 22 (looking north-north-east).



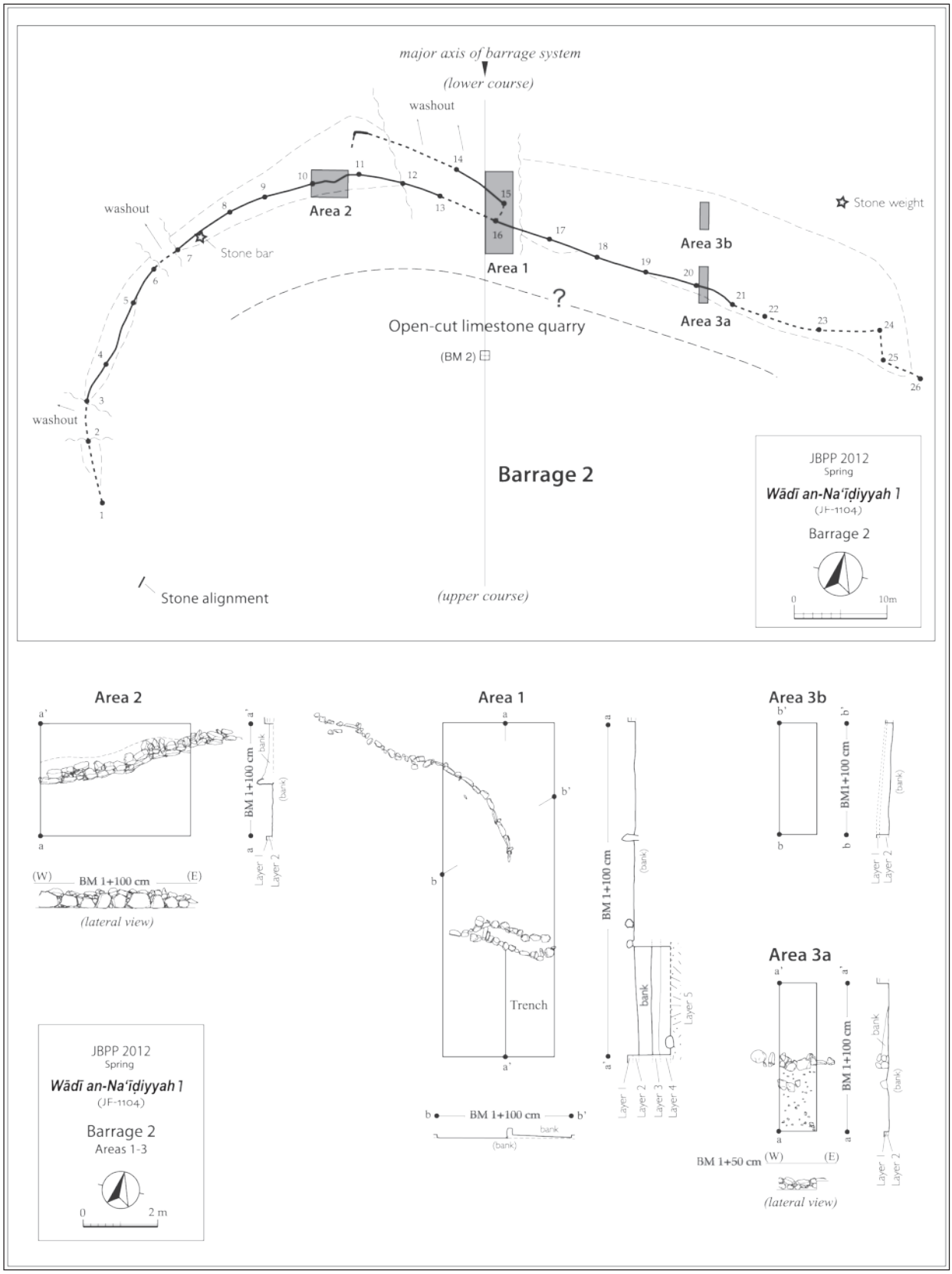
26. Barrage 1: general view of the eastern wall of the robber pit (looking north-east).




24. Barrage 1: cross-sections of the robber pit.

investigation have been collectively described above, no repetition is needed here. The two columnar sections provided valuable insights into the purpose of the open-cut limestone quarry.

Incidentally, the robber pit yielded a large stone weight, a chronological indicator of the Jafr PPNB barrage system (**Fig. 34: 2**). This limestone product occurred as a stray find in the base of the pit. Seeing that several limestone cobbles were scattered in and around the pit, it is conceivable that the diagnostic find was combined with the other cobbles to form an attractive stone-built feature, probably a tomb. It is our present interpretation that the stone weight was originally incorporated somewhere into the barrage wall and was then re-used in the erased feature as building material. Similar artifacts occurred as stray finds in Area 1 (**Fig. 34: 1**)




*27. Barrage 2: plan and sections / elevations.*

*28. Barrage 2: general view (looking south-west).*

*29. Barrage 2: general view (looking north-east).*

and behind Barrage 2 (**Fig. 34: 4**). These finds, though not *in situ*, are suggestive of a PPNB date for the Wādī an-Nu'ayḍiyyah 1 barrage system.

**Excavation of Barrage 2**

Barrage 2 is situated *ca.* 130m downstream of Barrage 1, or *ca.* 20m upstream of the playa outlet (**Fig. 3**). As with the upper barrage, it is constructed across the playa and is oriented to the south-south-east. The barrage wall, *ca.* 125m in total length and up to *ca.* 0.3-0.4m in preserved height, describes a roughly straight line in its eastern part and a gentle curve in its western part (**Figs. 27-29**). Overall, the barrage is much inferior in construction quality than the upper barrage, being up to a few courses high and constructed of much smaller and less standardized construction materials. Furthermore, it is devoid of both a central protrusion and a revetment (Instead, as noted below, it is equipped with a rectangular rear wall and an extensive foundation bank) The flooded area is slightly smaller in scale than Barrage 1, being estimated at *ca.* 1-2 ha. These contrasts between the upper and lower barrages are common

*30. Barrage 2: general view of Area 1 (looking north-north-west).*

to every Neolithic barrage system known to date in the Jafr Basin (Fujii 2007c, 2011c), providing a key to understanding their formation process (Fujii *et al*. 2011).

*Area 1*

The operation in Area 1 aimed to examine the structure of the central part of the barrage. It revealed three simple walls, which all sat on an extensive foundation bank overlying Layer 3 (**Figs. 27, 30**). The central wall stretched across the excavation area and can, therefore, be defined as the main part of the barrage wall. The front wall may be regarded as a simple barrier for protecting the barrage wall from erosion. The rear wall, on the other hand, formed the western edge of a rectangular rear 'fence' that extends along the central part of the barrage. Seeing that only this wall was constructed with upright slabs, it may have been packed with mud and rubble and used as a sort of rear support for the barrage wall. No datable *in situ* artifacts were found in the excavation area.

We opened a small sub-trench in front of the barrage wall for the purpose of exploring the origin of the huge volume of deposits used in the construction of the large-scale bank extending in front and behind the barrage wall. We found a forward extension of the foundation bank, but no clear evidence for the material source was obtained within the extent of the sub-trench. A possible interpretation is that, as with the western part of Barrage 1, a non-productive open-cut limestone quarry existed ahead of the sub-trench and supplied silty deposits as well as low quality building stone (This is highly likely as, in contrast to Area 1 of Barrage 1, Layers 4 and 5 in

*31. Barrage 2: general view of Area 2 (looking north-west).*

the sub-trench include small limestone cobbles only). There is a possibility that the non-productive open-cut quarry in front of the barrage was extensive, but a re-investigation is needed to verify this tentative perspective. No datable *in situ* finds were recovered.

*Area 2*

This excavation area was opened to explore the structure of the western part of the barrage wall. The limited excavation revealed a well-preserved masonry wall segment up to *ca.* 0.5m high that used upright limestone cobbles as foundations (**Figs. 27, 31**). However, unlike Area 1, no clear evidence for the front protection wall was confirmed. No diagnostic artifacts were found in the operation area, but a diagonally truncated stone bar made of cortical flint was recovered at a point *ca.* 15m south-west of the area, beside wall segment 7/8 (**Fig. 34: 3**).

*Areas 3a and 3b*

*32. Barrage 2: general view of Area 3 (looking north).*

These two small excavation areas were set up across wall segment 20/21 in the eastern part of the barrage **(Figs. 27, 32)**. The small soundings confirmed an eastern extension of the poorly constructed barrage wall, the front protection wall and the extensive foundation bank, all attested to in Area 1. The existence of the extensive foundation bank implies that the open-cut limestone quarry, a likely source of raw material, extended eastward too. It appears that as with Barrage 1, Barrage 2 was

*33. Barrage 2: general view of stone alignment (looking north).*

also reinforced in its eastern half, at least in terms of the foundation bank. As suggested below, this is probably because the eastern half of the playa gave passage to seasonal floodwaters. A stone weight was found behind the barrage wall, at a point *ca.* 15m east of Area 3b **(Fig. 34: 4)**.

*Stone Alignment*

Barrage 2 was also associated with a short stone alignment **(Figs. 27, 33)**. However, unlike the similar example at Barrage 1, this one was much smaller in size (*ca.* 1.5m long) and was located close to the western edge of the expected flooded area. As suggested above, this isolated feature might have been used as a water level gauge during the rainy season, but further verification is needed to validate this ethno-archaeological working hypothesis.

**Small Finds**

Small finds from the extramural barrage site are understandably very scarce, being limited to three stone weights, a diagonally truncated stone bar, a few dozen chipped flint artifacts and a limited number of early Islamic artifacts. Although none of them occurred *in situ*, they provide valu-

able insights into the date of the barrage system. In addition, several Arabic graffiti probably inscribed in the recent past were found on construction materials, but they are omitted from the following description.

*Stone Weights*

A total of three stone weights were recovered: two from Barrage 1 and the other from Barrage 2. All of them were made of a fine-textured, and therefore heavy, limestone boulder. The largest example (52.5cm long, 27cm wide, 24cm thick and *ca.* 46 kg in weight) occurred in an upper fill layer (Layer 2b in Area 1) of Barrage 1 (**Fig. 34: 1**). Unusually, this stone weight is made of a prismatic limestone boulder and, probably for this reason, substitutes a circumferential groove for a pair of lateral notches. The second largest example (45.2cm long, 39.4cm wide, 15.8cm thick and *ca.* 36.2 kg in weight) was recovered in the robber pit beside the west 'wing' of the same barrage (**Fig. 34: 2**). The existence of a small hole, *ca.* 10cm in diameter and *ca.* 3cm in depth, in the center of the ventral surface suggests that the artifact was made on a re-used pillar base, another chronological indicator of the Jafr Pastoral PPNB. Otherwise, this artifact is typical of Jafr PPNB stone weights, being modified into a violin-shaped profile by means of bifacial grooving and bilateral notching. The smallest example (35.4cm long, 21.2cm wide, 10.3cm thick and 9.4 kg in weight) was also recovered as a stray find behind the east 'wing' of Barrage 2 (**Fig. 34: 4**). It lay on the present ground surface, suggesting that it had been removed from its original position in the recent past. Though typical in overall profile, this product does not have a bifacial groove and is modified by means of a pair of lateral notches and partial trimming only.

Similar artifacts have been found at every PPNB barrage and outpost known to date in the Jafr Basin and can, therefore, be regarded as standard equipment of the Jafr Pastoral PPNB (e.g. Fujii 2007b: fig. 16, 2007c: fig. 9; Fujii, Adachi *et al*. 2011: figs. 32, 33, n.d.b: fig. 13). There is little doubt that the three stray finds from Wādī an-Nu'ayḍiyyah 1 share a similar date and function. Available evidence from the other barrages suggests that they were originally incorporated into the barrage wall, especially its central protruding reinforcement wall, as good luck talismans or ritual objects intended to secure the safety and longevity of the barrage. The three products might have attracted someone's notice precisely because they were used in such a conspicuous placement. Anyhow, the occurrence of these diagnostic finds is suggestive of a PPNB date for the barrage system of Wādī an-Nu'ayḍiyyah 1.

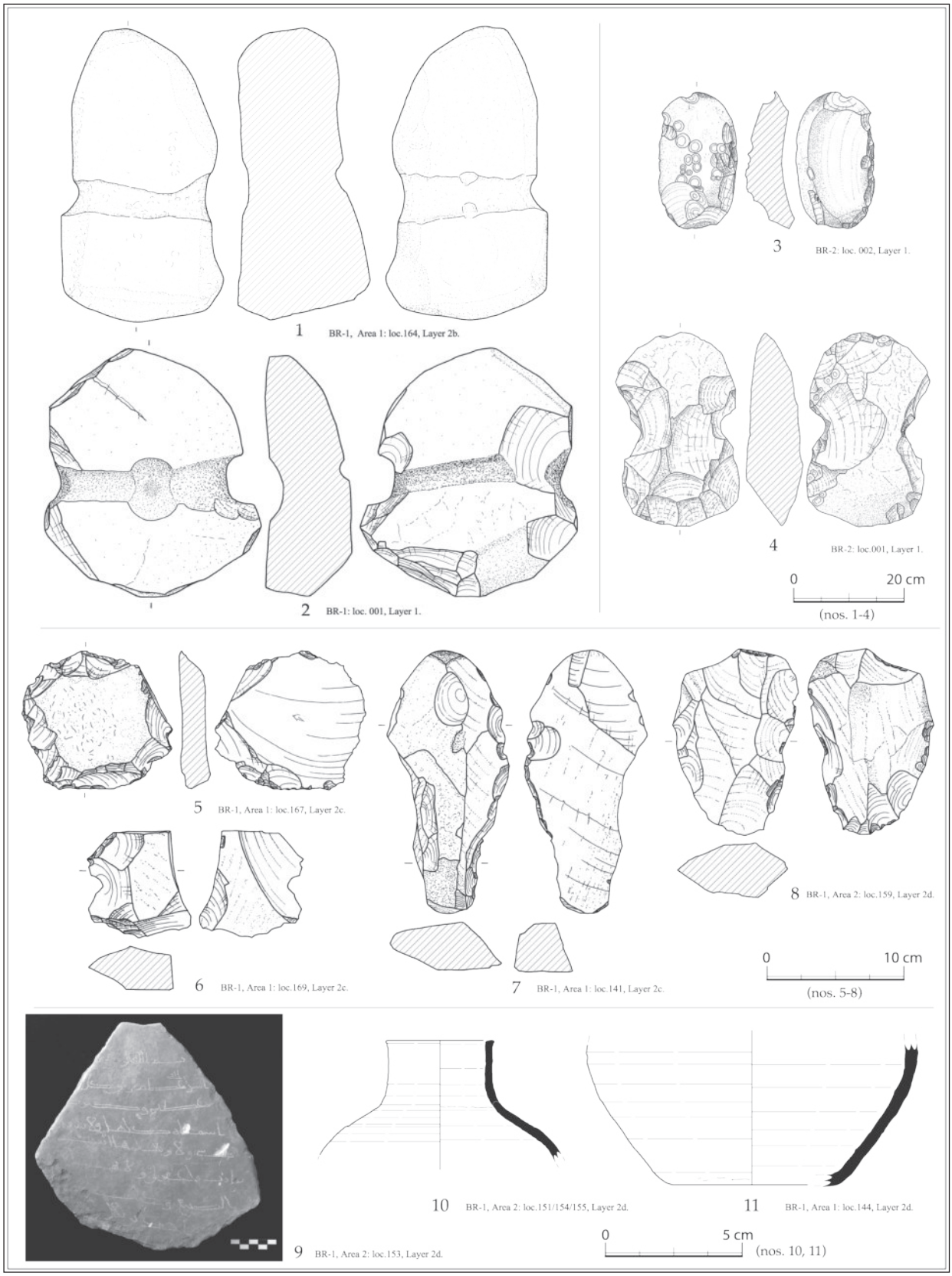
*Stone Bar*

A diagonally truncated stone bar, another chronological marker of the Jafr Pastoral PPNB, was recovered immediately beside wall segment 7/8 of Barrage 2 (**Fig. 34: 3**). This unique artifact, 25cm long and 3.4 kg in weight, is made of a cortical flint nodule with a large thermal-flaking scar on its ventral surface. It is produced taking full advantage of the original shape of the material, with secondary retouch being limited to diagonal truncation at both ends. In this sense, it can be defined as an *ad hoc* tool, along with the three stone weights described above. Slight edge damage is present at one end, suggesting that it was used as a digging tool.

A large number of parallel examples have been reported from the PPNB agro-pastoral outposts of Wādī Abū Ṭulayḥa (e.g. Fujii 2008: fig. 31, 2009: fig. 19) and Wādī Ghuwayr 17 (Fujii, Quintero *et al*. 2011: fig. 27). They were probably used for digging foundation pits for semi-subterranean masonry structures unique to the Jafr Pastoral PPNB. On the other hand, the find from the extramural barrage site was probably used in the open-cut limestone quarry in front of the barrage wall. The occurrence of another chronological indicator of the Jafr Pastoral PPNB has provided further insights into the date of the barrage system.

*Chipped Flint Artifacts*

The two major excavation areas at Barrage 1 yielded a few dozen chipped flint artifacts, which included two digging tools (**Fig. 34: 7-8**) and two large denticulates (**Fig. 34: 5-6**). In view of their large dimensions and heavy edge damage, there is a possibility that they were also used in the open-cut limestone quarry. This frequency of heavy-duty digging tools is characteristic of the Jafr Pastoral PPNB; similar examples have been found at Wādī Abū Ṭulayḥa (e.g. Fujii 2007a: fig. 28, 2009: fig. 15) and Wādī Ghuwayr 17 (Fujii *et al*. 2011: fig. 25).




*34. Small finds from Barrage 1.*

*Early Islamic Artifacts*

An Early Islamic gravestone and a dozen wheel-made, reddish, plain ware sherds occurred in Layer 2d in the two major excavation areas of Barrage 1 (**Fig. 34: 9-11**). In view of the fact that the sherds occurred concentrically around the gravestone, it is safe to say that both of them derived from a single tomb. However, the tomb appeared to have been swept away in repeated floods and no clear evidence was left in the two areas. Anyhow, their occurrence in the lower fill layer indicates that most of the original deposits (and / or pit spoil) of the open-cut limestone quarry was carried away by Early Islamic and subsequent floods. The same observation was made at Barrage 1 of Wādī Abū Ṭulayḥa (Fujii 2007a: 409-411).

**Surrounding Survey**

Our intermittent survey during the excavation of the barrage system recovered four pillar bases (*loci* 1001-1004) and one stone weight (*locus* 2001) around the site. Two of them (*loci* 1001 and 1004) were associated with a small flint workshop that produced naviform cores and blade components. These survey results contribute to a more comprehensive understanding of the barrage site.

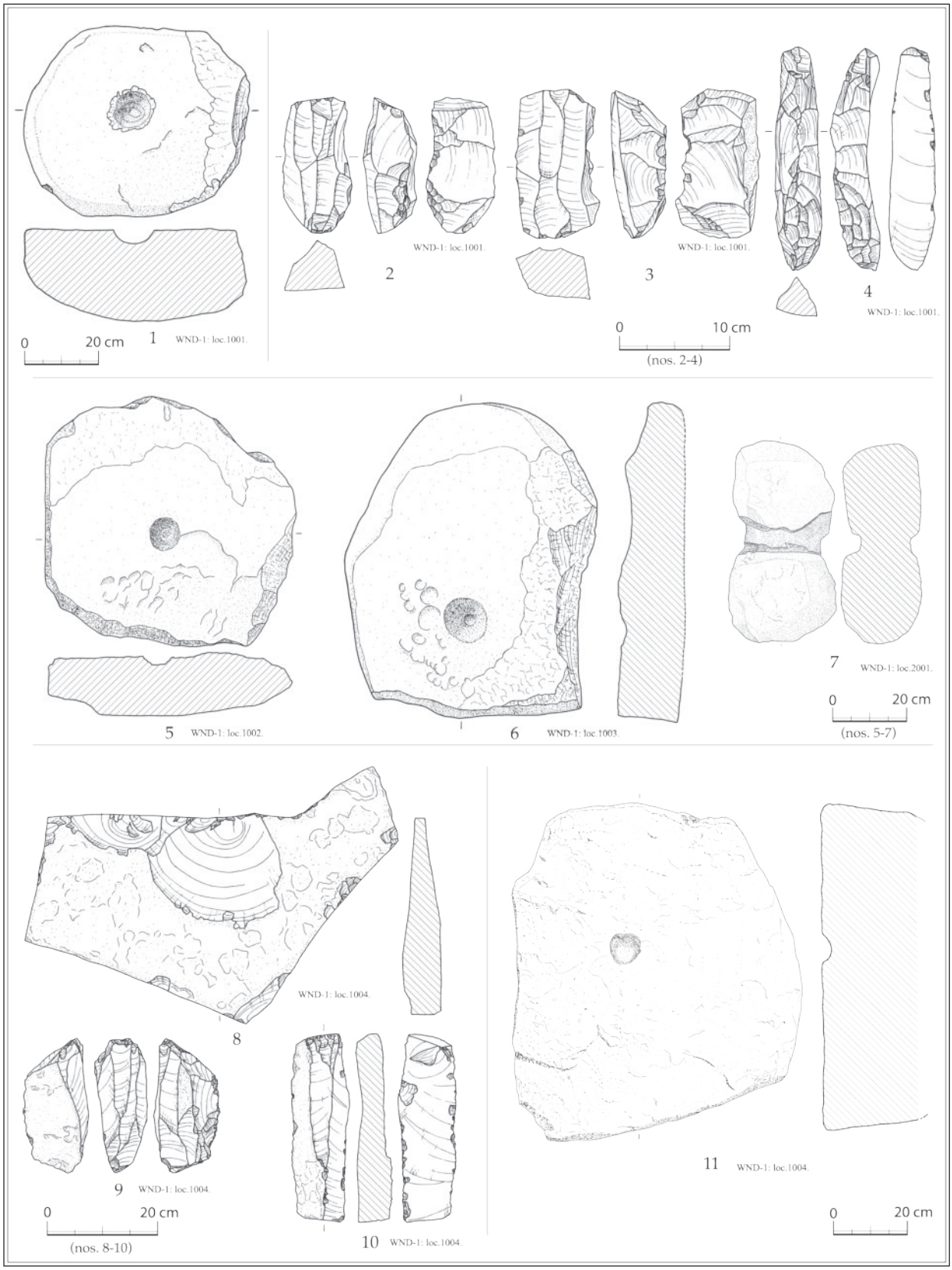
*Loci 1001-1004*

The four large pillar bases were found at *loci* 1001-1004, lying *ca.* 2km to the east of the barrage system (**Fig. 2**). These *loci* were located *ca.* 0.5-1km apart from each other, in an area of outcropping limestone situated in slightly undulating flint pavement desert (**Figs. 36, 37**). However, none of them appeared to be associated with clear evidence for structural remains.

The artifacts are made of large, flat limestone boulders, measuring *ca.* 60 - 90 cm long and *ca.* 50-100 kg or more in weight (**Fig. 35: 1, 5, 6, 11**). In terms of morphology, they are characterized by a relatively flat upper surface and a small concavity (*ca.* 7-10cm in diameter and *ca.* 3-5cm deep) produced roughly in the center of the upper surface. Similar products have been found at the PPNB outposts of Wādī Abū Ṭulayḥa (e.g. Fujii 2007a: fig. 30, 2008: fig. 30, 2009: fig. 19) and Wādī Ghuwayr 17 (Fujii *et al*. 2011: fig. 28) as well as Barrage 1 of Wādī Abū Ṭulayḥa (Fujii, Adachi *et al*. 2011: fig. 34) and Barrage 1 of Wādī Ghuwayr 106 (op. cit.). It appears that the four survey finds share a similar date with these excavated examples.

In view of their heavy weight and bulk, it is indisputable that the four artifacts were produced on the spot. This is not to say, however, that the limestone outcrops around them functioned as workshops for supplying limestone products to the nearby barrage system. This is because, first, neither half-finished products nor debitage were left at the outcrops and, second, because no pillar bases were incorporated into the Wādī an-Nu‘ayḍiyyah 1 barrage system. Considered in this light, it seems more likely that the limestone artifacts were not only produced but also actually used on-site to receive a wooden pillar for supporting a tent-like hut. Given this, the question is: who produced the pillar bases and built the huts? It is highly suggestive in this respect that a pillar base was incorporated into the central part of Barrage 2 of Wādī an-Nu‘ayḍiyyah 2 (**Fig. 39**). This may indicate that the temporary encampments were founded by barrage constructors who were involved in the construction of the neighboring two barrage systems. This assumption would explain the reason why the four pillar bases were scattered around the barrage site and occurred only as isolated finished products. The existence of the pillar bases is significant in that it suggests that the barrage system was associated with several contemporary encampments.

Interestingly, *loci* 1001 and 1004 included a small PPNB flint workshop which took advantage of the scatter of tabular flint nodules (**Fig. 38**). Given the interpretation suggested above, it would follow that the two encampments accommodated a small group of flint knappers who were probably also the barrage constructors. The workshops produced naviform cores and crested blades as main products (**Fig. 35: 2-4, 9**); tool blanks and retouched tools were rarely present. It is therefore conceivable that the workshops represent first stage ateliers for tool blank production. The blade blanks produced were probably removed to a nearby outpost such as Wādī Ghuwayr 17 or a yet-to-be-identified parent settlement far to the west. Anyhow, the co-existence of the PPNB flint workshops corroborates the dating of the encampments and, by association, the nearby barrage system. Incidentally, the surface collection included tabular scraper cores




*35. Small finds from Barrage 2 (above) and surrounding loci (below).*

36. Locus 1002: general view (looking north).

37. Locus 1004: general view (looking west).

38. Locus 1001: pillar base and flint workshop (looking north).

(**Fig. 35: 8**) and Jafr blades (**Fig. 35: 10**) too. This means that the flint scatters were re-used in the Chalcolithic - Early Bronze Age, another flourishing period in the Jafr Basin.

**Locus 2001**

In addition to the four pillar bases, a large stone weight – again made of a limestone boulder – was recovered at *locus* 2001 *ca.* 5.5 km to

39. Wādī an-N'īḍiyyah 2: pillar base incorporated into the central wall of Barrage 2 (looking north-east).

the west of the barrage system (**Fig. 3**). This artifact measured 54cm long, 34cm wide, 21.5cm thick and 57 kg in weight (**Fig. 35: 7**), and was similar in general profile to the find from Area 1 of Barrage 1 (**Fig. 34: 1**). It occurred in the middle of a flint pavement desert and was associated neither with a limestone outcrop, nor with a flint workshop or structural remains. However, in view of the close relationship between PPNB barrage systems and grooved stone weights (Fujii 2010c, n.d.b: fig. 13), there is a good possibility that this diagnostic artifact derived from the nearby barrage system of Wādī an-Nu'ayḍiyyah 1 or 2.

**Summary and Discussion**

The excavation has demonstrated that Wādī an-Nu'ayḍiyyah 1 represents a fourth example of a Jafr PPNB barrage system, after Wādī Abū Ṭulayḥa, Wādī ar-Ruwayshid ash-Sharqī (Fujii 2007b, 2007c, 2010a) and Wādī Ghuwayr 106. The following discussion briefly reviews the investigation results and pursues further details of this perspective.

*Date and Function*

Since these two key issues have already been addressed elsewhere (Fujii 2010c, n.d.b), no lengthy discussion is needed here. As for dating, both the occurrence of the diagnostic limestone artifacts and the incorporation of a semicircular, protruding reinforcement wall (into the central part of Barrage 1) are shared with every PPNB barrage known to date in the Jafr Basin, thereby corroborating the dating of the Wādī an-Nu'ayḍiyyah 1 barrage system. In addition, the existence of the four PPNB encampments (and

the contemporary flint workshops associated with two of them) around the barrage system support this dating. There is little doubt that the site of Wādī an-Nu'ayḍiyyah 1 dates back to the PPNB.

The issue of function also admits further in-depth discussion. It is now evident that the two elongated, stone-built features at Wādī an-Nu'ayḍiyyah 1 were used as basin-irrigation barrages to facilitate agro-pastoral adaptations within this desert landscape. A range of collateral evidence – their location on permeable terrain, a grand design aimed at creating a shallow and extensive flooded area and the imperfect waterproof properties of the barrage walls – all argue against their use for simple water impoundment, instead supporting the basin-irrigation hypothesis. A possible revision provided by the current investigation is that the open-cut limestone quarry in front of the barrage wall might have served as an anthropogenic watering place for initial pastoral transhumants and their livestock. If this is the case, it would follow that at least some of the Jafr PPNB barrages were multi-purpose dams possessing both the function of basin-irrigation and of supplying drinking water, a likely assumption when we consider the scarcity of reliable extramural water sources in the arid margins.

*Open-Air Limestone Quarry*

Additional comments should be made about the open-cut limestone quarry attested to for the first time at the barrage system of Wādī an-Nu'ayḍiyyah 1. The clear evidence came from Areas 1 and 2 of Barrage 1, where an extensive pit *ca.* 0.6-1.0m deep was found in front of the barrage wall. In view of the site stratigraphy (**Fig. 26**), there is little doubt that the pit represents an on-site quarry for procuring good quality limestone cobbles and boulders included in Layers 4 and 5. As a matter of fact, a dozen boulders still remain exposed at the base of Pit 103 in Area 1 (**Figs. 9, 12**). In addition, the two major excavation areas have several depressions left by removed building stones. Both observations clearly indicate that there was a large open-cut limestone quarry in front of the barrage wall. However, the extent of the quarry has yet to be confirmed. All we know at the present stage is that: (1) the northern edge is probably located between the revetment and the barrage wall, (2) the eastern and western edges extend beyond Area 5 and Area 6 respectively, (3) the southern edge lies between Trench 11 and the southern end of Area 1 (**Fig. 6**). It follows that the open-cut limestone quarry covered an area of at least 1,000 square meters in front of the barrage wall.

The discovery of the large-scale, on-site, open-cut quarry provides valuable insights into a few essential issues. To begin with, it sheds light on the source of the building stones used in the construction of the barrage system. Our previous report suggested that they were brought in from surrounding *wadi* beds (Fujii, Adachi *et al*. 2011), but this explanation is now harder to support. The presence of an on-site quarry has resolved the discrepancy between the barrage location in an area poor in exposed building materials on the one hand, and the expected volume of available construction materials on the other. It has also provided a convincing explanation of how the barrage managed to incorporate a large volume of less weathered limestone cobbles and boulders, which are usually difficult to procure on the *Ḥamād* surface.

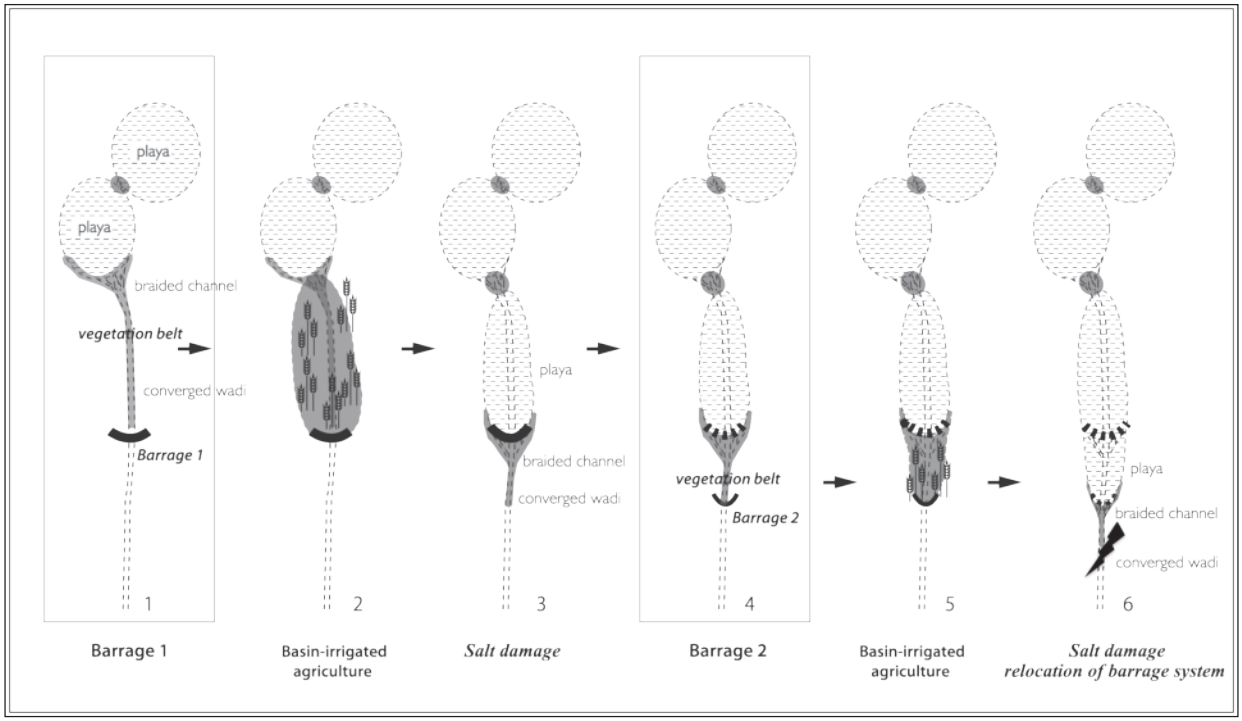
The discovery provides insights into the origin of halved boulders as well. As noted above, the central part of a Jafr PPNB barrage usually piled up halved boulders with their fractured surface facing outwards. The exposure of good quality boulders in the base of Pit 103 in Area 1, coupled with the site stratigraphy of Barrage 1, suggests that they were procured on the spot. Of significance is their violin-shaped profile with lateral concavities, which most likely facilitated their halving by direct percussion (These unique boulders probably supplied the raw material for the production of the large grooved stone weights as well). It is our present view that, immediately after quarrying, they were halved on the spot and transported to – and piled up at – the rear side to form the revetment and barrage wall. Presumably, this high degree of labor efficiency made it possible for a small group of pastoral transhumants to construct a large-scale barrage in the middle of flint pavement desert, poor in exposed construction material. As suggested above, there is also no doubt that the pit spoil from the open-cut limestone quarry served as construction material for mud banks and foundations.

Incidentally, both the unique construction method (i.e. on-site construction of stone walls at the edge of an open-cut quarry) and the use of halved boulders are shared by semi-subterranean structures at contemporary outposts such as Wādī Abū Ṭulayḥa (e.g. Fujii 2007: fig. 7, 2008: fig. 5) and Wādī Ghuwayr 17 (Fujii *et al*. 2011: fig. 10). The cistern at Wādī Abū Ṭulayḥa also used the same masonry technique (Fujii 2009: figs. 25, 26). These commonalities, though limited to construction, corroborate our perspective that the three major components – an agro-pastoral outpost as a fixed 'front-line' base for initial transhumants, a basin-irrigation barrage as a remote cereal field and a cistern as a reliable source of drinking water – constituted the Jafr Pastoral PPNB in a unified manner (Fujii n.d.).

*Location and Formation Process of the Jafr PPNB Barrage System*

Our previous report suggested that the Jafr PPNB barrages were constructed at the lower edge of the lowest component of a semi-open playa system, and that the downstream renewal of the upper barrage forced by salt damage led to the formation of a seemingly organized barrage *system* (Fujii *et al*. 2011).

The investigation at Wādī an-Nu'ayḍiyyah 1 necessitates a reconsideration of the first perspective. This is, first, because Trench 11 yielded evidence for a small *wadi* flowing northward across the central part of Barrage 1 (**Fig. 21**) and, second, because the present vegetation around the barrage system is concentrated not in the flooded areas in front of the two barrages, but in a braided channel and subsequent converging *wadi*, both located at the outlet of the playa (**Fig. 5).** The first consideration demonstrates that the barrage was constructed across the buried *wadi*. This means, in turn, that the lowest playa where the barrage system is now located was formed owing to the damming effect of the two barrages. The second consideration, on the other hand, confirms that – even though salt-resistant – dry land vegetation in and around a playa has a natural tendency to become established on well-watered and, at the same time, well-drained terrain free of salt damage. (It is precisely for this reason that the central part of a semi-open playa, to say nothing of a closed one, is devoid of vegetation even after heavy rain.) Taken together, it seems more reasonable to assume that the barrage system was constructed somewhere along the converging *wadi* so as to incorporate the limited vegetation belt as a future cereal field. The location at the lower end of the lowest playa is




*40. Reconstructed formation process of the Jafr PPNB barrage system.*

most unlikely, because it results in the exclusive incorporation of the saline area unsuitable for agriculture.

Taking these new perspectives into consideration, the formation process of the Jafr PPNB barrage system can tentatively be reconstructed as follows (**Fig. 40**): (1) the first barrage was constructed across a converging *wadi* (draining from the original, lowest playa of a semi-open playa system) so as to incorporate the contemporary vegetation belt as much as possible, (2) basin-irrigation agriculture successfully took place within the elongated flooded area of the barrage, (3) however, basin-irrigation of dry land inevitably led to salt damage in due course, (4) for this reason, it became necessary to relocate the barrage to a smaller vegetation belt newly formed downstream, (5) the relocation revitalized basin-irrigated agriculture but (6) top-soil salinization occurred again, but further shrinkage of the vegetation belt meant that further downstream renewal of the barrage system was abandoned.

This scenario sheds new light on the internal structure of the Jafr PPNB barrage system. Of significance is the fact that the existence of an upper barrage not only reduces the water pressure acting on a lower barrage, but also impedes the development of a second braided channel owing to its damming effect. Both of these explain the reason why the lower barrage is usually much smaller in scale and less substantial in structure than the upper barrage. Understandably, the damming effect increases in an exponential manner as the barrage system is renewed downstream. It is probably for this reason that the Jafr PPNB barrage system consisted only of two barrages and rarely developed further. It is conceivable that such deep-rooted structural unsustainability led to the repeated relocation of a barrage system (and a neighboring outpost as its operating body). In this sense, we can argue that the Jafr PPNB pastoral transhumance involved a potential for pastoral nomadization from the beginning, regardless of the post-PPNB climatic deterioration culminating in the 8.2 k event (Fujii *et al*. 2011).

## Concluding Remarks

The investigation at Wādī an-Nu'ayḍiyyah 1 has provided further evidence to corroborate our previous perspectives on the date and function of the Jafr barrage system. Not only that, it has produced the following three new observations.

First, the Jafr PPNB barrage system proved to have been associated with an open-cut limestone quarry used as a source of material and the site for a revetment, as well as being a large depression that may have served as a watering place. Such a multi-purpose barrage was combined with an outpost and an intramural cistern to form the essential infrastructure that made up the pastoral adaption of the Neolithic Jafr Basin.

Second, the investigation has provided further insights into the location and formation process of the Jafr PPNB barrage system.

Third, the survey has shed new light on the surrounding encampments, thereby contributing towards a more comprehensive understanding of the barrage system or complex. The next field season, scheduled for the summer of 2012, will be devoted to an investigation of the adjacent barrage system of Wādī an-Nu'ayḍiyyah 2.

**Acknowledgements**

Our research project has been financially supported by the Japan Society for the Promotion of Science (Grant No. 17063004). We would also like to express our sincere gratitude to the Department of Antiquities of Jordan for their kind and steady support of our project. Our special thanks go to Mr Amer Bdour, representative of the DoA, who continued to support us during this highly difficult field season.

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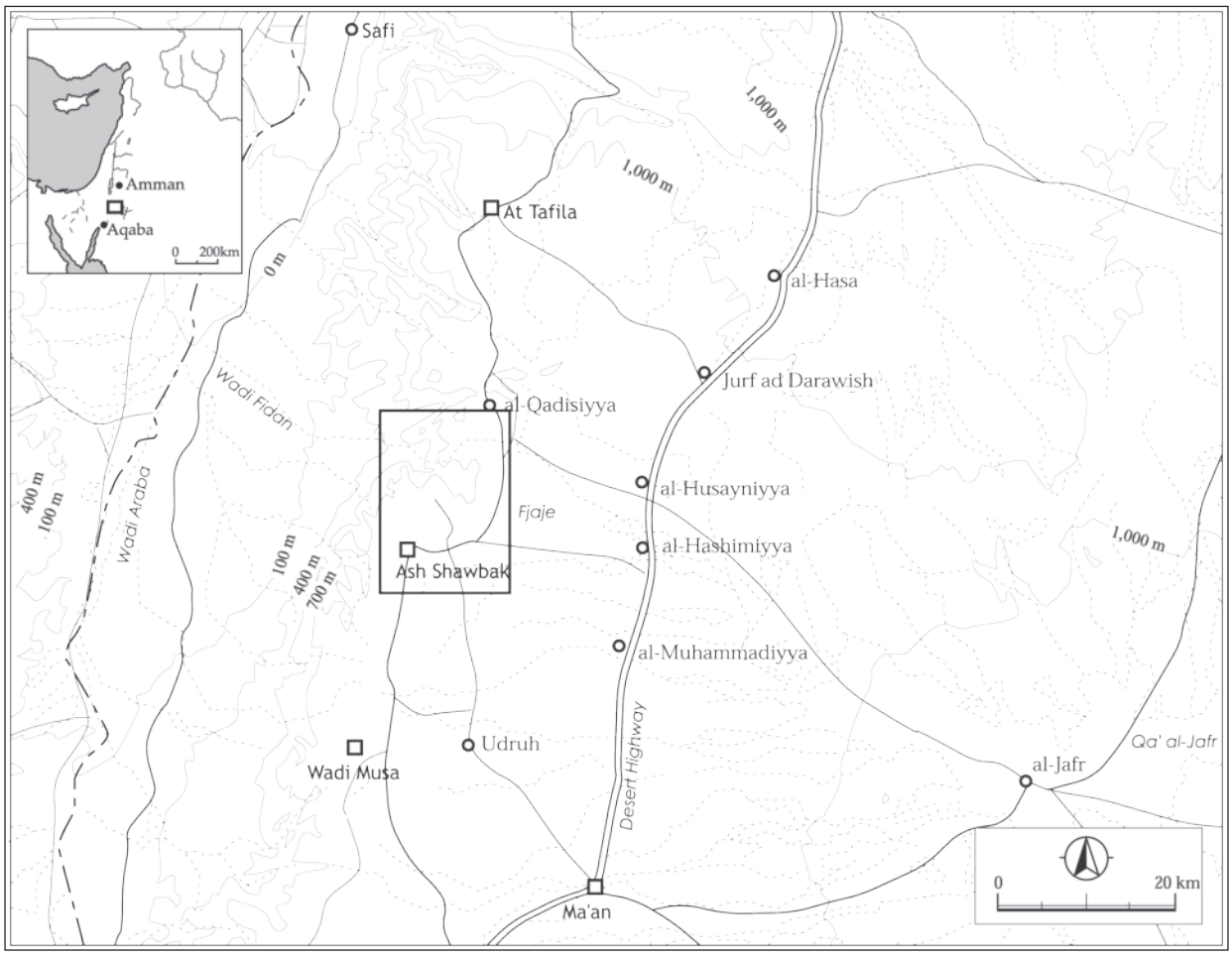
# A PRELIMINARY REPORT ON THE SHAWBAK NORTH ARCHAEOLOGICAL PROJECT (SNAP): SUMMER 2011

*Sumio Fujii, Masatoshi Yamafuji and Yui Arimatsu*

## Introduction

As a part of our major research project (JBPP: the Jafr Basin Prehistoric Project), we have started a sub-project (SNAP: the Shawbak North Archaeological Project) with a view to shedding new light on the general occupational history of the hilly terrain at the western edge of the Jafr Basin. This area is a nodal point of surrounding topographic zones, including the Karak/Ṭafīla highlands to the north, the Wādī Mūsā intermountain plain to the south, the Jafr Basin to the east, and the Wādī Faynān lowland drainage basin to the west (**Fig. 1**). Despite its geographical importance, it has so far been poorly investigated: major sites investigated to date are limited to Palaeolithic flint scatters along the al-Fujayj escarpment (Rollefson 1981a, 1981b, 1985), the Neolithic settlement




*1. Location of the research area.*

of Wādī Baddā (Fujii 2007), the dolmen field of Umm aṭ-Ṭuwayrāt (Dubis *et al*. 2004; Scheltema 2008), Iron Age sites around Khirbat ad-Dabba (Whiting *et al*. 2008, 2009) and Shawbak Castle. Considering the rich archaeological potential of the area, the present state of investigation is far from satisfactory.

Our new research project is intended to fill the information gap at this nodal point and, in so doing, provide a basis for synthesizing the separate data sets in surrounding areas. The project anticipates a total research period of seven years, from 2010 to 2017. The first phase (2010-2012) aims to build up a comprehensive database of archaeological sites in the research area. The second phase (2013-2017), on the other hand, will be devoted to soundings and excavations at several promising sites located in the first phase. The first field season was conducted in the summer of 2010, focusing on the northern half of Area 1. The survey located a total of twenty sites ranging in date from a Palaeolithic flint scatter to a Nabatean settlement. The second survey, conducted between 5 and 8 October 2011, located sixteen sites in the western half of Areas 4 and 7. This report briefly summarizes the results of these investigations.

**Research Area**

Our research area consists of the vast depression below the al-Fujayj escarpment and a part of the hilly terrain in the south, covering an area extending *ca.* 12km north - south by *ca.* 10km east-west. It is defined by the following four topographical features: Wādī al-Ḥmrā and its northern slopes to the north, the main highway passing through the town of Shawbak to the south, the Fujayj escarpment to the east and the steep slopes leading down to the Faynān area to the west (**Fig. 2**).

The research area includes a few major drainage systems. To begin with, Wādī Ṭarṭar flows northward from the northern flank of the hilly terrain and joins Wādī an-Nakhīl roughly in the center of the research area. Wādī al-Bustān drains north-eastward from the hilly terrain and likewise joins Wādī an-Nakhīl, which in turn runs westward down to the Faynān area. These three drainage systems divide the research field into seven survey areas with various topographic traits.

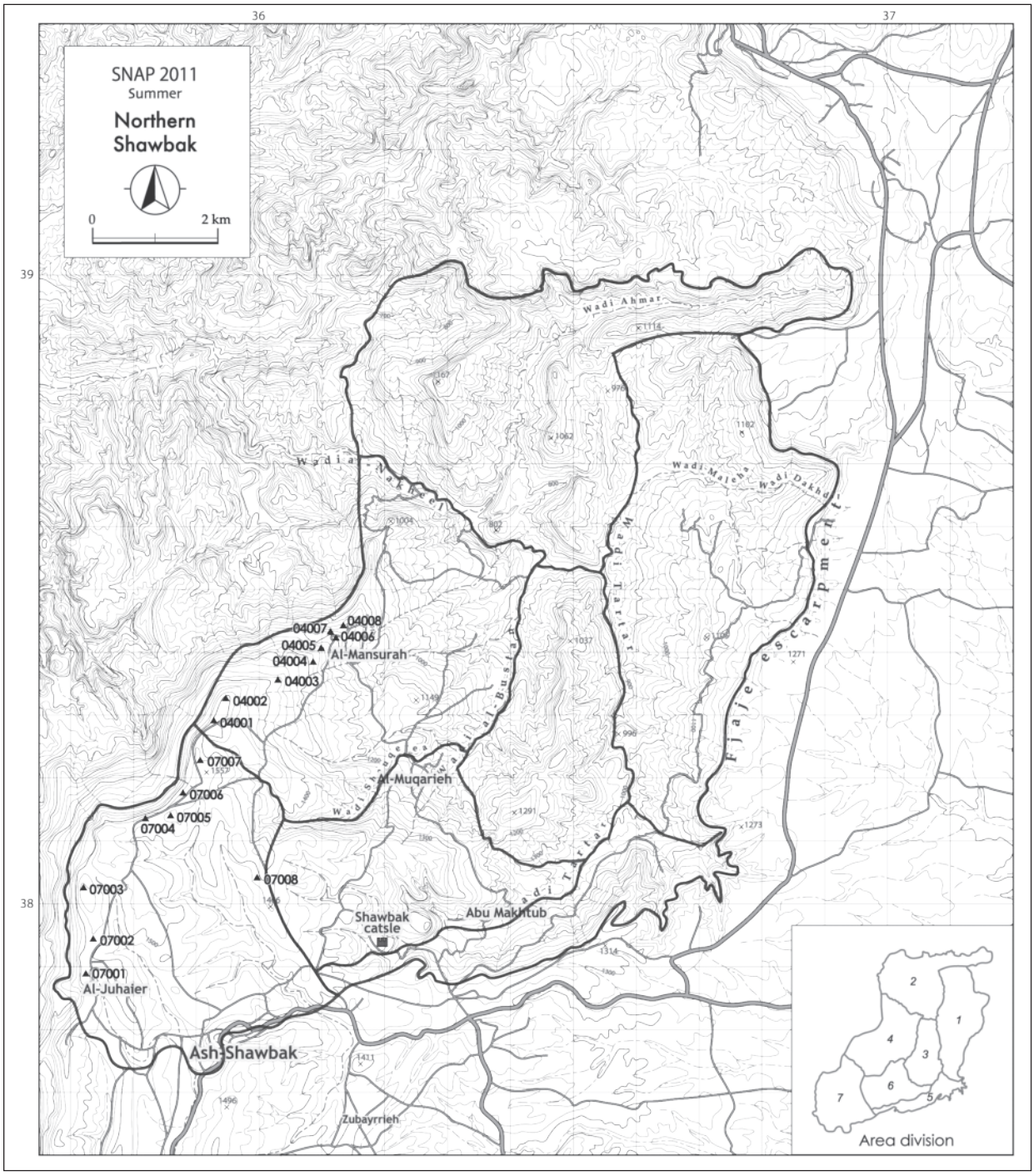
The depression area is under arid climatic conditions, being poor in vegetation. For this reason, no traditional settlements are existent. However, due to its unique topography, there are several perennial springs and streams (e.g. Wādī an-Nakhīl and Wādī Shuqariyyah), which provide drinking water for local herders. The hilly terrain, on the other hand, is relatively rich in water supply and several settlements with residents engaged in horticulture and pastoralism are dotted throughout the area. Thus, the research area can be divided into two: the arid depression to the north and the relatively fertile hilly terrain to the south.

The second survey, our main concern here, focused on the elongated hilly country in the western half of Areas 4 and 7. The survey took place by means of transects on foot, and a total of 64 hours were devoted to the fieldwork. The identification of sites was based on artifact scatters and / or evidence of structural remains. Every site located was plotted on a topographic map and registered according to the SNAP site code system. The surface collection consisted of 583 pottery sherds and 8 flint artifacts, all of which were registered and carefully recorded.

**Results of the Investigation**

The survey located a total of sixteen sites, including three sites (Sites 04002, 07001 and 07004) that had been tentatively registered during the first field season. The following description is made in an ascending order of site registration number, regardless of supposed site date(s). The register number is five-digit; the first two digits indicate an area number and the last three digits a site serial number within each area. The following description includes site name, coordinates for location (according to WGS 84), elevation, site location, site type, site size, preservation state, surface finds, structural remains, possible date and comments. Period abbreviations are as follows:

EB: Early Bronze Age
MB: Middle Bronze Age
LB: Late Bronze Age
Ir: Iron Age
Hel: Hellenistic period
Nab: Nabataean period
Rom: Roman period




*2. Registered sites of the summer 2011 field season.*

Byz: Byzantine period
Isl: Islamic period

*Site 04001*
Site name: unknown.
Coordinates: 30˚33.726 N; 35˚31.997 E.
Elevation: 1508m.
Site location: on the upper part of a steep slope overlooking the Faynān gorge (**Fig. 3: 1**).
Site type: artifact scatter.
Site size: unknown.
Preservation: partly destroyed by a modern road.
Surface finds: 5 pottery sherds.
Structural remains: unidentified.

1. Site 04001 (looking N).

2. Site 04002 (looking N).

3. Site 04003.

4. Site 04004 (looking SE).

5. Site 04005 (looking W).

6. Site 04006 (looking SE).

7. Site 04007 (looking S).

8. Site 04008 (looking S).

*3. General view of registered sites in Area 4.*

Possible date: Rom - Byz.
Comments: no special comment.

*Site 04002*
Site name: unknown.
Coordinates: 30˚33.933 N; 35˚32.126 E.
Elevation: 1513m.
Site location: at the top of a steep slope overlooking the Faynān gorge (**Fig. 3: 2**).
Site type: isolated structural remains and artifact scatter.
Site Size: ill-defined.
Preservation: relatively good.
Surface finds: 102 pottery sherds (**Fig. 4: 1-6, Fig. 5: 1-6**).
Structural remains: several masonry wall alignments constructed with dressed limestone boulders up to ca. 1 m long.
Possible date: Hel, Nab, Rom-Byz (majority of finds) and Isl.
Comments: Nabataean fine ware sherds concentrated on the eastern part of the site.

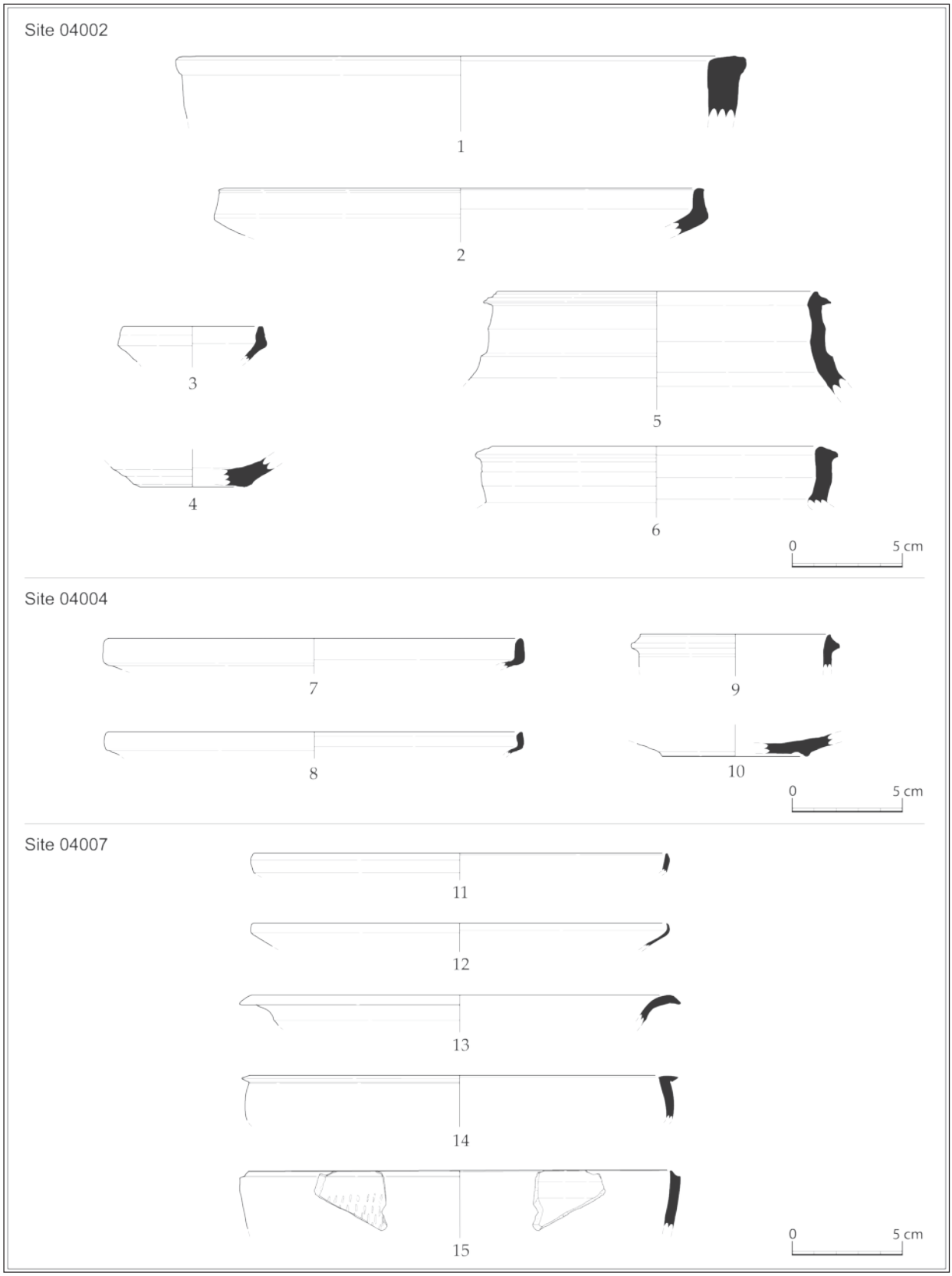
*Site 04003*
Site name: unknown.
Coordinates: 30˚34.055N; 35˚32.638E.
Elevation: 1391m.
Site location: on the upper part of a steep slope overlooking the Faynān gorge (**Fig. 3: 3**).
Site type: isolated structural remains and artifact scatter.
Site size: ill-defined.
Preservation: heavily damaged.
Surface finds: 6 pottery sherds.
Structural remains: poorly preserved stone alignments of dressed limestone boulders.
Possible date: Rom-Byz and Isl.
Comments: no special comments.

*Site 04004*
Site name: unknown.
Coordinates: 30˚34.254N; 35˚33.085E.
Elevation: 1301m.
Site location: on the upper part of a steep slope overlooking the Faynān gorge (**Fig. 3: 4**).
Site type: isolated structural remains and artifact scatter.
Site size: ill-defined.
Preservation: heavily damaged by recent cultivation.
Surface finds: 69 pottery sherds (**Fig. 4: 7-10, Fig. 5: 7-10**).
Structural remains: unidentified.
Possible date: EB, Ir, Hel, Nab and Rom-Byz (majority of finds).
Comments: no special comment.

*Site 04005*
Site name: unknown.
Coordinates: 30˚34.346N; 35˚33.093E.
Elevation: 1271m.
Site location: on the upper part of a steep slope overlooking the Faynān gorge (**Fig. 3: 5**).
Site type: cemetery?
Site size: ill-defined.
Preservation: partly damaged.
Surface finds: 38 pottery sherds.
Structural remains: a rectangular cist constructed of large limestone slabs.
Possible date: Rom-Byz (majority of finds) and Isl.
Comments: no special comment.

*Site 04006*
Site name: unknown.
Coordinates: 30˚34.390N; 35˚33.114E.
Elevation: 1213m.
Site location: on the upper part of a steep slope overlooking the Faynān gorge (**Fig. 3: 6**).
Site type: artifact scatter.
Site size: ill-defined.
Preservation: heavily damaged by recent cultivation.
Surface finds: 29 pottery sherds.
Structural remains: unidentified.
Possible date: Rom-Byz.
Comments: no special comment.

*Site 04007*
Site name: unknown.
Coordinates: 30˚34.513N; 35˚33.251E.
Elevation: 1199m.
Site location: on a gentle slope to the north-west of Site 04006 (**Fig. 3: 7**).
Site type: artifact scatter.
Site size: ill-defined.
Preservation: -
Surface finds: 67 pottery sherds (including Nabatean fine ware sherds (**Fig. 4: 11-15, Fig. 5: 11-15**).
Structural remains: unidentified.
Possible date: Ir, Hel, Nab, Rom-Byz (majority of finds) and Isl.
Comments: no special comment.




*4. Selected small finds from registered sites in Area 4.*

| Fig.: no. | Period | Form | Color | | | Inclusion | Note |
|---|---|---|---|---|---|---|---|
| | | | interior | exterior | core | | |
| 4: 1 | Rom-Byz | Bowl | orange (2.5YR6/6) | light yellow orange (10YR8/4) | orange (2.5YR6/6) | black, brown and white sand 0.1-1mm in diameter | wet smooth with wheel |
| 4: 2 | Rom-Byz | Bowl | orange (2.5YR6/6) | orange (2.5YR6/6) | orange (2.5YR6/6) | black sand 0.1-0.5mm in diameter | wet smooth with wheel |
| 4: 3 | Rom-Byz | Bowl | orange (2.5YR6/6) | orange (2.5YR6/6) | orange (2.5YR6/6) | black sand 0.1mm in diameter, mica | wet smooth with wheel |
| 4: 4 | Rom-Byz | (Base) | brownish gray (10YR5/1-4/1) | brownish gray (10YR5/1-4/1) | brownish gray (10YR5/1-4/1) | gray sand 0.1mm in diameter | wet smooth with wheel |
| 4: 5 | Rom-Byz | Jar | orange (7.5YR6/6) | dull orange (5YR6/3) | orange (7.5YR6/6) | white and black sand 0.5-1mm in diameter | wet smooth with wheel |
| 4: 6 | Rom-Byz | Jar | orange (2.5YR6/6-6/8) | orange (2.5YR6/6-6/8) | orange (2.5YR6/6-6/8) | black and brown sand 0.5-1mm in diameter, with a little mica | wet smooth with wheel |
| 4: 7 | Nab | Bowl | orange (2.5YR6/6) | orange (2.5YR6/6) | orange (2.5YR6/6) | black sand 0.1mm in diameter | wet smooth with wheel |
| 4: 8 | Nab | Bowl | orange (2.5YR6/6) | orange (2.5YR6/6) | orange (2.5YR6/6) | black sand 0.1mm in diameter | wet smooth with wheel |
| 4: 9 | Rom-Byz | Jar | orange (2.5YR6/6) | orange (2.5YR6/6) | orange (2.5YR6/6) | calcite 0.5-2mm in diameter, black and white sand 0.5-1mm in diameter | wet smooth with wheel |
| 4: 10 | Rom-Byz | (Base) | bright reddish brown (2.5YR5/6) | dull reddish brown (2.5YR5/3) | bright reddish brown (2.5YR5/6) | black and brown sand 0.1-2mm in diameter, a little mica | wet smooth with wheel |
| 4: 11 | Nab | Bowl | orange (2.5YR6/8) | orange (2.5YR6/8) | orange (2.5YR6/8) | none | wet smooth with wheel |
| 4: 12 | Nab | Bowl | orange (5YR7/6-7/8) | orange (5YR7/6-7/8) | orange (5YR7/6-7/8) | none | careful wet smooth |
| 4: 13 | Nab | Bowl | orange (5YR6/6-6/8) | orange (5YR6/6-6/8) | dull orange (7.5YR7/4-6/4) | black and brown sand 0.1-1mm in diameter | wet smooth with wheel |
| 4: 14 | Nab | Bowl | orange (2.5YR6/6-6/8) | orange (2.5YR6/6-6/8) | orange (2.5YR6/6-6/8) | black and white sand 0.1-0.5mm in diameter | careful wet smooth |
| 4: 15 | Nab | Bowl | orange (2.5YR6/6-6/8) | orange (2.5YR6/6-6/8) | orange (2.5YR6/6-6/8) | black sand 0.1mm in diameter | careful wet smooth, rolling incised dots on ext. surface |

*5. List of selected small finds from registered sites in Area 4.*

*Site 04008*
Site name: unknown.
Coordinates: 30˚34.575N; 35˚33.251E.
Elevation: 1176m.
Site location: located on a gentle slope to the north-west of the settlement of al-Manṣurah (**Fig. 3: 8**).
Site type: artifact scatter.
Site size: ill-defined.
Preservation: -
Surface finds: 25 pottery sherds.
Structural remains: unidentified.
Possible date: Ir (?), Rom-Byz (majority of finds) and Isl.
Comments: no special comments.

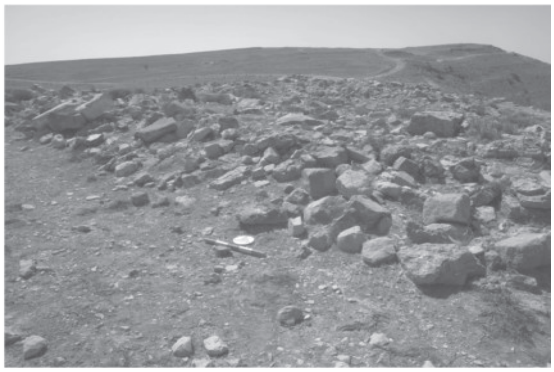
*Site 07001*
Site name: Khirbat al-Juhayr.
Coordinates: 30˚31.560N; 35˚30.747E.
Elevation: 1507m.
Site location: at the top of a gentle slope *ca.* 0.3km north of al-Juhayr (**Fig. 6: 1**).
Site type: cairn field.
Site size: *ca.* 3ha (*ca.* 300m north-south by *ca.* 100m east - west).
Surface finds: 20 pottery sherds (**Fig. 7: 1-9, Fig. 8: 1-9**).
Preservation: partly destroyed by modern houses.
Structural remains: several exposed elongated cists.
Possible date: EB IB (majority of finds), Hel and Rom-Byz.
Comments: EB coarse ware sherds (**Fig. 7: 1-5**) predominate, but Roman - Byzantine fine ware sherds were also present (**Fig. 7: 6-9**).

*Site 07002*
Site name: unknown.
Coordinates: 30˚31.888N; 35˚30.829E.
Elevation: 1506m.
Site location: on a gentle hill *ca.* 0.5km north of

1. Site 07001 (looking N).

2. Site 07002 (looking S).

3. Site 07003 (looking S).

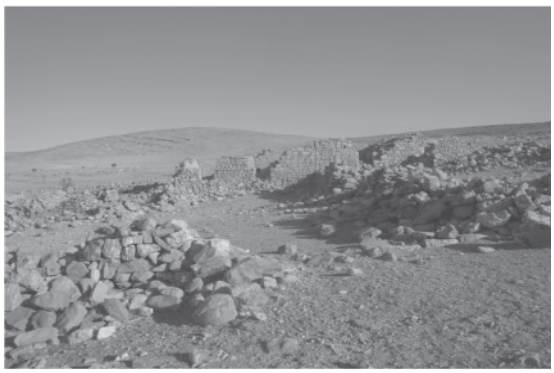


4. Site 07004 (looking SW).

5. Site 07005 (looking S).

6. Site 07006 (looking N).

7. Site 07007 (looking N).



8. Site 07008 (looking N).

*6. General view of registered sites in Area 7.*

Site 07001 (**Fig. 6: 2**).
Site type: artifact scatter.
Site size: *ca.* 0.4ha (*ca.* 100m north-south by *ca.* 40m east-west).
Preservation: -
Surface finds: 8 pottery sherds and 1 flint artifact.
Structural remains: several stone alignments.
Possible date: Hel, Rom-Byz and Isl.
Comments: no special comment.

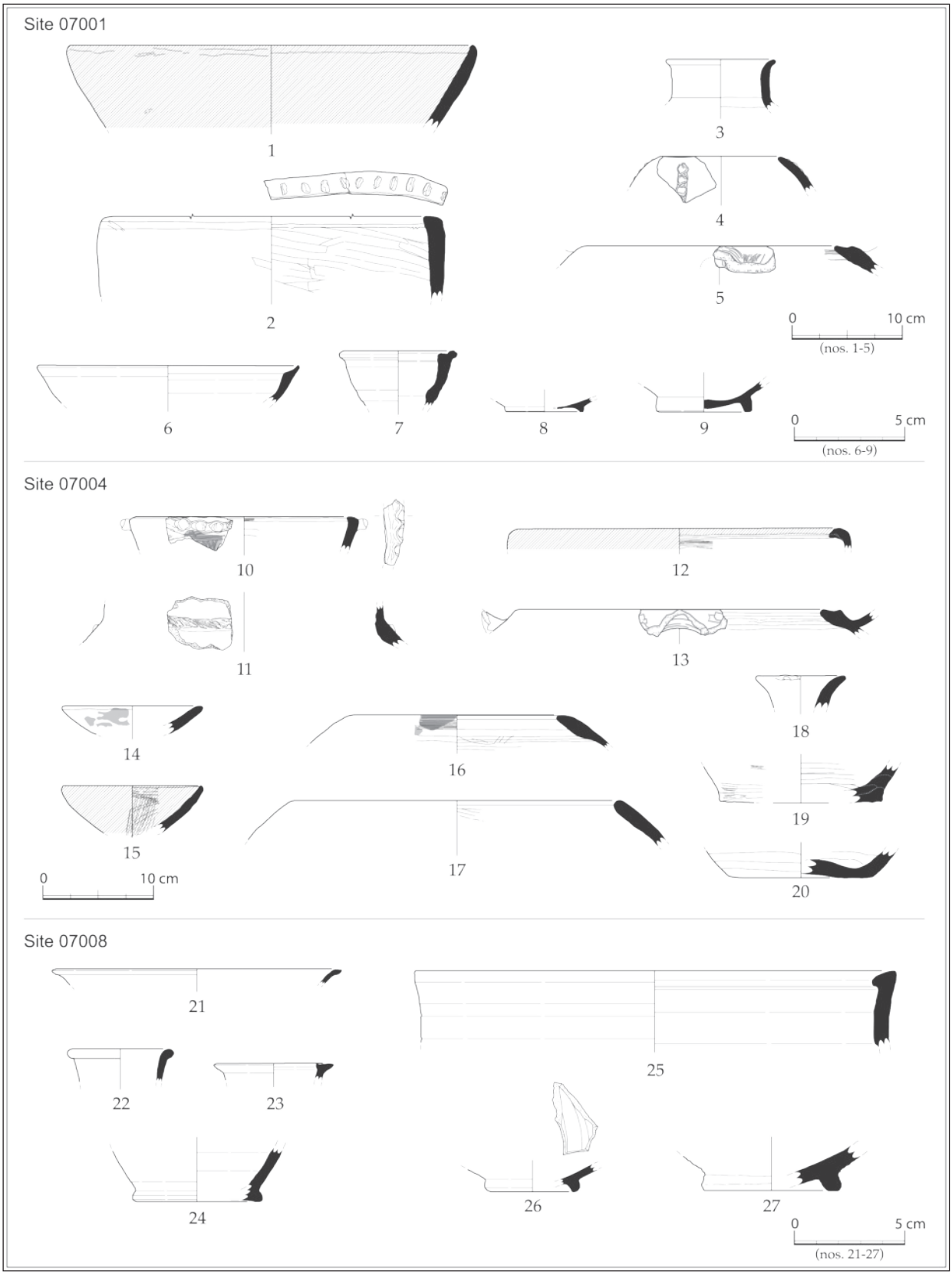
*Site 07003*
Site name: unknown.
Coordinates: 30˚32.307N; 35˚30.714E.
Elevation: 1551m.
Site location: an edge of the western escarpment (**Fig. 6: 3**).
Site type: artifact scatter.
Site size: *ca.* 1ha (*ca.* 100m north - south by *ca.* 100m east-west).
Preservation: heavily damaged.
Surface finds: 12 pottery sherds and 1 flint artifact.
Structural remains: several intermittent stone alignments ca 5m long by *ca*. 0.5m wide.
Possible date: Rom-Byz and Isl.
Comments: no special comment.

*Site 07004*
Site name: unknown.
Coordinates: 30˚32.875N; 35˚31.305E.
Elevation: 1525m.
Site location: an edge of the western escarpment **(Fig. 6: 4).**
Site type: cairn field, settlement (?).
Site size: *ca*. 1.3ha (*ca*. 250m north - south by *ca*. 50m east-west).
Preservation: partially plundered.
Surface finds: 94 pottery sherds and 6 flint artifacts.
Structural remains: several elongated cairns 5-7m long.
Possible date: EB IA, EB IB, (EB II) (the majority of pottery sherds were EB), Ir, Rom-Byz and Isl.
Comments: The distinctive EB IA pottery sherds (**Fig. 7: 10-11, Fig. 8: 10-20**) have parallel examples at 'En Esur and Yiftah'el (Yannai 2006: 92, fig. 4. 71: 3; Braun 1997: fig. 9. 5: 2, 9. 18: 1, 3). Also of significance is the occurrence of EB IB-II cooking pots and lamp bowls; the latter have much in common with contemporary material from Tel Arad in the northern Negev (Amiran *et al*. 1978: pl. 13: 7, 19, 22: 30 etc.). Similar finds have also been confirmed in Stratum III (EB II) at Bāb adh-Dhrā' (Rast and Shaub 2003: pl. 31: 26, 33: 19).

*Site 07005*
Site name: unknown.
Coordinates: 30˚32.966N; 35˚31.576E.
Elevation: 1545m.
Site location: on a gentle slope *ca*. 0.5 km east of Site 07004 (**Fig. 6: 5**).
Site type: artifact scatter.
Site size: ill-defined.
Preservation: partly destroyed by modern road construction.
Surface finds: 20 pottery sherds.
Structural remains: several stone concentrations (cairns?).
Possible date: Ir, Hel, Nab and Rom-Byz.
Comments: no special comment.

*Site 07006*
Site name: unknown.
Coordinates: 30˚33.100N; 35˚31.738E.
Elevation: 1531m.
Site location: located on a gentle slope *ca*. 0.5 km north of Site 07005 (**Fig. 6: 6**).
Site type: artifact scatter.
Site size: *ca*. 0.6ha (*ca*. 80m north - south by *ca*. 70m east - west).
Preservation: -
Surface finds: 34 pottery sherds.
Structural remains: unidentified.
Possible date: Hel, Nab and Rom-Byz (majority of finds).
Comments: no special comment.

*Site 07007*
Site name: unknown.
Coordinates: 30˚33.293N; 35˚31.880E.
Elevation: 1540m.
Site location: on a gentle slope *ca*. 0.5km north of Site 07006 (**Fig. 6: 7**).
Site type: artifact scatter.
Site size: ill-defined.
Preservation: -
Surface finds: 15 pottery sherds.
Structural remains: none.
Possible date: Rom-Byz (majority of finds).




*7. Selected small finds from registered sites in Area 7.*

| Fig.: no. | Period | Form | Color | | | Inclusion | Note |
|---|---|---|---|---|---|---|---|
| | | | interior | exterior | core | | |
| 7: 1 | EB I | Bowl | dull yellow orange (10YR7/4) | dull orange (7.5YR6/4) | dull orange (7.5YR6/4) | amount of very small white sand, gray and white sand 1mm in diameter | Red slipped (5YR5/6) (partially remains) |
| 7: 2 | EB I | Krater | orange (7.5YR7/6) | dull orange (7.5YR6/4-7/4) | dull reddish brown (2.5YR5/4-4/4) | gray sand 1-2mm in diameter, white sand 1mm in diameter | Diagonally smoothed on int. surface, continuous thumb-indentations on rim, rim diameter = 596mm |
| 7: 3 | EB I | Jar | dull orange (7.5YR6/4) | dull orange (7.5YR6/4) | dull orange (7.5YR6/4) | amount of black sand 0.5mm in diameter, white sand 1-3mm in diameter, small amount of translucent sand 0.5mm in diamete and mica | Horizontally smoothed on ext. surface |
| 7: 4 | EB I | Holemouth Jar | bright reddish brown (2.5YR5/6) | bright reddish brown (2.5YR5/6) | Ext.: orange (2.5YR6/6) Int.: gray (5Y4/1) | white sand 0.5mm in diameter, amount of black sand 0.5mm in diameter | Indented rope decoration below exterior rim |
| 7: 5 | EB I | Holemouth Jar | orange (2.5YR6/6) | orange (2.5YR6/6), dull yellowish orange (10YR7/4) | bright reddish brown (2.5YR5/6) | amount of sand 1-4mm in diameter, white sand 1-2mm in diameter, black sand 1-3mm in diameter | Smoothed on both surfaces, spout below rim, coarse ware |
| 7: 6 | Rom-Byz | Bowl | dull orange (5YR6/4-6/6) | dull orange (5YR6/4-6/6) | dull orange (5YR6/4-6/6) | black sand 0.5mm in diameter | wet smooth with wheel |
| 7: 7 | Rom-Byz | Bowl | orange (5YR6/6) | orange (5YR6/6) | dull orange (5YR6/4) | black sand 0.5-1mm in diameter | wet smooth with wheel |
| 7: 8 | Rom-Byz | (Base) | orange (5YR7/6-6/6) | orange (5YR7/6-6/6) | orange (5YR7/6-6/6) | none | careful wet smooth |
| 7: 9 | Rom-Byz | (Base) | orange (5YR7/6-6/6) | orange (5YR7/6-6/6) | orange (5YR7/6-6/6) | none | careful wet smooth |
| 7: 10 | EB I(A) | Bowl | red (10R5/6) | orange (2.5YR6/6) brownish gray (5YR5/1) (soot mark?) | Ext.: brownish gray (7.5YR5/1) Int.: bright reddish brown (2.5YR5/6) | sand 1mm in diameter, very small amount of white sand 0.5-1mm in diameter | Horizontally smoothed on both surfaces, indented handle on exterior rim |
| 7: 11 | EB I(A) | Jar | orange (2.5YR6/6) | orange (2.5YR6/6), dull brown (7.5YR5/3) | brownish gray (10YR5/1) | amount of calcite fragments 1-3mm in diameter | Incised rope decoration on the joint of neck and shoulder, very coarse ware |
| 7: 12 | EB I(B)-II | Bowl | dull orange (7.5YR7/4) (slip on rim: dull reddish brown 2.5YR4/3) | orange (2.5YR6/6) (slip/wash: dull reddish brown 2.5YR4/4) | yellowish gray (2.5Y5/1) | very small amount of white sand 1mm in diameter | Burnished on ext. surface<br>Smoothed on int. surface<br>Red slipped on exterior surface and rim |
| 7: 13 | EB I(B)-II | Holemouth Jar | orange (2.5YR6/6) | orange (2.5YR6/6), dull yellowish orange (10YR7/4) | - | calcite fragments 1-3mm in diameter, amount of sand 1-2mm in diameter | Horizontally smoothed on both surfaces, spout below rim, coarse ware |
| 7: 14 | EB I(B)-II | Lamp bowl | dull orange (5YR6/4) | orange (5YR6/6) | dull yellow (2.5Y6/3) | amount of sand 0.5mm in diameter, calcite fragments 2mm in diameter | Partially red slip remains (red, 10YR5/6), lamp bowl with soot mark |
| 7: 15 | EB I(B)-II | Lamp bowl | dull orange (5YR6/4) (slip: red 10R5/6) | dull orange (7.5YR7/4) (slip: dark red 10R3/4-red 10R4/6) | Ext. side: yellowish gray (2.5Y4/1) Int. side: light gray (2.5Y7/3) | sand 1mm in diameter, limestone fragments 2-3mm in diameter | Burnished on both surfaces, lamp bowl |
| 7: 16 | EB I(B)-II | Holemouth Jar | dull orange (7.5YR6/4) | grayish brown (7.5YR5/2) | dull reddish brown (2.5YR5/4) - dull brown (7.5YR5/3) | amount of calcite fragments 1-2mm in diameter, small amount of sand 1mm in diameter | Horizontally smoothed on both surfaces, with soot mark on ext. rim? |
| 7: 17 | EB I(B)-II | Holemouth Jar | dull orange (7.5YR6/4) | dull orange (7.5YR6/4) | dull yellowish orange (10YR7/3) | sand 1mm in diameter, small amount of red sand 1-2mm in diameter, translucent sand 1-1.5mm in diameter | Smoothed on int. surface, thick calcite on ext. surface |
| 7: 18 | EB I(B)-II | Jug? | dull orange (2.5YR6/4) | dull orange (2.5YR6/4) | yellowish gray (2.5Y6/1) | sand 1-2mm in diameter, limestone fragments 0.5-3mm in diameter | Thumb-indentation on outer rim |
| 7: 19 | EB I | Jar base | dull reddish brown (2.5YR5/4) | light gray (5Y7/1) | brownish gray (10YR5/1) | small amount of sand 1mm in diameter | Horizontally smoothed on both surfaces |
| 7: 20 | EB I | Jar base | orange (5YR6/6) | orange (2.5YR6/6) | dull reddish brown (5YR5/4) | small amount of sand 1-1.5mm in diameter, very small amount of white sand 0.5-1mm in diameter | Horizontally smoothed on both surfaces |
| 7: 21 | Nab | Bowl | orange-bright reddish brown (2.5YR6/6-5/6) | orange-bright reddish brown (2.5YR6/6-5/6) | orange-bright reddish brown (2.5YR6/6-5/6) | black sand 0.1-0.5mm in diameter | wet smooth |
| 7: 22 | Rom-Byz | Jar | orange (2.5YR6/6) | orange (2.5YR6/6) | orange (2.5YR6/6) | black sand 0.1mm in diameter | wet smooth with wheel |
| 7: 23 | Rom-Byz | Jar | dull orange-orange (5YR6/4-6/6) | dull orange-orange (5YR6/4-6/6) | dull orange-orange (5YR6/4-6/6) | black and white sand 0.1-0.5mm in diameter | wet smooth with wheel |
| 7: 24 | Rom-Byz | (Base) | orange (2.5YR6/6-6/8) | orange (2.5YR6/6-6/8) | orange (2.5YR6/6-6/8) | black sand 0.1mm in diameter | wet smooth with wheel |
| 7: 25 | Rom-Byz | Bowl | orange (2.5YR6/6-6/8) | grayish brown (7.5YR6/2-5/2) | orange (2.5YR6/6-6/8) | black, white and gray sand 0.1-0.5mm in diameter | wet smooth with wheel |
| 7: 26 | Isl | (Base) | dull orange (7.5YR7/4) | orange (2.5YR6/8) | orange (2.5YR6/8) | black and white sand 0.1-0.5mm in diameter | wet smooth with wheel, black paint on buff slipped surface |
| 7: 27 | Ir? | (Base) | orange (2.5YR6/8) | orange (2.5YR6/8) | orange (2.5YR6/8) | black and white sand 0.1-1.5mm in diameter | wet smooth |

*8. List of selected small finds from registered sites in Area 7.*

Comments: no special comment.

*Site 07008*
Site name: unknown.
Coordinates: 30˚32.353N; 35˚32.403E.
Elevation: 1474m.
Site location: located on the eastern slope of a small valley leading to Shawbak (**Fig. 6: 8**).
Site type: settlement.
Site size: *ca*. 4ha (*ca*. 200m north-south by *ca*. 200m east-west).
Preservation: relatively well preserved.
Surface finds: 39 pottery sherds (**Fig. 7: 21-27, Fig. 8: 21-27**).
Structural remains: many stone-built structural remains forming a 'conglomerate'.
Possible date: Ir, Hel, Nab, Rom - Byz and Isl (including a glazed pottery sherd).
Comments: There is a perennial spring *ca*. 50m north of the site, where various pottery sherds were collected.

## Concluding Remarks

The brief survey has suggested (1) that the general occupational history of the western part of Areas 4 and 7 dates back to at least the Early Bronze Age, and (2) that it includes various forms of archaeological site, ranging from substantial settlements, through temporal occupations and isolated structural remains, to simple artifact scatters. Of particular interest is the EB I - II small settlement (Site 07004), the finds from which are suggestive of some cultural contact with the contemporary Negev Highlands as well as the Dead Sea plain. Subsequent surveys, scheduled for the spring and summer of 2012, will focus on the eastern half of the research area.

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# ‘AWJĀ 1 - 3: NEOLITHIC AND CHALCOLITHIC OPEN SANCTUARIES IN SOUTHERNMOST JORDAN

*Sumio Fujii, Masatoshi Yamafuji and Kazuyoshi Nagaya*

## Introduction

Along with excavations at the barrage site of Wādī an-Nu‘ayḍiyyah 1 (Fujii *et al*. this volume), the 2011 summer field season of the Jafr Basin Prehistoric Project (JBPP) conducted a rescue investigation in the ‘Awjā area near the Jordan-Saudi border. The targets of the investigation were three small sites (‘Awjā 1-3) located in the center of the area. We devoted a couple of days in the second week of September to fieldwork aimed at exploring their date, function and archaeological implications. As a result, it turned out that the sites contain unique features common to Neolithic to Chalcolithic open sanctuaries or symbolic cemeteries in the neighboring Jafr Basin. This discovery has proved that the Jafr chronology (Fujii n.d.), a key to tracing the process of pastoral nomadization in southern Jordan, is applicable to the border area as well. The following is a brief summary of the results of the investigation.

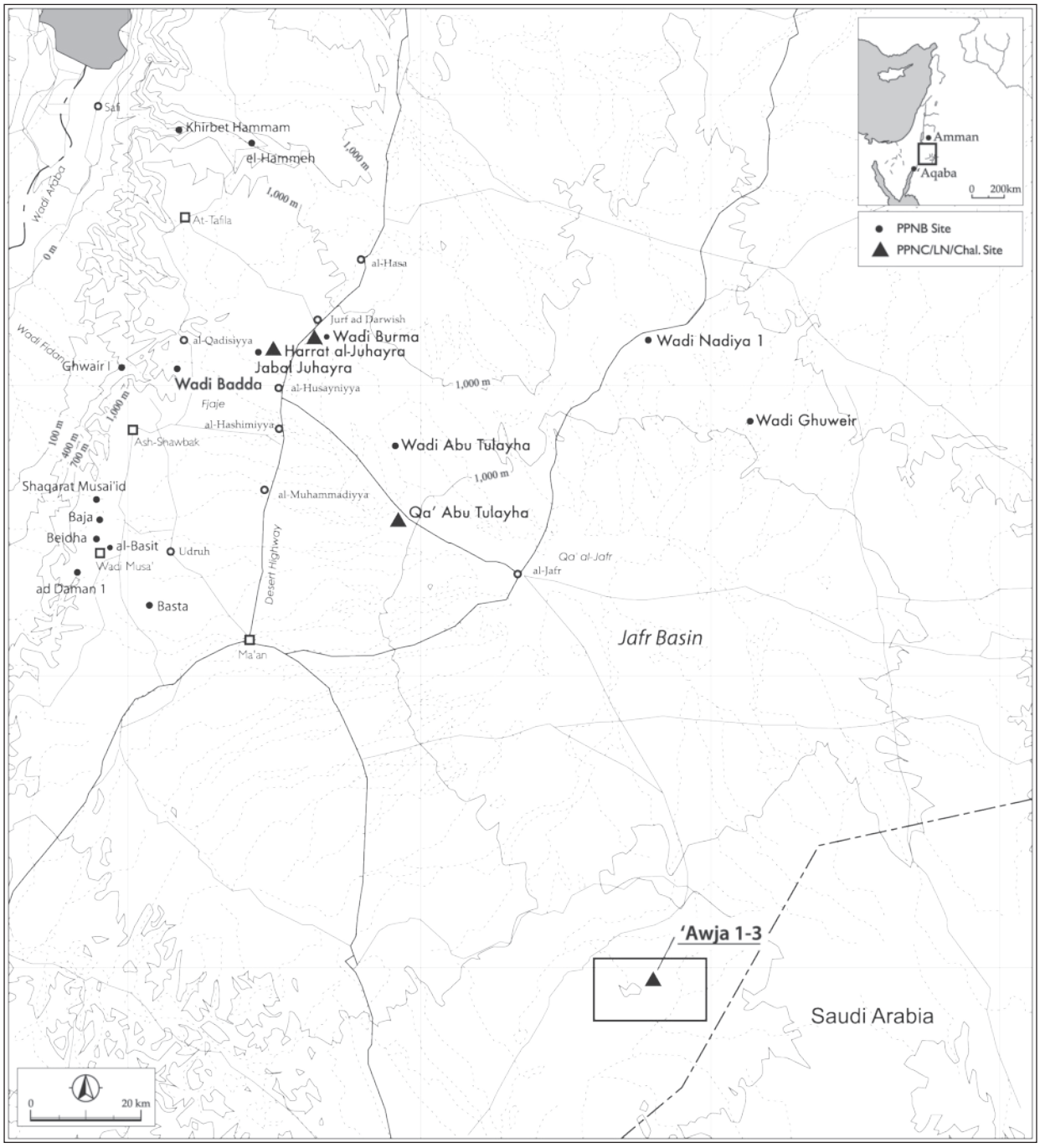
## The Site and its Setting

The ‘Awjā area is situated below the escarpment forming the southern watershed of the Jafr Basin and abuts the Jordan-Saudi border (**Fig. 1**). A large, flat-topped sandstone hill – known locally as Tall ‘Awjā – is situated in the center of the area and serves as a prominent landmark. The three small sites, ‘Awjā 1-3, are located in flat terrain extending north-east of the mesa-like hill (**Fig. 2**). The surrounding landscape consists of gently undulating reddish sand desert, dotted small playas or *qī‘ān* (pl. of *qā‘*), meandering *awdiya* (pl. of *wadi*) and isolated sandstone rises and hills, including Tall ‘Awjā. The local hydro-environment is very harsh; while recent mean annual rainfall is less than 50mm, the potential mean annual evaporation is over 2000mm (Royal Jordanian Geographic Center 1986: figs 14, 41). For this reason, neither perennial natural water sources nor traditional settlements exist, and local land use has been limited to sporadic pasturing. It is no wonder that aside from the ath-Thulaythawāt area to the west (e.g. Abu-Azizeh n.d.a, n.d.b, n.d.c.; Abu-Azizeh *et al*. n.d.) and the Wādī Rumm drainage basin (e.g. Henry 1995; Rollefson and Matlock 2007), southernmost Jordan has been poorly investigated.

The sites of ‘Awjā 1-3 were found for the first time during the 2010 summer field season, on the basis of patchy information from local workers who participated in the excavations at Wādī Ghuwayr 17 and 106 (Fujii *et al*. 2011b, 2011c). Our short visit confirmed that the area includes unique features reminiscent of Neolithic to Chalcolithic burial features in the Jafr Basin, and that they have been partly damaged by illicit diggings by local inhabitants. It is for the reason that we embarked on a rescue investigation in the subsequent 2011 summer field season.

## Investigations at ‘Awjā 1

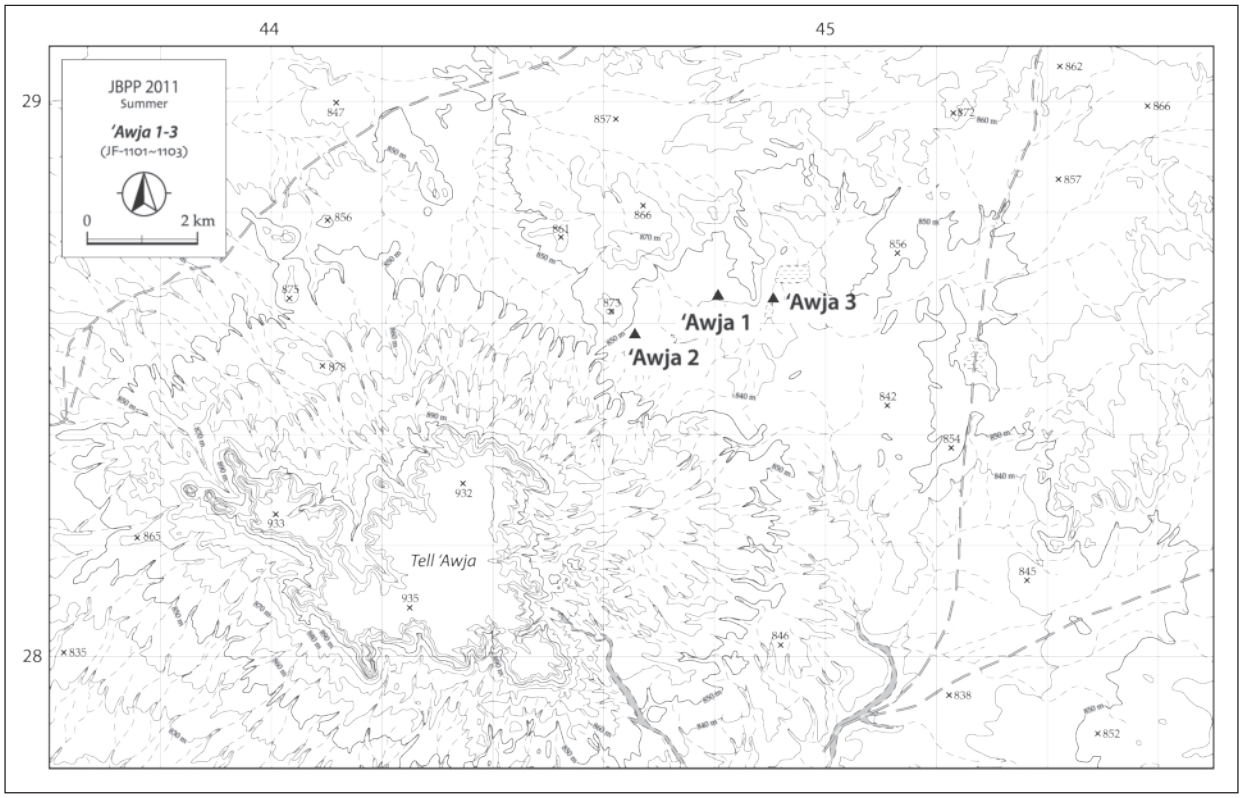
The site of ‘Awjā 1 (N 29˚42′100″, E 036˚27′805″, elev. *ca.* 860m) is located *ca.* 5km north-east of Tall ‘Awjā on an isolated sandstone rise *ca.* 15m in diameter and *ca.* 3m in height. We identified a dozen archaeological features dotted within an area extending *ca.* 100m from east to west and *ca.* 70m from north to south (**Figs. 3-5**). They fell into the following three groups: (1) two complexes of rectangular structures (Complexes I-II) to the south-west of the sandstone rise, (2) a total of eight small features (Features A-H) concentrated on the north of the rise and (3) two large, platform-like features (Features I-J) occupying the western edge of the site. Owing to time constraints, we briefly



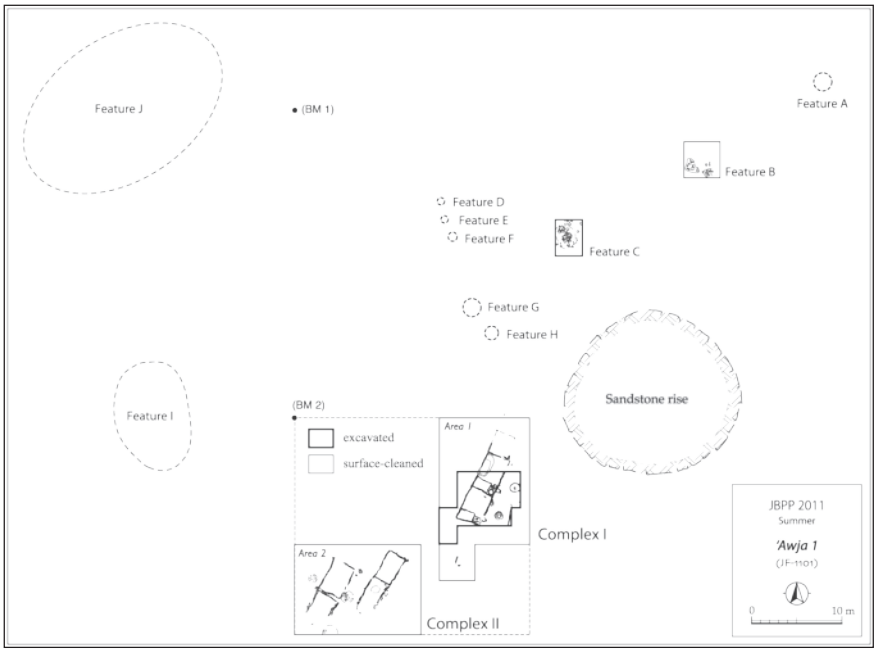

*1. Neolithic to Chalcolithic sites in the Jafr Basin and surrounding areas.*

sounded part of the first and second groups only, leaving the others intact for future investigation.

The sounding confirmed the following site stratigraphy: Layer 1 – the surface layer – consisted of light buff, very loose, silty sand deposits *ca.* 2-3cm thick; Layer 2 contained reddish buff, slightly compact, silty sand deposits *ca.* 5-10cm thick; Layer 3 represented light brown, relatively compact, silty sand deposits at least 10cm thick. In addition, Layer 4 (containing angular limestone cobbles) was partly exposed in the lower half of a round pit-like feature in front of Unit C of Complex I, but its details still remain unknown. Excavated features of the first group were constructed on the upper surface of Layer 3, while those of the second group appeared to overlay Layer 2. However, this is a tentative interpretation based on patchy information, which needs further investigation.




*2. ‘Awjā 1 - 3: location and surrounding topography.*




*3. ‘Awjā 1: general site plan.*

*Complex I (Area 1)*

The limited investigation at Area 1 revealed at least three rectangular structures, two round features and a few intermittent wall alignments **(Figs. 6-7)**. All of them used standardized limestone and sandstone slabs *ca.* 10-30cm long and *ca.* 2-8cm thick, placed on the upper surface of Layer 3. These construction materials were probably procured from neighboring rocky hills where similar slabs outcrop in abundance.

*4. ʻAwjā 1: distant view of the site (looking east).*

*5. ʻAwja 1: general view of the site (looking north-east).*

In terms of technology, the builders adopted the two-rowed upright slab wall technique, a unique construction method endemic to Neolithic desert sites in the southern Levant. The scarcity of fallen stones around the walls indicates that they consisted only of the foundation course and were not equipped with any solid upper structure.

The three rectangular structures, measuring *ca.* 2.5-4m by *ca.* 2-3m, were laterally connected to form an elongated structural entity (Continuum 1a) at least *ca.* 11 m in total length. Close scrutiny of joins, especially those between Units A and B, suggested that the continuum developed from north-east to south-west. Apart from Unit A, which was only surface-cleaned, Units B and C shared a similar division of space, being equipped with a 'vertically' long rectangular compartment at the rear left corner and a few small, rectangular or round features at the front left corner. Of significance is the existence of two round features in front of them. It appears that both of these belong to the adjacent structure, forming a unit similar to a pseudo-house burial cairn at Qāʻ Abū Ṭulayḥa West, a Late Neolithic open sanctuary or symbolic cemetery in the north-western part of the Jafr Basin (Fujii 2000, 2001).

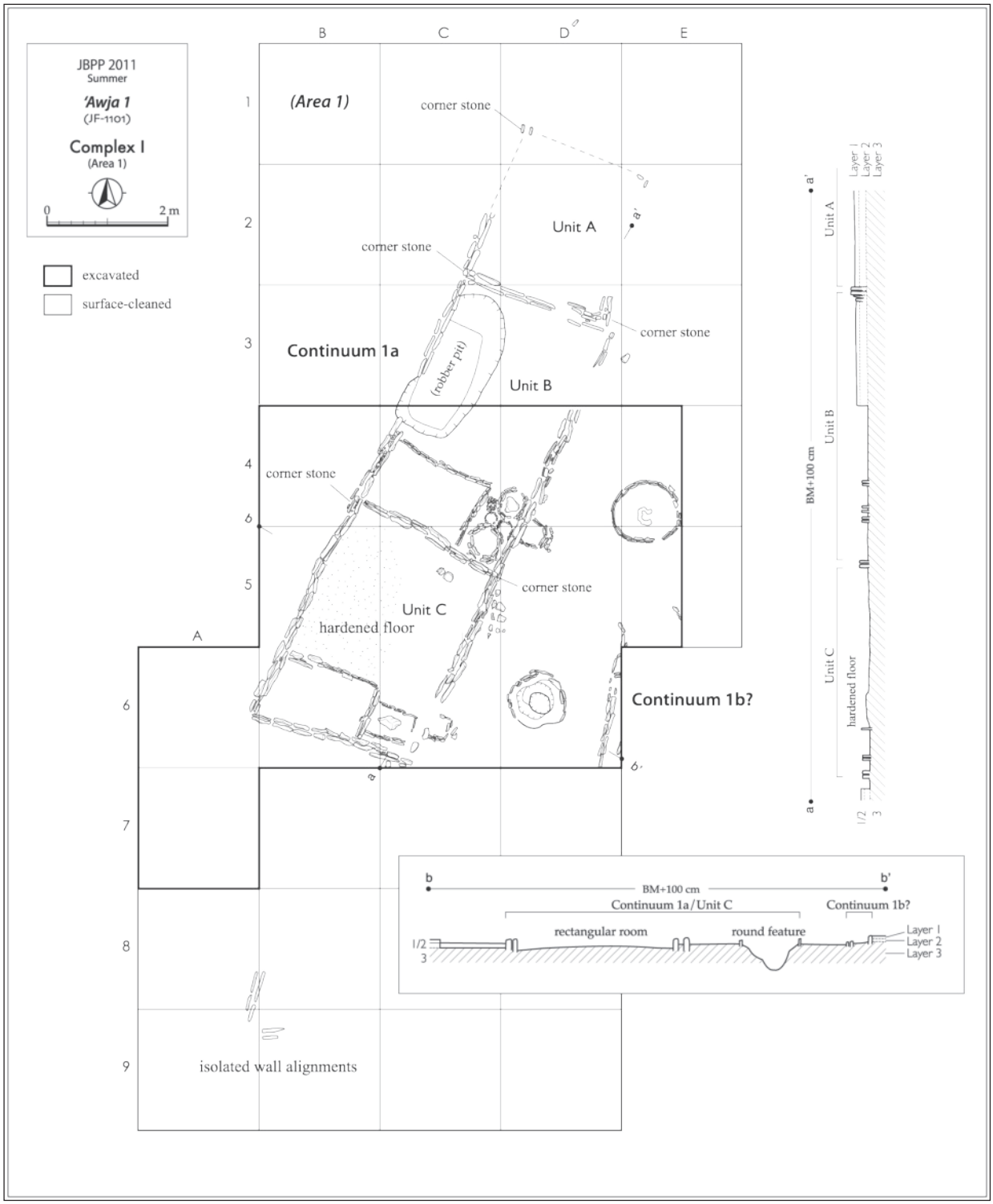
A few slender corner stones *ca.* 15-20cm high still stood between some adjacent units. These were probably used for marking out the four corners of rectangular structures in advance of construction. A similar device has been found at Qāʻ Abū Ṭulayḥa West (Fujii 2001: 24). The excavation also confirmed a whitish, somewhat hardened floor in the rear half of Unit C, but it is still unknown whether this is natural or anthropogenic in origin. Also ambiguous is the attribution of the intermittent wall alignments dotted around the continuum. In view of the overall structure of Complex II described below, it is possible that the short wall alignment to the immediate east of Unit C represents a part of another continuum (i.e. Continuum 1b) running in parallel with Continuum 1a. However, nothing can be said about the other wall alignment at the south-western corner of the excavation area. Further investigation is required to clarify our overall picture of Complex I.

Neither artifacts nor faunal / botanical remains were recovered from the excavation area. Even hearths and ashy deposits were not found. As described below, exactly the same applies to Complex II in Area 2. This suggests that the two complexes were not foci of domestic life. Given this, it seems more reasonable to assume that they functioned as an open sanctuary or symbolic cemetery, for example. The total absence of traces of economic activity is shared with Qāʻ Abū Ṭulayḥa West, corroborating the chrono-functional correlation between the two.

*Complex II (Area 2)*

Area 2, which was laid out to the south-west of Area 1, explored the general character of the other complex by means of surface cleaning (**Figs. 8-9**). This brief inspection confirmed a total of four rectangular structures, forming a pair of continua extending north-east, south-west with a gap of *ca.* 2m between them. Unlike Complex I, both continua appeared to consist only of two units. It would follow that they each measure *ca.* 7-8m in total length.

The four structures of Complex II had much in common with those of Complex I, including




*6. 'Awja 1: plan and section / elevation of Complex I.*

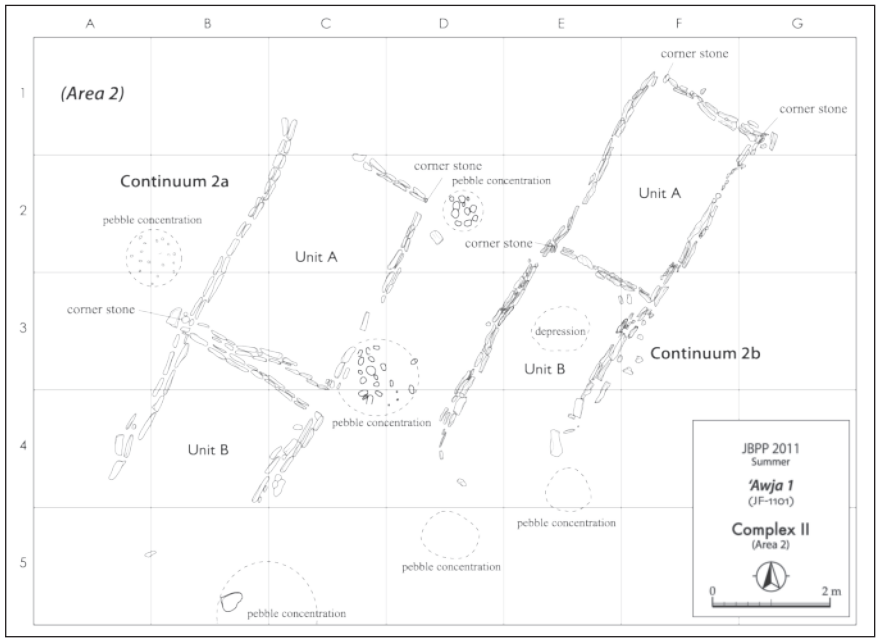
use of the two-rowed upright slab wall technique and a standing corner stone at every nodal point. However, they were slightly smaller than the three structures of Complex I, with a floor area of *ca.* 3-4m by *ca.* 2-2.5m. Another possible difference between the two was the presence / absence of internal divisions of space. While the two excavated units of Complex I incorporated

7. ʻAwjā 1: general view of Complex I (looking north).

a rectangular compartment and a few small features, the four structures of Complex II appear to lack any division of internal space. In addition, they lacked clear evidence for adjacent round features, although several pebble concentrations and / or a shallow depression dotted in and around the structures are potential candidates. Neither artifacts nor hearths were found.

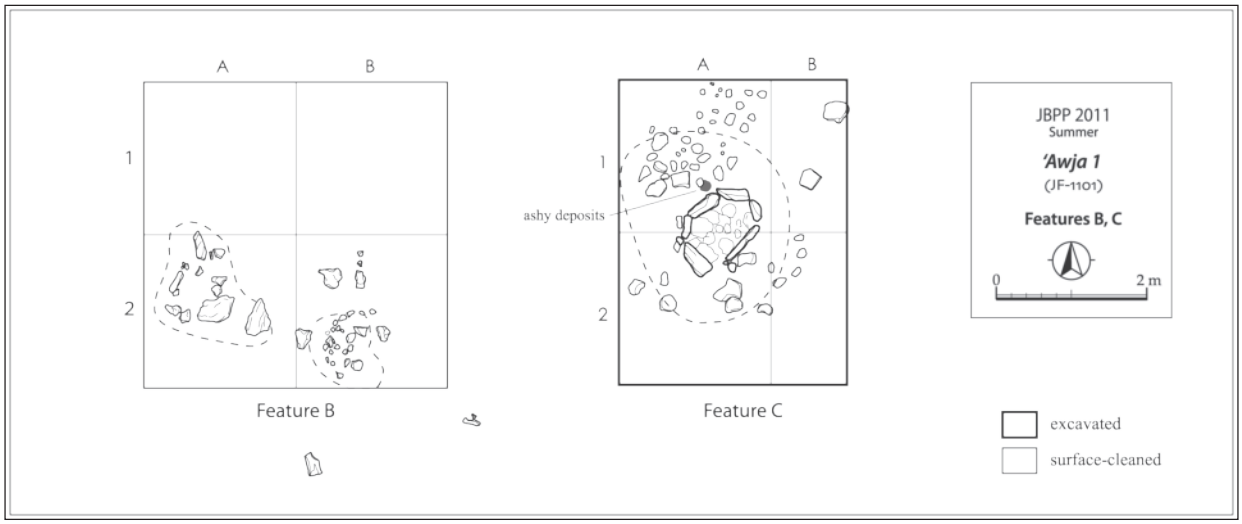
*Adjacent Small Features*

Of the immediately adjacent small features, we cleaned Feature B and excavated Feature C **(Fig. 10).** However, no details of the former



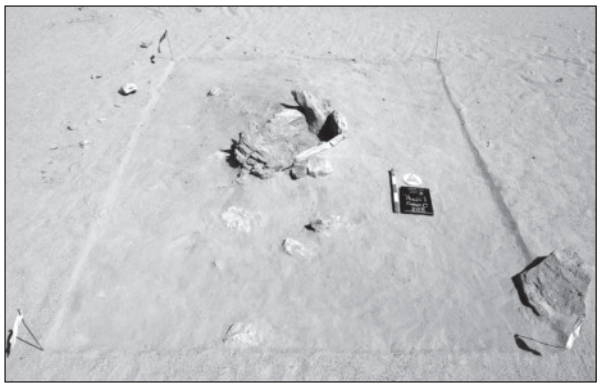

8. ʻAwjā 1: plan of Complex II.

9. ʻAwjā 1: general view of Complex II (looking north).




*10. ‘Awjā 1: plan of Features B and C.*

were confirmed owing to its poor state of preservation, except that it contained two small, ill-defined pebble concentrations *ca.* 1-1.5m across. Feature C, on the other hand, consisted of a rectangular, cist-like space under a small sand pile *ca.* 2-2.5m in diameter and *ca.* 0.2m in height (**Fig. 11**). This space, *ca.* 1m by *ca.* 0.6m in floor area, was slab-lined and pebble-paved. Although no clear evidence for plundering was confirmed, neither artifacts nor human skeletal remains were discovered within it.



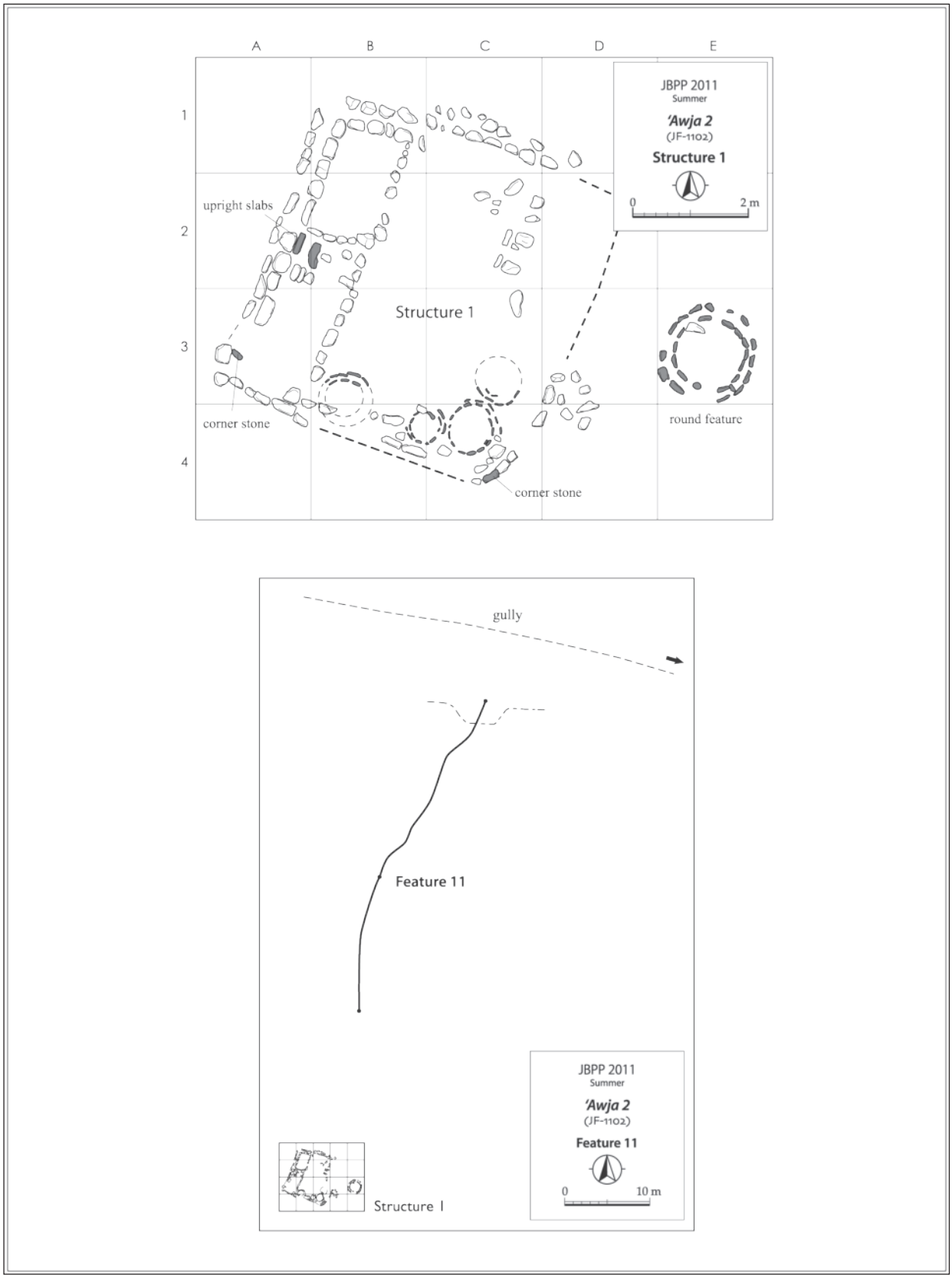
*11. ‘Awjā 1: general view of Feature C (looking north).*

It appeared that these two small features were constructed on the upper surface of Layer 2. Additionally, they did not adopt the two-rowed upright slab wall technique that characterizes the two complexes described above. Both observations seem to suggest that they are later in date than the complexes. Their function is also obscure. Leaving to one side the poorly preserved Feature B, Feature C appears to resemble a mound tomb equipped with a small cist, but a final conclusion must await further investigation. All we can say is that there seems to be no clear chrono-functional correlation between the two complexes and the small features around them.

**Investigations at ‘Awjā 2**

The site of ‘Awja 2 (N 29˚41′690″, E 036˚26′850″, elev. *ca.* 864m) is located on a gentle slope lying *ca.* 3km north-east of Tall ‘Awjā, or *ca.* 2km west-south-west of ‘Awjā 1. The site consisted only of a roughly square structure (Structure 1) *ca.* 6m by *ca.* 5m in floor area (**Figs. 12-14**). We cleaned it and briefly examined its general layout. This limited fieldwork demonstrated that, as at ‘Awjā 1, the structure was originally delineated by two-rowed upright slab walls and that, again as at ‘Awjā 1, it was accompanied by a round, double-lined feature in front of the entrance space. It should also be added that small round features were incorporated into the front left corners and that standing stones were used for marking the four corners. There is little doubt that the two sites shared a similar date and function.

There were however a few notable differences between them. First, the structure at ‘Awjā 2, unlike those at ‘Awjā 1, existed as an independent feature and was not part of an elongated continuum. Second, it incorporated a pair of ‘horizontally’ long rear compartments instead of a single ‘vertically’ long lateral compartment. Also of interest is a concentration of upright slabs or ‘mini-ashlars’ sandwiched between the two rear compartments, which is suggestive of




*12. ʻAwjā 2: plan of Structure 1 (above) and Feature 11 (below).*

*13. ‘Awjā 2: general view of Structure 1 (looking north).*

*14. ‘Awjā 2: general view of Structure 1 (looking south-west).*

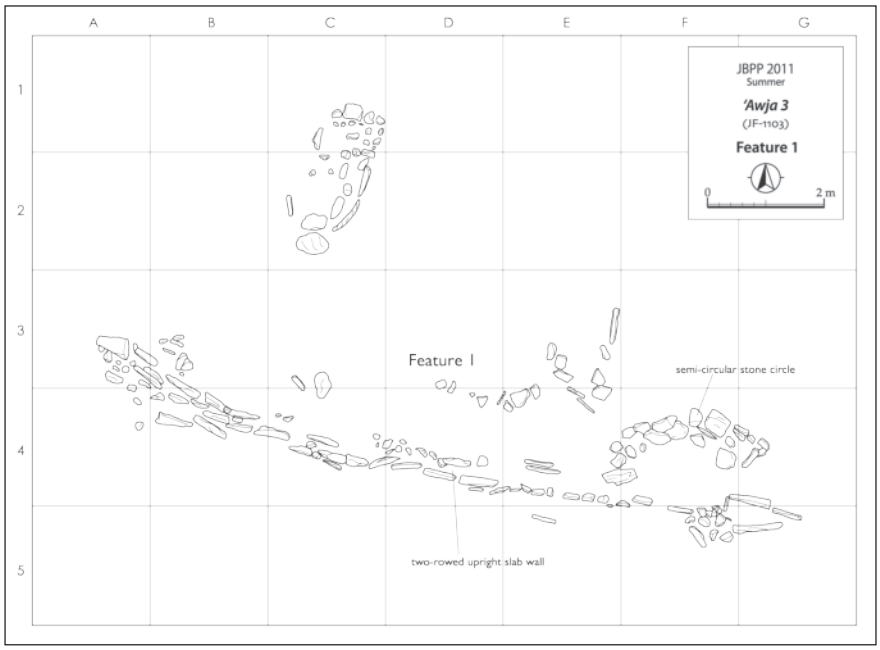
a ritual aspect for the structure. Third, the structure had a nearly square plan. These differences all seem to suggest that a minor chronological gap existed between the two sites. Again, with the exception of several non-diagnostic flint flakes, no artifacts were recovered.

Incidentally, the site included a freestanding wall (Feature 11) constructed of a single row / course of upright limestone slabs **(Fig. 15)**. It started at a point *ca.* 30m north-north-east of Structure 1 and extended northwards in a gentle curve for *ca.* 40m as far as the south bank of a small gully. The chrono-functional correlation with the neighboring structure is unknown, but it reminds us of a similar stone alignment at Qā‘ Abū Ṭulayḥa West (Fujii 1999: fig. 13).

**Investigations at ‘Awjā 3**

This site (N 29˚41′952″, E 036˚28′417″, elev. *ca.* 848m) occupies the north bank of a small playa lying *ca.* 6km north-east of Tall ‘Awja, or *ca.* 1km west of ‘Awjā 1. Surface cleaning confirmed an elongated stone-built feature (Feature 1) that consisted of a hollow semi-circle *ca.* 2m in diameter and a two-rowed upright slab wall *ca.* 12m long and up to *ca.* 0.5m high (**Figs. 16-17**). The combination of a cairn-like round feature and a two-rowed upright

*15. ʻAwjā 2: general view of Feature 11 (looking north-east).*




*16. ʻAwjā 3: plan of Feature 1 and surrounding features.*

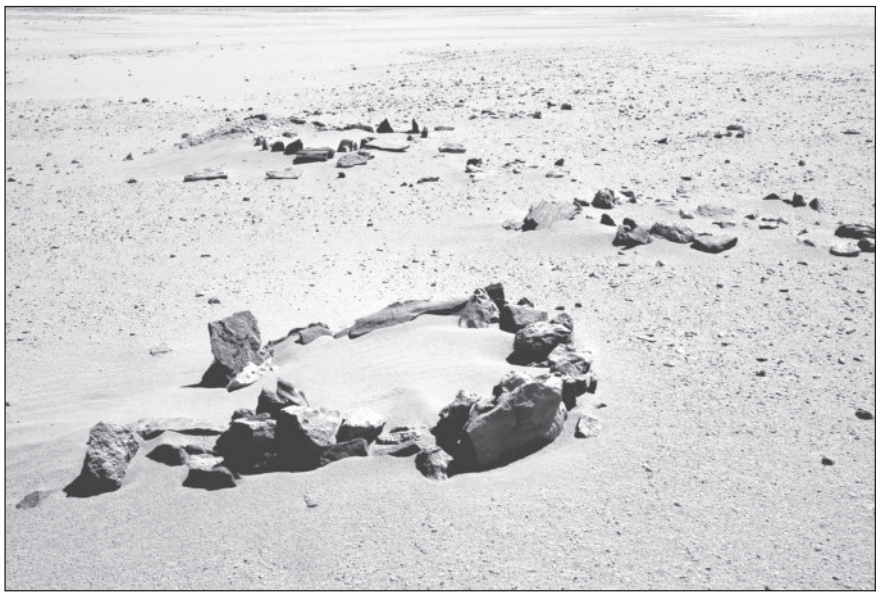
slab wall is characteristic of Chalcolithic burial cairns at Qāʻ Abū Ṭulayḥa West (Fujii 2001: fig. 13, 2003: figs 11-12), suggesting a chronological correlation between the two sites. Again, no artifacts were recovered with the exception of a few heavily abraded flint flakes scattered on the present ground surface.

A slab-lined rectangular feature, *ca.* 2m long and *ca.* 1m wide, existed near the western edge of Feature 1. In addition, several round features and stone concentrations, *ca.* 1-2m in diameter, were also dotted to the east of Feature 1 (**Fig. 18**). However, nothing is known about their chrono-functional correlation with neighboring Feature 1, except that the rectangular feature was most likely constructed of building material robbed from Feature 1.

**Discussion**

The ʻAwjā sites are enigmatic in many aspects, including their date and function, but available evidence is extremely limited. As they yielded neither artifacts nor charcoal samples, all that remain are techno-typological comparisons of the structural remains themselves in a broad context. As suggested above, our previous

*17. ‘Awjā 3: general view of Feature 1 (looking north-east).*

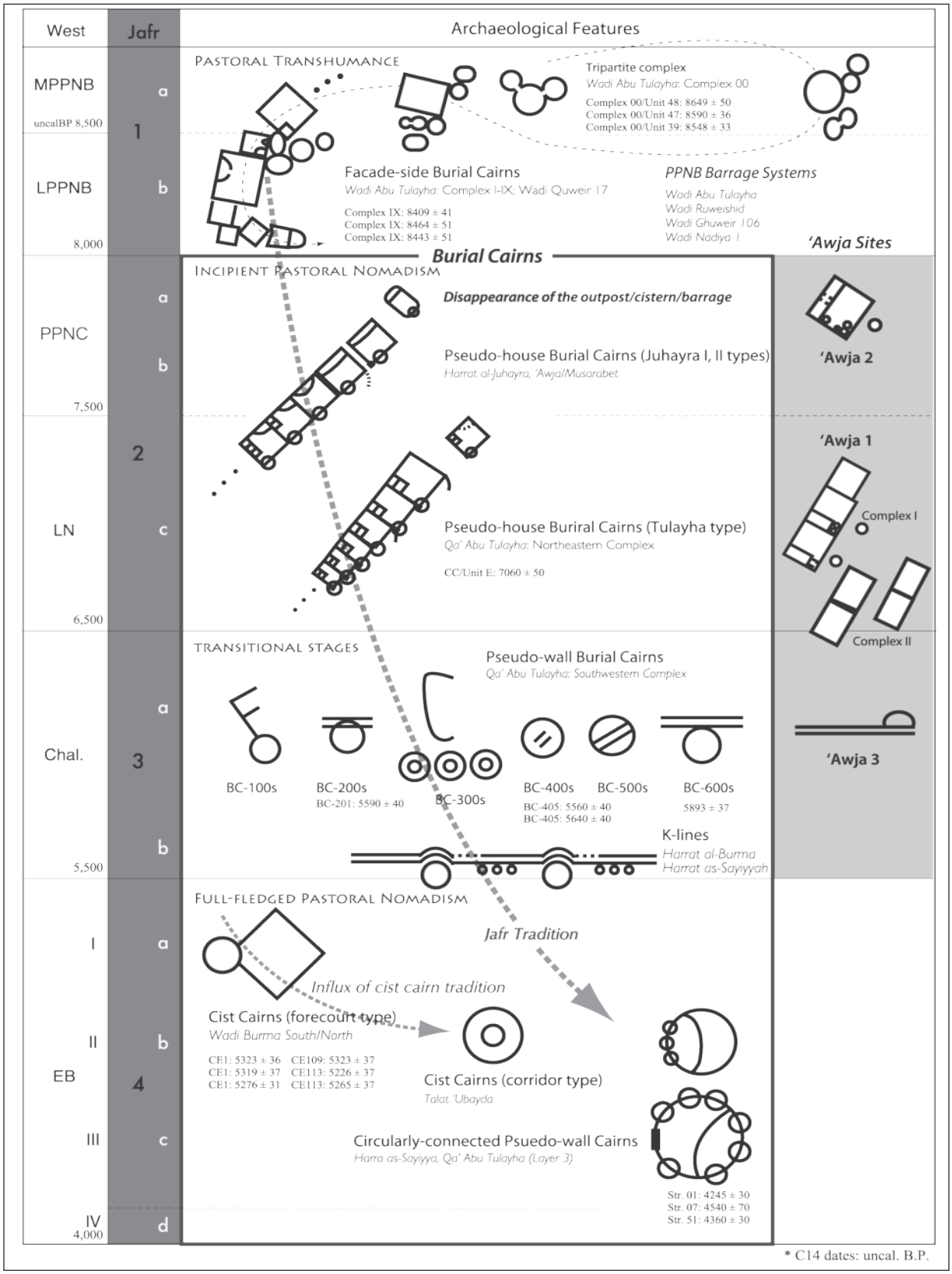


*18. ‘Awjā 3: partial view of surrounding features (looking south-east).*

investigations in the neighboring Jafr Basin may provide valuable keys with which to tackle the essential issues (**Fig. 19**).

*‘Awjā 1*

As noted above, Complex I has much in common with the Late Neolithic pseudo-settlement (or laterally-connected body of pseudo-house burial cairns) at Qā‘ Abū Ṭulayḥa West (Fujii 2001: fig. 2, 2002: fig. 5). Affinities between the two sites cover a broad spectrum of characteristics, including (1) their isolated location in the middle of the desert, (2) the presence of a unit consisting of a rectangular structure and a cairn-like round feature, (3) the lateral connection of units and consequent formation of an elongated structural entity extending north-east - south-west, (4) use of the two-rowed upright slab wall technique, (5) incorporation of a rectangular compartment(s) in the rear left corner of a unit and (6) use of standing corner stones. Furthermore, both sites are devoid of traces of domestic activities, e.g. artifacts and hearths. There is no doubt that they share a similar date and function. Thus, Complex I at ‘Awjā 1 can be tentatively defined as an open sanctuary or symbolic cemetery of Late Neolithic pastoral nomads who migrated around the Jafr Basin. If this interpretation is correct, it would follow that the small round feature in front of each struc-




*19. Tentative chronology of burial features in the Jafr Basin and 'Awjā area (revision of Fujii n.d.: fig. 38).*

ture represents a symbolic (and therefore usually empty) burial cairn in line with the Jafr pseudo-settlement.

Complex II, on the other hand, is marked by the formation of twin short continua and the absence of internal divisions of space. To date, no parallel examples have been found in the Jafr Basin. Similar features from the Negev and Sinai have been interpreted as open sanctuaries; a few of them have been attributed to the Late Neolithic on the basis of C-14 dating (Eddy and Wendorf 1999: figs 3-34, 3-42, 11-5; Beit-Arieh 2003: 430; Rosen *et al*. 2007: fig. 4). This dating is consistent with our tentative perspective that Complex II represents a subsequent, simplified form of Complex I. Taken together, it would follow that the complex represents an open sanctuary or symbolic cemetery of Chalcolithic pastoral nomads who migrated around the Jafr Basin.

*ʻAwjā 2*

ʻAwjā 2 differs significantly from ʻAwjā 1, both in site-form and in division of internal space. While ʻAwjā 1 contains several continua and incorporates a ʻvertically' long compartment at the rear left corner of a unit (in the case of Complex I) or nothing (in the case of Complex II), ʻAwjā 2 consists only of a single, independent structure equipped with a ʻhorizontally' long rear compartment. Parallel examples for the latter have been excavated at Ḥarrat al-Juhayra, a PPNC pseudo-settlement on the north-western margin of the Jafr Basin (Fujii 2005: figs 1-4). Several units occupying the north-eastern edge of this site have similar traits, suggesting chronological synchronism with Structure 1 of ʻAwjā 2. If this is the case, the site may date back to the PPNC. As for function, it can probably be defined as an independent form of a pseudo-house burial cairn, a fundamental component of a pseudo-settlement. It is our tentative perspective that the structure represents a prototype of Complex I at ʻAwjā 1, both in terms of morphology and date.

*ʻAwjā 3*

The unique feature at ʻAwjā 3 is the combination of a hollow stone circle and an elongated freestanding wall, both constructed using the two-rowed upright slab wall technique. There is little doubt that the feature is in some way related to pseudo-wall burial cairns, especially their later forms (i.e. the BC-600s and -700s) as confirmed at Qāʻ Abū Ṭulayḥa West and Wādī Burma (Fujii 2003: figs 11-12, 2005: fig. 3). Thus, it can be tentatively dated to the Late Chalcolithic. The typological sequence at Qāʻ Abū Ṭulayḥa West indicates that the pseudo-wall burial cairn is a subsequent, simplified form of a pseudo-house burial cairn (Fujii 2001: 29-32, Fujii n.d.: figs 19, 22). Thus the stone-built feature of ʻAwjā 3 can probably be understood as a symbolic cairn tomb or open sanctuary of Late Chalcolithic pastoral nomads, who inherited this unique funerary ritual from their ancestors who had been involved in the construction of ʻAwjā 1 and 2.

*Cultural Sequence and Regionality*

From the above, we can tentatively interpret the three sites as open sanctuaries or symbolic cemeteries of Early Neolithic to Late Chalcolithic pastoral nomads who migrated around the Jafr Basin. In view of the series of common traits noted above, there is little doubt that they belonged to the same cultural tradition.

The aforementioned typological comparisons with other sites in the region suggest that the ʻAwjā sites evolved from ʻAwja 2 (*viz*. an independent structure with a ʻhorizontally' long rear compartment), into Complex I of ʻAwjā 1 (including an elongated continuum retaining division of internal space), then into Complex II at the same site (consisting of two pairs of shorter continua without any division of internal space) and finally into ʻAwjā 3 (represented by a pseudo-wall cairn). Although there might still be a minor hiatus between Complex II at ʻAwjā 1 and the pseudo-wall cairn at ʻAwjā 3, the sequence suggested above is a good match with the Jafr chronology. In view of the fact that a similar sequence has been confirmed in central Syria as well (Fujii *et al*. 2011; Fujii n.d.: fig. 45), we can propose that the Jafr chronology has the potential to provide a common means of tracing the process of pastoral nomadization in various inland areas of the Levant.

It goes without saying, however, that the Jafr chronology has its own limitations. This is because, first, it still has a few minor chronological gaps and, second, it is based on Jafr datasets and therefore does not fully incorporate all regional characteristics of the inland Levant. A

good example of the first issue is Complex II at ʻAwjā 1, which has no parallel examples in the Jafr chronology. The complex might fill a minor typological gap between the pseudo-house burial cairn and the pseudo-wall burial cairn of the Jafr chronology. The issue of regionality, on the other hand, is best illustrated by the series of typological differences between the Jafr and ʻAwjā pseudo-settlements. To begin with, while the Jafr pseudo-settlements are characterized by linear development, the ʻAwjā pseudo-settlements prefer parallel arrangements of shorter continua. The second difference consists of the division of internal space, which also highlights the regionality of both areas. It should also be added that while the Jafr sites apply the two-rowed upright slab wall technique to the pseudo-house only, the ʻAwjā sites extend it to the attached cairn-like features as well. These regional differences indicate that both areas shared the same cultural tradition but differed in minor aspects.

**Concluding Remarks**

The rescue investigation of the ʻAwjā sites has enabled us to confirm anew the versatility of the Jafr chronology as a key to tracing the process of pastoral nomadization in southern Jordan. The discovery of the three open sanctuaries or symbolic cemeteries near the Jordan / Saudi border has demonstrated that the chronology is applicable to southernmost Jordan, or even parts of the Negev and Sinai. Taking the results of our recent investigations in central Syria into consideration, the geographical applicability of the Jafr chronology would be enlarged still further. However, as noted above, much still remains obscure, including assessment of regional characteristics. Further work is needed to consolidate the reliability of the Jafr chronology.

**Acknowledgements**

The Jafr Basin Prehistoric Project (Phase 3) has been financially supported by the Japan Society for the Promotion of Science (Grant No. 17063004). We would like to express our sincere gratitude to the Department of Antiquities of Jordan for their steady co-operation in our long-term research project in and around the Jafr Basin. We are also deeply indebted to Mr. Amer Bdour, representative of the DoA, for his careful support in both field and laboratory. Our thanks also go to our local workers, whose unexpected diligence in the remote wilderness was essential to the success of this difficult field season.

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# BUILDING ARCHAEOLOGY IN JORDAN: PRELIMINARY REPORT ON THE 2009 - 2011 SURVEYS AT UMM AS-SURAB

*Roberto Parenti*

**The Site**

Umm as-Surab (MEGA Jordan n. 2806) lies in the district of Mafraq, *ca.* 2km south of the Jordan-Syria border. The archaeological site is located in a slightly elevated area of the southern Ḥawrān, where rich agricultural soils cover the underlying volcanic rock. The basalt has been used as the main building material all over the region since Antiquity, with structures of Roman, Byzantine and early Islamic (Umayyad) date, as well as those of the modern era. Additionally, Iron Age and Nabataean pottery and epigraphs have been recorded in previous surveys and excavations (cf. Homès-Fredericq and Hennessy 1989: 622).

**Reasons for Selection of the Site**

Umm as-Surab is an ideal site for a building archaeology survey for many reasons:

(1) It is large enough to have many styles of construction represented, without being so large that it cannot be investigated within a relatively short period (e.g. three to four seasons);

(2) It has many buildings with walls standing 3-5m high, with few recent restorations; this makes the wall elevations suitable for stratigraphic analysis;

(3) It has been inhabited for long periods with numerous gaps in occupation that help in identifying construction phases (including reconstructions and adaptations);

(4) The construction styles represented at the site are representative of the wider area, which was relatively homogenous in cultural terms during many historical periods.

The southern Ḥawrān has a long tradition of well-documented interdisciplinary studies, from the beginning of the 20th century to the present day. In particular, there are well-published projects by French scholars working in the Syrian Ḥawrān that permit useful and detailed comparisons on a vast range of issues concerning settlement and building techniques (in particular cf. Clauss-Balty 2008).

In the Jordanian Ḥawrān, the site of Umm as-Surab is less well documented than the better known site of Umm al-Jimāl, which is situated nearby and has been – and still is – the subject of long-term investigations by American missions (De Vries 1998). Fortunately, the chronological sequence at Umm as-Surab seems to be the same as that of Umm al-Jimāl, enabling chronologies at the former site to be established on the basis of comparisons with the latter.

**Project Aims and Methodologies**

As described above, Umm as-Surab is an ideal site at which to conduct a 'Building Archaeology in Jordan' project. The main aim of the project is to compile an 'Atlas of Building Techniques', e.g. rooms, roofs, openings, masonry, building materials etc., as they are represented both at this site and in the region as a whole. In essence, the research aims to understand how the extant buildings have been built. A 'constructional history' can be produced by recording all the building information that is inherently 'written' into the architectural structures (*viz*. materials, techniques, size of elements etc.), thereby shedding light on change and evolution over the course of time.

The 'Atlas of Building Techniques' is closely linked to the methods used to record building characteristics and to the reconstruction of their structural history according to the principles of archaeological stratigraphy, applied through identifying and recording the results of 'consistent and homogeneous constructional actions'. A

'consistent and homogeneous constructional action' might be what Harris (1989) calls context in excavations but, in the case of buildings, stratigraphic study can be slightly different. As part of the formation of a stratified deposit, a 'homogeneous constructional action' might be a whole 'building unit' (e.g. the Ss. Sergius and Bacchus church referred to below, in relation to the buildings surrounding it). However, it must be demonstrated that there are clear chronological differences between the different 'building units'.

Within the 'building units', there can be different 'constructional phases' (e.g. the reconstruction of a roof during the Mamluk or Druze period). Within the 'constructional phases', there can be different 'activities' (e.g. construction of the diaphragm arch, followed by construction of supports for the horizontal beams, filling of residual spaces and, finally, covering with an impermeable material).

More circumscribed 'constructional activities' are referred to as 'stratigraphic units' (e.g. filling an opening, preparation of floor surfaces etc.). Within a single 'stratigraphic unit', there can be further levels of observation (e.g. different layers of internal replastering).

Stratigraphic analyses combine these five levels of close examination. Therefore, the results are based on these observations of relative chronology.

At Umm as-Surab it was decided to record the first two levels only, namely 'building units' and 'constructional phases'. The analysis was expanded to include individual 'stratigraphic units' only in few key areas where it was necessary to gain an understanding of construction sequences (e.g. in the room immediately north of the *prothesis* of the church).

Stratigraphic analysis of buildings was first undertaken in Italy in the late 1970s by archaeological projects that were digging stratigraphically for the first time (see Parenti 2002: 73 for a bibliography on this subject). Since these projects were investigating historical periods between the 9th and 14th centuries, the research was conducted inside buildings that were sometimes still in use and always had tall, elevated walls.

Careful observation of masonry has enabled us to identify differences between the various building components (e.g. building material, dimensions, workmanship, mortar, stone-cutting etc.) visible in wall elevations, to the extent that the logical next step was to record them and attempt to reconstruct their relative chronologies.

Observations were recorded according to criteria that have, in essence, remained the same since the late 1970s, *viz*. (1) drawing the walls and identifying 'coherent constructional actions' (now replaced by orthophotos and 3D models with photographic restitution of the surfaces), (2) recording the characteristics of each 'constructional action' (US = It. "stratigraphic unit") and (3) establishing their relative chronologies. For example, if the US being recorded were an extension to a room, it would be 'supported' by earlier masonry. As in excavation, negative US can also be identified and recorded, e.g. removal of building material through collapse or demolition, in which case the US 'cuts' the wall.

Proceeding in this way, an entire building complex can be divided into 'homogeneous constructional actions', with their own relative chronologies (i.e. 'before', 'after' or 'contemporary with'). These 'constructional actions', each defined by a sequential number, can be studied by means of a stratigraphic diagram or 'Harris matrix'.

By interpreting the results of these surveys, we can reconstruct successive building phases, with relative chronologies for the different activities associated with the construction of walls and other structures. When studying standing buildings with long construction sequences, this allows us to create 'local typological series', with no need for lengthy and expensive excavation seasons. Epigraphy, ancient written sources, surface pottery and many others forms of evidence associated with the building itself enable the relative and absolute chronologies to be linked. Also, archaeometric and biochemical analyses can be carried out on small samples of building material. These may permit more accurate typological comparisons that may shed light on the chronology, use and abandonment of the structures, thereby enabling the building to be dated more accurately.

**Initial Survey Results**

After a first season in 2009, the Laboratory of Building Archaeology at the University of Siena carried out a second instrument survey season on the standing monuments in 2011, involving an Italian - Jordan team directed by

R. Parenti[1].

Hitherto, the site had only been the subject of preliminary studies. H.C. Butler visited it in 1904-1905 and again in 1909. More recently, G.R.D. King provided a description of the main churches (see Homès-Fredericq and Hennessy 1989: 624 for a comprehensive bibliography of research carried out up to the late 1980s). On the whole, scholars focused on the remains of the main Ss. Sergius and Bacchus church and surrounding buildings, particularly the extant tower that K.A.C. Creswell considered to be an early example of a square Syrian-style minaret (Creswell 1989). More recently, the Department of Antiquities of Jordan (DoA) has carried out some restorations, as well as a small sounding (see notes in the MEGA J entry).

29 'topographic units' (TU) have been identified in the archaeological area (**Fig. 1**), most of which have been geo-referenced. This has allowed the new surveys to be matched with old aerial photographs and surveys. We have focused on the Ss. Sergius and Bacchus church (TU 28) and a building complex in the southern part of the archaeological area that has recently been excavated by the DoA (TU 24), as well as a little church beside the road mentioned by King (1983).

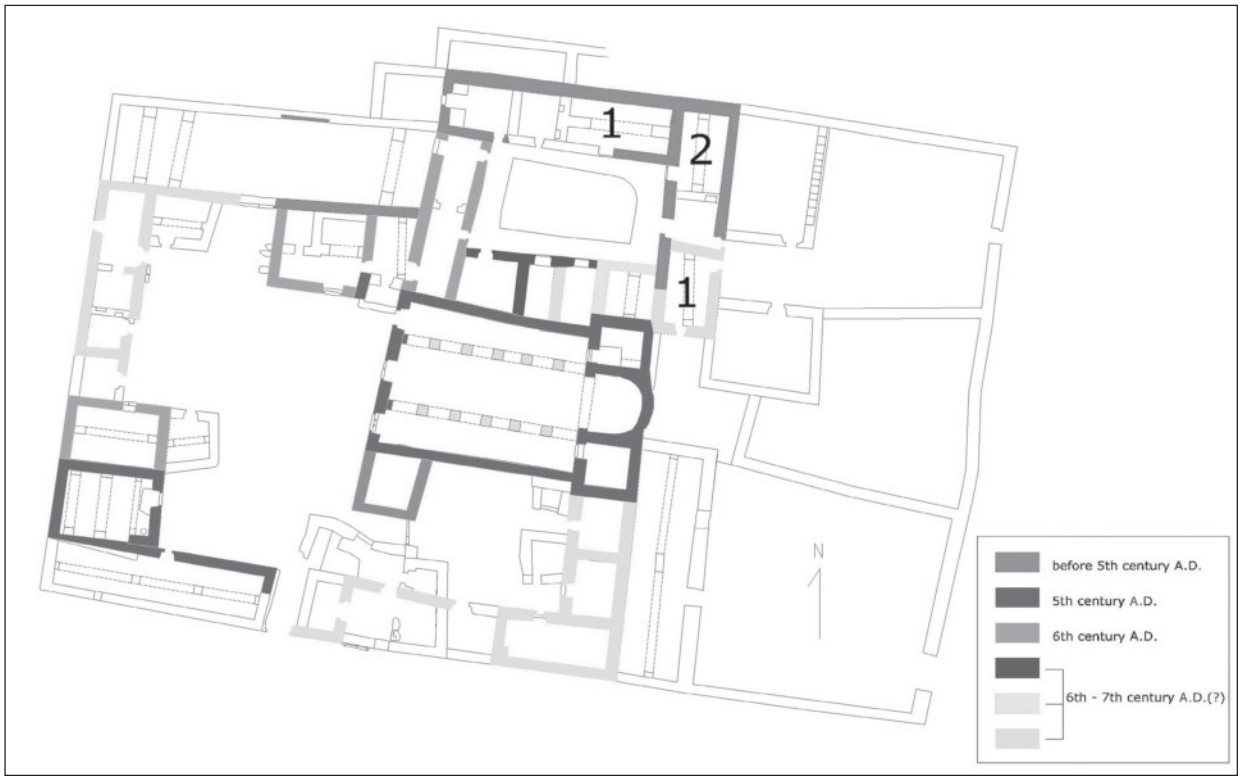
## The 'Building Units' of TU 28 and Wall Construction Techniques

It seems clear that the very large complex in TU 28 (**Figs. 2-3**) is earlier than the church of Ss. Sergius and Bacchus (489 AD). Recent soundings carried out by the DoA close to its north-west corner yielded pottery of probable Late Roman period date (Dr Jamile al-Qutaish, pers. comm.).

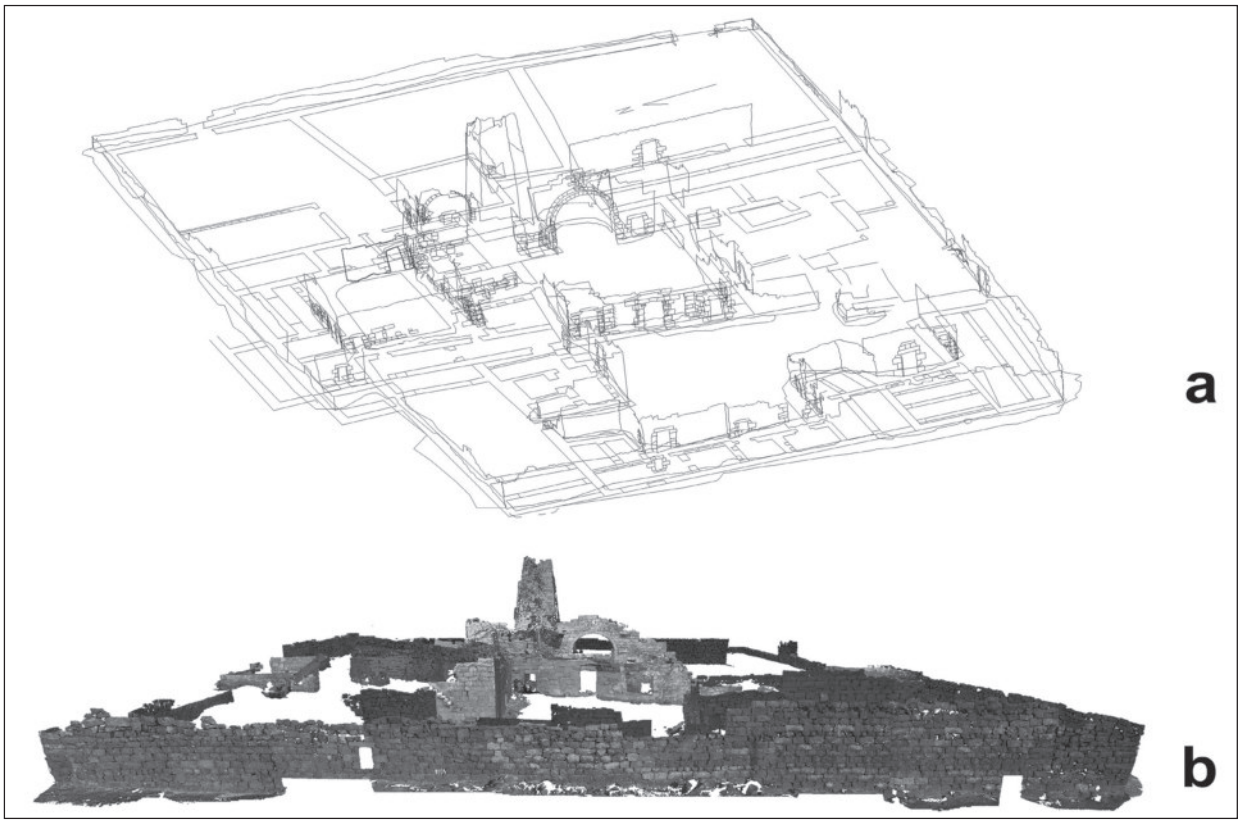
The building complex is characterised by Type 1 masonry (**Fig. 4**), which is especially clear on the north side of TU 28 and stands more than 2m high in some areas. Near the north-western edge, two rooms have this type of masonry


*1. Umm as-Surab: 'topographic units'.*

1. The University of Siena project is supported by the Italian Ministry of Foreign Affairs. The fieldwork was carried out by a team consisting of: Prof. R. Parenti (director, University of Siena), S. Anastasio (MiBAC), T. Hunaiti (DoA), J. al-Qutaish (DoA), S. Mariotti (University of Siena), F. Saliola (METRA), A. Arrighetti, P. Caciagli, P. Gilento and N. Pini (University of Siena students). Data-processing at the Laboratory of Building Archaeology in Siena was carried out by the following students: A. Arrighetti, P. Caciagli, E. Casalini, A. Fortini, A. Furno, P. Gilento, C. Nerucci, N. Pini and C. Sessa. The plans and orthophotos are the work of A. Arrighetti, P. Caciagli and P. Gilento.




*2. Umm as-Surab: plan of the Ss. Sergius and Bacchus church, showing the different phases.*




*3. Umm as-Sarab: (a) RGB point clouds of the Ss. Sergius and Bacchus church with standing turret; (b) orthophoto.*

(rooms 1 and 2 in **Fig. 2**). Although the perimeter of room 1 seems complete, the outside wall of room 2 has been partly demolished to create a new entrance opening on to the internal courtyard. Even though a small window remains near the north-east corner, the complete perimeter of room 2 could not be traced. Since the inner wall extended at least as far as the north-east corner of the church, it seems likely that both rooms had similar dimensions. In others parts of TU 28, this type of masonry is only found in the course separating the foundations and superstructure, *viz*. a row consisting exclusively of bond stones (*diatoni*).

There are some traces of masonry that is later than Type 1 but predates the construction of the church. However, its scarcity permits neither reconstruction nor interpretation.

The construction of the church of Ss. Sergius and Bacchus was a significant event, which can be accurately dated to 489 AD (cf. Bader 2009: 61 and bibliography) on the basis of the dedicatory epigraph that once graced the lintel of the main entrance to the church (now broken and no longer *in situ*).

The church had a nave and two aisles, with a semi-circular apse and two side rooms (possibly a *prothesis* and *diaconicon*). The columns set on the church paving display two types of workmanship (one with masons' marks), but it is unclear whether this represents two constructional phases or the reuse of earlier columns (**Fig. 5**). Shortly after the construction of the church, a small room was added to the façade.

The lateral door in the north wall, now collapsed and almost entirely obscured by rubble, seems contemporary with the masonry of the church. This implies the existence of a courtyard, two sides of which were formed by the earliest room; the third side is formed by a room with Type 1 masonry that associates it with the church, while the fourth side – close to the north wall of the church – can not be studied because of subsequent modifications. At least other two entrances were opened on the west side of the courtyard, giving access to the western and northern rooms.

After the construction of the Ss. Sergius and Bacchus church, at least three complexes were built to its north in a period that remains uncertain, but which was before the Islamic period. The first is very similar to buildings known from the second half of 6th century AD (according to the Petra papyri), with several parallels at Umm al-Jimāl (with at least three floors, external staircases and windows and doors similar in shape to many examples from the southern Ḥawrān) (**Fig. 6**).

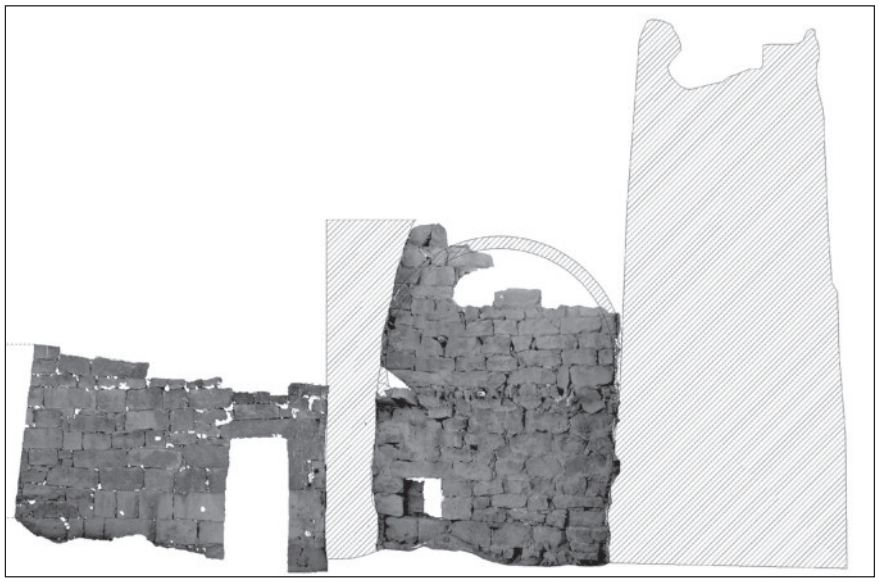
It is very probable that, along with the church and courtyard, at least other three or four 'building units' already existed. Two were found near the south-west corner of TU 28 and were most likely built one after the other, while another was located near the north-western edge of the church. If we include the western wall of TU 28 with these 'building units', along with their associated rooms, as a whole TU 28 represents a quadrilateral entity defined by 'building units' and other structures. It had few entrances and contained the church, a courtyard in front of the church and probably two cisterns (one in the courtyard of the religious complex and another under the 'building unit' near its south-western corner).

*4. Umm as-Surab: Type 1 masonry.*

*5. Umm as-Surab: columns on the church paving.*

With the advent of Islam in the area (around 636-640 AD) there were no major structural changes to the site. However, the church was converted to a mosque by blocking the arch, demolishing the apse, creating a *miḥrāb* in the southern wall (noted by King in 1980, before the recent restoration work) and constructing a turret adjacent to the *prothesis* (**Fig. 7**). This turret is very similar to a nearby example located in village of Sama'a, which appears to be later than 625 AD (King 1983: 127) on the basis of building activities that seemingly postdate an epigraph. According to Butler, Creswell (1926: 137) interpreted them as Byzantine bell towers, while King (1983) supposed them to be minarets; the latter interpretation has been confirmed by the survey. The Umm al-Surab and Sama'a minarets may be two of the earliest examples of such structures, probably dating to the early 8th century AD. The cistern in the small courtyard was also restored by building some pointed arches over it, presumably to support a cover.

It seems possible that the village was abandoned in the 8th century (perhaps as a result of earthquake damage), owing to a total lack of immediately post-Umayyad pottery. It seems likely that subsequent changes to the abandoned structures did not occur until the Mamluk resettlement in the early 16th century. These involved the restoration of the diaphragm arches support-



*6. Umm as-Surab: orthophoto of the west side of room 1.*

*7. Umm as-Surab: turret on the Ss. Sergius and Bacchus church.*

ing the roofs and the construction of small shelters close to the houses, presumably for animals.

Subsequently, the Druze–who first appeared as refugees and were then deported to the area – rebuilt the abandoned ruins or constructed new residences; their occasional building activities can be identified quite easily (**Fig. 8**).

*8. Umm as-Surab: Druze building.*

*9. Umm as-Surab: standing pointed arch.*

**Building Techniques and Material**

This report is limited to brief discussions of some of the major analytical themes. Regarding building techniques, we focus here on pointed arches. Creswell's theory (Warren 1991) was that the Umayyads inherited a system of round arcading from the Byzantines, which had a tendency to become slightly pointed. Under Umayyad rule, the round arch persisted, but developed into a two-centered form with increasing pointedness. In the following two centuries the trend was still apparent, but was complicated by the appearance of a four-centered arch; Umm al-Surab is a good case study for these developments (**Fig. 9**).

Regarding the masonry, Type 1 (**Fig. 4**) is the earliest of the types represented in the church. This is apparent in the stratigraphy of the room to the north of the *prothesis*, on the eastern wall and – with less certainty – in the foundation trench of the wall in the northern survey. The latter is supported by the presence of unstratified Late Roman and Early Byzantine sherds in the survey material.

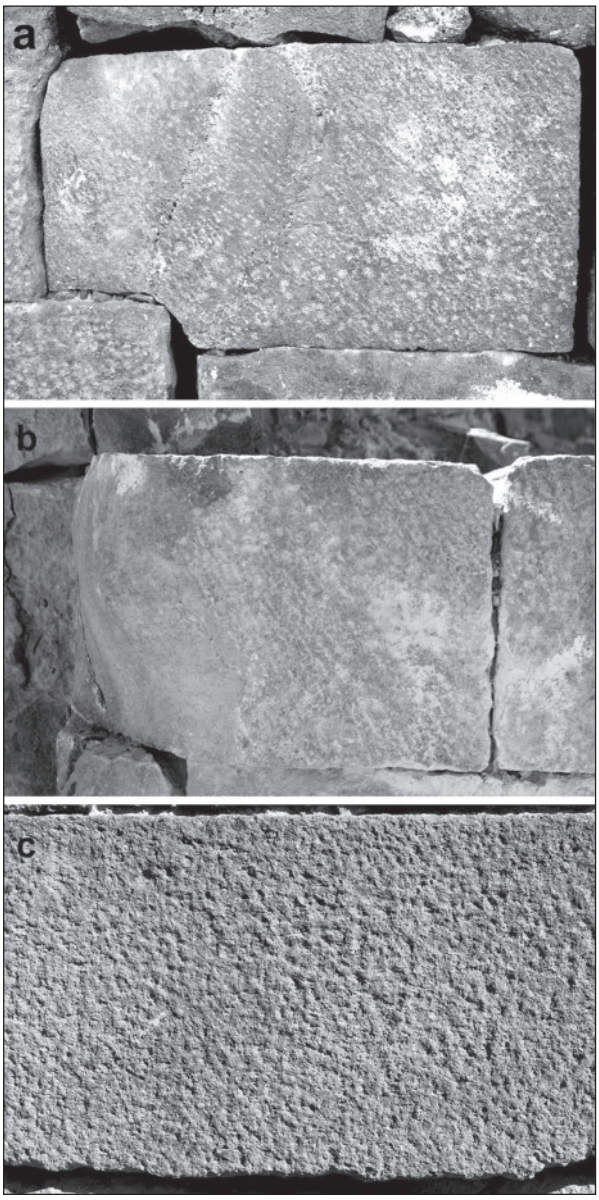
The principal characteristics of this masonry are: (1) the dimensions of the individual blocks (typically larger than other masonry types), (2) the occasional presence of doubled rows with a few large wedges and (3) the fact that openings are made with perfectly squared blocks. The tools for finishing the blocks comprise pointed tools used almost perpendicularly, as well as the *mazza*, *marteau tetu* and *macao*. There are also indications for the use of a broad chisel or axe, as at Umm al-Jimāl.

Openings, which include doors, windows and small loopholes, consist of a threshold and door jambs with leaf and lintel. The numerous niches are perhaps the most characteristic element. The thickness of the masonry can tentatively be considered another characteristic element, since it is always at least 85cm thick and frequently attains 90-95cm.

Type 2 masonry is most likely Byzantine but, as it could date to anywhere between the mid 5th and late 7th centuries, a more detailed assessment of its chronology will be carried out in 2012. The description below is based on the west wall of the TU28, the two main 'building units' and the alignment of the Type 1 wall (to which the bond stones [*diatoni*] and two upper courses are connected). The characteristic feature of Type 2 masonry is the presence of continuous rows of bond stones, whose external face is either square or slightly narrower, alternating with four courses taller than the bond stones and with occasional small wedges. At Umm al-Jimāl this technique is more recent than the *quinconce* bond stone technique.

A variation on this theme (*viz*. row of bond stones plus four horizontal rows) is characterised by the reuse of a great deal of earlier material and frequent use of wedges, but with well built corners using longer and better squared blocks. Above this type of masonry is more recent rebuilding associated with roof construction, perhaps relating to the Mamluk or one of the Druze periods.

Building material consists mainly of volcanic basalt, owing to its local availability. Blocks were prepared and finished using different tools, which varied according to the type of rock. In the basalt area, there are a great number of quarries just a few metres from the buildings; these were occasionally converted into cisterns. **Fig. 10a** shows a block from a Type 1 wall, located on the east side of the cloister at Umm as-Surab, with tool marks very similar to those on a block of the so-called Commodo Gate at Umm al-Jimāl (**Fig. 10b**), i.e. 2nd century AD. This is very different to the tool (*martellina*) marks on the Byzantine block at **Fig. 10c**.




*10. Different tool marks: (a) Roman blocks from Umm as-Surab; (b) Roman blocks from Umm al Jimāl; (c) Byzantine block from Umm as-Surab.*

The appearance of mortar is an interesting matter. The first mortars used as settings or beds are thought to be at Qaṣr ’Bshīr, dating to the end of the 3rd century AD, i.e. Roman. Some interesting examples of mortar can be seen in the extant walls at Qaṣr al-‘Uwaynid, where two Severian epigraphs – dating to 200 - 202 AD and 201 AD respectively – were found. However, the chronology of this site requires further analysis. A different type of air-drying mortar appears at Qasr al-Kharana in the early 8th century; these so-called ‘mortar bricks’ are gypsum-based and were made using unusual technology that gives them great strength and durability. At Umm as-Surab, we have found a different lime mortar in the turret, where it was also used for exterior plastering (see Parenti and Gilento 2010: 190-192).

**Survey Methodology**

In order to get reliable results, we need to identify and record the different building phases of many elements. Data recording must be done precisely and consistently. Additionally, the processed data must be both detailed and easy to share across different platforms, as well as being suitable traditional publication and on-line / multimedia products.

Taking these requirements into consideration, we have adopted a data-recording system that acquires the walls’ features via rapid photogrammetry and produces processed data that is compatible with Database Management Systems and GIS. The computer aided methodology we use allows for a composite survey based on: (1) a marker based system using a total station and (2) a visual system that produces orthophotos, 3D Models and photographic renderings. The latter uses innovative technology based on point clouds (Z-Scan and Z-Map [developed and released by MenciSoftware, Italy]); it has almost the same resolution as a laser scanner, but with lower costs and photographic rendering of the surfaces.

These techniques offer the following advantages:

(1) Different protocols can be applied to different contexts inexpensively, thereby improving the sustainability of projects;
(2) They are not destructive;
(3) They allow less time to be spent in the

field, albeit at the cost of more time in the laboratory.

**Expected Results**

The next season is scheduled for autumn 2012, with the aim of completing the instrument survey and shedding further light on remaining uncertainties, especially regarding the chronology of the Ss. Sergius and Bacchus church and its associated minaret.

The most urgent task concerns the measures required to minimise further collapse of the standing buildings. It should be noted that the archaeological site lies within an inhabited area; as a result, the ruins are continuously traversed by the inhabitants of the modern village.

Completion of the work will proceed alongside the compilation of the regional 'Atlas of Building Techniques', thanks in part to the comparisons made possible by investigation of sites with standing buildings.

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# JARASH: MINIMAL PRESERVATION INTERVENTIONS IN THE EASTERN SECTOR OF THE SANCTUARY OF ARTEMIS, 2009 - 2010

*Roberto Parapetti*

During the spring 2009 season[1], an archaeological preservation intervention that had been delayed for several years was finally carried out, *viz*. consolidation of the west façade wall of the Propylaea Church.

Of greatest concern was the dangerous lean of the pillar *in antis,* which originally belonged to the north-east edge of the trapezoid court of the Roman Sanctuary of Artemis and was incorporated into the west wall of the church in the Byzantine period.

The lean of the pillar can be attributed, if not to the seismic activity endemic in the region, to the removal of building material from ancient Gerasa during the early 20th century for the construction of modern Jarash.

Another event took place much later in exactly the same area, during the tragic riot of September 1970. During our archaeological work there, a number of likely Jordanian army firing points were identified at the abutment of the Artemis Bridge. This raised ground was presumably considered strategic for control of the ʻAmmān-Irbid road passing just below it, with assorted machine-gun ammunition being scattered over the area.

Whatever was responsible for the lean of the pillar, the situation was made worse by severe deterioration and reduction of the load-bearing capacity of the ashlars at the pillar base (**Figs. 1-3**).

During our clearance work and excavations in the area, started some years earlier (Brizzi *et al*. 2001, 2010), the tumble at the base of the pillar was left untouched until March 2009 in the hope that the buttressing it provided might help prevent the sudden collapse of the pillar.

At this point, the following work was undertaken to ensure the pillar's preservation, as it was considered significant visible evidence of the presence of the *via sacra* approaching the Sanctuary of Artemis (Parapetti 1983-84):

(1) Removal of the tumble and archaeological excavation of the deposits below it down to the flagstone pavement of the church, on which a *tannūr* was found (Brizzi 2010: fig. 4). This confirmed the hypothesis that the structure had ceased to function as a church some time before the earthquake of 749, which caused destruction throughout the city.

(2) Construction of scaffolding and removal of the 24 blocks in 12 rows that make up

*1. West wall of the Propylaea Church in 1977, from the west.*

1. In 2009, the management of the Italian expedition to Jarash was transferred from the *Centro Ricerche Archaeologiche e Scavi di Torino* (1977 - 2008) to *Monumenta Orientalia*, an NGO based in Rome.

*2-3. North-west pillar in antis of the trapezioid court of the Sanctuary of Artemis, from the west and east before preservation intervention.*

*4. North-west pillar in antis of the trapezoid court of the Sanctuary of Artemis, from the east after preservation intervention.*

*5. North-west pillar in antis during dismantling, from the south-east.*

the present pillar and plinth. These were all stacked on the ground, numbered and measured, and the two fragmentary blocks making up the upper cornice of the plinth restored (**Figs. 4-5**).

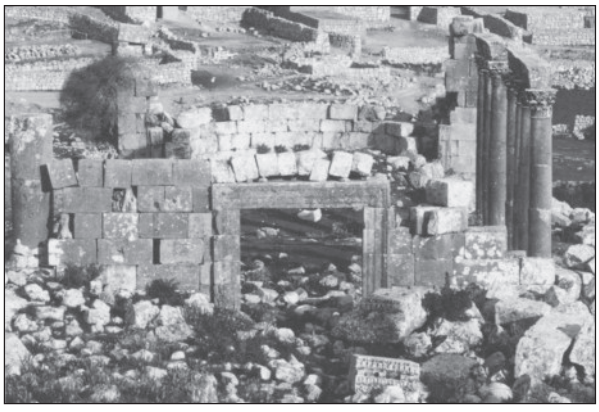
(3) Replacement of the deteriorated ashlars on which the plinth was originally laid with new ones on both eastern and western sides, and consolidation of the blocking that sealed the entrance to the church nave.

(4) Repositioning the blocks in their original upright position, without any binding material as per the original construction (**Fig. 6**).

(5) The following year, in 2010, *anastylosis* of the central portal of the west wall of the church was planned; it is now in progress.

In a late 19th century photograph, the entire portal is standing - even the relieving arch above it (**Fig. 7**). However, in photographs of the 1920s it is decidedly reduced, being evidence for the spoliation mentioned above. In the photo at **Fig. 8**, the lintel is missing while the jambs are entirely preserved. Two blocks from the topmost row of the church's apse are also missing. In two other photos at **Fig. 9**, taken before and after the American excavation there (Crowfoot 1935), more elements of the jambs are missing.

*6. North-west pillar in antis; upper cornice of the plinth during dismantling, from above.*



*7. West wall of the Propylaea Church in the 1880s.*

*8. West wall of the Propylaea Church in the 1920s.*

*9. West wall of the Propylaea Church in 1934 after excavation.*

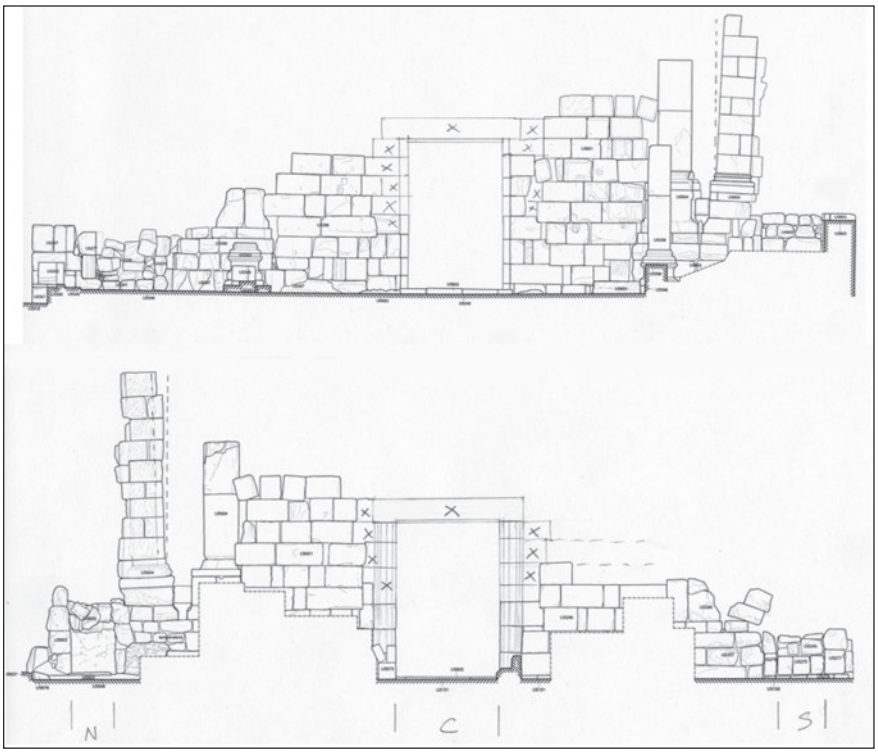
By moving and reorganising the enormous number of collapsed architectural elements on the ground during our previous seasons, we have been able to identify part of the portal's lintel, *viz*. the eastern of the two back-to-back elements it originally consisted of. Fewer than half of the moulded jambs are presently preserved *in situ* and only one element was recovered on the ground (**Figs. 10-11**).

Regarding the *anastylosis*, the following work has been carried out to date:

(1) Consolidation of the wall north of the portal. The two uppermost misaligned rows of blocks were taken down - one had deteriorated to such an extent that it had to be replaced - and then reassembled (**Figs. 12-13**).

(2) New stone blocks have been purchased to replace the missing elements of the jambs; their final shaping will be the next task in the programme of works[2].

2. The abovementioned work has been possible thanks to the collaboration of Abdulmajid Mjelli, responsible for restorations at Jarash, and his staff.




*10-11. West wall of the Propylaea Church; plan of preservation interventions (east and west sides).*

*12. West wall of the Propylaea Church in 2009, from the north-west.*

*13. West wall of the Propylaea Church; north side after consolidation, from the south-east.*

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# PRELIMINARY REPORT ON THE 2012 SEASON OF THE MADABA PLAINS PROJECT: TALL JALŪL EXCAVATIONS 2012

*Paul Gregor, Randall Younker and Paul Ray*

## Introduction

The 2012 season at Tall Jalūl, conducted by Andrews University, took place between 17 May and 8 June 2012. The excavations on the *tall* were directed by Randall Younker, Paul Gregor and Paul Ray of the Institute of Archaeology, Andrews University. Around 30 faculty, students and volunteers joined more than 15 Jordanian workers during the excavations this season[1].

Excavations at the site of Tall Jalūl began in 1992 **(Fig. 1)**, with excavations in the Jalūl Islamic village beginning in 2008. For background information on Tall Jalūl, the Jalūl Islamic village and the history of excavations at the site, see Gane *et al*. 2010; Gregor 2009; Gregor *et al.* 2012; Gregor and Gregor 2009, 2010; Herr *et al*. 1994, 1996, 1997; Younker *et al*. 1993, 1996, 1997, 2007, 2009; Younker, Gane and Shqour 2007; Younker and Merling 2000; Younker and Shqour 2008.

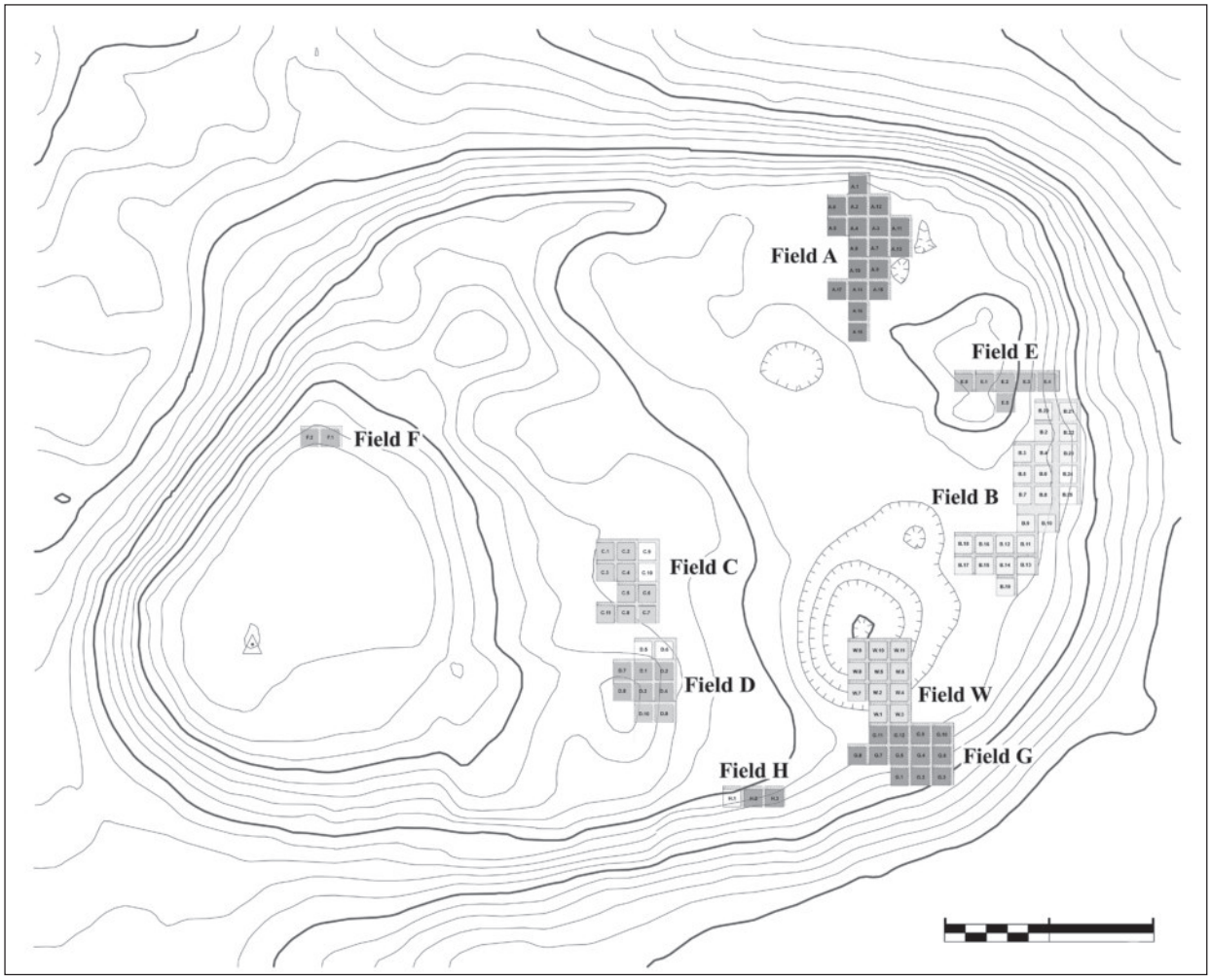
## Results of the 2012 Season at Tall Jalūl (Field W)

Field W was carefully laid out on the south-eastern ridge of the large depression on the south-eastern side of the *tall*. Work started here during the 2010 season when four squares were opened in order to find the continuation of the water channel from Field G, anticipating that it would run straight to the depression where the remains of a water system were anticipated. The excavation of these squares brought the desired results and the continuation of the channel was revealed. However, it turned out that the channel does not connect to the water system, but rather passes the depression on its eastern ridge, going further north. By the end of the season, almost 30m of the water channel were unearthed, but some sections of the channel had been destroyed by later stone robbers.

In 2011, a section of the water reservoir was revealed along with its eastern wall. The inner side of the reservoir's eastern wall was plastered several times during the several centuries of its usage. Plaster on the bottom of the reservoir was more than 30cm thick. Material found on the bottom of the reservoir indicates that it went out of use during the 7th century BC. Three floors were also discovered outside the reservoir's wall. The earliest one was dated to the 9th century BC.

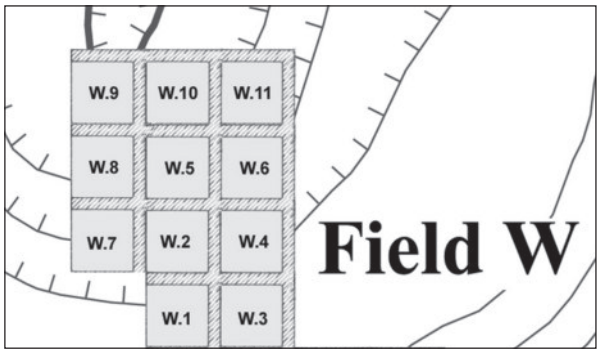
This season, in 2012, work continued in Field W. In addition to Square W.2, which was

1. We wish to thank Faris al-Hmoud, Acting Director General, and his staff (including Jehad Haroun) at the Department of Antiquities of Jordan for their support of the project this season. We would also like to thank Barbara Porter and Chris Tuttle of the America Center of Oriental Research (ACOR) for their usual assistance. Finally, we appreciate the help of Hanadi Taher, of the Department of Antiquities of Jordan, who served as our departmental representative.
Staff for the 2012 season included director Randall W. Younker, co-directors Paul Z. Gregor and Paul Ray. Sabal Zaben was pottery formator and helped with a number of logistical issues. The Field Supervisor this season was Paul Gregor. Paul Ray also served as object registrar and dig architect. Helena Gregor was the pottery registrar and Erika Fortin was photographer. Jerry Chase and Jacob Moody oversaw GPS readings on the *tall*.
Square Supervisors for Field W included Erika Fortin, Abalardo Rivas, Ralph Hawkins, Christine Chitwood, Jacob Moody and Trisha Broy. Volunteers included Soon Bum Kwon, Brittany Colpepper, Mariana Garcia, Raul de Souza, Stephane Beaulieu, Robert Chase, Medaliz Gutierrez, Chad Shively, Tara Tellman, Jessica Ritter, Seneque Edmond, Jose Espero, Jonathan Torres, Elmer Guzman, Hanny Guzman, Karen Denmark, Heather Merizan, John Pohlman and Sharon Pohlman.




*1. Jalūl topo color 2e.*

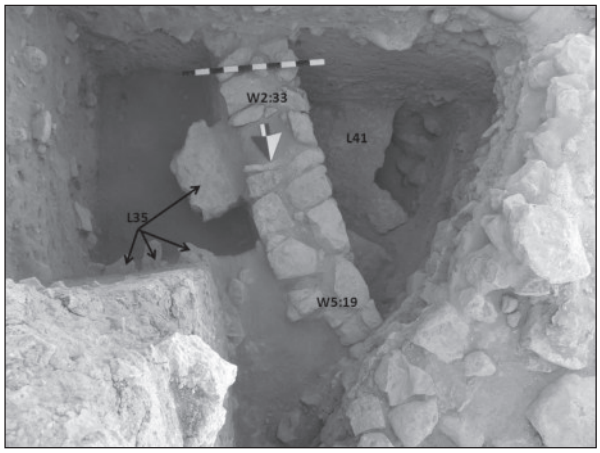
worked the previous two seasons, five additional squares (W.7 - 11) were opened, being placed around the previously excavated squares **(Fig. 2)**. The goal of the 2012 season was to discover the possible date of the reservoir's construction and to expose the rest of its structure. After a third season of excavation, Field W has now yielded four occupational phases consisting, in part, of structures next to the water system.




*2. Jalūl topo color 2a.*

**Occupational Phase 1 (Early Bronze Age III / IV)**

Work continued this season in Square W.2 with the hope of revealing the date of the reservoir wall. Three superimposed floors were discovered during the 2011 season. In order to preserve the lowest floor (W.2:25), only a small area (approximately 2.0m$^2$ and 30cm deep) was excavated to find the date of its construction. Material found in the fill under the floor may date to the 10th century BC. This season, the area of excavation was enlarged in order to find as much material as possible to date the construction of the reservoir wall. Under this floor 1.2m of fill was found, below which a small wall (W.2:33=W.5:19) was revealed **(Fig. 3)**. This wall was constructed of small and medium roughly-hewn boulders. Its two rows were 60cm wide, the excavated sec-

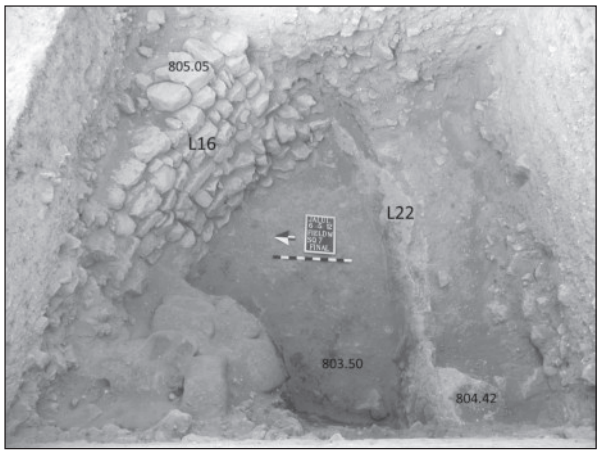



*3. Early Bronze Age wall.*

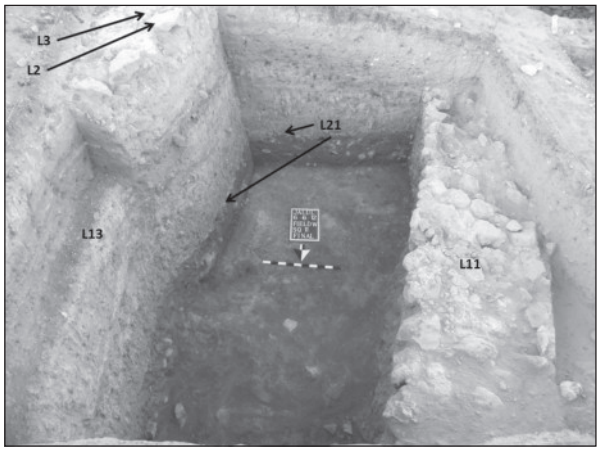
tion being 3.5m long and two courses high. The wall probably belonged to a domestic building. A dirt floor (W.2:35) and stone fill were found on its eastern side. Pottery found on the floor and around the wall was of Early Bronze Age III / IV date. The majority of sherds belonged to holemouth jars and bowls. Also, several 'envelope' ledge handles were discovered. The wall, which sits on 1.0m of fill, dated to the same period. Under this, bedrock (W.2:41) was reached. The EB wall (W.2:33=W.5:19) was cut by the reservoir wall (W.2:19=W.7:22=W.11:11), clearly showing that the latter was built later.

**Occupational Phase 2 (9th century BC)**

Occupational Phase 2 was present in Square W.2, and in Squares W.7 and W.11, as excavated this season. It seems that the water reservoir was built during this phase; its walls were found in Squares W.7 **(Fig. 4)** and W.11 **(Fig. 5)**. So far about 12m of the reservoir's eastern wall




*4. Water reservoir.*




*5. Water reservoir and floors.*

(W.2:19=W.5:11=W.11:11) has been revealed. Wall W.7:22 turns sharply, creating its southern perimeter; it seems that the reservoir had an oval rather than a circular shape. The reservoir wall was well-constructed, with the interior side covered by a thick layer of plaster. Evidence of plaster was not found on Wall W.11:11 as this side of the wall was in the balk, but is visible on Wall W.7:22 where a good portion of its face was exposed. This wall was replastered several times owing to extensive use of the reservoir, which functioned until the 7th century BC and went through several stages of rebuilding, as evidenced by the two contemporary floors found outside the reservoir wall in Square W.2 (L23 and L13=L17) during 2011 season.

After the construction of the reservoir, a thick layer of fill was brought in and laid outside its wall. The fill was tightly packed, creating a foundation for Floor W.11:21=W.2:25, which was used as street and gave access to the reservoir. The floor / street was made of beaten earth surfaced with packed pebbles, which were apparently intended to create a rough walking surface that would reduce the risk of pedestrians slipping.

Later, during the same century, 50cm of fill (W.11:18-20) was brought in to create a foundation for another floor (W.11:17=W.2:24). This floor was mainly constructed of lime plaster, as seen in Square W.2. In Square W.11, however, the same floor (W.11:17) seems to have been made of beaten earth filled with pebbles, as in the earlier floor. Since the reservoir wall and all the floors were partially damaged by stone robbers, it was impossible to see where and why the

builders changed materials in constructing the same street surface. The reason might have been that Floor W.11:17 was closer to the entrance of the reservoir and was therefore more exposed to water spillage. The entrance to the reservoir, however, has not yet been discovered.

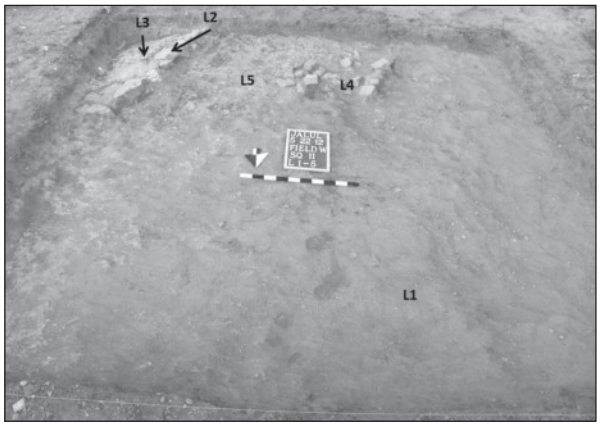
**Occupational Phase 3 (8th century BC)**

This occupational phase is found in Square W.11 and possibly W.7. As mentioned above, the southern reservoir wall was found in Square W.7, but it seems that the reservoir was partitioned by another wall (W.7:16) which was found inside the reservoir itself **(Fig. 4)**. Since only one side of the 'partition' wall was revealed, it is not possible at this point to determine its function and size with any certainty. It was built with medium boulders; its southern side sloped at an angle and was not plastered. It is possible that southern wall of the reservoir was damaged and could no longer function properly, so its constructors built another one in its place. Future excavations will likely provide an answer to this problem. Since this 'partition' wall was built inside the reservoir, it reflects a later addition; we therefore provisionally assign it to Phase 3.

This phase was also revealed in Square W.11. The third floor surface (W.11:13) was found here, being a continuation of the same floor found earlier in Square W.2 (Locus 13=17). It was constructed on approximately 60cm of fill. The floor itself was made of beaten earth, packed with pebbles similar to the previous two **(Fig. 5)**. It also functioned as street or road, apparently leading to the entrance of the reservoir.

**Occupational Phase 4 (7th century BC)**

This phase of occupation was found only in Square W.11 and consisted of a fragmentary continuation of the water channel (W.2:2, 3) found in earlier seasons. This feature was located in the south-eastern corner of the square **(Fig. 6)**. The stones which were used in its construction were small- to medium-sized boulders which were roughly hewn before they were laid in place. The channel was constructed in the same manner as found in previously excavated squares. So far about 50m of the channel have been discovered, running from Field G and passing along the reservoir on its eastern side. No evidence has been found so far to indicate its relationship with the reservoir. Further excavations should reveal the answer to this question.




*6. Water channel.*

A post-7th century BC fill was found in most of the squares. One of the objects of interest found in the fill in Square W.7, between Loci W.7:16 and 22, was a stone with an ink drawing on it (Object Reg. # J0899) **(Fig. 7)**. Our initial


*7. Jalūl rock drawing.*

impression is that it is a stylized depiction of an Islamic fort or *khān* - perhaps one that existed at Jalūl. It seems to show the plan of a square structure with four corner towers and four gates, with another structure in the center. Pointed crenellations or battlements seem to crown the towers and walls. More study needs to be undertaken before a definitive interpretation of this drawing can be made.

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# TWIXT DESERT AND SOWN: THE POPULATION DYNAMICS OF SOUTHERN JORDAN FROM BYZANTIUM TO THE MAMLUKS - A NEW GIS PROJECT[1]

*Claudine Dauphin and Mohamed Ben Jeddou*

**The Desert and the Sown**

"The eastern side of the Ghawr is much more fertile than the western. Enough water flows from the beautiful hills of 'Ajlūn to turn the plain into a garden, but the supply is not stored, and the Arabs of the 'Adwan tribes content themselves with the sowing of a little corn. At the end of March the eastern Ghawr is a carpet of varied and lovely bloom, which lasts but a month in the fierce heat of the valley, indeed a month sees the plants through bud and bloom and ripened seed" (Bell 1907: 16).

On 5th February 1905, the future English writer, traveller, political officer, administrator, archaeologist-explorer and cartographer Gertrude Bell (1868-1926), who became highly influential in British imperial policy-making owing to her extensive travels in Greater Syria, Mesopotamia, Asia Minor and Arabia, and who – along with T.E. Lawrence – helped establish the Hashemite dynasties in Jordan and Iraq, set off from Jerusalem to Damascus on horseback in order to revisit the Druze country, crossing the stony and flower-carpeted desert margins of Jordan[2]. Having left as-Salṭ with its wealth of apricots and vineyards, she journeyed with guide, cook and camping equipment through wide valleys: "treeless, uninhabited, and almost uncultivated. A generation or two hence", she mused, "it will be deep in corn and scattered over with villages. I shall not be there to see. In my time the uplands will still continue to be that delectable region of which Omar Khayyam sings: 'The strip of herbage strown that just divides the desert from the sown'". She was glad that during her lifetime the uplands would "be empty save for a stray shepherd standing over his flock with a long-barrelled rifle; and when I meet the rare horseman who rides over those hills and ask him whence he comes, he will still answer: 'May the world be wide to you! from the Arabs'. That was where we were going, to the Arabs" (Bell 1907: 23).

*1. Fattoh al-Banna (1975 - 2009).*

Like this *bint al-'arab*, or 'daughter of the desert' as she was dubbed by the wandering Bani Sakhir *bedouin* (Kamm 1956: 114), let us follow the camel depicted on the 1930s dress of a *bedouin* woman from southern Jordan **(Fig. 2)**

1. In memory of Fattoh al-Banna (1975-2009),Computer expert at the Department of Antiquities of Jordan and friend **(Fig. 1).**
﴿وبشر الذين آمنوا وعملوا الصالحات أن لهم جنات تجري من تحتها الأنهار كلما رزقوا منها من ثمرة رزقا قالوا هذا الذي رزقنا من قبل وأتوا به متشابها ولهم فيها أزواج مطهرة وهم فيها خالدون﴾. **البقرة.25**

2. For Gertrude Bell's 1905 trip see Kamm 1956: 111-115; Winstone 1980: 59-62.

*2. Camel crossing field of flowers; embroidery on a 1930s bedouin woman's dress from southern Jordan.*

across the floral plain (Weir 1970) and, with our faces turned towards the desert, let us go towards the first black tents – to the Arabs.

"With me along the strip of herbage strown
That just divides the desert from the sown"
(*Rubā'iyāt of Omar Khayyām* 11)[3]

**The Exploration of Palestine and Jordan**

Although Palestine and Jordan have been explored by numerous archaeological surveys since the Survey of Western Palestine by C.R. Conder and H.H. Kitchener (1881-1883) and the explorations across the River Jordan by G. Schumacher (1886), a scientific investigation of fluctuations in population dynamics in Palestine and Jordan – including the whole area between the Palestinian coast and the vast deserts of southern Jordan – has never been attempted. Our project, "*Fallāḥīn* and nomads in *Palaestina Tertia* from Byzantium to Saladin: population dynamics in the light of new research tools (Geographical Information System [GIS])", otherwise known as the "Palestine III Project", combines for the first time GIS and traditional archaeo-historical interpretations of the past, the one enriching the other.

**From Byzantium to the Abbasids: The Depopulation of Palestine**

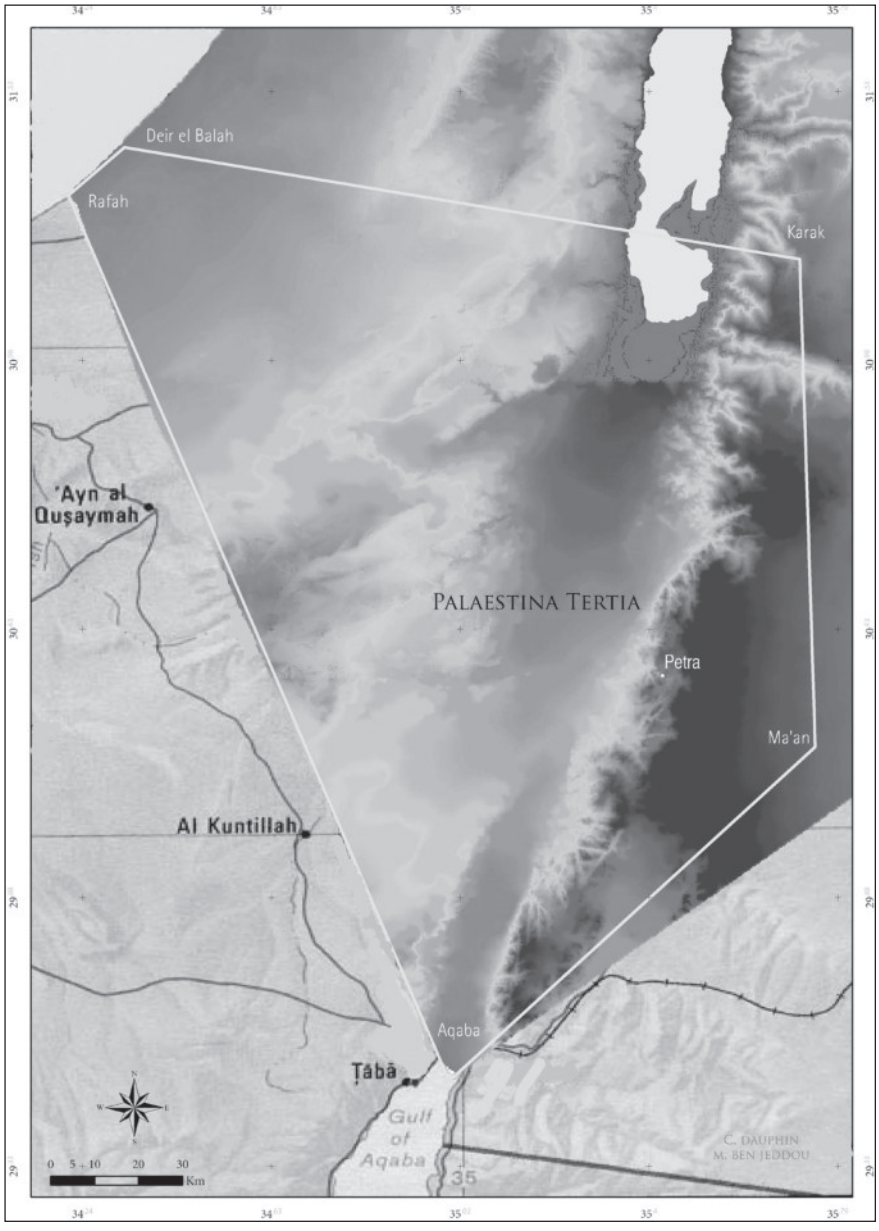
The settlement distribution map of Palestine at the beginning of the 7th century indicates dense occupation on both banks of the River Jordan on the eve of the Muslim conquest. A century later, by time of the Abbasid take-over of 750, western Palestine appeared to be a 'demographic desert'. Attributed simplistically to the Persian (614-617) and Arab invasions (636-640), this decline was already inherent in the late Byzantine period (6th - early 7th centuries). With a young and expanding population, described as "progressive" (Waugh 1990: 295-296, figs. 13.13-14), by the 6th century Palestine had reached the beginning of the second stage of the 'demographic transition' model, *viz*. 'early expansion', which characterises modern Bangladesh or Kenya (Britain reached this stage of development between 1760 and 1880; see Waugh 1990: 292, fig. 13.9). By accelerating and developing beyond agricultural potential, demographic growth inevitably engenders the "poverty trap" (Witherick 1990: 150). Weakened by endemic infectious diseases (e.g. tuberculosis, syphilitic *bejel*, leprosy, endoparasites, malaria), the population of Byzantine Palestine was also undermined by an iron-deficient diet. Droughts and locust invasions, which devastated harvests and pastures in the 6th century, resulted in famines with catastrophic demographic consequences, not only because of the number of deaths, but also because of the negative impact of malnutrition

3. The *Rubā'iyāt of Omar Khayyām* is a selection of quatrains in Persian attributed to the poet, mathematician and astronomer Omar Khayyām (1048-1131), native of Khorasan (the north-eastern province of Persia).

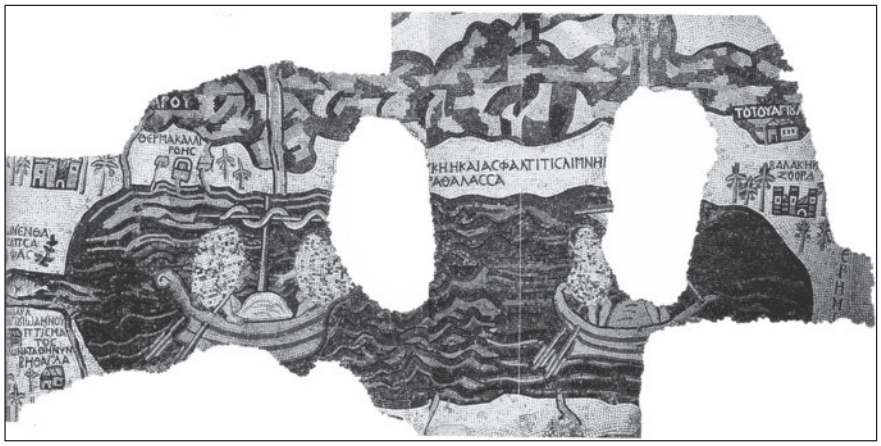
on reproduction (e.g. amenorrhea, impotence). Wiping out entire families over several generations, the plague of 541-542 killed between 20 and 25% of the population, the initial death toll being doubled by cyclical returns of the scourge, notably the Plague of 'Imwas (639-640) at the beginning of the Moslem occupation (Dauphin 1998 I: 445-518).

A detailed analysis of archaeological demography, a new discipline based on landscape archaeology allied to historical geography, which borrows its analytical tools from physical anthropology, religious sociology and socio-economic history, was developed by Dauphin (1999) between 1980 and 1990 and applied to Byzantine Palestine. However, until recently it had not been applied to Jordan east of the rift valley or *ghawr*.

Archaeological and historical data clearly indicate that the scenario for Jordan was somewhat different. As the Byzantine infrastructure collapsed in Palestine, preachers such as Patriarch Sophronius of Jerusalem whipped up fear of the Saracens. In a sermon on the Epiphany which he delivered at the Church of the Holy Sepulchre in Jerusalem on 6th January 637, he lamented: "Abomination of the desolation clearly predicted to us by the Prophets. The Sarrasins rampage




*3. Palaestina Tertia (GIS M. Ben Jeddou and C. Dauphin).*



*4. Mādabā mosaic map (6th century AD); on the right, south of Zoara, note Greek inscription eremos (= "desert") (courtesy of Studium Biblicum Franciscanum, Jerusalem).*

across lands forbiddent to them, destroy the cities, devastate the fields, put fire to the villages, torch the holy churches, topple the holy monasteries, defy the Roman armies, gain trophies in war, progress from victory to victory and behave towards us with increasing arrogance" (*Homilia in Theophaniam* 10: 24-31; Papadopoulos-Kerameus 1898: 166). However, according to Patriarch Eutyches of Alexandria in his *Annals*, on launching the conquest the first successor of God's envoy (*khalīfat rasūl allāh*), Caliph Abu Bakr (r. 632-634), ordered the Muslim armies: "Do not kill neither children, nor the elderly, nor women. Do not strip the palm tree of its bark; Do not burn it; do not fell down fruit trees and do not destroy tilled fields; Do not slaughter lamb, ox, or camel, except for your subsistence" (Eutychius, *Annals* 276; Breydy 1985a: 131, 1985b: 111).

In panic, thousands of refugees took to the roads of Palestine in an attempt to cross the River Jordan amidst chaos probably not dissimilar to that of the 1948 catastrophe, or *nakba*, whilst others scrambled to embark on ships to Cyprus or the capital of the Byzantine empire, Constantinople. The 'Palestinian refugees' swelled the numbers of and brought new blood to the populations beyond the River Jordan, which had been depleted by famine and plague, much as in Palestine west of the *ghawr*. The Christian communities of *Palaestina Tertia*, which was renamed the *jund* of Urdunn, prospered under the Umayyads (Schick 1995a). For example, there were fifteen churches at the garrison town of Kastron Mefa'a (Umm ar-Raṣāṣ), ranging in date from the 6th century to the final phase of the Umayyad period, the most impressive being the mosaic-paved Church of St. Stephen, dated 718-756 AD (Piccirillo and Alliata 1994).

**From 'Archaeological Demography' to GIS**

Following the publication of Dauphin's major study, *La Palestine Byzantine: peuplement et populations* (1998), she expressed a wish that a new generation of researchers apply her approach of archaeological demography, refining it methodologically and extending it in time and space. In the mid 1970s the Cambridge school of 'new archaeology' had established the theoretical bases of spatial analysis (Hodder and Orton 1976; Clarke 1977), whilst geographers were developing Geographical Information Systems (GIS) which K.L. Kvamme (1989) was the first to apply to archaeology some twenty years later.

Whilst carrying out research in Israeli archaeological archives and in the field before the peace agreement between Jordan and Israel, there were sound political reasons why Dauphin had been unable to access data concerning that part of Jordanian territory which lay within Byzantine *Palaestina Tertia*, *viz*. an irregular polygon extending from 'Aqaba (Byzantine Ayla) in the south, to Ma'ān in the east, al-Karak in the north-east and Dayr al-Balaḥ / Raphia in the north-west **(Fig. 3)**. This constitutes a transitional climatic zone between 'sub-tropical Mediterranean' and 'arid continental', historically the border zone between the land of the *fallāḥīn* ("sedentary farmers") and the desert **(Fig. 4)** of the *badu* ("nomads"). *Palaestina Tertia*, with Petra as its capital, comprised the Negev desert south of Eleutheropolis – modern Bet Guvrin – the Wādī 'Arabah valley and the southern part of *Provincia Arabia* from the

Arnon River – Wādī al-Mūjib – to the Gulf of ʻAqaba[4], a total of some 7,000 km$^2$. Bisected by the rift valley, or *ghawr*, which separates it from the Negev desert, it is characterised by inclined uplands set symmetrically from south to the north which create favourable conditions for movement, trade and conquest (*viz*. Roman, Persian, Arab, Crusader, Ottoman Turkish). The plateaus are higher on the east (*ca.* 1700m) than on the west (*ca.* 1000m). Annual rainfall is greater in the north (*ca.* 300mm) than in the south and east (*ca.* 100-50mm, with evapotranspiration of between 1300 and 2400mm).

The sides of this polygon had never been impenetrable; pastoralists paid no attention to its boundaries. The deserts to the south and east of *Palaestina Tertia* were occupied by nomadic *badu*. To the south, the *Limes Palaestinae* was established as a defensive line within Byzantine territory itself. To the east, the Byzantine administration entrusted control of the *limes* to Ghassanid *bedouin* (who came from Yemen in the 5th century in search of pasture and had been converted to monophysite Christianity by itinerant monks) and recognised their domination over all the tribes "from the snowy mountains unto the territory of Ayla" (Caussin de Perceval 1847-1848: 249).

Moreover, in 1998 – when *La Palestine Byzantine* was published – the intensive surveys of the Negev desert (being that part of *Palaestina Tertia* lying west of the rift valley) by the Israeli Negev Emergency Survey were neither complete nor fully published.

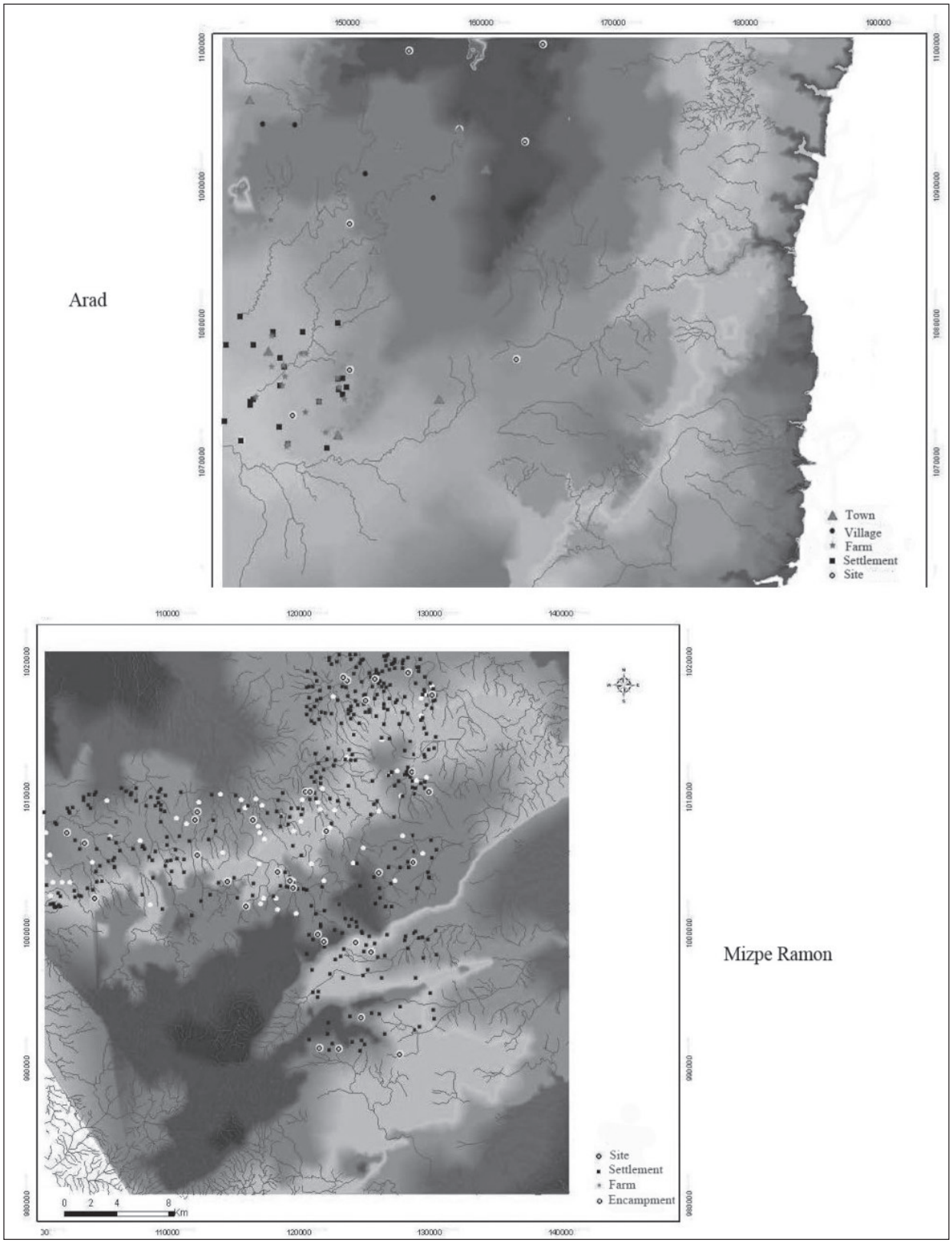
Since Dauphin's discovery in 1981 of a sanctuary to St. John the Baptist at er-Ramthaniyye in the Jaulan – Byzantine *Gaulanitis* – and her 1985-1988 study in which she interpreted it as a pilgrimage centre for Ghassanid nomadic tribes (Dauphin 1995), she had been interested in the processes of sedentarisation. For his part, Mohamed Ben Jeddou – formerly a member of the Tunisian Heritage Institute – had participated in several projects in the Near East and wished to test the GIS methods which he had pioneered in Tunisia (Ben Jeddou 2007) in a physically and anthropologically similar area, i.e. one occupied by both farmers and nomads. Dauphin and Ben Jeddou therefore decided to pool their knowledge and join forces with the French geographer J.M. Castex in an attempt to fill the gap of *Palaestina Tertia* in Dauphin's demographic study. The aim was to cross archaeological demography with GIS, combine analysis of literary and historical sources with geographical interpretation, and apply geospatial approaches to landscape archaeology in order to explore fluctuations in the relationships between man and environment, and between nomadism and sedentarism in this semi-arid area over eight centuries.

The initial focus was on demographic fluctuations at the transitional period between the end of the Byzantine era and the emergence of the Abbasids in 750 AD. The study area was not only a border zone between the sown of the *fallāḥīn* and the desert of the *badu*, but one which had also experienced Arab infiltration before the Moslem conquest of 636.

**Pilot Project**

A pilot project was conducted in 2007-2008 in order to shed light on fundamental questions concerning three types of relationship: 'time / space', 'sedentary, semi-sedentary and nomadic peoples' and 'pagans, Jews, Christians and Moslems'. In order to better trace the infiltration of Arabs who went on to co-exist with Byzantine rural communities by settling in the central Negev desert, two regions of *Palaestina Tertia* were selected for closer study: Arad to the southwest of the Dead Sea (Dauphin 1998 I: 108-110, III: 961-979) and Mizpe Ramon with its extinct volcanic craters in the heart of the central Negev desert (Haiman 1986, 1991, 1993; Lender 1990; Rosen 1994). Against the background of general demographic decline, of Christianity penetrating into the Jewish stronghold of the *Darôm* in the 5th century (taking it over in the 6th century) and – further south in the central Negev uplands – of Islam becoming consolidated (manifested archaeologically by several hundred Arabic inscriptions and the construction of open-air cult-places [*masjid*]), two contrary demographic movements met in the central Negev. The hypotheses put forward by the Negev Emergency Survey **(Fig. 5)** were confirmed, *viz*. (1) a move towards the south and central Negev uplands and (2) terrace agriculture maximising the resources

4. On geo-historical *Palaestina Tertia* see Gutwein 1981: 5-40.




*5. Distribution of types of Byzantine sites in relation to the hydrographic network in two sub-regions of the Negev desert: Arad and Mizpe Ramon (GIS M. Ben Jeddou and C. Dauphin).*

of *wadi*s - a characteristic feature of the northern Negev plains. This resulted in an increase in the number of farms in the Late Byzantine period and under the Umayyads. These were abandoned under the Abbasids, during which time there was a south-north infiltration of Arab nomads who gradually became sedentary (Dauphin and Ben Jeddou 2009).

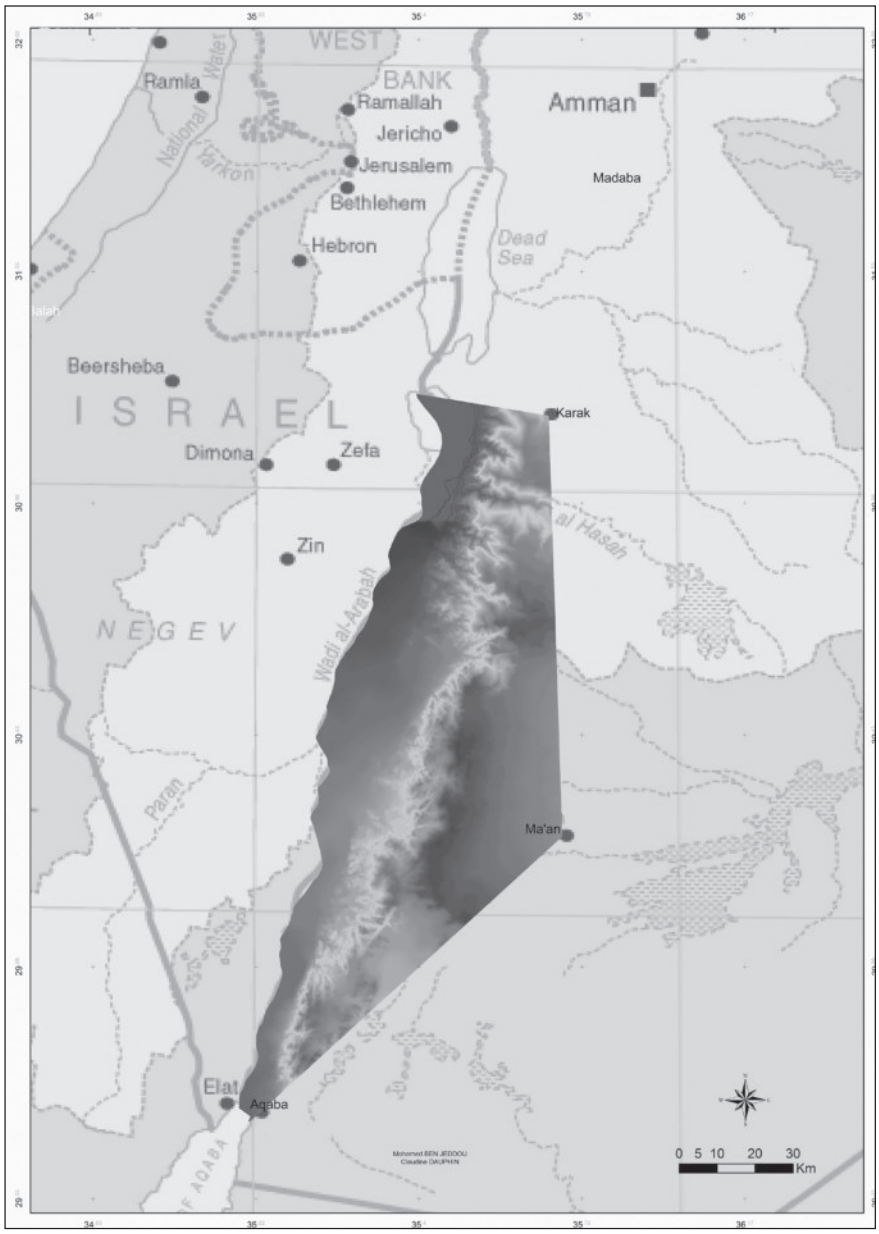
**Chronology and Archaeological Databases**

The long chronological span of our study – from the Byzantine period to the victory of Saladin over the Crusaders at the battle of Ḥiṭṭīn (4th July 1187), which precipitated the collapse of the Latin Kingdom of Jerusalem and, by way of the Ayyubids (1188-1260) the rise of the Mamluks (1260-1516) – includes two major chronological breaks: between the Umayyads and Abbasids (750), and between the Crusaders and Ayyubids (1187).

A database of all Byzantine and Arab sites in *Palaestina Tertia* west of the *ghawr* was created by Mohamed Ben Jeddou on the basis of sites recorded in the catalogue of Dauphin's *La Palestine Byzantine* (1998 III). This was updated with data published by the Negev Emergency Survey and the results of recent excavations, augmented by Arab sites found in the archaeological archives of the State of Israel and the Negev Emergency Survey. This database comprises 1,099 archaeological sites described by 20 descriptors, which were in turn divided into 70 variables (e.g. date: Byzantine, Byzantine-Arab, Arab).

For the area east of the rift valley **(Fig. 6)**, i.e. southern Jordan, our corpus of archaeological sites is essentially based on the inventory of sites recorded in the 1973 *Archaeological Heritage of Jordan*: *The Archaeological Periods and Sites (East Bank)* and on JADIS (Jordanian Archaeological Database and Information System), the latter being the computerised database of the Department of Antiquities of Jordan[5]. The reason for using JADIS rather than MEGA (Middle Eastern Geodatabase for Antiquities) is that MEGA, which was created by the Getty Conservation Institute in Los Angeles in cooperation with the Department of Antiquities of Jordan, does not yet include all the data on JADIS. All Byzantine (330-636 AD), Islamic (636-661), Umayyad (661-750), Abbasid (750-1258), Fatimid (969-1171), Crusader (1099-

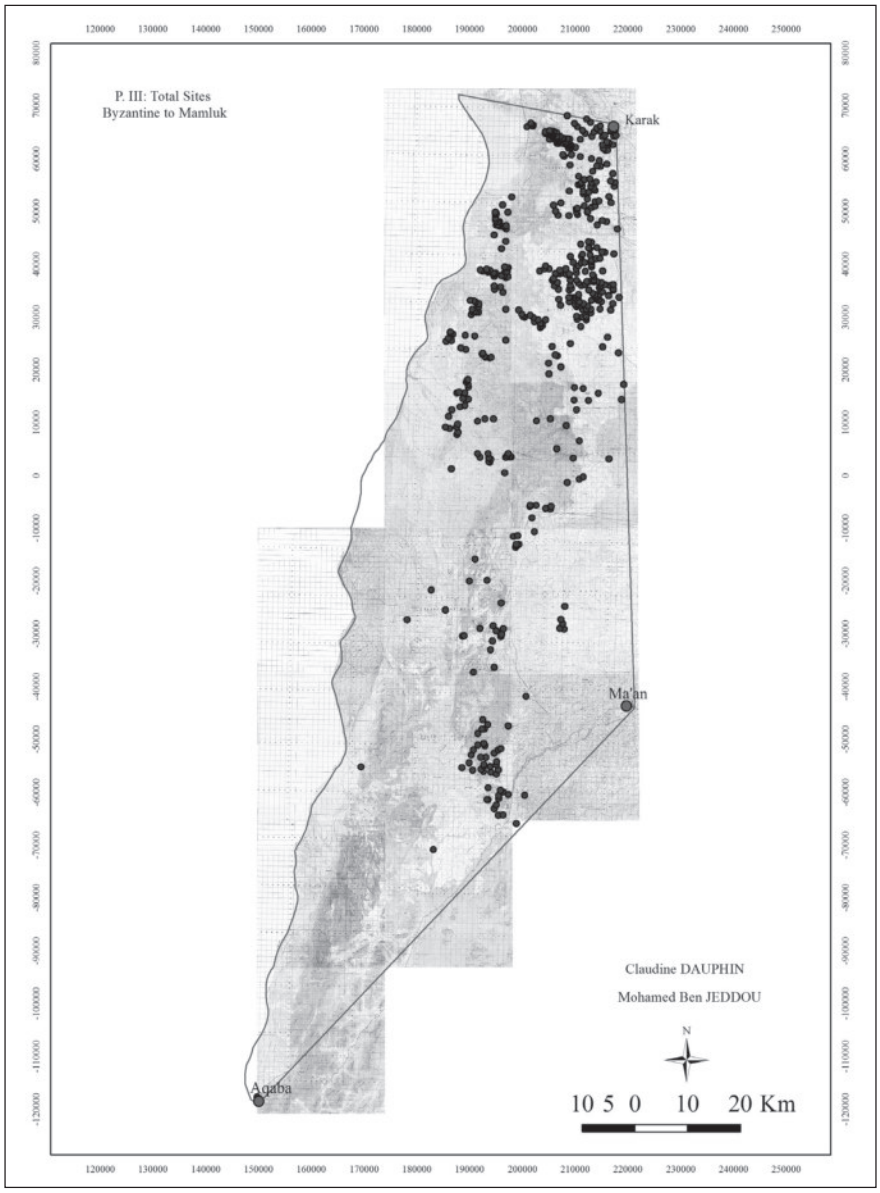
5. In January - February 2008, Mohamed Ben Jeddou carried out research for the Palestine III Project with a short-term bursary from the Institut Français du Proche-Orient (IFPO) at ʻAmmān. We are extremely grateful to the late Dr Fawwaz al-Khraiysheh, then Director General of the Department of Antiquities of Jordan (DoA), for permission to access the JADIS database and acquire topographic maps from the Royal Jordanian Geographic Center, ʻAmmān, as well as pedological maps of southern Jordan from the Directorate of Agriculture and Irrigation. We would particularly like to thank the Director of the Directorate of Agriculture and Irrigation, Eng. Riyad Beqeen, and Dr Mahmoud Al-Freehat and Ahmad Eid Aloweidi, both of the Department of Land Use, for their good will towards us and their interest in the Palestine III Project. Professor Bill Finlayson, then Director of the Council for British Research in the Levant (CBRL), ʻAmmān strongly supported our applications for (1) an Honorary Professorship in Archaeology and Theology at the University of Wales Trinity Saint David, Lampeter and (2) access to JADIS and the Jordanian archaeological archives. Our application was followed up with rigour and warm cooperation by CBRL Administrator, Mrs Nadja Qaisi. At the DoA, Catreena Hamarneh, then Director of Archives, and Mrs Samar Habahabeh greatly facilitated our work in the JADIS database; access problems were solved by Fottoh al-Banna (Information Technology). Qutaiba al-Dasouqi and Jamal Safi (Topography, Mapping and Drawing) guided us through the administrative complexity of the Royal Jordanian Geographic Center, ʻAmmān. We thank them all wholeheartedly. Our debt of gratitude is particularly great to Dr Mark Merrony, Director of the Mougins Museum of Classical Art (MMCA) founded in 2011 by Mr Christian Levett, and Mrs Julianne Coutts, in charge of Finance and Marketing at the MMCA, for the Museum's financial support of the Palestine III Project as well as for their enthusiasm. The present article is based on a lecture with the same title which we delivered at the British Institute, CBRL, ʻAmmān on 28th November 2011. We wish to thank Dr Carol Palmer, Director of CBRL ʻAmman, for her perfect organisation of the lecture and Mrs Qamar Fakhoury, Director of Studies and Publications at the DoA, for bringing to light the educational value of the combination of archaeology, history and GIS in our work.




*6. Jordanian Palaestina Tertia east of the ghawr (GIS M. Ben Jeddou and C. Dauphin.)*

1291), Ayyubid (1171-1341) and Mamluk (1250-1517) sites in *Palaestina Tertia* east of the *ghawr* were recorded. The 'sites' table provides a unique site number which serves as link between the new inventory and the JADIS database. The total number of sites was 517 (Byzantine = 420, Islamic = 134, Umayyad, Abbasid and Fatimid = 59, Crusader, Ayyubid and Mamluk = 135). Five chrono-spatial maps of *Palaestina Tertia* east of the *ghawr* were generated **(Figs. 7, 8)**.

In JADIS, sites are recorded in 'chronological blocks'. For example, Umayyad, Abbasid and Fatimid sites constitute a single 'block', so that unless one has consulted the Jordanian archaeological archives and / or recent archaeological publications it is impossible to know which sites are Umayyad and which are Abbasid or Fatimid. Similarly, in order to conduct a detailed analysis, it is imperative that site-type (e.g. city, village, hamlet, farm, fortress, encampment) and architectural components (e.g. domestic structures, cult places, reservoirs) are identified, none of which are described on JADIS. Historical sources (e.g. Arabic geographical treatises and itineraries, in particular those of the 19th and early 20th centuries) mentioning sites and describing landscapes before modern development must also be examined.




*7. Distribution of Byzantine to Mamluk sites in Palaestina Tertia east of the ghawr (GISM. Ben Jeddou and C. Dauphin).*

**Environmental Databases and Methodology**

Within the context of the creation of an integrated Geographical Information System, the archaeological database was linked to an environmental database on which a number of spatial analyses were conducted. Geographical data were produced for spatial modelling on the basis of sixteen 1:50,000 topographic maps obtained from the Royal Jordanian Geographic Centre at ʻAmmān. These maps were geo-referenced by M. Ben Jeddou.

*Spatial Vector Data*

Point data

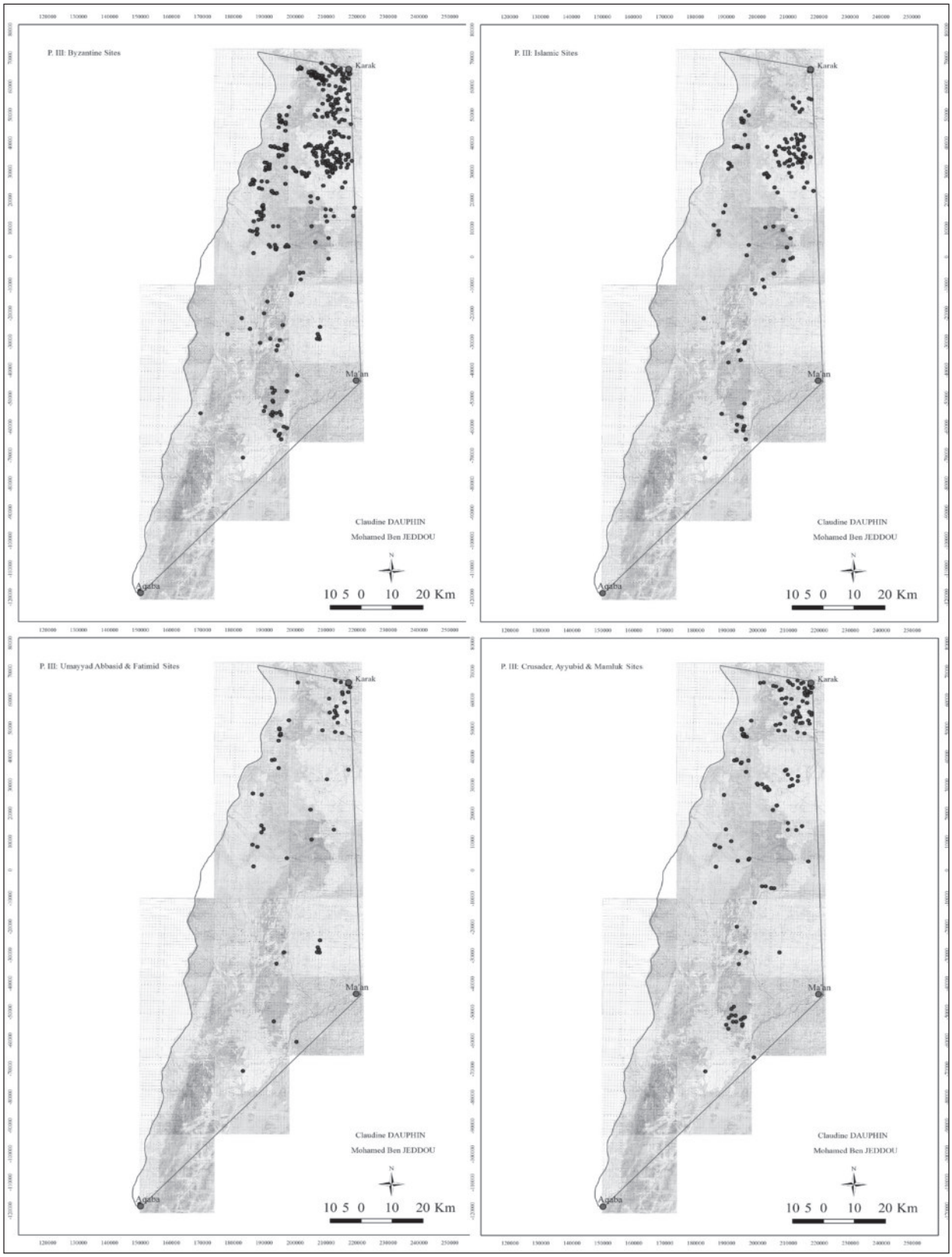
These include hydrographic information, e.g. springs, wells. This layer was produced on the basis of the 1:50,000 topographic maps. Very few springs were recorded.

Linear Data

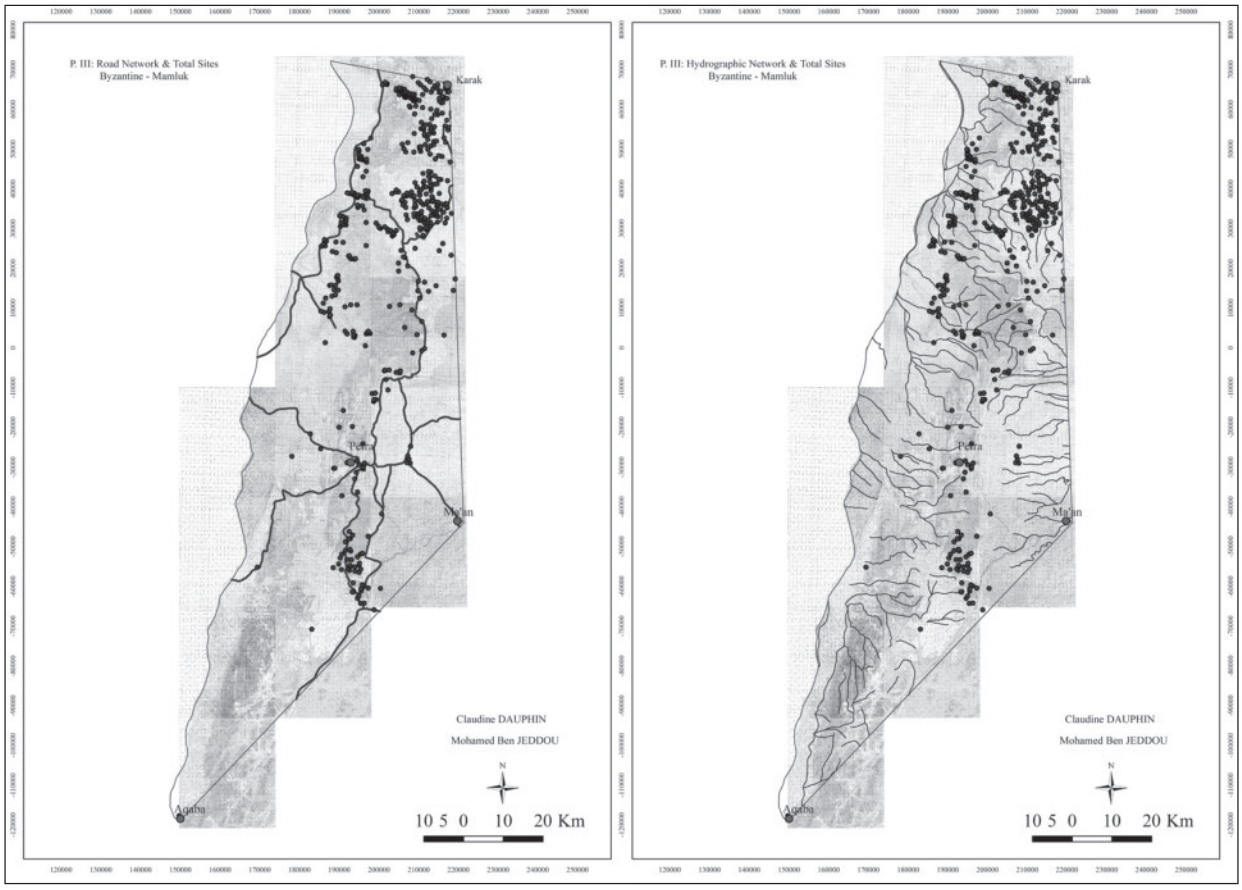
This layer was produced through digitisation of contour lines on the 1:50,000 topographic maps.

Hydrography

This layer reflects the present state of the hydrographic network. It shows all information on perennial and seasonal *wadi*s, as well as on irrigation channels. It may be possible to trace past hydrographic networks owing to a relative




*8. Distribution of sites in Palaestina Tertia east of the ghawr: (top left) Byzantine; (top right) Islamic; (bottom left) Umayyad - Abbasid - Fatimid; (bottom right) Crusader - Ayyubid - Mamluk (GISM. Ben Jeddou and C. Dauphin).*




*9. All sites in Palaestina Tertia from Byzantine to Mamluk periods against (left) road network; (right) hydrographic network (GIS M. Ben Jeddou and C. Dauphin).*

lack of human disturbance in southern Jordan.

In our study area, the hydrographic system derives from the orography: *wadis* run parallel to folds. This hydrographic network is dense with many ramifications. It covers the entire region, generally in a south-westerly or south-easterly direction **(Fig. 9)**. The hydrographic network is subject to significant variations of flow based on annual rainfall.

Ancient Roads

The ancient road network is particularly relevant to the study of ancient populations. It played a major role in *Palaestina Tertia* on both sides of the *ghawr*. Examined in the light of historical sources, archaeological remains (e.g. roads, *wadi* crossings, milestones) have enabled us to trace a number of routes following Roll (1999).

The vector layer shows Roman and Byzantine roads. The close relationship between site distribution and the ancient road network recalls both the movement of agricultural and commercial products between settlements and the south-north axis of the *Via Nova*, and the caravans which carried Indian spices from Ayla (‘Aqaba) to Damascus (Dauphin 1998 I: 117). At Petra, they were joined by the caravans of the ‘incense road’, which carried loads of Yemeni incense and myrrh from the port of Qani’ on the Gulf of Aden to Marib, and thence across the immense desert of *Rubat al-Khali* (the “Empty Quarter”), stopping at Najran and Yathrib-Medina (Groom 2002: fig. 29). After the Moslem conquest, the direction of commerce was reversed, with Moslem pilgrims travelling from Damascus to Mecca. Caravan stops, with reservoirs and cisterns which were filled each year before the *ḥajj*, were established along *Darb al-Ḥajj* (Petersen 1991). From Ma‘ān, this followed a south-easterly route towards Tabûk and then went on to Medina.

*Pedology*

Pedological maps were kindly provided by

the Pedological Section of the Jordanian Ministry of Agriculture. These comprise two modern 1:250,000 maps of southern Jordan which classify soils into several categories according to type (Al-Qudah, El-Rihani and Sartaoui 1993).

Our study area was divided into 18 types of land region and 147 units of soil association, of which 55 appear in the table of our pedological layer. Our approach is different but complementary, classifying soil types according to agricultural potential. This classification is based on numerous factors: e.g. crops grown, agricultural potential, slope, rock outcropping. Seven categories of agricultural capacity were defined: (1) non-existent: uncultivated, zero potential, (2) very weak: small areas of grazing, (3) weak: pastureland, (4) medium: cereals (barley), (5) quite good: cereals (wheat), irrigation, (6) good: two cereal harvests, irrigation, orchards and (7) very good: all types of cultivation, good harvests.

**The Petra Church, *Papyri* and Fields**

In order to reconstruct the landscape in any given period, it is necessary to compare the agricultural potential of certain sites with the results of environmental studies (e.g. pollen analysis) and data from historical sources. For example, light was shed on agriculture in the hinterland of Petra, capital of *Palaestina Tertia*, in the 6th century by 152 *papyri* discovered in December 1993 in a storeroom of the Byzantine church at Petra excavated by the American Center of Oriental Research (ACOR), ʻAmmān. Charred in the fire which had destroyed the church, those *papyri* which were still legible comprised contracts concerning the property and land of Theodoros, son of Obodianos, and his family, as well as legal documents including transactions, property descriptions and disputes between several Petra families over at least two generations (Frösen, Arjava and Lehtinen 2002; Arjava, Buchholz and Gagos 2007; Arjava, Buchholz, Gagos and Kaimio 2011). This particular Theodoros was a deacon, who became archdeacon of the church where the *papyri* were discovered. The *papyri* mention orchards, vines, grain fields, wheat and barley threshing floors, and farms. It is now imperative to investigate the information contained in the Petra *papyri* in the field and to analyse the results in the context of GIS.

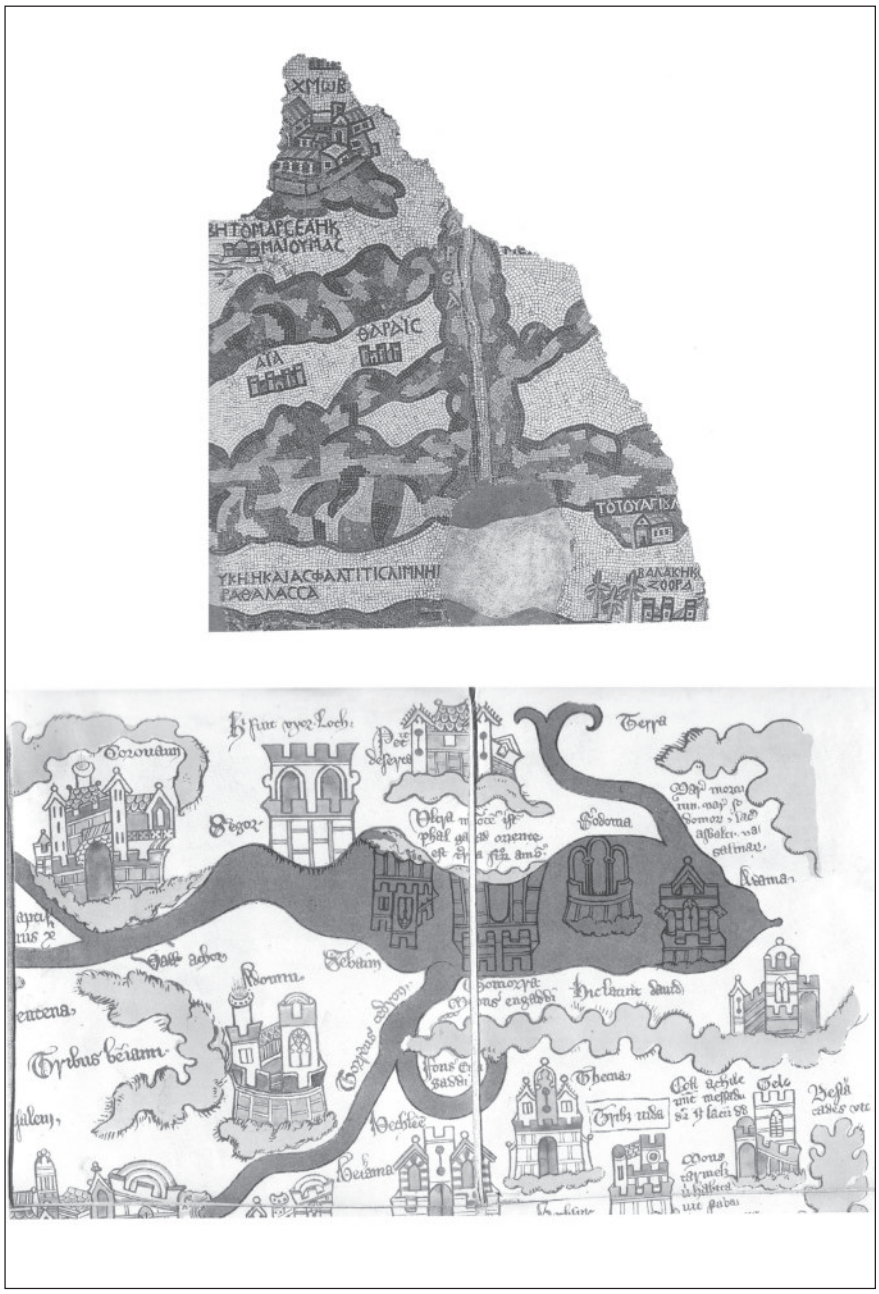
In the next stage of analysis, we will refine our research and consider other factors and approaches, whilst taking into account the spatial dimension in order to answer the following questions: Where and why are sites situated? Did changes take place in the factors governing site location over time?

**Statistical Analyses**

*Density Calculations*

This type of spatial calculation takes the notion of ‘neighbourhood’ into account, by examining the distribution of archaeological entities / sites over an area of 7000 km². Zones of concentration are depicted by colour shading, making it easier to visualisation the spatial context of the results.

During the Byzantine period, there was a great density of occupation in the northern part of study area **(Fig. 11)**, on fertile soils in the vicinity of al-Karak, the episcopal see of Characmoba **(Fig. 10)** located at the ancient crossroads of the north-south Kings’ Highway and east-west road linking al-Karak with the Dead Sea. By the Islamic period, this concentration seems to have moved south of al-Karak, corresponding to the initial billeting of the Moslem conquerors on the arable margins (Dauphin 1998 II: 370-371). During the Umayyad - Abbasid - Fatimid period, zones of concentration are clearly visible near al-Karak, west and north of Fīfā and north of Maʻān. As the Umayyad caliphate became established, both administratively and militarily, troops left their cantonments and settled down. The centre of gravity thus shifted from the desert towards semi-arid and, later, agricultural land. The creation of sites on the pilgrim road from Damascus to Mecca is also evident. *Darb al-Ḥajj* crossed Jordan from north to south via al-Karak and Maʻān (broadly corresponding to the modern Desert Highway), then headed off towards the south-east in the direction of Tabûk (Peters 1994: map 1; Kennedy 2012: 92-109; Petersen 1991, 2012). In the Crusader-Ayyubid-Mamluk period, the Karak region continued to play a central role, with sites clustering around the Crusader castles of Shawbak and Karak **(Fig. 10)**, despite the existence of three Crusader castles in Petra and its environs (Vannini and Nucciotti 2009; Voisin 2009). Moreover, the province (*mamlakat*) of al-Karak was of great economic and strategic importance



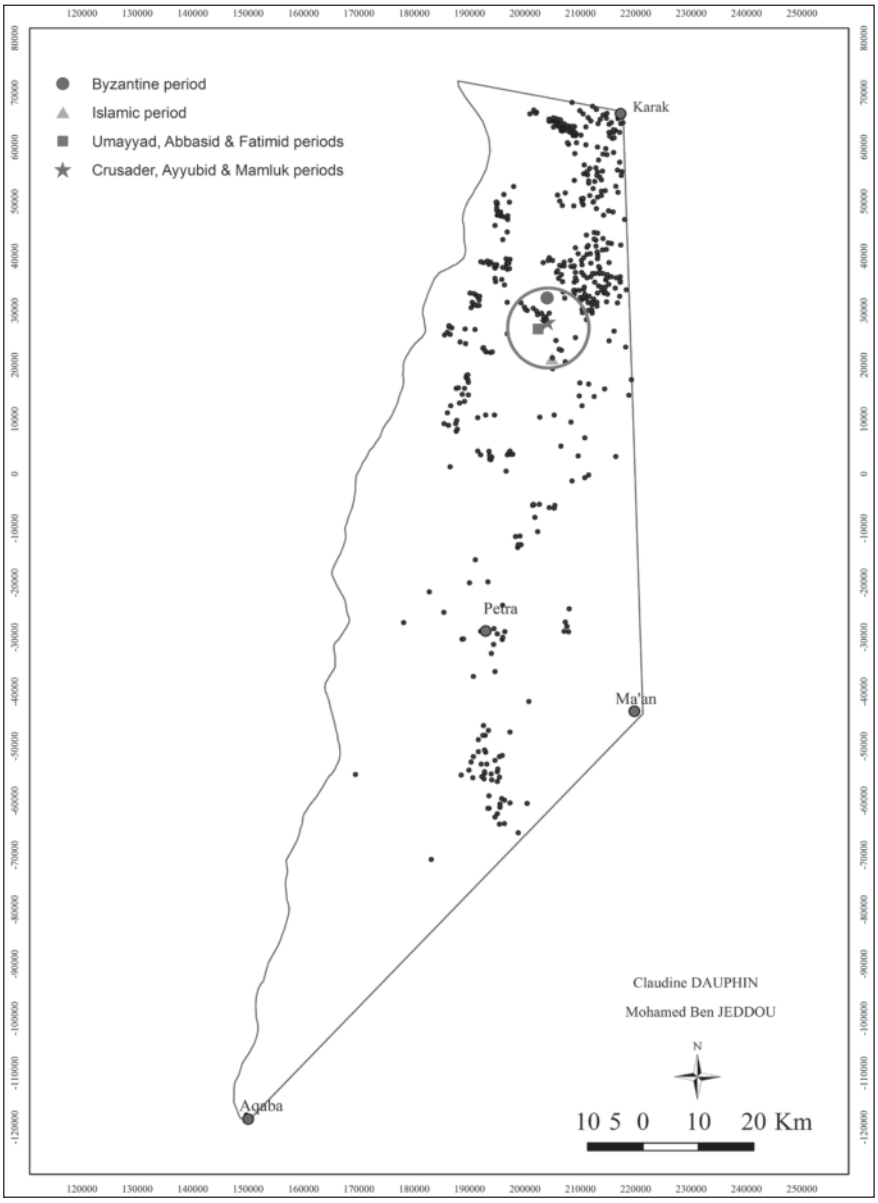
*10.(Top) Mādabā mosaic map, including vignette of Byzantine (Chara) cmob (a), modern al-Karak (courtesy of Studium Biblicum Franciscanum, Jerusalem); (bottom) map of the Holy Land showing the itineraries of William Wey, Fellow of Eton College, in 1458 and 1462; depiction of the Dead Sea, cities and castles (courtesy of The Board of Trinity College, Dublin).*

to the Mamluk state. At times of food shortage in Egypt, Karak wheat was exported to Cairo, the centre of Mamluk power. Furthermore, the sugar industry which the Crusaders developed in the Jordan valley was subsequently one of the most profitable sectors of the Mamluk agricultural economy (Walker 2008).

*Mean Centre*

The technique of 'mean centre', based on Euclidian distance, consists of measuring the value of x and y coordinates for all points, or centroids for linear and surface entities. This technique was used in order to identify the geographic centre (or centre of concentration) of archaeological sites for each period. This has enabled us to measure general patterns of settlement concentration and check whether any shifts occurred. Our map **(Fig. 12)** suggests that the average centre remained circumscribed within a circle averaging 11km in diameter from 330 to 1517AD. Thus, the distribution of population remained constant through time, with a focus on the northern area, despite minor nuances specific


*11. Density calculations in Palaestina Tertia east of the ghawr: (top left) Byzantine; (top right) Islamic; (bottom left) Umayyad - Abbasid - Fatimid; (bottom right) Crusader - Ayyubid - Mamluk (GISM. Ben Jeddou and C. Dauphin).*




*12. Mean centre in Palaestina Tertia east of the ghawr (GISM. Ben Jeddou and C. Dauphin).*

to each period.

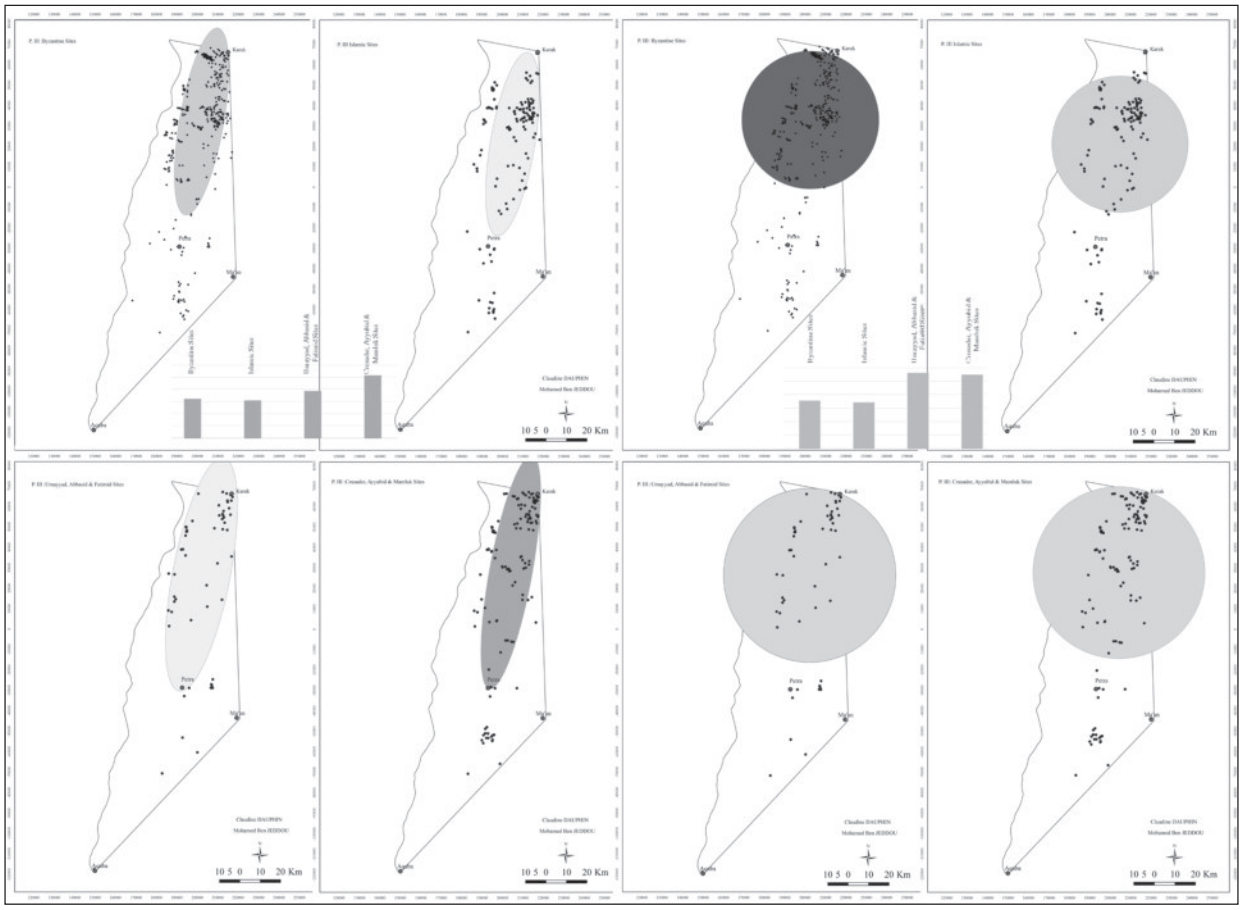
An 'interpretative system' is thus set up, with spatial analyses requiring frequent 'returns' to the environmental database in order to garner historical explanations.

*Spatial Statistics*

By using statistical methods to analyse spatial distribution, patterns, processes and relationships, the location of centres or the manner in which features were distributed around centres can be investigated.

Directional Distribution

Does the distribution of sites around a mean centre follow a certain pattern? To measure the trend for archaeological sites of each period (or 'set'), the standard distance from the mean centre was calculated separately in the x and y directions in order to define the axes of an ellipse. This shows whether the distribution of features has a particular orientation or not. As is evident from the four ellipses of **(Fig. 13)**, the general orientation for all periods is south-west - north-east. However, both the extent and shape of the ellipses change over time. The Islamic period is characterised by a shift southwards, representing a population movement out of the densely-populated Byzantine districts, particularly in the hinterland of al-Karak, in favour of new areas further



*13. (left of page) Directional distribution: (top left) Byzantine; (top right) Islamic; (bottom left) Umayyad - Abbasid - Fatimid; (bottom right) Crusader - Ayyubid - Mamluk; (right of page) Standard distance: (top left) Byzantine; (top right) Islamic; (bottom left) Umayyad - Abbasid - Fatimid; (bottom right) Crusader - Ayyubid - Mamluk (GISM. Ben Jeddou and C. Dauphin).*

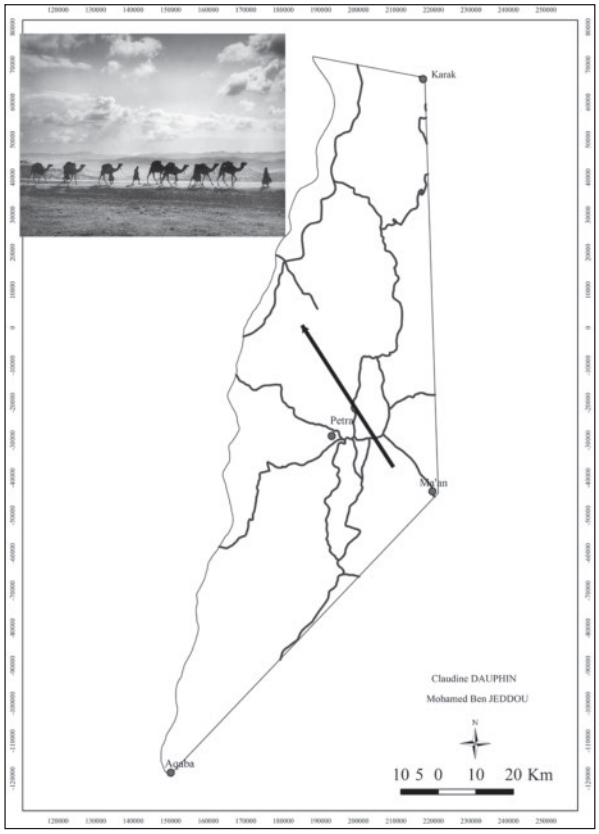
to the south. The Umayyad - Abbasid - Fatimid ellipse resembles that of the Byzantine period, witnessing a return to former 'Byzantine districts' manifested on the ground by the Umayyad establishment of large agricultural estates on the fringes of Byzantine villages (Hamarneh 2010: 98-99). Density of demographic occupation and intensity of land use reached a peak in the Crusader - Ayyubid - Mamluk period, with demographic expansion in all zones.

Standard Distance

This technique is used to answer questions related to the spatial distribution of archaeological sites. It allows one to measure the degree to which features are concentrated or dispersed around a geometric mean centre. Which period had the most extensive territory? How dispersed are features around that centre? The greatest territorial extent coincides with the Islamic and Crusader - Ayyubid - Mamluk periods **(Fig. 13)**, supporting the results of the directional distribution analysis.

Linear Directional Mean

This method is used to identify direction (or orientation) by calculating the average angle of a set of lines. What is the predominant direction? Is it possible to identify the mean direction, length and geographic centre for a set of lines, such as the roads of Byzantine *Palaestina Tertia*? The Byzantine road network east of the *ghawr*, as drawn by I. Roll (1999), is incomplete. The results of the linear directional mean analysis are therefore provisional. Although the Byzantine road network has all the appearances of being orientated north-south, the linear directional mean analysis brings out a hidden feature, *viz*. east-west communications across the River Jordan in the direction of the holy




*14. Linear directional mean against Byzantine road network in Palaestina Tertia east of the ghawr (arrow emphasises east - west communications with Jerusalem) (GISM. Ben Jeddou and C. Dauphin); (top left corner) camel caravan on Mount of Olives, Jerusalem with the hills of Moab in the distance, 1930s (courtesy George Khavedjian, Photo Elia, Jerusalem).*

city of Jerusalem, the focal point of the entire region **(Fig. 14)**. The north-west - south-east linear directional mean is supported by historical sources. Notably, in order to alleviate successive periods of famine in Palestine west of the *ghawr* between 518 and 521, wheat was imported from Moab on the backs of female camels (Schwartz 1939, *Vita Sabae* 186: 15-17; Festugière 1962: 116)[6].

Thus, in addition to enabling us to model distribution, direction and relationships, spatial statistical analyses have so far revealed at least one pattern that was not immediately apparent and have allowed us to consider our data in a spatial manner.

**Spatial Analyses**

Although the spatial dimension of human activities is an essential element of archaeological research, it was neglected for many years. However, archaeologists now admit the possibility of reconstructing human activity, the agrarian landscape and population dynamics by means of spatial analyses (Kvamme 1992: 37; Zhang and Goodchild 2002: 115-122; Goodchild 2005: 3-33; Ahearn and David Smith 2005: 387**)**.

Our current research on *Palaestina Tertia* aims to integrate historical, archaeological and environmental data in order to gain a better understanding of the relationship between man (whether sedentary or nomadic) and space across the long span of eight centuries.

*Slope and Aspect*

Slope and aspect do not seem to have played an important role in the selection of areas for settlement in any of the periods under consideration. Could this be due to the burial of sites under accumulations of soil, a lack of site identification or even erroneous geographic coordinates?

*Altitude*

The distribution of sites indicates that low-lying areas were deemed undesirable for settlement, with the majority of sites being located at higher elevations. 236 of a total of 420 Byzantine sites are to be found at elevations ranging from 700 to 1,700 m. This seems to have been a characteristic element of the southern Jordanian landscape in Antiquity. It may have been linked to visibility, communications and perhaps defence. Moreover, rainfall increases with altitude, resulting in the possibility of two harvests per year, lower air and soil temperatures, less evaporation and the presence of compost-producing vegetation.

*Pedology*

The distribution of sites in relation to soils is significant, with major concentrations of sites (notably in the Byzantine period) in the northern part of the study area, corresponding to the presence of fertile soils. In the southern area, sites are typi-

6. Likewise, at the end of the 19th century, the *bedouin* of Transjordan travelled to Jerusalem to sell their wheat (Spafford-Vester 1950: 153).

cally located near the remains of terraces, a technique to retain soils and protect them from erosion (Mayerson 1962). This system of terraces on slopes or in *wadi* beds was not linked to any specific type of agriculture, as they supported cereals, vegetables, vines and also fruit trees, notably olives.

*Altitude and Pedology*

The correlation between altitude and pedology indicates that the richest soils are situated either in the north or at higher altitudes, where sites of all periods are also concentrated. In the southern part of the study area, sites were most frequently situated mid-slope or on rock fans, whilst cereals were grown in catchment basins and valley bottoms.

*Distance to the hydrographic Network*

Observations of cost / distance in relation to hydrography show that the 'hydrographic' variable is particularly interesting. The tight concentrations of Byzantine sites coincide with the dendritic hydrographic network comprising a multitude of small *wadis* **(Fig. 9)**. The risks posed by flooding of alluvial plains (e.g. malaria [Dauphin 2006]) do not seem to have deterred the establishment of settlements during the Byzantine period. This was probably because the best arable land was to be found where tributaries joined the main *wadis* and in the *wadi* beds, which were terraced for agricultural purposes.

*Dendritic Distribution of Byzantine Sites*

A similar dendritic distribution of population in the Byzantine period is also found west of the *ghawr* in the central Negev desert, in the area of the extinct volcanic craters at Mitzpe Ramon (Dauphin and Ben Jeddou 2009: figs 5 and 10). However, although this dendritic distribution of sites continued into the Islamic period in the latter region **(Fig. 6)**, east of the *ghawr* in southern Jordan a deliberate distancing of sites from water seems to have occurred from the Islamic period onwards, continuing into the Umayyad - Abbasid - Fatimid period. The malaria-carrying anopheles mosquito lays its eggs in stagnant waterponds, in pools of water along stream banks and in stretches of water on alluvial plains with impervious soils and bad drainage (Sergent and Sergent 1947). Consequently, the Prophet Mohammad forbade his *bedouin* from camping in valley bottoms or next to springs and paths which were the "meeting-places of night insects" (Lammens 1914: 24-25). The 8th century poet Ibn Mayyada emphasised the natural tendency of Caliph al-Walid II to prefer the desert to the agricultural *rīf* by proclaiming: "The vicinity of springs is not suitable for us; mosquitoes and fevers consume us" (Lammens 1910: 95). Terrified by malarial fever which was unknown in the desert, the *badu* warned: "Beware of the *rīf* ! To approach it means death, short term perdition" (al-Jahith n.d.). Thus, the progressive sedentarisation of the *bedouin* followed a strategy of avoidance.

In a swing of the pendulum, land use by the Crusaders – who were Christians with a western mentality – reinstated the close relationship between settlement and access to water, leading to a distribution of sites similar to that of the Byzantine period.

*Distance to Springs*

No preference may be surmised from the relationship of sites with springs[7]. However, this statement reflects the modern situation where very few springs have been recorded. Textual sources contemporary with the periods under consideration permit some adjustments. Thus, whereas the immediate surroundings of Petra lack springs on the Jordanian 1:50,000 topographic maps, the Petra *papyri* mention no less than three springs which provided water to the settlement of Wādī Mūsā in the Byzantine period (Inv. 88, no. 36, Kaimio and Koenon 1997: 495; Gagos and Frösen 1998: 473; Arjava, Buchholz and Gagos 2007: 195).

*Distance to Ancient Roads*

The calculation of cost / distance indicates a strong correlation between the proximity of ancient roads and archaeological sites in all periods. There is a clear preference for areas located close to the road network, principally within thirty minutes travel time[8].

7. For cost / distance to springs see Dauphin, C. and Ben Jeddou, M. 2012b: fig. 2.

8. For cost / distance of archaeological sites in relation to the road networks of all periods combined see Dauphin, C. and Ben Jeddou, M. 2012a: fig. 5.

*15. Along the Kings' Highway of Jordan, women's festive dresses: (left) as-Salt, ca 1935; (right) Ma'ān, ca 1930 (Widad Kamel Kawar Collection, 'Ammān.)*


*16. Bedouin eating mansaf, 1925 (courtesy George Khavedjian, Photo Elia, Jerusalem).*

## An Attempt at Modelling

*Multivariate Analysis of Data: Fallāḥīn and Nomads*

The decision to conduct a study of population dynamics in our region by means of statistical analyses should be viewed within the framework of a diachronic approach which allows for the possible combination of a number of different variables, as well for checking the weight of each archaeological variable in population dynamics. In order to conduct a multivariate analysis, it is necessary to include as much information as possible (in addition to that of JADIS), e.g. from site publications, the Jordanian archaeological archives etc. By means of this type of analysis, we hope to shed light on sedentary sites.

The situation regarding nomadic encampments is more complex, owing to the infrequent survival of such sites in the archaeological record (Rosen 1987: 34-35, 1988). Furthermore, there is a near-absence of surveys focused on such sites in southern Jordan. The Greek inscriptions on the mosaic pavement at the funerary church of St. Sergius in the ecclesiastical complex at Nitl (Piccirillo 2002: 209-217), 10 km east of Mādabā, testify to the presence of a section of the Banu Ghassan tribe at the gates of Mādabā. This confirms the tradition recorded by the Arab historian Ya'qubi (d. 897), *viz*. that the Ghassanids had established themselves in the Balqā', south of Philadelphia ('Ammān), during the reign of the Byzantine Emperor Anastasius (r. 491 - 518). However, no trace of semi-sedentary encampments has been detected, whereas evidence of these was found by Dauphin (1995) around the *martyrion* of St. John the Baptist at er-Ramthaniyye in the Jaulan.

We will thus have to adapt the descriptive categories of our database to reflect reality and reveal the settlement typology of ancient nomadic space (tents), as opposed to the sedentary space of the *fallāḥīn*. Anthropologically, the contrast between the desert and the sown in Jordan is striking, be it detectible only in dress **(Fig. 15)**[9] and food **(Fig. 16)**[10].

## The Road Creates the Water Source; it Attracts Man

Analysis of the distribution of archaeological material in relation to environmental data illustrates varying choices over time. Reasons for this are diverse. Road networks and hydrography have always played an important role in structuring the man-made landscape, notably in

9. There are great differences between the black and blue *thawb khalaqa* in cotton, with enormous sleeves, worn on festive occasions at as-Salṭ *ca.* 1935 (**Fig. 6**, left), and the gold and orange Damascus silk *thawb qameh* worn on similar occasions in Ma'ān *ca.* 1930 (**Fig. 6**, right). Both are in the collection of Widad Kamel Kawar, 'Ammān (al-Banna-Chidiac 2011: 149-150). The presence of Damascus silk at Ma'ān, in the heart of southern Jordan, is linked to the *Darb al-Ḥajj* from Damascus, on which pilgrims to Mecca – and also merchandise and luxury goods – travelled southwards to Ma'ān and on to Tabûk and Medina.

10. On food as a differentiation marker between *fallāḥīn* and *bedouin* in Jordan see Palmer 2002.

the Byzantine and Crusader periods. The late French geographer Jean Gottmann (1959: 91), Professor of Geography at the University of Oxford, ended his 1959 study on the relationship between "Man, Road and Water in South-Western Asia" with these words: "The road creates the water source; it attracts man".

Ḥumaymah provides a fascinating example. Just as the Moslem conquerors had emerged from the Arabian desert, it was in the desert – at the 8th century palace of al-Ḥumaymah – that the Abbasid dynasty mounted its rebellion against the Umayyads. Its predecessor, the city of Auara (Arabic *ḥuwāra* = "white"), had been founded by the Nabataean King Aretas III or IV in the 80s BC in an area poor in water resources (Graf 1983) to serve as a centre for sedentarisation of the local nomadic Nabataean pastoralists. Numerous reservoirs were dug in order to catch the winter rains, while 27 km of covered aqueducts delivered water from springs in the mountains to the north, thereby encouraging *bedouin* in the district to semi-sedentarise, camping there on an annual basis to trade in provisions for caravans (Eadie and Oleson 1986; Oleson 1986, 1988, 1990). After the annexation of Nabataea by the Romans, the rectangular Roman fort became a camp of "autochthonous archers on horseback" (Schick 1995b: 320) at *ca.* 400 AD, which in turn encouraged further settlement around the site[11]. Once sedentary, groups tended to settle on the most fertile lands first, hence the importance of the third factor: agricultural potential.

Our project, which integrates environmental and archaeological data by means of spatial analyses, should enable us to reconstruct the landscape and evaluate more clearly and precisely the transformations which have left their marks on the relationships between communities of *fallāḥīn* and nomads on the one hand, and the natural environment on the other. Methods of *bedouin* land use, first involving pastoralism on semi-arid lands, then subsequently semi-sedentarising and sedentarising (and sometimes even returning to a nomadic state), stem from very different perceptions of the environment and its potential. Reconstructing these perceptions from the traces that remain etched upon the landscape is a major challenge for our research.

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11. For the results of the al-Ḥumaymah Excavation Project see Oleson 2005.

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# PRELIMINARY REPORT OF THE FIRST SEASON OF THE DANISH-GERMAN JARASH NORTHWEST QUARTER PROJECT 2011

*Achim Lichtenberger and Rubina Raja*

## Introduction

Between 5 and 19 September 2011 a Danish-German team from the University of Aarhus, Denmark and Ruhr University Bochum, Germany conducted an intensive survey of the north-west quarter of the ancient city of Jarash **(Fig. 1)**[1]. The survey consisted of architectural documentation, geodetic measurements and geophysical survey over an area of 4.2 ha. It was the first season of a project that is intended to last for several years with the aim of exploring the north-west quarter of ancient Jarash. The project is funded by the Deutsche Forschungsgemeinschaft (DFG) and the H. P. Hjerl Hansen Mindefondet for Dansk Palæstinaforskning.

## Aims of the International Jarash North-West Quarter Project

The 2011 survey season prepared the way for a long-term archaeological project. The survey area is the highest point in ancient Gerasa and has hitherto been largely unexplored, apart from the excavation of the synagogue church by the Yale University mission (Kraeling 1938: 234-241) and two later trial trenches by V.A. Clark and J. Bowsher 1986.

The overall aim of the project is to examine continuity and change in settlement patterns and building development in this particular area from the pre-Hellenistic to early Islamic periods in order to discuss implementation, use and re-use of grid patterns and buildings over a longer period, and to link the results with broader patterns of urban development in the city and the region.

The project aims to clarify questions associated with the settlement history of the north-west quarter. There is a particular focus on examination of the early settlement history in order to analyse the impact of Hellenisation in the Near East in general and Gerasa in particular, and to determine whether or not these processes can be traced throughout the Roman imperial period (for further literature on Gerasa see Zaid 1997; Lichtenberger 2003; Kennedy 2007; March 2009; Raja 2012).

The north-west quarter occupies a prominent position because of its location on the highest area within the ancient city and its proximity to one of the main sanctuaries, that of Artemis. However, its distance from the *wadi* raises the question of how the area was supplied with water. It has been suggested that the Graeco-Roman city originally developed from two separate settlements, *viz*. Greek Antioch and an indigenous Gerasa, with two separate main cults - of Greek Zeus Olympios and Artemis (probably the *interpretatio graeca* of a local goddess) (cf. Lichtenberger 2008). If this hypothesis holds true, the north-west quarter close to the Artemision would be a plausible location for an early settlement at Gerasa. The sondages by V.A. Clark and J. Bowsher further east yielded Early Bronze Age material that hints at an early occupation in this area (Clark and Bowsher 1986: 343). On the basis of their earlier work, we wish to carry out further investigations by means of sondages in carefully selected locations. The architectural and geophysical survey in 2011 served to document all visible structures and to select areas for excavation in future seasons.

Another important aim of the project is to

1. The team consisted of the authors (directors), Georg Kalaitzoglou (assistant director), Jens Christian Pinborg (architect), Rudolf Kniess (geophysics), Dana Pilz (geophysics), Ditte Maria Damsgaard Hiort, Annette Højen Sørensen and Stefan Riedel (archaeologists).

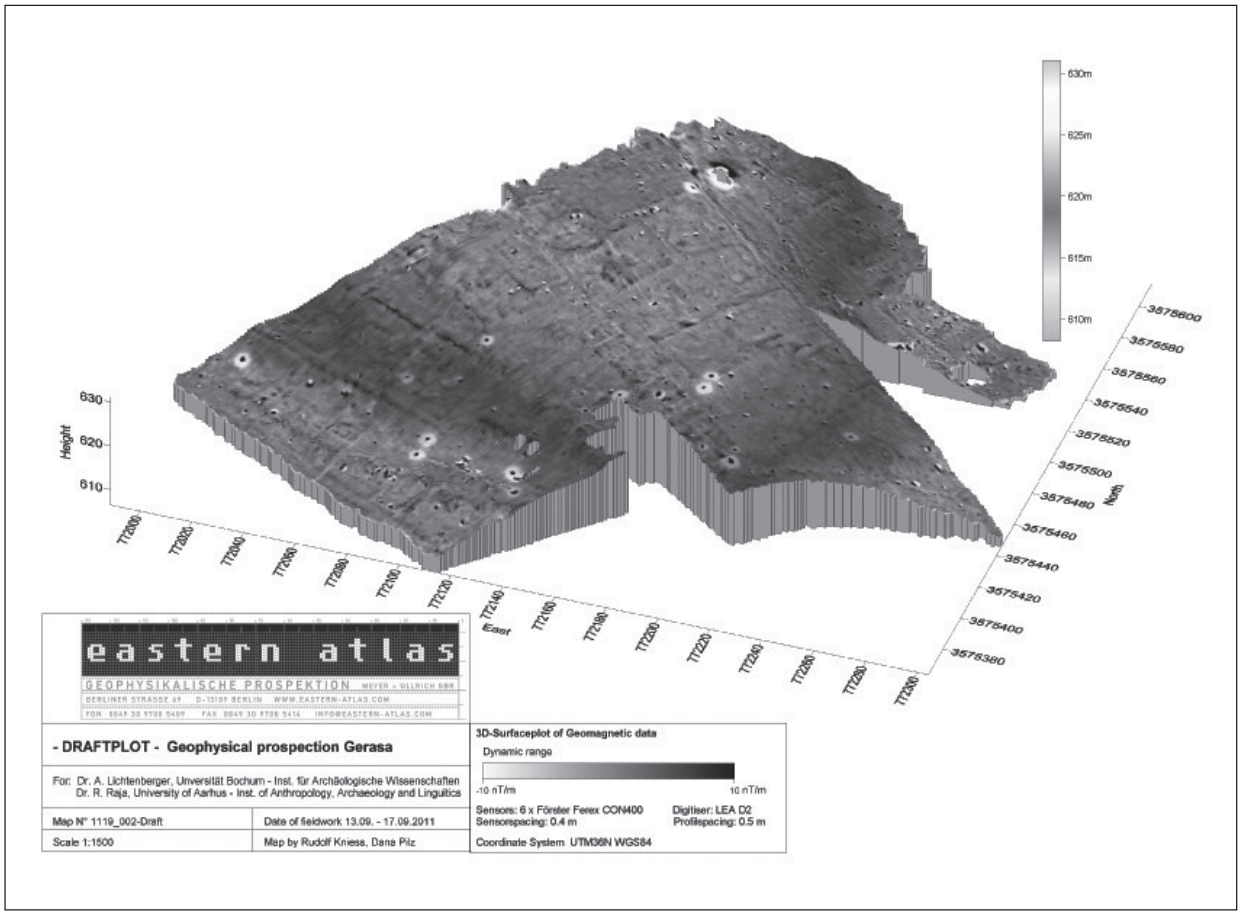

*1. Aerial photo of Jarash with survey area marked.*

study the issue of water supply in ancient Gerasa. To date, no detailed study of this problem has been undertaken[2]. In the north-west quarter, a large cistern provides the logical starting point for such a study. This will be investigated further in the 2012 season.

**General Topography (Fig. 2)**

The north-west quarter is the highest area within the walled city, with a prominent location on the hill top and a view of the surrounding area, including the city, *wadi* and valley. The terrain slopes down to the east in the direction of the Artemision, as well as to the north and south. The northern side consists of a relatively steep rocky slope, while the southern side descends over several artificial terraces. The western limit of the area is defined by the city walls. To the north, the area must have been limited by the North Decumanus running to the north-west gate. The entire north-west quarter is covered with walls, mostly just with one or two courses of rough limestone remaining *in situ*. Aerial photography from 1917-1918 shows that parts of the north-west quarter were used for agriculture; some later terracing may therefore have taken place (**Fig. 3**). This was also observed by Clark and Bowsher (1986: 343) in one trench, where

2. On the supply of water to Jarash see the preliminary study of Seigne (2004); cf. the contributions in Ohlig (ed.) 2008.




*2. 3D surface plot of geomagnetic data.*

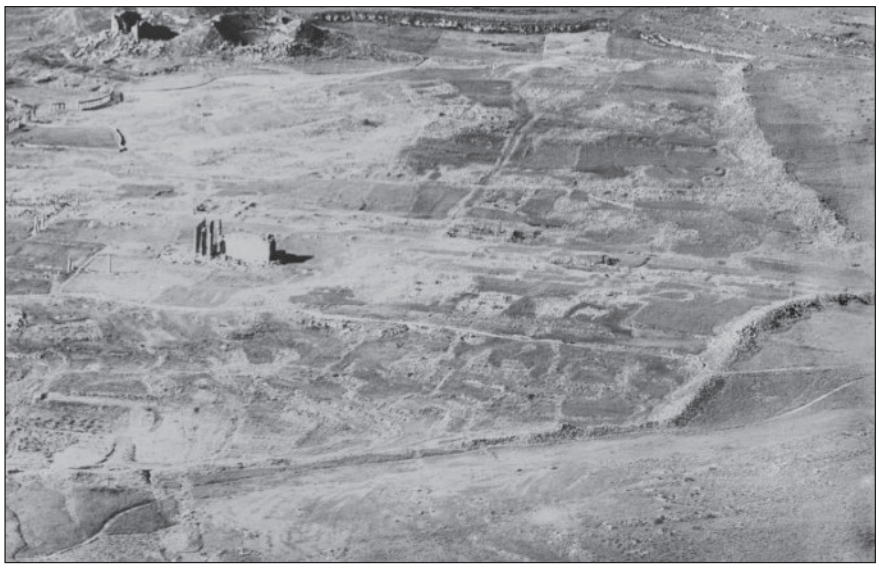
the uppermost metre of deposit was recent agricultural soil. Until recently, parts of the highest area within the north-west quarter were used as a football pitch.

**2011 Survey Season**

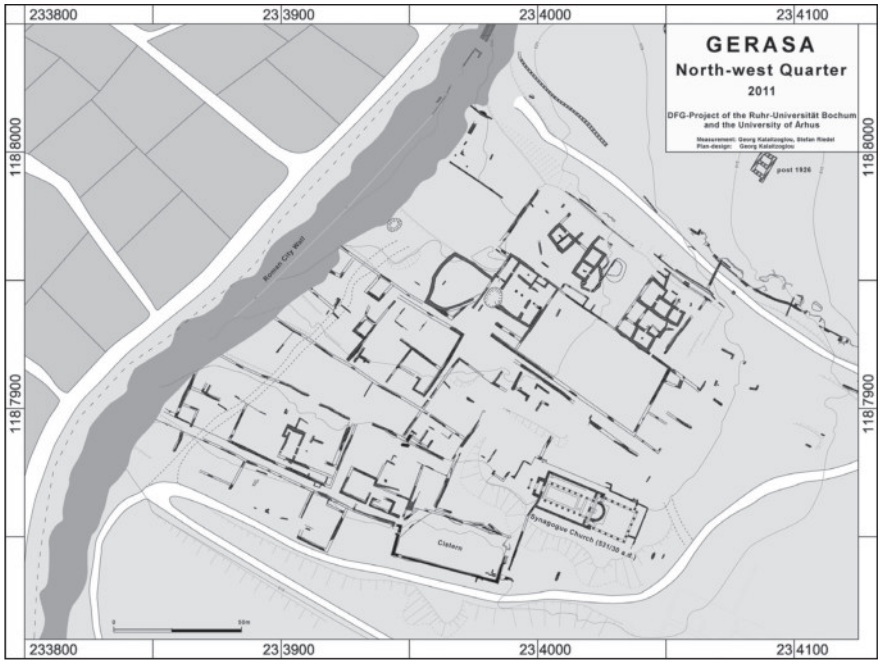
The foci of the 2011 survey season were the archaeological remains in the north-west area of the city, beginning west of the Sanctuary of Artemis and extending to the city wall further to the west (**Fig. 4**). The survey consisted of the following components: (1) architectural field survey and documentation, (2) geodetic survey and (3) geophysical survey (geomagnetics and georadar).

The area was divided into two sectors, which were investigated by two survey teams each consisting of two archaeologists. The teams recorded, described, sketched and analyzed all structures visible on the surface, as well as other important finds. They were supported by an architect who drew 25 architectural elements and modelled these in a 3D photo modeller program, which allowed for detailed analysis by combining several disparate elements (on the architectural decoration of Gerasa cf. Nassar 2004). Several capitals (**Fig. 5**) and fragments of capitals have been documented and, in the debris of the city wall, a fragment of a large limestone relief of the Roman period was discovered. This fragment, which has very deep relief, shows part of a clad torso and traces of an accompanying animal, probably feline or an eagle (**Fig. 6**).

During the survey season, a total of approximately 350 walls – making up varying complexes of different size and function – were identified by the survey teams. Owing to the exclusively non-invasive methods used by the survey, only those structures visible on the surface could be recorded; most of these seem to be of late Roman, Byzantine and early Islamic date (on early Islamic Jarash cf. Blanke *et al*. 2007; Damgaard and Blanke 2005; Walmsley 2007).



3. *Aerial photo of Jarash, 1917 / 1918; BayHStA, BS-Palästina 1127a (courtesy of Bavarian War Archive).*




4. *Map of structures recorded in the north-west quarter of Gerasa.*

The north-west quarter was built on at least six terraces that follow the natural topography of the hill. The terraces are organised by means of streets and in some places they connect via stairs. The structures visible on surface are mostly built from *spolia* and appear to be of late date. However, the general layout seems to date back to an earlier period. This can be seen, for example, in the case of the large cistern (see below) that cut an earlier street when it was constructed.

Of the numerous structures observed, the following are of particular interest and should be investigated further in future seasons:

(1) The 'Ionic building';
(2) The 'southern street' and adjoining complexes;
(3) The cistern;
(4) The northern domestic complexes and caves.

*The 'Ionic Building'*

This monumental complex is located centrally on the hill top within the north-west

*5. Ionic capital from the 'Ionic building'.*

*6. Fragment of Roman relief.*

*7. 'Ionic building' from the south-west.*

quarter (**Fig. 7**). It consists of a relatively large, roughly square building with several rooms. In front of the complex, an oblong terrace more than 50 metres long extends to the east in the direction of the Sanctuary of Artemis.

*8. Monolithic altar.*

The building itself incorporates a significant number of *spolia*, including several of the Ionic order (**Fig. 5**). These would originally have formed part of one or more Roman period buildings. The location and layout of this complex indicates that it could have been the residence of one of the important families in late Antiquity or the early Islamic period. Particularly notable are three adjoining 'courtyard houses' which seem to belong to the same period as the 'Ionic building'. This area and its complexes should be examined in more detail, as they may yield interesting data about social structures in the period between late Antiquity and the early Islamic era. Next season, the 'Ionic building' complex will be investigated by means of carefully placed sondages in order to clarify aspects of its history and use over a longer period.

In the adjoining area, a monumental monolithic altar decorated with stylised bulls' horns was discovered in an open pit, indicating earlier cultic activities in the area (**Fig. 8**).

*9. 'Southern street' from the west.*

*10. Cistern from the south.*

*The 'Southern Street' and Adjoining Complexes*

In the southern part of the survey area, we identified an east-west street running from the city wall to the cistern (**Fig. 9**). Several complexes branch off on both sides of this street; these include structures used for production, a complex with a small cistern and several courtyard structures. This 'quarter' extends over more terraces laid out on the hill sloping to the south. Several side streets leading up the hill were identified between some of these complexes. Although most visible structures in this area appear to be of late Antique to early Islamic date, their overall layout conforms to the orthogonal street grid of the ancient Roman city. This area therefore needs to be investigated in more detail in order to understand its changing use and development over time.

*The Cistern*

A large rock-cut cistern is located in the south-eastern part of the survey area. It measures *ca.* 41x21 metres (**Fig. 10**). The cistern blocks the 'southern street'; it is therefore likely that it was built after the street had lost its urban function as a line of communication between the western and eastern parts of the area.

*11. Repairs to cistern.*

A natural cave is located under the cistern. This cave extends east-west for a distance of at least 20 metres and becomes gradually deeper towards the west. This cave was also used as a cistern as at its ceiling there was a round stone cut opening for drawing water. At some point, the floor of the cistern seems to have collapsed on its eastern side, where the natural cave was closest to the rock surface. (**Fig. 11**). The cistern was in use for quite some time, as attested by several layers of hydraulic mortar, in some places combined with large white *tesserae*.

It was possible to locate one water inlet in the form of a channel leading into the cistern**.** Furthermore, a possible entrance (perhaps also a well) was found *in situ*. However, it still remains to be clarified whether or not these were the only ways of supplying water to and accessing water from the cistern. The northern part of the cistern was at a higher level than the southern part, so there may have been an over-fall basin. On almost the entire southern side, a rock-cut


*12. Magnetogram.*

'depression' runs horizontally; this was probably used to fix a cover for the cistern.

Objectives in forthcoming seasons will include clarification of the date of construction, water supply to and use of water from the cistern. Furthermore, we wish to explore how the cave might have been associated with the use and/or abandonment of the cistern. As little is known about the supply of water within the ancient city of Jarash, one aim will be to examine closely whether water supply and distribution to the north-western part of the city might be explored by investigation of the cistern and its immediate surroundings, including a sondage in the cistern.

*The Northern Domestic Complexes and Caves*

On the north side of the survey area, the hill is 'truncated' by the steep, rocky hillside. In various places, this hillside was worked, both horizontally and vertically. The rock-cut facades were integrated into several buildings, some of which were connected to caves of varying sizes. In two locations, rock-cut staircases gave access to the hill top. Two notable complexes are located between the rocky hillside and the terrace of the 'Ionic building'; it appears that these structures saw several phases of domestic use.

**Geodetic Survey**

Over 14 days, two surveyors carried out a geodetic survey using a total station. With the aim of drawing up a detailed map of the north-west quarter, the area (*ca.* 3.8 hectares) was surveyed with a Sokkisha Set5 instrument. By working closely with the survey teams, it proved possible to record the visible architectural remains as well as topographic detail. The resulting map, which combines the architectural and geodetic surveys, gives a detailed impression of the structures visible in this part of the ancient city (**Fig. 4**).

**Geophysical Survey (Geomagnetics and Georadar)**

Geophysicists from Eastern Atlas, Berlin carried out a large-scale geometric survey of the entire study area between 14 and 19 September 2011 (see report, this volume). A six fluxgate array was used for the geomagnetic survey. Owing to the topography, positioning via DGPS was applied. The array was carried by two people because the steep topography did not permit the instrument to be wheeled across the area.

By means of the magnetogram (**Figs. 12 and 13**), anomalies were detected which could be interpreted as topographical, geological and archaeological features. A preliminary analysis tentatively suggests that some of these features correlate with architectural structures visible on the ground.

At the northern edge of the survey area, the magnetogram revealed parallel structures - possibly the western section of the Northern


*13. Geomagnetic survey; interpretation of geomagnetic data.*

Decumanus leading to a monumental city gate (cf. Zaid 1997: 43). On the terrace east of the 'Ionic building', structures oriented north-south have been detected, crossing the terrace. These may be associated with some kind of division of the terrace. South of the same terrace, several wall structures – which are not visible on surface – were detected, hinting at the presence of a domestic quarter.

Ground-penetrating radar was used in carefully selected areas in order to test the feasibility of this method on the terrain. A GSSI SIR 3000 with a 270 MHz antenna was used. It proved difficult to distinguish limestone from limestone sediment and was therefore also difficult to measure depths. However, for structures closer to the surface, more positive results may be forthcoming after the data have been processed.

## Conclusion

The two-week survey season has yielded many results, which need to be analysed further. So far, a detailed map of the north-west quarter has been prepared and compared with the geophysical results. On the basis of this analysis, areas of particular interest have been selected for testing by means of sondages in the 2012 season. The combination of architectural, geodetic and geophysical survey proved an excellent way of carrying out a non-invasive assessment of the site and has provided optimal information for preparing future excavations. Even during the survey and subsequent analysis, several structures could be identified which seem promising for future excavation with the aim of examining the settlement history of the north-west quarter of Jarash. Furthermore, structures were also identified which may be able to answer more specific questions, *viz*. the development of the city's water supply system and urban transformations at the end of classical Antiquity.

## Acknowledgements

The directors and team were supported by members of the DoA throughout the season. We would like to thank Acting Director General, Fares A.K. Hmoud, for facilitating our work at Jarash in 2011. We would also like to thank Ahmed Shami and Akram Al- 'Atoum from the Jarash Antiquities Department who supported us both scientifically and logistically. Our residence at the Archaeologists' Camp and the support of Abdel Majjid Mjely – whom we thank – contributed towards the successful outcome of the season. We would also like to thank Jihad Haroun and Khalil Hamdan for friendly and professional advice and guidance. We would like to thank the DoA for its support and good co-operation, which we hope to continue in future. Furthermore, we would like to mention that the German Protestant Institute of Archaeology in 'Ammān has provided

considerable help; in particular we would like to thank Dieter Vieweger, Jutta Häser and Nadia Shuqair. Finally, we would like to thank Louise Blanke, Thomas Lepaon, Jacques Seigne, Alan Walmsley and Thomas Weber for assisting us before, during and after the season.

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# THE FUNERARY TOPOGRAPHY OF PETRA PROJECT (FTPP): PRELIMINARY REPORT ON THE 2010 SEASON

*Lucy Wadeson*

**Introduction: The Topographical Setting of the Tombs at Petra**

Among the monumental rock-cut tombs at Petra, there are 628 recorded façade tombs (Nehmé 2003: 158-160) and six so-called block tombs (*djinn* blocks), which are carved free from the rock on all four sides. The façade tombs at Petra are carved in the sandstone rock-faces of the mountainous terrain surrounding the city **(Fig. 1)**. There are four types of sandstone at Petra, including Smooth, Tear, Honeycomb and ad-Dīsī[1]. The majority of the rock-cut monuments are carved in the Tear sandstone since it is friable and easily carved. Only *ad-Dayr* and part of the *Khaznah* are carved in the harder Honeycomb sandstone, and some of the block tombs and the Obelisk Tomb (Br.[2] 35) are carved in the lighter coloured ad-Dīsī sandstone (Rababeh 2005: 38-39). The latter is found in the higher parts of the city, since it is the topmost layer of the sandstones. The façade tombs tend to take dominating positions in the landscape, either overlooking the city or lining the *wadis* that provide entrance to the city. The block tombs are only found in the *Bāb as-Sīq* necropolis in the east and the area around the Snake Monument in the south (Rās Sulaymān / Wādī ath-Thughra). Notably, these mark important entrances to the city and are located on high ground.

*1. Façade tombs in Wādī Farasa, Petra (L. Wadeson).*

Although the tombs form one huge necropolis encircling the city, they can be roughly divided into smaller cemeteries according to the area in which they are carved. These areas are by no means equal in size or in the nature of their terrain, nor do they have the same number of tombs. The cemeteries traditionally referred to in the literature include: al-Ḥabīs, Wādī Kharrūba, Wādī al-Muʿayṣara West, Wādī al-Muʿayṣara East and Wādī at-Turkmāniyyah in the north; Mughur an-Naṣāra and Wādī al-Maṭāḥa in the north-east; al-Khubthah to the east; the Theatre, Street of Façades, Outer *Sīq*, Bāb as-Sīq and Wādī al-Mudhlim to the south-east; Wādī Farasah and Wādī Rattām in the south; and the Snake Monument / Rās Sulaymān, Wādī ath-Thughra and the base of Umm al-Biyāra to the south-west. The location of the tombs seems to follow the topography and thus the groupings are not exact, with some overlap. However, the divisions are useful for scholarship.

Besides the façade tombs and block tombs, there are more than 730 non-monumental tombs carved vertically down into the rock throughout Petra (Nehmé 2003: 157), especially on the tops of rocky outcrops. The most simple are deep 'pit' graves which descend in levels to receive one or more burials. The larger 'shaft' tombs have a

1. For a summary of the geology of Petra and detailed descriptions of the types of sandstone see Rababeh 2005: 31-39.

2. Br. = Brünnow and von Domaszewski's (1904) numbering of the tombs.

similar appearance to the pit graves on the rock surface. However, these consist of a *ca.* 3 metre deep shaft with toe-holes providing access to a simple underground burial chamber carved either on one or both sides of the shaft.

The tombs are not the only rock-cut monuments carved in the surrounding mountains of Petra. There are rock-cut houses, whose presence among the tombs is a result of the expansion and later contraction of the city (McKenzie 1990: 109), and numerous hydraulic installations for which the Nabataeans were renowned (Diodorus Siculus 19. 94. 6-8; Strabo *Geog*. 16.4.21). However, the most frequently occurring non-funerary structures are those of a religious nature, including high places, altars, votive niches, triclinia, stibadia and cultic chambers. The latter sometimes include decoratively carved façades, such as the Bāb as-Sīq Triclinium (Br. 34), the Lion Chamber (Br. 452), Triclinium Br. 455, *ad-Dayr* (Br. 462), the Carmine Façade (Br. 731) and Br. 846 in Sīq al-Bārid.

Owing to the looting and reuse of the rock-cut monuments throughout the centuries, and the paucity of textual sources relating to them, we lack evidence that would otherwise inform us of the date of their carving and use. Thus, many questions remain unanswered that are related to the development of the cemeteries and the city, the chronological relationship between the different types of tombs, and the sorts of activities that were associated with the monuments and their installations. These issues are currently being tackled by the 'Funerary Topography of Petra Project' (FTPP), which is an extension of the author's doctoral research.

**Background to the FTPP: Previous Research**

The author's doctoral thesis, *The Façade Tombs of Petra: from Exterior to Interior* (University of Oxford, 2010), was based on a detailed and novel study of the interiors of the Nabataean façade tombs at Petra (Wadeson 2010b). Documentation and study of the tomb interiors took place between 2005 and 2007 thanks to the kind support of the late Dr Fawwaz al-Khraysheh and Sulieman Farajat, former inspector of the Petra Archaeological Park. The study was facilitated by the departure of the Bdūl tribe from most of the tombs in the 1980s and the clearance of a number of them in a World Bank-supported project in 2003. The two major aims of this research were to reconstruct the little-known funerary practices and burial customs associated with the façade tombs, and to elucidate the chronological relationship between the different façade types. Besides architectural and spatial analyses of the façade tombs at Petra, which incorporated the little surviving burial and epigraphic evidence, comparative studies were undertaken with the inscribed and dated Nabataean tombs at Madā'in Ṣāliḥ and the monumental rock-cut tombs in Alexandria and Jerusalem.

New insights were gained into the funerary customs associated with the Nabataean façade tombs, their significance and how they were conceptualised. Certain unique aspects of the Nabataean funerary tradition were revealed, such as the form of the burial installations and their use, and the placement of burials both in high places and in feasting areas (Wadeson 2011a: 31-36; 2011b: 1-24). Consequently, it was argued that the funerary practices of the Nabataeans were as characteristic as their architecture, sculpture and religion, indicative of them having a strong cultural identity of their own, despite Hellenistic and Roman cultural influences. Furthermore, no evidence was found to support the previously-proposed idea that the Nabataeans were practising secondary burial (Wadeson 2011a: 35).

A new chronological sequence was proposed for the tombs, in which the larger tombs with a more complex façade type (e.g. Hegr and Double Pylon tombs) tend to occur earlier than their smaller, simpler versions (e.g. Step, Proto-Hegr and Single Pylon tombs) (Wadeson 2010a: 48-69, 51, fig. 2). This contrasts with previous chronologies, which assume an increasing complexity in façade design over time.[3] A detailed examination of the information in the inscriptions on the façade tombs at Madā'in Ṣāliḥ in relation to their façade types and tomb plans revealed the social dynamics influencing the developments in Nabataean funerary architecture. Thus, the largest and earliest tombs (Hegr and Double Pylon types) were commissioned by

3. For example, see Brünnow and von Domaszewski 1904:139-91; Browning 1973: 79; and more recently Netzer 2003: 13-36, 39-45, 46-47.

the wealthy elite of Nabataean society, whereas the later, smaller versions of these tombs (Step, Proto-Hegr, Single Pylon types) were bought 'ready-made' by those of a lesser social and economic status, who often had to share the cost and burial space between families (Wadeson in press; 2010b: chapter 6).

**Aims and Objectives of the FTPP**

In order to complete the study of the façade tombs at Petra, the FTPP was set up to focus on the area outside the façades and the topographical setting of the tombs. Specific aims of the project are:

1. To determine the development of the cemeteries at Petra utilizing the chronological sequence for the different façade types established in the author's doctoral research;
2. To determine to what extent Petra's natural environment played a role in the form, layout and location of the various types of tombs;
3. To ascertain the relationship between the façade tombs and the urban environment, including houses, quarries, religious installations and hydraulic features, in order to shed light on the development and nature of the city.
4. To establish the architectural and chronological relationship between the monumental and non-monumental tombs;
5. To understand the area immediately outside the façade tombs, how it relates to the tomb interiors and how it functioned in the funerary tradition (i.e. to reconstruct funerary practices taking place outside the tombs);
6. To understand the funerary landscape of Petra in its wider regional context through a comparison with other sites with a similar urban character and funerary architecture.

**FTPP Season 1: Fieldwork Strategy**

The first field season of the FTPP involved resurveying all the façade tombs recorded in the author's doctoral research. The cemeteries were surveyed in the following order, based on the maps and numbering of Brünnow and von Domaszewski (1904): Bāb as-Sīq, Wādī al-Mudhlim, Outer *Sīq*, Street of Façades, Theatre, Wādī Farasa, Wādī Rattām, Snake Monument / Rās Sulaymān, Wādī ath-Thughra, base of Umm al-Biyāra, al-Ḥabīs, Wādī Kharrūba, Wādī al-Muʿayṣara West, Wādī al- Muʿayṣara East, Wādī Turkmāniyah, Mughur an-Naṣāra, Wādī al-Maṭāḥa and al-Khubtha. The following new information was recorded and studied during the survey:

1. The spatial relationship between the tombs and other rock-cut structures (of a non-funerary nature) in the vicinity, such as houses, quarries, cisterns and channels;
2. The spatial relationship between the façade tombs and other types of tombs, such as the block tombs and shaft tombs;
3. The relationship between the tombs and the natural environment (such as type and quality of the sandstone, or form of the rock-face and rock outcrops).

In addition, the typology of the façades was rechecked and further examples of relative chronology between individual façade tombs were collected (through spatial analyses of neighbouring tombs). The tombs on Brünnow and von Domaszewski's 1904 maps were colour coded according to their façade type in order to seek any potential relationship between façade type and location. Although the data collected is still under analysis, several preliminary observations can be offered at this stage.

**FTPP Season 1: Preliminary Results**

*Chronology of the Façade tombs*

Among rows of tombs, it was observed that two or three tombs carved side by side might share similar dimensions and decorative details, for example Tombs Br. 67-69 in the Outer *Sīq*, Tombs Br. 101-103 in the Street of the Façades **(Fig. 2)** and Br. 140-143 in the Theatre area. This suggests they may have been carved by the same stonemason / workshop and can be linked chronologically. With the aid of a relational database, similar tombs across different areas are being sought to determine whether they are chronologically related. Combined with the newly proposed chronological sequence for the façade types, this will allow us to establish which cemeteries were being utilised at the same time, and will hopefully provide some clues concerning the development of the Petra necropolis.

*Location of the Façade Tombs and their Typology*

The number of façade tombs documented

*2. Façade tombs Br. 101-103, Street of Façades, Petra (L. Wadeson).*

at Petra according to their location and type are listed in **Table 1**.[4] The areas with the highest number of tombs include Wādī al-Muʿayṣara West, Wādī al-Muʿayṣara East and Wādī Farasa. However, it ought to be remembered that these areas are not equal in size, and in fact the highest concentration of tombs over a small area is found in the Street of Façades. The reason for the low number of façade tombs in the Bāb as-Sīq and around the Snake Monument may be due to the topography, since the ad-Dīsī sandstone is softer in these areas and the small rocky outcrops were perhaps less suitable for carving façades **(Fig. 3)**.

Notably, patterns emerge which suggest

**Table 1:** The number of façade tombs documented by the author at Petra according to façade type and location.

| | Single Pylon | Step | Proto-Hegr | Arch | Simple Classical | Double Pylon | Hegr | Complex Classical | TOTAL |
|---|---|---|---|---|---|---|---|---|---|
| ***Bāb as-Sīq*** | 0 | 0 | 2 | 0 | 0 | 0 | 3 | 0 | **5** |
| **Outer *Sīq*** | 0 | 0 | 1 | 0 | 0 | 10 | 4 | 1 | **16** |
| **Street of Façades** | 13 | 1 | 5 | 1 | 1 | 10 | 1 | 0 | **32** |
| **Theatre** | 12 | 1 | 7 | 3 | 1 | 5 | 1 | 0 | **30** |
| ***al-Khubtha*** | 4 | 0 | 2 | 0 | 0 | 16 | 9 | 4 | **35** |
| ***Wādī Farasa*** | 5 | 0 | 7 | 2 | 4 | 14 | 12 | 4 | **48** |
| ***Wādī Rattām*** | 0 | 0 | 4 | 1 | 0 | 1 | 0 | 0 | **6** |
| **Snake Monument (*Rās Sulaymān*)** | 0 | 0 | 1 | 0 | 0 | 4 | 1 | 0 | **6** |
| ***Wādī ath-Thughra*** | 1 | 2 | 0 | 1 | 1 | 16 | 2 | 0 | **23** |
| ***Umm al-Biyāra*** | 7 | 3 | 1 | 2 | 0 | 13 | 6 | 0 | **32** |
| ***al-Habīs*** | 0 | 0 | 2 | 0 | 2 | 1 | 0 | 0 | **5** |
| ***Wādī Kharrūba*** | 4 | 0 | 6 | 2 | 2 | 2 | 2 | 0 | **18** |
| ***Wādī Muʿayṣara* West** | 38 | 2 | 9 | 9 | 2 | 14 | 4 | 0 | **78** |
| ***Wādī Muʿayṣara* East** | 14 | 5 | 15 | 11 | 0 | 4 | 4 | 0 | **53** |
| ***Wādī Turkumāniyah*** | 0 | 2 | 6 | 2 | 0 | 2 | 5 | 0 | **17** |
| ***Mughur an-Naṣāra*** | 3 | 2 | 16 | 2 | 3 | 5 | 6 | 0 | **37** |
| **TOTAL** | **101** | **18** | **84** | **36** | **16** | **117** | **60** | **9** | **441** |

4. This is based on the total number of façade tombs (441) documented by the author at Petra. Only those tombs that were accessible and had a determinable façade type were documented. The total number recorded by Nehmé (2003: 158-160) is 628.

*3. Rock formation and different sandstones in Rās Sulaymān / Wādī ath-Thughra, Petra (L. Wadeson).*

*4. Façade tombs at the base of al-Khubtha, Petra (L. Wadeson).*

there is a relation between façade type and location. For example, certain areas are dominated by the smaller, simpler Single Pylon, Step and Proto-Hegr tombs such as the Street of Façades and Theatre in the south, and Wādī Mu'ayṣara West and Wādī al-Mu'ayṣara East in the north. Whereas other areas are dominated by the larger, more complex Double Pylon and Hegr tombs, such as the Outer *Sīq*, Wādī Farasah, al-Khubtha and the base of Umm al-Biyāra. This may have some chronological bearing, suggesting some cemeteries are earlier than others. However, this can only be confirmed once the analysis of the data is complete. One difficulty is that the façade types, once introduced, continued to be made. This of course makes the task of examining the development of the cemeteries according to a chronological sequence of façade types more challenging.

Since we know there is a relation between façade type and socio-economic status of the tomb owners (Negev 1976: 219, 235; Wadeson in press), it may also be the case that certain areas of the city were more prestigious for tomb-carving, perhaps because of their visibility in the landscape, for example al-Khubtha **(Fig. 4)**. Notably, several of the smaller, simpler façade tombs are carved in less visible positions than their larger counterparts, such as in narrow gorges (Tombs Br. 124-129, south of the Street of Façades) **(Fig. 5)** and isolated areas with little or no visibility from the city centre or major routes into the city (Tombs Br. 295 - 297 in Wādī Rattām). Some of these types of façade tombs are even cut into quarries, such as Tombs Br. 394a, 528, 594a - b and 624, which had the advantage of previously worked rock surfaces and may thus have been a cheaper location. The latter is also a useful example of relative chronology between the quarries and certain tombs.

*5. Façade tombs Br. 124 - 129 in a narrow gorge to the south of the Street of Façades, Petra (L. Wadeson).*

However, one of the major and certain factors influencing the location of the tombs was the natural topography, including the morphology and geology of the rock. This also played a

large role in the form of certain tomb types, as the examples discussed below attest.

*The Effect of Topography on the Form and Location of the Tombs*

It has previously been argued how the physical setting and resources of Petra were closely related to carving and construction techniques and thus architectural style, which resulted in the distinctive appearance of Nabataean monuments (Rababeh 2005: 223-227; Bessac 2007: 141). The results of the first season of fieldwork for the FTPP can now demonstrate the close relationship between the natural environment and the form, layout and location of the different types of tombs.

Most of the tombs are carved in the Tear sandstone because it is friable, easily worked and found in prominent locations within the city. However, *ad-Dayr* and part of the *Khaznah* are carved in the harder Honeycomb sandstone, which is why they are well preserved (Rababeh 2005: 30). This is unsurprising given the quality of carving, size and decoration of these two famed monuments. Pflüger has noted how the larger and more elaborate façade tombs tend to be carved in the better quality sandstone, even if this meant they were less prominent in the landscape (1995: 285-287). Size and decoration were clearly not the only concerns of the elite owners of these tombs (McKenzie 1990: 115), but also the quality of the rock. However, in contrast to this, Pflüger observes how the prominent position of the monumental Palace Tomb, Corinthian Tomb and Urn Tomb ('Royal' tombs) overlooking the city centre took priority over the poorer quality sandstone at the base of al-Khubtha (1995: 285-287) **(Fig. 4)**. The Nabataeans attempted to protect these elaborate façades from erosion by diverting run-off water away from them and setting them back into the rock, but the crumbly Tear sandstone has not fared well over the centuries (Pflüger 1995: 285-286).

Notably, the block tombs (with all four sides carved free from the rock) are only carved in the lighter-coloured ad-Dīsī and Honeycomb sandstones, which are located in the higher parts of Petra **(Fig. 6)**. These include Tombs Br. 7, 8, 9 and 30 in Bāb as-Sīq and Tombs Br. 303 and 307 by the Snake Monument. The ad-Dīsī sandstone is in fact the topmost layer of the stones. The formation of the rock in these areas is significantly different from the high cliffs closer to the city centre, since it is naturally shaped into small, rounded outcrops, which have been likened to the shape of an elephant's head (Rababeh 2005: 37) **(Fig. 3)**. There are few façade tombs in these areas, since the form of the rock was perhaps less suitable for façade carving, which ideally requires a taller, more vertical surface. Rather, the rock in these high parts of the city lends itself to a four-sided monument which follows the shape

*6. Block tombs Br. 7 and 9 in Bāb as-Sīq, Petra (L. Wadeson).*

of the outcrop and has ease of accessibility. This may explain why the block tombs are carved on all four sides (Wadeson 2012). It is also notable that they are located at important entrances to the city (Browning 1973: 181; Mouton 2006: 96; 2010: 278), such as Bāb as-Sīq and by the Snake Monument, which are naturally on higher ground, as they may have had a protective role or acted as territorial markers.

The clever use of the landscape in locating and carving different types of tombs reveals the ingenuity and creativity of the architects and stonemasons, as well as their familiarity with the geological environment in which they lived and worked. The relation between the topography and the layout of the tomb complexes at Petra is also observable, but a detailed study of this is reserved for the second season of fieldwork, when the tomb complexes will be recorded and examined. Besides shedding light on the significant role that the physical environment of Petra played in the form, layout and location of the tombs, the study of their topographical setting has also allowed some new observations on the architectural and chronological relationship between different types of tombs.

*The Relationship Between Different Types of Tombs*

Several non-monumental tombs, such as the pit graves and shaft tombs, were in use at the same time as the façade tombs (1st century BC - 2nd century AD), such as the 1st century AD North Ridge Shaft Tombs 1 and 2 (Bikai and Perry 2001: 59-78), and the pit graves in the Soldier Tomb Complex (Schmid and Barmasse 2006: 220-227). However, it has not been determined whether the non-monumental tombs predate the façade tombs in their introduction. Isabelle Sachet's excavation of the shaft tomb behind block Tomb Br. 303 revealed that it may have been in use since the end of the 2nd century BC, based on the discovery of Hellenistic *unguentaria* (2009: 100-102). This is considerably earlier than the earliest dated façade tombs (Tombs 62D and 62E beneath the *Khaznah*) which have a *terminus ante quem* of 50 BC (Wadeson 2010a: 54, table 3; Farajat and Nawafleh 2005: 380, 386, 388).

Other evidence may suggest that shaft tombs were in use before façade tombs at Petra.[5] This concerns eleven shaft tombs that were converted into façade tombs at a later period. These include Tombs Br. 262, 361B, 540, 542, 543, 669, 672, 685, 690, 691 and 693. They are mostly found in the areas of Wādī al-Muʿayṣara and Mughur an-Naṣārā in the north, where the rocky outcrops with their multiple levels were favourable for adding façades on the next level down from the shaft entrance (Wadeson 2012: 113-117). It is clear that the façades were added subsequently since (1) they are not well-aligned with the shaft tomb chambers, (2) an intermediary corridor (deep threshold) or small chamber is often added to connect to the larger shaft tomb chamber (i.e. there is no normal façade tomb chamber) and (3) there is a difference in tooling **(Fig. 7)**. In the case of Tomb Br. 542, the original ground level of the shaft tomb chamber was lowered to meet the level of the façade entrance. This is indicated by the remains of the original floor level on the walls

It is not likely that the façades were carved without knowledge that a shaft tomb already existed in the rock behind, as Kennedy suggests (1925: 40), especially since the shaft entrance would have been visible to the stonemasons as they carved the façade. It seems that the stonemasons attempted to join the chambers, perhaps with the aim of monumentalising the pre-existing simple tomb with a decorative façade. It ought to be remembered that an older tomb was being reused, perhaps by the descendents of the family that originally owned the tomb who could

*7. A view into Tomb Br. 540 through the façade entrance (note shaft entrance and chamber at the back), Wādī al-Muʿayṣara West, Petra (L. Wadeson).*

5. The idea of shaft tombs predating façade tombs was suggested by Murray & Ellis (1940: 28-29) in relation to their observation of two shaft tombs with façades in Mughur an-Naṣāra and above Wādī Abū ʿUllayqah.

not afford to build an entirely new façade tomb. The conversion of these shaft tombs seems to have been aimed at 'upgrading' them in terms of decoration and monumentality, rather than providing additional burial space.

Finally, we may turn to the chronological relationship between block tombs and façade tombs. Recent studies and excavations have concluded that the block tombs may be the earliest group of monumental tombs at Petra, perhaps carved at the end of the 2nd century BC (Mouton 1997: 81-98; 2006: 79-119; 2010: 275-287; Sachet 2009: 100-102). Besides these tombs, carved free from the rock on all four sides, there are several others that take the form of both block tombs and façade tombs. More specifically, one side of the tomb is still attached to the rock while the others are free, for example Tomb Br. 824 **(Fig. 8)**, or only the top half of the tomb is carved free on all four sides, such as Tomb Br. 270 (Wadeson 2011b: 20, fig. 10a). This technique provides space for a larger burial chamber than is possible for the block tombs, while still keeping a degree of monumentality.

Such tombs may in fact be an intermediary type between the block tombs and the façade tombs (Mouton 2006: 87; Wadeson 2012: 117-121). Certain examples can be shown to predate the façade tombs carved around them. Tomb Br. 824 is earlier than the façade Tomb Br. 825 carved behind it, because if the latter was carved first, the uncarved rock into which Tomb Br. 824 was carved would have completely blocked the visibility of Tomb Br. 825 **(Fig. 8)**. It is uncommon for a Hegr façade tomb to be carved behind a rock or in a position where it cannot be seen. The same argument applies to Tomb Br. 70 which has three sides carved free from the rock and, if uncarved before the façade tombs either side, the rock would have partly concealed their view.

It ought to be emphasised here that the block tombs and semi-block tombs are typically decorated with two rows of crowsteps (the top one often freestanding) which is equivalent to the Double Pylon type of façade design (Wadeson 2010a: 51, fig. 2) **(Figs. 2, 8)**. The presence of this type of decoration on these supposedly early tombs supports the argument that the Double Pylon façade tombs were one of the earliest types to be introduced at Petra (Wadeson 2010a: 67). These observations lead us to question of whether the façade tombs should be considered as a simplified and abstract form of the block tombs.

**Conclusions**

Although the analysis of the data collected during the first field season of the FTPP is still in progress, preliminary results are already shedding new light on Petra's funerary landscape. Patterns have emerged which suggest a notable

*8. Tomb Br. 824 (left) and Tomb Br. 825 (right), Outer Sīq, Petra (L. Wadeson).*

relation between the façade type of a tomb and its location. Chronological and / or economic reasons for this have been proposed, but one of the dominating factors influencing the location of different types of façade tombs, and different types of tombs in general, appears to be the geological and geographical characteristics of the site. This demonstrates the familiarity that the stonemasons had with their environment. By studying the funerary monuments in their natural and urban landscape, it has also been possible to interpret the architectural and chronological relationships between different types of tombs. Thus, new evidence supports the early dating of the block and semi-block monuments and is beginning to elucidate the development of monumental funerary architecture at Petra. The second season of fieldwork for the FTPP will focus on documenting and examining the installations found outside the façade tombs and the layout and function of these so-called tomb complexes.

**Acknowledgements**

The first field season of the 'Funerary Topography of Petra Project' (FTPP) took place between 3 and 26 May 2010. It was kindly funded by the Wainwright Fund (University of Oxford) and supported by the Council for British Research in the Levant (CBRL) through a Junior Visiting Fellowship. I would like to thank the former Director General of the Department of Antiquities of the Hashemite Kingdom of Jordan, the late Dr Fawwaz al-Khraysheh, for granting permission to work in Petra and also the director of the Petra Archaeological Park, Dr Emad Hijazeen, for his support of the project. Furthermore, Dr Zeyad al-Salameen (al-Hussein Bin Talal University) was extremely helpful in logistical matters, such as equipment and accommodation. I would also like to express my gratitude to staff at the Petra Museum, including Morad Nawafleh, Ashraf Hamadeen and Anas Tweissi, for arranging transport and generally offering their support, as well as to staff at the Petra Archaeological Park and the College of Tourism. The FTPP team included myself (director; Oxford / CBRL) and Fiona Hopkins (assistant; BSc Canterbury). Mouhanna al-Bdool and Fadia Saleem were also of assistance on separate occasions.

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# THE TALL ZAR‘Ā AND GADARA REGIONAL PROJECT 2009 - 2011

*Jutta Häser and Dieter Vieweger*

**Introduction**

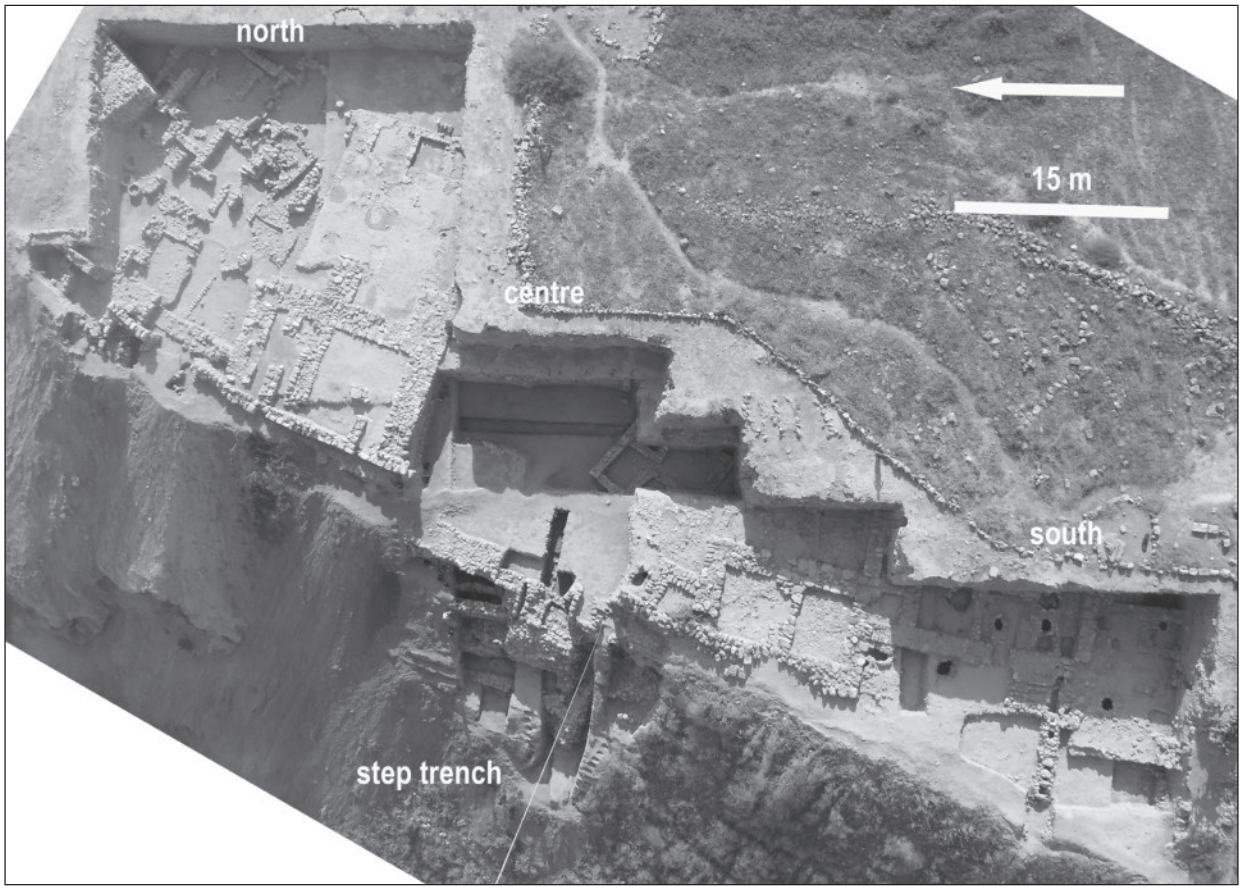
The ‘Gadara Regional Project’ was initiated by Dieter Vieweger in 2001. Since 2004 it has been a joint project of the Biblical Archaeological Institute and the German Protestant Institute of Archaeology under the direction of Dieter Vieweger and Jutta Häser. Yearly excavations at Tall Zar‘ā, the most interesting site in the area, have brought an uninterrupted sequence of settlements from the Early Bronze Age to the Umayyad period to light (Vieweger and Häser 2008: 375-395). Three seasons were carried out between 2009 and 2011. During these seasons, excavations continued at Tall Zar‘ā (**Fig. 1**). Additionally, surveys were carried out in Wādī al-‘Arab and Wādī az-Zaḥar during the summer seasons between 2009 and 2011.

**Area I**

Excavation Area I is located on the north-western slope of Tall Zar‘ā. By the end of the 2008 season, an area of 1,150m$^2$ had been excavated. In 2009, Area I was enlarged and divided into four sections: *viz*. the step trench and the southern, central and northern parts. The northern part was opened during the 2009 season. It measures 600m$^2$ and covers squares AP-AT 118-123 (**Fig. 2**).

By the end of the 2008 season, the southern and central parts of Area I had been excavated to the earliest Late Bronze Age stratum 11 (*ca.* -22.90m). This exposed a ground-plan of impressive Late Bronze Age architecture, with a casemate city wall, tower, some courtyard houses and two very large houses (Vieweger and Häser 2008: fig. 7). The area was extended to the north because some extraordinary finds were discovered in the monumental house at its northern end (Vieweger and Häser 2008: fig. 7, squares AP-AR 118-120). It was assumed that this building had a special function. This part of Area I was excavated from 2009 to 2011. It


*1. Overview of Tall Zar‘ā from the west.*




*2. Aerial view of Area I from the west at the end of the summer 2011.*

yielded a continuous stratigraphic sequence dating from the Umayyad period back to the Late / Middle Bronze Age.

In the central part of Area I, the Late Bronze Age casemate wall and two courtyard houses were removed to investigate the Middle and Early Bronze Age strata. This work was carried between 2009 and 2011. The earliest strata, 20 and 19 (reached in 2011), date to the Early Bronze III period.

The step trench below the central part of Area I, which was opened in the 2004 season and had already revealed an Early Bronze Age city wall and additional glacis, was excavated further in 2010 and 2011. One of the aims of these seasons was to see if traces of a Middle Bronze Age city wall existed in this part of the site. Another aim was to establish the stratigraphic relationship between the Early Bronze Age defensive structures and the deep-cut channel of the overlying levels.

There were no excavations in the southern part of Area I during the 2009 season, but they resumed in 2010. Parts of the Late Bronze Age city wall and large southern building were removed to the lowest level of their stone foundations. It was demonstrated that all structures of the latest Late Bronze Age stratum were erected on top of several metres of backfill on the western slope of the *tall* (see below). This was the reason for halting the excavations in this part of Area I.

*Early Bronze Age*

During the survey of the *tall*, a high concentration of Early Bronze Age finds were found on the north-western slope of the hill. Considerable architectural remains were therefore expected in this area. The excavations have confirmed this assumption. Part of an Early Bronze Age city wall and glacis were revealed in the step trench in the central part of Area I. Both the remains of this fortification and their absolute elevation were of interest. They start at a level of -26.35m, i.e. 9.32m below the earliest stratum which can be dated to the Umayyad period. This fortification was investigated to

a depth of -31.40m, i.e. 14.17m below the Umayyad stratum. The base of the foundations is expected to be at around 33m below sea level. The cultural layers therefore have a depth of 16m. For the time being, it cannot be determined if the Early Bronze Age city wall was connected to the architectural phases which have so far been excavated. It has to be assumed that it was associated with an earlier Bronze Age settlement phase.

The Early Bronze Age city wall was cut by a channel which ran 5m directly down from the latest Late Bronze Age stratum, *viz*. 11, and turned at a right angle to the slope at a depth of -31.20m (**Fig. 3**). The construction of the channel was associated with stratum 12 (backfill; reconstruction phase); it was re-used in stratum 11, i.e. Late Bronze Age II.

All other Early Bronze Age remains were excavated in the central part of Area I (AL-AO 118-119) during 2010 and 2011 (**Fig. 4** [stratum 20]; **Fig. 5** [stratum 19]). During the summer 2010 season, the upper level of the transitional period (Early Bronze Age IV / Middle Bronze Age I) was reached. In spring 2011, two strata with fireplaces, pits, floors and simple stone walls were discovered (strata 17 and 18). The finds demonstrate that this area was used for domestic purposes, such as cooking and storage. Below these two strata two Early Bronze Age III strata were excavated, revealing the remains of substantial walls belonging to a house with at least two rooms (strata 19 and 20) (**Fig. 6**).


*3. Outlet of Late Bronze Age channel which cut through the Early Bronze Age fortifications.*

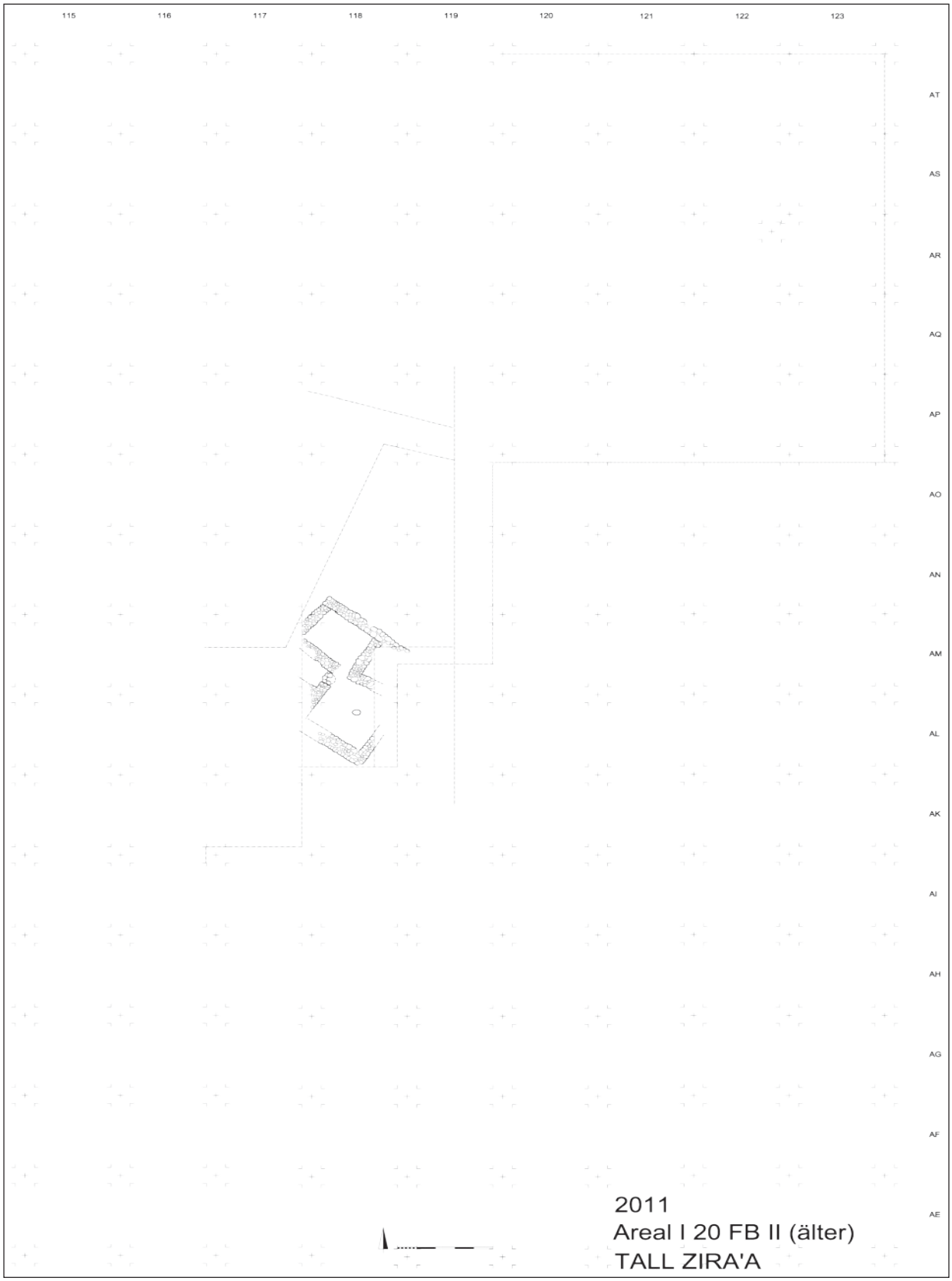
The excavation area associated with the Early Bronze Age remains is very small, so interpretations can only be preliminary. However, the finds confirm a general picture of the transition from the Early to Middle Bronze Age, which is marked by a sharp decline in the city's material culture.

*Middle Bronze Age*

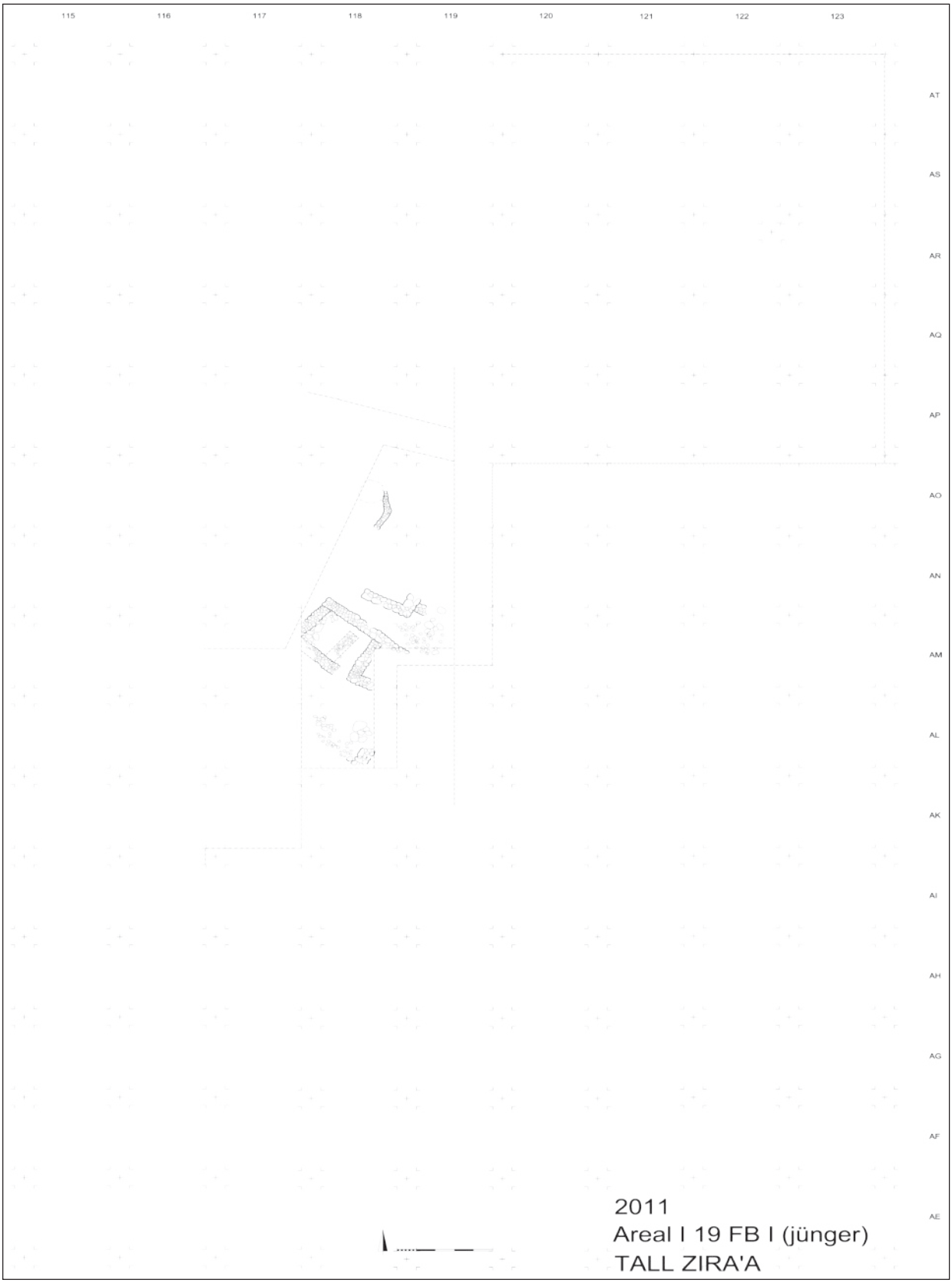
Although there was a remarkable change in settlement activities from the Early to Middle Bronze Age, the stratigraphic sequence continues without a break. Above the Early Bronze Age IV / Middle Bronze Age I strata (18 and 17), three strata of Middle Bronze Age date were excavated in the squares AL 118, AM 118, AM 119, AO 118 and AO 119 (strata 16, 15 and 14). The elevations of the strata were -25.40m, -26.05m and -26.35m. The remains of the Middle Bronze Age consist of the stone foundations of domestic buildings. On the western side they were truncated by the catastrophic landslide (see below). Therefore, the layout of the houses cannot be determined.

Middle Bronze Age stratum 16 was characterised by domestic activities with large storage facilities. In the next Middle Bronze Age stratum, *viz*. 15, a crucible with the remains of bronze was discovered which suggests that bronze or copper working took place in that area. Middle Bronze Age stratum 14 was again marked by domestic activities. Particularly interesting is the continuity of stone-built ovens, associated with smelting activities, which were constructed in the same spot during the Late Bronze Age and Middle Bronze Age (**Fig. 7**). The finds consisted of pottery sherds, grinding stones, mortars, flint tools and small fragments of bronze / copper.

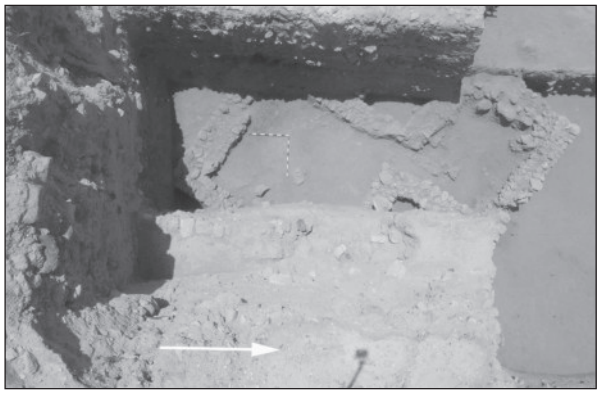
In conclusion, the assumption that there was



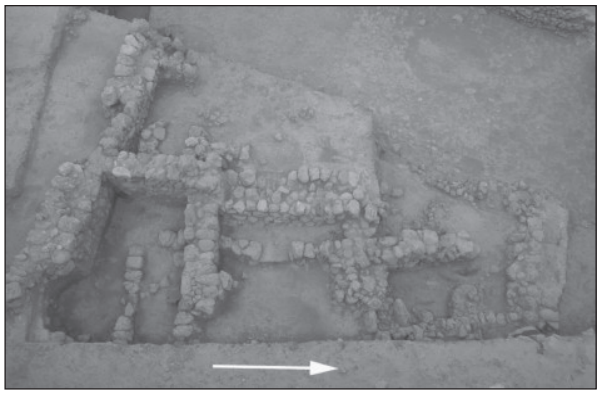

*4. Plan of Early Bronze Age stratum 19 (2011) (drawing Marianne Vogt-Werling).*




*5. Plan of Early Bronze Age stratum 20 (2011) (drawing Marianne Vogt-Werling).*



*6. View of the Early Bronze Age architectural remains of stratum 20 from the east.*



*7. Architectural remains of the Middle and Late Bronze Age strata in the central part of Area I.*

no break between the Middle and Late Bronze Age, but merely continuous cultural change, can be strengthened. It is particularly visible in architecture and handicrafts. No trace of the Middle Bronze Age city wall was discovered in this part of the excavation, unlike the situation in other cities of comparable size. Possibly it also collapsed as a result of the catastrophic landslide during the Late Bronze Age.

*Late Bronze Age*

Late Bronze Age stratum 13 followed the earliest Middle Bronze Age stratum 14 without any hiatus in the settlement sequence in the central part of Area I (AL 118, AM 118, AM 119, AO 118 and AO 119) (**Fig. 7**). The remains consisted of two houses which were truncated by the later landslide, just like the earlier buildings of the Middle Bronze Age. This landslide happened around 1,400 BC. The actual cause is difficult to determine. It might have been caused by an earthquake, by the collapse of one of the many caves in the sinter of the *tall*, by slope wash or, indeed, by a combination of different factors. The archaeological finds show that the inhabitants had many problems with the drainage of surface water. Therefore, they built several large channels to drain water to the edge of the slope. During the excavations between 2008 and 2011, it was discovered that this landslide affected at least 1500m$^2$ of the Late Bronze Age settlement, i.e. almost all of Area I. Only some squares in the north and central parts of Area I were unaffected. The eroded part of the slope was evidently important enough to the inhabitants of the Late Bronze Age city for them to rebuild the area by backfilling with soil layers 30-45cm deep, each covered by a stone pavement. This operation was carefully carried out at least ten times. In the central part, backfill of 4.50m depth could be demonstrated. These layers were strengthened by a stone wall on the edge of the slope. More than 75% of the pottery in the backfill was of Early Bronze Age date. This could mean that it was carried from the bottom to the top of the hill. The city wall, tower, large houses and most of the courtyard houses were erected on top of this back-fill. The city wall was constructed along with the retaining wall of the layers of back-fill.

The fact that a *ṭābūn* was found in one of the stone pavement layers showed that the backfill was created not in a single year, but over a longer period of time – no doubt to allow for compaction of the soil and stone layers. A channel which drained to a straight shaft in the upper-most layer is evidence of the need to drain surface water to the edge of the hill. Another channel was cut straight through the older Early Bronze Age fortifications (see above).

Even after this intensive rebuilding operation, the plot boundaries did not change very much. The outer walls of two of the houses, which were excavated in the central part of Area I, were rebuilt in the same place and the layout of the houses was very similar to that of their predecessors. In addition, a stone-built oven was constructed in the same spot as before.

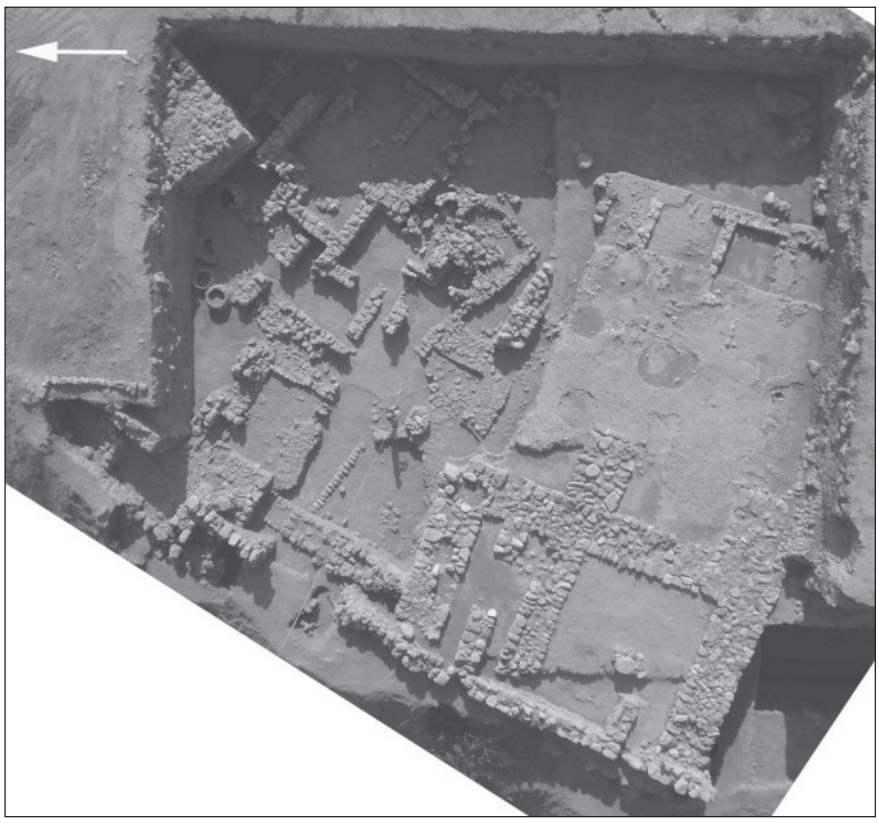
All buildings of the latest Late Bronze Age stratum, *viz*. 11, were constructed on top of the back-fill, except the houses north of the monumental building in the central part (which was not affected by the landslide) and in the northern part of Area I (**Fig. 8**). In these areas,

the transition from the Middle to Late Bronze Age could be examined. In the northern area, the excavations stopped at this transition in summer 2011.

Unlike the Early, Middle and earlier Late Bronze Age strata, the latest Late Bronze Age stratum, *viz*. 11, was completely excavated in Area I (1,750m$^2$). Therefore, the architectural remains provide a good impression of the city's layout in the 14th-13th century BC. The most prominent structure is the casemate wall which fortified the city on its north-western side (**Fig. 8**). According to the radiocarbon dates, it dates to between 1,450 and 1,300 BC. This wall, the adjacent tower (with a small sanctuary) and the small gateway, as well as the courtyard houses in the central part of Area I, have been discussed elsewhere (Vieweger and Häser 2008: 379-384).

Two monumental buildings were found in the north and south parts of Area I. Their 3 m wide walls suggest that they had three floors. The southern monumental building, situated in squares AE-AF 114-116 consisted of several rooms which were re-designed four times. This has not been observed in other buildings of this stratum. None of the rooms could be identified as a courtyard. A fireplace in AE 116 and the silo in AE 114-115 were both carefully constructed. In AE 115, the remains of a mud-brick wall on top of its stone foundations was still standing to a height of about 1m and was plastered with lime on both sides. This is rarely seen in other parts of the excavation. The 2m wide outer wall of this large building was used as a southern extension of the city wall. Directly to the north of this large building, a 10m long and 2m wide covered water channel with vertical shafts for maintenance was found. It was used to drain surface water to the edge of the slope.

The northern monumental building was partly uncovered in 2006. Only the stone foundations of its southern wall were visible. An adjacent room to the north yielded 23 cylinder seals in an area of only 1.5mx1.5m, as well as a silver pendant (Vieweger and Häser 2008: fig. 8) and a scarab with the cartouche of Amenophis III (Vieweger and Häser 2008: fig. 9). During subsequent excavations it turned out that this building (AR 119-120) consisted of a large room and stairway to the north **(Fig. 8)**. Several pieces of quarz-frit inlay for furniture or boxes were discovered in the foundations of the staircase.



*8. Architectural remains of the latest Late Bronze Age stratum in the northern part of Area I.*

Unfortunately, these foundations were heavily disturbed by pits which were cut into the ground by the Iron Age I inhabitants. To the west, i.e. at the edge of the slope, a large Roman-period pit disturbed the earlier layers.

The excavations between 2009 and 2011 revealed the entire extent of this monumental building. It appears that three antae were built against the eastern wall. In front of them, a large and carefully paved courtyard was laid out. The eastern edge of this courtyard consisted of several small rooms. The northern outer wall could only be identified by its negative outline, i.e. the foundation trench and northern limit of the courtyard pavement, as the inhabitants of the Iron Age I settlement used the stones of this wall for their own buildings. The remarkably thin wall on the western side of the building might be explained by the realization on the part of the builders of this structure that they should not put too much load on the back-fill at the outer edge of the hill. Several more cylinder seals were found in the area of this building. Owing to the finds and construction, it can be assumed that this building had a special function in the Late Bronze Age city. It might have been a temple or an administrative building. Particularly notable are finds of the raw material and products of glass and faience processing.

In 2011, the excavations demonstrated that the entire building was founded on the back-filled hill. In contrast, the houses north of this monumental building were not affected by the landslide, as no back-fill was visible in this part of Area I. There is no observable change between the architecture of Late Bronze Age stratum 13 and that post-dating the reconstructions of stratum 12. This means that in this part of Area I, stratum 13 and stratum 11 are the same. In summer 2011, the relationship between the city wall and domestic architecture was clarified. The unique situation of this area made it possible to observe the transition from the Middle to the Late Bronze Age settlement.

The most interesting find in this part of Area I was a votive ceramic plate (TZ 18181; **Fig. 9**) depicting a man in an attitude of combat. Five heads are shown around him. The figure is worked in relief whereas the heads were scratched into the surface. We may be dealing with a king or a god who is surrounded by the heads of killed enemies. There is no parallel for this plate in the Near East, but the subject fits well with the depiction of kings with their slain or captured enemies.

*9. Votive ceramic plate with a depiction of a standing man in relief and five incised male heads (drawing Ernst Brückelmann).*

*Iron Age I*

The cultural change after the decline of the Late Bronze Age city-states is obvious at Tall Zarʻā. The rejuvenation of the settlement on the *tall* during Iron Age I demonstrates new features as well as the continuation of traditions from the Late Bronze Age. The Late Bronze Age city on Tall Zarʻā (stratum 11) was destroyed around 1,200 BC. The reason is not apparent from the results of the excavation. It could have been an earthquake, local catastrophe, battle or similar. Especially striking is the fact that the inhabitants of the Early Iron Age settlement (stratum 10) did not create a new layout for the settlement, but

used the remains of the Late Bronze Age city instead. What remained of the stone foundations of the city wall were used for large silos (e.g. in AK 116, AL 118, AM 116-117, AN 117, AO 117 and AP 117) and hovels (AL 117-118, AN-AO 118-119 and AN 117-118). It has therefore been assumed that the Iron Age I inhabitants could still see and use the ruins of the Late Bronze Age city. However, the city wall itself was not rebuilt. The central part of Area I might be interpreted as an area used for agricultural tasks, with storage facilities, working and habitation areas. This would fit well with traditional perspectives on the beginning of the period during which the Israelites and Judaeans established settlements in the highlands west of the Jordan River.

However, a completely different picture arises from discoveries in the southern part of Area I (AE-AI 115-116 and AI 117) at Tall Zar'ā. In AE 118, a double building with carefully laid stone foundations was built on top of the ruins of the Late Bronze Age house. A large oven with several layers of clay, lime and pottery sherds was constructed in the middle of the house. This building clearly shows a continuation of the Late Bronze Age courtyard house during the Iron Age I period.

The entrance to the northern house was carefully paved (AI 116). The door socket was still *in situ*. The layout of the northern house was that of a courtyard building with a large water jar, *ṭābūn* and grinding installation in the south-western corner of the courtyard (AG-AH 116). The courtyard of the southern house could only be partly excavated. In addition to the abovementioned large oven, a large water basin was also installed there (AE 116). These two houses might have been used for administrative purposes or could have belonged to a high-ranking individual. However, this interpretation requires further analysis of room contents.

The two large storage silos in the northern and southern houses (AG 115-116 and AE 116) are most impressive in comparison to their counterparts in the central part of Area I. Unlike the simple stone-lined pits in AK 116, AM 117, AN 117 + 118 and AO 117-118, these large silos were built with mud-bricks and had a capacity of about 10m$^3$. Owing to their depth, they cut deeply into the Late Bronze Age levels. A *Götterhaus* ("window pot") was found within the silo in the southern house.

There is another large building in the north of Area I which can be dated to Iron Age I (AP-AQ 118-120). However, this displays characteristics of the new (so-called) four-room house, having a large courtyard with long, narrow rooms along the sides. The main room in AQ 120 is especially well-preserved. Here, raw glass and the remnants of glass processing were found. It can therefore be assumed that this house included a workplace for glass processing (**Fig. 10**). This seemingly demonstrates a continuity of glass processing in

*10. Architectural remains of Iron Age I stratum 10 above the Late Bronze Age monumental structure (stratum 11) in the northern part of Area I.*

almost the same spot from the Late Bronze Age to Iron Age II

Other houses were excavated north of the Iron Age I four-room house. These were heavily disturbed by subsequent building activities. Two radiocarbon dates from Iron Age I stratum 10 yielded dates of 1,220-970 BC and 1,270-1,040 BC respectively. Significant finds include a miniature silver vessel (TZ 12479), a bronze vessel (TZ 7082) and a near-complete kernos (TZ 2939). Two aniconic, well-cut cultic stones were found close to the glass-working area. They provide insight into the religious life of Tall Zarʻā during the Iron Age I period.

*Iron Age II*

The settlement at Tall Zarʻā became more consolidated again around 1,000 BC (stratum 9). However, it never reached the high quality of the Late Bronze Age city. Owing to the nature of the Iron Age IIA-B (10th-8th centuries BC) architectural remains, it is assumed that the population had risen. Fortifications were again built in the form of a zig-zag line shaped by the outer walls of the buildings. This cannot be compared with the high standard of the Late Bronze Age casemate wall.

An earthquake or attack was probably the reason for the destruction of some parts of the settlement. Several buildings clearly show two building phases. If the settlement had been attacked, this military conflict might have been associated with the Israelite - Aramaic battles documented in the Book of Kings or in the Tel Dan inscription. Since there were some alterations in the ground plans of houses after the rebuilding, the settlement architecture has been divided into two phases (stratum 9A [Iron Age II earlier phase; **Fig. 11**]; stratum 9B [Iron Age IIB later phase; **Fig. 12**]).

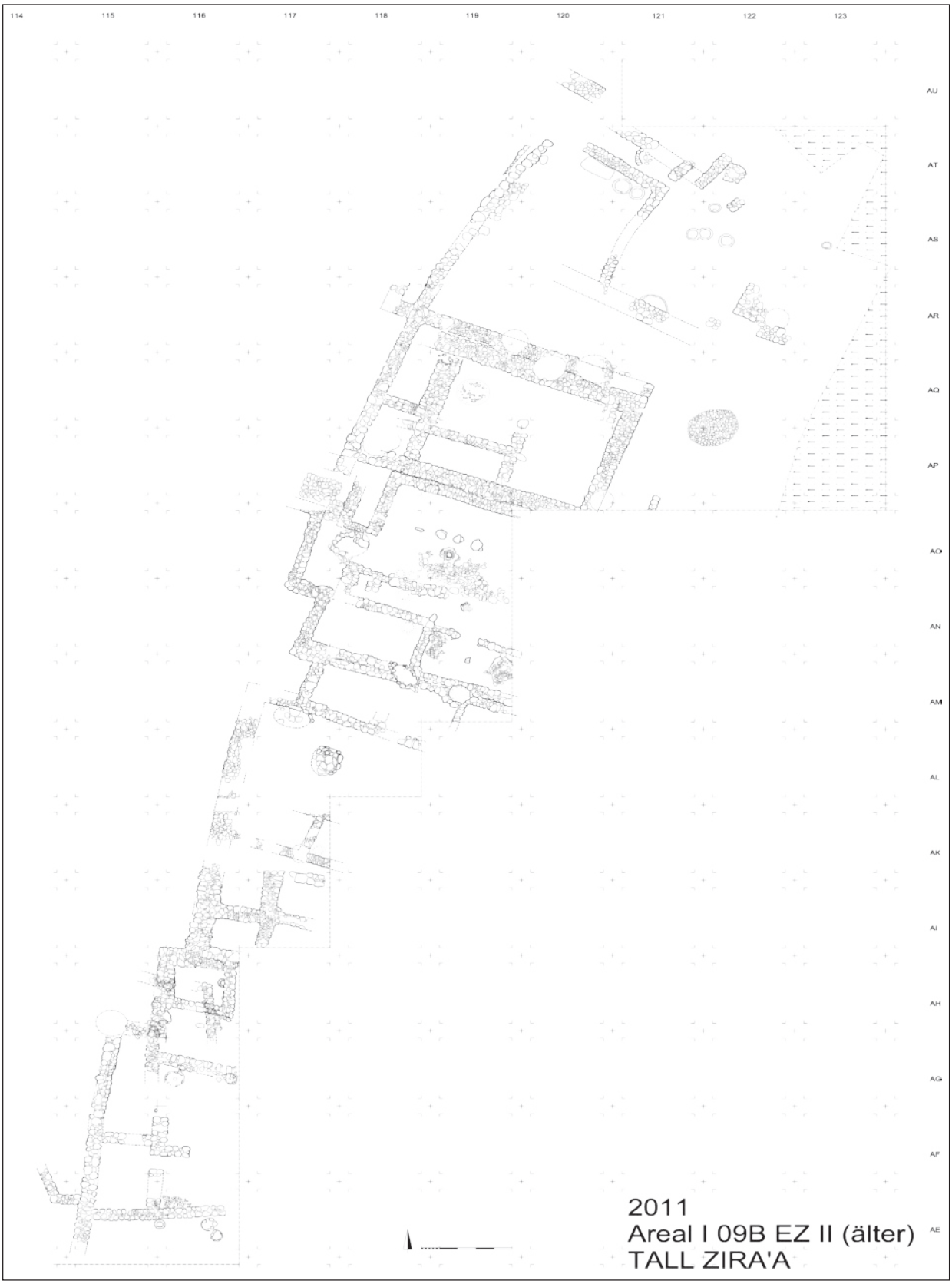
Generally, the architecture of the Iron Age II period seems to be a dense juxtaposition of domestic and public buildings (AI-AL 116-119) constructed with an agglomerative building technique. Double walls in AR-AQ 119-120, AP 118-120, AM-AN 117-118 and AH-AI 116 marked the limits of property and helped to differentiate several houses. In the areas with agglomerated buildings, the outer walls of the houses have created a zig-zag city wall. In contrast, the outer walls of the central part of this settlement were thicker and ran straight. The quadrangular building in AH 116, especially in AI-AK 116-117, can be interpreted as towers; it could not be determined if there was a gate between these towers.

For the earlier Iron Age II period, the house in squares AP-AR 118-120 in the north of Area I is especially well-preserved **(Fig. 11)**. The western part of the house has the characteristics of a four-room-house. The room at the rear (AP-AQ 118) was oriented to the zig-zag city wall. A large and carefully constructed fireplace was found in the centre of the courtyard. Inside this house – or at least in its vicinity – glass-processing activities were carried out. This assumption was underlined by the discovery of a so-called 'industrial pot' (**Fig. 13**) and raw glass (**Fig. 14**). A well-cut stone table was also found in the same context.

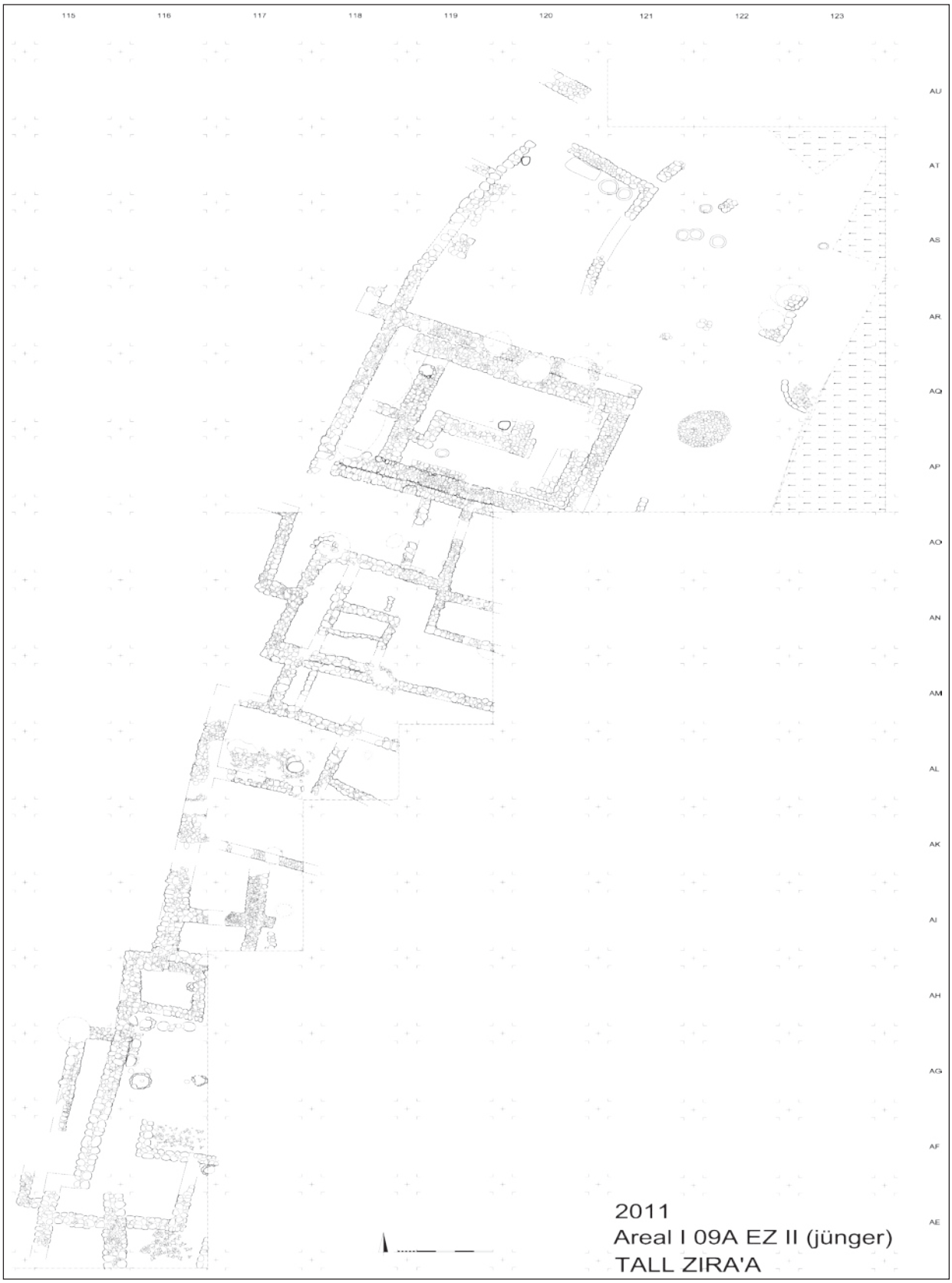
Another building was located directly south of this house and had similar architectural features. Four *ṭābūns* and a furnace with a crucible, a carefully built fireplace and a large storage vessel in the courtyard are amongst the remarkable finds of this house. The storage jar was situated close to three pillar bases and a cultic stone which were built in one row and found *in situ*. A radiocarbon date from the destruction layer in the room in square AO 118 yielded a date of 1,270-980 BC.

The proposed gateway (AM 118-119), a public area for the storage of oil and other staples (AI-AL 116-119), and other domestic structures (AE-AH 115-116) were found to the south. The most interesting finds of the earlier phase of Iron Age II are a cylinder seal, a bronze figurine of the god El plated with gold and silver (Vieweger and Häser 2008: fig. 17) and the head of a terracotta figurine (TZ 8349; **Fig. 15**).

The architecture of the later Iron Age II period (9th-8th centuries BC) is marked by alterations to many of the houses (**Fig. 12**). However, neither the zig-zag city wall nor the agglomerative building technique were changed. Three houses were identified in the southern and central parts of Area I. The possible public building in the center of Area I was altered, insofar as the large silo was covered with a large stone as it went out of use. The area around this big stone was paved and used as a courtyard. A radiocarbon sample gave a date of 1,120 to 900




*11. Plan of Iron Age II stratum 9A (later phase) (2011) (drawing Marianne Vogt-Werling).*




*12. Plan of the Iron Age II stratum 9B (earlier phase) (2011) (drawing Marianne Vogt-Werling).*

*13. So-called 'industrial pot' found in the Iron Age II stratum.*


*14. Raw glass found in the Iron Age II stratum.*

BC.

The house to the north was divided into two sections: A and B. Section B was accessed by a large courtyard in AM-AN 119, with a broad room adjacent to the north directly connected to the city wall. To the south, there were two long rooms. The eastern one was divided into two parts. Section A consisted of at least one large room which also had a dividing wall. The western wall of this room was identical to the zig-zag city wall. Most probably, only the narrow eastern part of this room was roofed. The entrance to the house was situated to the east, connected with a courtyard or another room.

Squares AP-AT 118-123 in the north of Area I began to be excavated in spring 2009 and further building remains of Iron Age II date soon came to light. Ovens of various types were especially well-preserved. Two almost completely preserved ovens were constructed using alternate layers of clay, lime and pottery sherds, of which samples were taken for archaeometrical analysis. Six of the 14 ovens had a domed roof. Cooking pots with four handles were still standing in two of the ovens.


*15. Upper part of a female figurine with face of Hathor and side view of a lioness, perhaps the goddess Sekhmet.*

Unfortunately, the Iron Age II houses in this area of the excavation had been badly damaged by Hellenistic and Roman pits. Therefore, only a few remaining walls of the houses could be identified. A seal impression with a depiction of a god standing on a bull (TZ 7146) and a basalt head of a man (TZ 9059) are some of the most interesting finds of the later Iron Age II stratum.

*Classical and Umayyad Periods*

By 2009, excavations had revealed an Umayyad house and extensive Roman - Byzantine occupation. Hellenistic architecture was represented by some house walls in the northern part of Area I. However, no ground-plan could be reconstructed. The Roman strata yielded several large, very well-built pits and the remains of some houses. The Byzantine occupation is characterised by large courtyard houses which follow the curve of the hill. They are very similar in layout to the Byzantine houses in Area II, and it seems that they were built in a co-ordinated episode of construction.

Generally, it can be stated that the northern part of the *tall* (Area II) was the nucleus of the settlement in the Classical periods. The north-eastern part of Area I contained the south-western parts of these impressive structures. Only in the prosperous Byzantine period did the settlement spread beyond the nucleus to cover the whole 'plateau' of the *tall* (including Areas I and III).

**Area II**

In 2006, the first excavations were undertaken in Area II on the northern edge of the *tall*. This part of the hill is slightly higher than almost anywhere else, with the exception of the southern part. It is also the most well-protected place on the *tall*, since there is a 40m cliff to the north and there is no access from that side to the buildings standing there. In 2009, the excavated area of Area II was extended to the west, south and east, eventually measuring *ca* 1,500m$^2$. A sequence of ten strata[1] was identified which date from the Late Hellenistic to Umayyad periods (**Fig. 16**).

*Hellenistic Period*

The lowest level reached so far (stratum 10) is marked by a 2.2m wide wall running 35m east-west through the whole excavation area. In the east, it was truncated owing to the steepness of the slope and later building activities. In the west, it ends at the edge of the excavation area and cannot be traced further. In the western part of Area II a large building was attached to the south side of this wide wall. The length and thickness of the wall suggest that it was part of some kind of fortification. However, it is too early to determine the exact layout and function of this structure, since only the uppermost stone layer had been excavated by the end of the 2011 season.

*Roman Period*

The next four strata (9-6) display a complete change of architecture, being characterised by the remains of several houses which are orientated north-west - south-east and follow the curve of the terrain. Owing to intensive building activity in the Byzantine period, the remains are very

*16. Aerial view of Area II at the end of the summer 2011 season.*

1. The strata in Areas I and II are numbered differently. The numbering of strata in Area II is still preliminary and has not yet been correlated with strata in Area I; this will be undertaken for the final publication.

disturbed. The architectural remains of stratum 9 came to light in the northern part of Area II, where the surface slopes to the north. Two rooms or courtyards were identified. Stratum 8 is represented by at least three buildings. However, the remaining foundation walls show no clear layout for the time being.

Our picture of stratum 7 is more coherent. Three large buildings with several rooms and courtyards were identified. The best preserved is situated in the west of Area II; although soil and debris accumulated here in the Byzantine period, it was not used for new building (see below). Stratum 6 is only represented in the north-east where some unconnected walls were constructed on top of a stratum 7 building. It is possible that more walls of stratum 6 will become visible after the removal of the Byzantine walls in the adjacent squares. Generally, the walls of the different Roman strata were not built directly on preceding ones, but were constructed above them with a slight change of orientation. Their attribution to the Roman period is based mainly on the pottery sherds found in these strata.

*Byzantine Period*

There was another complete change of building orientation in stratum 5. A new building orientated almost perfectly north-south was constructed above an earlier house. Two rooms were revealed, with an entrance in the south-east marked by a threshold of stone slabs. A pillar base was set in the middle of the room. The orientation, location of the entrance, pillar base and layout of the building are very similar to the Byzantine building in the centre of Area I. By the time of this stratum, or at latest the following one, the whole area was covered with soil and debris to create a new surface for construction. However, the new building complex was not erected on top of this surface, but the foundations were cut deeply into the ground, destroying the remains of the Roman period.

During the period represented by stratum 4, the stratum 5 building was extended to the north and east. A large courtyard was built against its northern wall. A broad room was added north of the courtyard. Three rows of rooms and / or courtyards were added to the east of the former buildings and the courtyard. To the south, a rectangular room was added to the stratum 5 building and the entrance was moved from the south-east corner to the middle of the south wall. After this re-arrangement, the room could only be entered through the room to the south. The walls were built with field stones and dressed stones robbed from other buildings. Small wall-painting fragments were found in the debris, demonstrating that some rooms were decorated.

Some walls of stratum 4 were destroyed and it seems that a catastrophe occurred in the settlement. This could have been one of the disastrous earthquakes that struck during the Byzantine period. In the following stratum 3, the building was enlarged again. New rooms were constructed against the older walls and a large courtyard with a well-built entrance was added to the west. Interestingly, strict wall alignments were abandoned, although the north - south orientation was retained. The older rooms had evidently collapsed and were filled with sand, stone and roofing material. According to several coin finds, we can assume that these rooms filled some time after the early 6th century AD.

*Umayyad Period*

In the following stratum 2, the strict north - south layout was abandoned and a new north-west - south-east orientated house was built inside the large courtyard to the west. One room of this building was excavated completely and two others in part. The large Byzantine building complex was still in use. Some modifications could be identified on the eastern side of the excavation areas. Several Umayyad pottery sherds were found in this stratum. Therefore, a very late Byzantine or Umayyad date seems likely.

*Later Islamic Periods*

Only few sherds and other remains dating to the later Islamic periods were found in Area II. It therefore has to be assumed that the building complex was abandoned in the Umayyad period and that settlement activity shifted to other parts of the *tall*. During the 2008 excavations in Area III, many Mamluk pottery sherds were found in the building remains. Additionally, the *tall* survey conducted in 2001 identified a dense scatter of Late Islamic sherds around the well. These were presumably the main areas of Late Islamic settlement.

**The Wādī al-'Arab and Wādī az-Zaḥar Surveys**

The summer seasons between 2009 to 2011 were devoted to a survey in Wādī al-'Arab, conducted under the auspices of the 'Gadara Regional Project'. Only a few surface investigations had hitherto been carried out in that region. The main aim of this sub-project is to document all archaeological sites in Wādī al-'Arab and the adjacent Wādī az-Zaḥar in order to describe and interpret settlement distribution and history. This is important since it gives an insight into the development of the region which was centred on Tall Zar'ā between the Early Bronze and Iron Ages, and on the Decapolis city of Gadara during the Classical periods.

Wādī al-'Arab is extremely rich in springs and offers good conditions for agriculture. Its source is located in the highlands west of Irbid, from where it runs down to the Jordan River. Furthermore, Wādī al-'Arab provides a straightforward ascent from the Jordan valley to the Irbid - ar-Ramtha basin and has therefore long been an important trade route from the Mediterranean coast to Damascus, Baghdad and 'Ammān. Questions arise concerning the location of actual trade routes through this area and their changing importance. The survey focuses on evidence that might help to answer these questions. Clearly, the data collected from sites in the *wadi* and its vicinity needed to be as detailed and up to date as possible.

In summer 2009, the lower part of Wādī al-'Arab from North ash-Shūnah up to Dūqarah was surveyed. Eighty archaeological sites were registered and described. Archaeological material was systematically collected and entered into a database. Thirty of these sites were previously unknown. More than 80 % of the sites were of Hellenistic and / or Roman - Byzantine date, while 20 % can be dated to the Bronze / Iron Ages and the Islamic period. The most important sites were already known, *viz*. Tall al-Kanīsah and Tall al-Qāq.

Two other sites should be mentioned here. One dates to the Middle Bronze Age, the other to the Roman period. The Middle Bronze Age site was previously known. This site and Tall Zar'ā are intervisible; the entrance to Wādī al-'Arab could be controlled from either location. The other site, which dates to the Roman period, was located 50m upslope and was previously unknown. It is intervisible with Gadara, which is not the case for the Middle Bronze Age site. This gives a first hint of settlement movements in Wādī al-'Arab in connection with the shift in the Hellenistic period of the regional center from Tall Zar'ā to Gadara.

During 2010, a second survey season was carried out in Wādī al-'Arab and Wādī az-Zaḥar. It covered the area from Dūqarah up to the Irbid area. The nature of the landscape changes as one approaches the upper reaches of Wādī al-'Arab. The *wadi* is more incised, with most of the settlements on the edges, high above the *wadi*. The majority of ancient settlements are known through the work of Glueck and Mittmann. Almost all of the modern villages date back to at least the Roman and / or Byzantine periods, some of them as far back as the Iron Age or Bronze Age. Most of the ancient settlements, including many of the Islamic sites, have been destroyed by overlying modern settlements.

During the 2011 season, this close investigation of the Tall Zar'ā hinterland ('zone A') was augmented with a wider investigation of the Wādī al-'Arab region achieved through revisiting the major sites in the whole area ('zone B'). The exact location of all sites was recorded by GPS, pottery was collected for comparative studies and descriptions of the current state of sites were updated. An important aspect of the survey consists of recording the increasing damage done to archaeological sites by construction and agricultural activities (**Fig. 17**). In one case, a known Roman site has been completely destroyed over the last two years. Despite the continuing destruction of ancient

*17. Western section of foundation pit at the school at Qumm.*

sites, representative samples of pottery were collected, from which a concise overview of the history of Wādī al-'Arab can be derived.

**Acknowledgements**

The directors of the 'Gadara Regional Project' would like to express their sincere thanks to the Department of Antiquities, in particular to former Director-General the late Dr Fawwaz al-Khraysheh, former Director-General Prof. Dr Ziad al-Saad and Acting Director-General Mr Faris Hmoud for their consistent help. We would like to thank all participants in the project, especially Patrick Leiverkus who was responsible for the survey in Wādī al-'Arab. We also thank all the institutions (Evangelische Kirche in Deutschland; Gerda Henkel-Stiftung; Werner Jackstädt-Stiftung; Friends of the Biblical Archaeological Institute; German Institute of Archaeology) which have provided generous support for our project.

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2011c Tall Zirā'a und Wadi al-'Arab: Jahresbericht 2010 des DAI. *Archäologischer Anzeiger* 2011/1: 373-382, Beiheft.

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# EXCAVATION AT KHIRBAT AL-MUDAYNA AND SURVEY IN THE WĀDĪ ATH-THAMAD: PRELIMINARY REPORT ON THE 2008, 2010 AND 2011 SEASONS

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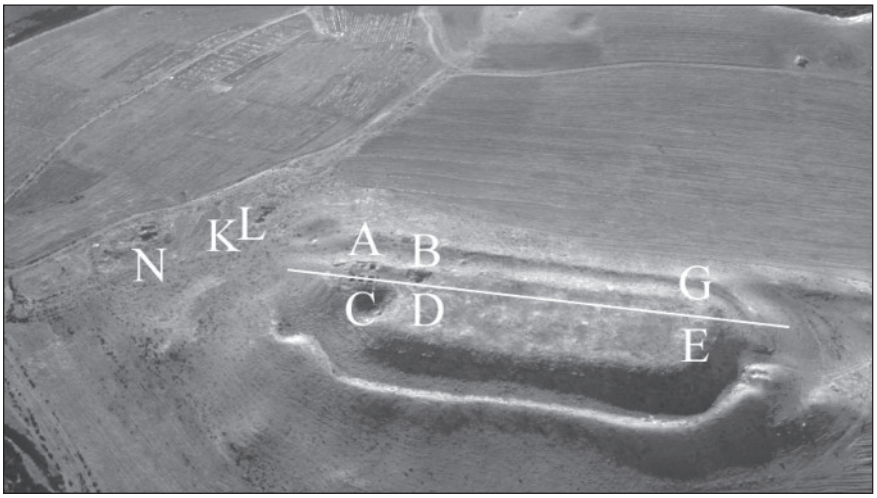
**Introduction**

Three seasons of archaeological excavation were carried out from 16 June - 25 July 2008, 21 June - 28 July 2010 and 27 June - 3 August 2011 at Khirbat al-Mudayna (Thamad), both in the fortified Iron Age town and the Nabataean-early Roman settlement. Additional documentation and mapping was undertaken in 2010 by the Wādī ath-Thamad Survey team at Khirbat al-Hirī, directed by J. Ferguson[1]. The senior project director was Dr P.M. Michèle Daviau; Dr Robert Chadwick and Dr Michael Weigl were Associate Directors. Team members included scholars, volunteers and students from Canada, the United States, the Netherlands, Denmark, Austria, the United Kingdom, Saudi Arabia and Jordan. Robert Mittelstaedt was camp manager and was assisted with photography in 2010 by John Kantor; Natasha Dilke was the chief photographer in 2011. Local workers also assisted the team each season. This report will present the results of excavation in Fields A + C (north) and Fields B and D on the mound (**Fig. 1**). Also included are the results of excavation in Fields L + K (Reservoir 700) and Field N (House 800), structures dated to the Nabataean-early Roman period. Intensive documentation was carried out at survey site WT-12, a large Nabataean settlement in Wādī Shābik. Additionally, mapping was completed at Khirbat al-Hirī and at sites in the north-western part of the survey region.

**Fields A + C (North)** (Robert Chadwick)

The first section of this report will discuss work undertaken in Fields A and C, directly north of North Gate 100 during the 2008 season. The second section will discuss the 2010 excavations of the so-called 'moat' in Field B outside




*1. View of Khirbat al-Mudayna showing location of excavated Fields.*

1. The Wādī ath-Thamad Project is sponsored by Wilfrid Laurier University, Waterloo, ON, Canada, and was funded in part by the Department of Archaeology and Classical Studies. Additional funding was provided by the Deutsche Palästina-Vereins and by friends and colleagues.

*2. Plastered north face of Bastion 1000, sealed by Vorplatz fill layers and surface plaster (A14:43).*

the walled portion of the Iron Age II town (see below).

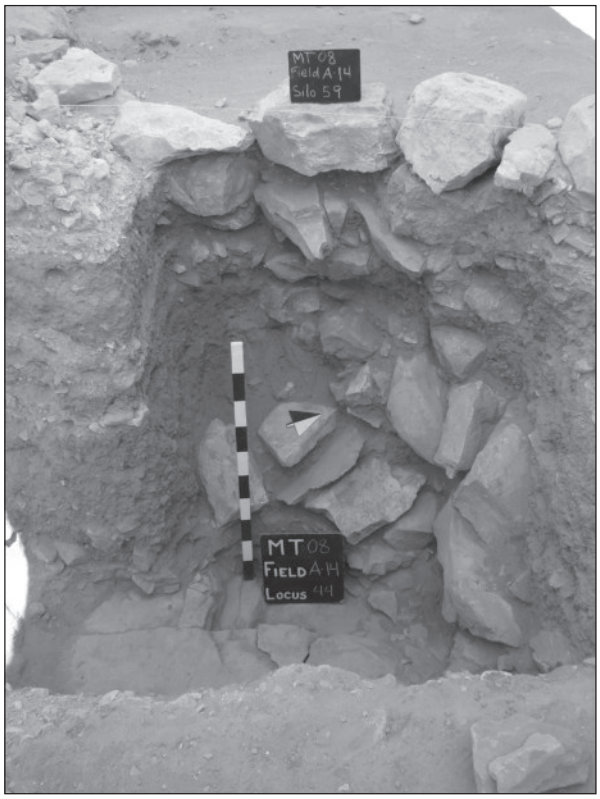
The 2008 excavations focused on understanding the construction phases of gate bastions B1000 and B1500, and their relationship to the in-ground silos and the large *Vorplatz* area immediately to the north. Work in Squares A14 and C94 exposed the exterior faces of bastions B1000 and B1500, whose exterior north wall surfaces were covered with a layer of yellowish-white plaster with straw temper (white [2.5Y 8/2] and yellow [10YR 8/6]; **Fig. 2**). In previous seasons, similar plaster layers have been exposed on a number of exterior wall surfaces in the Gate 100 area and elsewhere on the site.

Directly in front of bastion B1000 were a number of horizontal fill layers approximately 1.25-1.50m deep, consisting of angular white limestone pebbles, layers of reddish soil mixed with river-rolled gravel, and thin lenses of lime powder. All of these fill layers sealed against bastions B1000 and B1500. Of interest was locus A14:43, a reddish plaster surface which runs up to the base of bastion B1000. This layer is different from the plaster on the north face of B1000; it is redder in colour and contains pebble or sand temper instead of the vegetable temper found in plaster used on exterior walls. It is also harder because of what appears to be a small amount of lime powder. Locus A14:43 is situated on top of a layer of soil mixed with pebbles and cobbles between 0.02-0.15m thick, applied directly onto the bedrock to smooth out the natural rock where it is uneven and make a suitable subsurface for the application of plaster locus A14:43. This horizontal plaster layer was exposed over an area measuring 3.00-2.25m, but it no doubt covers a larger area in front of the original gate entrance. Owing to the lack of any artefacts, ash or signs of pedestrian wear, it is uncertain whether plaster layer A14:43 was an artery of pedestrian circulation and whether it was in service for any length of time.

As in previous seasons, excavations revealed that the same kinds of fill material were used throughout the construction of the subterranean surface of the *Vorplatz* area to the north of the gate. Soil, cobble and pebble fill layers such as A13:30 and A13:32 are similar to loci located elsewhere in front of North Gate 100. The 2008 season's excavations exposed the exterior faces of the silo walls and confirmed that three of the in-ground storage installations (Silos 20, 50 and 59) were all sealed by alternating horizontal fill layers.

*Silo Support Installations*

Cobbles and small boulders that served as silo support installations were exposed in Square




*3. Support installation placed against the outer wall of Silo 59.*


*4. Support installation abutting exterior of Silo 20 (top left); bedrock (lower center).*

*5. Square C94: Silo 50 wall (right); support installation (center above bedrock); exterior plaster of bastion B1500 (left).*

A14, abutting the exterior of Silo 59 **(Fig. 3)**. Comparable silo support installations employing similar construction techniques and consisting of conglomerations of cobbles and small boulders were used to reinforce the outer wall (A13:37) of Silo 20 (**Fig. 4**). While the boulders abut the outer face of the silo wall, fill layers composed of soil, pebbles and cobbles (A13:30, A13:32) seal against the support installation. Excavations in Square C94 exposed a similar support installation which abuts the exterior face of the wall of Silo 50 (**Fig. 5**) and then continues for 0.50m where it also seals against the plaster (C94:34) on the north face of Bastion 1500.

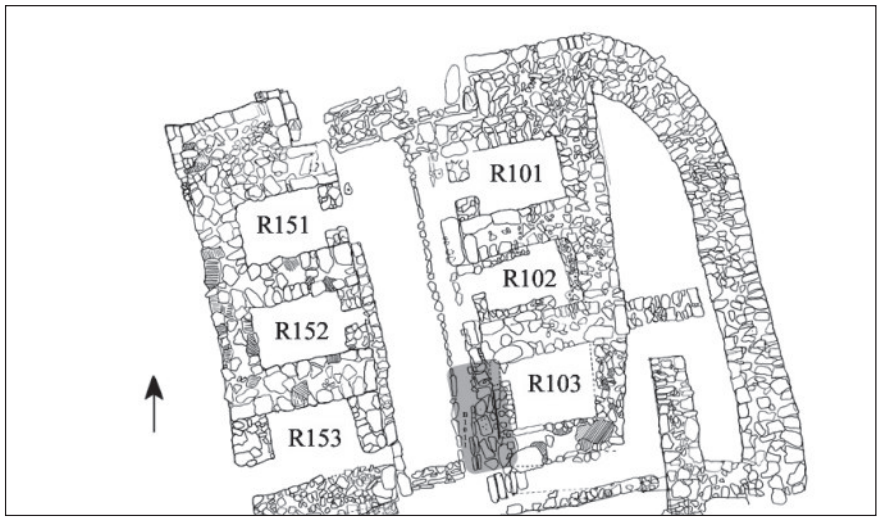
*Tower 1013*

The second task undertaken during the 2008 season was the excavation to bedrock of the area north of Tower 1013 and west of the cultic standing stone installation. Horizontal fill layers seal against support installation A13:33 outside of Silo 20; they also seal against the northern and western faces of the Tower 1013 making it clear that the tower was built before the fill loci were laid down around it. Excavations exposed the outside corner of a few of the top-most stones of Silo 20, clarifying the relationship between Tower 1013, Silo 20 and the underlying horizontal fill layers consisting of cobble, pebble and soil loci, similar to subterranean loci located elsewhere in the *Vorplatz* area. The similarity between these diverse loci found in various probes under *Vorplatz* S120 indicates that the fill material is the same across the entire area and that all fill material was laid down at the same time against the bastions and around the silos.

**Field A** (P. M. Michèle Daviau)

*Introduction*

As excavation progressed in the domestic and industrial building in 2011, it became apparent that certain features of the architecture could be used as indicators of remodelling in the buildings themselves. This realisation led to unanswered questions regarding the third room on the south-east side (R103) of North Gate 100. This room was clearly built after Inner Casemate Wall 2002 had been constructed, since the east wall of Room 103 (W1010) was on an angle to accommodate the position of Wall 2002. In order to answer the many questions concerning the history of the gate architecture, the remaining stones of Bench 1011 (**Fig. 6**) along the east side of Central Road S104 were dismantled to reveal the footings of the south Pier (W1004) of the northern two-room gate unit (Rooms 101+102), the west wall of Room 103 (W1006) and the south Pier (W1005) of the third room (R103).




*6. North Gate 100 showing area of excavation of Bench 1011 (in gray) west of R103.*

The principal features include:

| | | |
|---|---|---|
| W1004 | A15:22 = A16:7 | East - west Pier Wall: north wall of R103 |
| W1005 | A16:8 | East - west Pier Wall: south wall of R103 |
| W1006 | A16:2 | North - south secondary wall: west wall of R103 |
| W1010 | A16:6 | North - south exterior wall: east wall of R103 |
| B1011 | A6:19 + 22 | Bench on east side of gate road: S104 |
| | A6:50 | Threshold in Doorway F into R103 |

*Results*

The topography of the site necessitated the creation of deep fills along the east side that extended from the bedrock exposed in the central road (S104) to the footings of the Outer Casemate Wall (W2002), located at a depth of *ca.* 3.94m below the roadway. It was assumed, based on previous excavation in 1996, that the south room (R103) was an addition, built after gate Room 102 to which it is attached. While it is clear that the east wall of R103 abuts the south pier wall (W1004) of the eastern two-roomed unit of Gate 100, the sequence is now better understood with the removal of Bench 1011. The excavation area was located in Square A6 and extended for a length of 5.00m beginning just north of Stairs A7:19, which were built up against the south face of Wall 1005. The bench (**Fig. 7**) had been constructed along the eastern side of Street 104, against the west face of the pier walls (W1003, W1004 and W1005) and, as a result, concealed the west face of wall W1006 and the outer side of Doorway F into Room 103.


*7. Bench 1011, upper course with edging stones (A6:46), looking south.*


*8. Exposure of cobbled construction surface along the west face of Pier Wall 1005 with edging stones A6:46 and drain stones (A6:40) in the foreground, looking east.*


*9. Doorway F with base stones on same level as base of Pier Wall 1004.*

The lowest soil layer (A6:53; **Fig. 8**) consisted of a layer of large angular cobbles and pebbles, most probably just above bedrock (A6:41) given the elevations on bedrock in Drain 105 running along the west side of A6:53. This layer appears to be the principal construction surface for the southern pier (W1004) of the two-chambered eastern portion of the chambered gate, as well as for the threshold of Doorway F (A6:50), the secondary west wall (W1006=A16:2) and the southern pier wall (W1005). All of these walls and the threshold were levelled with small chink stones above the cobble layer, while the southernmost Pier Wall (W1005) was footed on a row of protruding stones (A6:48), of which the northernmost stone also supported the south end of Wall W1006. This discovery is a great significance for understanding the sequence of construction in the gate area, although it raises additional questions that will need serious reflection.

Threshold A6:50 in Doorway F (**Fig. 9**) was also footed on Cobble Layer A6:53, chinked with pebbles, and formed of two courses of small boulders that filled the space between the south face of Pier Wall 1004 and the north end of Wall 1006 (0.74m). The threshold was 0.37-0.40m thick and stood 0.28-0.31m in height; Cobble Layer A6:52 sealed up against it and Pier Wall 1004.

Above the heavy cobble layer was a soil layer (A6:52) with smaller cobbles and pebbles which sealed against the threshold and both the footing stones (A6:48) of Pier W1005 on the east and a single row of stones (A6:46), 3.75m long, that formed the west edging of the area where Bench 1011 was installed. When found, this stone row ran parallel to the eastern row of drain stones (A6:40) which extended 13.18m along the east side of Roadway 104. At the south end, a small curb stone extended east-west linking the bench edging stones to the foot of Staircase A17:19, possibly to channel water away from the footings of the walls of R103.

The cobble layers (A6:52, A6:53) were covered with a hard-packed soil layer (A6:49) which included an ash lens adjacent to the west face of Pier Wall 1005, suggesting that this was a use surface in the space (*ca.* 0.70m wide) between the edging stones and the walls of Room 103. A certain amount of build-up was noted with the presence of another soil layer (A6:47) which contained animal bones, a small number of ceramic sherds, ash pockets and oven fragments. This layer was compressed, probably owing to the weight of the lower course of bench stones and their underlying makeup. The bench stones (A6:45) themselves consisted of large cobbles and small boulders (see **Fig. 10**) which, along the west edge, were roughly hewn in a rectangular shape. These stones were put in place above the edging stones (A6:46) and packed with plaster.

*10. Lower Bench stones (A6:19 = A6:43) against Pier W1005 with edging stones in foreground.*

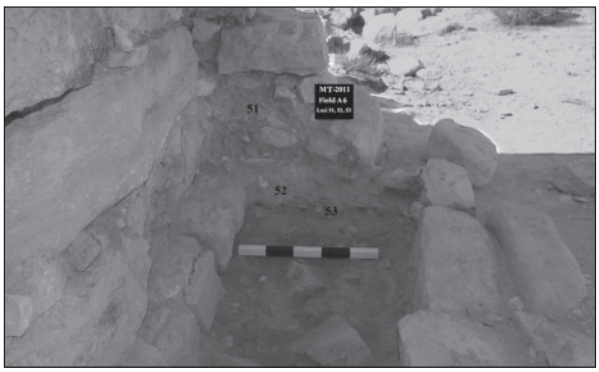
The lower course was comparable to the northern extent of Bench 1011 and included two sub-rectangular stones placed east - west which protruded into Doorway F above Threshold A6:50, forming a step out of Room 103. The soil surrounding the bench stones was packed, becoming looser below them.

When the south end of Bench 1011 was remodelled with the addition of an upper course of large boulders (A6:22 = A6:42) for a length of 2.10m, the west edge was faced with vertical stones and plastered. At this stage, the bench covered the lower step of Staircase A17:19 + A7:40). The bench stones were only partially preserved in 2011 and much of the soft limestone had eroded and was mixed with the wind-blown soil (A6:0.5), forming a crusted surface.

A similar sequence can be seen in the south balk (**Fig. 11**) which reveals the build-up under the steps of Staircase A7:19. Here packed soil with cobbles (A6:51) appear to be superimposed on the two cobble layers (A6:52, A5:53), again supporting the supposition that the third room was built in the same construction event that saw the establishment of the northern gate rooms.

**Field B** (Robert Chadwick)

Early explorers claimed that the site of Khirbat al-Mudayna was surrounded by what they called a 'moat'. This term is a misnomer and, in this report, trenches or earthworks built for defensive purposes will be referred to as 'ditches', a term which more accurately describes their function. Over a century ago Brünnow and Domaszewski[2] noted the main features at Khirbat al-Mudayna including its 'Graben', for which they include a section drawing (1904 I: fig. 15). Alois Musil took note of what he believed was a ditch (1907: 300, fig. 137) as did Glueck: "about half-way down the slope is a wide ditch or dry moat, which encircles the entire mound" (1934: 13). Glueck also published an aerial picture, in which the site looks flat and rectangular, hinting at the possibility that the top of the mound was shaped by some kind of large podium-fill. However, excavation of structures footed on bedrock inside the town demonstrates that this was not the case.



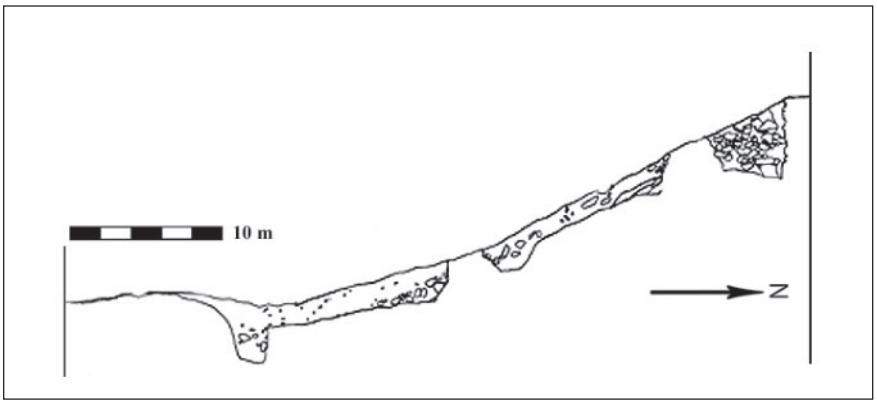

*11. Soil layers under steps of Staircase A17:19 with footing stones A6:48 (left) and edging stones A6:46 with the east - west curb stone (right).*

The goal of the 2010 season was to determine the nature and function of this exterior 20-25m wide earthwork which surrounds the site on at least three sides, outside of and below the outer casemate wall. Previous excavations undertaken in 2001 at the south end of the site established that although there was a built-up layer of fill which covered some irregularities in the terrain, including a very deep natural hole in the bedrock, there was no evidence for any kind of purpose-dug ditch designed for defensive purposes. There was, however, a natural syncline of the bedrock.

At the opposite end of the site, 150m to the north, extensive excavations in Fields A and C north of Gate 100 have not exposed any kind of ditch, only the natural incline of the geological formation underneath the site. The 'moat' hypothesis, so eagerly embraced by early explorers (none of whom actually excavated at the site) has not been demonstrated.

A line of three squares, B57, B47 and B37 (**Fig. 12**), all running east-west and perpendicular to the outer casemate wall (W2001), were opened during the 2010 season. The horizontal surface of the eastern-most square, B57, was nearly flat with a 2° slope to the west. In B47, the next square to the west, the escarpment increased rapidly from 3° to 17°. The slope continued to increase until it reached square B37, the square closest to the outer casemate wall W2001, where it reached 25° of declination. Beginning a few centimetres below the topsoil surface, all three squares contained clearly de-

2. Brünnow and Domaszewski (1904) provide a description of "Die Römerstraβe von Mâdebâ bis Petra", made on 3 April 1897.

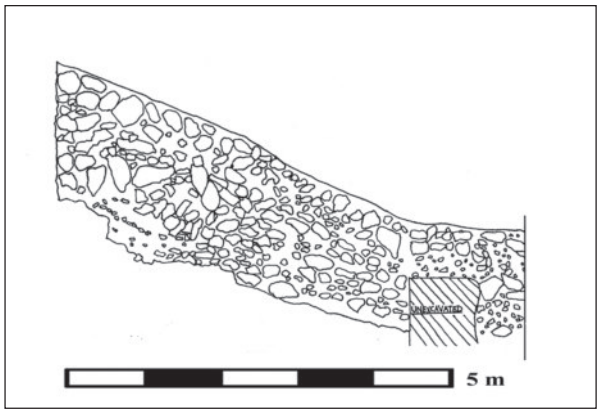



*12. Section drawing from 2001 excavations in Field F; south end of Khirbat al-Mudayna showing a naturally occurring geological formation rather than a purpose-built ditch.*

finable layers of deliberately laid fill consisting of pebbles, cobbles and soil, with the occasional small boulder. The excavators believe that this material constitutes a glacis.

The deposition exposed in these three squares can be divided into two categories. To the west, beginning on the outside of casemate wall 2001 and sealing against it, was a layer of large cobbles and small boulders, up to 1.61m deep and piled up in a steep 25° angle against the lower portion of the eastern face of the outer casemate wall (W2001; **Fig. 13**). Easily mistaken for wall tumble, on closer inspection the tight and systematic way the stones were positioned suggests that they were placed against the base of W2001 to steepen the slope of the glacis, and were then covered with a layer of soil to protect and preserve them from the elements. Unlike the lower courses of the casemate wall W2001, which consist of very hard chert boulders, the glacis deposition had few hard chert stones; about 50% of it consisted of friable limestone, some of which was badly crumbled and decayed. This seems to argue in favour of the soft limestone being specifically placed at the foot of the casemate to add support to it.

A second type of deposition was exposed farther downslope to the east, starting in Square B47 and continuing eastwards. In this square, directly underneath a locus consisting of pebbles and soil, a subterranean retaining wall (B47:2) of roughly rectangular cobbles was exposed. This retaining wall runs parallel with the outer casemate wall located approximately 10m upslope to the west. Made of the softer, chalky white limestone abundant in the area, this low wall was




*13. Deposition against Outer Casemate Wall.*

*14. Six excavation terraces in Field B: Square B47 (foreground); Square B37 (background).*

never meant to be exposed to the elements which would have destroyed it in a matter of decades. Because it runs in two rows parallel to the casemate wall with a low profile of only 2-3 courses, it is doubtful whether this wall could have served as anything other than a parallel support installation to hold the sloping soil layers in place. Elsewhere on the site, similar subterranean support installations consisting of loosely scattered revetment installations – which fan out to the north of the gate entrance – have been exposed in previous seasons. Subterranean supports are likewise seen surrounding the numerous silo wall support installations mentioned above. Since this was a well-known method employed at Khirbat al-Mudayna, we should not be surprised to see it used in the construction of the glacis.

As excavations in the three squares progressed, tip lines where containers of soil and stones had been dumped were clearly visible in the balks. The approximately 1.60 to almost 3.00m deep multiple layers of soil, pebbles, cobbles and small boulders were part of a large flat-lying retaining feature, which constituted a subterranean revetment system of stones that extended under a large part of the eastern glacis and probably continued around most of the site.

*Glacis 3001*

The glacis at Khirbat al-Mudayna is an ever steepening earthwork (**Fig. 14**) beginning near the foot of the outer casemate wall and continuing eastwards for approximately 25m. The glacis acted as a support to cover the foundations of the casemate circumvallation wall, protecting it from effects of rain and erosion. The lower portion of the glacis is 5-6m higher than the surrounding terrain; its defensive nature becomes apparent when it is approached from the level of the modern cultivated fields. The lower portion of the glacis is nearly flat, even slightly concave towards the centre, which may be one of the reasons why earlier explorers approaching from the east thought it was a 'moat'. It then ascends upwards on the west, reaching a slope of 25° as it seals against Outer Casemate Wall 2001. It is likely that the glacis was constructed to put attackers at a disadvantage, since the slope would have slowed down their progress as they approached the walls, making them easy targets for defenders. By building a sloping, 25m wide

*15. Casemate wall W2001 construction footed on bedrock.*

open area below the walls, the builders created a 'danger-zone', a kind of no man's land, where attackers had no cover in their final dash to the walls. The glacis offered defenders one additional advantage: it made the use of wheeled siege engines of the type used by the Assyrians during the same period much more difficult.

*Casemate Construction*

A 2m wide section of Wall W2001, the outer face of the circumvallation wall, was exposed and its foundation excavated to bedrock (B37:12; **Fig. 15**). It was determined that wall W2001 was footed on B37:8, a series of small, flat boulders running perpendicular to the wall. These hard chert stones had been leveled and placed on a top of a 0.30m thick layer of reddish-brown soil mixed with pebbles and small cobbles. This layer was situated between the bedrock and the casemate foundation stones, and resembled closely in texture and material the soil, pebble and small cobble fill material (A13:35) underlying the plaster road surface in front of North Gate 100. Construction of the casemate wall was similar to the thick wall con-

struction methods used in other parts of the site and one may speculate that wall, tower and gate construction were all done at the same time by the same group of builders. Like structures elsewhere on the site, the exterior was covered by a layer of yellow chaff tempered plaster similar to plaster traces found elsewhere in the gate area.

*Conclusions*

The 2010 season's excavations, reinforced by the work done in Fields E and F at the south end of the site in 2001, confirmed that the site is surrounded by a 25m wide soil, pebble and cobble glacis, but not a defensive ditch. Finally, although there was no clear evidence for a beaten earth surface or paving stones for a paved road, it is possible that the existing pebble and earth surface may have been used as a roadway. Even today, local people still use the lower section of the glacis as a path or roadway to gain access to certain parts of the site. There is no evidence that the glacis ever connected to a gate at the south end of the site, nor is there any evidence that it connected with the six-chambered gate at the north end of the site.

**The Street** (E. Kate Johnston)

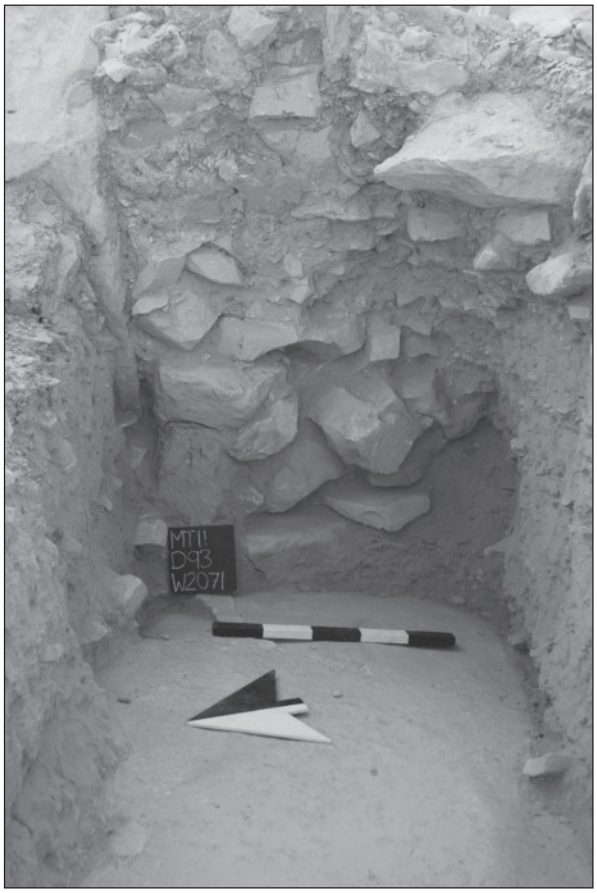
With three seasons of excavation now completed in the street between Fields B and D, it is possible to draw some conclusions about not only the depositional history of the street itself, but also the relationship of the architectural elements in both fields to the street and to each other.

*Construction of the Street*

The street was built up over an unknown period of time on top of the bedrock outcropping that makes up the foundation of the hill. The varying height of the outcropping means that the thickness of the street and the street levels are not uniform, even across a single square (**Fig. 16**). The southernmost excavated portion of the street is also the thinnest; bedrock level was reached after approximately 1.5m of sediment was removed. However, even within that small area, the variation in bedrock height is nearly 40cm. As the street goes north, the bedrock sinks further.

The street appears to have been built on a peak of the hill. The excavation of Building 210 revealed much lower bedrock heights to the east and west of the highest point of the street. The buildings in Field D have not yet been excavated as far south as those in Field B, but B300 (Daviau *et al.* 2008: fig. 6) also has a floor that is below street level, indicating that the bedrock sinks to the east and west, as well as to the north (**Fig. 17**).


*16. South Balk, showing bedrock outcroppings and variation in height.*




*17. Bedrock sinking towards B210, the southernmost pillared building.*

Each street layer was laid down in two discrete parts. First, there was the intentional deposition of clean brown soil, and then a slightly thicker accumulation of refuse that includes bone and ceramic sherds. The topmost level directly below the topsoil is grey wash, thicker towards Field B to the east. This layer is found over the street in all three excavated squares. There are only two street layers above the bedrock in the southernmost square (D93), although this number increases in the squares to the north.

*Relationship to the Architectural Elements*

The primary goal of the 2011 season was to determine the relationship between the depositional history of the street and the construction of the buildings in Fields B and D. This work was begun in 2010, with the excavation of the doorways into B205 and B210, but the primary objectives were not achieved until 2011.

As **Fig. 18** illustrates, sections were excavated east-west across the street to link the architectural features on each side. In D93, this was exposed to bedrock, revealing that the buildings in Fields D and B were founded on bedrock and that the street then sealed up against them.

While bedrock was not exposed in D92, excavation still showed that the street sealed up against the building elements on both sides. This was most clear in the position of the threshold stones, which are visible in section as having been put on top of older street levels and are sealed against by the more recent ones (**Fig. 19**).

*18. Excavated probes in D92 (left) and D93 (right), looking east.*

*19. Threshold stone in D92 with associated street layers.*

*Conclusions*

It seems clear enough from the excavation that the street was constructed following the primary construction phases of the buildings on either side and that the access ways to said buildings were adapted as the street level became higher, likely to deal with issues of flooding. Furthermore, the street was leveled deliberately, in discrete layers, in order to compensate for differences in the height of the bedrock outcropping.

While fairly simple, the conclusions obtained by excavating the street in the 2011 season are important for the overall interpretation of the site. They also raise some additional questions to be explored in later seasons, such as what the inhabitants of the buildings did before the street was installed, how the bedrock was cleared and how the inhabitants coped with the variation in bedrock outcroppings while constructing the street.

**Field B** (Michael Weigl)

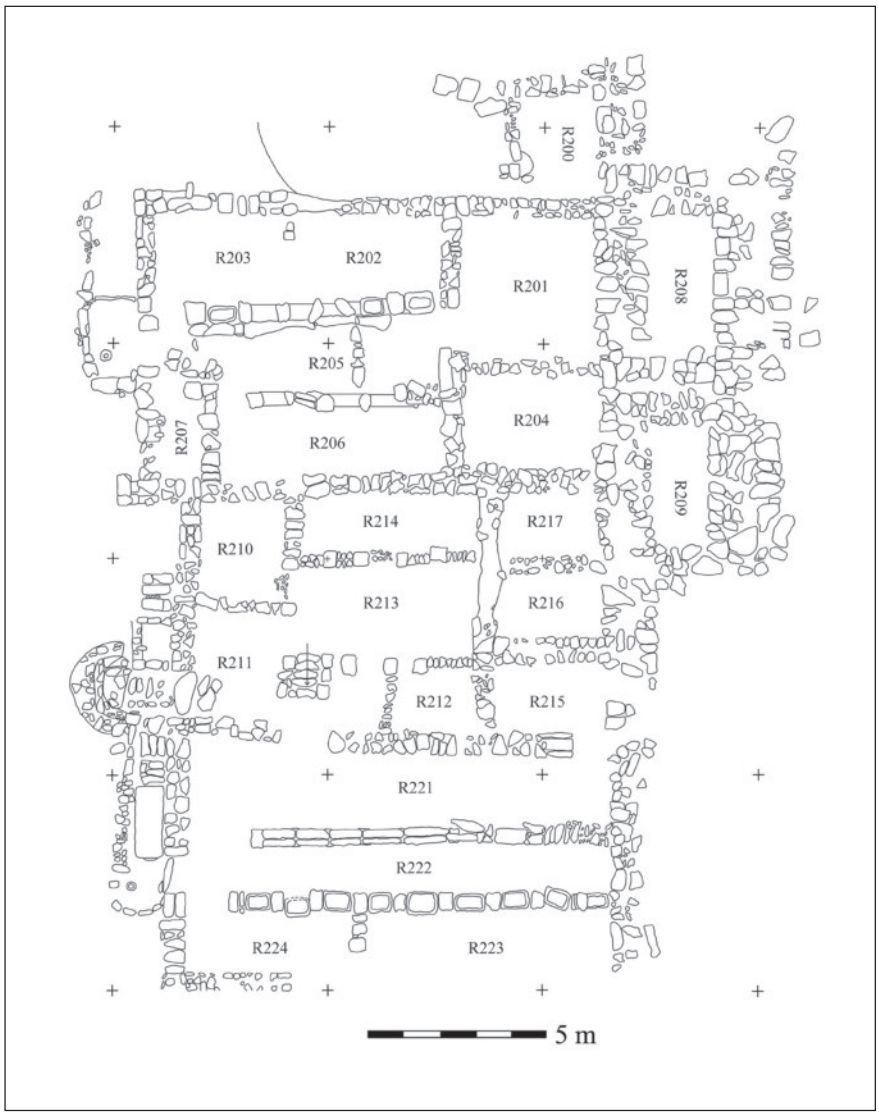
Archaeological work in Field B during the 2008, 2010 and 2011 seasons concentrated on the close investigation of stratigraphical sequences in industrial buildings B205 and B210, which have been excavated continuously since the 2006 season (Daviau *et al*. 2008). In both buildings, the latest occupational layers had already been reached in 2008, yielding yet more evidence of their industrial character, their intense use over an extended period of time (e.g. frequent wall repairs recognized by the insertion of ground-stone tools in a secondary context)[3] and their violent destruction by fire and subsequent collapse. Textile related production

3. This observation was first noted by Steven Edwards, supervisor in Field D.

activities in tripartite B210 were prominent in the north (R221) and south rooms (R223) which were, in their latest phase, both covered by an extensive flagstone pavement built over several constructional and short-lived occupational phases superimposed above bedrock. Several heavy duty grinding implements fallen from above, in particular two large-scale industrial saddle querns, were uncovered in R223, which had at a very late phase been sub-divided by a short secondary wall stub running perpendicular to the building's south wall.

During the past two seasons, the primary research goal was to excavate beyond these latest occupational layers all the way to bedrock in order to obtain a complete understanding of the stratigraphy, phasing, period(s) of use and function of B205 and B210 (**Fig. 20**). These excavations were partially carried out as soundings and partially by full excavation. The central and south rooms of B210 (R222, R223) were also explored to their foundations on bedrock. In the south-eastern room of B205, a sub-floor construction was identified; its secondary relationship is evident in the late addition of a pillared wall (W2025) linking it to B210. In addition, the foundations of the (north - south) Inner Casemate Wall (W2002) and the south wall of B210 were investigated.

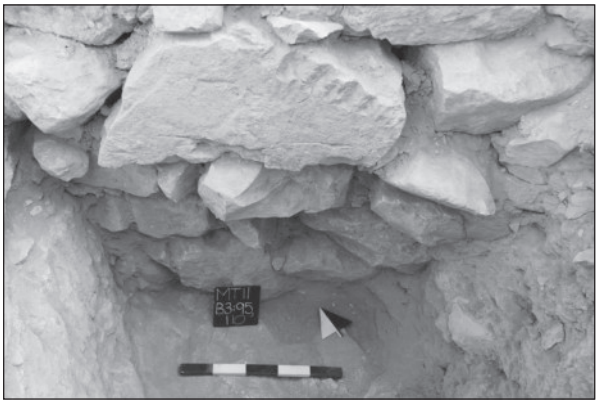
During archaeological investigation it became clear that these two buildings had a much longer and more complex constructional and occupational history than previously assumed. In this regard the occupants had to accommodate




*20. Plan of Buildings 200, B205 and B210.*

the very peculiar drop of the bedrock's surface from west to east. The entrance porch on the west, lined by a north-south monolithic wall (W2070 and W2071), led down into B210 via three roughly parallel threshold stones and an additional step that fell out of use after the earliest phases of occupation (**Fig. 21**). Here, at the foot of the entrance, the bedrock curves in a very rounded, almost circular shape (**Fig. 22**). This natural feature of the *tall* was used during the earliest phase of occupation for erecting a massive support wall, on which the northern (W2033) and southern pillared (W2034) walls were footed at a considerably later time. This feature was found to extend east, while the bedrock continues to plunge sharply and was covered with layers of boulder and cobble fills to create an even living surface throughout the building. Massive support walls (stylobates) run under the footings of the previously excavated rows of pillars. It became evident that the building must have been used for a purpose other than textile production in its earlier phases, since the basins with their chinkstone support walls were installed above the stylobates (excavated in 2007) and are a late feature of the pillared walls. Thus, tripartite Building 210 originally served a function not yet identified and was then converted to accommodate changing interregional economical needs.


*21. Bedrock step supporting the foundation walls for W2033 and W2034.*



*22. Round bedrock feature with footing of support wall for W2033.*

Excavation in 2010 yielded more evidence in support of this theory. Underneath the latest plaster floors that had been reached in the 2008 season, several layers of sub-floor constructions (soil, cobble fill, construction surfaces and very large boulders) were put in place to stabilize the walls of R215, in particular on its west side (W2020) and on the east where all walls abut Inner Casemate Wall 2002. A secondary passageway into the north room of B210 linked R215 in B205 with that building at a much later time, adding a pillared wall and a doorway on its south side (W2025) which was then blocked in the latest stage of construction. It remains undetermined for the time being as to which rooms / buildings R215 was linked initialty. Further research will help determine these issues left unsolved at the end of the 2011 season.

In future field seasons, additional investigation into features of B200, B205 and B210 will be necessary: excavation of the casemate rooms on the east side of B205 and B210; excavation of the storage cellar in B210 (Square B3; Daviau *et al*. 2008: fig. 4) and excavation of the large sink hole / depression at the very north of Field B / south of Field A. The street to the west of these buildings will need to be revisited in future seasons (see Johnston, this article), as architecture will have been exposed to their east, and the western outer walls of B205, B210 and the support walls of the monolithic porch at the entrance to B210 have been consolidated by specialists to avoid destruction of architecture.

*Conservation, Consolidation and Preservation*

In order to protect the walls of the exposed buildings, extensive backfilling was carried out in Fields B and D. All squares in B210 and in Room 215 of B205 (**Fig. 23**), as well as several probes in D92 and D93 (**Fig. 24;**see also **Fig. 18** above), were carefully backfilled with boulders and fine soil to the height at which excavation had halted in previous seasons. On top of the soft soil fill, cobble stones were placed in

*23. Building 210 after backfilling with soil and cobble layers.*

*24. Square D92 after backfilling and deposition of cobble layer.*

patterns to indicate the termination of archaeological activity in these areas, to preserve the stratigraphy and support the walls. Extensive backfilling was also undertaken as a conservational measure in all of the excavation units in the centre of and to the east of Field D. In areas where future excavation is pending, layers of thick plastic were put over the unexcavated soil in order to facilitate the identification of previous seasons' stopping points at the beginning of future ones.

Backfilling is an important step towards future site management, with the aim of indicating completion of excavation in some areas whilst making them visually attractive for visitors to the site. At the same time, re-excavation of these areas will still be possible in the future. In addition, several well-preserved walls in Field B were consolidated by experts from the Mādabā office of the Department of Antiquities at the expense of the Wādī ath-Thamad Project, as a contribution to the protection of Jordan's archaeological heritage (**Fig. 25**).

Also, in compliance with the strategy to maintain the site in a natural and proper condition, a very large dump on the east side of Field B was removed at the end of the 2011 field season. On the very last day of field activities, the large dumps in the Nabataean-Early Roman house (B800) were also removed, clearing the view and preparing for future consolidation of this important feature at the northern foot of the *tall*.

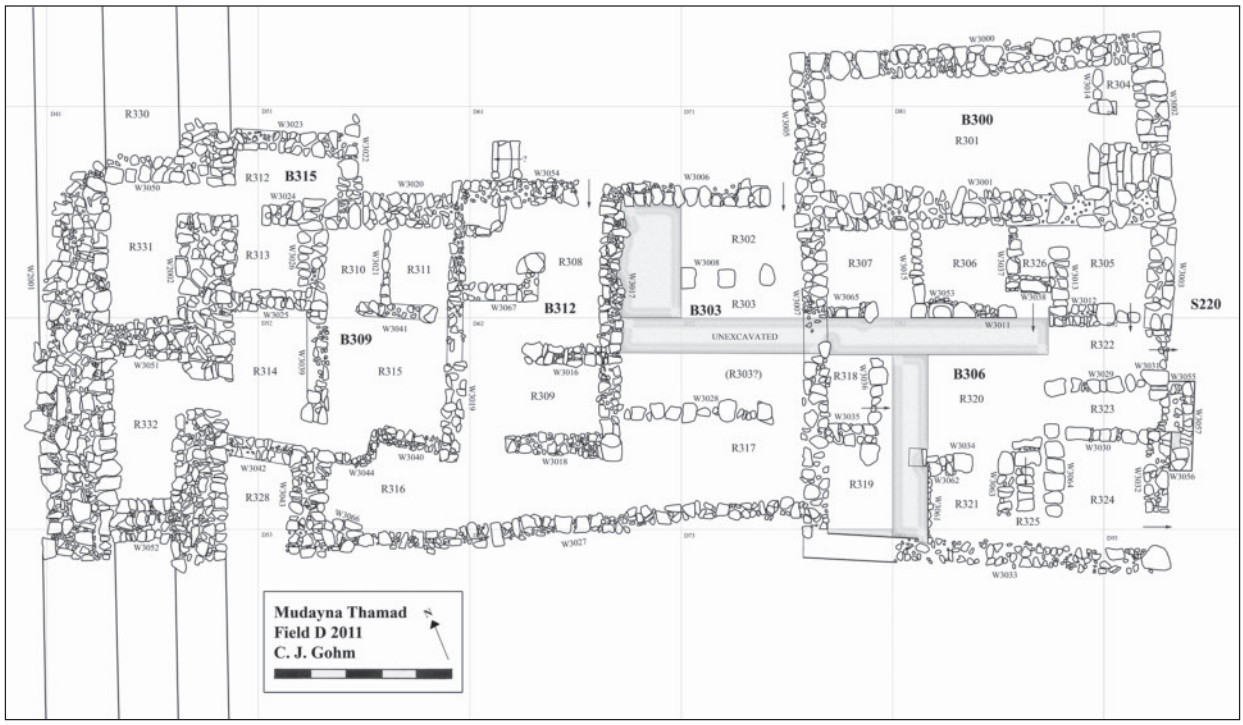
**Field D** (Christopher J. Gohm and Steven Edwards)

Excavations continued in Field D during the 2008, 2010 and 2011 seasons, and were focused in the area west of Buildings 200, B205 and B210 (the three industrial buildings in Field B). Twelve 6×6m squares were investigated in order to document the layout, stratigraphic history and function of the structures comprising this part of the Iron II settlement (**Fig. 26**)[4]. These excavations resulted in greater exposure within previously-identified buildings B303 and B306 (Daviau *et al.* 2008: 349-350), as well as the recognition of three additional structures (B309, B312 and B315) and the western casemate system (W2001 and W2002).

Although occasional industrial remains were recovered in Field D, the function of this area clearly differed from that of Field B. Specifically, the pottery, installations and artifacts indicated that the buildings served a primarily domestic

*25. Consolidated south wall of Building 210, looking east; photo Mr Ali al-Khayyat.*

4. Square supervisors were K. Albino, H. Norum and E. Zeran for the 2008 season, V. Cafik, Z. Reilly-Ansons, M. Silver and N. Urosevic for the 2010 season and K. Albino, R. McMullan, Z. Reilly-Ansons and N. Urosevic for the 2011 season.




*26. Major wall lines of Field Phase 1 in Field D (in progress).*

function. These excavations have yielded one of the largest horizontal exposures of Iron II domestic architecture thus far identified in the region. Based on the layout of the buildings and the nature of the communications between them, these structures appear to constitute several distinct residences. Accordingly, this area has been designated the 'North-West Domestic Quarter'[5]. This residential quarter was separated from the remainder of the Iron II settlement by three walls, the southern wall of B306 (W3033), the long east - west wall south of B309, B312 and B303 (W3027), and the narrow partition wall in B309 (W3042).

Once again, only one occupation phase was documented in this part of the ancient settlement (Daviau *et al*. 2008: 346). Multiple construction and use / modification phases were evident, however, attesting to a relatively long occupational history. The earliest features in the area consist of the western casemate wall, which is abutted by Units B309 and B315, and the previously-excavated B300, which is abutted by B303 and B306. Precise construction phasing in this area is otherwise problematic, as the majority of the walls are footed either on bedrock or discontinuous leveling fills. The following discussion summarizes the key findings associated with each of the five excavated buildings.

*Building 303*

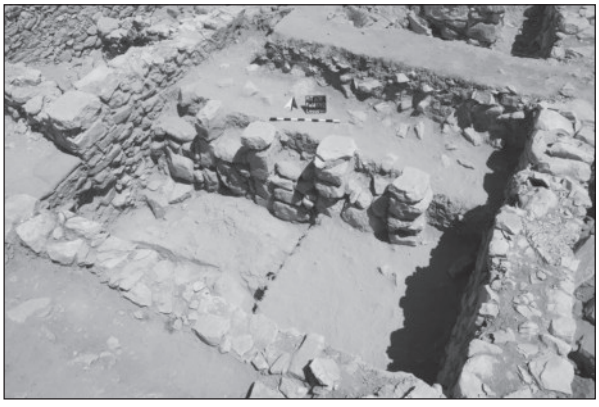
B303 was first explored in 2007 in an effort to better understand the area west and south of the monumental B300 (Daviau *et al*. 2008: 349). Two east-west rooms were investigated (R302 and R303), both of which exhibited evidence of domestic use. During the 2010 and 2011 seasons, excavations were resumed in B303 to gain a better sense of the structure's layout and associated domestic assemblage (Square D72). This work resulted in the identification of the possible southern half of R303 and one additional southern room (R317). These two spaces were divided by an east-west pillared wall; a doorway in the east provided communication between the two rooms. B303 therefore comprised at least three broad rooms (R302, R303 and R317).

The pillared wall in R317 consisted of four

5. It seems likely that second-storey communications existed between several of the buildings in the western part of Field D, as the main floor plans present numerous problems of access (e.g. B309 and B315). Wooden stairs may have been used in these areas.

tall pillars and four low cross-walls. Excavations to the south exposed a boulder pavement (D72:50) and bedrock outcropping beneath a series of collapse layers (**Fig. 27**). Few artifacts were found on this surface, although a restorable krater, two chert pounders, a basalt working surface, several astragali, an industrial hand grinder, a limestone altar fragment, a gaming piece, an anthropomorphic figurine fragment and several other objects were found in the collapse layers above. All of these would likely have been in use on the second floor of B303, further attesting to the structure's domestic function. Prior to the laying of the boulder pavement, the area was prepared for construction. A hard-packed fill (D72:53 / D72:52) was laid to level bedrock depressions in the west; a soil layer (D72:51) was then laid over the fill (**Fig. 28**). The function of R317 is unclear, but it appears as if this area served as a corridor providing access to the southern part of B312. The central part of B303 requires further excavation, as does the possible extension of R317 to the west[6].

*27. View of R317 from the west, showing the pillared wall (W3028), boulder pavement (D72:50) and bedrock outcropping used as a surface.*



*28. View of B303 from the south-east, showing the pillared wall (W3028), southern R317, footings of the westernmost pillar and underlying bedrock.*

*Building 306*

Following the excavation of R305 and the discovery of several high status items in 2007 (Daviau *et al*. 2008:350), a large scale operation was planned for B306 during the 2010 and 2011 seasons. As a result of these excavations, the complete plan of the building has been realized. Measuring 11×10.5m, this structure comprised two eastern hallways (R322 and R323), a western room (R318), four northern rooms (R307, R306, R326 and R305), three southern rooms (R319, R321 and R324) and a staircase to the upper storey (R325), all of which were arranged around a central hall (R320). As mentioned above, all of the northern walls abutted the southern W3001 of B300[7]. This structure was therefore built after B300; based on the fact that W3027 (the southern wall of B303) abuts W3007 (the western wall of B306), it also appears to be earlier than B303.

This building has been subjected to extensive excavation; only three standing balks remained at the close of the 2011 season (**Fig. 29**).

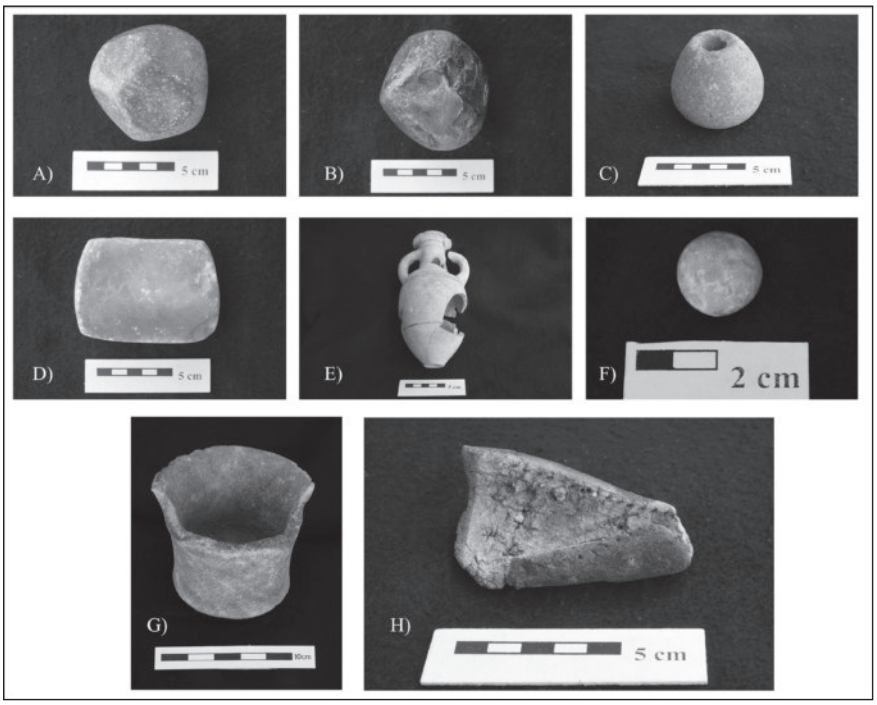
*29. View of B306 from the south-west, showing the southern R321, R325 and R325, the eastern R322 and R323, and the central R320.*

6. These areas will be explored in a future season of the Wādī ath-Thamad Project (C. Gohm).
7. W3001 and W3003 were previously reported as being "bonded in the lowest courses" (Daviau *et al*. 2008: 350). Upon further examination in 2011, it was realized that W3003 clearly abutted W3001, as only one 'bonded stone' was identified. This stone served as a foundational element for W3001, extruded to the south and was incorporated during the construction of W3003.

The majority of rooms have therefore been fully documented; each exhibited evidence of several use / modification phases following construction. As in B303, bedrock was used as a foundation for the majority of the walls; wherever voids were present, hard-packed fills were used to provide a stable footing. The earliest surfaces consisted of a mixture of exposed bedrock and beaten earth. Later surfaces consisted of soil accumulations that were likewise beaten by foot traffic.

As in other parts of Field D, the ground floor surfaces supported few *in situ* artifacts. The most notable exception was R307, the latest surface of which was littered with a mixture of ground floor remains and upper storey collapse - all of these finds were encased in an extremely hard layer of decaying ceiling plaster that was difficult to excavate. Given the nature of the finds, the western and eastern halves of the room had to be investigated separately to avoid crushing pottery and artifacts underfoot. Several unique stone objects were found just over the floor, including two multi-faceted hand grinders, a socketed mace-head and an unusual alabaster hand grinder (**Fig. 30A-D**). The mace-head is without a contemporary parallel in the region. It has been suggested that it was looted from an earlier (possibly Early Bronze Age) context. Work in R307 also resulted in the recovery of a massive corpus of ceramic sherds (over one thousand), including fragments of multiple pithoi, storage jars, hole-mouth jars, a decorated amphoriskos (**Fig. 30E**), Thamad Painted Ware and several other forms. These sherds were distributed throughout the stratigraphic levels within the room, demonstrating that the upper stories contained the household's storage and serving vessels.

Other areas of concentrated finds included R306 and R324. In a burned collapse layer over the floor in R306 (D81:54), abundant restorable pottery was found, as well a bone textile tool, a nodular grinding surface, an industrial grinder, an industrial upper loaf-shaped millstone, a zoomorphic figurine, a hand grinder, a mortar, a pounder and a miniature tray. Embedded in the latest surface beneath (D81:55), an industrial grinder, a pecking stone, two hand grinders and a stopper were found. These finds suggest that R306 was used for food processing activities, which accords well with the discovery of an *in situ* rectilinear limestone basin in the south-western corner of the room (supported by Partition Wall 3053). In R324, collapse layers (D82:32 and D82:35) over the latest surface contained abundant Iron II pottery, a perforated stone, an altar fragment, a limestone socket, a pestle, a basin fragment, a basalt tray, a hand




*30. Notable artifacts from Field D: (A) multi-faceted hand grinder (MT3328), (B) multi-faceted hand grinder (MT3353), (C) socketed mace-head (MT3344), (D) alabaster hand grinder (MT3354), (E) decorated amphoriskos (MT3404), (F) nṣp weight (MT3035), (G) basalt bowl (MT2985) and (H) possible leather furniture fixture (MT3237).*

grinder, a chert pounder and an inscribed *nṣp* weight (**Fig. 30F**).

Similar artifacts were found in the remaining rooms (R319, R321, R323, R326), the majority of which appear to have fallen from the second storey. Notable large finds from the collapse layers included two circular limestone basins (one in R320 and one in R321, both 0.83m in diameter) and an up-ended limestone table (in the doorway to R322 from the street). R322 proved to be the principal access hall to B306; a well-preserved threshold was found with its worn door socket *in situ* beneath the collapse layers (**Fig. 31**). Interestingly, part of the threshold consisted of a recycled shaft altar fragment. Work in Street 220 identified a potential ramp leading into B306, in addition to a series of walls blocking the entrance at the east end of R323.

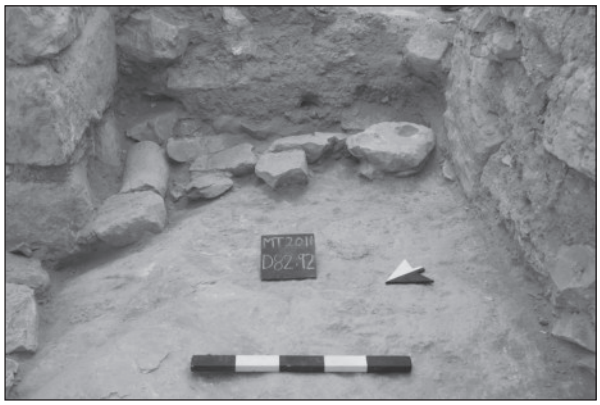
On the whole, B306 appears to have served as a domestic residence, but the presence of numerous high status and unusual goods suggests that it belonged to a wealthy and/or prominent family. Unfortunately, owing to time constraints, the stairwell and unusual blockage outside R323 could not be fully excavated and therefore await further archaeological exploration.

*Building 309*

B309 is located immediately west of B312, with which it shares W3019. This structure possesses a very unusual design, with two northern rooms (R310 and R311), a large eastern room (R315), a curving hallway to a western room (R314) and a doorway to a casemate room (R332). Excavations in the southern part of Square D52 revealed a small curvilinear wall (W3044), which left B309 with a complete lack of external doorways. This absence suggests that access to the second storey was gained via wooden ladders (perhaps within R316) or a possible stone staircase on the northern exterior of B312 (see below).

Excavations began in R310 and R311 in 2008; a low, single-row partition wall (W3021) was found separating the two areas. The northern W3020 measured 0.94m in thickness and resembles B300 in terms of its monumentality. Unlike the tall eastern wall of B309 (W3019), which was built on a compact beaten earth layer more than 1m above bedrock, W3020 was founded on bedrock and was preserved at a much lower level than the surrounding architecture. It is believed that this wall belonged to an earlier construction phase at the site and was later incorporated into B309.

In 2010, excavations shifted to the southern half of B309. The remains in this area proved to be extremely complex, as upper storey walls and installations were preserved *in situ*, including three narrow walls and two semi-circular bins (**Fig. 32**). Following the documentation and removal of these features, lower storey walls were encountered and the layout of B309 was fully realized (**Fig. 33**). Finds from the collapse layers in R314 include an exquisite stone bowl and an unusual leather object, which likely functioned



*31. View of the threshold at the east end of R322 (B306) from the west, showing the worn door socket (upper right), recycled shaft altar (upper left) and bedrock footing.*


*32. View of upper storey features in B309 from the north, showing bin D52:11 (centre), part of bin D52:22 (lower right), wall D51:5 (upper right) and wall D52:13 (upper centre).*

8. A sample of the leather object has been submitted for radiometric dating.

*33. View of B309 from the south, showing all ground floor wall lines and the state of excavations at the close of the 2011 season.*

as a furniture fixture or – less likely – a bow grip (**Fig. 30G-H**). The leather object was perforated along the edges and pierced by several iron and copper-base metal pins, of which one of the latter had a spiral cross-section (possibly formed by twisted copper wires)[8].

On the whole, the majority of small finds from B309 were utilitarian in nature (e.g. hand grinders, pounders and millstone fragments), suggesting a focus on food processing and storage. Significant quantities of smashed ceramic vessels and animal bones were found in R315, for example, and a rectangular limestone basin was recovered from the upper storey collapse in the northern half of R314 (the leather object was found next to this basin).

Excavations in the south-eastern part of D52 resulted in the identification of another room (R316) which may be associated with the potential east-west corridor running across the southern parts of B312 and B303. Although incomplete, investigations in R316 resulted in the discovery of abundant animal bones and several fragmentary zoomorphic figurines. In the south-western part of D52 a massive north-south wall (W3043) was found, running parallel to the inner casemate wall. This wall appears to continue to the south; R328 to the west has only been partially excavated. In the closing days of the 2011 season, a possible earlier wall with a different orientation (W3066) was recognized beneath W3027. This area will be further explored in the 2012 season.

Casemate R332 was also examined during the 2011 season and contained a number of fragmentary storage vessels and several well-preserved utilitarian tools (including a mortar, a pestle and a variety of millstones). Interestingly, floor level in this casemate room was over 1m below the doorway through the inner casemate wall (**Fig. 34**). Given the lack of communications to the north and south, it seems likely that R332 was functionally incorporated into B309. The dimensions of both the inner casemate wall (W2002) and outer casemate wall (W2001) are consistent with those previously documented in Fields A, B and E. The inner casemate wall measures between 1.50 and 1.60m in thickness, whereas the outer casemate wall measures between 2.10 and 2.40m in thickness. Both walls were constructed of semi-dressed limestone boulders and cobbles in the boulder-and-chink style, as were the three cross walls (W3050, W3051 and W3052) identified during the 2011 season.

*Building 312*

B312 is located immediately west of B303

*34. View of R332 from the north, showing the doorway through the inner casemate wall to (left), bedrock and collapse layers (centre), and outer casemate wall (right).*

in the centre of the excavated area; it comprised two rectilinear rooms (R308 and R309). The northern R308 contained a large central pillar (D61:15) and a low partition wall (W3067). A doorway in the south-west provided access to the southern R309. Although incompletely excavated, the potential corridor identified in R317 appears to continue to the south of B312, where a doorway provided secondary access to R309. The primary entrance to B312 was however identified in the north-eastern corner of R308; the structure was accordingly assigned an independent building number. Interestingly, this doorway was flanked by a possible staircase (D61:7) leading to the second storey. This feature was constructed against the northern exterior wall of the building (W3054) and requires further investigation[9].

In the north-west corner of R308, a small curvilinear installation (D61:28) was uncovered. It consisted of a single row of stones arranged in a quarter-circle and the interior was paved with flat-lying cobbles atop a hard-packed beaten earth and plaster layer (**Fig. 35**). The function of this installation remains unclear, although the nature of the paving suggests that it may have been used as a storage area for vessels containing liquids. The majority of the Iron II ceramic sherds collected from the floor in R308 comprised fragments of storage jars and cooking vessels. Small finds included two hand grinders, three chert pounders and an anthropomorphic figurine.

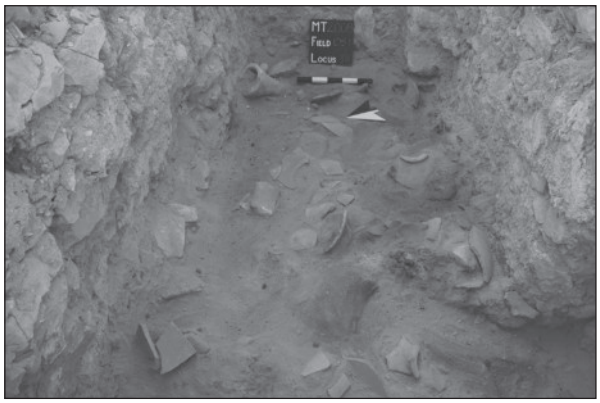
The finds from the southern room (R309) were similarly utilitarian. A circular limestone basin (0.80m in diameter) in the eastern part of the room was in two pieces leaning against W3017. Beneath this basin, and throughout the remainder of R309, several hundred early Iron II and late Iron II sherds were discovered. Other finds included two chert pounders, a large quern, an upper loaf-shaped millstone, a bone spatula and part of a zoomorphic figurine. Overall, the finds from B312 are clearly indicative of a domestic context, with numerous areas involved in food processing activities.


*35. View of D51:28 in the north-western corner of R308 from the south, showing the installation and beaten earth surface D61:32.*

*Building 315*

B315 was first excavated in 2008 and was revisited in 2010. Comprising the northern R312 and the southern R313, this building appears to be an architecturally distinct unit - it does not communicate with any other structure in Field D, with the exception of casemate R331 to the west. A single doorway connected R312 to R313. Given the lack of access to these rooms, it must be assumed that wooden ladders were used to descend from the upper storey.

Excavations determined that both R312 and R313 were used as storage areas. Large quantities of storage jars were found in both rooms, along with a number of mortars and millstones (**Fig. 36**). In R313, collapse layer D51:43 contained many ceiling plaster fragments and the remains of several smashed vessels (more than 200 sherds of Iron II and late Iron II date). These vessels, which included at least one large krater and one pithos, likely once rested on the second storey. Beneath this layer, D51:44 contained abundant ash and charcoal, as well as at least three burned




*36. View of R312 from the west, showing layer D51:38 and associated finds.*

9. A small-scale excavation is planned here for the 2012 season (S. Edwards) in order to determine if this was indeed an external staircase (as opposed to patterned boulder collapse).

ceiling beams (one nearly 1.5m long), restorable ceramics (at least one storage jar), a weight, a polishing stone and an upper loaf-shaped millstone. Multiple use-surfaces were also identified in each of these rooms; these accumulated over the boulder and soil fills that served to provide a stable footing for the Iron II walls.

Although casemate R331 was only partially excavated during the 2011 season, massive quantities of storage vessel fragments were recovered, as well as several complete millstones. There can be no doubt that this part of the Iron II settlement was dedicated to storage and food processing. As a final note, although the ground floor plans of B315 and B309 are distinct, it seems likely that these areas were connected via the upper storey. In essence, these buildings may constitute part of a larger domestic complex, in which R312 and R313 (and potentially casemate R331) served as a dedicated storage area. Given the lack of ground level access to B315 and B309, it is also possible that B312 and B303 also comprised part of this larger complex.

**Nabataean-Roman Sites in the Wādī ath-Thamad Region: Site WT-12 / Mughur Shābik, Site WT-139 and Site WT-143** (Mechthild Ladurner)

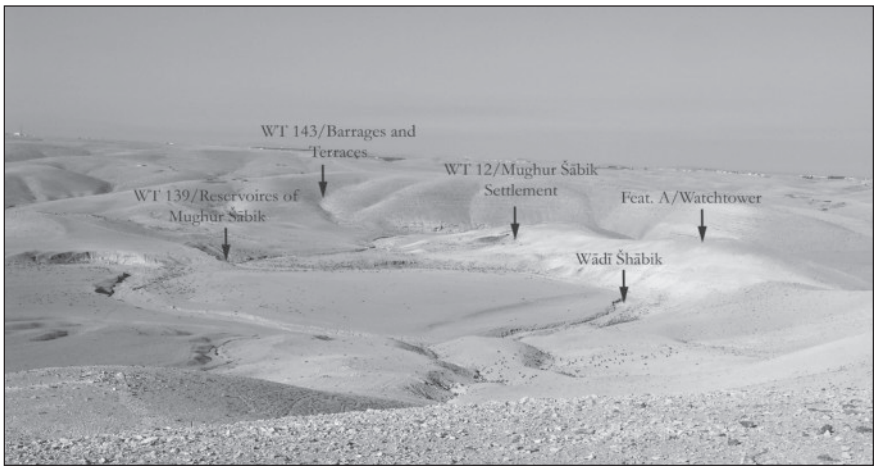
Another focus of research, added in 2007 to the Wādī ath-Thamad Project, consists of the documentation and study of Nabataean-Roman sites in the region, where 'site' is defined as a structure, a group of structures or a concentration of finds (see Silvonen *et al*. 2008: 171). Previous seasons of the Wādī ath-Thamad Regional Survey, as well as data from two years of extensive survey between 2007 and 2008, have revealed more than 30 Nabataean - Roman sites in the area, including architectural structures (domestic structures, watchtowers etc.), water installations (dams, channels, cisterns and reservoirs), agricultural features (field boundaries and terraces), road sections, quarries and burial sites (see Dearman 1996; Foley 1998; Daviau, Mulder-Hymans, Foley *et al*. 2000; Daviau, Steiner, Weigl *et al*. 2006; Daviau and Foley 2007; Lykke and Ladurner 2011; Ladurner 2012)[10].

The main objective of the 2008 field season was the documentation of Mughur Shābik, one of the major Nabataean settlements in the area, as well as its adjacent sites (**Fig. 37**). The site, registered on *MEGA-Jordan* as Site 2696, lies 2.2km south-east of Khirbat al-Mudayna on the bank of Wādī Shābik, a tributary of Wādī ath-Thamad[11]. Its topographical setting resembles several other Nabataean-Roman settlements in the area and is particularly similar to WT-6 / Tāqa (Site 12382 on *Mega-Jordan*). The architectural remains of both sites are aligned along the banks of the *wadis*, which surround vast areas of agricultural land lying in front of the settlements.

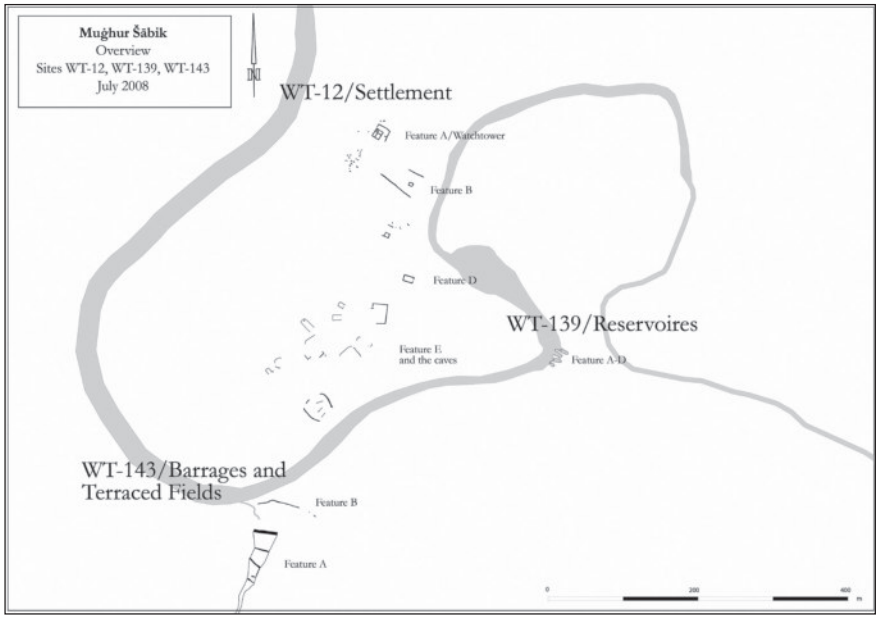
The surface pottery at Mughur Shābik has so far permitted the differentiation of two occupational periods. After an earlier settlement phase in the second half of the 1st century AD, there seems to have been a hiatus that lasted until the re-occupation of the area around the middle of the 3rd century AD.

Our understanding of the layout and organisation of the settlement, as well as its relation to neighbouring sites WT-139 and WT-143, is still fragmentary. The architectural remains at Mughur Shābik are located on the top and at the base of a rocky hill flanking the *wadi* (**Fig. 38**). In the southern part we documented eight semi-natural caves of similar size and layout, each consisting of a single rock-cut chamber (between 45 and 55 $m^2$), with a courtyard in front delineated by curvilinear or rectilinear walls (**Fig. 39**). Although there is no secure evidence for either the date or the function of these caves, they do have features in common with dwelling-caves at Petra (e.g. Kolb 2007: 146-153). Close to this area is a free-standing, hall-like structure (Feature E), measuring 25×20m with no visible

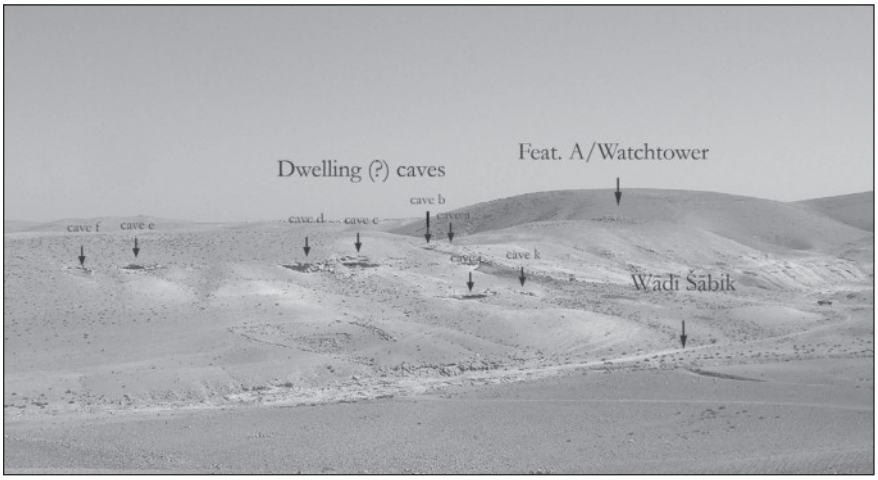
10. The regional survey was directed in the first two seasons (1996 and 1997) by J. Andrew Dearman (Austin Presbyterian Seminary, Austin, Texas, USA), followed from 1998 to 2001 by Christopher M. Foley (University of Saskatchewan, Canada). It is presently carried out under the direction of Jonathan Ferguson (University of Toronto, Canada). The surveys of Nabataean sites were carried out in 2007 and 2008 by Rainer Feldbacher, Mechthild Ladurner and Anne Lykke at the invitation of Project director P. M. Michèle Daviau and in parallel with the research of Jonathan Ferguson.
11. Wādī Shābik was mentioned and mapped by a number of early explorers in Transjordan. See Tristram 1874: 152, 175; Brünnow and Domazewski 1904: 3–5, 26–28, 1905:73–74, 86, 90; Musil 1907: 12–13, 18–21, 108–112, 246–248.




37. *WT-12 / Mughur Shābik and neighbouring Sites WT-143 and WT-139, seen from the north-east.*




38. *Schematic map of WT-12 / Mughur Shābik, WT-143 and WT-139.*




39. *The dwelling (?) caves of Mughur Shābik seen from the south.*

interior divisions. Several trade-related items were found inside, as well as in the immediate vicinity of the building, thereby suggesting an industrial function.

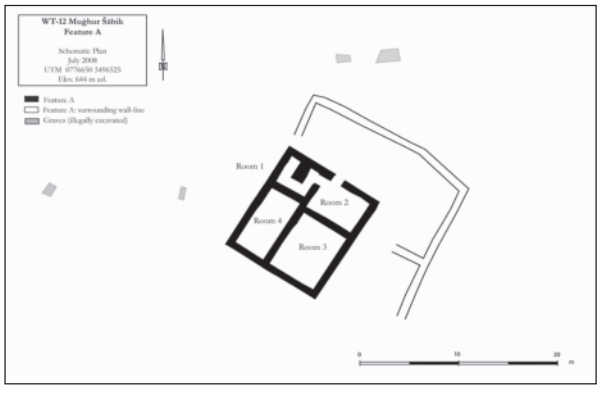
Further to the north we documented a rather poorly preserved, north-west-south-east orient-

ed structure measuring 14×8m (**Fig. 40**).

One course of the limestone blocks is visible above ground level, having an embossed exterior face to the walls (5-8cm wide margin, worked with a dentilated chisel). Projecting boulders on the inner face of the eastern and western walls at regular intervals of approximately 1.20m can most likely be interpreted as supports for arches, a feature common to several Nabataean buildings in the area, i.e. 800 and 802 at Khirbat al-Mudayna (Daviau, Mulder-Hymans, Foley *et al*. 2000). Although Nabataean pottery was found in relatively large quantities in the immediate vicinity, questions on the date and function of this structure remain open.

In the northern part of the settlement, on top of the hill at Shābik, lies Feature A - a nearly square (12×11m), well-built structure with rather thick walls (80-90cm) partly covered by debris (**Fig. 41**). The only entrance to this building lies on its north-eastern side, leading into a rectangular vestibule that gives access to a staircase leading to the roof or an additional floor (**Fig. 42**). The well-chosen position of this structure overlooking the buildings to its south, the surrounding farmland and the rock-cut water reservoirs to its east, in combination with its size and layout, suggests that this feature may have been a watchtower protecting the settlement and surrounding territory.

*40. Feature D seen from the north-west.*

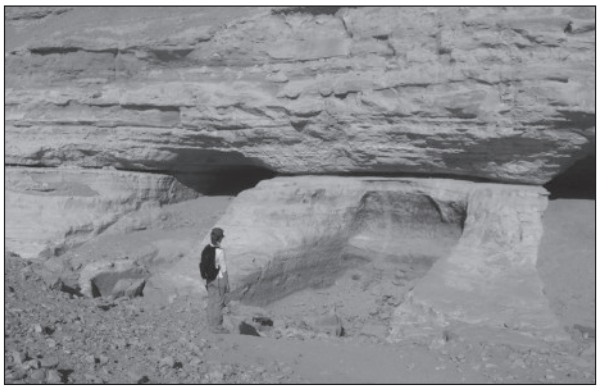



*41. Watchtower / Feature A on top of the hill at Shābik.*

*42. Room 1 of Feature A, with its central pier for a staircase.*

Immediately to the north and south of the presumed watchtower we documented a series of looted graves that seem to be placed in a regular manner, insofar as most of them are orientated north-east - south-west. As the looters have destroyed most of the evidence, there is little material with which to date these graves, except for a Late Roman coin ([?] Valerianus on the obverse) found in the immediate vicinity.

Approximately 300m south-east of the so called watchtower, flanking Wādī Shābik, is site WT-139. It comprises four large reservoir basins cut parallel to each other into a rock slope descending towards the *wadi*. The central basin, Feature B, is a nearly rectangular basin of 6.9×4.6m, separated from the three basins to its north and south by bedrock balks (**Fig. 43**). The narrower basins (A, C and D) are equipped



*43. The central reservoir basin (Feature B) of WT-139.*

with an opening of 0.80-2.00m, flanked on one side by an L-shaped scarp of bedrock, leading the water into a tank of 0.33 – 5.00 m in width. All four basins are protected from the sun by the protuberance of the bedrock vaulting. Almost no pottery was found on or around site WT-139. The proximity of this site to WT-12 / Mughur Shābik suggests that the water stored in these basins was used by the inhabitants of this same settlement, perhaps for agricultural purposes such as irrigation and watering livestock.

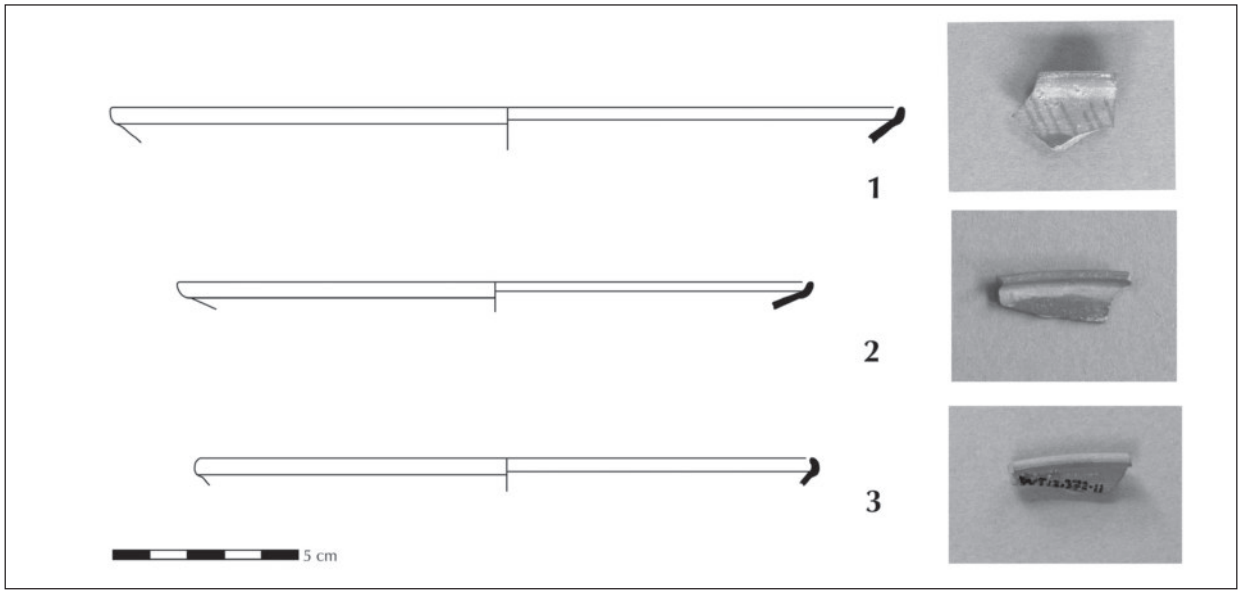
Site WT-143, lying approximately 30m south of the settlement on the opposite site of the *wadi*, is similarly ambiguous regarding its date. Situated in a north - south orientated gully, site WT-143 comprises a system of gully barrages and terraced fields. The upper barrages are built across the gully and consist of uncut blocks.

The lower, broader walls can most plausibly be interpreted as agricultural terrace walls. These could have served to maintain soil on slopes, while the upper barrages slowed down the flow of water. Similar sites are found throughout the Wādī ath-Thamad region (Lykke and Ladurner 2011). Although almost no pottery was found at Site WT-143 or comparable sites in the region, Nabataean parallels from Jabal Hārūn show similar characteristics (Lavento *et al*. 1999; Lavento *et al*. 2007; Silvonen *et al*. 2008).

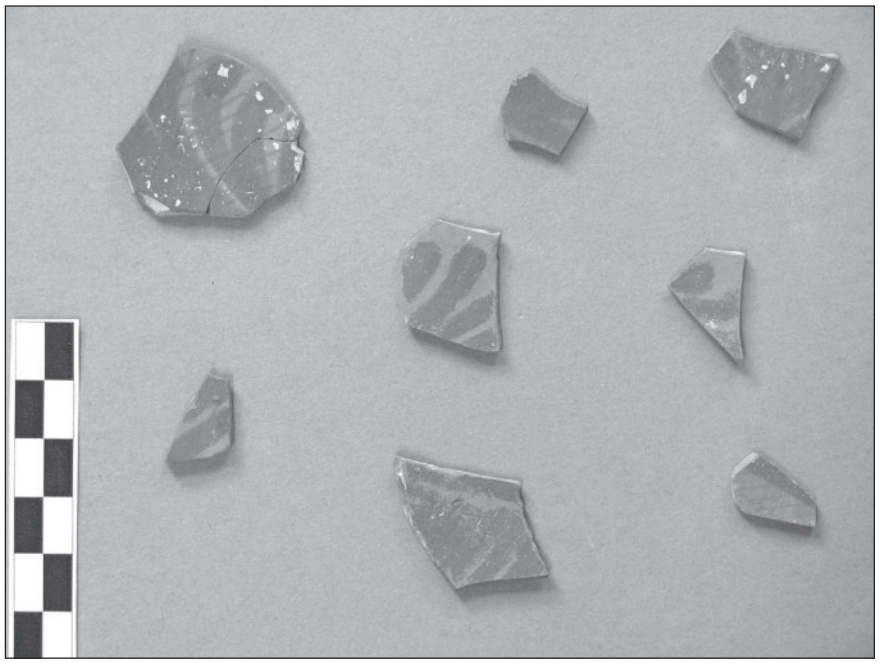
Our first results from Mughur Shābik and neighbouring sites lead us to view this area as a single entity, most likely dedicated to agricultural production. Bearing in mind that the attribution of specific features of this site to a particular period is difficult on the basis of survey data alone, there is some evidence to suggest that a significant proportion of the architectural features and agricultural and hydraulic installations of Mughur Shābik belong to the Nabataean / Early Roman period. This date is suggested by the presence of Painted Nabataean Fine Ware (**Figs. 44-45**) and Unpainted Fine Ware (**Fig. 46**), as well as some fragments of Eastern Sigillata A bowls **(Fig. 47**). The settlement was most likely abandoned by the end this period and was not - according to surface finds - re-occupied prior to the second half of the 3rd century AD.

**Field N: The Nabataean House Complex** (Noor Mulder-Hymans)

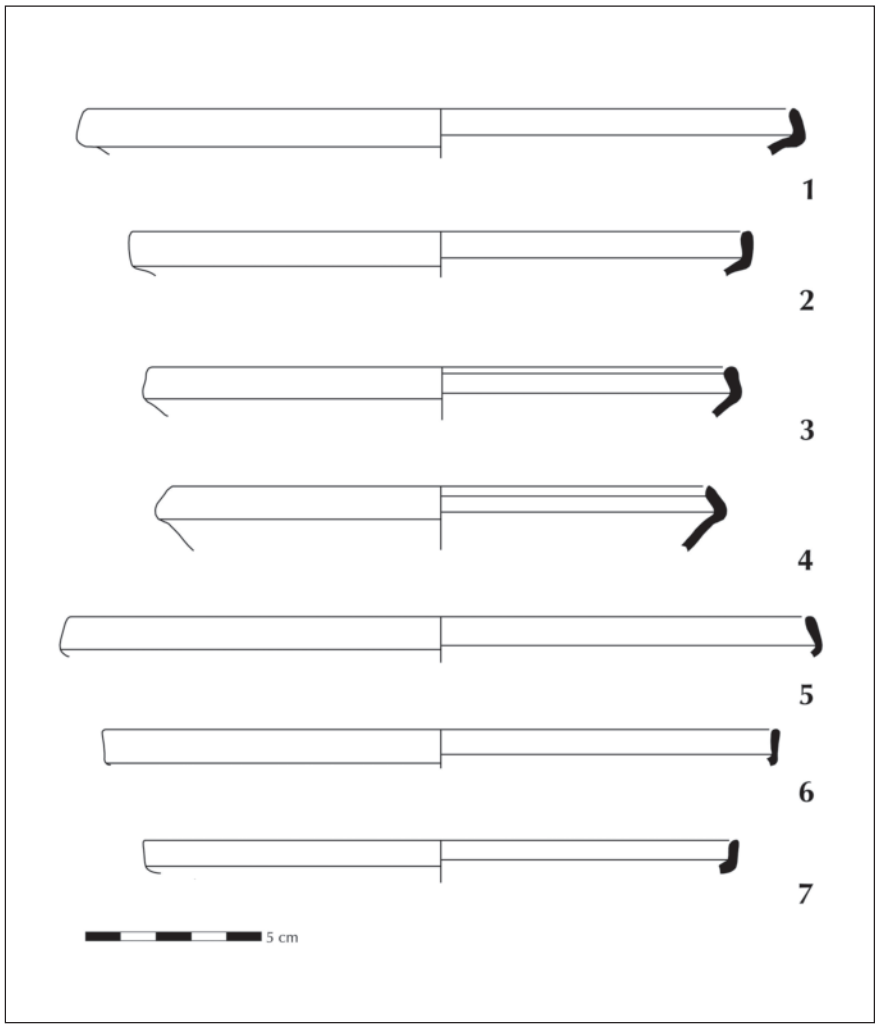
After eight seasons of excavation, the Nabataean house complex in Field N at Khirbat al-Mudayna has been completely exposed (**Fig. 48**). This complex consists of two units, including one in the south-east corner (B800) and a second unit of rooms on the west and north surrounding a central courtyard (B802). This larger unit is surrounded by an enclosure wall that abuts



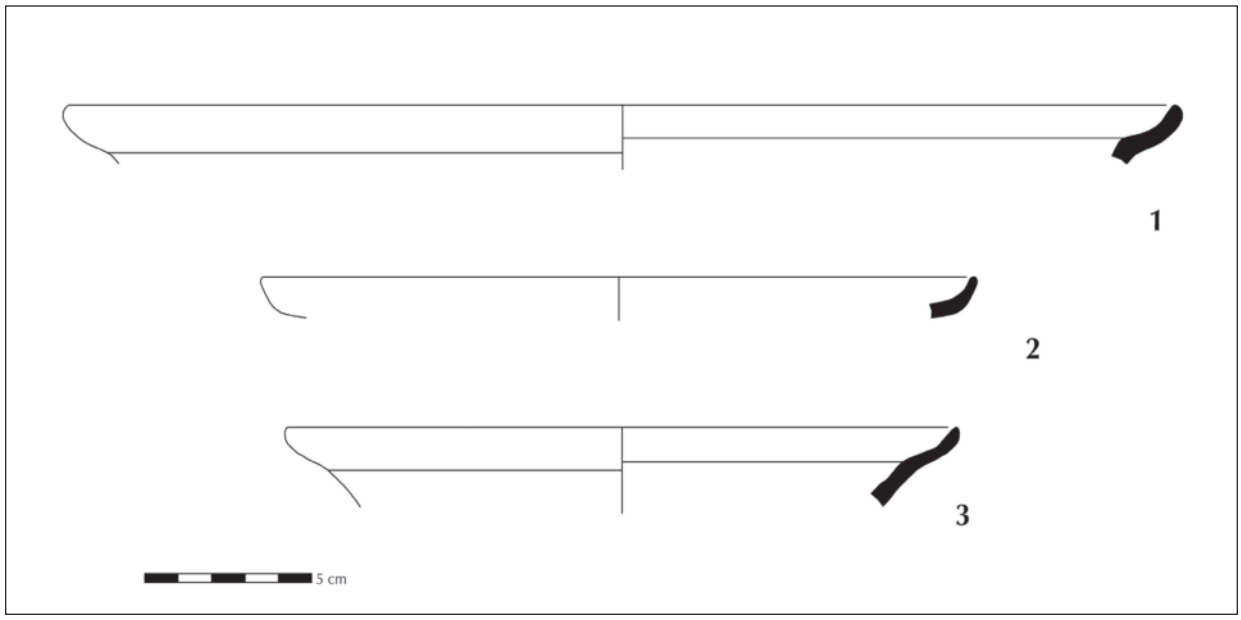

*44. Examples of Nabataean Painted Pottery: (1) WTR 12/10.8, painted bowl, diam. 21.2 cm, surface colour 2.5YR 6/6 orange-red, colour of decoration 2.5YR 5/5 reddish brown; (2) WTR 12/370.1, painted bowl, diam. 17 cm, surface colour 2.5YR 6/6 light red-orange, colour of decoration 2.5YR 4/5 pale brownish red; (3) WTR 12/372.11, bowl, diam. 16.4 cm, surface colour 2.5YR 6/6 light red-orange, no traces of paint on the rim.*



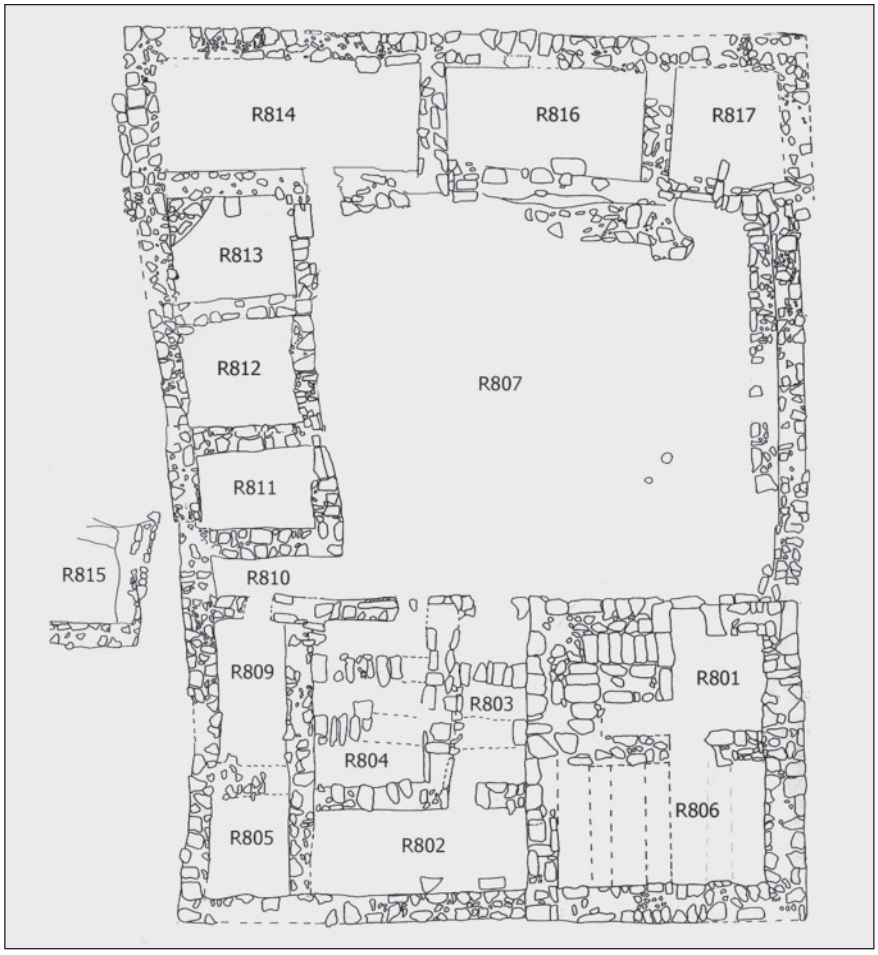
45. *Fragments of Nabataean Painted Pottery; decoration is similar to Dekorphase 3b (70 / 80-100 AD) as defined by Schmidt (1996, 2000).*




46. *Examples of Nabataean Plain Pottery: (1) WTR 12.14.83, bowl, diam. 20 cm, surface colour 5YR 6/5 light reddish brown; (2) WTR 12.367.14, bowl, diam. 16.8 cm, surface colour 5YR 6/5 reddish brown; (3) WTR 12.373.15, bowl, diam. 16.4cm, surface colour 5YR 6/6 light reddish brown; (4) WTR 12.373.13, bowl, diam. 15.2cm, surface colour 2.5YR 6/6 red; (5) WTR 12.19.2, bowl, diam. 21cm, surface colour 2.5YR 6/6 red; (6) WTR 12.19.10, bowl, diam. 18 cm, surface colour 2.5YR 6/6 red; (7) WTR 12.370.3, bowl, diam. 16.8 cm, surface colour 2.5YR 6/6 red.*




*47. Examples of Eastern Sigillata A from Mughur Shābik (close to Hayes 54, dated 75 / 80-130 / 150 AD): (1) WTR 12.370.14, plate, diam. over 30cm, colour of fabric 7.5YR 8/4 pale pink, colour of slip 10R 5/8 red; (2) WTR 12.19.33, plate, diam. 21.2cm, colour of fabric 5YR 7/3 pink, colour of slip 10YR4.5/8 red.*




*48. Plan of building complex 800 + 802 at the end of the 2010 season.*

B800. In this report the excavation results of the 2007, 2008 and 2010 seasons within Complex B800 + B802 will be discussed. The excavations of the earlier seasons have been reported previously (Daviau *et al*. 2000: 275–279).

Within this large building complex, two types of pottery were found: Nabataean and early Roman. The Nabataean pottery consisted of daily household coarse wares, well-fired with fine and sharp ribs on cooking pots, jugs and jars. Plain and coarse ware bowls, as well as the eggshell-thin ware, mainly in the form of plates and shallow bowls (with or without floral painted designs) are also present. A research program has been set up to study these wares which have been preliminary dated to the 1st century BC - 1st century AD[12]. The Early Roman pottery shows a variety of types: jugs, casseroles, cooking pots, bowls and jars. It is very well-fired pottery with a variety of ribs on the outside, from shallow to very sharp. Several types of red slip wares, including *terra sigillata,* and some oil lamps dating to the late 1st - early 2nd century AD were also found.

*Building Unit 800*

Building 800 is located at the south-east side of the complex and consists of Rooms 801 and 806, and a staircase to the upper storey. Altogether this unit measures 9m×7.5m. Along with Rooms 802, 803 and 804 of B802 to the west, these rooms formed the living quarters of this well-constructed part of the complex.

*Building 802*

Rooms 805 + 809

To the west of Rooms 802 and 804 is a long narrow space (3.5m×9m) consisting of Rooms 805 and 809. When first uncovered, Rooms 805 and Room 809 were divided by a collapse of stones that was only later recognized as an arch dividing a single room. This room is enclosed by W8016 to the west, W8002 to the south, W8015 to the east and two wall stubs to the north, two wall stubs to the north (W8023 and W8024 on the west and east sides respectively of Doorway G). The arch stones are smaller than those used in the arches spanning Rooms 814-817, located along the outer north wall (W8017) of B802, because R805 was a much narrower room. In the south (R805) a hard beaten surface was reached, while at the north end, below the fill in Doorway G, a threshold stone was visible as well as a support stone underneath it. The fill in Doorway G has been left in place as a support for both wall stubs.

In the west, a few cobbles under Wall 8016 served as foundation stones, but most of this wall was built directly on a very hard packed whitish soil, as was the case for most walls in other rooms. Only a few sherds were found on the top of this hard packed soil, which appears to have served as the final surface in this room.

Room 810

To the north of Room 805 + 809 is Room 810, an open area between Walls 8016 to the west, W8021 to the north, and wall stubs 8023 and 8024. This space measures 2.5×4.5m, serving as access to Courtyard 807 and forming a small corridor that leads to Doorway G. All the surrounding walls were built with several irregular lower courses as a footing and were topped with heavier and larger stones. The many patches of wall plaster *in situ*, as well as in the debris, demonstrate that the not-so-regular boulder-and-chink constructed stone walls were smoothed with a layer of plaster. The floor (N45:26) was a surface of very hard packed soil, which also served as the foundation for the walls. Only W8012 and W8024 rested on good foundation stones. Below the floor in Room 810 virgin soil was reached.

Room 812

Along the west side of central courtyard R807 are three nearly square rooms north of Corridor 810 (R811, R812, R813). Central Room 812 measures 4.3×4.5m, opens onto the courtyard to the east and is enclosed by four walls (W8016, W8019, W8020 and N44:24). On the east there is a continuation of the east walls in R811 and R813, although at the north end of this wall a doorstep was found. These walls are also built in boulder-and-chink construction. Room 812 was filled with large boulders, cobbles and pebbles through several loci. The builders of this structure scavenged Khirbat

12. Dr Maria-Louise Sidoroff has undertaken a study of the small Petra-style forms; Alisha Mohamed has completed her MA thesis on the decorative schemes represented at Wādī ath-Thamad sites.

al-Mudayna for many of their building stones. This is shown by chisel marks on at least half of them that are of typical of the Iron Age town on the *tall*, but different to those considered typically Nabataean. Room 812 was fully excavated and several deep probes were made along the walls to determine their construction history below the surface (N44:26). The walls rest partly on foundation stones, but mainly on the very hard packed whitish soil. A small, crudely-worked stone container and part of a ceramic lamp from the 2nd century AD were found in Debris Layer N44:22 above the floor surface.

Room 814

Part of this room was previously excavated in 2006. When completely exposed, the room measured 4.7×8.5m, with walls of the same construction seen throughout. The tumble of an arch, N32:12, was visible as a broken line of big boulders (voussoirs) in front of a heavy friable pier, N32:13, in W8017. The first stone (voussoir) of the arch had shifted, but was built into W8028. Within W8017 two more piers were constructed, N32:14 and N32:15. All piers are in a poor state of preservation (**Fig. 49**). In the upper loci some very nicely tooled architectural fragments were found, one piece measuring 18×11×4cm (**Fig. 50**).

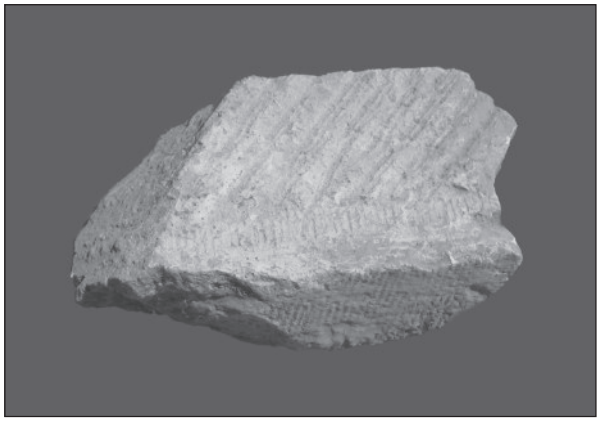
Underneath some layers filled with boulders, cobbles and pebbles, a heavy burned habitation layer *ca* 0.30m deep, N32:25, was associated with the threshold stone in the doorway and the stepping stone in front of it. Part of a 2nd century AD oil lamp and some early Roman pottery was found on the underlying surface. Probes were made along W8017, 8027 and N43:12 through the floor. Foundation stones were discovered mainly under W8017 and Pier 13. The other parts of the walls rested on the natural, very hard packed soil.

Room 817

Room 817 is the north-east corner room of Building 802. The room is smaller than Room 816 to the west and Room 814 in the north-west corner. W8028 along the south side of R816 is abutted by W8029, which is the east wall of room 816 and west wall of room 817. A partly collapsed arch, N52:6, sits on a soil and wall tumble fill, dividing the room into two equal halves: west and east. Most of the arch stones and voussoirs were of friable limestone and fragmented, but in the north part of the arch some solid stones were visible. Rooms 816 and 814 had three arches each; these were resting on piers in W8017 and were built into the walls W8028 and 8018. In Room 817 the arch was built into W8017 and rested on a pier on the south side (N52:32).

Although a threshold stone marks the entrance to R817, no habitation surface was found at this elevation. Once soil locus N52:25 – flush with this stone – was removed, it became clear that the threshold stone was a nice piece of reused limestone that rested on small, round, regularly shaped cobbles. The southern part of the doorjamb rested on this threshold stone, leading to the conclusion that the threshold stone and southern part of the doorjamb were constructed at the same time. The northern part of the doorjamb reached into the foundation of W8029, N52:34, and was built at the same time as this west wall. This part belongs to surface N52:33,


*49. Collapsed voussoirs in Room 814.*



*50. Nabataean tool marks preserved on an architectural fragment.*

which is hard packed and had many ashy pockets, bones and pottery. On top of this surface are the foundation stones of the pier that would have supported the arch on the southern side of the room. W8029 itself also seems to have two distinct construction styles; the top wall stones are built over the doorjamb.

The function of this room is still unclear; few objects have been found, except for a small stone fragment, a piece of iron, two fragments of glass, a ceramic fragment, a good deal of pottery (some charred) and a large cache of restorable ribbed pot sherds located in the north-east corner. The later addition of the threshold stone and southern portion of the doorjamb seems to indicate that the room had at least two phases.

Room 815 Outside B800 + 802

Room 815 was partly excavated in a previous season and revealed a plastered floor (N45:8) and the lower courses of a plastered wall, W8022 (N45:6). To gain a better understanding of what the shallow plastered area was used for, three new squares were opened in 2010: N35, N36 and N25. The plaster floor was completely uncovered, along with the four walls that surround it (**Fig. 51**). When fully exposed, this feature measured 9.24×4.25m. The floor plaster runs up to and seals up against the four walls that enclose the floor, which suggests that it may once have held water. It has not been determined if this room was used as a water reservoir, a settling tank or even as a shallow pool. Interestingly, a channel has been found which will need to be investigated further in order for any decisive conclusions to be made, since the channel could have been built prior to the first phase of R815. A similar structure has been found against W8031 near the south-west corner.

*51. Plastered area R815 to the west of B800 + 802, looking east.*

Between R815 and the west wall (W8016) of B802 is a narrow passageway cluttered with a collapsed construction of very big boulders and a rope stone. It is not clear at this stage of excavation if these boulders are components of a cistern that was related to the plastered room.

Conclusion

The Nabataean house complex in Field N, Building 800 + 802, was built in one stratum with two possible phases close in time. Phase one was the solid boulder-and-chink construction of B800. This unit with a staircase and a second (and possibly third) floor was well-built with a stone-paved floor in Room 806 (Daviau *et al*. 2000: fig. 11). Built up against B800 on its west side is a second unit constructed using the same construction techniques. At the same time the perimeter walls were built. W8005, the south wall of B802 and Room 805, abuts the south wall of B800, W8002. On the east side of the complex, the east wall (W8030) of B802 abuts the east wall (W8003) of B800. The corners of the four perimeter walls are bonded, and all inner house walls abut the four perimeter walls.

The rooms of Building 802 are grouped around the courtyard and were built as an integral unit. The walls were built in boulder-and-chink construction, but with smaller, more irregular stones in two rows with a rubble core. The rooms themselves had arches resting on piers. The surfaces consisted mainly of hard beaten earth or hard packed whitish earth and stone paved floors. In some rooms there were ash pockets on the surfaces. A relatively small quantity of pottery sherds and household objects was found, but their infrequency suggests abandonment and removal of most personal possessions. In R814, a 0.30m thick layer of heavy burned soil with ash and charcoal fragments, some bone and blackened pottery sherds was exposed. Adjacent to Room 814 in Central Courtyard 807, an oven – possibly for communal use – was excavated.

Since the area around Mudayna is known as a rich grain-growing area of Moab, the Nabataean settlement could have functioned as a supply area for the city of Petra. This may explain the occasional pieces of very thin, painted Nabataean pottery imported from Petra.

The ceramic repertoire of the inhabitants of this complex included cooking ware and household utensils, with a variety of ribbed wares represented – especially in jars and jugs. A few pieces of imported *terra sigillata* were also present. In all rooms around the courtyard that were excavated to floor level, this pottery is found together with Herodian-style oil lamp fragments. The oldest pottery present consists of Iron Age potsherds which washed down from the Iron Age settlement on the mound above the Nabataean site. It is not yet clear why the Nabataean settlement was deserted, although it may be related to the Roman conquest of the Nabataean realm in the early 2nd century.

*Room 815*

Room 815 with its plastered floor has very low walls and is located above floor level in the adjacent house complex. The plaster in Room 815 was very well-laid and runs up the surrounding walls, with extra heavy plaster (a 'curb') where the floor meets the wall. A small part of the plaster floor was removed and a sub-floor with flat cobbles revealed. In the depression (cistern?) next to R815, three plastered layers with stone layers in between are visible in the section. This resembles the high-quality construction of the plastered floor and walls in the reservoir: Building 700 (Daviau *et al*. 2006: fig. 19).

Below these three plaster layers in R815, the earlier surface of heavy plaster was visible. Because Reservoir B700 was very close to the house complex, Room 815 is likely to have had its own special function. So far no parallels are known and further study is needed. In the area to the west of the Nabataean house, more walls are visible on the surface. Further excavation may lead to a better understanding of the function of Room 815 and its possible association with other structures in the settlement.

**Wādī ath-Thamad Regional Survey** (Jonathan Ferguson)

During the 2010 field season, the Wādī ath-Thamad Regional Survey[13] continued its study of Khirbat al-Mudayna's hinterland. The following sites were visited and documented in 2010, with a focus on sites in the north-western portion of the survey territory:

- WT-1: Khirbat al-Mudayna on Wādī ath-Thamad;
- WT-9: a hilltop stone pile (ruined watch-tower?) north-west of Khirbat al-Mudayna;
- WT-17: Khirbat al-Hirī, an Iron Age fortress north of Khirbat al-Mudayna;
- WT-24: Khirbat az-Zūna, a late Roman *castellum*;
- WT-30 / 100: a ruined tower or farmstead north of Zaynab;
- WT-144: a long field wall in Wādī az-Za'farān east of Khirbat al-Hirī;
- WT-145: a stone circle with standing stones and inscriptions south of Khirbat al-Hirī;
- WT-146: two stone circles and graves east of Khirbat al-Hirī;
- WT-147: three dams at the confluence of two *wadis* north of Khirbat al-Hirī;
- WT-148: graves and abandoned *bedouin* camps north of Khirbat al-Hirī;
- WT-149: a plastered room or installation north of Khirbat al-Mudayna;
- WT-150: a looted cemetery north of Khirbat al-Hirī;
- WT-151: three looted cemeteries north of Khirbat al-Hirī;
- WT-152: a looted cemetery with a megalithic structure north of Khirbat al-Hirī;
- WT-153: a looted grave and cairn north of Khirbat al-Hirī;
- WT-154: a cave and grave on the hill slope north of Umm Ruṣūm;
- WT-155: the early 20th century village of Umm Rusūm, west of Khirbat al-Hirī;
- WT-156: a hilltop lithic scatter north-west of Khirbat al-Hirī;
- WT-157: a looted cemetery east of Khirbat al-Hirī;
- WT-158: caves and a wall line east of Khirbat al-Hirī;
- WT-159: a Byzantine / Early Islamic complex north-west of Khirbat al-Hirī.

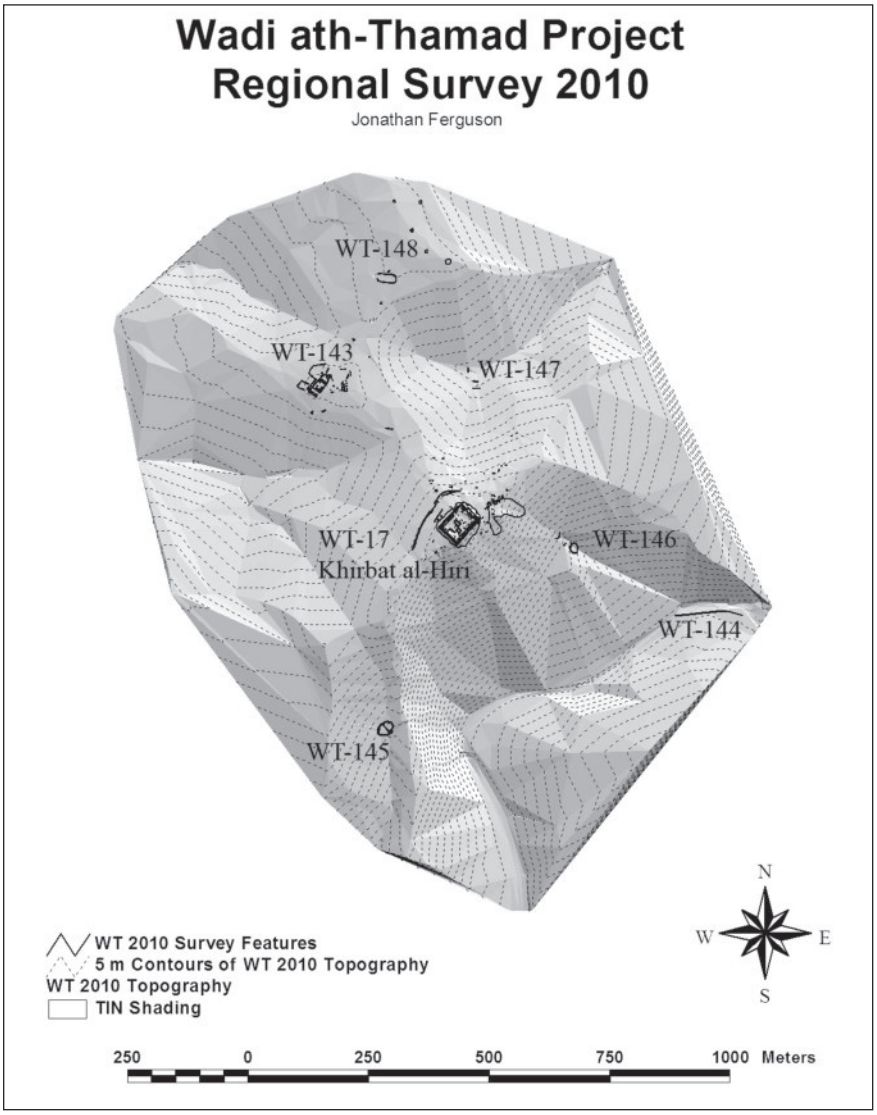
As the aim of the 2010 Wādī ath-Thamad

13. The Regional Survey is conducted under the direction of Dr P. M. Michèle Daviau (Wilfrid Laurier University, Waterloo, Ontario, Canada) as part of the Wādī ath-Thamad Project. Personnel for 2010 included Jonathan Ferguson (Survey Director, University of Toronto, Canada) and undergraduate volunteer Justine Southam. Basem al-Mahamid served as the representative of the Department of Antiquities of Jordan.

Regional Survey was to map and document a part of the survey territory that had not been intensively surveyed before, there were no existing points of reference in the immediate area. A new benchmark was therefore established at Khirbat al-Hirī (WT-17) with a GPS receiver and an orientation backsight to Qaṣr az-Za'farān I (WT-34) with a total station. Sites WT-17, WT-159 and WT-144 - WT-148 were intensively surveyed in relation to one another and their surrounding landscape, which covered an area 1,531m north-south × 1,365 m east-west, extending 145m in height from the top of Khirbat al-Hirī down to the bed of Wādī az-Za'farān (**Fig. 52**).

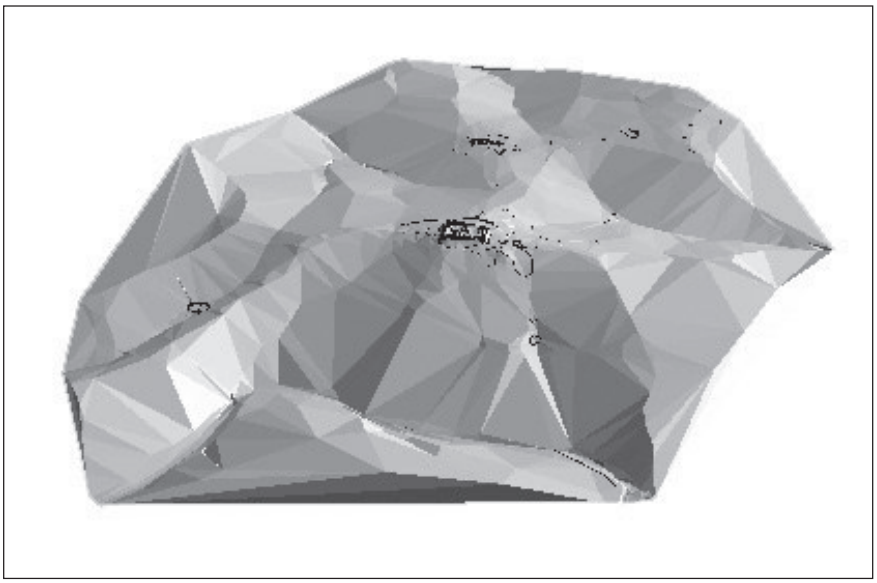
Not only did this exercise build a detailed dataset of the topography around Khirbat al-Hirī, it also led to the discovery of five new sites which would never have been found without crossing this territory on foot. Over the course of the 2010 season, 907 points were surveyed with the total station expressly for topographic modelling. However, since all surveyed points (including architecture, caves, graves etc.) were recorded three-dimensionally, a total of 3,225 points are available for topographic mapping and three-dimensional modelling (**Fig. 53**)[14].

In all, twenty-one sites were visited and documented by the Regional Survey in 2010. Looting and vandalism continue to seriously degrade the archaeological patrimony of this re-




*52. Topographic map of the 2010 survey region, with Khirbat al-Hirī (WT-17) at centre and Wādī az-Za'farān at lower right.*

14. The archaeological features were drafted using AutoCAD 2006, while topographic modelling was performed with ArcView GIS 3.2a.



*53. Three-dimensional model of the 2010 survey region, view to north-west.*

gion: eight previously unknown cemeteries were found to have been systematically looted, while the Roman fort of Khirbat az-Zūna suffers from ongoing damage. This report will focus on the fortress of Khirbat al-Hirī, but also touches on four other sites which are representative of the region's archaeological richness and diversity.

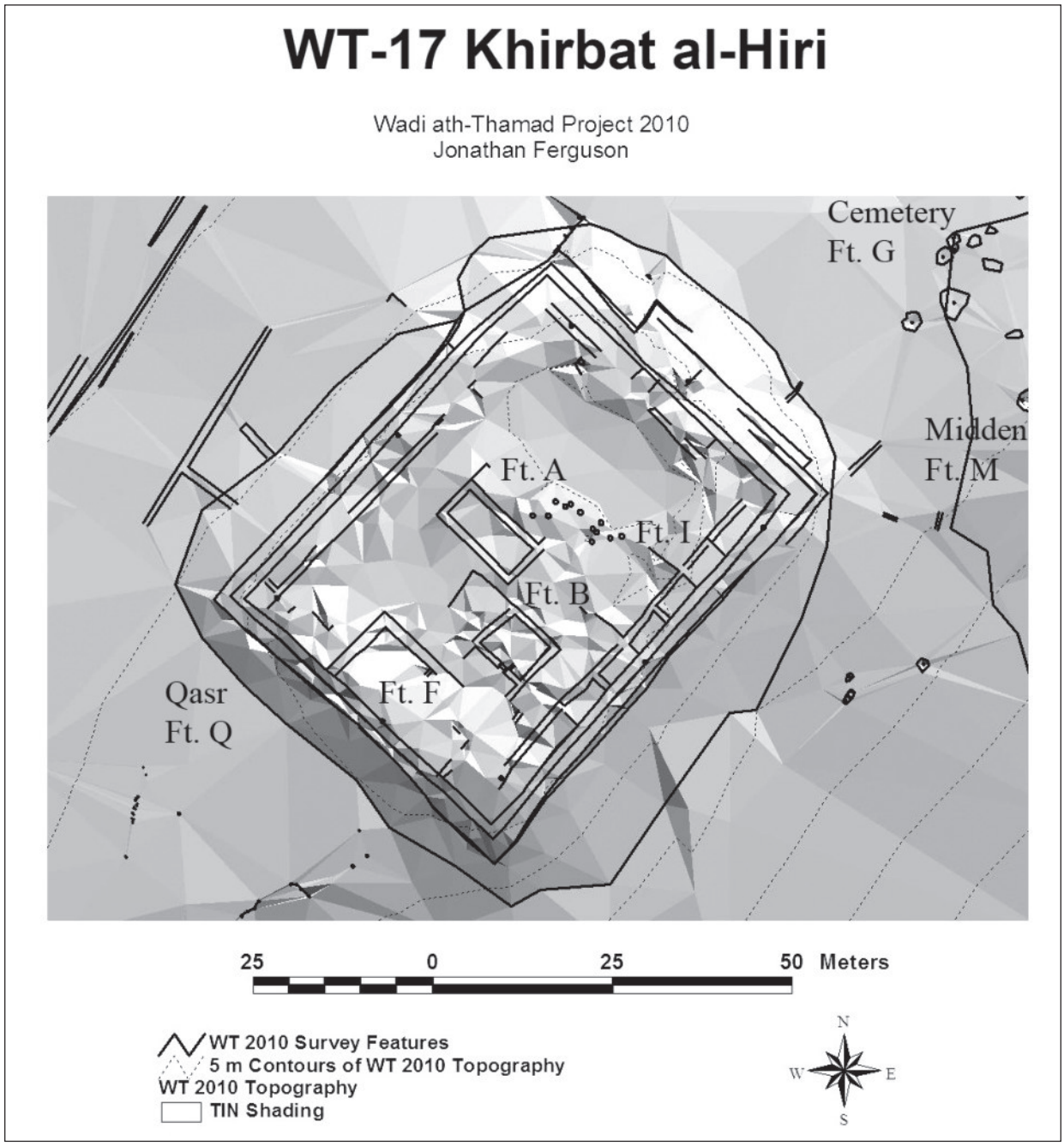
**Khirbat al-Hirī** (WT-17)
UTM Zone 36: 774421E 3502181N 749 m asl (BM 5369)
Bearings: 5.44 km at 197°T / 193°M to Khirbat ar-Rumayl (WT-18); 1.75 km at 227°T / 221°M to Qaṣr az-Za'farān II (WT-32); 2.16 km at 249°T / 245°M to Qaṣr az-Za'farān I (WT-34)
JADIS: 2311.009 (Palumbo 1994: 2.133)

The site of Khirbat al-Hiri[15] occupies a tall prominence with clear views in all directions (**Fig. 54**). Over a century ago, Khirbat al-Hirī was documented by Tristram[16] (1874: 177-178), Brünnow and von Domaszewski (1905: 86) and Musil (1907: 174). Later, Nelson Glueck visited Khirbat al-Hirī (his Site 66) and described a hilltop fortress, surrounded by cisterns and re-

*54. Khirbat al-Hirī (WT-17), view to south from WT-148.*

15. Site WT-17 has been known variously as either "Khirbat al-Hirī" or "Rujm al-Hirī" by the Regional Survey staff over the years. However, the former toponym is preferable because Rujm al-Hirī is the name of a different ruin documented by Glueck near Mount Nebo (his Site 237) and he differentiated the two sites in this way (Glueck 1935: 110; Zwickel 1990: 161; Palumbo 1994: 2.59, JADIS 2113.028).
16. Tristram refers to two adjacent sites, "Kasr el Herri" and "Kirbet el Herri" (1874: 177–178). The former (Tristram's "Kasr") is the site referred to in subsequent literature as Khirbat al-Hirī (followed here), while the latter is apparently the village of Zaynab to the east, across Wādī az-Za'farān.

used as a *bedouin* cemetery. Based on surface finds, Glueck determined the site to have been founded in the early Iron Age, with later re-use in the Nabataean period (1934: 12). While the site is well-known to scholars (e.g. Zwickel 1990: 153; Palumbo 1994: 2.133), it had yet to be thoroughly studied or mapped prior to the 2010 field season. The site was identified by the Wādī ath-Thamad Regional Survey in its first year (1996); five looted graves, two caves and three cisterns were identified and photographed in 2005. Khirbat al-Hirī formed the focus of the 2010 season, and detailed documentation and surveying was conducted there of both archaeological features and the surrounding landscape (**Fig. 55**).




*55. Khirbat al-Hirī (WT-17), showing the qasr (Ft. Q), interior architecture (Fts A, B, F and I) and portions of the exterior walls, cemetery (Ft. G), midden (Ft. M).*

*The Qaṣr*

The defensive walls of the fortress of Khirbat al-Hirī (the "*qaṣr*") were designated Feature Q**.** The fortress is oriented at 40°T and the outer corners of its walls measure up to 69.41m south-west - north-east and 53.56m north-west - south-east. When referring to directions in general terms, however, directions are given with reference to the *qaṣr*, e.g. the longer walls of the fortress are referred to as the eastern and western walls.

Except on its northern side, the *qaṣr's* defensive walls show a two-layered method of construction. The inner wall averages 1.5m thick and is built in a boulder-and-chink technique. The outer wall consists of a rubble fill with an exterior boulder-and-chink facing, and is also about 1.5m thick where the upper courses of its facing survive. The outer wall is battered, i.e. its base is thicker and its outer faces slants inwards towards the top. It remains unclear whether the inner wall is similarly battered. In some places, particularly on the eastern side, the exterior wall stands to a height of up to 2.13m (**Fig. 56**), but is probably concealed to a considerable depth by the surrounding tumble.

The northern wall of the *qaṣr* is more heavily fortified, with up to four wall layers visible at the north-eastern corner, although all but the inner wall are rubble-filled. The gate has been hypothesized to be in this area, an idea supported by a wall section running perpendicularly to the perimeter and the depressed topography of the centre of the northern side. In this area, the tumbled stone extends outwards for 13.67m and 5.83m below the top of the *qaṣr's* inner wall. It may be, then, that the gate itself remains buried under the considerable overburden of fallen stones here.


*56. The battered exterior face of the qaṣr's eastern defensive wall at Khirbat al-Hirī (WT-17 Ft. Q).*

Interior Architecture

Feature A is a building west of the *qaṣr's* centre, measuring 13.91 by 9.86m. It takes the form of a rectangle, but with two walls extending northwards from either side. The walls of this building measure about 1m thick, but no northern wall was found. Instead, thirteen round pieces of limestone (each about 60cm across and 15cm thick) were found in that area and may have acted as drums or bases for columns across its front. In other words, this building appears to be a broad-room structure with columns *in antis* across its front, as might be found with a temple. Such a role might be supported by the prominent position of this building, facing the northern plaza and hypothesized gate.

To the south-east of this building is Feature B, measuring at least 16.41 by 10.16m and having two adjacent rooms. The construction of this building is made of somewhat smaller stones than Features A and F, but the walls still measure between 0.85 and 1.00m thick. On the southern side, two perpendicular lintels can be seen, one forming a clear doorway at the present ground level.

Feature F is a building built against the centre of the rear defensive wall of the *qaṣr* (assuming the gate is to be found on the northern side). Its walls are 1.5m across, the same thickness as the inner perimeter wall, suggesting that they were built at the same time and that this was a structure of some importance. While the entrance to this building is obscured, an interior lintel can be seen against its northern wall.

A range of at least seven rooms (each measuring about 2.6 by 5.5m), built against the eastern side of the *qaṣr's* inner defensive wall, was designated Feature I. The inferiority of its construction when compared to the *qaṣr*, i.e. made with smaller stones and thinner walls (about 1 m thick), suggests that this was not a casemate construction in the normal sense. Based on a regular series of depressions and wall stubs on the western side of the *qaṣr*, Feature I was probably mirrored by a similar arrangement of rooms on that side.

In addition to these internal buildings, two areas were notable for their lack of ruined walls

or tumbled stone, and may have served as plazas or courtyards. One extends across much of the width of the northern portion of the *qaṣr's* interior, while a smaller one was identified in its south-western corner.

Exterior Features

A number of walls were mapped outside the *qaṣr*, although their purpose remains unclear. The longest were found on the western side of the fortress; together they extend for 175m, following the contours of the hill. Similar walls were mapped by the Regional Survey at Qaṣr az-Za'farān I (WT-34) and Khirbat az-Zūna (WT-24) in 2005 (Daviau *et al.* 2006: 277, 280; cf. Ferguson 2009: figs 1C, 5D) and Uraynibah West (WT-16) in 2008. The excavation of one such wall at Khirbat az-Zūna showed that it was relatively recent and unrelated to the occupation of the *castellum* (Ferguson 2009: 238). On the other hand, one external wall farther to the north-west of the *qaṣr* appears different from the others, as it is built of larger stones set on edge, forming a megalithic 'alignment' (Scheltema 2008: 19-21).

The site's midden (Feature M) was located north-east of the *qaṣr*, downwind of the prevailing westerly winds and easily accessible from the presumed northern gate. The midden measures up to 82.26m across and extends down two shallow gullies on the eastern slope of the hill. The frequency of sherds is very high here compared to elsewhere on the site, with the pottery dating almost exclusively to the Iron II period. Examination of three 5m$^2$ sample areas showed that the midden has an average density of 30.9 sherds per square metre. Other types of material, such as bone, were very infrequent.

Eight cisterns have been identified and mapped at Khirbat al-Hirī, all to the north of the *qaṣr*. These cisterns appear in two groups, based on elevation and – presumably – geology. The lower group of five cisterns occurs in a series along a path with elevations between 713 and 720m (Feature E at WT-159 lies along the same contour). One of these cisterns still contained water when visited. The upper three cisterns are closer to the *qaṣr's* north-western corner, between 729 and 732m asl. Feature D has a simple opening and a depth of 3.43m, but still shows plaster adhering to its wall in at least one patch. Feature E, on the other hand, has recently (but prior to 2005) been restored, with a cemented stone superstructure that includes the cistern's mouth and a trough for watering livestock. This cistern descends for 4.29m from the rebuilt mouth. A triangular secondary opening serves to fill the cistern via a small channel.

Like the cisterns, caves at Khirbat al-Hirī appear grouped along similar elevations. One group of three caves is found south of the qaṣr, along the south-eastern face of a bedrock outcrop. Four other caves occur in the bedrock immediately north of the *qaṣr*, including one in the bedrock on which the fortress' north-western corner was built. Another series of five caves is found a little to the north-east, between the elevations of the two groups of cisterns, at about 731m asl. Feature C appears as a sinkhole, from which a cavity extends at least 4.61m to the north-west. The cave Feature H can be accessed directly from its downslope side and has a rough, low stone wall extending across its opening, from which the cave's chamber extends at least 6.13m to the east. This cave has seen some recent use, as shown by an ash pit and goat tracks in the dried mud floor.

Numerous cupholes were found carved into the bedrock south of the *qaṣr*. The 35 cupholes surveyed in this area range from 6 to 29cm in diameter, with the majority tending towards the smaller sizes. The dating and function of these circular depressions remains unresolved (see discussion in Scheltema 2008: 23-25).

In more recent times, Khirbat al-Hirī has served as a *bedouin* cemetery, both within the *qaṣr's* walls and to the north-east of the fortress. It proved impossible to record the graves inside the *qaṣr*, since they were built of the same tumbled stone that covers the interior. Feature G is the cemetery to the north-east and east of the *qaṣr* (overlapping the midden); it includes at least 39 graves, of which 15 have been looted. The remaining 24 graves were identified by the arrangement of stones visible on the surface and are generally aligned east-west.

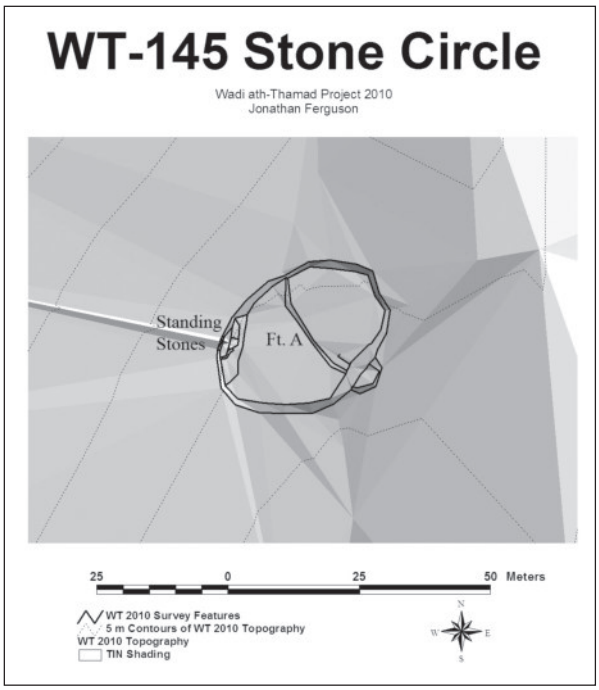
**WT-145**

UTM Zone 36: 774286E 3501780N 686 m asl
Bearing: 423m at 19°T to Khirbat al-Hirī (WT-17, BM 5369)

While mapping the topography of a ridge to the south of Khirbat al-Hirī, a stone circle was

discovered in a small gully between it and the next ridge to the west. Although site WT-145 has good visibility to the east and south, it is hidden from WT-17 by the intervening ridge.

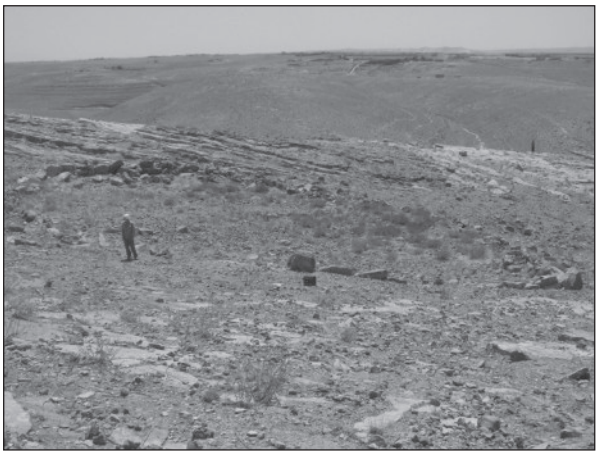
The site is confined to Feature A, a roughly circular wall of boulders (some well over a metre in size) measuring 36.47m south-west – north-east and 25.22m north-west – south-east (**Figs. 57-58**). Although the plan of this wall shows it to be closer to an ellipse than a circle, this is not evident in its setting. The inside of the circle is noticeably level compared to the surrounding landscape, and the southern (downhill) portion of the wall is noticeably thickened (up to 3.13m) and battered, to act as a retaining wall. The circle is bisected along the axis of the gully by a poorly preserved wall of smaller boulders. A parallel internal wall appears present in the south-east, but its course can only be traced for 2.79m. An apsidal projection, measuring 7.75m across, is attached to the circle in this same area.



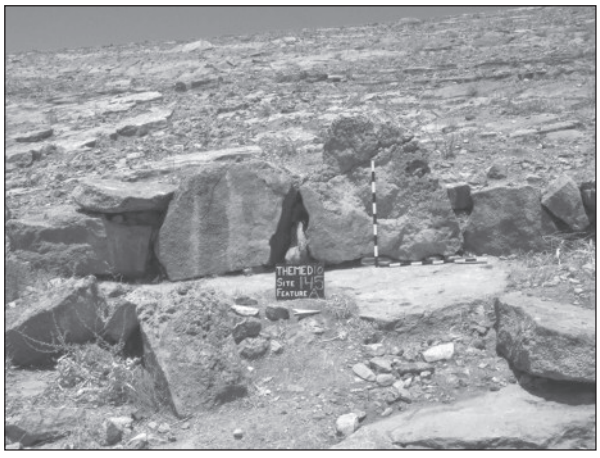

*57. The megalithic stone circle (WT-145) south of Khirbat al-Hirī, with the standing stones at its western end.*

The western end of the circle is set apart from the rest of the interior by two low, bedrock ledges that are bordered in places by more boulders, although the central axis was left unobstructed. This area focuses on two adjacent standing stones that appear to form a pair, facing east (107°T) (**Fig. 59**). The larger, northern stone (to the right when standing inside the circle) measures 1.60m at its widest point and is 1.54m high. The smaller, southern stone (to the left) is 1.33m wide and 1.21m high. On the upper bedrock ledge, in front of each of the standing stones, are pecked designs, which may be Thamudic inscriptions. Unfortunately, no artifacts were discovered at WT-145, despite an intensive search by the survey team.

Without engaging in untenable speculation, this site and ones like it (such as WT-146 and WT-152, which also have round constructions of large stones) appear to be part of the megalithic tradition of Jordan that peaked in the Chalcolithic or Early Bronze Ages. These simple stone monuments may have played a role in the ritual, communal or astrological lives of their makers, but the dating and interpretation of megalithic stone circles both remain problematic (Scheltema 2008: 21-23).



*58. The stone circle at WT-145 with Justine Southam, facing east.*



*59. The two standing stones at the western end of the stone circle at WT-145 and bedrock ledge with inscriptions.*

**WT-151**
UTM Zone 36: 775011E 3503500N 730m asl (at Ft A on hilltop)
774881E 3503473N 726m ASL (Ft B)
774848E 3503401N 717m ASL (Ft C)
Bearing: 1,445m at 204°T to Khirbat al-Hirī (WT-17, BM 5369)

On a hilltop north of Khirbat al-Hirī, site WT-151 includes three cemeteries, all of which exhibit systematic looting. The largest is Feature A on the summit, measuring about 55m across, where at least 33 looted graves were counted. The graves are all cut into the bedrock and most measure about 2m long by 0.5m wide and reach depths up to 2.5m deep, but even a child's grave barely 1 m long was emptied of its occupant. Most are simple shaft graves, although one has a side chamber and displaced cap stones visible in its bottom (**Fig. 60**). A larger tomb was also found, measuring about 3×2m at the surface and over 1m deep, with a step leading downwards at one corner. Loculi or chambers were seen opening off the tomb's southern and western sides. Nabataean, Early Roman and Byzantine pottery was collected at this cemetery.

Downhill and to the west is Feature B, a cemetery *ca.* 8m wide with at least eight looted graves. These graves are less well-defined than those at Feature A and may have been shallower or not rock-cut. One grave had two pieces of ashlar masonry lying in it, including a bossed stone and another with Nabataean tooling. More Nabataean and Byzantine pottery was collected at this cemetery, including many small sherds of *Dekorphase* 3a - b Nabataean Painted Fine Ware of *ca.* 20-100 AD (Schmid 2000). South-west of Feature B and farther downhill is Feature C, a small cemetery with at least one poorly-defined, looted grave. Other alignments of stone can however be seen; these may represent two or more unlooted graves or, less likely, other wall lines.


*60. A looted rock-cut grave in cemetery Ft A at WT-151, showing a side chamber and displaced cap stones (right), facing north.*

**Umm Ruṣūm** (WT-155)
UTM Zone 36: 772817E 3502413N 696m asl
Bearing: 1,622m at 98°T to Khirbat al-Hirī (WT-17, BM 5369)
JADIS: 2311.013 (Palumbo 1994: 2.133)

The village of Umm Ruṣūm was the only site in the JADIS database within the Regional Survey's territory that had yet to be identified, so a concerted effort was made to locate it in the 2010 season. The entry in JADIS lists the site as a modern (1915-1950) village, but further states: "no bibliography; no information" (Palumbo 1994: 2.133). This name appears at least as early as the 1949 topographic map of Kerak (1:250,000), on which it labels a settlement in the *wadi* bed between az-Za'farān and "Rujum *(sic)* el Hirī". Later maps show it in the same location, along what is sometimes labelled Wādī Umm Ruṣūm.

Discussion with local inhabitants clarified matters: the area north of az-Za'farān was generally known as Umm Ruṣūm, but we were directed towards the old village of that name. Site WT-155, the village of Umm Ruṣūm, consists of at least three linear houses, two cave dwellings and a circular structure (**Fig. 61**). However, since much of the settlement lies behind the fence line of a modern farm, only the three features described here were visited.

Feature A is a house with three rooms that all open to the east, with no interconnection between them. Each room has a window on its western side, although the central room also has one facing east. The house is built of stone, which is covered with a straw-tempered mud plaster; it has been painted and, in places, coated with cement. The roof must have originally been made of wood and mud, but has been replaced with metal-reinforced cement. The southern room has benches and recesses built into its walls and a small hole through the wall near the door. Part of the plaster has fallen off the wall in this room,

*61. Part of the late Ottoman village of Umm Ruṣūm, showing the entrance to the cave (Ft C) (left) and the three-roomed house (Ft A) (right).*

showing the house's construction technique. The central room also has built-in benches and recesses, including one very large shelved recess about 1.4m wide by 1.4m high and 0.5m deep, of uncertain function. The northern room is devoid of such installations. Two similar houses can be seen behind the fence line of the adjoining farm, which appear to be in current use.

To the north of the house is Feature B, a circular stone structure with traces of mud plaster or mortar. Basem al-Mahamid, our Department of Antiquities representative, suggested that it was a bread oven.

Feature C is a cave dwelling to the south of the house. Its eastern end and the entrance are partly built of mud-plastered stone and concrete, while the majority of the structure is carved into the bedrock. A wooden door still hangs on its hinges. A similar entrance to another cave can be seen east of the two houses in the western group, behind the fence. Inside the cave, the first room has a central concrete pillar supporting the roof, which is pierced by a smoke-hole. To the right, a window and door both lead to another room. At the rear of the central room is a third room, which has a central pillar and four holes (two are paired) in its ceiling.

In addition to these features and those behind the fence, Umm Ruṣūm has a number of terrace walls running parallel to the hill's contours, designed to minimize field erosion. Surface finds collected there include Iron Age, Roman, Byzantine, Umayyad, Abbasid (including a green-glazed sherd) and probably Ottoman pottery, as well as a deformed bullet, a basalt millstone, a stone loom weight fragment and lithics (including a blade). This is a site with considerable potential for future study, given its apparently long span of occupation and the light it might shed on the modern settlement of the region.

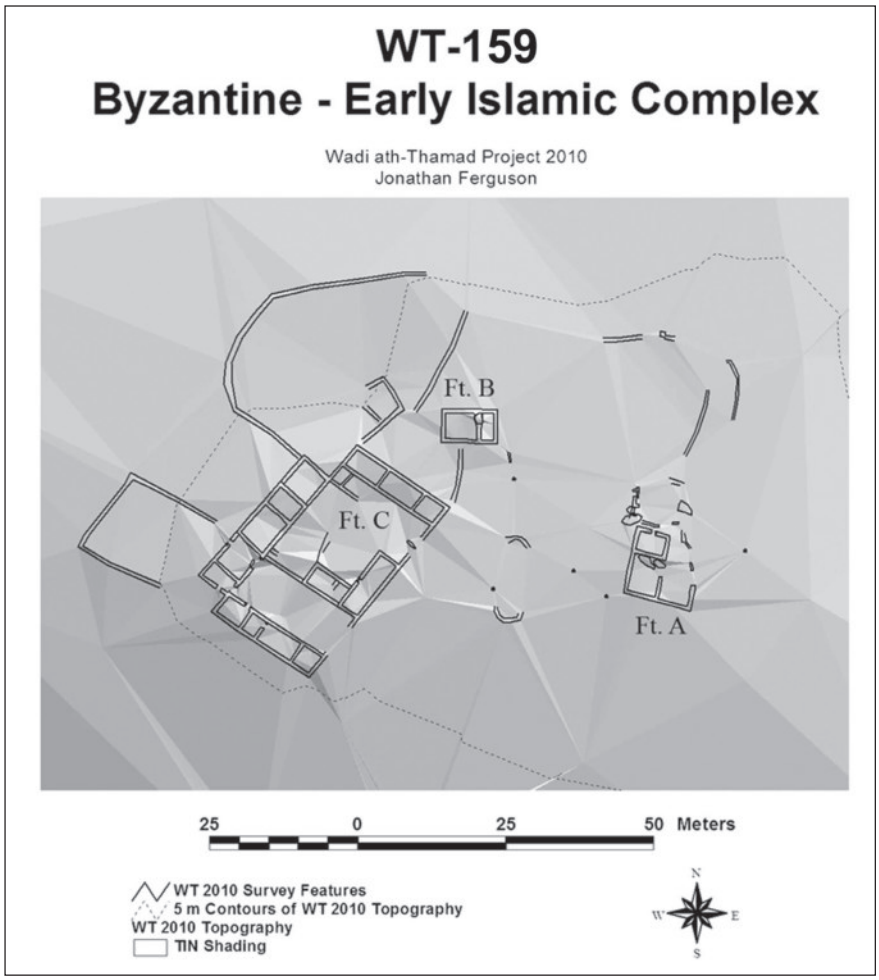
**WT-159**

UTM Zone 36: 774195E 3502502N 716m asl
Bearing: 394m at 145°T / 156°M to Khirbat al-Hirī (WT-17, BM 5369)

The ruins of four rectilinear buildings are visible on a ridge extending north-west from the hill of Khirbat al-Hirī (**Fig. 62**). With the exception of a few Iron Age body sherds, the pottery collected at this new site (WT-159) dates from the Byzantine and Umayyad periods, when Umm al-Walīd was thriving to the north-east.

Feature A, the building on the east side and closest to the modern dirt road from Umm al-Walīd, is an L-shaped structure (11.74×11.49m) with three rooms. The two southern rooms appear to have been open to the outside, while the northern room had a doorframe in its northern wall. To the north-west is Feature B, a rectangular building 9.52×5.73m, with two rooms divided by a north-south wall closer to its eastern side (this wall is now partially obscured by a *bedouin* grave). Farther to the north is Feature F, a smaller structure measuring 4.30m wide and at least 5.50m long (its western extent is unclear); it may in fact be a grave like the slightly smaller Features B and D at adjacent site WT-148. Measuring 37.29m south-west – north-east by 25.75m south-east – north-west, the largest structure by far is Feature C on the western side of the site, which has sixteen internal rooms arranged around two courtyards. Two rooms in its north-western wing may belong to an earlier phase, since their walls are abutted by later constructions. Although there are some gaps, the arrangement of this building can be reconstructed with some certainty, as door jambs and lintels are visible in many locations. Its function, on the other hand, is less clear, but it may have served as a large farmstead or country estate.

Two cisterns were found at WT-159. One of them, Feature D to the south of Feature C, has been refurbished with a new cemented superstructure in 2005 (the date 2005 can be seen written in the cement); the neighboring *bedouin*




*62. The Byzantine and Early Islamic site WT-159, showing the central structures (Fts A, B and C). Another small building (Ft F) and a cistern (Ft E) are located farther to the north-east; another cistern (Ft. D) is located to the south.*

family watered their flocks of sheep and goats there daily during our field work. On the north-eastern side of the site is cistern Feature E, which has fallen into disuse and is now the exclusive haunt of wild doves.

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# QUṢAYR ‘AMRA WORLD HERITAGE SITE: PRELIMINARY REPORT ON DOCUMENTATION, CONSERVATION AND SITE MANAGEMENT ACTIVITIES IN 2010 - 2012

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## Introduction

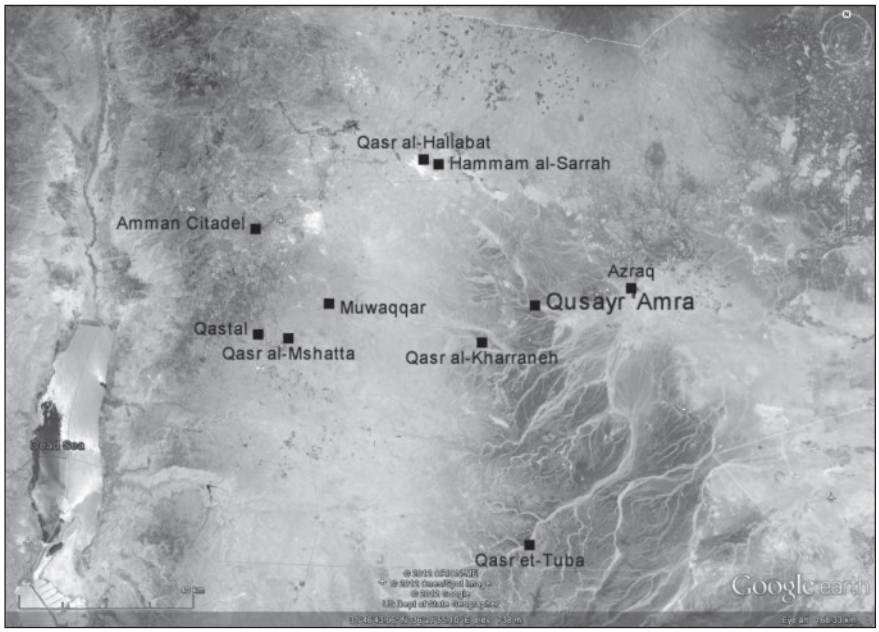
Three investigation and conservation seasons at Quṣayr ‘Amra World Heritage Site took place in 2011-2012: the first from 17 March to 28 May 2011, the second from 3 October to 3 December 2011 and the third from 15 April to 26 June 2012. The Project is a partnership between the Department of Antiquities of Jordan (DoA), the Higher Institute for Conservation and Restoration of Rome (Istituto Superiore per la Conservazione ed il Restauro, ISCR) and the World Monuments Fund (WMF) [2]. Expert conservators trained at the Istituto Superiore per la Conservazione ed il Restauro in Rome (ISCR) took part in the work alongside staff and workers of the DoA and WMF representatives and consultants[3].

## Background

The Umayyad Castle of Quṣayr ‘Amra is one of four World Heritage sites in Jordan. It was added to the UNESCO World Heritage List in 1985. The site, located approximately 80km east of ‘Ammān, along the highway to Azraq (**Fig. 1**), was documented for the first time by Alois Musil in 1898, who returned there in 1902 with the painter Alphons Mielich in order to copy the paintings that he had seen in his first visit. The resulting publication (Musil 1907) is still an important reference today given the decay that has partly obscured some of the scenes. Unfortunately some of the decay was caused by Musil and Mielich themselves, who admitted to having used chemicals to clean the paintings from layers of black soot (the result of fires lit inside by local *bedouin*). Moreover Musil and Mielich detached some of the paintings, causing further damage in the process. A complete figure and other fragments are today at the Pergamon Museum in Berlin, after they were sold by Mielich without Musil’s agreement. Other fragments are apparently lost, while others were inadvertently destroyed during detachment (Vibert-Guigue and Bisheh 2007: pl. 14).

Subsequently the site was visited and photographed by a number of travelers. The establishment of the Department of Antiquities in 1928

1. With technical contributions by Livia Alberti, Chiara Arrighi, Angela Atzori, Arabella Bertelli De Angelis, Giulia Sara De Vivo, Luigi De Cesaris, Stefania Di Marcello, Francesca Mariani, Alessandra Meschini, Alessandra Peruzzetto, Alex Sarra, Cristina Tomassetti, Carlo Usai and Nikos Vakalis.
2. ISCR is the oldest and most prestigious institution in Italy dedicated to the conservation of cultural heritage monuments. WMF is a not-for-profit institution dedicated to the protection and conservation of cultural heritage worldwide. Project Managers are Dr Giovanna De Palma (Archaeology), Carlo Birozzi (Engineering), Asma Shhaltoug and Dr Gaetano Palumbo. Operations Managers are Maria Carolina Gaetani and Marie-José Mano.
3. We wish to thank HE the Minister of Tourism and Antiquities, Mr Nayef al-Fayez, Dr Ghazi Bisheh, former and present Directors General of the Department Antiquities Dr Ziad al-Sa‘ad and Mr Fares al-Hmoud, for encouragement and assistance throughout the project. Ignacio Arce, José Luis Lerma and Ignacio Moscoso have contributed technical expertise to the documentation components of the project. Wisam Esaid, Romel Gharib, Jihad Haroun, Husam Hijazeen, Mohamed al-Khatib, Ahmed Lash (DoA) and Hussein Khirfan (Ministry of Tourism and Antiquities) contributed expertise to the conservation project and the site management planning component. This article is dedicated to the memory of Dr Fawwaz al-Khraysheh, former Director General of the Department of Antiquities, who made this project possible, and Luigi De Cesaris, who made available his profound knowledge of conservation techniques to the project.




*1. Location of Quṣayr 'Amra and other Umayyad sites mentioned in the text.*

contributed to the early protection of the site. Various conservation interventions followed, not all of them properly documented, until a Spanish project under the direction of Martìn Almagro was conducted there between 1971 and 1974, with a second intervention in 1979 (Almagro *et al*. 2005). Work on-site included the archaeological documentation of the site and its surrounding structures, consolidation of both the western wall of the main hall (using a reinforced concrete beam) and the vault of the western aisle, and the cleaning, consolidation and – in several areas – repainting of figures in order to enhance scarcely visible features. Both the repainting and the application of layers of shellac as a protective substance over the restored paintings were not documented, and were unknown to the scientific community.

It was only when Claude Vibert-Guigue started an exhaustive (1989-1997) documentation of the paintings at the request of the Department of Antiquities that this intervention was recognized (Vibert-Guigue 1994). However, the exact composition of the materials applied remained unknown.

The Spanish intervention made the site better known to the world and one of the major tourist attractions in Jordan. In 1985 the site was added, along with Petra, to the UNESCO World Heritage List. More undocumented work on the structure, both exterior and interior, was executed between the end of the 1980s and the beginnings of the next decade. Between 1989 and 1997 a Franco-Jordanian project was implemented, consisting of a detailed, 1:1 documentation of all paintings. Following a disastrous flood in 1994, the Institut Français d'Archéologie au Proche-Orient (IFAPO) financed and implemented a series of flood risk reduction and water management interventions between 1995 and 1996[4]. These consisted of the excavation and reconstruction of a wall to protect the site from floods, reconstruction of the ancient *sāqiyya* (Ar. "well") that in antiquity served the baths on site and constructions of berms to redirect the waters of Wādī al-Buṭum away from the site during episodes of rain and flooding (Bisheh *et al*. 1997). IFAPO also contributed to the construction of the visitor center and limestone paving of the main hall, throne room and *apodyterium* (dressing room of the baths), while the *tepidarium* and *caldarium* rooms were provided with a wooden passage (here the ancient floor is lost, leaving the *suspensurae* and lower floor level visible) (Morin and Vibert-Guigue 2000).

In 2007 the DoA sent a request for assistance to the WMF, as the conditions of the monument seemed to be deteriorating, especially with regard to the important cycle of mural paintings conserved in its interior. WMF listed the site

4. Project financed by the French Embassy in Jordan and the DoA.

on its 2008 Watch list and provided, through the Robert Wilson Challenge to Conserve Our Heritage, a first grant to be matched by other organizations. The Italian Ministry of Culture stepped in by providing a grant in 2009. In 2010 a first sampling season took place, in order to study the composition of mortars outside and inside, as well as those of the paint layers inside. This sampling work was accompanied by site condition assessments, collection of background literature and discussions with scholars and researchers that had worked on the monument in the past. At that time the team also started contacting institutions worldwide with photographic collections that could contain early images of the site in order to track the evolution of interventions where reports and publications could not supply adequate information.

In October 2010 a Memorandum of Understanding was signed between the stakeholders, after a definition of the project's scope and initial budget.

In January 2011, two training courses took place in ʻAmmān, the first for workers and masons, covering techniques of lime mortar production and application, and the second for conservators, covering cleaning techniques for mural paintings. It was however decided that only trained conservators would work on the mural paintings, given the complexity of their conditions. The precise date of the paintings and their manufacturing technology remained partially uncertain, and the whole picture was further complicated by the substantial restorations that the painted complex had undergone in the past.

The training course was followed, in early February 2011, by a workshop which represented an important occasion for the exchange of information and experience between Jordanian, Spanish, French and Italian experts, who had carried out studies and interventions on the monument in the past.

The three field seasons conducted in spring 2011, autumn 2011 and spring 2012 were attended by numerous conservators, and involved Jordanian professionals working on ancient plasters and stone. The latter consisted of four rotating groups, each consisting of three DoA staff. A similar arrangement for DoA workers focused on the exterior walls and allowed many of the people trained in January to gain hands-on experience at the site.

**Previous Documentation and Creation of a Project Archive**

One of the aims of the Project is to collect published and unpublished documentation about the site in order to create a repository of this information at the Department of Antiquities, since a complete archive does not exist anywhere. On the basis of previous studies and information available through publications, the team was able to contact a number of institutions holding photographic collections and other archival material. The response was overwhelming, since most of the archives which were contacted responded favorably by sending digital copies of their holdings, often allowing free use of the material for research purposes. Collaborations were established with the École Normale Supérieure and CNRS in France[5], the Institut Français du Proche-Orient (IFPO) in Jordan, the Spanish Archaeological mission in Jordan, the Pergamon Museum and Rathgen laboratories in Berlin, Germany, as well as with a number of institutions holding early images of Quṣayr ʻAmra which have generously made these historic photographs available for study. These include the Academic Society of Alois Musil (ASAM) in Prague, the Gertrude Bell archive in Newcastle, the Creswell archive at the Ashmolean Museum, Oxford, the Lankester-Harding archive at the Department of Antiquities of Jordan, the Jaussen and Savignac archive at the École Biblique, Jerusalem, the Horsfield archive at University College London, the Laboratory of Archaeology at the University of Granada, Spain, the Rockefeller Museum in Jerusalem and the Aerial Photographic Archive for Archaeology in the Middle East (APAAME) at the University of Western Australia. Other institutions and private individuals were contacted and they may be able to provide yet more previously unknown information on the site.

5. More than 10,000 pictures, thousands of drawings, documents and archives were collected during the Franco-Jordanian project. The 2007 joint publication (DoA / IFPO) presents one part of the work. Claude Vibert-Guigue's PhD (Sorbonne 1997) helped to gather information about the building, its state of conservation and a first historical background of the paintings' alterations.

**Building Features: Exterior**

The building is a lodge and bath house characterized by a main rectangular hall, divided into three aisles of the same width (**Fig. 2**). The barrel vaults covering them are underpinned by two large, slightly pointed arches. The central aisle ends in a smaller area leading to two apsidal rooms. To the left of the entrance, the main hall leads to a small bath house consisting of three small rooms: the *apodyterium*, the *tepidarium* and the *caldarium*. The *caldarium* is roofed by a dome resting on pendentives. The hot air coming from the nearby boiler room could circulate in the hypocausts and terracotta tubes underneath the plaster, heating the *caldarium* and *tepidarium* rooms.

Perimeter walls are made with stone blocks and a rubble core (**Fig. 3**). The structure is similar to others of the same period, such as Ḥammām as-Sarāḥ in the vicinity of Qaṣr al-Ḥallabāt. In the lower part, ashlars are alternated with small flat horizontal stones so as to make the setting beds regular. Similar walls were also found at Qaṣr al-Kharrānah and the ʻAmmān Citadel mosque. The internal part of the wall is made of rubble of the same stone, randomly bedded in a gray and friable mortar mixed with ash. The masonry is about 75cm thick, ensuring appropriate strength. Neither the large, slightly pointed arches separating the two aisles in the main hall nor the central aisle in the same hall have any buttresses.

The external wall color is homogeneous owing to a thin, ochre, ‘earthy’ patina resulting from the desert wind; this covers even the lowest portions of mortar. Investigation of samples confirmed *in situ* observations. Surface brushing revealed the genuine, more grayish color of the stones and mortars.

*2. General view of the site.*

The rear facade of the monument shows traces of plaster covering the stones. Large portions are visible near the mortar joints where they can more easily adhere to the underlying layers. The surface of this mortar is treated with regular herringbone-patterned signs, clearly aimed at improving the adherence of the final plaster layer (**Fig. 4**). The plaster also displays large gravel particles, which were applied to its surface with the palm of the hand in order to increase the ‘grip’ of the thinner, final layers of finishing plaster. However, the entire outer plaster layer and most of the preparatory layers are lost.

At Qaṣr al-Kharrānah, only 13 kilometers away, fragments likewise confirm the outer plastering of this building.

Mortars are still strong and can be broken without crumbling. They are composed of lime with a number of aggregates in different proportions:

(1) Bright red, sometimes grayish-brown *coc-*

*3. Wall section of the praefurnium showing the construction technique.*

*4. Original mortar found on the exterior of the monument.*

*ciopesto*;

(2) Flint grains of different colors (whitish, gray, brown, reddish), always characterized by chipping edges and conchoidal fractures;
(3) Alluvial sand made of carbonate stone grains of different color and type. Stereo microscope analysis found calcareous fossiliferous micritics (with foraminifera), flint limestone and possibly marl limestone. Their color ranges from whitish to light gray and from light brown to yellowish and orange;
(4) Calcite and hydrous iron oxides (calcareous limonitic 'crusts');
(5) White calcium carbonate grains, probably – on the basis of a positive HCl 2N microchemical test result – carbonated lime 'lumps' (*bottaccioli*) or carbonated slaked lime aggregates with 'inert' function, used in accordance with a Byzantine technique;
(6) Black, opaque, fibrous grains, *viz*. charcoal and ash fragments;
(7) Plant fibers.

Considering the large amount of calcareous aggregate, the weight ratio between binder and aggregate can be estimated at around 1:3.

Most of *cocciopesto* and plant fibers can be found in the surface finishing layers, while charcoal and ash are more common in the ones below.

Water-resistance in the extrados of the vaults is guaranteed only by plasterwork. As the roof does not have gutters, water is drained by sloping the spaces between the barrel vaults towards the southern side. The vaults are made of quadrangular stone ashlars. On top of them, four mortar layers were applied. The lowest, just above the stone core of the vaults, is made of lime mortar, ash and a thin inert charge of different color, serving as bedding for flat stone fragments. This layer was probably used to control the roughness of the vault's exterior core. Three other layers, with decreasing granularity, were placed on top of the one just described. The second mortar layer, with a similar composition to the lowest, is about 1.5cm thick. On its surface, various grits ranging in size from 1 to 4cm were applied. Several roundish areas created by hand pressure can be observed. Grit applied in this way supported the third layer of mortar, thereby increasing its 'grip'. This layer is typically 2.5cm thick and includes diverse aggregates (roundish stones, flint and *cocciopesto* fragments) ranging in size from 0.5mm to 5mm. It also contains smaller particles invisible to the naked eye. The fourth, finishing layer was applied to make the lower one more uniform. It is just 1-1.5mm thick, white and full of lime putty (*grassello*) and vegetable fibers, still identifiable in surface traces. The original appearance must have been very smooth and compact, to judge by those areas where the mortar still remains intact.

Some important elements of the masonry, such as the lintel and jambs of the entrance door, are made of basalt, which can be found in Azraq,

*5. Mortar loss at the base of the walls (before intervention).*

25 kilometers to the east.

**State of Conservation: Exterior**

The monument's state of conservation showed some worrying problems concerning the masonry. First, flooding (including an episode as recently as 1994) seems to have caused the loss, in parts almost total, of the original bedding mortar and the mortar inside the core of the masonry in the lower 60-70cm of the walls (**Fig. 5**).

The surfaces of the walls showed widespread filling between the ashlars performed using cement mortars during previous restoration works. This cement, besides being aesthetically unpleasant, may have contributed to increased salt content, which is sometimes visible as efflorescence in the lower parts of the walls.

The ashlars of the exterior wall, made of light yellow sedimentary stone, appeared to be in overall good conditions. Some of them, because of their geological nature combined with the effect of atmospheric agents, show signs of de-cohesion and de-adhesion of the constituent material, mainly near the most exposed and micro-exfoliated areas. There are also macroscopic fissures in the ashlars, along with micro-fissures and de-cohesive areas. This may be the result of both pressure and – in the lower parts – rising damp. On the southern and northern walls, ashlars that were removed in the past or are otherwise missing have exposed the cement core walls to rainwater infiltration, which has caused loss of mortar within the masonry. All along the perimeter of the monument, graffiti are visible on the wall, even at a considerable height.

*6. Condition of the extrados of the vaults (before intervention).*

The extrados of the vaults were in worrying condition, owing to the loss of the original mortar layers. This has exposed the rubble core and allowed water to penetrate deep into the vaults, affecting the painted surfaces inside (**Fig. 6**).

The dome of the *caldarium* was heavily integrated in the early 1990s using cement mortar, which is in very good condition and unaffected by the serious damage afflicting the original mortar.

As on the other vaults, here too the top mortar layer has disappeared; the surface looks eroded and fragmented because of bio-deteriorating agents, as well as the effects of wind and diurnal variations in temperature. As can be seen from old photographs, most of the plaster on the dome was lost, leaving the masonry exposed.

The mortar layers on top of the vaults of the main hall are in different states of preservation. The most exposed, *viz*. the eastern, has lost almost all of the three mortar layers and the stones placed right upon the structure were in plain view, so the risk of infiltration to the paintings was very high.

The west wall is about 30cm out of plumb. While the lateral thrust of the three vaults is resisted by the east wall adjoining the thermal bath, the west wall is freestanding and not buttressed. The size of the shear wall supporting the last vault is clearly insufficient to resist thrust. The movement of the wall caused serious longitudinal damage along the higher part of the vault, visible from both inside and outside. Spanish conservators and architects during the 1971-1975 seasons tried to solve the problem by installing a reinforced concrete beam in the wall by the last two rows of stones. The beam runs along the orthogonal facades up to the windows.

On the inside, the damage was filled and covered with yellow paint. On the outside, the intervention was more complex and may not have been carried out at the same time. The gap on the extrados was covered with tar paper and filled with roughly smoothed concrete mortar, with no attempt to connect it with the ancient mortar. In the 1990s, more filling was carried out. The eastern vault differed from the other two on account of the lack of the second layer, which in the other two vaults is the layer with the presence of grits to increase its 'grip'. This may be evidence for damage to the second layer in antiquity, which might have been replaced by mortar of the third layer during repair works.

The monument is provided with rectangular windows in the higher part of the main body, situated in the centering which closes the barrel vault, and several circular openings about 20cm in diameter. Some of them have a brick pipe, occasionally round, but more often rectangular in section. Others have less regular openings, perhaps owing to the loss of the internal pipe. Sometime in the last 30 or 40 years, glass was set in circular iron frames on the outside of the building to prevent water from entering. Many of these covers were broken, missing or had lost adhesion and allowed water to penetrate. On the inside, streaks and large eroded areas suggest that the glass had been missing for a long time or that fillings were not waterproof.

The original windows are lost; the monument had 10 wooden window frames (plus four iron frames in the *caldarium* dome). These were very damaged, simply left open or with broken glass, thereby allowing the ingress of water and pests into the building. Bird droppings and water stains are visible on the interior paint layers under every window.

**Conservation Intervention: Exterior**

Before the intervention started, chemical and physical analyses were carried out in order to verify the composition of the mortar and the aggregates, as well as the granularity curve. Observation of the exterior walls allowed for the detection of homogeneous mortars. It was immediately clear – and subsequently confirmed by analyses – that the whole building is covered with the clay dust typical of this part of the desert; it is easily carried by the wind and raised by sudden 'dust devils' that occur at certain times of the year. The bedding and facing mortar is not the typical yellow-pinkish color of clay, but white-grayish as often happens to lime putty (*grassello*) mortars. The use of ash and coal as an additive or inert material makes this color more intense. The clay on the masonry became embedded in it and it is not easily removable except by use of mechanical brushes. The choice of mortar color was highly influenced by this observation.

During the second season, the mortars of Qaṣr al-Kharrānah were also investigated, in view of this site's physical proximity to Quṣayr ʻAmra, as well as its similar age and construction techniques. Unexpectedly, these investigations revealed the use of gypsum, which was never found at ʻAmra. Although building techniques concerning the arches and vaults were completely different from those used for the bath, some masonry features appeared to be similar. On the contrary, the use of gypsum as a binder is something new.

Biological deterioration of mortars was analyzed in order to identify the most effective biocide. Mild polishing was used to remove sandy particulate from surfaces; areas affected by biodeterioration were treated with Preventol R80 3% in deionized water, applied in three phases with seven-day gap between one treatment and next.

Conservation was aimed at performing the minimum intervention required to guarantee the stability of the structure and conservation of *in situ* mortars and plasters.

So far as possible, the new mortars and aggregates used comply with the existing ones.

Similarly, attempts were made to ensure that the intervention was both identifiable and documented with photographs and drawings. The state of conservation dictated reintegration of missing plaster fillings and covering mortar layers.

All mortars used consisted of slaked lime putty matured for more than six months. DoA experts turned quicklime into slaked lime in barrels next to the work yard. The first stage of the intervention implied the choice of aggregates and mortar color. White sand, yellow sand, *wadi* sand and *cocciopesto* were used. A warmer tone was preferred to the original grayish color of

mortars, since it was closer to the wind-deposited clay that covered the whole building.

*Cocciopesto*-based hydraulic mortars were used for deep consolidation. Granularity analysis on ancient mortars allowed compatible mortars to be worked out. Nevertheless, with the aim of integrating ancient mortars exposed to the elements for centuries, several attempts were necessary until a suitable color mixture was found.

A three part / volume dry mixture must be mixed with one part / volume of slaked lime putty, with the addition of sufficient water to make the mixture soft as a dense cream. The modern intervention was limited to a lower level compared to the original, so as to be clearly perceptible.

Surface treatment of the intervention was subject to careful treatment in order to harmonize it with the original, now eroded by atmospheric agents; the wet mortar was therefore brushed with soft brushes. An application of water mixed with desert clay completed finishing. The mortars were designed to have a mechanical resistance similar to that of the existing ones.

The first interventions on the exterior of the monument were conducted on the lower sections of the walls, which have been affected by the loss of the bedding and core mortar. Gaps and holes were filled with stone chips up to 60-70cm above ground level. The filling was divided in two distinct operations: one aimed at re-establishing the building's compliance with static safety requirements, the other at protecting the surfaces from future deterioration. Consequently, we examined different mortars characterized by the presence of a lime binder.

DoA technicians prepared a sufficient quantity of lime putty (*grassello*) from quicklime produced in a nearby plant. In total, fourteen tests were carried out in order to achieve a mortar capable of meeting the mechanical and aesthetic requirements of this type of conservation work. The prepared mortars were tested on the eastern wall to verify their mechanical and aesthetic features. A hydraulic mortar (*grassello*, grit, *cocciopesto* and yellow sand; binder to charge ratio = 1:3) was used internally, in order to ensure its 'grip' in an unventilated environment. Once the walls were secured against possible collapse and the ashlars were replaced in their original positions, a surface mortar complying with the specific conservation and aesthetic requirements was applied.

The intervention on the exterior of the building followed a number of phases:

(1) Removal of Portland cement used in previous restoration work and of stones used to fill in gaps;
(2) Removal of dust and earthy deposits from surfaces using paintbrushes and medium- to hard-bristled brushes;
(3) Where necessary, the surface was roughened using a mortar made of inert and hydraulic charges of different granularity (binder to charge ratio = 1:3; *grassello*, sand, grit and *cocciopesto*). Stones of different sizes were soaked in water and used to fill the gaps in the core wall. This allowed the restoration of cohesion within the masonry;
(4) Missing ashlars were replaced by natural stones found nearby, with the intention of restoring a complete view of the surfaces without the 'interference' of missing parts. In order to underline the presence of non-

*7. Building exterior (before intervention).*

*8. Building exterior (after intervention).*

original ashlars, the perimeter filling was done slightly under the surface level;

(5) In the same way, the finishing mortar used for the gaps between ashlars (binder to charge ratio = 1:3; *grassello*, sand, grit and volcanic sand) was applied slightly under the surface level to make the conservation intervention identifiable.

The final smoothing of the surfaces was aimed at easing the flow of rainwater to the ground.

We paid particular attention to avoid depressions where dampness and roughness might create the right conditions for future deterioration (**Figs. 7 and 8**).

The upper layers of mortar in the *praefurnium* vault were missing, leaving the surface exposed to atmospheric agents. Moderate signs of de-adhesion were noticeable between the layers of mortar and between them and the masonry support. The grey-green-black color of bio-deteriorating agents was clearly visible near the areas most exposed to dampness. Furthermore, the old restoration cement looked cracked, allowing water infiltration. Here the old restorations were removed and new lime mortar layers applied.

During the study aimed at understanding the building phases of the vaults, we were also able to observe different types of mortars used in previous restoration works. Five types of recent restoration mortars were identified and classified:

(M1) Brown mortar (possibly because of earthy impurities); rich in aggregates and poor in binders, it does not seem to contain cement and is probably the oldest;

(M2) Grey cement mortar made of large size aggregates of different granularity;

(M3) Grey cement mortar made of white small aggregates; it was mainly used to seal and fix the glass covers on the vaults' openings;

(M4) Grey cement used to fill the edges of the different layers of original mortar; rich in soil particles;

(M5) Grey cement mortar made of aggregates of different granularity; similar to mortar M2 but containing finer aggregates.

Surface plaster layers displaying de-adhesion problems were initially re-attached using a ready mixed low-salt mortar (Ledan TB1).

Cement fillings from previous restoration works were removed, because of the greater hardness of their constituent material compared to that of the original surfaces. In this way, pre-existing mortars did not suffer further damage. Fissures in the cement mortar of the *caldarium* and *tepidarium* dome were then filled with lime putty (*grassello*) mortar, desalinated cement (with properties consistent with the conservation intervention) and sand (1 part *grassello*, ¼ part white cement, 2 parts yellow sand, 1 part red sand and ¼ part black sand).

Cement surfaces on the *caldarium* dome, which could not be removed because of their hardness, were slightly coated with water and sandy dust to harmonize the surface color and remove the 'spotted' effect of the exterior surface of the dome.

A spreading test of the mortar was run in the 2011 spring season on the *praefurnium* vault, which had completely lost the top two layers of original mortar. This small-scale test allowed the procedure for work to be conducted on the three upper vaults during the subsequent autumn season to be defined.

At the same time, a group of conservators

*9. Eastern vault (before intervention).*

*10. Eastern vault (after intervention).*

focused on the roofs. On the barrel vaults, cement layers from previous restorations were mechanically removed with hammer, scalpel and angle grinder with diamond cutting discs. Gaps were filled with mortars similar to the existing ones. A sacrificial layer was constructed in order to protect the original mortars, which are widely cracked and have become fragile over time. During each working day, mortar was spread over approximately 9m$^2$. For some of the surfaces, final smoothing was necessary to allow rainwater to drain to the ground. To slow down erosion caused by atmospheric agents such as wind and sand, low and rough areas where water could accumulate were eliminated (**Figs. 9 and 10**).

Consolidation of detached layers of plaster was tested in the alcoves next to the bath. Once the edges of gaps were filled, lime-based grout was injected. However, this type of intervention was stopped because of the large amount of mortar absorbed and the impossibility of controlling leakage from internal fissures adjacent to painted decoration.

Consolidation of the longitudinal gap in the vault with concrete, done during the Spanish intervention of the 1970s was found to be quite drastic. Once the first layer was removed and tar paper identified, cement and water repellent were carefully cleaned off. The tar had made concrete consolidation ineffective and could allow water seepage. The concrete was gradually removed and replaced with a new lime-based mortar mixed with rubble. Afterwards, it was leveled off with finishing mortar.

Throughout the autumn season, windows were replaced with similar wooden structures. The broken shutters could be opened but not controlled, so they were replaced with fixed shutters to prevent animals from entering the building.

Each one of the barrel vaults of the main hall originally had eight openings defined by a rectangular-section ceramic tube (*ca.* 6-8cm per side). The tube was inserted into the masonry, probably to let fresh air in and steam out. The original openings were sealed by glass in circular metal frames, now rusted. These were replaced with rounded glass caps in order to avoid water accumulation and were installed without metal support to prevent the glass from breaking because of metal expansion. Four openings on the west side of the west vault were completely sealed with cement mortar and were re-opened.

**The Interior**

The best description and documentation of the monument and its decorative elements is the work conducted by the Franco-Jordanian team, directed by Claude Vibert-Guigue under the supervision of Dr Ghazi Bisheh, between 1989 and 1997 (Vibert-Guigue and Bisheh 2007).

The monument is characterized by 350m$^2$ of mural paintings that almost entirely cover the interior surfaces. These paintings are extraordinary and unique in their style and representations. Although mural paintings existed at other Umayyad sites, Quṣayr ʻAmra is the only one where the paintings are legible and largely preserved. They depict court scenes and leisure activities, (including a caliph or prince on his throne with other kings of his time [e.g. the Byzantine emperor, King Roderic of Spain and the Sasanian emperor Chosroe]), hunting scenes with dogs, representations of bathing scenes, dancing women and craftsmen at work. The dome of the *caldarium* illustrates constellations and zodiac signs, and is the earliest known representation of the zodiac on a non-flat surface. The wall paintings represent the transition between Byzantine culture and the new Islamic era, and are also heavily influenced by Sasanian art and iconography. Finally, two rooms are decorated with floor mosaics, embellished by the use of glass *tesserae*[6]. This section is focuses specifically on the work conducted on one of the panels of the main (reception) hall.

**Reception Hall**

The entrance hall of the monument is a rectangular room with a north - south major axis of three aisles separated by two slightly segmental arches (**Fig. 11**). Rectangular windows are located in the northern, eastern and southern sides. The pictorial decoration of the aisle is principally divided into three bands at different heights:

(1) The lower one, up to a height of 2.1m above the main floor, is homogeneously painted on the three walls and the arch springer, and de-

6. For further details on the decoration of the monument and its interpretation (see Musil 1907; Fowden 2004; Almagro *et al*. 2005; Vibert-Guigue and Bisheh 2007).

*11. Main hall.*

picts geometric-patterned imitation marble;
(2) The central one, between 2m (on the eastern and western sides) and 3m (on the southern side) high, contains the main figurative representations. The sides of the arch are decorated with ornamental patterns; along the eastern and western sides, the paintings reach the spring of the vault and beyond;
(3) The upper decoration covers the vaults; on the northern and southern sides, the lunettes are separated by a central window.

**Western Aisle: Southern Wall Paintings**

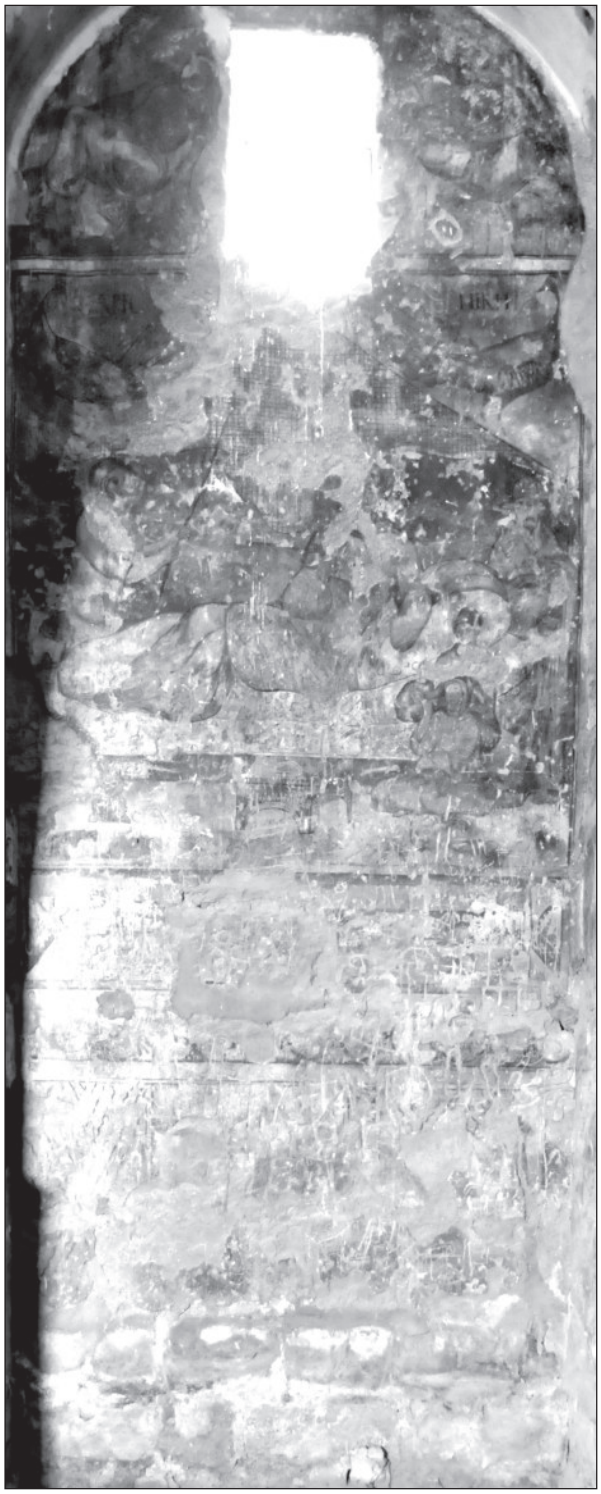
Following analysis of source documents, observation of the pictorial cycles and the results of the first scientific analyses, the southern wall paintings of the reception hall's western aisle were found to be affected by a number of issues and problems representative of other parts of the monument, especially concerning the use of unusual conservation techniques and materials in past conservation projects.

The bibliographic collection in our possession, consultation of historical and technical articles and information gathered from DoA archives lacked any description of the interventions performed on Quṣayr ʻAmra's painted walls.

Regarding the area under investigation, it was necessary to verify the historical and scientific data taking into account the present condition of the mural paintings. The decoration on the investigated wall is divided in four bands (the below description is based on what could be seen before conservation) (**Fig. 12**):

(1) In the area just above the window, there is a Kufic inscription inscribed in a rectangle whose meaning was, before this conservation, undecipherable. On both sides of the window, two human figures, perhaps allegoric, filled the space with three-quarter views. The figure on the right joins his fingers around his knees, whilst the one on the left leans his back against the edge of the window opening;
(2) The main scene of the composition portrays a central figure laying on a sofa, protected by a curtain or a net, and four lateral figures, one to the left and three to the right. Above the curtain / net, there is a representation of two peacocks under two Greek inscriptions: *APA* (Ara) and *NIKH* (Nike).

The characters are portrayed in the act of making different gestures. The veiled figure sitting in the foreground on the right seems to hold the elbow of the character at the back with his / her left hand. He / she holds a scroll or the cloth of the garment at chest-level in his / her right hand. A medium-sized *lacuna* prevents the correct reading of the position of the background figure with a covered head, whose hand (with a raised forefinger) and deep blue garment are visible. These figures have been interpreted as children; Fowden (2004: 184-185) added that one of them may be al-Hakam, designated heir of Caliph al-Walid II, and the other his half-brother ʻUthman. The figure



*12. South wall of the west aisle (before intervention).*

standing behind the other two at the back of the sofa represents a man wearing a garment, cloak and sandals. He is in the act of making a gesture with one hand whilst holding a baton. Fowden (2004: 185) interprets this figure as a representation of Caliph al-Walid II.

To the left of the central figure, a woman holding a pole seems to support the net above the central figure. The latter is represented at a larger size than the others and rests on a bed or sofa, with the torso and head upright. This figure was interpreted as representing a woman, perhaps the mother of Walid II's heir, according to Fowden's interpretation (2004: 184-185).

On the ground in front of the central figure, a brazier is represented in perspective;

(3) Immediately below the figurative scene is another inscription set inside a *tabula ansata* with dark outlines. Before conservation, its meaning was undecipherable, but a *basmala* type of inscription has been proposed by Imbert (1996);

(4) The decoration on the lower band with imitation marbles and stylized plant patterns connects the southern wall with the other pictorial cycles of the Reception Hall[7].

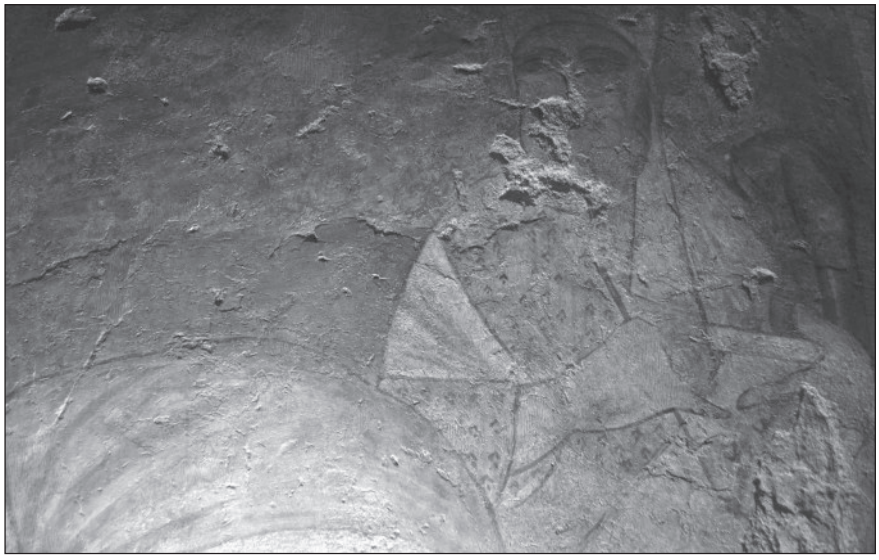
**Execution**

The painted wall is made of squared local limestone ashlars installed using an interstitial mortar. The mortar is composed of siliceous inert materials of different granularity and color, and slaked lime. Often, the mortar is also used to level off the roughness of the wall and make it smooth enough for the last layer to be spread. In addition, in some areas (lower part of the wall; splay of the window) grit of different granularity and color was scattered on fresh mortar to prevent it from shrinking when drying, as well as to improve the 'grip' for the next layer.

At the bottom of the wall, 4cm thick fragments of bedding mortar from the skirting marble slabs can be observed. Marble slabs covered the whole aisle to a height of 50cm; a few fragments remain in the throne room. Slab slots are still visible on the floor. The plaster, without further preparatory layers, was applied directly on the stone and consists mainly of plant fibers, slaked

7. Imitation marbles were recognized as such during Vibert-Guigue's documentation work, although Musil had interpreted them as representations of suspended hangings.

8. Analyses were performed by the Higher Institute for Conservation and Restoration in Rome (Istituto Superiore per la Conservazione ed il Restauro) and the Diagnostic Laboratory for Conservation and Restoration of the Vatican Museums. Four different spreading phases were identified.



*13. An example of 'pontata' visible in center of image.*

lime and an organic protein binder[8]. About one centimeter thick, it has an intense white color and quite a smooth surface although some unevenness can be detected.

Raking light inspection has revealed successive plaster spreading phases ('*pontate*') from top to bottom (**Fig. 13**).

The upper '*pontata*' is divided in two '*giornate*', the left overlapping the right. By and large, this wall was clearly plastered before the vault and side walls.

In some localized areas, mortar was probably added in order to correct unevenness. Signs of presumably hurried and non-homogeneous work are visible on smooth surfaces close to rougher and irregular areas. Plaster smoothing seems more accurate in the lower part, intentionally simulating marble. No traces of direct or indirect incisions were found. The preparatory drawings, which outline figures and major decorations, are orange-red colored.

Another element of the pictorial technique is represented by the preparatory drawing performed directly on the rendering, which can be glimpsed in *lacunae* in the painted layer.

Wide traces of red and yellow colors can be noticed near the lateral figures' garments and can be assigned to this preparatory phase.

The sequence of pictorial levels appears to be complex. A first drawing of the figurative scheme may have been traced when the preparatory layer was still drying. This could have allowed cohesion between pigments and plaster. Blue backgrounds especially can be assigned to this phase.

This first level was followed by a series of pictorial layers performed using binder. In this phase, the characters' complexion and probably hair – now missing – as well as other pictorial details were completed. These include white circles and highlights on the folds of the main character's garment, the furnishing, the peacocks' plumage and the Kufic Arabic inscription at the top of the lunette.

In particular, the *tabula ansata* shows two different phases of blue paint. For the first, *fresco* technique was used. For the second, a thicker layer was applied to dry walls where the binder had caused cracking (*cretto*). On this surface, ochre letters were outlined in red and lined up with a blue horizontal line painted in relief on their upper edges.

The double spreading of blue paint is also noticeable on the main character's foot and shows a micro-*cretto* on the first layer applied directly on plaster. The palette that was chosen reveals extensive use of precious pigments such as lapis lazuli, which was spread on the background even when it was to be covered by more layers of paint. According to analysis of pigments, elements such as lead and arsenic (white lead and orpiment), natrojarosite, calcium hydroxide (*bianco Sangiovanni*), ochre, lapis lazuli, minium and cinnabar are part of a complex and variegated palette of natural and

synthetic pigments, some of which may have been hard or very expensive to obtain[9].

**State of Conservation**

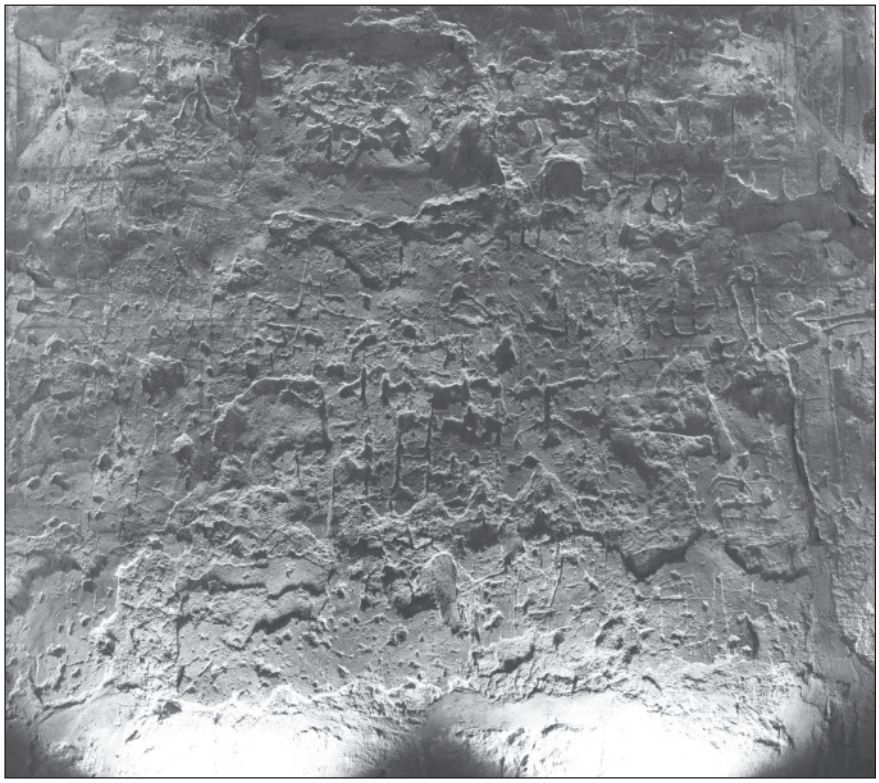
The state of conservation and its history concurred remarkably to alter the original look of the mural paintings within the monument. The fortunes of their conservation can be partly retraced using reports, notes, and photographs. The constant use of the area as a shelter by local tribes and its remote location has led to the loss of large portions of plaster. This was the result of incisions and graffiti, which affected not only the lower part of the walls, but also the upper area. In some cases delicate details, such as the characters' faces, were severely damaged (**Fig.14**).

Since the rediscovery of the monument in the late 19th century, surface cleaning efforts – even though not always appropriately performed – have allowed better visibility on the one hand, while accelerating the deterioration of constituent materials on the other. A large portion of the pictorial film applied on dry plaster (*secco* technique) has been lost because of aggressive cleaning methods, which totally depleted the binders and damaged the plaster on most exposed areas. As a consequence, surfaces appear to be more opaque than they probably were, and widely incomplete.

Lead-based pigments have undergone major alteration, turning from white to dark grey tones. These include the hand and part of face of the central figure, some characters' faces and ornamental elements of the lozenge-patterned blanket. Some of the substances used to perform aggressive cleaning in the past, may have favored the alteration and change of some original pigments.

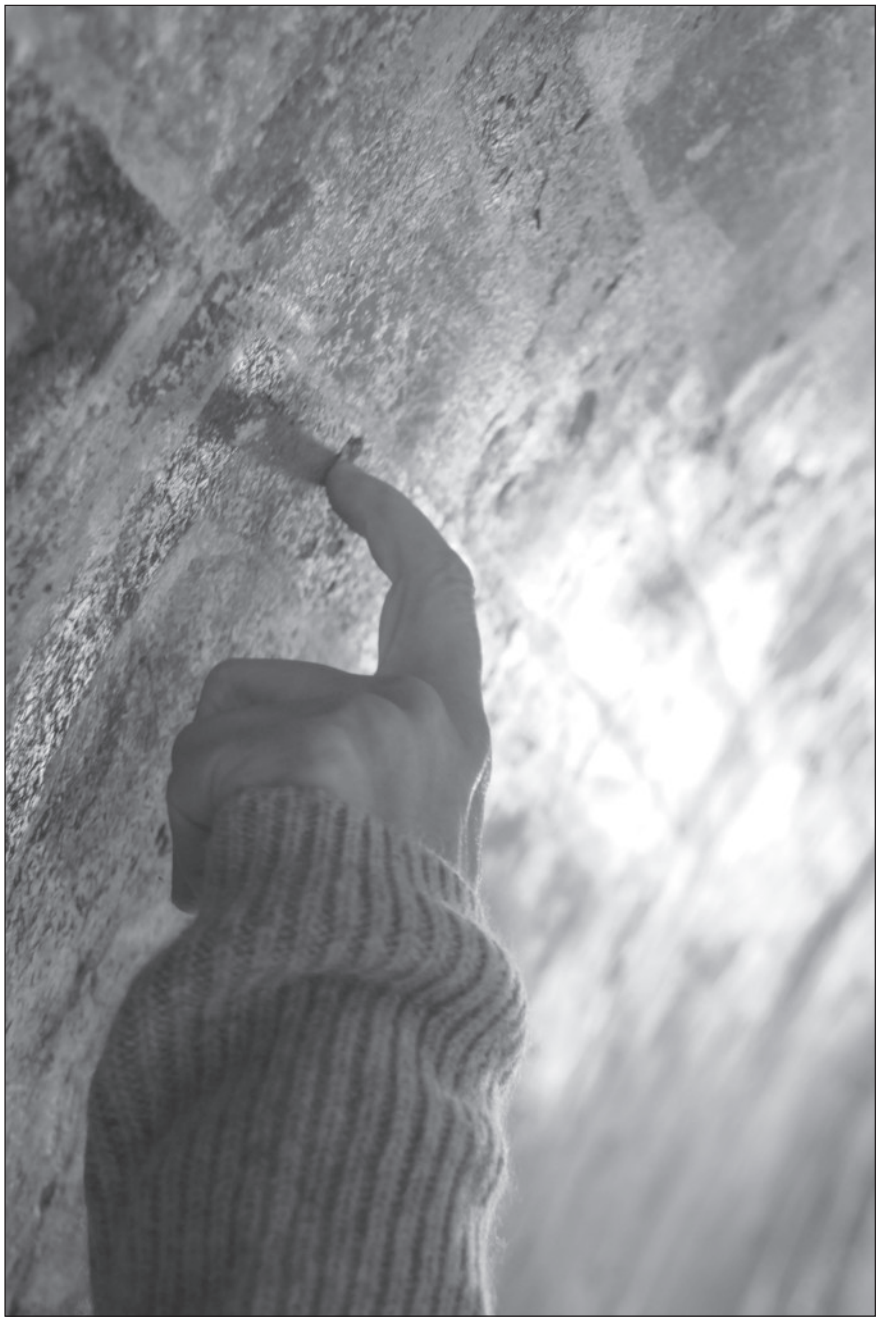
Furthermore, the lack of adequate closure has allowed desert dust and birds to enter the building and cause deterioration, as testified by traces of carbonate and oxalate concretions caused by water percolation, combined with animal droppings identified below the windows. These concretions are combined with extensive soot residues and yellow substances.

In the mid 1970s, the monument was subject to an extensive restoration intervention aimed at preserving the masonry and plaster and, at the same time, reintegrating the paintings. At



*14. Graffiti and incisions visible with raking light.*

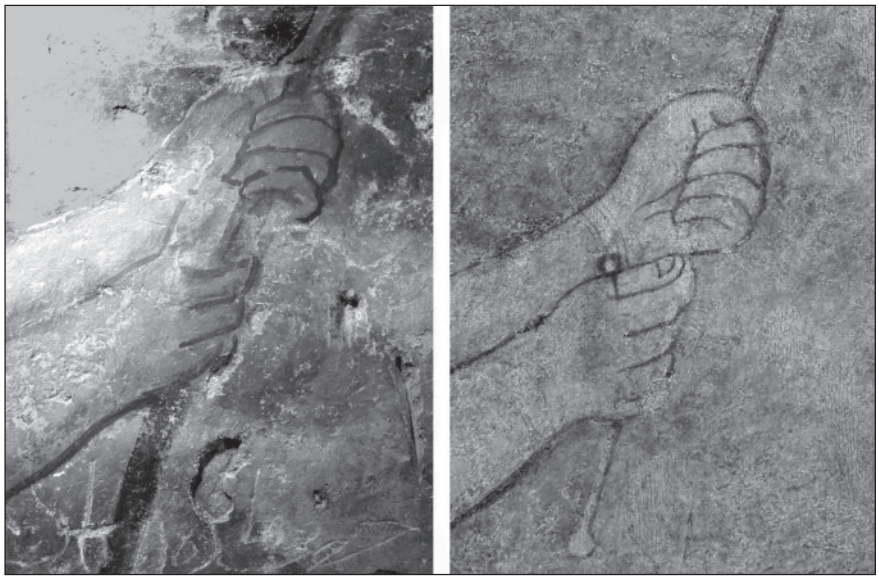
9. Analysis performed by ISCR and the Diagnostic Laboratory for Conservation and Restoration of the Vatican Museums.



*15. Shiny effects of shellac applied on the surface.*

that time, the gap between the west and south walls was filled with rubble and cement mortar. Detachments of the preparatory layer from the masonry (de-adhesion) were secured with vinyl resin. The edges of the widest *lacunae*, or the *lacunae* themselves, were sealed with cotton soaked in that same resin – without applying any other filling – and covered with a yellowish tempera which, in some case, was applied on exposed stone walls and also onto parts of the original pictorial layer.

After partial cleaning, the paintings throughout the building (with very few exceptions) were covered with a layer of natural resin (shellac) (**Fig. 15**). This substance, more suitable for use on furniture than for protecting mural paintings, must have been applied in order to modify the refractive index of fading colors, made irreversibly opaque by previous interventions. At the time it was applied, the shellac was more transparent, but over the last forty years it has acquired a strong amber tint, worsened by several



*16. An example of repainting from the 1970s intervention (left) and the original found underneath (right).*

layers of atmospheric fine particles owing – in part – to tourism. In addition, the shellac layer is now showing signs of contraction, causing the pictorial layer underneath to lift. This shellac layer has extensive repaintings (**Fig.16**) in non water-soluble color in some of the *lacunae*. Traces of an older brown shellac layer, a residue of previous interventions, were also found.

Large traces of soot residues and particles (silico-aluminates) found in saline concretions of a different nature, which were never removed, prevented the correct reading of some original details of the composition. Therefore, the aim of the reintegration by the Spanish team was to outline with dark colors the characters and other figurative elements still visible.

Some parts of the drapery, zoomorphic elements (peacocks) and geometric / decorative patterns (squaring; tent) were repainted more freely.

Natural and man-made causes affected the pictorial film, typically scratching and whitening the surface. Some figurative details of the characters' profiles disappeared or fell off. Countless *lacunae* can be found in the whole pictorial layer (lapis blue background) or parts of it.

Therefore, when the present project began, the paintings of the south wall were scarcely visible, their colors were severely altered and iconography was affected by the interpretation given by the Spanish conservators.

Large *lacunae* extending down to the masonry are found throughout this panel. A large *lacuna* extends from the net painted above the central figure, halves its face and affects the chest, part of the hand holding the pipe and the lozenge-patterned blanket. Many small *lacunae* are widespread on the surface.

Being easily accessible, the lower band of the paintings with its faux marble decoration is the most affected by widespread and deep scratches. The pictorial film and plaster also show intentional damage such as graffiti and incisions. The detachment of mortar from the walls caused large *lacunae* reaching the lower part, once covered with marble slabs. There are also traces of burning and black inscriptions.

Even the faux marble area was subject to interventions during the restoration work in the 1970s. Rough repainting of the geometric patterns and veins are visible under the yellow shellac layer.

In the lower band, moderate adhesion faults were detected between the rougher layer of mortar, the bedding mortar of the marble slabs and the masonry. There are also saline concretions.

In the upper band, medium and large detachment areas were identified between the preparatory render coat and the wall structure.

Some stylized images of animals and symbols carved by *bedouin* living in the *bādiyyah* are of historic and palaeographic interest (Betts 2001). These were classified and analyzed, but at the same time threaten the preservation of paintings as graffiti represent a discontinuity in the plaster and weaken it.

In addition to those detected by Vibert-Guigue's investigations, further small-sized losses of plaster were found. Medium-extent cohesion faults in the layers of rendering were noticed, in particular along the perimeter of *lacunae*, together with several cracks and fissures. Widespread abrasions and losses of the pictorial film due to previous inappropriate cleaning interventions were detected.

**Previous Interventions**

The reconstruction of the paintings' conservation history was deemed particularly significant to define the criteria for the new intervention. Methods and materials used over time were investigated, as were their effects on the paintings and their possible role in the deterioration process.

For this reason, all of the restoration works carried out from 1898 (the time of Musil's first visit) to 1996 (the most recent intervention, performed in compliance with modern standards) were assessed.

Historical documents, restoration reports, published photographic materials and unpublished archive pictures supplied by many institutions were examined. The enthusiastic response of several institutions to our requests for documentation bears witness to the keen interest of many scholars and professionals in this monument.

The most important interventions affecting the appearance of the paintings were those of Alois Musil and the Spanish group guided by Martìn Almagro in the early 1970s.

The state of the paintings at the time of their discovery can be determined from drawings by the Austrian painter A.F. Mielich and from descriptions of the state of preservation of the paintings 'discovered' by Alois Musil (1907) in 1898. Unfortunately, the publication does not include the pictures that the author claims to have taken and the description of the restoration techniques used is limited to generic information.

Musil claims that he cleaned the paintings, which were then mainly covered with soot owing to use of the monument by *bedouin*, with soda and soap and, subsequently, with a mix of Venetian turpentine, gasoline and alcohol.

Probably as a result of this aggressive first cleaning, whitening signs appeared, hindering the reading of the paintings. Allegedly, Musil redefined the figures' outlines and brightened the colors in order to improve the reading of the pictorial text. This may be the reason for the most ancient shellac traces forming the first layers overlapping the original pictorial film.

This is also confirmed by observation and direct comparison between Mielich's drawings[10] and the pictorial surfaces. We noticed that the painted areas copied on the drawings are very close to the original. Some details, such as the figures to the right of the main figure on the sofa, were depicted just by outlining the images, while large areas - which were probably still covered by soot stains and / or have subsequently become readable as a result of cleaning, were reproduced on the paintings with a homogeneous grey color.

Following Musil's intervention, roughly fifty-five years passed until we find more systematic documentation. Nevertheless, photographs taken by travelers and scholars in the intervening period have been found in several libraries and archives, and are an important contribution to research. In 1962, Ettinghausen took pictures that are important evidence of the paintings' condition before the Spanish work.

About a decade later, Professor Almagro and his team of Spanish restorers carried out structural interventions along the western wall of the western aisle, carrying out restoration work on the paintings inside the monument between 1971 and 1973, and again between 1978 and 1979. No photographic evidence has been found of the state of preservation encountered during the restoration works of the early 1970s, except for an unpublished report of a performed intervention mentioning the painting in a 'neutral colour' of the *lacunae* and plaster. This is still visible, although the color has a yellow-greenish hue. The comparison with Ettinghausen's documentation, where the *lacunae* do not appear to be filled with cotton, allows us to conclude that the use of such material and the overlapping colors and shellac should all to be attributed to the Spanish team's interventions.

The reason why the Spanish team went for such a vast reconstructive intervention may

10. Drawings were done partly *in situ* and partly in Vienna from pictures, since he stayed on-site for only 12 days.

have been linked to the effects of the aggressive cleaning carried out at the beginning of the 20th century using inadequate methods. The Spanish team must have restored paintings seriously affected by the previous cleaning, on which Musil and Mielich had applied unifying and brightening agents, perhaps the older shellac identified in our analyses. Furthermore, soot from fires lit inside the monument must have been redeposited on the surfaces before it was declared a protected cultural site.

**Diagnostic Analyses**

Diagnostic analyses aimed to describe the essential features of the paintings' constituent materials, the alterations they underwent over time, and the chemical and physical composition of the substances applied during past restoration work (which may have interacted with the pictorial film). Analyses were conducted using the following tools: SEM microscopy, EDS analysis, FTIR analysis and GS / SM analysis.

**Conservation Intervention: Interior**

*Graphic Documentation*

The painted surface was graphically documented by means of themed maps detailing execution technique, state of preservation, previous interventions and the present intervention on the southern wall and lower band of the western wall.

Claude Vibert-Guigue's drawings made between 1987 and 1992, and published in 2007, were used as a graphic base. Their high quality, accuracy and wealth of detail allowed the state of the surfaces in 1987-1992 and their current state to be compared. High resolution photographs supplemented Vibert-Guigue's drawings.

*Photographic Documentation and Remote Sensing*

Before, during and after the restoration, an accurate photographic report of the surface conditions, different phases of the intervention and training activity throughout this whole period was conducted. UV and IR photography was also carried out, showing details poorly visible or not visible at all to the naked eye.

A thermographic survey of the entire complex was conducted by Dr José Luis Lerma (Universidad Politécnica de Valencia) in February 2011, in order to visualize thermal discontinuities in the walls of the building. The survey allowed the visualization of the composition of the walls hidden beneath the paint layers and the identification of areas which may indicate the presence of voids or of possible water infiltration. Dr Ignacio Arce (Director, Spanish Archaeological Mission in Jordan) contributed to the project high-resolution photography, orthophotography of exterior elevations and 3D reconstructions of some of the interior spaces. Finally, the DoA conducted a new topographic survey, mapping the entire complex, and also carried out a laser scan of the main building in order to produce an accurate 3D model of the site to be used in future phases of the conservation project, as well as for presentation and education purposes.

Environmental monitoring has been carried out since 2010, following the installation of sensors throughout the building, in order to measure variations in temperature and relative humidity within the structure. These measurements are especially useful now, following the installation of new windows and covers that have effectively 'sealed' the building. Comparing data with the measurements during the year before the installation of the new windows will help us to understand the effect of this intervention on the stability of the environment inside the building.

*Collection of Marble Fragments*

Many stone pieces, along with pottery fragments, were discovered on the plateau in front of Quṣayr ʿAmra. Given their proximity to the building, it is safe to assume that they were originally from inside it. A grid was laid out with GPS, allowing the exact location of recovered fragments to be recorded. No excavation was carried out; fragments were simply collected on the surface.

Because of the patina adhering to these fragments, it was difficult to recover any information about them or possible traces of previous intervention. After careful dry removal of incoherent deposits with soft brushes, an ammonium salt solution was used for cleaning.

The removal of concretions allowed different marbles to be identified, *viz*. (1) fine-grained, uniform white marble, (2) gray-veined marble

*17. Marble fragments collected outside the monument.*

and (3) stratified discontinuous fragments similar to *cipollino* marble.

Investigation of execution techniques allowed fragments of mural and floor coverings to be distinguished on the basis of thickness, cramp signs, rounded moldings, carved edges and toothed chisel signs (**Fig. 17**). It was also possible to make a tentative identification of the back face of the slabs, through the presence of original mortar residuals. A number of fragments also showed point, ruler and caliper signs indicating that the slabs, once installed, were prepared for incision or fretwork, or for the application of *tesserae* or inlays.

A recording form was designed for the description of the fragments, now grouped and stored in containers along with the pottery finds. Some of them were subject to cleaning with the above-mentioned methods and separated on the basis of thickness, in order to be numbered, examined and catalogued.

**Conservation Intervention**

The cleaning operations were complex and carried out in phases, primarily because of the presence of the shellac layer. This substance becomes irreversible with ageing and its removal required progressive treatments and particular care, in order to respect the original pictorial layer.

Before cleaning, Portland cement filling the joints was mechanically removed where necessary.

As the very stiff and non-transpiring cotton that filled the *lacunae* had weakened the plaster, its removal required particular care. The cotton was softened with a mixture of demineralized water, acetone and ethanol, paying attention not to affect the painted surface. Once the cotton surface layer had softened, it was cut away small pieces at a time. This operation was repeated until it was completely removed. Where removal might have damaged the painting, cotton gauze soaked in acrylic resin solution was applied to the pictorial layer (**Fig. 18**). This allowed the safe removal of cotton and ensured adhesion of the detached areas. Afterward, the gauze was taken off with organic solvents and complete removal of the acrylic resin was verified under raking light.

At the end of this operation, the borders were consolidated and filled with a weak mortar made of 2.5 parts inert materials to 1 part binder.

Adhesion faults between the plaster and ma-

*18. Careful cleaning of the mural paintings.*

*19. Injection of mortar to consolidate the base of the painted layers.*

sonry were restored using a low-pressure injection[11] of low-salt, ready-mixed hydraulic mortar (**Fig. 19**). Emulsion acrylic resin was used to reattach small-size detachments and adhesion faults on the pictorial film. Before and after the cleaning, the painted surface underwent pH and electrical conductivity measurements.

The cleaning consisted of removing over-applied substances: shellac, repaintings, older shellac traces and a grey-brown layer of organic nature.

Shellac was made soluble and completely removed using a mix of organic solvents included in the solubility area of natural and synthetic resins. Solutions were thickened with gel[12] in order to allow better control of cleaning, extend the time exposure, improve the contact surface, limit solvent penetration and delay its evaporation.

The grey-brown layer of organic nature was removed using the same pH 6 gel chelating buffered solution. Furthermore, carbonate and oxalate concretions and soot stains were reduced by applying a chelating buffer solution using different time exposures.

Afterwards, the surface was treated with a Japanese paper compress soaked in 10 % pH 6 ammonium citrate and covered with the same agent in carbopol for a 5 minute exposure time. The choice of pH of the saline solution was dictated by the exclusive interest in its chelating properties. The surface was then carefully washed with deionized water. After cleaning, electrical conductivity tests and pH measurements were carried out to verify the complete removal of the saline solution.

**Treatment of the *Lacunae* and Pictorial Reintegration**

The reintegration of the pictorial text was

11. Ledan TB1 by TecnoEdileToscana: low-soluble salt, ready-mixed, hydraulic mortar.
12. Gel solvents used for cleaning are composed as follows (for each 100ml of solution): 55ml benzyl alcohol, 35ml isopropyl alcohol and 10ml Ligroin, added to the gel prepared with 1gm Carbopol, 9ml Ethomeen C25 and 1ml Ethomeen C12; 70% benzyl alcohol, 30% isopropyl alcohol. Carbopols are polyacrylic acids neutralized by Ethomeen C25 and C12, turning into salts with gel properties. Carbopol Ultrez 21 turns water into gel with no need for neutralization.

aimed at re-establishing its formal and chromatic features for correct legibility.

The pictorial reintegration is a critical action. The decision to integrate a pictorial text depends on its state of preservation and the damage it has sustained. The aim is to reconstruct logical threads of the image enabling its comprehension, legibility and potential unity, without erasing or hiding its conservation history.

There is a subtle balance between aesthetic requests and historical accuracy. The methods in use and their legitimacy are clearly expressed by Cesare Brandi (2005), founder of ISCR (previously ICR). The integration aims to reduce the visual disturbance caused by *lacunae* and unhomogeneous parts of the surface, considering the needs of both aesthetic and philological interpretation. Furthermore it must be recognizable and reversible. Materials must have the following characteristics: reversibility, transparency, chemical / physical stability of pigments and binders, and minimal alteration as a result of ageing.

Pictorial film losses and preparatory layer abrasions were treated with a light transparent watercolor glaze to reduce optical interference. The color shade chosen followed the original. The color intensity of *graffito* engravings of historical interest was softened using watercolor glazes.

**Lacunae Selected for Reintegration**

After long consideration following Cesare Brandi's theories and with the agreement with of the project management team, restorable *lacunae* were identified by means of careful examination of their pictorial composition in order to legitimize the intervention.

After cleaning, *lacunae* in preparatory layers that could be reintegrated (because the reconstruction would not be hypothetical) were filled to surface level using aerial mortar (binder to charge ratio 1:4) and then reintegrated using *tratteggio* (a hatching technique) (**Fig. 20**). This technique was first used by ISCR conservators and has been codified by Cesare Brandi (Bentivoglio and Oteri 2005). Small *lacunae* in the preparatory layers were filled. The deepest ones were filled with a first layer of mortar consisting of 2 parts chalky white sand (passing through a 2mm mesh, but retained on a 0.5mm mesh), 1 part volcanic black sand (passing through a 2mm mesh) and 1 part slaked lime. The final layer of mortar, spread at the same level as the painted layer, is made of 3 parts chalky white sand (passing through a 0.5mm mesh) and 1 part slaked lime. Filling was performed selectively so as not to erase historical incisions or to exceed reintegration of the most severely damaged areas, in particular on the lower part of the wall. Fragments of the letters preserved in the *tabula ansata* were studied by means of a relief drawing at 1:1 scale. Since filling was considered legitimate, according to Project epigrapher Frédéric Imbert's instructions, very small *lacunae* were restored so as to ensure continuity in the reading of the epigraph. Restoration could have been extended to larger areas, yet it was limited in order to preserve the historical value of the artwork.

**Lacunae not Selected for Reintegration**

In case of *lacunae* that were impossible to integrate because the reintegration would have been hypothetical, the stone and original interstitial mortar were cleaned. *Lacunae* in the original interstitial mortar and stone unevenness were fixed with a mortar consisting of 5 parts siliceous sand (passing through a 0.5mm mesh), 1 part white lime powder (passing through a 0.5mm mesh), 1.5 parts black volcanic powder (passing through a 0.5mm mesh), ½ part grit from the *wadi* (retained on a 0.5mm mesh) and slaked lime. The charge to binder ratio was 2.5:1.

This composition was selected after a number of tests on samples, with the aim of ensuring that it was distinguishable at close range from the original mortar.

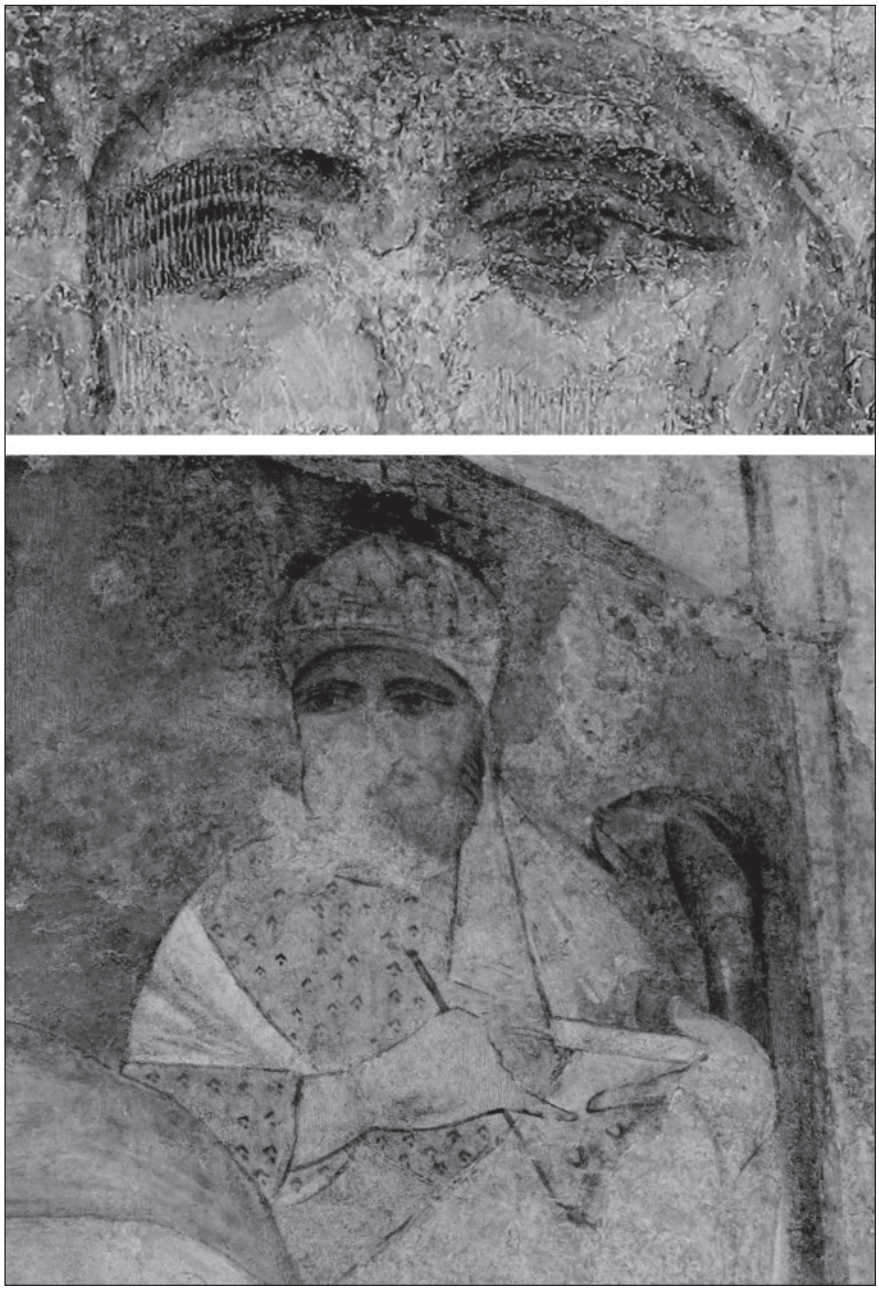
**Change in Iconography**

*Lunettes: Human Figures*

The iconography of the two figures in the lunettes besides the window has changed completely after the cleaning intervention (**Figs. 21 and 22**).

Before intervention, one of the arms of the figure on the left, joining his knee to his face, was extraordinarily long. The other, leaning against his hip, was out of proportion.

In the same manner, the garments outlined an unintelligible leg position. Repainting, removal and cleaning revealed a left arm more in



*20. An example of tratteggio used to improve the visibility of detail.*

*21. Lunette (before conservation).*

*22. Lunette (after conservation).*

*23. Detail of left character with inscription.*

proportion with the rest of the body. One of the sleeves follows the elbow profile and is raised from the figure's chest, while the right arm (completely misunderstood by the previous intervention) is in reality bent, supporting the head of the figure.

The legs, once crossed, are now close together and both feet are visible, though fragmented (**Fig. 23**).

The change in iconography is also clear on the right side of the lunette. The original scene showed a figure joining his fingers around his knees, with one arm in the foreground and the other hidden behind his chest but outlined by the sleeve.

This interpretation was proved to be wrong when cleaning revealed an arm bent behind the figure's head, which rests over a pillow that was invisible before intervention (**Fig. 24**). Feet were also discovered, one of which was completely illegible before the intervention.

The two characters – usually considered as allegoric figures – provided us with two more unexpected (given the state of conservation of the painting) details, *viz*. two Greek inscriptions painted on dry plaster (*secco* technique) upon the blue background.

The I and C (possibly O) letters are legible on the left side, with ONAC on the right side. This latter discovery suggests the character's

*24. Detail of 'Jonah's' head with inscription.*

possible identification as the prophet Jonah. This hypothesis is confirmed by several representations of the prophet lying under a tree that God miraculously provided for him as a shelter after he succeeded in converting the inhabitants of the city of Nineveh[13]. The image of Jonah sleeping under a tree with his arm bent behind his head was known from the 2nd century and is often depicted on Christian sarcophagi, mosaic decorations and catacomb mural paintings, both in the Roman area and its provinces (Milburn 1988: 62-64)[14]. Moreover, the fact that at least the character on the right is male has been confirmed by the discovery of traces of a beard.

The curve of the lunette is further marked by representations of trees, foliage and flowers.

*25. Upper inscription (before conservation).*

13. Book of Jonah, Chapter 4, Verses 5-6: "So Jonah went out of the city, and sat on the east side of the city, and there made him a booth, and sat under it in the shadow, till he might see what would become of the city. And the LORD God prepared a gourd, and made it to come up over Jonah, that it might be a shadow over his head, to deliver him from his grief. So Jonah was exceeding glad of the gourd." The story is also mentioned in the Qur'an, in Sura 37 (as-Sâffât), 146: "And we caused to grow, over him, a spreading plant of the gourd kind".
14. Cf. for example, a floor mosaic in Aquileia, wall paintings in the catacombs of Via Latina and Saint Callistus in Rome, sarcophagi in Saint Maria Antiqua in Rome, and the Vatican Museums, Vatican City.

The tree may have a more direct significance in the interpretation of the right figure as Jonah, as mentioned above.

*Dedicatory Inscription at the Top of the Lunette*

At the top of the lunette, above the window, an inscription was detected but was illegible owing to the conservation condition of the wall (**Fig. 25**).

During previous restoration, following the usual treatment with shellac, this area was repainted but only a few letters were revealed, while the rest of them and the text as a whole remained obscure. The frame around the inscription, outlined in black, was identified as a repainting and removed during the autumn 2011 season.

By cleaning this area under Imbert's supervision, three lines of text consisting of half-preserved words were identified (**Fig. 26**). Their white / light yellow color is similar to the pigment used for the Greek inscriptions relating to the two characters painted at the sides of the window. The epigraph was clearly painted upon the blue background and foliage (barely visible) during the last phase of decorative work in this area.

The loss of pictorial film left clear marks and allowed the almost complete identification of the missing letters. The words are in Kufic script, without diacritical marks. This, and the poor state of preservation of some letters make reading and interpretation quite difficult. A preliminary reading by F. Imbert is as follows:

(1) *O God, make al-Walīd b. Yazīd virtuous the way you did with your*
(2) *pious servants! Surround him with the freshness of mercy, O Lord of the worlds*
(3) *and for your community, eternal ... the religion the day of ... all the ...*

*26. Upper inscription (after conservation).*

Line 1: *Ṣalāḥiyya* Ṣalāḥ("goodness"; "rightness") could also be *ṣāliḥāt* ("the good works and deeds"). This line is based on the repetition of the Arabic root *ṢLḤ* (*aṣliḥ* […] *ṣalāhiyya* Ṣalāḥ). In fact, the presence of the article is strange. At the end of the line, the letter *dāl* of '*ibād* ("servants") is not present. This is exactly what Jaussen and Savignac saw in 1909 (Jaussen and Savignac 1922: 99, fig. 18, n. 4).

Line 2: The second word is problematic: there is only one round letter after the article *al-* and this could not be read as *mufliḥīn* ("lucky"; "fortunate") without the letter *mīm*. On the first photographs taken during the cleaning itself, there is a little tip appearing on the top of the round letter, like the drawing of a *ṣāḍ* in little proportions: it could be possible to read *ṣāliḥīn* ("pious") in old *scriptio defectiva*. The following expression looks strange, but the shape of the letters is quite clear: *aḥīṭ-hi bi-bard raḥma* ("surround him with the freshness of mercy"). In Arabic grammar, we should have *aḥiṭ* and not *aḥīṭ* and the verb is commonly followed by the Arabic particle *bi-*[15]. At the end of the line, the word *walī* (lord) is preceded by the vocative *yā'* in *scriptio defectiva*.

Line 3: *Li-ummati-ka* is clear ("for your community"). The word after it could be read as the Arabic root *Khuld* ("eternity"), but the letter *lām* seems too short. Other readings are possible as *jund* ("army") or *jayyid* ("good") but the meaning is not guaranteed. The last part of the line is not readable; we can only recognise letters with no clear meaning.

The Walid's inscription is not an official inscription. It has been painted in a place where it was quite invisible to the visitors, away from ground level. It is possible that this inscription is 'private', being an invocation to God in favour of a man called al-Walīd b. Yazīd. It is painted with close attention to its execution, but with smaller dimensions than the letters of the *tabula ansata*. The text of al-Walid had without any doubt a propitiatory value: to attract God's grace towards the prince al-Walid. The mention of the name of al-Walīd b. Yazīd helps us to date the

15. The invocation *Allāhumma adhiq-nā bard ʿafwi-ka* is well known in Islam: "O God make us taste the freshness of your forgiveness".

inscription to the Umayyad period.

The text is not a construction text. It does not help us to date the building of the bathhouse of Quṣayr ʻAmra or the paintings[16]. The only historical element in the whole inscription is the name, which consists of a single *isim* (surname) and *nasab* (name of the father) and is not followed by any mention of the titles of the caliph. Such titles are well known and are repeated on a number of epigraphic texts mentioning the Umayyad caliphs[17], e.g. ʻ*abid d-allah* ("the servant of God") and *amīr al-mu'minīn* ("prince of the believers").

At our present state of knowledge, which is still tentative, we should not attempt to provide a fixed date for this epigraphic text. In fact, the clear mention of al-Walid in the inscription does not provide a date for the paintings during the reign of caliph al-Walid II (743-744 AD). This leads us to believe that the text refers to prince al-Walīd b. Yazīd, during the long reign of Hisham b. Abd el-Malik and before his accession to the throne. This hypothesis may date the text, but not necessarily the building, to the years of Hisham's reign, between 723 and 743 AD. This interpretation would accord with the previously proposed reading of the inscriptions painted over the representation of the person seated on the throne on the back wall of the throne room, which mentions a "crown prince of the Muslim men and women" (*waliy* ʻ*ahid al-muslimīn wal-muslimāt*). It also agrees with the text found in the eastern aisle, which mentions a prince[18]. The cleaning of this latter text will be of fundamental importance, as it may then be possible to demonstrate conclusively that Quṣayr ʻAmra belonged to prince al-Walīd b. Yazīd.

*Peacocks and Inscriptions*

The tail of the peacock on the right was clearly subject to formal transformation and had been incorrectly interpreted by previous interventions (**Figs. 27 and 28**). A fragment of plaster just under the windowsill suggests that the symmetrical peacocks' tails would have converged on the centre of the composition, parallel to the upper corner of the drapery. After cleaning, the peacock on the left revealed a bent wing, hidden by background repainting in light blue. Traces of preparatory drawings for the feet of both peacocks also appeared, but these were painted in a different position during the intervention carried out in the 1970s.

A localized cleaning test was run on the APA inscription, in order to confirm the correct interpretation of the legible letters. The final A turned out to be an I and a C, supporting the hypothesis that the complete inscription was origi-

*27. Right peacock and Nike inscription (before conservation).*


*28. Right peacock and Nike inscription (after conservation).*

16. Such an inscription is found on the paintings of the Christian church of Mar Mûsa in Syria where we read: *Khal(l)aṣ al-muṣawwa(i)r* […] ("the painting is over").
17. See the Muwaqqar capital in ʻAmmān Museum, with the title belonging to Yazid, his father.
18. *Allāhumma bārik ʿalā al-amīr* [...] "O God, bless the prince…". The reading that we propose was made on the basis of photographs and sketches made by C. Vibert-Guigue.

nally XAPIC (Kharis) (Fowden 2004: 191-193; Vibert-Guigue and Bisheh 2007: pl. 26).

**Wall Intermediate Band: Central Scene**

The main scene of the composition portrays a central figure lying on a sofa, sheltered by a tent. Other figures stand at his side. Two peacocks and Greek inscriptions complete the scene. More accurate cleaning partly clarified its iconography.

The central figure, considered female by previous scholars, turned out to be a male with a beard. Presumably, it is a portrait of the man who commissioned the building, now supposed to be Walid II, perhaps – in view of the short (14 months) duration of his reign – when he still was a prince. Unfortunately, the figure's face is severely damaged and large, deep *lacunae* reach the stone underneath. After cleaning, the pipe held in his right hand turned out to be thinner.

On the left, a female character (possibly a slave girl) was previously interpreted as holding a pole up inside the tent. Removal of repainting from the tent above the central figure's head showed a *flabellum* decorated with peacock's feathers being waved by the woman. Over the *flabellum*, the lower edge of the tent above the characters' heads is bordered by a piece of deep blue sky.

The pictorial film of the *flabellum* pole appears to be very incomplete, even though its mark is visible on the lapis lazuli background. Repainting during the 1970s intervention lengthened the pole and hid its original head. The hair of the maidservant holding the *flabellum* appeared to be similar to that of the two women painted under the arch of the eastern aisle. It can be seen where the most superficial pictorial layers have fallen, leaving a typical mark on the blue background. The preparatory drawing of the hands – strengthened by previous repainting – is now visible as it was originally. After cleaning, fragments of pink pictorial film to the left of the bed leg were identified as belonging to the lower edge of maidservant's dress.

Beneath the altered repainting, the tent revealed weaving rich in details. The tent is made of a square-patterned weave, crossed by diagonals from left to right and from top to bottom. On careful observation, the weaving turned out to consist of two different units. These are both formed by black rectangles containing a number of smaller red ones. The vertical lines of the tent converge on the central top, which is unfortunately lost.

Cleaning revealed some preservation of the blanket. It is rich in legible details, but unfortunately most of their original three-dimensional tones have been lost[19]. The heavy outlines were removed and replaced by thinner ones. The original decoration consists of an orange background, upon which lozenges with white, upwards-pointing arrows were painted. Some of the arrows have been blackened by alteration of the original color and are no longer visible from a distance. This detail adds information to the classification of the textile materials represented in the pictorial cycle. Hitherto, only the blue details of the blanket had been considered. The edges of the lozenges are alternatively decorated with blue and white elements.

Cleaning the main character's legs, a blue garment decorated with white circles and little inverted 'v' decorations was discovered. The legs are quite three-dimensional and cast a shadow on the mattress below, giving the image an unexpected naturalistic perspective. The left foot – which had been interpreted in a different manner by the repainting – is now plainly visible and well proportioned. Many decorative details of the mattress have been lost, yet blue areas are still visible at the lower edge of the blanket and by the foot.

Complete cleaning of the two characters to the left of the central figure was also carried out. They seem to be male figures, pointing their right hands at the central character in a specific gesture. Because of a medium-sized *lacuna*, it is difficult to understand the rear figure's attitude. This character is wearing a Phrygian headdress and his raised forefinger and deep blue garment are still clearly visible. The character on the right in the central scene, behind them, had been interpreted as a man standing and almost joining his hands on his chest, with half-open fingers. Cleaning has revealed the real position of the

19. All types of textile materials represented in the pictorial cycle were identified in Vibert-Guigue and Bisheh 2007: pls 148 -149. The ornamental pattern of the blanket is shown in picture 9.

*29. Central panel (after conservation).*

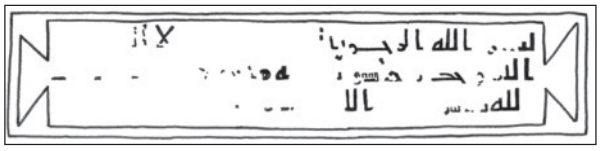
hands: he holds a stylus in his right hand and is using it to write symbols – perhaps letters – on the open scroll in his left hand. Just by his left hand, a round object – probably an inkpot – has been exposed. His garment has rich decoration, similar to that of other characters (**Fig. 29**).

**Inscription in the Tabula Ansata**

The *tabula ansata* is located between the main figurative scene and the band decorated with wheels and plants. It is rectangular and framed by perspective dentils. The *tabula ansata* was never repainted during the previous interventions, even though a thick shellac layer hindered its full understanding. Cleaning has clarified the initial part of the first two lines and revealed many fragments of the letters on the rest of the *tabula*. Its conservation status has been badly jeopardized and prevents complete reconstruction of the text, even though fragments seem to coincide with the letters of the *bismmallāh* formula (**Fig. 30**). A tentative translation made by F. Imbert is as follows:

(1) *In the name of God, the most gracious, the most merciful. There is no god except*
(2) *God, unique and with no associates...*
(3) *God ... God ...*

This is the most prestigious inscription in the bathhouse. It was facing the entrance door and we can imagine that this large, painted, monumental inscription was one of the first things to be seen by visitors entering the building. This inscription, visible from afar, was a reminder to visitors that they were entering an Islamic building belonging to a Muslim ruler.



*30. Copy of the surviving tabula ansata inscription.*

The text consists of traditional Islamic formulas, commonly found in Arabic inscriptions of the Umayyad period (661-750), cf. the example from Samakh in Palestine, south of Tiberias (Sharon 1966: 367-372). The identification of some letters at the beginning of Line 1 helped us to put forward a translation, despite the bad condition of the inscription. The only word that can be read without difficulty is the name of God (*Allāh*), which is repeated at least three times in the text. We are able to read the word *ar-Raḥmān* (the Merciful) but only have the definite article of *al-Raḥīm* (the Compassionate). This expression, according to the well-known formula, is followed by the *shahādah*, the Muslim declaration of belief, in two parts. The first part, *lā ilāha illāl lāh* ("there is no god but God") could be identified at the end of the first line (only a *lām-alif* letter and an isolated *alif* and *lām*) and the beginning of the second line, where we find the word *Allāh*. After this we find the declaration of oneness of God. From the word *waḥdahu*, we only have the *wāw* and *ḥā'*, and a part of final *dāl*. Also, it is possible to read the first letters of the expression *lā sharīka lahu* ("no associate"), *viz*. a *lam-alif*, then a *shīn* and a final *rā'*. The rest of the text is unreadable. We assume that the legible part was followed by the expression of the acceptance of the Muhammad as God's prophet but we can't be sure. This epigraphic text was perhaps ended with a date, which is often found in this type of official inscription.

The inscription in the *tabula ansata* is nothing more than a monumental inscription dating to the Umayyad period; the most important thing about it is that it is painted and not engraved. Very few inscriptions of this type are known in the Islamic world. One of the few examples known was found on the wall of the audience hall of the bathhouse of Ḥammām as-Sarāḥ, some kilometres from Quṣayr ʻAmra, close to the Umayyad palace of Ḥallabāt (Imbert forthcoming). Both are painted texts located in the same part of the audience hall, in front of the

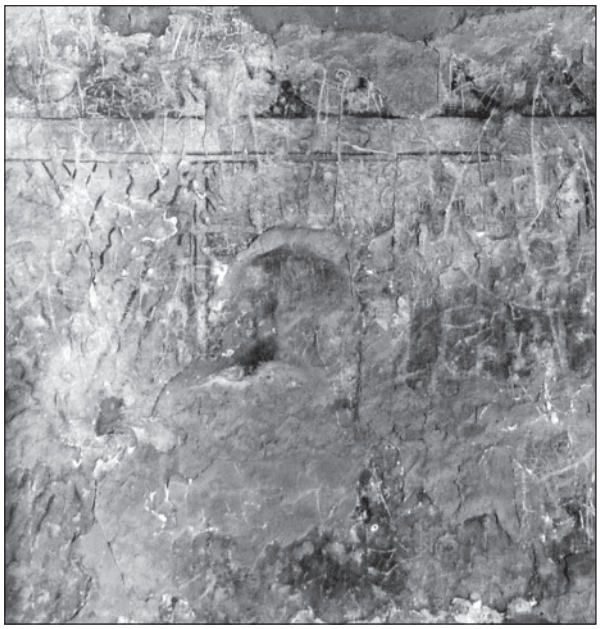
entrance. In Quṣayr ʻAmra, the length of the letter *alif* is 9m, just as at Ḥammām as-Sarāḥ[20]. In summary, these characters belong to the register of painted archaic monumental Kufic. The only known examples have been found in the Jordanian steppe east of ʻAmmān, at Ḥammām as-Sarāḥ and al-Kharrānah (painted in black ink on the wall in 710 AD), and in the paintings at Quṣayr ʻAmra. The concentration of painted texts in palaces and bathhouses in the *bādiyyah* shows the important role played by this region in the development of Arabic script, especially during the Umayyad period.

**Investigation of the Faux Marble of the Lower Band**

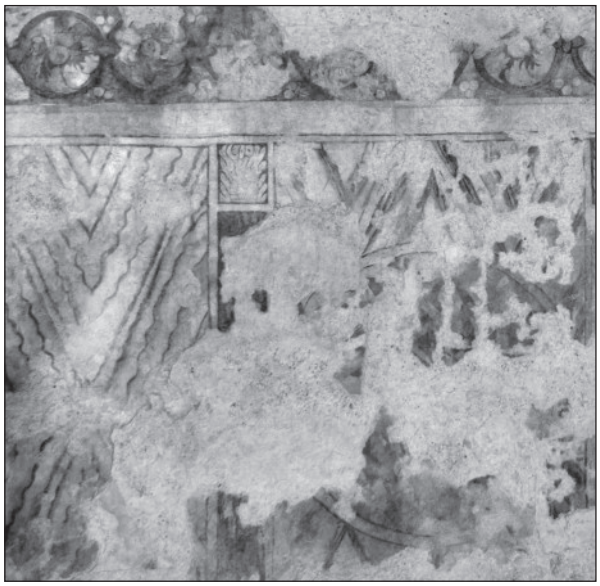
The whole west aisle of the Quṣayr ʻAmra reception hall is decorated with stylized patterns on the lower band. The south wall shows this horizontal partition too. Under the *tabula ansata*, bordered with a 4cm high colorful modillion pattern, there are 7.5cm wide monochromatic linear dividers with a 22.5cm high ornate band with joined circular phytomorphic volutes. The largest part is simply painted as faux marble. Imitation proconnesian marble stands out with raking and specular shaded veins, alternating with red porphyry pilasters surmounted by Corinthian capitals. The pilasters frame an insert with a yellow *marmor numidicum* (*giallo antico*) background and a circular inlay with a *sectilia* (marble mosaic) of different colors in the centre. The only layer of bright colored and fiber reinforced plaster is flat and the surface is probably polished (**Fig. 31**).

The discovery of numerous marble fragments, that once covered the walls and floor of the monument, has allowed us to define the types of stone that inspired the painters' composition.

The circle and flower patterned decoration on the frame running from the side walls up to the vault is the same of imitation marble. After the intervention, it proved to be very similar to reliefs found inside other Umayyad palaces such as Hisham's Palace and Khirbet al-Mafjar[21] (**Fig. 32**).



*31. The faux marble area (before conservation).*



*32. The faux marble area (after conservation).*

**Site Management Planning**

The site of Quṣayr ʻAmra was added to the World Heritage List in 1985 (ref. 327) under criteria i, iii and iv of the World Heritage Convention (http://whc.unesco.org/en/list/327). The nomination dossier did not include a site management plan, nor clear definitions of site boundaries. In fact, the nomination dossier only discusses the main building and its paintings, ig-

20. The inscription at Ḥammām as-Sarāḥ is in very poor condition. It measures 345 x 125 cm and consists of 11 lines and some 35 meters of text, written on 45 stones of the wall (without any kind of frame).

21. Visible *in situ* and in fragments conserved at the Rockefeller Museum, Jerusalem (Marie-José Mano, pers. comm.).

noring the presence of a vast complex of ancillary sites, all of which are related to the original establishment of the *quṣayr*.

These sites include (from west to east):

(1) A number of small structures on the edge of a slope overlooking Wādī al-Buṭum;
(2) A ruined *qaṣr* that was damaged by bulldozing in or around 1996;
(3) A possible mosque, of which only foundations remain (this mosque may also be interpreted as a ʻdesert mosqueʼ, that was never intended to be completed as a built structure) (Genequand 2002);
(4) Hydraulic features, including a diverting dam and perhaps a canal, much disturbed by the construction of a water basin in recent years;
(5) A square building or tower, midway between the *qaṣr* and the *quṣayr*;
(6) Traces of two rectangular structures to the north (near the visitor center), with a concentration of loose glass *tesserae* near the surface;
(7) A cistern not far from the present visitors' car park;
(8) Traces of structures to the east of the *quṣayr*;
(9) A long wall bisected by the ʻAmmān - Azraq highway;
(10) Stone blocks to the south of the *wadi*, south of the *quṣayr*;
(11) Another wall and a second *sāqiyya* to the east of the ʻAmmān - Azraq highway.

The 1971-1974 plan prepared by the Spanish team working at the site also showed a number of structures on the plateau between the ruined *qaṣr* and Quṣayr ʻAmra. All of these sites seem to belong to the same period of construction as Quṣayr ʻAmra, *viz*. the early 8th century AD. A number of recent studies have stressed the importance of these remains for gaining a better understanding of Quṣayr ʻAmra and its function(s) (Vibert-Guigue and Bisheh 2007; Genequand 2002). The perimeter wall that can be seen north and east of the main building, for example, might define the limits of a *paradeisos*, a garden in the tradition of Classical as well as Byzantine and early Islamic cultures (Vibert-Guigue 1998). Quṣayr ʻAmra might have been used as a lodge for the caliph, while the ruined *qaṣr* and other structures were perhaps built for the use of guests, servants and soldiers. More studies and investigations are necessary before these hypotheses can be consolidated, but the more pressing matter is the protection of these sites, which were left outside the fenced area.

**Disturbances and Threats**

These remains were either separated from the main building (with the construction of the ʻAmmān-Azraq highway thirty years ago), or have been bulldozed or vandalized without apparent reason. Moreover, the recent construction of a water reservoir 200m above the main site is a threat that should not be underestimated, since this reservoir can hold up to 40,000 cubic meters of water. A serious flash flood could compromise its embankments and release the water towards the site. More serious still is the 2011 construction of an earth dam 300 meters wide just above the junction of Wādī al-Ḥarth with Wādī al-Buṭum, at a distance of 2 km from the site. This effectively blocks all water flowing into Wādī al-Buṭum from this important tributary *wadi*, which supplies two-thirds of Wādī al-Buṭum's discharge.

Quṣayr ʻAmra is located on a *wadi* with a substantial stands of *buṭum* trees (*Pistacia atlantica*), some of which may be centuries old. The *wadi* can carry a large amount of water and, in fact, a flood occurred in 1994 when the site was submerged under 70cm of water.

The main disturbances in the vicinity of the site are:

(1) Illegal quarries 2km west of the site. Although it has been claimed that these quarries have been stopped, it seems that some quarrying activity is still taking place;
(2) A Ministry of Agriculture well and other installations to the north-east, and a private farm to the south of the site. These have scarred the desert surface to plant trees (now dead) and install irrigation pipes;
(3) Dirt tracks to access the farms and quarries;
(4) The ʻAmmān-Azraq highway, which bisects the site, separating the second *sāqiyya* and wall remnants from the rest of the site;
(5) A large water reservoir 200m west of the site;
(6) A dam on Wādī al-Ḥarth, 2km upstream, and at least two more check dams on Wādī al-Buṭum, 2-3km upstream;

(7) A long berm along a dirt track delineating the north end of the site. It is difficult to understand when, by whom and for what purpose this berm was built. One hypothesis is that it was made by the Ministry of Agriculture to define the nature reserve of Wādī al-Buṭum;
(8) Paths leading visitors to the main building;
(9) Bulldozing of the *qaṣr* 500m west of the main site. This seems to have taken place around 1996 and may have been linked to the construction of the paths mentioned above;
(10) An electricity line 400m east of the main building, along the ʻAmmān-Azraq highway;
(11) Another electricity line, this time buried, has disturbed the site passing between the second *sāqiyya* and the ʻAmmān-Azraq highway, bisecting the wall remnants just north of the second *sāqiyya*.
(12) Vandalism to the second *sāqiyya*, which photos taken by the Spanish team after the excavation and conservation of 1971-1974 show to have been good condition, but which today is an unrecognizable pile of rubble. This site was originally fenced, but the fence has either been stolen or taken down; only a few remnants are still visible.

It is clear that there has been very little coordination between the various Departments and Ministries in the past. Public works proceeded in the form of highway construction without proper archaeological assessments; the same can be said of the Ministry of Agriculture experimental station, water reservoir and the establishment of a nature reserve. The Ministry of Tourism's paths and tree planting schemes were unsuccessful and have contributed to make the original landscape more difficult to recognize. This is all compounded by active threats to the main site itself, especially the vandalism and graffiti that remain the most serious threat to the integrity and authenticity of the site (**Fig. 33**).

*33. Vandalism in the alcove room.*

All this calls for the urgent establishment of a management and conservation plan, which the Project is carrying out using a participatory approach with full involvement of all stakeholders. A team consisting of heritage specialists and DoA staff was formed, with the aim not only of compiling an operational management plan, but also of providing elements to define the limits of the World Heritage site, as well as suggesting improved presentation and visitor management for the site. Two stakeholder meetings were conducted in April and June 2012, and other consultations will take place during the course of the project.

Students from the Queen Rania Institute of Tourism and Heritage at Hashemiya University participated in a one-week survey aimed at understanding visitor behavior and *desiderata* at the site. The survey will be repeated in future season at the site.

**Conclusions**

The first three seasons of documentation and conservation at Quṣayr ʻAmra have achieved important results: the exterior of the building is now conserved, water infiltration has been stopped and the monument shows a more balanced palette of color and shadow. Inside, condition assessment and analyses have allowed the recognition of the original painting techniques used by the Umayyad artists, as well as the materials applied in recent interventions. Various experiments have allowed methodologies to be defined in order to reduce or eliminate the repainting and layers of shellac applied in the last century to protect the site, but which now pose a real threat to the conservation of the mural paintings. The results are extraordinary, not only because it has been demonstrated that apparently irreversible conservation interventions can at least be reduced in their negative effects, but also because of the surprising presence of layers of original paint that can still be read and interpreted. The changes in iconography and the discov-

*34. South wall of the west aisle (after conservation).*

ery of previous unknown details and inscriptions have added to the scientific and historic importance of the monument (**Fig. 34**). This work will continue is future seasons, in an effort to return the monument to stable conservation conditions with the care and protection it deserves.

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# LATEST FIELD STUDY OF THE JARASH HIPPODROME: BYZANTINE - UMAYYAD DYEING WORKSHOPS (E1-E7 AND W2-W18)

*Fanny Bessard, Julie Bonnéric and Olivier Callot*

During the 1st / 7th century, the town of Jarash faced challenges related to earthquakes (in 633 and 659[1]), plague (Black Death[2]) and invasion (Persians in 614 and 628; Arabs in 14 / 636). It would be normal to assume that these events shook the town, but no sudden social facture occurred. Subsequently, during the 2nd / 8th century, Jarash developed – albeit slowly – both economically and socially. Urban transformations occurred with the construction of a new mosque near the *tetrakionia* (Walmsley and Damgaard 2005) and the conversion of Antique temples and theatres into trading and artisanal establishments. The northern chambers of the Antique hippodrome racecourse at Jarash were originally warehouses; their transformation took place at that time.

The monumental study of the hippodrome conducted by A. Ostrasz and I. Kehrberg between 1984 and 1996 revised our knowledge of this site and its history. Unfortunately, the extent of the damage to the stands and the technical difficulties of the excavation made it hard for them to thoroughly explore the remains of the rooms dedicated to craft activities in that area. To resolve this issue, we conducted four excavation seasons between 2006 and 2009 with the help of the Department of Antiquities and IFPO ʻAmmān. These seasons concentrated on hippodrome rooms E1 to E7 (north-east) and W2 to W18 (north-west). The rooms excavated by A. Ostrasz and I. Kehrberg between 1984 and 1996 were re-examined to create a new plan, while as yet unexplored rooms were exposed for the first time. The only archaeological material available for study was that recovered during the four recent field seasons. This project enabled new hypotheses to be formulated regarding the nature of the north-east and north-west chambers of the hippodrome. The chronology of the remains was also established more accurately, thereby enhancing our understanding of the building. These excavations resulted in the discovery of sixteen dyeing workshops (rooms E1 - E7 and W2 - W18), dating from the 1st / 7th and 2nd / 8th centuries **(Fig. 1)**.

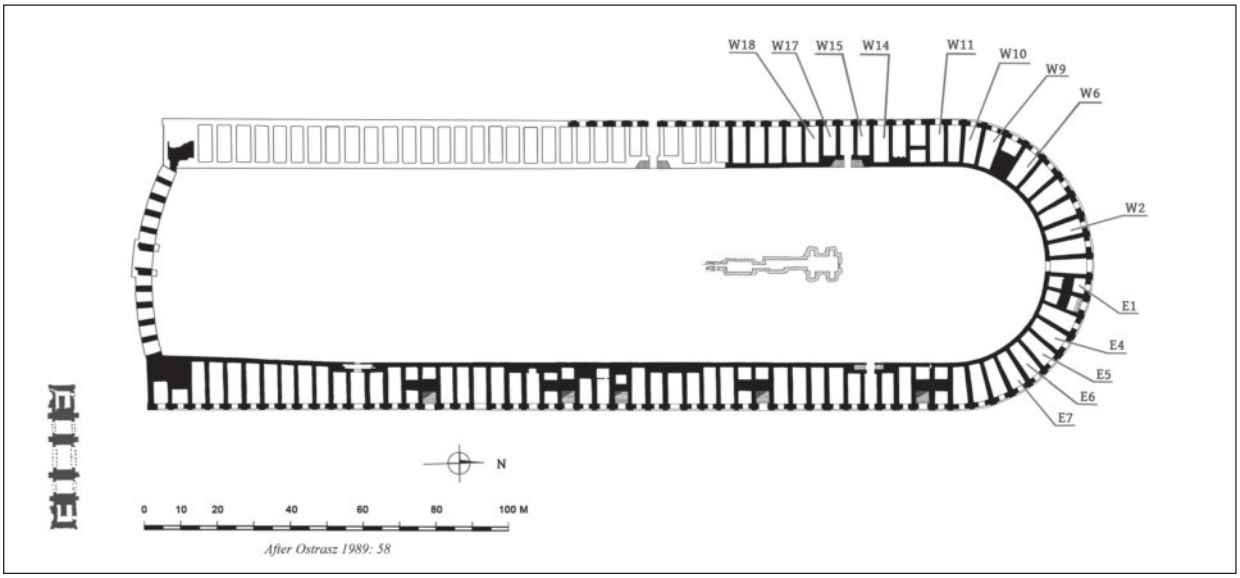
Study of the workshops highlighted three types of occupation: some were totally levelled, others were re-arranged and some were built *ex nihilo*. Although dating is not easy, these workshops are mostly associated with the Byzantine - Umayyad transition (1st / 7th and 2nd / 8th centuries). Various data lead us to believe that these Antique and Mediaeval workshops were dedicated to dyeing, rather than to tanning as suggested in the past (Kehrberg and Ostrasz 1997).

**Planning: Three Types of Workshop**

The workshops discovered north and north-west of the hippodrome racecourse show similarities in shape and organisation. In rooms E1 to E7 (north-east) and W2 to W18, the workshops were built after the original Roman floor had been dug out. Their shape is rectangular (9m east-west x 3.5m north-south) or trapezoidal (9.2 - 10.1m east-west x 4.15m north and 3.1m south) depending on their location within the hippodrome. In most cases, the original Roman door was narrowed with the construction of a second door. Door-steps, the lower part of door-jambs and hinges are

1. Some private homes discovered by M. Gawlikowsky were destroyed during earthquakes (Gawlikowski 1986).

2. Close to 200 people were buried in rooms W2 and W3 of the racecourse.




*1. General plan of the hippodrome.*

the only remains of these second doors. The workshops are fitted with basins, work benches and a main cistern. Depending on the nature of the flooring, each workshop can be divided into two distinct sections: (1) the entrance and (2) the back of the room. The former is characterised by paving, while bare soil is typical of the latter. Nevertheless, the different workshops differ in their planning and organisation. Three types of planning can be identified on the basis of architectural characteristics.

First, some workshops were abandoned following total or partial destruction (W2, E4 and E6). Workshop W2 was mostly destroyed **(Fig. 2)**. The walls of these workshops are mostly 'identified' by their absence in the different terracotta floors. Three areas of bedrock remain in basin B: two along the northern wall and one to the east. Of the southern wall of basin D, the foundations of the terracotta wall used to 'double' it are all that remains. It is clear that these facilities were abandoned and destroyed without being re-occupied later.

Elsewhere, other workshops (E7, E5 and W6) underwent partial reorganisation, indicating certain behavioural changes. E5 and W6 seem to have been abandoned first and were then refurbished. E5 **(Fig. 3)** seems to have been occupied during two stages. Modifications to basins A and B, the construction of basin C and the refurbishment of basin F help to distinguish between these two stages. Reinforcement of

*2. Aerial view of chamber W2.*

*3. Aerial view of chambers E5, E6 and E7.*

*4. Aerial view of chambers W14 and W15.*

the room with pillars made of shaped blocks in the north-east and south-east corners are also evidence for the second stage. Furthermore basins A and B, and their workbenches all show signs of previous use. As first constructed they formed two large basins, fitted with a drain that was subsequently blocked during the construction of the workbench for basin A. Remains of terracotta flooring visible along the edge of the western wall of the workbench (basin B) must have belonged to the original flooring, further highlighting two phases of use. Basin C is located along the southern wall. Its eastern side matches the small 'doubling' blocks of basin B; we can conclude that it was built during the second phase. Basin F and its workbench, located in the north-east corner of the room, show signs of prior use; the dimensions of the original basin remain unknown. A drain at the base of the workbench and signs of daubing in

the north-east corner of the Roman wall behind the counterfort are also visible.

Most of the workshops (W7 to W18) were established in a single episode without obvious refurbishing. W14 **(Fig. 4)** is good example of this. The workshops built *ex nihilo* consisted of a paved area with two to four shallow basins. The walls and bottom of the basin were covered with terracotta tiles sealed with mortar and fitted with a drain. A small gutter was made to empty water from each basin; these gutters usually lead to a large hole near the workshops' Roman doorway. Each basin faces a large cistern that is either built-in or consists of large terracotta jars. The paved entrance leads to an area of bare soil towards the back of the room. This area typically has between one and five basins associated with a tilted workbench (covered with a thick layer of calcite) and one to five cisterns (built-in or terracotta jars), which are often sealed with small blocks and mortar.

Although the general layout of workshops E7 to W18 is almost identical, *viz*. two separate work spaces - one paved and the other bare soil, some characteristics are worth mentioning. The eastern workshops (E1 - E7) and western workshops (W2 and W6) have more cisterns in that part of the room consisting of bare soil (up to seven in E7 and six in W6). Such workshops were mostly destroyed (E4, E6 and W2) or extensively refurbished (E5, E7 and W5). On the other hand, the western workshops built *ex nihilo* (W7 - W18) differ in organisation. There are fewer cisterns grouped in the secondary part of the workshop (just one in the case of workshop W9), whereas deep basins fitted with workbenches are more numerous.

**Purpose: Dyeing or Tanning?**

Since the equipment of these workshops is very similar to that of dyeing workshops, it is reasonable to conclude they were used for the processing and dyeing of fabrics. Our understanding of the set-up for dyeing is based on three very well-documented workshops: at the Isthmia sanctuary in the Peloponnesus (4th – 3rd centuries BC), Gaza (5th – 6th centuries AD) and the Jarash *macellum* (late 5th century and 1rd / 7th century).

The Isthmia dyeing workshop was established on a headland (Karadara 1961). It comprised a basin (1.25 x 0.9 m x 0.8 m deep) and cisterns (0.75 m Ø and ~0.6 m deep) with dimensions close to that of the Jarash hippodrome. Archaeologists interpreted the trapezoidal basin as having been used for cleaning wool arranged on skeins. Detergents were used to remove oils and waterproof pectins from the wool before dyeing. Two circular cisterns cut into the ground retain traces of calcite. They were probably used to soak and dye fabrics using soluble pigments (*murex* red) in an alkaline medium (soda, ash or lime). The Jarash *macellum* dyeing workshop, occupying *tabernae* 10 and 11 (Uscatescu and Martin-Bueno 1997), and that of Gaza also consist of basins and cisterns with similar dimensions and functions (Ovadiah 1969).

Archaeological discoveries such as these help us to better understand the organisation of work within the Jarash hippodrome workshops. Fabrics were cleaned at the entrance to the workshop. The paved area consisted of cisterns that were used as soap baths. The fabrics or textile fibres were soaked in order to get rid of all grit, grease and waterproof pectins. The basins were used to rinse the fibres; this explains why they were fitted with drains leading to an underground cistern under the workshop entrance. Waste-water was absorbed into the ground by capillary action. Fabric dyeing took place simultaneously, towards the back of the workshop. The underground cisterns, sealed with small blocks covered with a thick insulating coating for better thermal inertia, were probably used to prepare the dye; powdered tinctorial plants could be soaked there. The basins were used to dye the fibres and fabrics.

Even though the Jarash workshops have nothing in common with the tanning workshops discovered at Pompeii, Saepinum (1st century) and Liberchies in Belgium (2nd century), or with those still in use at Meknes in Morocco (Leguilloux 2004: 42-54), Kehrberg's initial 1984 - 1996 study of the workshops interpreted rooms E7 - W18 as workshops used for tanning rather than for dyeing (Kehrberg and Ostrasz 1997). Tanning, as opposed to dyeing, workshops would have required large quantities of water, plenty of space and heavy equipment, usually manifested in the form of large cisterns used to prepare the skins.

The Pompeii workshop consists of an internal

courtyard and indoor room (Leguilloux 2004: 46-50). The courtyard was used for the removal of hair and the soaking and heating of skins to preserve the dermis. The skins were soaked in wooden tubs of clear water and macerated in baths of organic matter (urine and faeces) to get rid of all blood, hair and muscular or adipose tissue. After being thoroughly rinsed a number of times, the skins were epilated using *peloirs* (knives without cutting edges). The indoor room was fitted with fifteen tanning cisterns to fix the leather without affecting the structure of the dermis.

This type of heavy equipment seems not to be present at the Jarash workshops. The fifteen tanning cisterns made of small blocks at the Pompeii workshop are large, on average 1.5m Ø and 1.6m deep (Leguilloux 2004: 47). The five brick-lined, shaped tanks of the Saepinum workshop are also large: 1.25m Ø and 1.4m deep (Leguilloux 2004: 50). Finally, at Liberchies, the tanning cisterns are made of small blocks or a simple lattice of branches and are around 1.3m Ø and 1.4m deep (Leguilloux 2004: 51-52). Such dimensions were necessary to manipulate the skins without changing their positioning and the layers of tan. The cisterns discovered at Jarash are much smaller (~0.65m Ø and 0.57m deep), hence the improbability of their having been used as tanning tanks.

Although there is significant archaeological evidence to suggest a dyeing function for the Jarash workshops, it is important to note that no dyeing equipment has been found at the site to date. The cisterns themselves do not show signs of dye, but we need to bear in mind that dye is a volatile substance that can disappear with time. The absence of organic dye only permits us to make suggestions regarding the use of these workshops. The absence of ovens demonstrates that the plants used did not require temperatures higher than 50 °C to dissolve and liberate their pigments. Thus, whatever dye was used could be mixed with fibres and fabrics without having to be being etched with alum at 90 °C. This suggests it was safflower from the Irbid region and / or indigo grown in the Jordan Valley during the 1st – 2nd / 7th – 8th centuries.

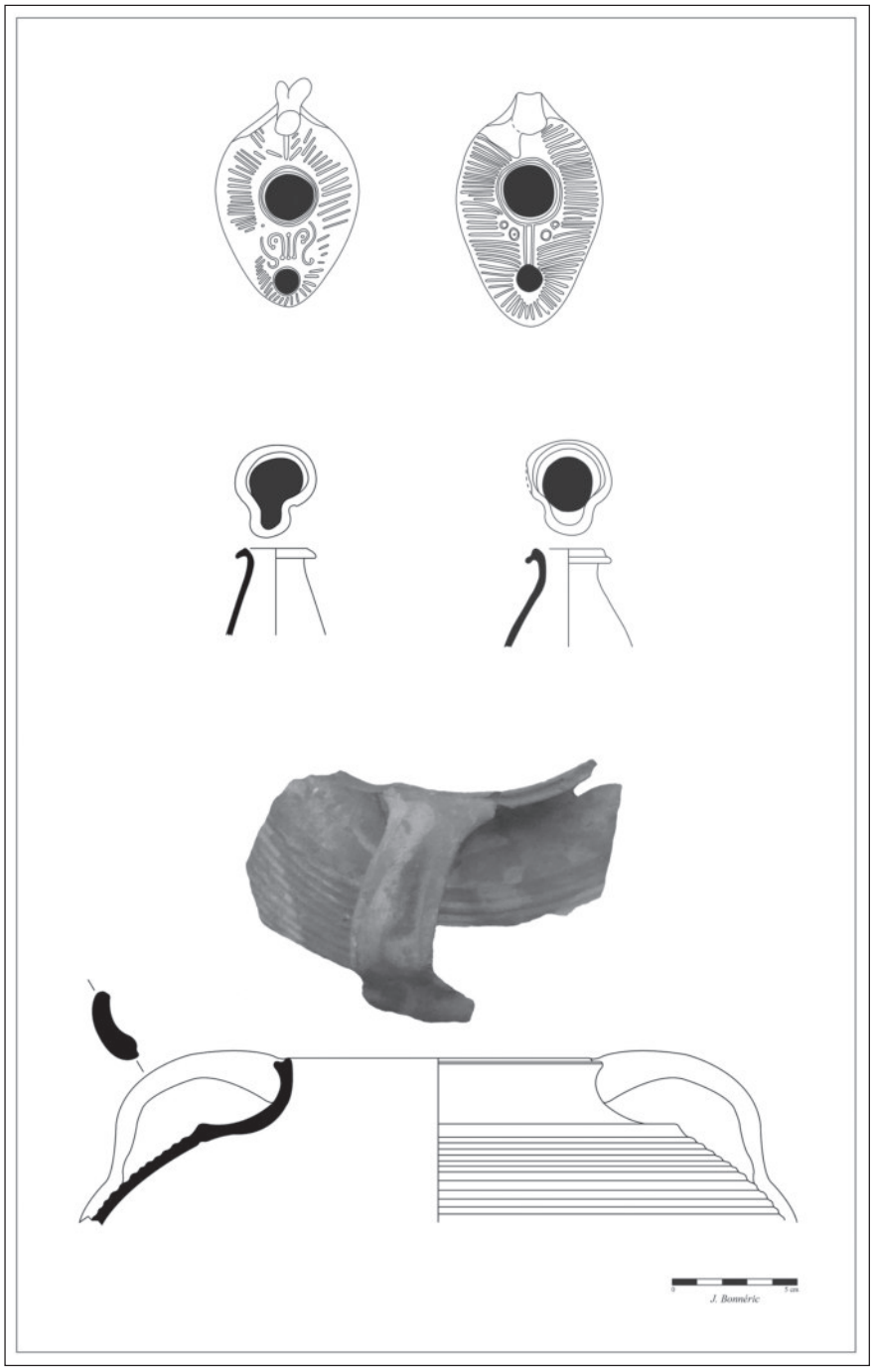
**Dating the Workshops**

Dating the workshops is particularly tricky. Numerous stratigraphic issues make the on-site archaeological material practically unusable in terms of precise dating. It is therefore the architecture which helps to establish the occupational chronology.

*Byzantine - Umayyad Material*

Ceramics do not permit precise dating of the workshops since the site was excavated previously and the context of discovery was already disturbed. Only rarely are objects found *in situ*, although the material has a relatively homogenous Byzantine - Umayyad character. Some artefacts of the Roman period were found, but most of the pottery found in the workshops themselves was made towards the end of the Byzantine and during the Umayyad periods. The discovery of some Roman artefacts can be explained by the disturbance of the Roman surface of the hippodrome at the time the workshops were established.

As mentioned above, most of the pottery is late Byzantine and Umayyad, including lamps, cooking pots, pans, bowls and water jugs. Lamps are of the moulded 'Jarash lamp' type, which were made in the town. They are characterised by a piriform shape, tenons that were sometimes animal-shaped and an elongated nozzle. They are decorated with stripes around the refilling hole, as well as with crosses, circles and lines. These lamps first appeared during the 6th century and were used until at least the end of the Umayyad period **(Fig. 5)**. Many sherds come from ceramics characterised by a ribbed and globular shape, with vertical ribbon-handles attached to the lip and shoulder, and a cambered base. Some have painted decoration in the white / off-white colours typical of the late Byzantine and Umayyad eras **(Fig. 5)**. Fragments of cooking dishes with horizontal handles were also found. These were used from the Byzantine to Abbassid periods. Jugs with a tri-lobed neck and piriform or cyclindrical paunchs were common during the 6th century and still used during the Umayyad period **(Fig. 5)**. Finally, grey-ware bowls made of thin but dense clay were produced from the Byzantine period until the 4th – 5th/ 10th – 11th centuries. The clay used for these bowls is similar to that produced in the reduction kilns discovered near the north theatre, which date to the Umayyad period. Because of




*5. Byzantine - Umayyad material: lamps, jugs with tri-lobed necks and cooking pot with white-painted decoration.*

the common nature of the material found and its generally lengthy period of use, we can only suggest a chronological association with the late Byzantine and Umayyad periods.

*Workshop Chronology*

Evolution of the workshops is suggested by the architecture. Even though the spatial organisation of workshops E7 to W18 is very similar, some differences have been noted which enable us to establish a chronology.

The workshops west of the hemicycle, *viz*. W7 to W18, were built *ex nihilo* and were occasionally modified later. In contrast, workshops E7 to W6 to the east were levelled and / or refurbished. Construction of workshops W7 to W18 in the western part of the hippodrome seems to have been sequential. The discovery of

post-reform Islamic *fulūs* in chambers W7, W11 and W14 at ground level and under the fallen stands allows two conclusions to be drawn. First, it suggests that the hippodrome was destroyed in the 132 / 749 earthquakes, giving a *terminus ante quem* for the workshops. Second, it suggests that the workshops were in use until that time. The lack of refurbishment suggests they were only occupied for a short period, probably less than a century. If they were still in use in 132 / 749, when the hippodrome collapsed, they were probably built before the mid 1st / 7th century which associates them with the Umayyad era.

In contrast, workshops E7 to W6 (east) show signs of destruction and refurbishment. Workshop W2 was even levelled and all of its facilities destroyed. The walls of these facilities can often only be traced using negative features. This destruction and refurbishment shows that the active phase of the workshops was longer in the eastern area than in the western area. Workshops E7 to W6 are therefore likely to have been built before the Umayyad workshops to the west, most likely during the Byzantine period, and were reused during the Umayyad period, although uncertainties remain. Later artisans, having changed their methods, seem to have modified the older Byzantine workshops to match their own – built *ex nihilo* – in order to better answer their technical needs.

It is hard to tell whether the eastern workshops were still active when the western ones were built. Nevertheless, signs of refurbishment and abandonment lead us to hypothesise that the Byzantine dyeing workshops must have been abandoned for a short period of time. During that brief period, chambers W2 and W3 were used as charnel-houses and cannot pre-date the mid 1st / 7th century[3]. During the subsequent Umayyad period, dyeing workshops were established in the western part of the racecourse and in some chambers of the eastern part, perhaps because it proved impossible to occupy the southern corner to the west (data from chambers W25 - 26 suggest that this part of the site had been destroyed long before). The artisans also seem to have made an attempt to adapt the extant workshops (E5 and W6) to their needs. These adaptations, perhaps too tentative and unsatisfactory, would have been covered with the gravel, pots and cooking pan fragments discovered during A. Ostrasz's study[4].

Finally, chambers E1 to E7 (north-east of the hemicycle) and W2 to W18 (north-west) do not suggest sporadic occupation of the hippodrome after the Arab invasions of 14 / 636 but, on the contrary, an intensive and dense appropriation thereof. This location seems to have prospered greatly under the Umayyad dynasty, with the development of large dyeing workshops. They were in use during the caliphate of 'Abd al-Malik (late 1st / 7th century) and, most likely, remained so until the earthquake that devastated Jarash in 132 / 749. The rehabilitation by individuals of Antique public buildings built during the 2nd century for industrial crafts (e.g. cleaning and dyeing of fabrics) seems characteristic of the general pattern of wider economic development at Jarash during the 1st / 7th and 2nd / 8th centuries.

The town of Jarash displays a degree of economic development, with an evolution from individual workshops (Byzantine period) to larger-scale manufacturing or - at the very least, large workshops (Umayyad period). The artisans seem to have been aiming for mass production of standardised goods using these impressive facilities. The importance of the Umayyad pottery workshops, e.g. at the north theatre (Schaffer 1986) and temples of Artemis and Zeus[5] (Pierobon 1986), differs from those of the Byzantine period. The workshop north of the theatre has five kilns, whereas the one located near the Church of St. Theodore has just one (Fisher 1938). In the nearby town of Baysan, individual workshops also disappear at the beginning of the 2nd / 8th century and were replaced by a whole block dedicated to industrial activities (large ceramic and dyeing workshops). This was located between the south theatre, the so-called Palladius road, the *sigma* to the west and the so-called Silvanus road to the north and

3. The charnel-house cannot be older than the mid 7th century, since gold coins depicting Constans II (641 - 668) or Constantin IV (668 - 685) were found there.
4. Caution is required regarding interpretation of this rubble. Although it includes Roman material, it doesn't belong to the time of the establishment of the workshops.
5. Three massive kilns of the Umayyad period were discovered on the lower terrace of the Zeus sanctuary in 1985 - 1996 by J. Seigne. This discovery has been the topic of a report by the Department of Antiquities.

east (Tsafrir and Foerster 1994: 97).

These sizeable facilities are associated with a concentration of workshops. During the 6th century, craft activities at Jarash seem to have been dispersed, *viz*. a dyeing workshop in *tabernae* 10 and 12 of the Roman *macellum*, a sawmill in a southern *criptoporticus* of the Artemis sanctuary (Seigne 2002a, 2002b), one pottery workshop west of the church and another under the south-east stand of the hippodrome (Kehrberg and Ostrasz 1997; Kehrberg in press). This scatter of Byzantine workshops at Jarash is characteristic of Antique urban industrial planning. However, two main industrial concentrations seem to have emerged at the end of the 1st / 7th and beginning of 2nd / 8th centuries. To the south, one concentration comprises the pottery workshops of the Zeus sanctuary and dyeing workshops of the hippodrome. To the north-west, a second concentration comprises the pottery workshops of the Artemis sanctuary and the north theatre. This phenomenon is evidence for the clustering of certain economic activities, probably from the start of the 1st / 7th century.

The development of manufacturing activities at Jarash demonstrates that the town flourished during the 1st – 2nd / 7th – 8th centuries (Bessard and Bonnéric 2010). These impressive workshops are a good example of industrial development and the clustering of craft activities. The latter may have been dictated by the coercive rules believed to have been imposed by the authorities in order to manage taxation. The appropriation and 'privatisation' of Antique public buildings with a cultural or recreational function for intensive, large-scale manufacturing activities could be indicative of the emergence of a new concept in urban planning that was associated with late Antiquity and, especially, the beginnings of Islam.

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# THE WĀDĪ AR-RUWAYSHID MINING COMPLEX: CHALCOLITHIC / EARLY BRONZE AGE CORTICAL TOOL PRODUCTION IN NORTH-EAST JORDAN

*Bernd Müller-Neuhof*

## Introduction

The cortical tool or cortical scraper, also known as 'fan scraper', 'tabular scraper' or 'Jafr tool', is an important *leitfossil* of Chalcolithic and Early Bronze Age cultures across south-west Asia, including Egypt[1].

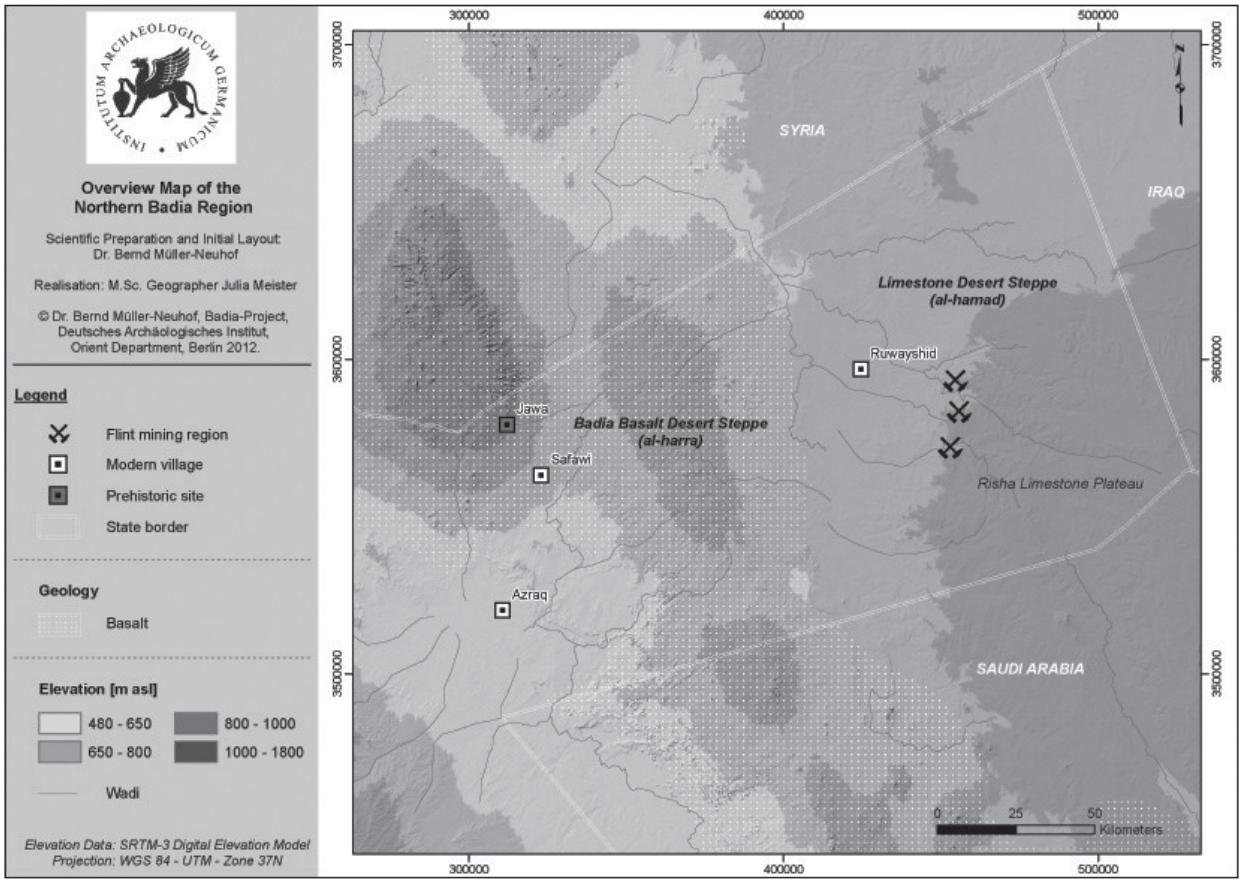
The first clear evidence for the production of cortical tools was discovered by Gary Rollefson in 1979 on the northern rim of the Jafr basin (Rollefson 1980: 14, figs. 1-2), who therefore named these items "Jafr cores" or "Jafr flakes". However, the importance of this discovery was not recognized until the late 1990s, when Leslie Quintero, Phil Wilke and Gary Rollefson revisited this region and carried out two surveys on the northern rim of the Jafr basin in 1997 and 1999. They discovered large opencast mines, where cortical scrapers were produced on a near-industrial scale comfortably exceeding one million objects (Quintero *et al*. 2002: 45). Additional evidence for flint-mining and on-site cortical tool production was discovered by Sumio Fuji to the west of the Jafr basin at Qā' Abū Ṭulayḥa West at around the same time (Fuji 2000, 2003).

All of these sites are characterised by evidence for opencast mining of flint nodules in more or less shallow pits and trenches, accompanied by core preparation and subsequent cortical flake removal. Production of these cortical flakes was the aim of these activities.

In 2000, Ricardo Eichmann and the author discovered a similar mine in north-east Jordan on the western fringe of the ar-Rīshah limestone plateau in the Wādī ar-Ruwayshid region. This mine was subsequently revisited and documented by the author in 2006, when it was realised that several additional mines are present on the same 'promontory' as the first mine (Müller-Neuhof 2006). However this region was not visited again for more detailed survey for another four years.

In 2010, a two-week survey was carried out[2] as part of the 'Arid Habitats in the 5th to Early 3rd Millennia BC: Mobile Subsistence, Communication and Key Resource Use in the Northern *Bādiyah* (North-East Jordan)' archaeological survey project, which has been funded by the German Research Foundation (*Deutsche Forschungsgemeinschaft*) since 2010[3]. A second

1. The author prefers the term cortical scraper instead of 'fan scraper', 'tabular scraper' or 'Jafr tool', as these terms do not give a clear description of these objects. The term 'fan scraper' refers to the fan-shaped design of these tools, but elongated shapes are also documented. The term 'tabular scraper' points to the utilisation of tabular flint for these tools; however, this implies that these tools have bifacial cortical faces, which is observed more in Late Neolithic lithic assemblages and almost never in Chalcolithic / EBA assemblages. The denomination 'Jafr tool' refers to just one place of origin where these items have been found, but there are more, as demonstrated by this contribution. Therefore, the term 'cortical scraper' (or 'cortical flake'/ 'cortical tool') seems to be a better term for these objects, as it describes their principal common characteristic: the cortical face of the blanks.
2. Participants in the 2010 survey season, in addition to the author, were Wesam es-Said (archaeologist, DoA Azraq) and Jan Krause (geographer, Institute of Geographical Sciences, *Freie Universität Berlin*).
3. When the first mining area was discovered in 2000 it was named RU 27. The numbering of this mining area and three further mining areas in 2006 (RU 28-30) was based on the co-ordinates of archaeological sites and specific topographical features identified during the short reconnaissance trip in 2000; the designation was kept during the 2006 survey (see Müller-Neuhof 2006). However, owing to the discovery of further mining areas in 2010 it was decided to rename these sites. Now RU 27 is equivalent to RUW 1, RU 28 to RUW 2, RU 29 to RUW 3 and RU 30 to RUW A (a Late Neolithic burin site).




*1. Map of the northern bādiyah with the location of the Wādī ar-Ruwayshid mining complex (©DAI Orient-Abteilung, J. Meister and B. Müller-Neuhof).*

and final survey season in the mining region was carried out in March 2012[4].

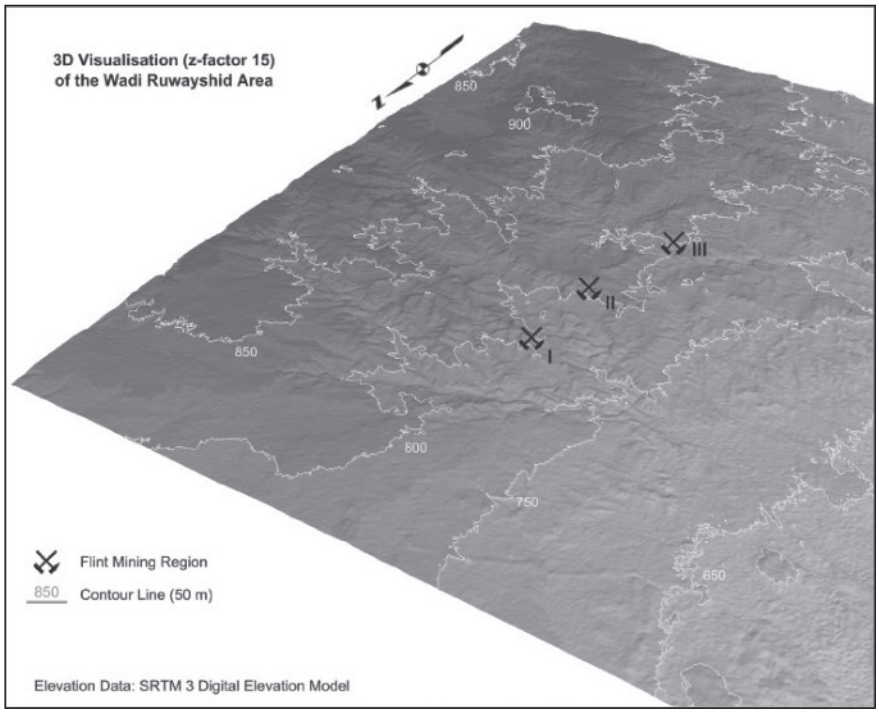
## Location and Extent of the Mining Region

The Wādī ar-Ruwayshid flint-mining region is located east of the basalt steppe-desert (*al-Ḥarrah*), in the limestone steppe-desert (*al-Ḥamād*) on the western escarpment of the ar-Rīshah limestone plateau (**Fig. 1**). This rises towards the south-east, with its highest elevation at Jabal ʻUnayzah - located where the borders of Jordan, Iraq and Saudi Arabia converge. This plateau comprises the watershed between Wādī Ḥawrān to the east and the Wādī ar-Ruwayshid system to the west. As a result, the western margins of the plateau in particular are characterised by several *wadi*s, cutting into the flanks of the plateau and creating individual plateau-like ‘promontories’. The surface, especially of the raised ground, is covered with typical *Ḥamād*-type flint pavement (**Fig. 2**).

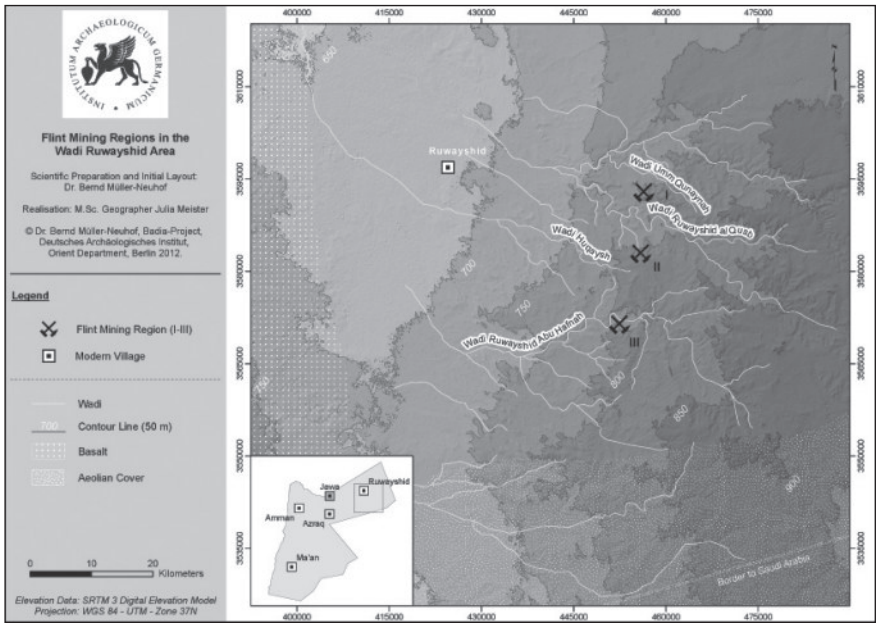
Several Eocene flint layers, characterised by fine texture and dark brown colour, outcrop at different levels on the slopes leading up to the raised ground. However, survey data indicate that large-scale mining and cortical flake production activities were restricted to flint sources occurring at elevations between 780 and 830m asl, mostly between 810 and 815m asl. It is assumed that these flint sources belong to a single flint layer, even though this layer occurs at slightly different elevations on different areas of raised ground. This may be the result of post-depositional events, such as subsidence and uplift associated with tectonic processes.

Following our observation that flint-mining activities were concentrated at elevations be-

4. Participants in the 2012 survey season at the mines, in addition to the author, were Jenny Bradbury (archaeologist, CBRL ‘Ammān), Wesam es-Said (archaeologist, DoA Azraq) and Johannes Köhler (archaeology student, Institute of Near Eastern Archaeology, *Freie Universität Berlin*).




*2. 3D visualisation of the western escarpment of the ar-Rīshah limestone plateau with location of the three mining areas (Areas I - III) (©DAI Orient-Abteilung, J. Meister and B. Müller-Neuhof).*



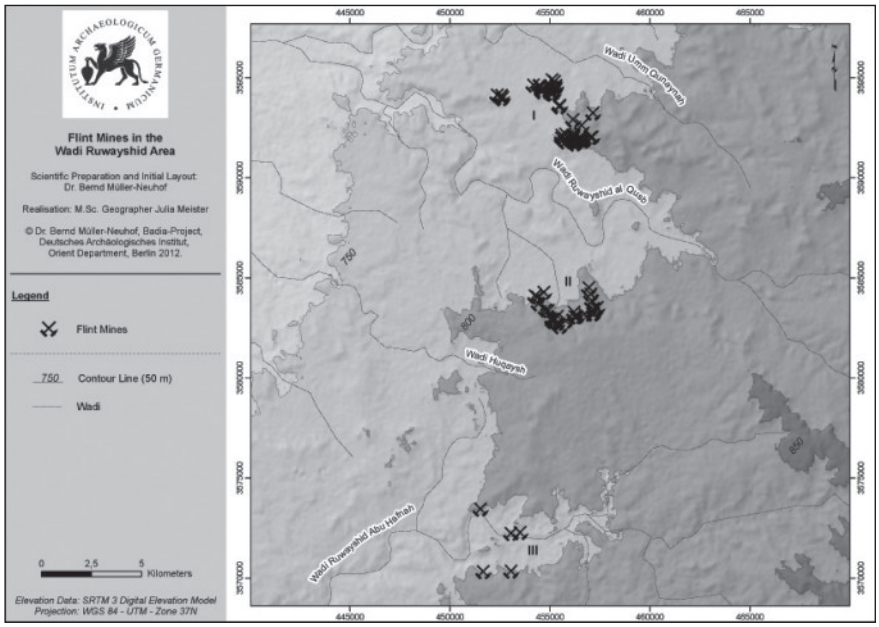

*3. Map with location of the three mining areas (Areas I - III) in the Wādī ar-Ruwayshid mining region (©DAI Orient-Abteilung, J. Meister and B. Müller-Neuhof).*

tween 780 and 830m asl, the eastern and western limits of the flint-mining region could be defined, as the rising elevation (to the east) means that the desired flint layer is covered by later flint and limestone layers, and the falling elevation (to the west) means that the desired layer does not exist.

Another observation was that mining of the flint layer only occurs where it outcrops from the steeper slopes of the 'promontories'. This enabled us to define the northern limit of the mining region, beyond which there is a shift towards more gentle slopes on which the flint layer is covered by ancient colluvium.

Beyond the southern limit of the mining region, the slope conditions are steeper and should theoretically have outcropping flint layers. However, in practice these areas are covered with a thick layer of reddish aeolian sediment which obscures all potential flint outcrops (**Fig. 3**).

The full extent of the mining region is there-




*4. Detailed map of the three mining areas with the location of individual mines (©DAI Orient-Abteilung, J. Meister and B. Müller-Neuhof).*

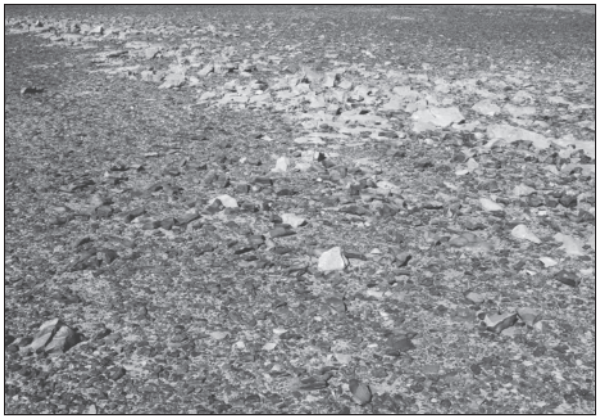
fore located between Wādī Umm al-Qunayyah in the north and Wādī ar-Ruwayshid Abū Ḥafanah in the south. Within this region, three concentrations of mines could be defined, *viz*. Area I in the north (surveyed in 2010), Area II in the centre and Area III in the south (both surveyed in 2012). These areas are divided by Wādī ar-Ruwayshid al-Quṣb (between Areas I and II) and Wādī al-Ḥuqaysh (between Areas II and III). As already mentioned, the southern limit of the region is defined by Wādī ar-Ruwayshid Abū Ḥafnah, although it should be noted that mining activities were recorded on bth the northern and southern banks of the *wadi* (**Fig. 4**).

The entire mining region, including the *wadi*s between the three mining areas, extends over an area of *ca.* 324km$^2$. This is probably the only mining region on the ar-Rīshah plateau, because it is only in this area that the slopes are steep enough to ensure that the outcropping flint layers are not buried under aeolian sediments[5].

**Mines, Workshops and Prospecting Sites**

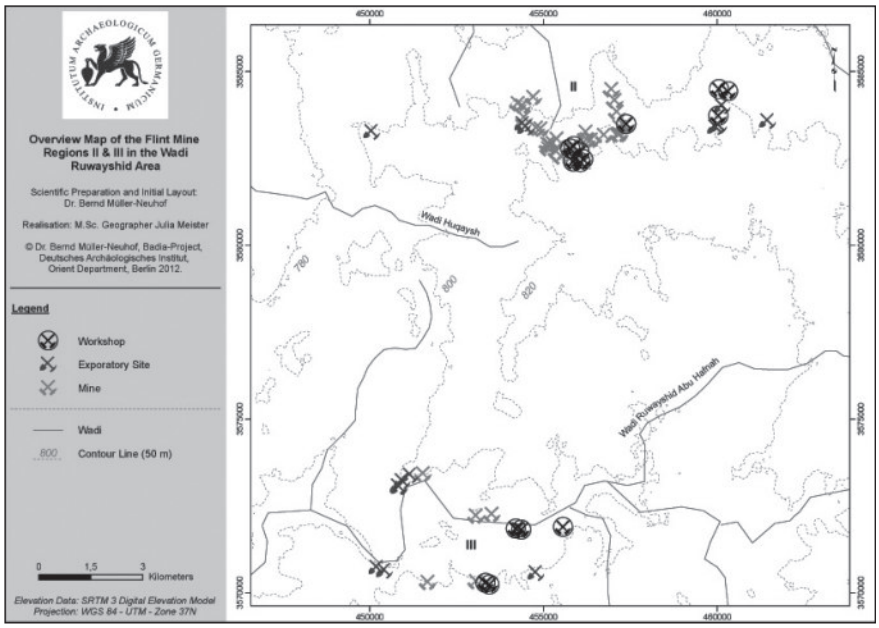
In addition to the mines, we were able – especially in 2012 – to identify so-called workshops and prospecting sites; these are discussed below.

Workshops are here defined as relatively small, discrete areas in which small-scale mining activities – typically simple, horizontal mining of the outcropping flint layer and on-site production of cortical tool blanks – took place (**Fig. 5**). The scale of cortical flake production at such workshop sites is much lower compared to that of the 'true' mines. It can be assumed that, on such sites, production of cortical flakes was primarily to meet the personal requirements of the groups or individuals frequenting them[6]. Especially in Area II but to some extent also in Area III, such workshops are located east of the mines at slightly



*5. Cortical flake production workshop in Area I (RUW5.22) (©DAI Orient-Abteilung, B. Müller-Neuhof).*

5. Following identification of the trench mines on the ground, it proved possible to identify the mines on Google Earth satellite images. No evidence for additional mines was detected on the ar-Rīsha plateau, not even on its Iraq side.
6. Concerning the output and possible organisation of the mining activities and their socio-economic context see below.




*6. Map of Areas II and III with location of mines, workshops and prospecting sites (©DAI Orient-Abteilung, J. Meister and B. Müller-Neuhof).*

*7. Cortical flake production workshop (RUW40) with remains of animal pen structure in the foreground (©DAI Orient-Abteilung, B. Müller-Neuhof).*

higher elevations (**Fig. 6**), quite often in association with a single animal pen (**Fig. 7**).

In Area I, such workshop sites are more frequent, being located in between the 'true' mines on the same 'promontories'.

Additionally, several sites were discovered where mining but no cortical tool production took place. These sites reach considerable size, but are all defined by the lack of any proper cortical flake production. Only a few negative scars of very small, thick cortical flakes indicate some trial production. These sites are all located on the eastern or western margins of mining Areas II and III (**Fig. 6**). It can therefore be assumed that these

*8. Prospecting site (RUW26) with flint outcrop in the foreground and mined flint nodules in the background (©DAI Orient-Abteilung, B. Müller-Neuhof).*

were prospecting sites, where the raw material was tested for its suitability for cortical flake production (**Fig. 8**) but was found wanting.

**Quarries, Pit Mines and Trench Mines:**

**Different Techniques of Raw Material Extraction**

Four different techniques of flint raw material extraction have been observed during our two survey seasons in the three areas of the Wādī ar-Ruwayshid flint-mining region. In part, these vary according to geographical location.

The northern mining region, Area I, is characterised by horizontal mines and pit mines. Horizontal mining took place on the ridges of the escarpments, where the desired outcropping flint layer lay under a layer of limestone *ca.* 0.2m thick. The raw material was obtained, first by quarrying the upper limestone layer from the side of the slope and then by extracting the exposed flint nodules and flint nodule fragments (**Fig. 9**). Evidence for this mining technique was observed on all 'promontories' with mining activity in Area I. However, with the exception of a few workshops, it was not observed in the other two areas.

Identified pit mines are always associated with horizontal mines on the 'promontory' ridges. They are therefore extensions of horizontal mining activities, starting on the edges of the ridges and extending towards the top of the 'promontories', where mining pits were excavated.

These pits can be identified today by concentrations of quarried limestone, which formerly covered the flint layer, lying in their immediate vicinity. The typical *Ḥamād*-type surface is absent from the shallow, formerly open pits, which are now filled with aeolian sediments and are characterised by relatively minor concentrations of flint-mining debris (**Fig. 10**).

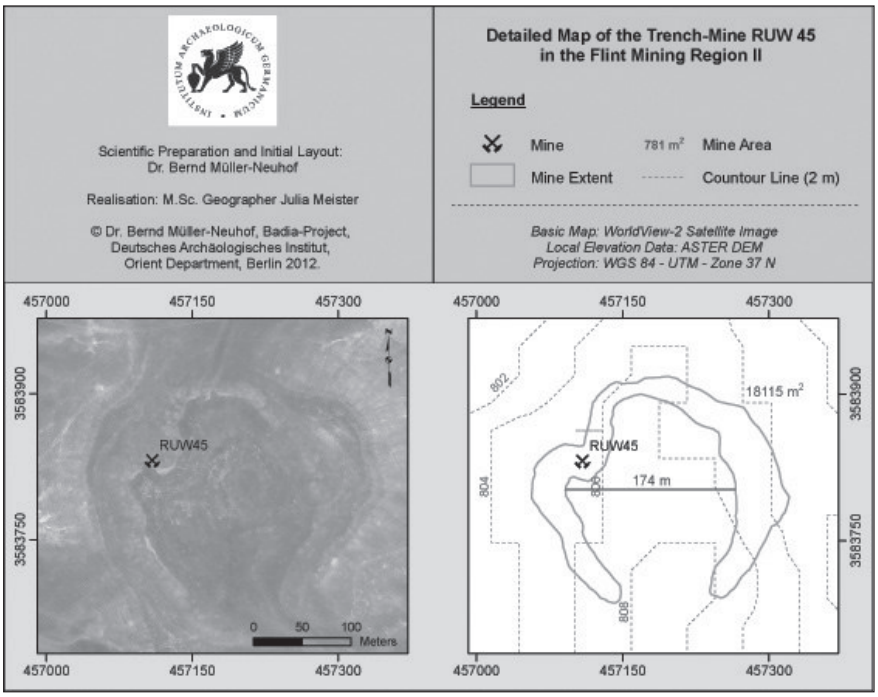
Owing to the fact that the flint layer was located close to the ground surface, immediately under the *ca.* 0.2m thick limestone layer, the entire depth of these mining pits was probably never more than 0.4 to 0.6m. Pit-mining is also confined to Area I.

Area II is characterised by abundant trench mines. These are all located on the tops of the 'promontories', typically close to the escarpments, parallel to and following the escarpment edges (**Figs. 11, 12**). Some of these trench mines reach lengths of almost 1,000m. In some cases, the entire top of the 'promontory' is traversed by several trenches. The width of the trenches varies between 10 and 20m. The combined extent of all identified trench mines, including a large combined trench / horizontal mine (see below), is 24 ha or 0.24km$^2$. Mining debris is usually concentrated on one side of the trench, typically that closest to the escarpment. Cores, core production debris and remains of cortical flake production are abundant within the mining debris, both on the trench floor and trench sides. Additionally, basalt tools for mining and blank removal were discovered in these trenches. These were mostly hammerstones of different sizes (**Fig. 13**), but a fragment of a large pestle-shaped hammerstone was also found (**Fig. 14**).

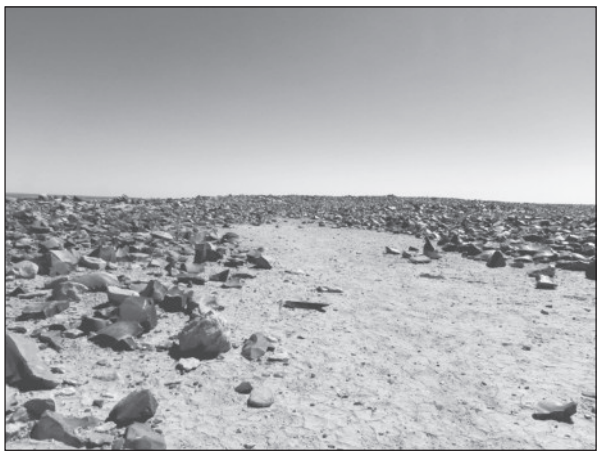
The largest mine, a combined horizontal / trench mine with a length of almost 1,500m, was identified in Area III. The western part of

*9. Flint mine (RUW3.5) with evidence for horizontal mining activities. Note the quarried limestone which originally covered the flint layer (©DAI Orient-Abteilung, B. Müller-Neuhof).*

*10. Pit mine (RUW3.20). Note whitish concentrations of limestone and mining debris, and minor concentration of flint-mining debris in the foreground (©DAI Orient-Abteilung, B. Müller-Neuhof).*




*11. Satellite image and map of a trench mine (RUW45) (©DAI Orient-Abteilung, J. Meister and B. Müller-Neuhof).*



*12. 'Floor' of a trench mine (RUW45) (©DAI Orient-Abteilung, B. Müller-Neuhof).*

the mine is characterised by a long quarry-like exposure all along the cliff, far below the escarpment, following a flint outcrop (**Fig. 15**). To the east, the mine changes into a trench mine because the topography changes from a cliff to a gentler slope.

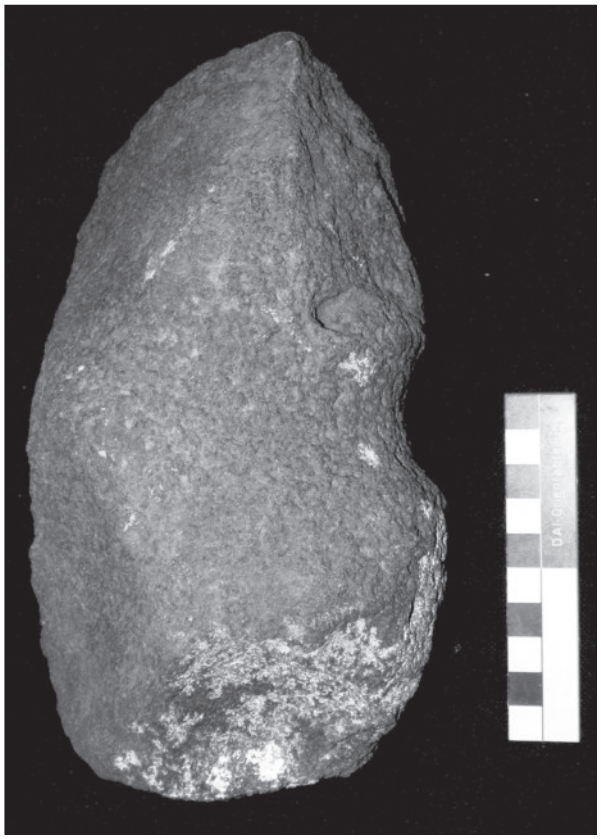
*13. Mining and cortical flake production tools: basalt hammerstones and hammerstone fragment from a trench mine (RUW45) (©DAI Orient-Abteilung, B. Müller-Neuhof).*

**Cortical Flake Types**

Three different types of cortical flake were identified on the basis of their negatives on the cores, *viz*. the fan-shaped flake, the elongated fan-shaped flake and the elongated flake.

In Area I, where pit and horizontal mining was carried out, most of the cortical flake negatives are fan-shaped (**Fig. 16**). In contrast, in Areas II and III, elongated flakes are clearly in the majority (**Fig. 17**), with smaller quantities of elongated fan-shaped cortical flakes (**Fig. 18**).

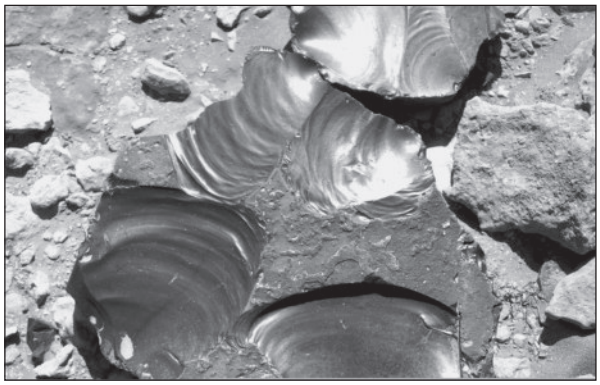
Since it was not possible to see any differ-



*14. Mining and cortical flake production tools: basalt pestle from a trench mine (RUW19) (©DAI Orient-Abteilung, B. Müller-Neuhof).*

*15. Horizontal mine showing exposed flint layer (RUW27) with cortical flake cores and mining debris above and below the exposed flint layer (©DAI Orient-Abteilung, B. Müller-Neuhof).*

ences in the platform preparation of fan-shaped and elongated cortical flake negatives, the reason for their different appearance might be explained by the fact that some cortical faces are plain while others are slightly convex.



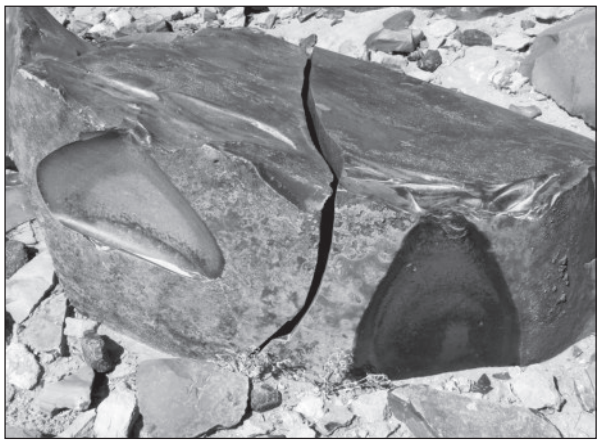
*16. Cortical flake core (from RUW3.28) with fan-shaped flake negatives (©DAI Orient-Abteilung, B. Müller-Neuhof).*


*17. Cortical flake core (from RUW19.2) with elongated flake negatives (©DAI Orient-Abteilung, B. Müller-Neuhof).*

It was observed that cores with slightly convex surfaces have elongated cortical flake negatives (cf. **Fig. 17**), while cores with plain surfaces are characterised by fan-shaped negatives (cf. **Fig. 16**). Elongated fan-shaped negatives were produced on cores where the surfaces lie in somewhere in between the plain and slightly convex types (cf. **Fig. 18**; see also **Fig. 19**).

It is not yet clear whether or not the flint nodules in Area I tend to have plain surfaces, while those of Areas II and III are more convex in their surface shape. The reason may also lie in the size of the flint nodules and therefore the cores, which can be correlated with the mining technique. Large nodules may have been extracted

*18. Fragment of a cortical flake core (from RUW45) with negative of an elongated fan-shaped flake (©DAI Orient-Abteilung, B. Müller-Neuhof).*



*19. Cortical flake core (from RUW45) with one negative of a fan-shaped flake on a plain surface and another negative of an elongated fan-shaped flake on a slightly convex surface (©DAI Orient-Abteilung, B. Müller-Neuhof).*

from trench mines because such mines exposed large areas. Thus, (almost) complete flint nodules could be extracted from the exposed flint layer. Extracting nodules from flint layers by horizontal mining broke up the nodules, which resulted in smaller chunks and therefore smaller cores.

In addition, the area of the flint layer exposed in pit mines was much more restricted than in the trench mines. Therefore, the extraction of flint nodules in these mines typically resulted in their breakage within the flint layer, which likewise produced smaller cores.

**Economic Output, Dating and the Socio-Economic Context of Production**

The overall surface area of all identified mines and workshops amounts to *ca.* 380,000m$^2$ (38 ha). In both survey seasons, several counts of cortical flake negatives on cores lying on the surface were carried out at different mines and workshops; cores embedded in mine sediments and mining debris were not considered.

The average number of negatives per m$^2$ was five. In pit mines and trench mines, the average increased to 11 negatives per m$^2$. Workshop sites, which extend over *ca.* 10,000m$^2$, have an average of 1.5 negatives per m$^2$.

Working on the basis of the above-mentioned average of 5 negatives per m$^2$, which is a conservative estimate overall, cortical flake production in the entire Wādī ar-Ruwayshid mining region amounted to at least 1.9 million blanks.

Mining activities in the ar-Ruwayshid region were highly organised, implying preliminary prospection for raw material (represented by prospecting sites on the edges of the actual mining areas), the manufacture and use of special mining and blank production tools (made on raw material originating in the basalt desert [e.g. hammerstones of different sizes; large extraction pestles]) and, finally, the planned and organised excavation of the mines themselves, especially in the case of trench mines. It seems clear that, at least in trench-mining Areas II and III, specialist groups were involved in these activities, which may hint at the date of these sites.

The period during which cortical scrapers were a common component of pre- and protohistoric toolkits in south-west Asia covers almost 3,000 years, from the beginning of the Late Chalcolithic until Early Bronze Age (EBA) III, possibly even EBA IV. However, it seems unlikely that mining activities in the Wādī ar-Ruwayshid region were carried out over such an extended period, as these mines are in a remote location lacking water resources without even natural facilities for water storage.

This suggests that specialist groups were in-

volved, who were experts in living for at least part of the year in such arid environments, far away from settlements, and who possessed appropriate logistical support for carrying out tasks such as prospection and mining.

It therefore seems likely that the entire economic *chaîne opératoire*, consisting of prospection, mining, blank production, transport and even distribution of the cortical tool blanks, was carried out by specialised transhumant pastoralists. These groups may have possessed domestic donkeys as beasts of burden (see also Quintero *et al*. 2002: 45). They would also have been familiar with the region, because of their frequent visits to the *wadi*s on the ar-Rīshah plateau between late autumn and early spring, when water and pastures were available, as part of their annual pastoral cycles (cf. Müller-Neuhof 2010, in press a). The suggestion that the primary function of cortical scrapers was for processing animal products (*viz*. shearing, slaughtering, skinning etc.) (cf. Henry 1995: 372) supports the proposal that pastoral groups were likely involved in these mining activities.

The beginnings of specialised (semi-) nomadic pastoralism, defined primarily on the basis of the emergence of surplus production of secondary animal products (cf. Sherrat 1983: 99) and which includes the specialised exploitation of geological resources in remote and mostly arid environments (cf. Müller-Neuhof in press b; Rosen 2002: 30ff.), is thought to date to the end of the Late Chalcolithic or beginning of the EBA (Rosen 2002: 30ff.), *viz*. towards the end of the first half of the 4th millennium BC.

The extent to which the Late Chalcolithic / EBA settlement of Jāwā, located almost 140km west of these mines as the crow flies, was directly or indirectly involved in the mining activities (e.g. as a place for exchange) remains an unsolved question. If the mining activities were entirely linked to the existence of the Late Chalcolithic / EBA settlement at Jāwā, the period of their exploitation would contract to a few centuries during EBA I, in the second half of the 4th millennium BC. However, the dating of the ar-Ruwayshid mines and, potentially, the interpretation of the socio-economic background of the groups involved may need to be reconsidered in the near future. Just 50km from these mines to the west as the crow flies, a new Late Chalcolithic / EBA site has been recently discovered[7]. The fortified settlement of Khirbat Abu al-Ḥūṣayn is located on top of a small volcano on the eastern edge of the basalt desert.

The presumed Chalcolithic / EBA date of this site relies on the few surface finds and architectural features found so far. Evaluating the possible rôle of Khirbat Abu al-Ḥuṣayn in the mining activities in the Wādī ar-Ruwayshid region is a task for future research.

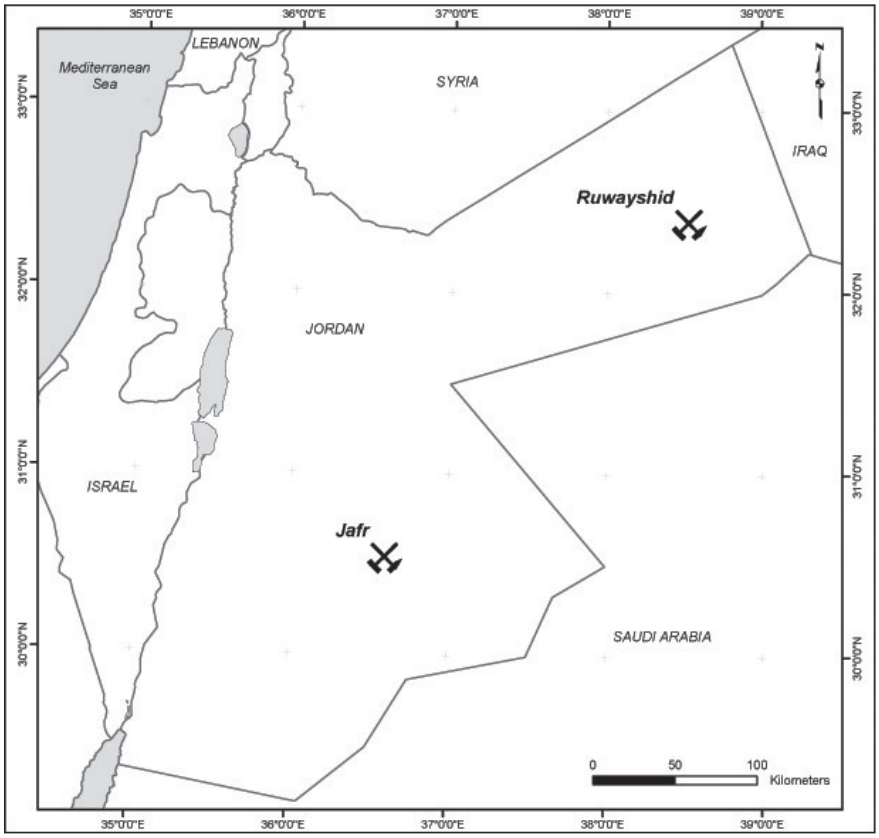
**Conclusion**

The Wādī ar-Ruwayshid flint-mining region on the western escarpment of the ar-Rīshah plateau is the second known mining region (after Jafr) where cortical scraper blanks were produced on an 'industrial' scale during the Late Chalcolithic / EBA period (**Fig. 20**). In both regions, which are characterised by remote location and arid environments, specialised transhumant pastoralists are highly likely to have been involved in organised prospection, mining, blank production and transport (distribution) of the blanks. The existence of just two mining and tool production regions seems unlikely in view of the long period of cortical scraper use and their wide distribution all over south-west Asia.

It is currently unclear where further mining and tool production regions might be expected. The existence of such large mines west of the Jordan valley and on its eastern bank can in all probability be excluded, because extensive surveys in these regions have not identified any evidence for their presence.

The location of the Ruwayshid and Jafr mines in the eastern part of Jordan relates to the specific qualities of the flint raw material, which is probably only to be found in environments with similar Eocene deposits. However, the

7. This site was discovered in autumn 2010 during one of the two transect surveys across the basalt desert, conducted as part of the wider research project. However, as the 2010 visit was too short for proper examination of the site, another visit was undertaken in March 2012. Evidence was found for a genuine Late Chalcolithic / EBA fortified settlement, with double-faced walls and a gate structure. A detailed survey of this site, including documentation of the architecture, is planned for the 2013 spring season.




*20. Map showing the two main Chalcolithic / EBA flint-mining and cortical scraper production regions: Jafr and ar-Ruwayshid (©DAI Orient-Abteilung, N. Marquardt and B. Müller-Neuhof).*

Ruwayshid region shows that, even within areas with these deposits, mining activities were very much restricted to specific topographic conditions, *viz*. outcrops of the desired raw material, with no colluvial or aeolian cover on slopes of the raised ground. These observations reduce the number of possible locations where further mines might be discovered, whether in Jordan or in adjacent regions to the north or east.

**Acknowledgements**

The author is very much indebted to the late Dr Fawwaz al-Khraysheh, who inspired his interest in the archaeology of the northern *bādiyah* many years ago and who, from the planning stage onwards, was always a supporter of this project. This report is dedicated to Dr Fawwaz al-Khraysheh.

The author is very grateful to the entire staff of the Department of Antiquities (DoA) of Jordan for all their help and support, especially to Departmental representative Wesam Esaid BA from the DoA office at Azraq, who has been a great help and partner over the course of two field seasons in the Wādī ar-Ruwayshid mining region.

Additional thanks are due to the participants in the 2010 and 2012 seasons: Dipl. Geogr. Jan Krause (Institute of Geographical Sciences, *Freie Universität Berlin*), Dr Jenny Bradbury (CBRL, ‘Ammān) and Johannes Köhler (Institute of Near Eastern Archaeology, *Freie Universität Berlin*), as well as to Dipl. Geogr. Nicole Marquardt and Julia Meister MSc (*Deutsches Archäologisches Institut*, *Orientabteilung*) who were responsible for the preparation of maps and all GIS-related issues after the fieldwork seasons.

The author is extremely grateful that the *Deutsches Forschungsgemeinschaft* (Ger. “German Research Foundation”) is fully funding the ‘Arid Habitats in the 5th to Early 3rd Millennia BC: Mobile Subsistence, Communication and Key Resource Use in the Northern *Bādiyah* (North-East Jordan)’ archaeological survey project (MU-3075/1-2) and that CBRL ‘Ammān has enabled the project to be affiliated with CBRL.

Further thanks are due to the Badia Research Program at the Higher Council of Science and Technology, especially Dr Odeh al-Meshan and

Mohammed Shahbaz, for enabling us to use the living and research facilities at aṣ-Ṣafāwī and for their logistical support, and to the German Protestant Institute in ʿAmmān for their hospitality.
Dr Bill Finlayson kindly undertook the task of proof-reading the English of this article. Any remaining mistakes are mine.

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# TALL AL- KAFRAYN: PRELIMINARY REPORT ON THE UNIVERSITY OF IOANNINA EXCAVATIONS: 2010 AND 2011 SEASONS

*Thanasis J. Papadopoulos and Litsa Kontorli-Papadopoulou*

**Introduction**

This report presents the results of the 2010 and 2011 seasons excavation by the Hellenic Archaeological Expedition of the University of Ioannina at Tall al-Kafrayn (**Fig. 1**). The site is situated *ca.* 5km south of the modern village of South Shūnih and 3 km south-south-west of al-Kafrayn dam. It was selected as the focus for our research because of its prominent and strategic location overlooking the central Jordan valley. Excavations have been conducted at the site since 2002 and preliminary syntheses of the results of Phase I (2002-2004) and Phase II (2005-2008) have already been published (Papadopoulos 2007; Papadopoulos and Kontorli-Papadopoulou 2010). Within the context of the archaeological sites surrounding it, Tall al-Kafrayn stands out in terms of its size and complexity, and provides interesting insights into the lives and subsistence patterns of ancient communities in the area.

Trench supervisors were post-graduate archaeology students from the University of Ioannina, namely Kostas Paschalidis, Spyros Thermos, Aris Frantzeskakis and Maria Sofikitou. Sofia Sakkari and Kalliopi Lambri were respectively illustrator and pottery specialist. Alexandros Lagopoulos (University of Thessaloniki) was the architect and Penelope Marinou the conservator. Archaeology students from the University of Ioannina, namely Theodora Alevra, Anastasia Nella, Eirene Petridou, Ioanna Stefanou, Charoula Poya, Sofia Baltzoi, Panayota Koutsona, Maria Lappa and Kostas Tsemberis, assisted with the fieldwork.

The project was funded by the University of Ioannina and Greek Ministry of Culture and Tourism, and was directed jointly by the authors.

**Aims of Phase III of the Project**

Phase III of the project is aimed at continuing exploration of the earlier occupation levels of the *tall*, documenting its remains and enhanc-

*1. Map of Jordan showing location of Tall al-Kafrayn.*

ing our knowledge and understanding of the site's history.

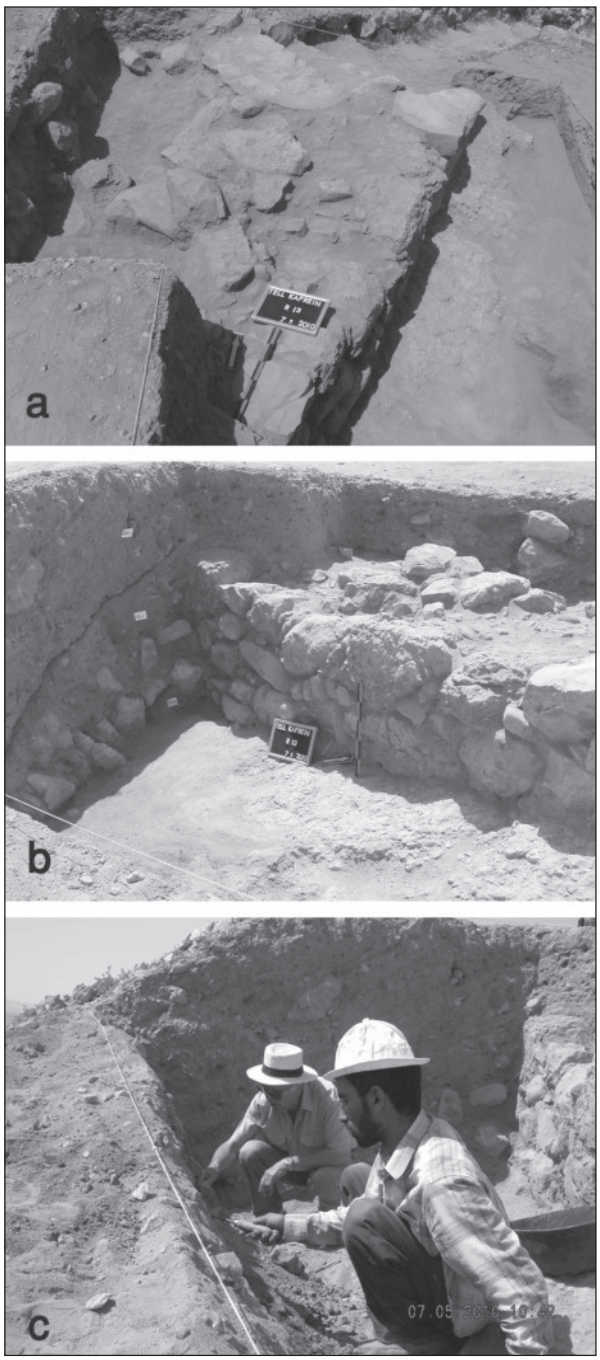
Information concerning recording system may be found in the preliminary report on the 2005-2008 seasons (Papadopoulos and Kontorli-Papadopoulou 2010).

**The 2010 Season**

During the tenth excavation season (2-14 May 2010) work continued on both the top and slopes of the *tall*. On the north-east part of the summit, trench R13 exposed the northern extension of the eastern defensive wall, which had been partly uncovered in trenches Q14-15 and P16 in 2009. This part of the wall (length [l] = 4.1m; width [w] = 1.5-1.6m; max. height [h] = 1.0m) (**Figs. 2a-d**) was founded on bedrock in the same fashion as its southern part. Its northernmost part was eroded and lost, but it seems almost certain that it once formed a right angle, turning west into trench R12.

Trench R12 (**Fig. 3a**), located on the north slope, revealed the easternmost part of the northern defensive wall. The base of this part of the wall (l = 4.3m; w = 1.59m; h = 1.47m), which is evidently a continuation of the wall previously exposed in trench R13, is still buried by deposits of fallen mud-bricks, stones and earth. Noteworthy was the discovery, at the easternmost end of its external face, of a partially preserved *tannūr*- or *ṭābūn*-type oven with fragments of a cooking pot on its *stomion* (**Fig. 3b**). This is similar to examples found in trenches J17 and M14-15 on the southern slope and top of the *tall* (Papadopoulos 2010: 298, fig. 37; Flanagan *et al.* 1996: 279, fig. 18; Steen 1991: 135-153). A fragment of a bronze pin, flint blades and carbonised wood and grain fragments were also recovered. However, the most important discovery was an ivory Egyptian scarab (**Fig. 4a-b**), attributed by Egyptologists Dr Vassilis Chrysikopoulos and Dr Jacke Philips to the Ramesside period, i.e. 19th – 20th Dynasties, most likely earlier rather than later within that date range[1].

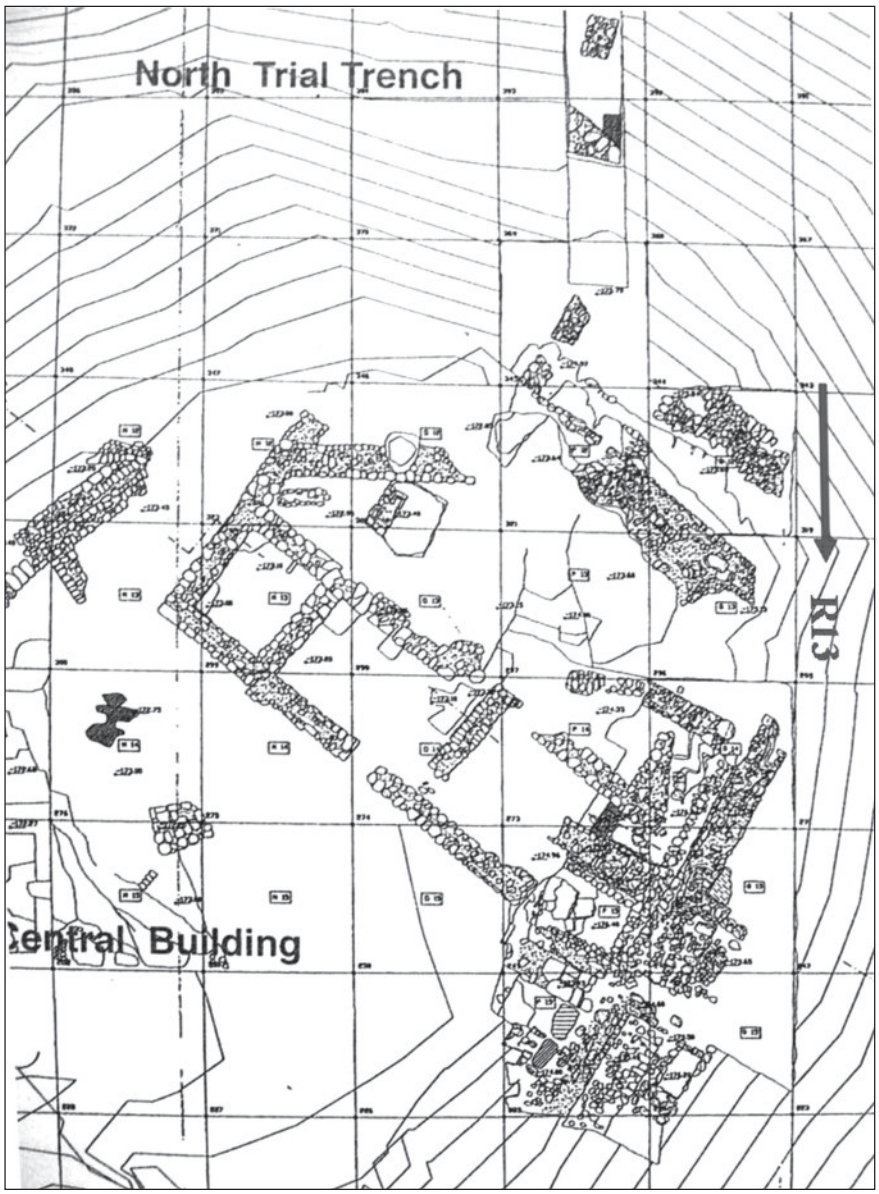
Work during the previous two seasons (2008 and 2009) in the northern exploratory trench (**Fig. 5a-b**) had revealed part of the impressive defensive wall of the *tall*, as well as another retaining (?) wall and a massive house wall. In




*2a-c. Trench R13.*

2010, the trench was extended by 6.5m in the direction of the slope, reaching a total length of 24m. This extension resulted in the exposure of two main levels of new walls and house floors. Two walls associated with the upper level, which joined at a right angle, may have formed part of a domestic room. Three successive floors of

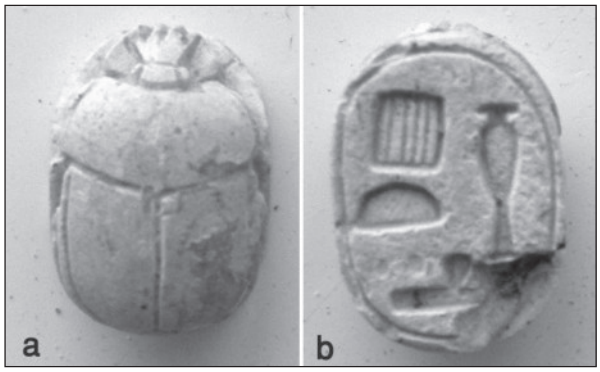
1. We warmly thank both scholars for their help in dating the scarab.




2d. Plan of trench R13.


3a. Trench R12.

3b. Trench R12; tannūr- or ṭābūn-type oven.

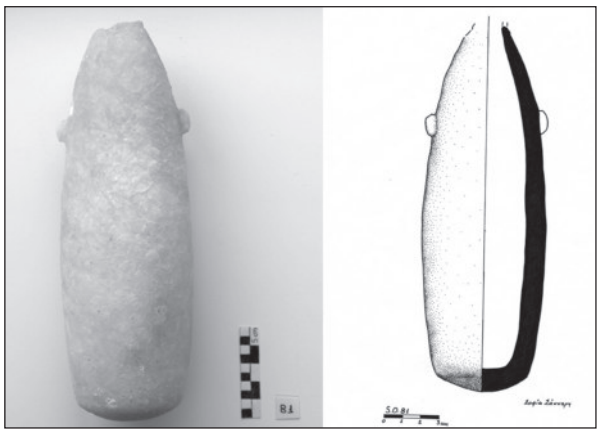



*4a-b. Egyptian scarab.*


*5a-b. Northern exploratory trench from the north and south.*

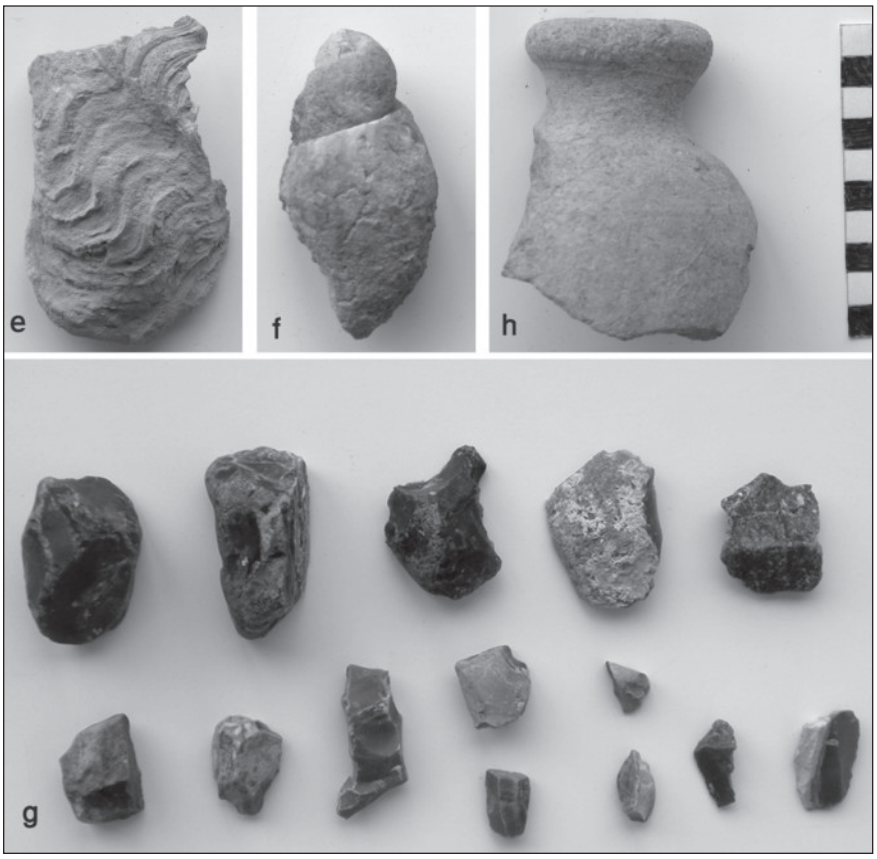
compact, beaten earth were identified and various cereal remains collected. No architectural remains were associated with the lower (and northernmost) level, which nonetheless yielded an exquisite near-intact 'alabaster' vase, missing only its flaring rim (**Fig. 5c-d**). There is a general consensus that such vessels were used as cosmetic containers. According to Dr Jonathan Tubb, some alabaster examples are imports from Egypt. However, he is of the opinion that this specimen is of local manufacture, dating it to the Persian period on the basis that similar vases are quite common in tomb deposits of this period. An alternative suggestion has been put forward by Dr Abdelsami Abu Dayyeh of the Department of Antiquities (DoA), who assigns it – on the basis of "many parallels from Tall al-'Umayrī and others displayed at the 'Amman Museum" – to the MBA II / early LBA (Hyksos period)[2]. Other finds include two sea shells, flint blades and Iron Age pottery (**Fig. 5e-h**).

The west slope of the *tall* had hitherto been neglected by our mission, so in 2010 it was decided to open the so-called western exploratory trench (**Fig. 6a**), roughly in square K11. It measured 2x8m and was oriented west-east. The purpose of this trench, like its counterpart on the north slope, was to examine the stratigraphic sequence of this part of the *tall*. During this season, work was restricted to the eastern half of the trench, where four successive layers of compact, beaten earth surfaces were revealed, as well as a well-built stone wall (l = 1.85m; w = 0.95m) running perpendicular to the axis of the trench and, further down, another similar floor. Of par-



*5c-d. 'Alabaster' vase.*

2. We warmly thank Dr Tubb and Dr Abdelsami for their helpful comments.

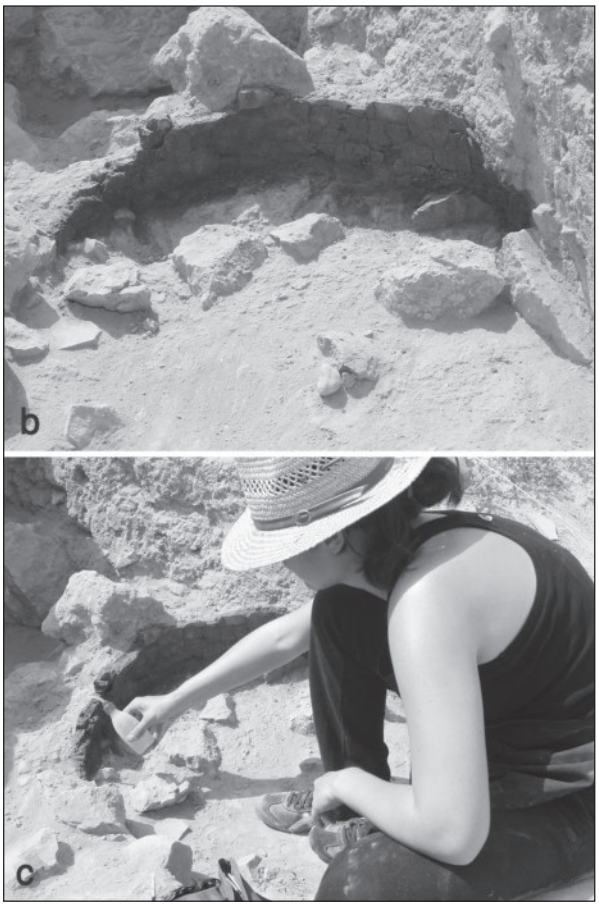



*5e-h. Sea shells, flint blades and Iron Age pottery.*

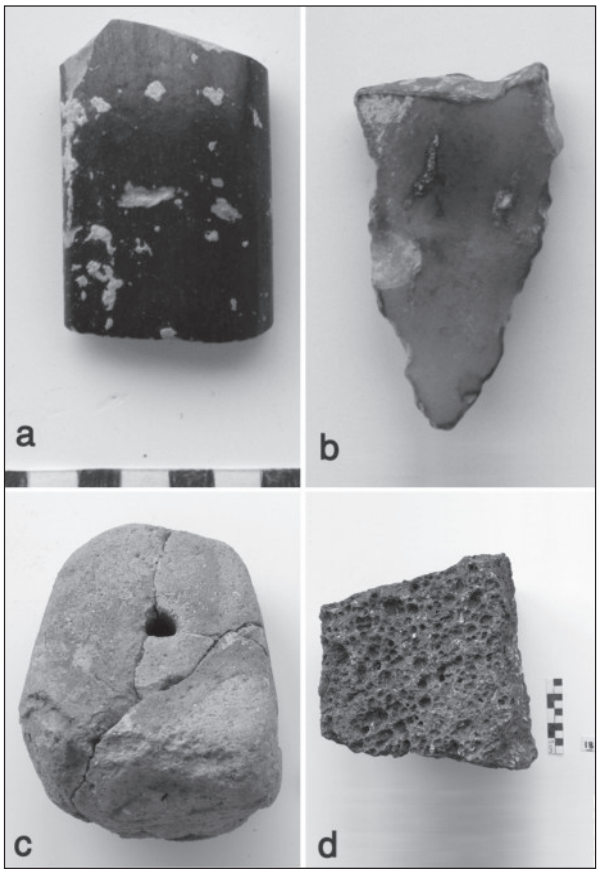

*6a. Western exploratory trench from the north.*

ticular interest was a *tannūr*- or *ṭābūn*-type oven (diameter [diam] = 0.68m; d = 0.2m) (**Fig. 6b-c**), half of which was reasonably well-preserved and similar to examples found in trench R12 and elsewhere on the *tall* (e.g. trenches J17, M14-15 [Papadopoulos 2010: 298, fig. 37]); this is suggestive of the presence of a food preparation area. Also of significance was the discovery of a fragmentary, small Attic (4th century BC) skyphos (**Fig. 7a**) in a layer beneath the oven. Other finds included Iron Age pottery, animal bones (including a knuckle bone [probably used for board games]), flint blades, a loom weight, a whetstone, basalt grinders and pounders (**Fig. 7b-d**).

During the previous (2009) season, an impressive part of the *tall*'s defensive wall was exposed in trench J17. In 2010, the excavation was extended into adjacent new trenches I17 and I18. This confirmed that the defensive wall was constructed as a large platform-like feature (w = 2.9m; present h = 1.3m) (**Fig. 8a**) made of rubble and irregular, massive stones, supported by a lower stone wall on its external face with a mud-brick fill in between. Unexpectedly, the




6b-c. Tannūr- or ṭābūn-type oven.




7a-d. Sherd of Attic skyphos, flint blade, loom weight and basalt grinder.

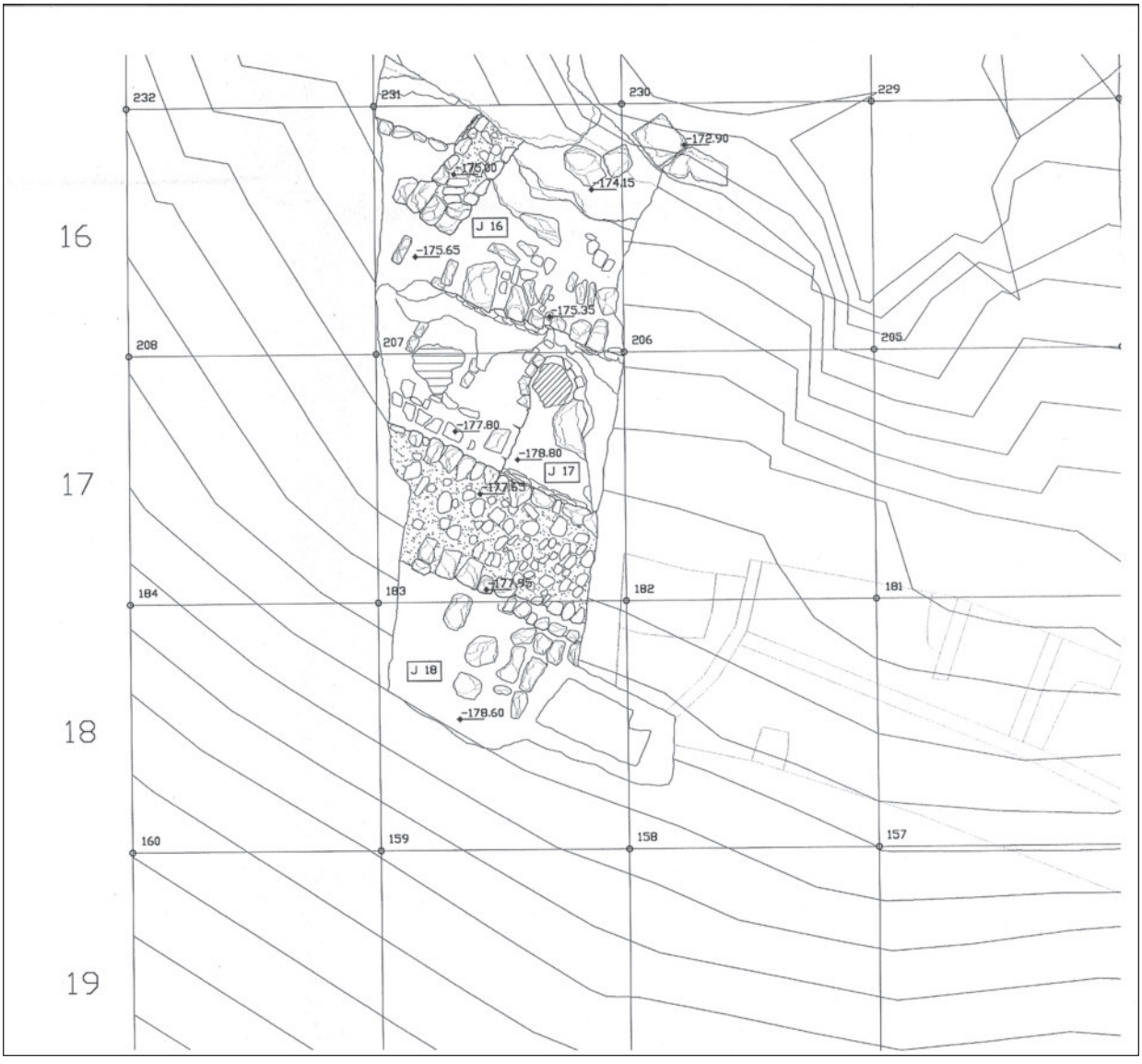
8a. Trenches J17, I17 and I18; large, platform-like wall.

whole construction was founded on a compact beaten earth surface, owing to an absence of natural rock in this area. The portion of the defensive wall uncovered so far (l = 9.5m) is indicative of a well-organised building programme dating, on the basis of the pottery, to the Early Iron Age. Another wall, oriented north-south and joining the abovementioned wall at a right angle, may belong to *intra muros* buildings, which will be explored next season. Other finds from trenches J17, I17 and I18 include flint blades, two snail shells, sea shells, stone weights or pecking stones and a stone pounder (**Figs. 8b, 8c-k**).

Work resumed in trench Q13, but was abruptly suspended owing to the discovery of an Islamic tomb (**Fig. 9**).

Part of the summit enclosure wall had been revealed in trench O16 during the previous season (2009). Its remaining northern part (**Fig. 10a**) was exposed this season. The only finds were Iron Age pottery, animal bones, snail shells and basalt grinder fragments (**Fig. 10b-d**). Further to the east, the remains of other walls indicate the presence of more buildings; these await investigation next excavation season.

During the 2010 season, a local friend from the village of Tall al-Kafrayn brought us a small clay female figurine in the shape of a

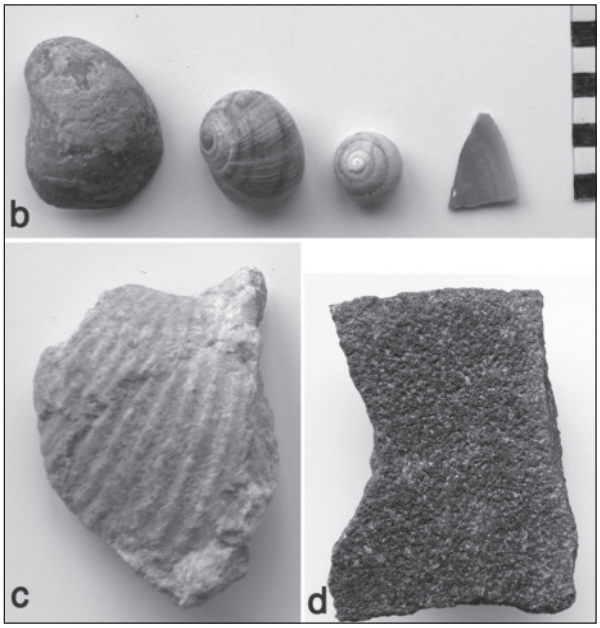



*8b. Plan of trenches J17, I17 and I18.*


*8c-k. Finds from trenches J17, I17 and I18: flint blades, sea shells, two snail shells and stone pounder.*

*9. Trench Q13.*

*10a. Trench O16.*




*10b-d. Finds from trench O16: sea shells and basalt grinder.*


*11a-c. Clay female figurine (private collection).*

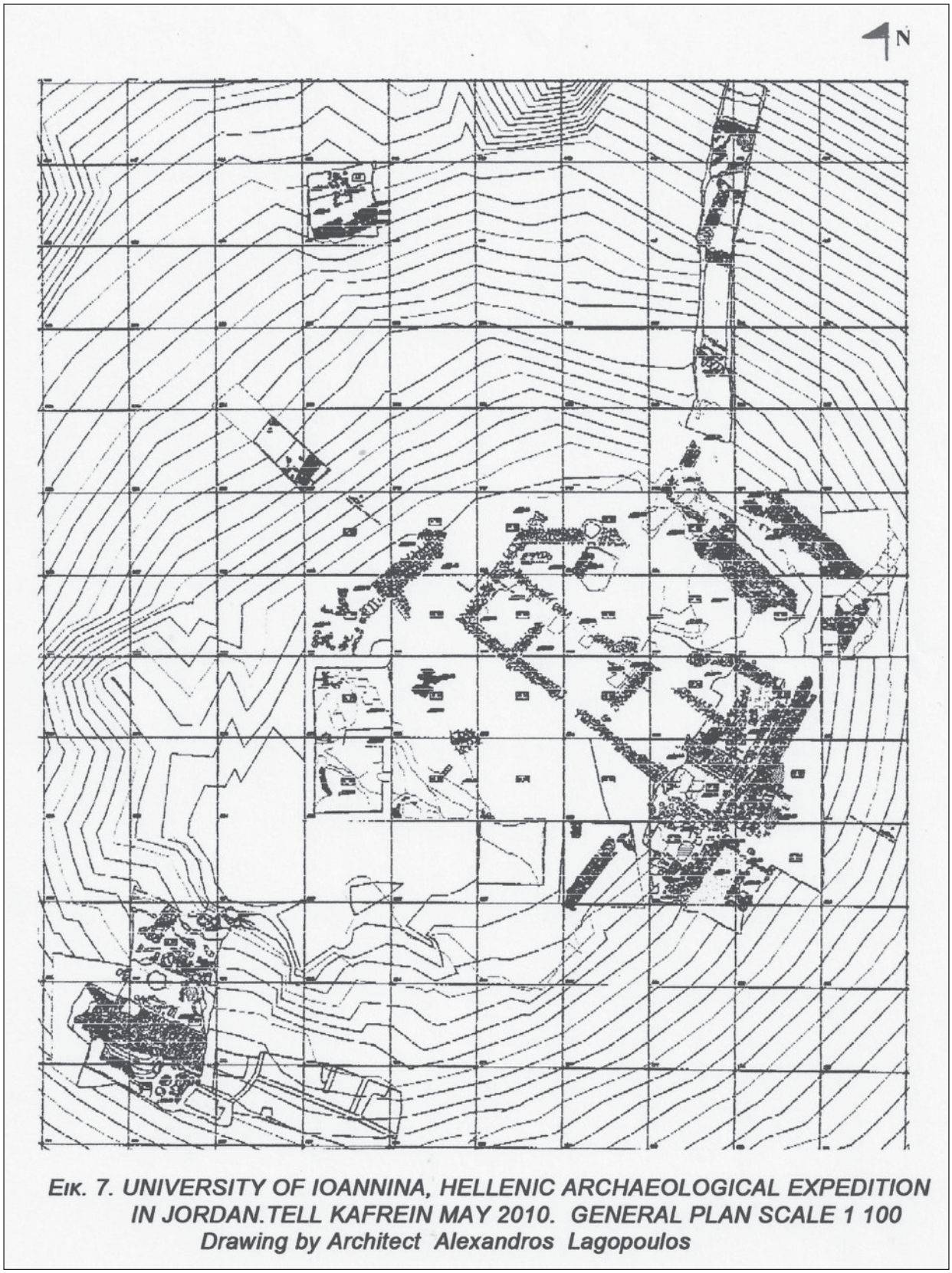
protome (h = 6.3cm; w = 4.5cm) (**Fig. 11a-c**). It is made of red clay, with grey and white grit inclusions, and is slightly chipped. The head, neck and upper chest are represented. The figurine has a neatly indicated headdress, the eyes are almond-shaped and the ears, nose, mouth and breast clearly represented; the chin is slightly pointed. The back of the figurine is roughly shaped by hand. This object is an example of Abdel-Jalil 'Amr's Type D moulded figurine (Amr 1980: 105) and has some parallels at Buṣayra which date to the late 9th or early 8th century BC ('Amr 1980: 373, nos. 71-72)[3].

In addition to the fieldwork, study and preparation of finds for publication was carried out (**Figs. 12-17**). Also, during the season the site was visited by DoA archaeologists Abdelsami Abu Dayyeh and Adeib Abu Shmais, who collaborated with us and helped mainly with the dating of pottery (**Fig. 18**).

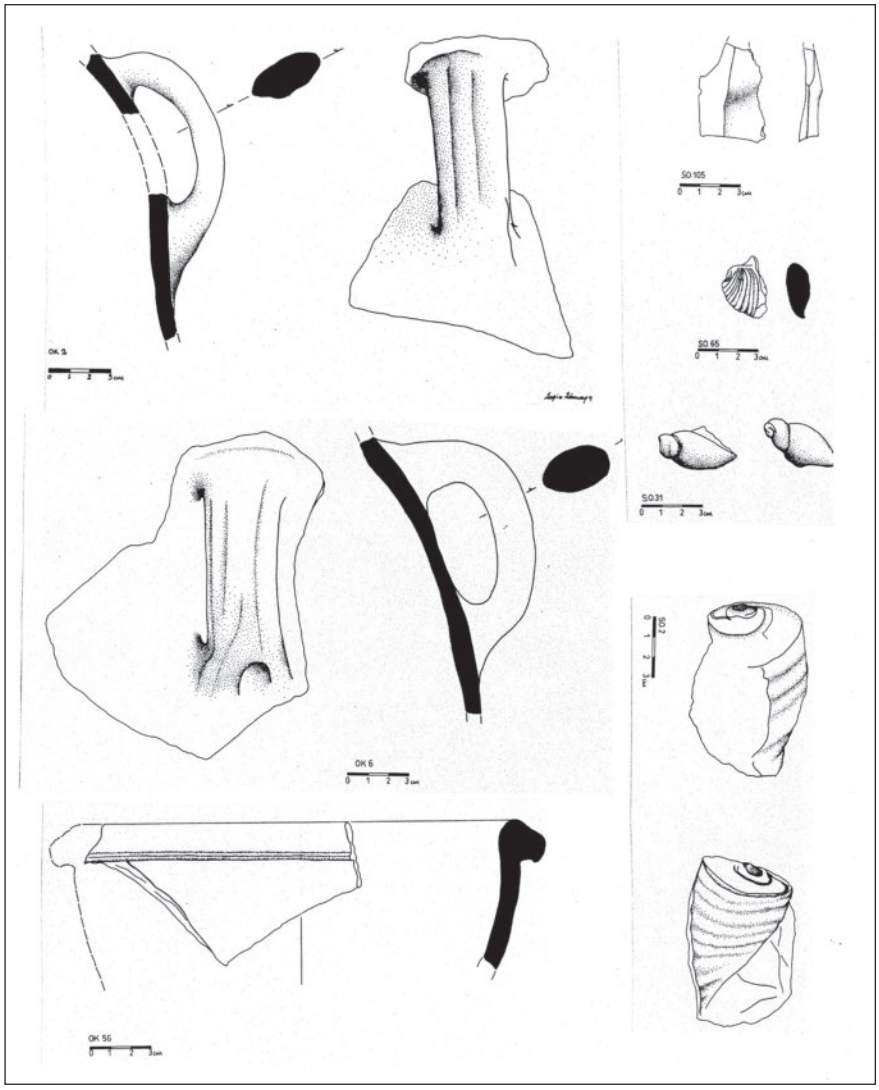
**Archaeometrical Results by the University of Ioannina**

Samples from three trenches on the south slope and close to the top of the *tall* (trenches I17, I18 and R12) were collected and sent to

3. Alternatively, Dr Abdelsami of the DoA has suggested that it is a local imitation of the Assyrian goddess Astarte dating to the 6th century BC.




*12. Tall al-Kafrayn; general plan of the architectural remains (2010).*



*13a. Selection of Iron Age pottery and other finds (photos and profiles).*

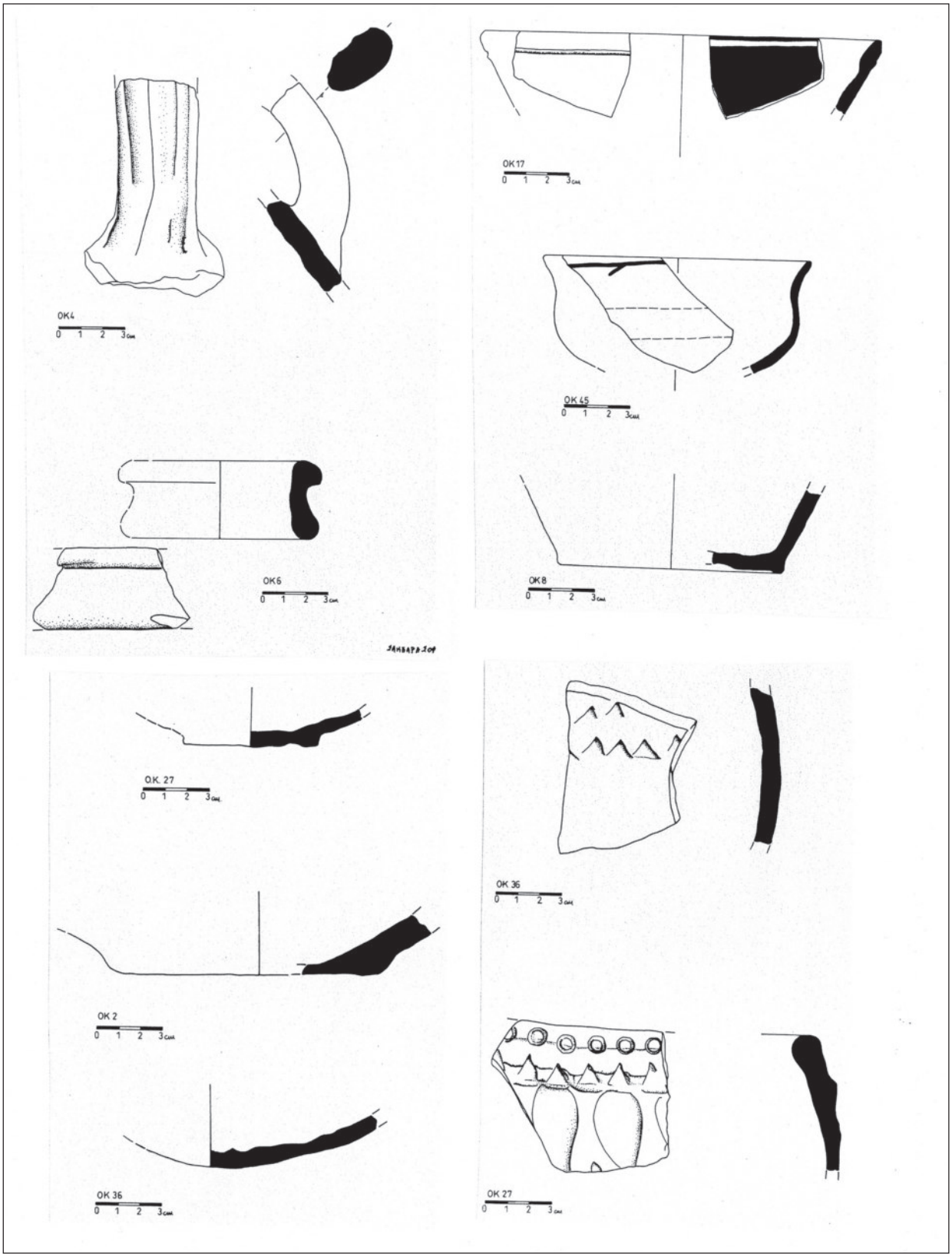
the laboratories of the Archaeometry Centre at the University of Ioannina for analysis and dating. The samples, which included both sherds and sediments, were dated using the Riso TL/OSL DA-15C/D reader. The estimated age of the sherd samples varied from 1400 BC ± 800 years to 2700 BC ± 1700 years, while the ages determined for the sediment samples ranged from 720 BC ± 630 years to 1100 BC ± 200 years. Further analyses, using techniques such as radioisotope-induced energy-dispersive X-ray fluorescence (EDXRF) spectroscopy and X-ray diffraction (XRD), will hopefully reveal the causes of these variations in observed age.

**The 2011 Season**

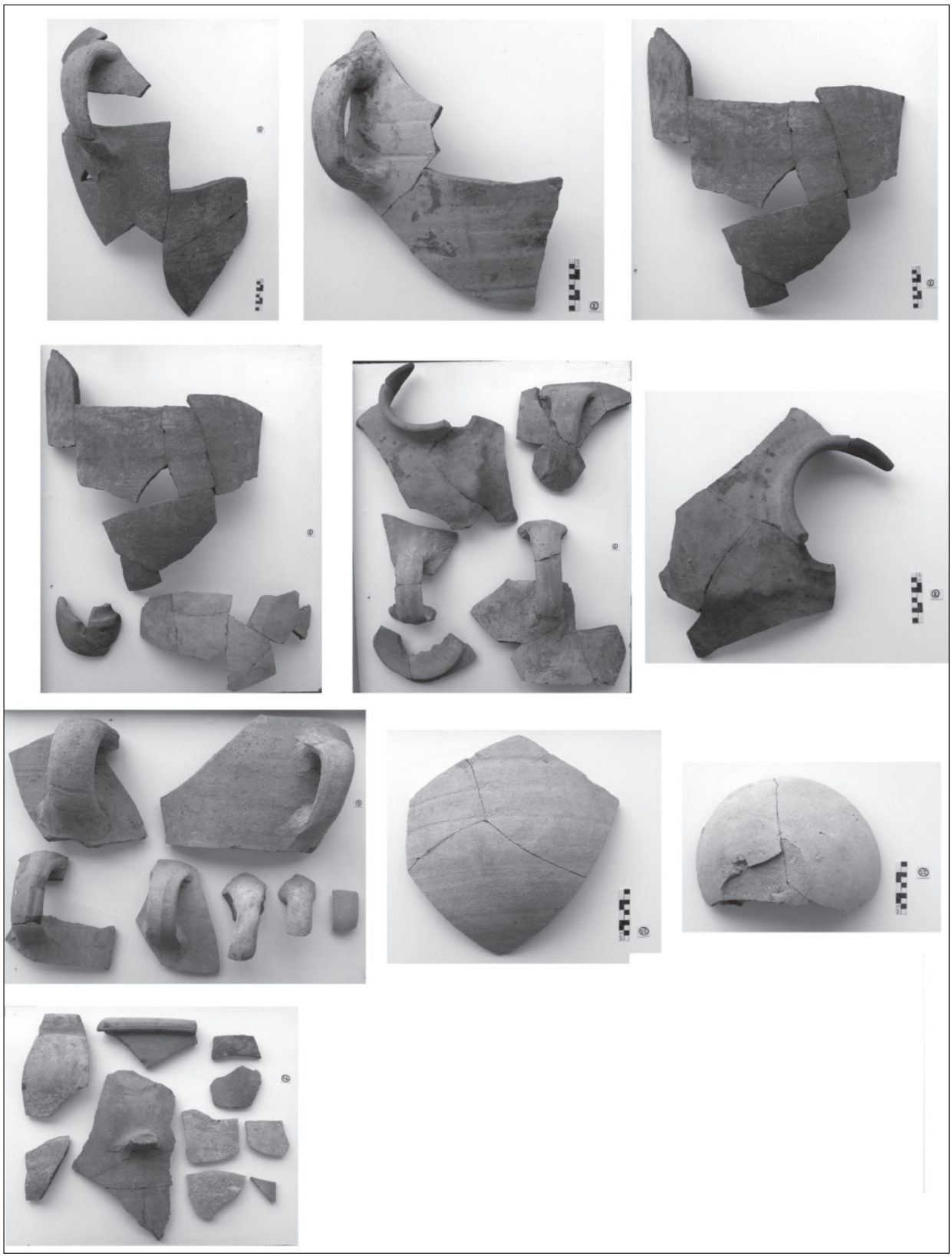
Work at Tall al-Kafrayn resumed in 2011 (the eleventh season; 10-17 April 2011) but was restricted to the northern and western exploratory trenches (**Figs. 19-21**). These yielded additional architectural remains, Iron Age I-II ceramic loom weights and stone artifacts. Much of the season was devoted to aerial photography of the *tall* by our two professional photographers, Kostas Xenikakis and Symeon Yessafidis, who used a remote-controlled camera and balloon at a height of 250-300m above the ground with excellent results (**Figs. 22-24**).

**Conclusions**

The continuation of excavation at Tall al-Kafrayn in 2010 and 2011 produced new evidence concerning the stratigraphy of the *tall*, its earlier levels and the ways of life of its inhabitants. In particular, work in the two ex-




*13b. Selection of Iron Age pottery and other finds (photos and profiles).*

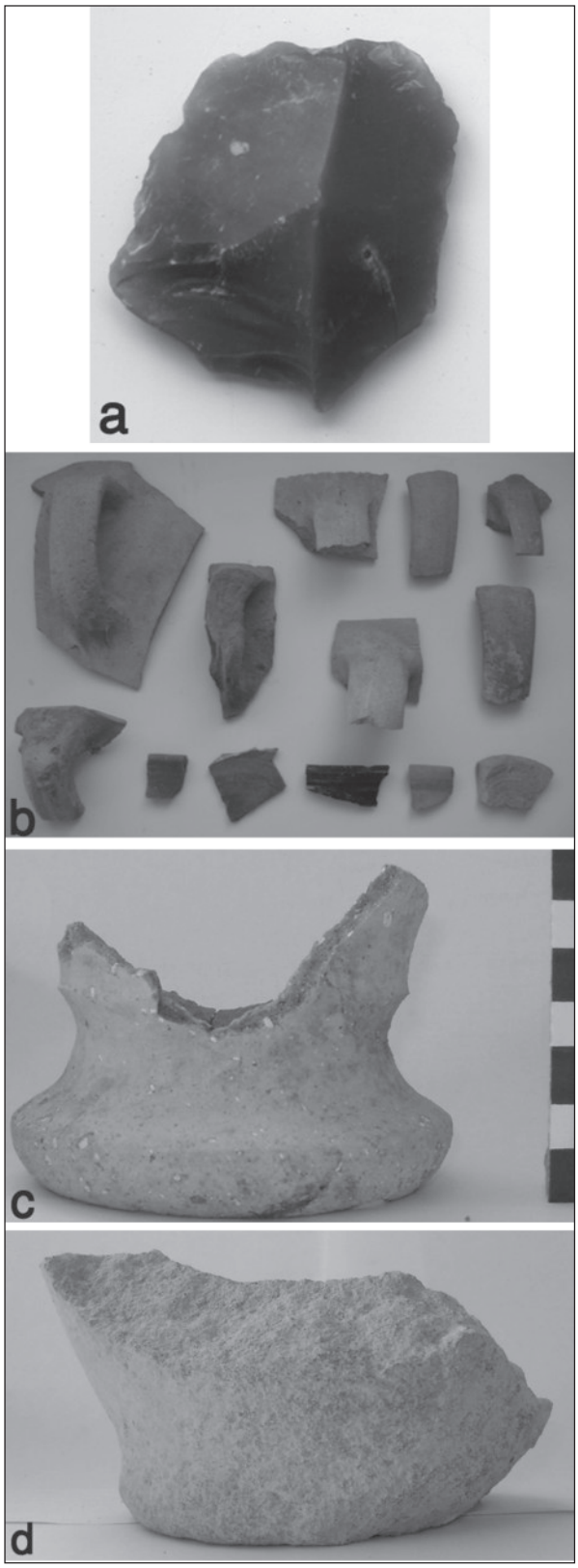


*14. Selection of Iron Age pottery and other finds (photos and profiles).*

15-17. Study and preparation of finds for publication (2010).

18. Visit of DoA archaeologists.

19. Northern exploratory trench (2011).




20a-d. Flint and pottery finds (2011).

21. Western exploratory trench (2011).

22. Aerial photography of Tall al-Kafrayn using balloon (2011).



*23-24. Aerial photos of Tall al-Kafrayn (2011).*

ploratory trenches on the northern and western slopes of the *tall*, as well work on its southern and eastern slopes, revealed important new architectural remains, *viz*. parts of the retaining and fortification walls, domestic installations and a reasonably well-preserved *ṭābūn*-type oven; a similar oven was found near the top of the *tall* in trench R12. Most of the pottery finds date to the Iron Age. Of particular importance and interest was the discovery of the two Egyptian objects (the scarab and, possibly, the exquisite 'alabaster' vase) and the fragmentary Attic (4th century BC) skyphos, which are indicative of links with Egypt and classical Greece.

Future seasons should see more extensive excavation of the structures exposed to date, as well as completion of the two exploratory trenches, with the aim of documenting the entire history of occupation at Tall al-Kafrayn.

**Acknowledgements**

The authors would like to thank the late Dr Fawwaz al-Khraysheh, former Director General of the Department of Antiquities of Jordan, for granting permission to excavate at Tall al-Kafrayn. DoA representatives Khaled Ahmad al-Hawawreh and Hussein al-Jarah of the Dayr 'Allā office are thanked for their kind assistance in facilitating the fieldwork. DoA archaeologists Abdelsami Abu Dayyeh and Adeeb Abu Shmais are similarly thanked for their valuable assistance and help with dating pottery and some other finds. We are once again much indebted to the Director of City Planning and Irrigation in South Shūnah for making the basement of his office available for the study of finds and temporary storage of excavation tools. We are grateful to the University of Ioannina and the Greek Ministry of Culture and Tourism for their financial support, as well as to the Greek Ambassador in 'Ammān, H. Asteriadis, and Secretary of the Greek Embassy, I. Malikourtis, for their assistance. We would also like to thank Archimandrite Innokentios, representative of the Greek Orthodox Patriarchate of Jerusalem, for providing us with safe and secure lodgings at the Pilgrims' House of the Monastery of St George at Mādabā. Finally, we cordially thank former Vice Rector of the University of Ioannina, Prof. Niki Agnanti, who visited us at Tall al-Kafrayn in 2011 and all of the team members mentioned above for their valuable assistance and excellent collaboration.

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# EXCAVATIONS AT EARLY BRONZE IV DHAHRAT UMM AL-MARRĀR IN THE JORDAN VALLEY

*Jennifer E. Jones, Steven E. Falconer, Patricia L. Fall and Mary Metzger*

**Introduction**

Following the regional abandonment of the largest settlements in the southern Levant in the late 3rd millennium BC, populations shifted to smaller sedentary settlements or pursued pastoral life-ways. As part of the Jordan Valley Village Project's effort to investigate Bronze Age rural agrarian life, we conducted five weeks of excavation in 1996/97 at Dhahrat Umm al-Marrār in the northern Jordan valley, Jordan. Perched on a hilltop overlooking the broad agricultural lands of the Jordan valley, our excavations revealed an Early Bronze IV village with domestic architecture and artifacts indicative of sedentary agrarian subsistence. Two particularly noteworthy finds from Umm al-Marrār are a stone wall at least 2m wide that encloses an area of 0.34 ha and an *in situ* collection of over two dozen ceramic vessels. The *in situ* pottery contains a variety of forms and provides a rare glimpse of a generalized domestic ceramic assemblage rather than the more specialized mortuary groups known from a variety of Early Bronze IV tombs throughout the region. Thus, Umm al-Marrār joins a growing corpus of excavated Early Bronze IV sites in the northern Jordan valley and provides new insights on the social dynamics of this crucial juncture in Levantine population aggregation and disaggregation.

The Early Bronze IV period (EB IV) (*ca.* 2350-2000BC) witnessed the regionally pervasive abandonment of the largest settlements in the southern Levant. Archaeological excavation and survey over the past half century have established that the region's inhabitants abandoned the towns of Early Bronze II-III (*ca.* 3100 / 3000-2350BC) by the end of Early Bronze III (Adams 2000; Philip 2001). Debate continues over whether these towns represented the first fluorescence of urbanism in the southern Levant (Dever 1995; Falconer 1994; Palumbo 1990, 2001; Philip 2001; Richard 1987). In either case, following the end of the larger Early Bronze Age settlements, pastoral sites prevailed in the arid parts of the region, while farming villages continued in areas with promising agricultural potential (e.g. Helms 1983, 1984, 1986, 1989; Prag 1974, 1986, 1989, 1990, 1991; Rast and Schaub 1978a, 1978b, 2003; Richard 1982, 1983, 1990; Richard and Boraas 1984, 1988; Richard and Long 1995; Richard *et al.* 2010). Sedentary villages continued to manage domesticated animals and plants, including orchard crops, especially grapes and figs (Fall, Falconer and Lines 2002: 463; Fall, Lines and Falconer 1998: 118). Pastoral communities processed plant foods with ground stone querns to complement the herding of domesticated sheep and goats, and the exchange of copper tools and ingots (Adams 2006; Cohen 1992; Cohen and Dever 1979, 1981; Haiman 1996).

Some debates over the nature of EB IV social organization have centered on the degree of political complexity and economic specialization that persisted after the collapse of Early Bronze II-III town life (Dever 1980; Palumbo 1987, 2001; Richard 1987). Changes in large scale specialized production following the abandonment of Early Bronze Age towns may signal the use of new modes of kin-based household production (Dever 1989, 1995). While regional patterns of ceramic production have been elusive (Goren 1996; Palumbo and Peterman 1993; Prag 1988), local pottery exchange (Falconer 1987; Jones 1999) and long distance trade of Canaanean blades clearly characterized the Early Bronze IV economy (Rosen 1996). Burial data also allude to a reduction in the size of social groups. For

example, EB IV shaft tombs at Bāb adh-Dhrā‘ held fewer than seven people, reflecting a return to Early Bronze I burial practices, rather than continuing the tradition of large EB II-III charnel houses (Chesson 1999). Reduced interments per tomb may allude to population decline or a contraction in family size or group membership during Early Bronze IV. This social reconstruction holds implications for the organization of labor, especially for extra-household tasks.

The excavation of Umm al-Marrār in December 1996 and January 1997 was an outgrowth of a multidisciplinary investigation into rural economy and ecology during the period of Early Bronze IV town abandonment and Middle Bronze Age re-urbanization (Falconer and Fall 2006). The results from Umm al-Marrār may be integrated with those from nearby contemporaneous sites, such as Tall Abū an-Ni‘āj, to illuminate the adjustments made by rural communities in societies undergoing population disaggregation (Falconer and Magness-Gardiner 1989; Fall, Lines and Falconer 1998).

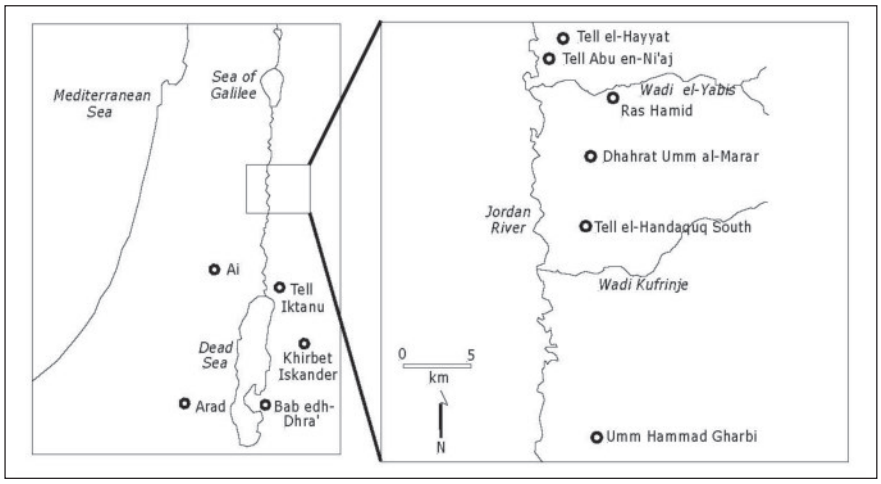
Dhahrat Umm al-Marrār was identified as an archaeological site in 1946, based on surface architecture and large quantities of pottery, chipped stone artifacts, and ground stone mortars and querns (Glueck 1951: 277-78). The East Jordan Valley Survey (EJVS) revisited the site in 1975, inferred an EB IV occupation date based on its pottery, and concluded that the large number of ground stone querns indicated an agricultural subsistence economy (Ibrahim, Sauer and Yassine 1976: 63). The EJVS also located small stone structures and a wider stone wall around portions of the site. Subsequent archaeological surveys corroborated EB IV habitation and continued the discussion about Umm al-Marrār’s enclosure wall (Palumbo 1990).

A variety of questions inspired us to excavate at Umm al-Marrār: (1) What form(s) of settlement and economy are represented by the material remains? (2) What are the larger implications of the enclosure wall? (3) How did this community fit within the structure of EB IV society? Our research results and interpretations provide a profile of Umm al-Marrār that adds to the broader comprehension of rural life during the dramatic social and economic changes experienced by the southern Levant in the late 3rd millennium BC.

**Site Setting and Description**

Dhahrat Umm al-Marrār (MEGA 9575; Palestine Grid 206.7E 194.8N) lies approximately 5km east of the Jordan River, between Wādī al-Yābis to the north and Wādī Kufranjah to the south (**Fig. 1**) (Falconer, Fall and Jones 1998). The site sits atop an isolated limestone hill with a summit approximately 100 meters below sea level, which overlooks the broad agricultural valley of the Jordan River near the transition between the plain of the Jordan valley and the foothills of the escarpment to the east. A spring emerges from these foothills and flows along the south-eastern foot of the hill 40m below its summit. Thus, Umm al-Marrār’s inhabitants had a commanding view of the surrounding landscape, as well as access to water and fertile agricultural land.

Pottery and lithic artifacts cover a 3.30 ha area on the hilltop and its slopes, while stone

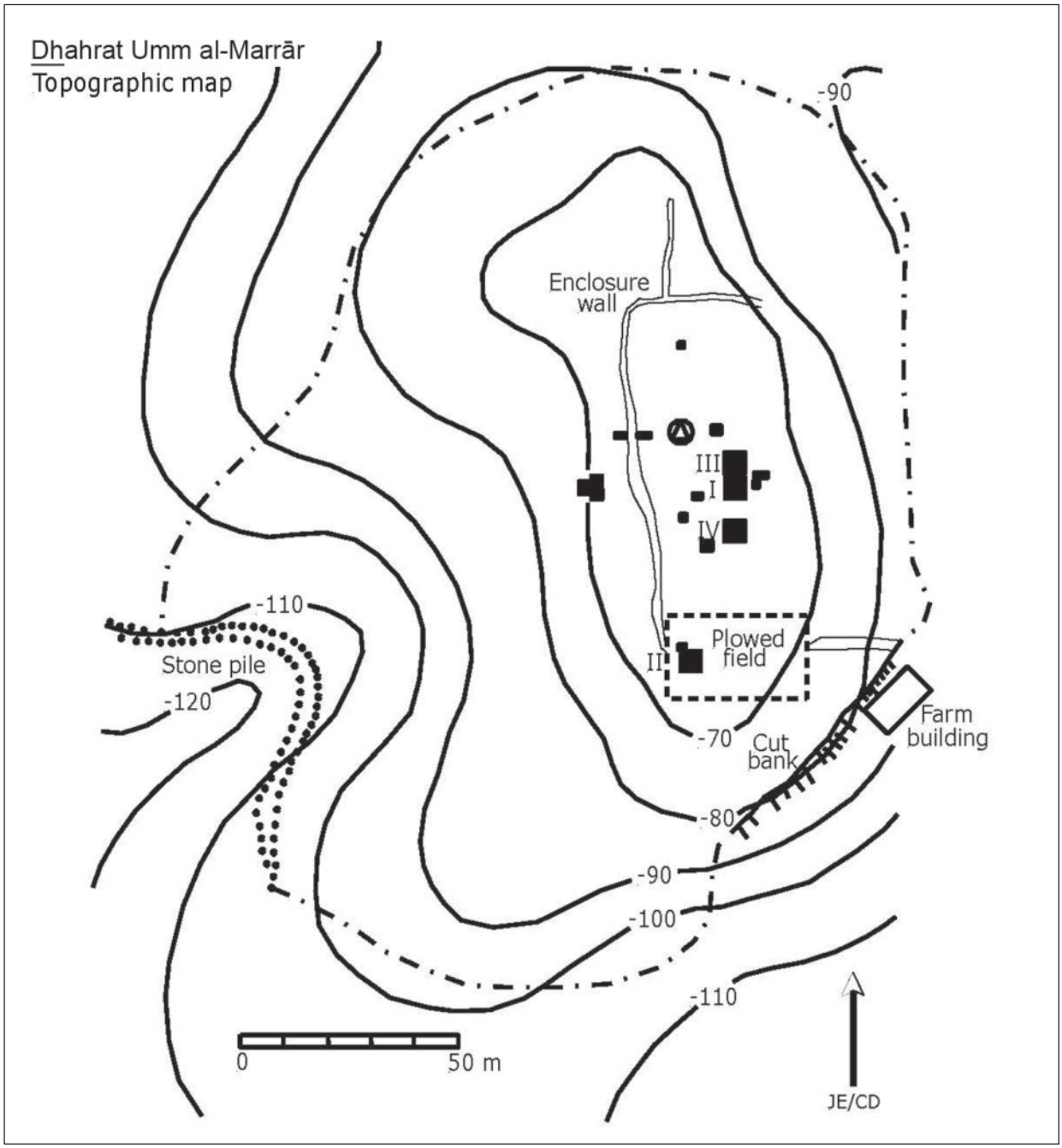



*1. Location of Dhahrat Umm al-Marrār in the northern Jordan valley, along with other Bronze Age sites mentioned in the text (drawn by J. Jones).*

walls are spread over an area of approximately 3400 m$^2$ or 0.34 ha within and adjacent to the stone enclosure wall (**Fig. 2**). Cultural deposits cover natural sediments and exposed sections of limestone bedrock. Cemented alluvial chert and limestone cobbles fill natural depressions in the bedrock and were used as hammer stones and construction material. Erosion, modern military earthworks, plowing and contemporary farm buildings have impacted the site, particularly along its southern side.

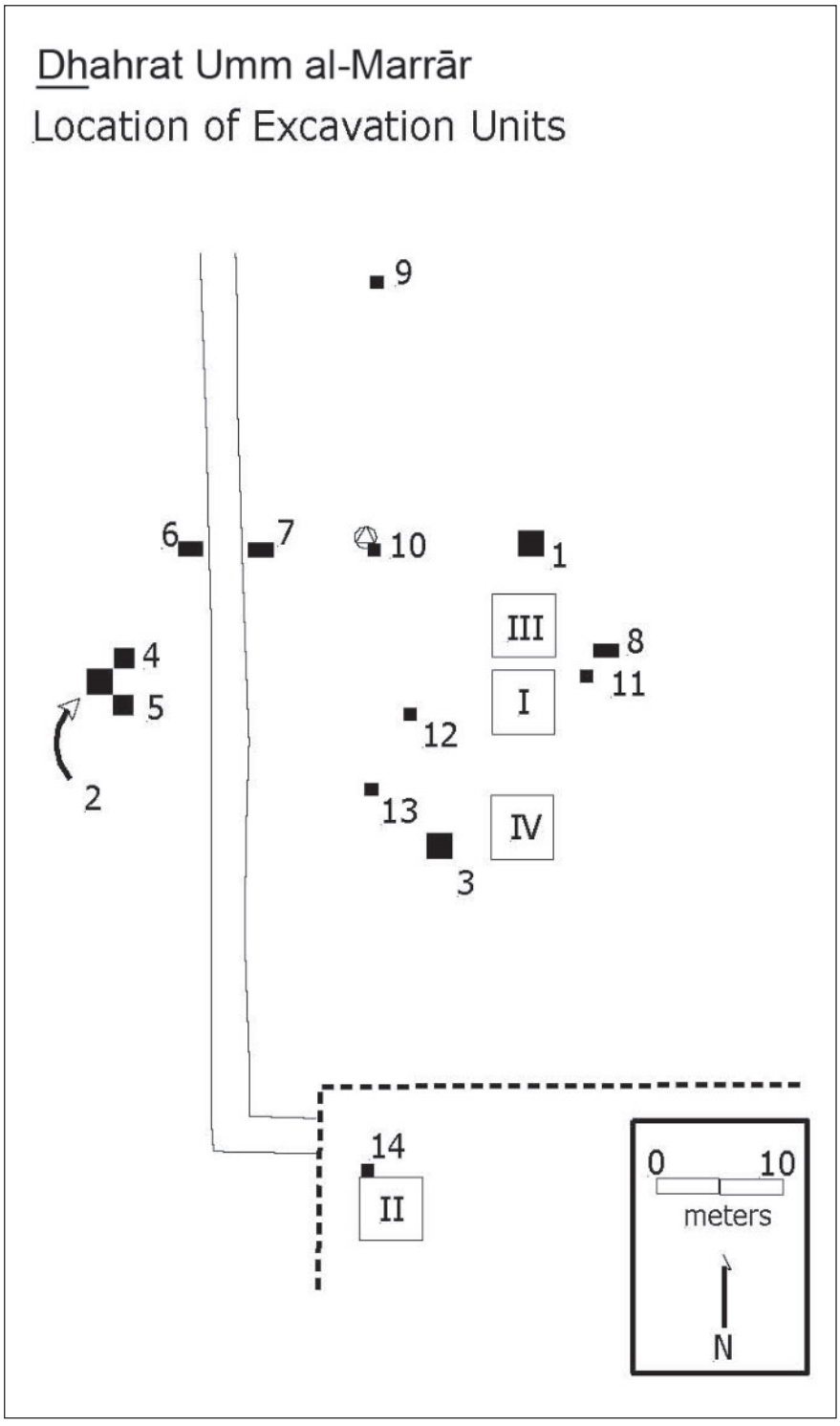
**Methods**

We investigated the depth and extent of cul-




*2. Topographic map of Dhahrat Umm al-Marrār showing the stone enclosure wall and excavation units. Contour lines indicate meters below the main site datum (datum indicated by circled triangle). Dashed line shows the maximum extent of EB IV pottery on the surface in 1996 / 97 (drawn by J. Eighmey and C. Davies).*

tural material, and the location of features and architecture using fourteen small excavation units, ranging from 1x1m to 2x2m (**Table 1**; **Fig. 3**). Inside the enclosure wall, near the top of the hill, four additional 4x4m units allowed broad exposures of two structures and a trash midden. We excavated nearly 93m$^2$ or about 2.7% of the area inside the enclosure wall during the 1996 / 97 season. Consistent with our field methods at Tall Abū an-Ni'āj, we sieved all excavated sediments through a 1cm mesh to recover stone and ceramic artifacts, as well as animal bones.




*3. Location of the excavation units at Dhahrat Umm al-Marrār (dashed line shows area disturbed previously by ploughing or bulldozer). Main site datum indicated by circled triangle (drawn by J. Jones).*

**Table 1:** Excavation Units Showing Size and Area Excavated[1].

| Excavation Squares | Field Designations | Size | Area Excavated |
|---|---|---|---|
| Area I | Area I | 4x4 | 16m$^2$ |
| Area II | Area II | 4x4 | 16m$^2$ |
| Area III | Area III | 4x4 | 16m$^2$ |
| Area IV | Area IV | 4x4 | 16m$^2$ |
| Unit 1 | 1 S / 12 E | 2x2 | 4m$^2$ |
| Unit 2 | 12 S / 22 W | 2x2 | 4m$^2$ |
| Unit 3 | 25 S / 5 E | 2x2 | 4m$^2$ |
| Unit 4 | 10 S/ 20 W | 1.5x1.5 | 2.25m$^2$ |
| Unit 5 | 13.5 S / 20 W | 1.5x1.5 | 2.25m$^2$ |
| Unit 6 | 1 S / 15 W | 1x2 | 2m$^2$ |
| Unit 7 | 1 S / 9.5 W | 1x2 | 2m$^2$ |
| Unit 8 | 9 S / 17.5 E | 1x2 | 2m$^2$ |
| Unit 9 | 20 N / 0 E | 1x1 | 1m$^2$ |
| Unit 10 | 1 S / 0 E | 1x1 | 1m$^2$ |
| Unit 11 | 11 S / 17 E | 1x1 | 1m$^2$ |
| Unit 12 | 14 S / 3 E | 1x1 | 1m$^2$ |
| Unit 13 | 20 S / 0 E | 1x1 | 1m$^2$ |
| Unit 14 | 50 S / 0 E | 1x1 | 1m$^2$ |
| | Total m$^2$ excavated | | 92.5m$^2$ |

Approximately 150 liters of excavated sediments were processed with a Float Tech 2000 water flotation machine to recover charred seeds and plant material. Faunal data are presented as numbers of identified specimens (NISP), permitting comparison with assemblages from other sites. Ceramic sherds were counted and weighed; all rim, handle, base and decorated sherds underwent further analysis, primarily to infer ceramic chronology and to identify vessel form and function. Vessel forms were coded using a morphological classification system developed for Tall Abū an-Ni'āj based on Cole's (1984) study of Middle Bronze Age pottery from Shechem. The size of ground stone tools and their utilized surfaces were measured in the field to the nearest millimeter and their functional types and raw materials recorded.

## Results

*The Enclosure Wall*

Dhahrat Umm al-Marrār's most prominent architectural feature, a lengthy rectangular enclosure wall, was built from unshaped blocks of limestone up to 70cm long, laid 2.0-4.5m wide on the surface. Preserved one course high, the widest section of the wall lies directly west of Areas I and III (see **Fig. 2**). This feature bounds the top of the hill with a 100m long segment along the western side of the hilltop, and northern and southern sections that extend 30m east to the edge of the hill. A separate wall extends

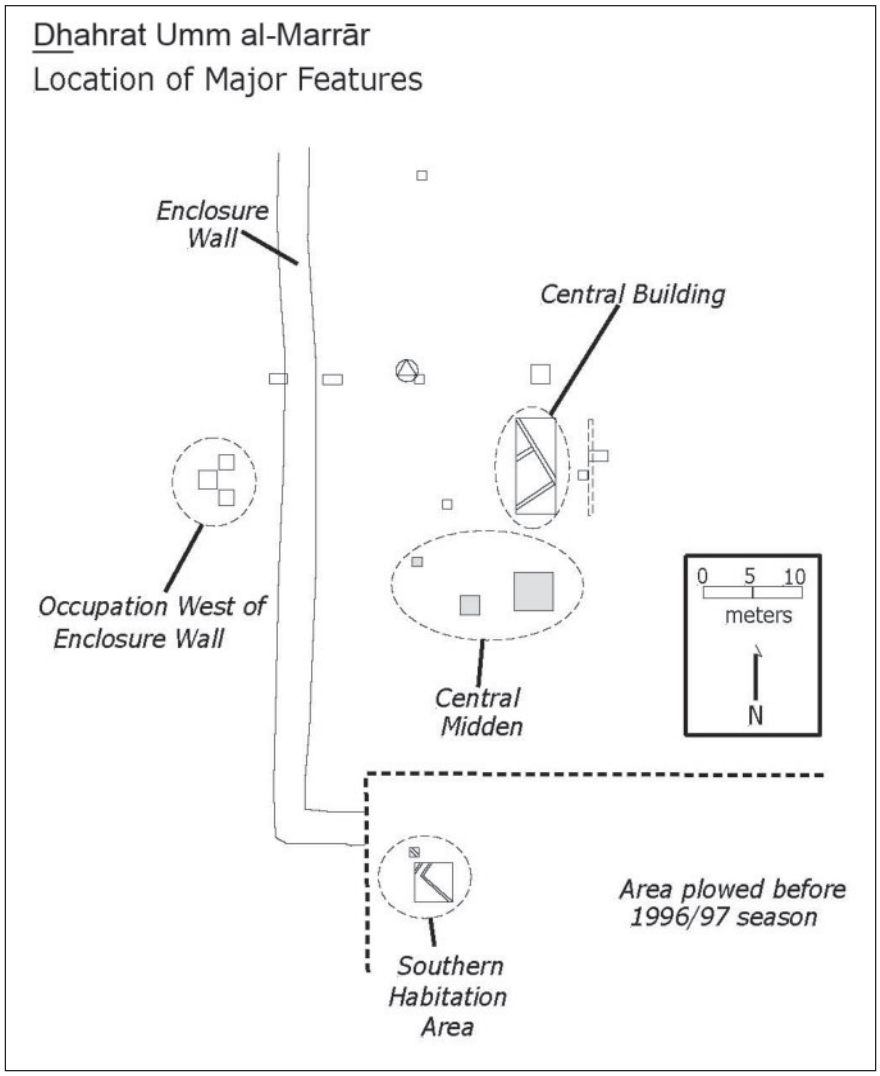
1. Field designations for each excavation unit refer to the distance (in meters) from the south-west corner of each unit to the main site datum.

25m north from the northern segment. These walls are presumably those identified by Glueck (1951) during his regional survey over 50 years ago. No gates, openings or towers are visible from the surface remains examined by the JVVP team, although the southern side of the wall was damaged prior to our 1996 / 97 excavation season. In the years immediately following our season, the western wall segment was damaged further when much of it was pushed to the eastern side of the hill with a bulldozer. Less than 25 meters of the western wall was visible on a subsequent visit to the site in 2000.

The enclosure wall marks a depositional transition at the site with more organic material and ash in soils deposited inside than outside. Two excavation units bisecting the western wall (Units 6 and 7) contain 50cm of soil and decayed mudbrick above bedrock, along with EB IV pottery, chipped stone artifacts and a shell pendant (see **Fig. 3**). These artifact-bearing sediments include a cobble fill that is found across the site, ranging from very thin layers inside structures to deposits 40cm deep in areas with no architecture.

*The Domestic Occupation*

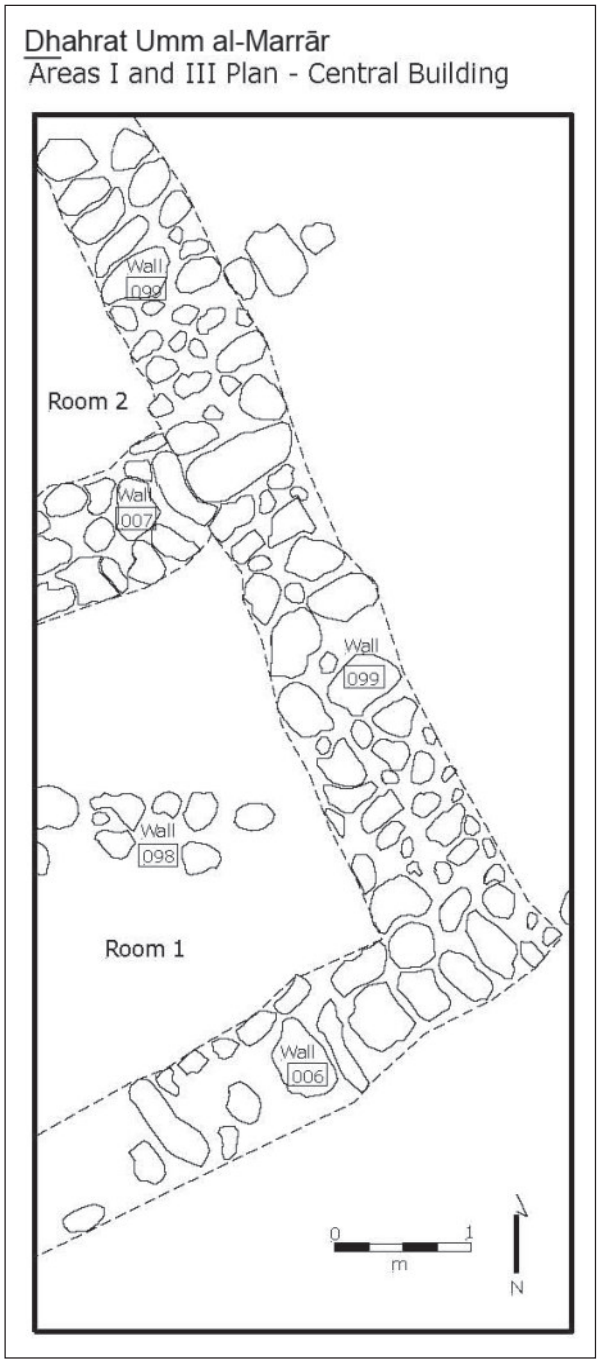
We sampled rectilinear stone structures within a number of our excavation units. The four large excavation areas (Areas I-IV) revealed rectilinear buildings in the central and southern parts of the site, a trash midden and features associated with domestic food processing and storage. Units west of the enclosure wall, and north and east of the central building, contain stone wall foundations and domestic assemblages including pottery, chipped stone, perforated




*4. Location of major architectural features at Dhahrat Umm al-Marrār. Main site datum indicated by circled triangle (drawn by J. Jones).*

whorls and weights, and a boulder mortar.

The central building lies at the summit of the hill in the middle of the enclosure wall (**Fig. 4**). Preserved three courses high, the three exposed walls divide the structure into two interior spaces (**Fig. 5**). The two exterior walls are 80cm wide and the interior wall was expanded from an initial width of 40cm to match the exterior segments. An uneven sherd pavement and earthen surfaces overlay a basal cobble fill inside the building. Considerable amounts of decayed mudbrick lay in the interior deposits, along with animal bone, pottery, chipped stone tools and debitage, and a vesicular basalt bowl base.

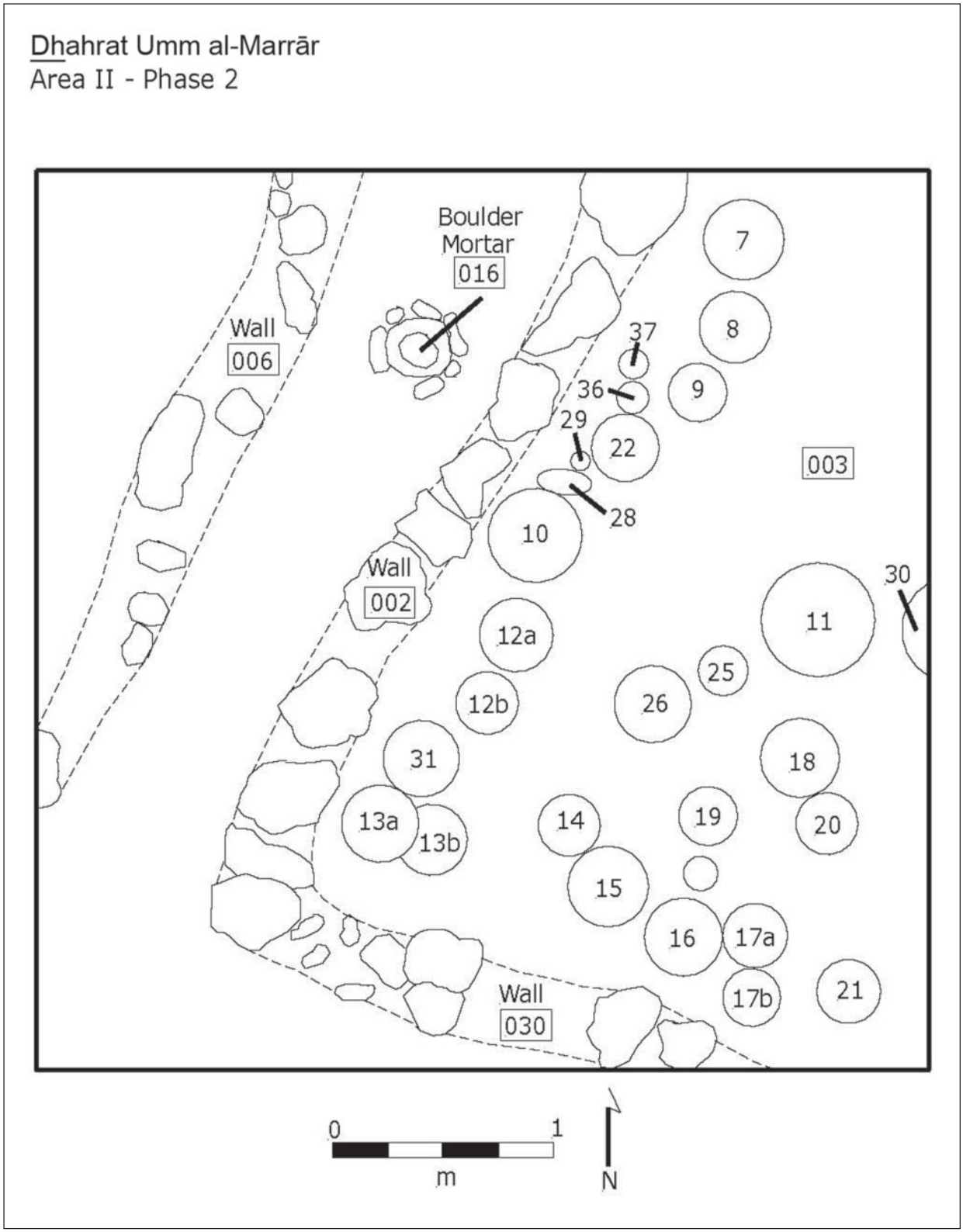



*5. Plan view of the central building at Dhahrat Umm al-Marrār. The southern and interior walls (I:006 and III:007) abut the eastern wall (I:099 / III:099). (drawn by J. Jones).*

Ashy soil and large numbers of sherds and chipped stone artifacts on the surface of the site mark two trash middens at Umm al-Marrār; one along the eastern slope and one south of the central building. Three excavation units in the central midden delineate archaeological sediments 20-50cm thick, covering at least 12m laterally. This artifact-laden cultural layer rests on top of decayed mudbrick and a mudbrick surface.

The southern habitation area contains two phases of domestic occupation associated with 20-60cm of sediment and features (see **Fig. 4**). The Phase 1 features include a boulder mortar, clay-lined pit, bedrock mortar, a stone platform supporting a pottery vessel, and a compacted earthen surface over a layer of cobble fill. These features were later covered by approximately 20cm of sediment with a clearly defined and compacted upper use surface. Phase 2 remodeling added two adjacent structures, with single row stone walls preserved one to three courses high (**Fig. 6**). A series of sherd pavements, a boulder mortar and earthen surfaces with ash lenses, charcoal, burned daub and mudbrick fragments lay within and between the walls.

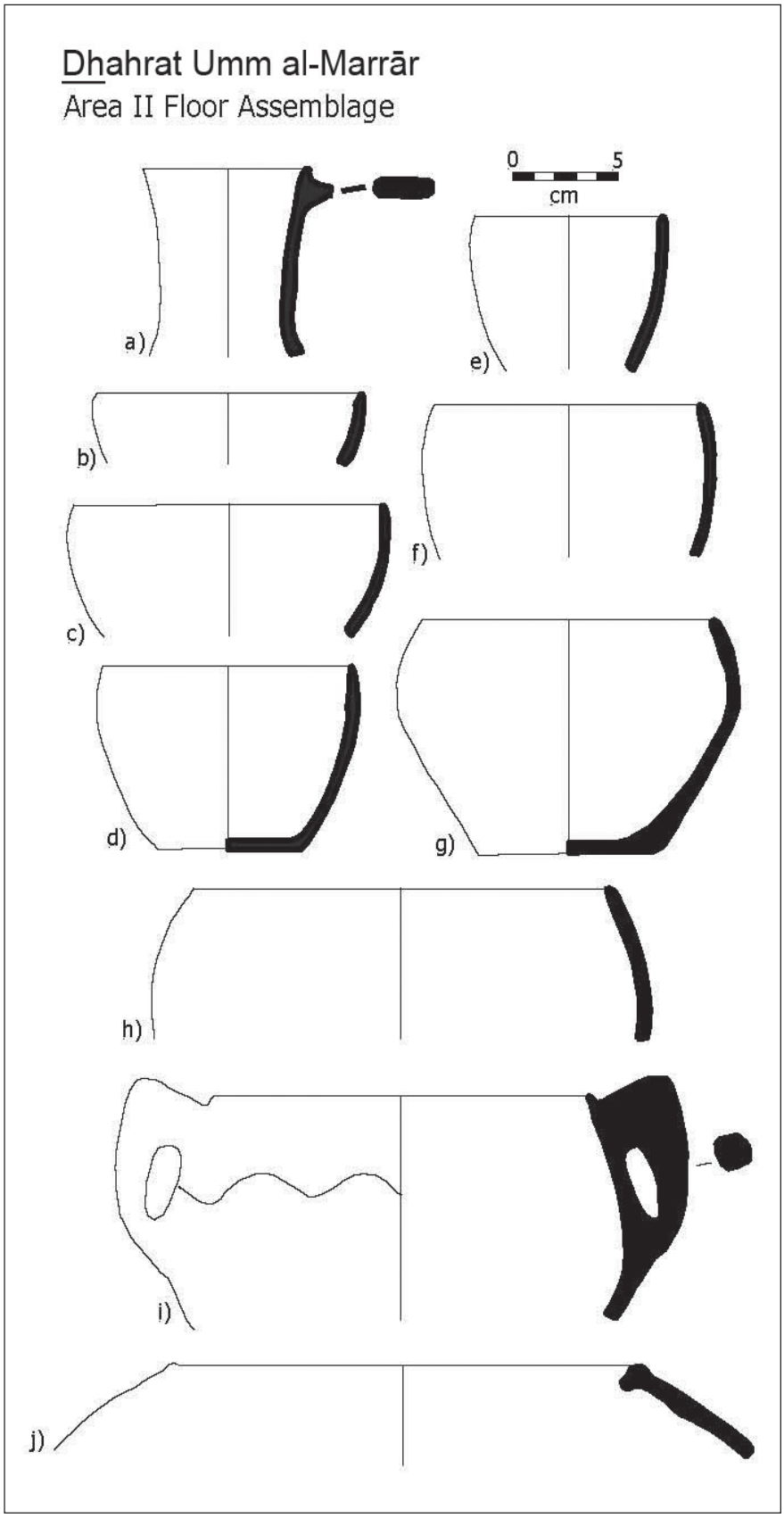
The eastern room revealed a remarkable *in situ* pottery assemblage featuring the bases of approximately two dozen flat-bottomed pots whose upper sections were sliced off by modern bulldozing. The whole and partially reconstructable vessels in this floor assemblage include a churn, eight plain cups, an eared cup, a small double-handled bowl, a holemouth cook pot, a strap handled juglet and numerous everted neck storage jars (**Table 2**; **Figs. 7-10**). Notably absent are lamps, wide, shallow, platter style bowls, and hole mouth jars, all of which were recovered elsewhere at the site. The activities represented in the floor assemblage include cooking, serving individual food portions, churning and long-term dry food storage. Activities not represented include shorter-term storage and preparation, as well as serving food from a common vessel.



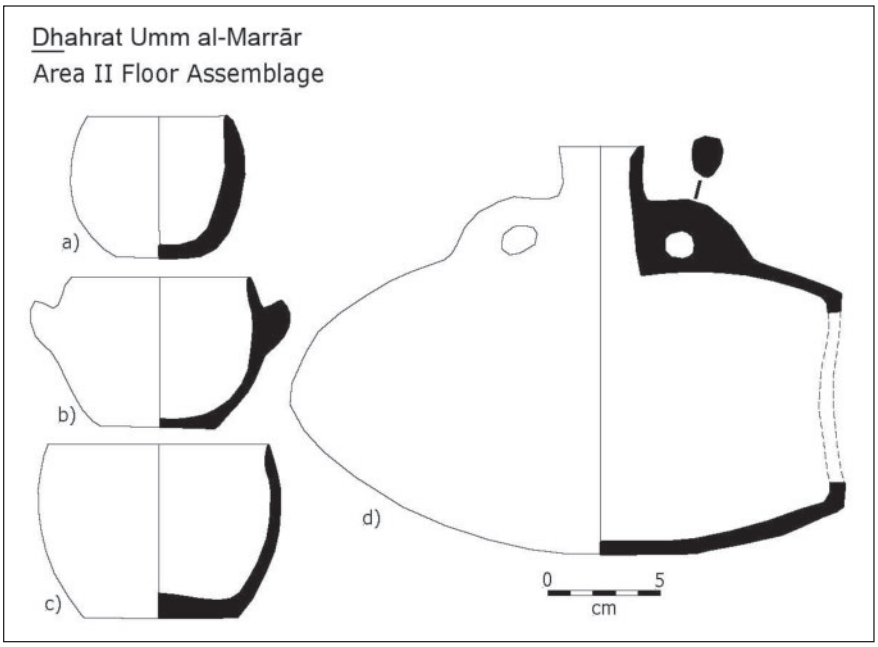

*6. Plan view showing locations of ceramic vessels found in situ on Phase 2 domestic floor, Area II, Dhahrat Umm al-Marrār. Pot #28 is a complete churn (FIG. 8d) and #29 and #37 are cups (FIG. 8b and a respectively) (Cole 1984, forms Cn and Bd) (drawn by J. Jones).*

**Table 2:** Munsell Colours for Exterior and Interior Surfaces of Pottery Vessels in the Area II Floor Assemblage.

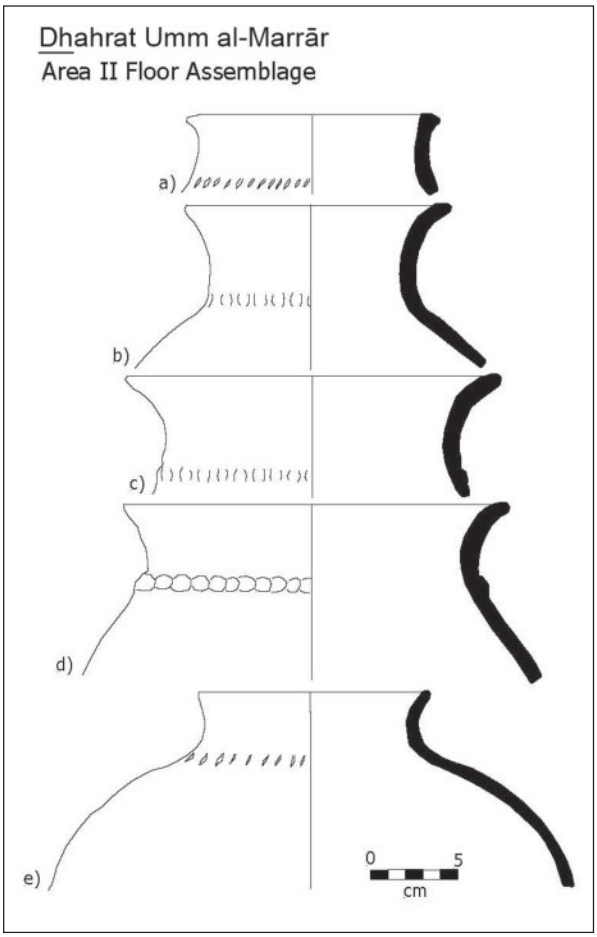
| Figure and sherd | Vessel Type | Colour (Ext / Int) |
|---|---|---|
| Fig. 7a | Necked bottle with strap handle (Jg) | 5 YR 7/6 - reddish yellow<br>5 YR 7/6 - reddish yellow |
| Fig. 7b | Cup (Bd) | 10 YR 7/4 - very pale brown<br>10 YR 6/3 - pale brown |
| Fig. 7c | Cup (Bd) | 10 YR 7/4 - very pale brown<br>10 YR 7/4 - very pale brown |
| Fig. 7d | Cup (Bd) | 5 YR 7/6 - reddish yellow<br>5 YR 7/6 - reddish yellow |
| Fig. 7e | Cup (Bd) | 10 YR 6/3 - pale brown<br>10 YR 6/3 - pale brown |
| Fig. 7f | Cup (Bd) | 10 YR 7/4 - very pale brown<br>5 YR 6/6 - reddish yellow |
| Fig. 7g | Cup (Bd) | Int/Ext - 10 YR 6/3 - pale brown<br>Core - 10 YR 6/3 - pale brown |
| Fig. 7h | Open bowl (Bo) | 2.5 YR 6/6 - light red<br>2.5 YR 6/6 - light red |
| Fig. 7i | Double-handled open bowl (Bo) | 7.5 YR 6/1 - grey<br>10 YR 6/2 - light brownish grey |
| Fig. 7j | Holemouth cooking pot (Ch) | 5 YR 5/4 - reddish brown<br>5 YR 5/2 - reddish grey |
| Fig. 8a | Cup (Bd) | 10 YR 6/3 - pale brown<br>10 YR 7/3 - very pale brown |
| Fig. 8b | Cup with handles (Bd) | 10 R 5/1 - reddish grey<br>10 R 5/1 - reddish grey |
| Fig. 8c | Cup (Bd) | 7.5 YR 7/6 - reddish yellow<br>7.5 YR 7/4 - pink |
| Fig. 8d | Churn (Cn) | 2.5 YR 7/4 - light reddish brown<br>5 YR 7/4 - pink |
| Fig. 9a | Everted rim jar (J) | 2.5 YR 7/3 - pale yellow<br>2.5 YR 7/3 - pale yellow |
| Fig. 9b | Everted rim jar (J) | 2.5 YR 7/4 - pale yellow<br>2.5 YR 7/4 - pale yellow |
| Fig. 9c | Everted rim jar (J) | 2.5 YR 8/3 - pale yellow<br>2.5 YR 8/3 - pale yellow |
| Fig. 9d | Everted rim jar (J) | 10 YR 7/3 - very pale brown<br>10 YR 7/3 - very pale brown |
| Fig. 9e | Everted rim jar (J) | 2.5 YR 7/4 - pale yellow<br>7.5 YR 7/6 - reddish yellow |
| Fig. 10a | Everted rim jar with ledge handle (J) | 10 YR 6/2 - light brownish grey<br>10 YR 6/2 - light brownish grey |
| Fig. 10b | Everted rim jar with ledge handle (J) | 5 YR 6/3 - light reddish brown<br>5 YR 6/6 - reddish yellow |
| Fig. 10c | Everted rim jar with ledge handle (J) | 5 YR 7/4 - pink<br>5 YR 7/4 - pink |
| Fig. 10d | Everted rim jar (J) | 10 YR 7/3 - very pale brown<br>10 YR 7/3 - very pale brown |



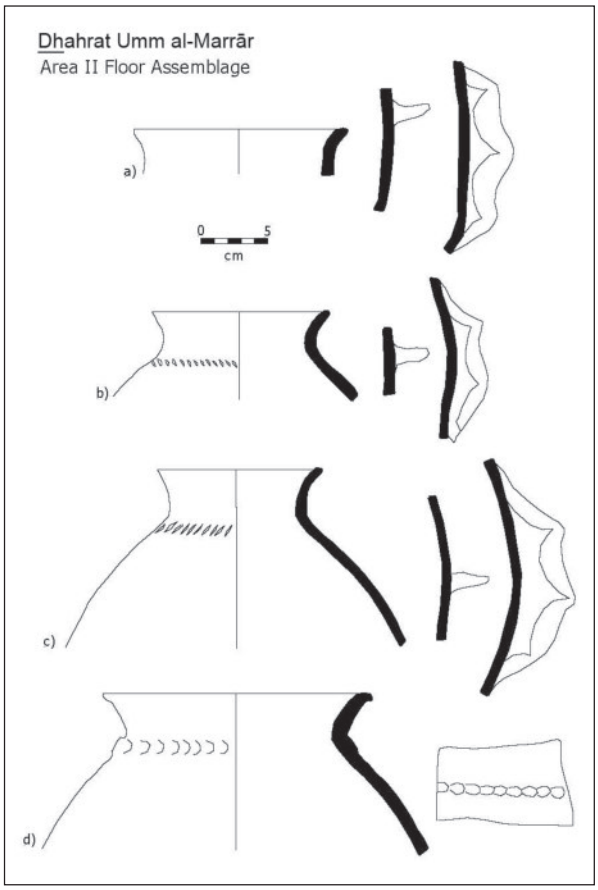

*7. Pottery vessels from the Area II floor assemblage, Dhahrat Umm al-Marrār (vessel form designations adapted from Cole [1984]): (a) necked jug, (b)-(g) cups (Bd), (h) open bowl (Bo), (i) double-handled open bowl (Bo) and (j) holemouth cooking pot (Ch) (drawn by J. Jones).*




*8. Cups and churn from Dhahrat Umm al-Marrār (vessel form designations adapted from Cole [1984]): (a)-(c) cups (Bd) and (d) churn (Cn) (drawn by M. al-Nahar).*




*9. Storage jars (comparable to vessel form J, adapted from Cole 1984) from the Area II floor assemblage, Dhahrat Umm al-Marrār (drawn by J. Jones).*




*10. Storage jars (comparable to vessel form J, adapted from Cole 1984) with: (a) - (c) associated ledge handles and (d) associated body sherd with decorative motif from the Area II floor assemblage, Dhahrat Umm al-Marrār (drawn by J. Jones).*

In contrast, for example, different subsets of the EB IV ceramic repertoire are found in tomb assemblages and the storeroom at Khirbat Iskander. Small spouted vessels, shallow bowls and jars are found in these two contexts, while multiple lamps are common in tombs (Richard and Boraas 1988). Functional and chronological differences likely account for the differences in form composition from these various contexts. Taken as a whole, the floor assemblage in the eastern room at Umm al-Marrār reflects domestic food-handling activities, with an emphasis on long-term storage, dairy processing, and the cooking and consumption of individual servings of foods or liquids.

*Material Culture and Subsistence Economy*

The vessel forms from Umm al-Marar include cups, open bowls with ledge handles at and below the rim, holemouth and everted cooking pots, holemouth and everted rim storage jars, jugs and pitchers (**Table 3**; **Figs. 11-12**). The vessel morphology and decorative styles, including trickle-painted cups and folded 'envelope' ledge handles, are exclusively EB IV. We did not encounter any Byzantine or Islamic sherds, which had been noted in very low numbers during a previous survey (Palumbo 1990: 88). Based on diagnostic rim sherds, 40% of the site assemblage consists of everted and holemouth rim storage jars, 27% are straight sided cups, 15.5% open bowls, 13.5% cookware and 3.5% jugs and pitchers (**Table 4**).

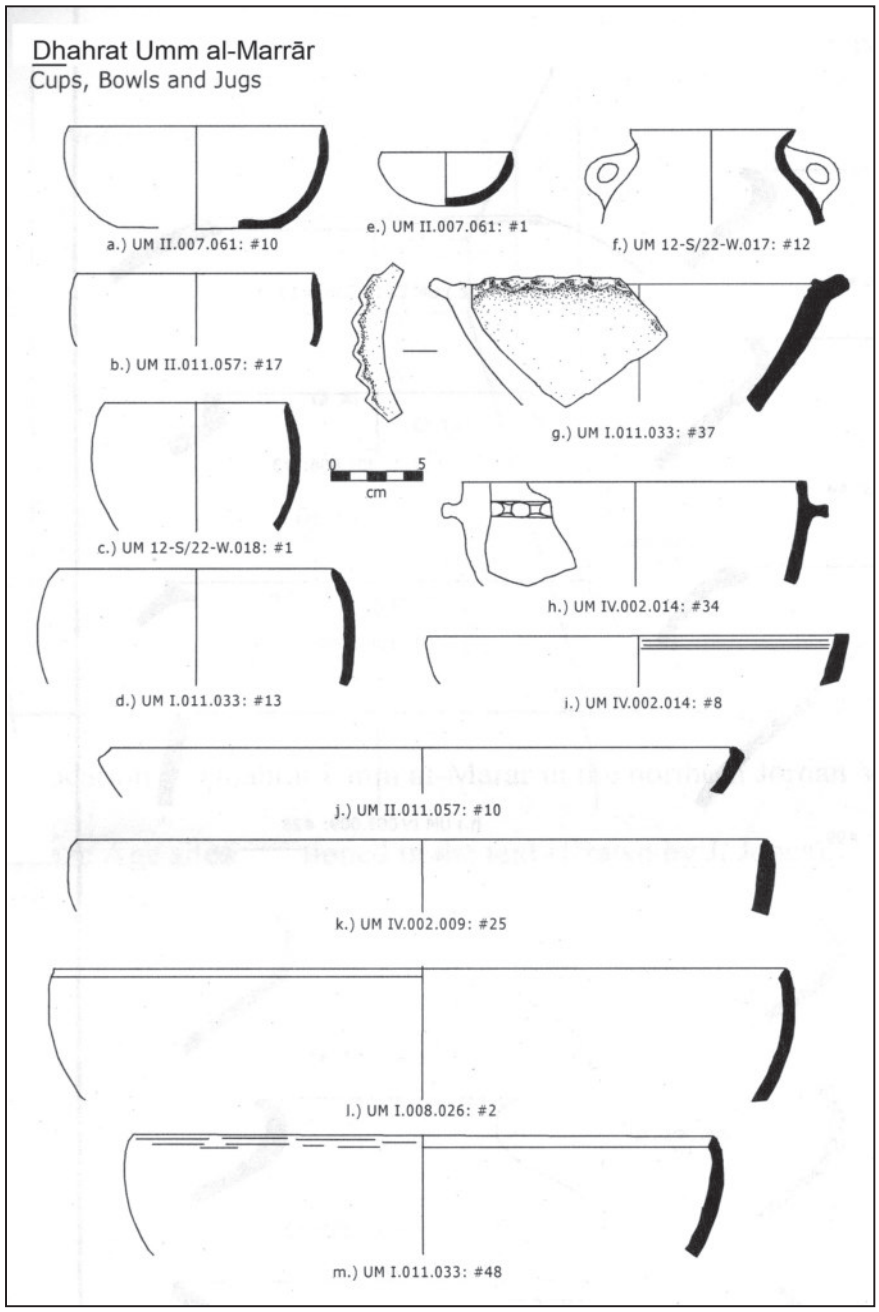
The stylistic characteristics of the vessels in the eastern room within Area II offer a unique opportunity to estimate when during the EB IV period Umm al-Marrār was occupied. In particular, the assemblage includes features considered indicative of the later part of EB IV, such as ledge handles with three or four large 'envelope' folds, as well as everted rim jars with incised, stacked coin and punctuate designs (Palumbo 1990: fig. 27, 2001: 239). An occupational date later in the period is supported further by the relatively high proportion of cups in the assemblage at Umm al-Marrār, which mirrors the frequency of this vessel type in the latest three phases at Tall Abu an-Ni'āj (Czarzasty 2005: fig. 7.4). Trickle painted cups also appear, although in low numbers (5 of 181 cup sherds).

The identifiable faunal specimens include 25 sheep or goat bones, seven pig bone fragments, nine cattle bone fragments, and four canid bones and a possible gazelle bone. The percentage of identifiable bones (32 percent) among the faunal fragments excavated from Umm al-Marrār is consistent with results from other nearby, contemporary villages (**Table 5**). In spite of the relatively large amount of sediment processed for flotation (150 liters) and approximately 48.5 $m^3$ of cultural material sieved, no carbonized plant

**Table 3:** Munsell Colours for Exterior and Interior Surfaces of Pottery Vessels in the Umm al-Marar General Assemblage.

| Figure and sherd | Vessel Type | Colour (Ext / Int) |
|---|---|---|
| Fig. 11a | Cup (Bd) | 5 YR 6/8 - reddish yellow<br>5 YR 7/8 - reddish yellow |
| Fig. 11b | Cup (Bd) | 5 YR 6/6 - reddish yellow<br>Int - obscured |
| Fig. 11c | Cup (Bd) | 5 YR 7/6 - reddish yellow<br>5 YR 8/4 - pink |
| Fig. 11d | Cup (Bd) | 7.5 YR 6/4 - light brown<br>5 YR 6/4 - light reddish brown |
| Fig. 11e | Cup – ad hoc form (Bd) | 5 YR 7/8 - reddish yellow<br>5 YR 7/8 - reddish yellow |
| Fig. 11f | Jug (Ja) | 7.5 YR 6/4 - light brown<br>5 YR 7/6 - reddish yellow |
| Fig. 11g | Open bowl with impressed handle at rim (Bo) | 5 YR 7/6 - reddish yellow<br>5 YR 7/6 - reddish yellow |

| | | |
|---|---|---|
| Fig. 11h | Open bowl with impressed band decoration and lug handles (Bo) | 10 YR 8/3 - very pale brown<br>10 YR 7/4 - very pale brown |
| Fig. 11i | Open bowl with incised lines (Bo) | 10 YR 8/3 - very pale brown<br>10 YR 8/4 - very pale brown |
| Fig. 11j | Open bowl (Bo) | 7.5 YR 7/6 - reddish yellow<br>7.5 YR 8/6 - reddish yellow |
| Fig. 11k | Open bowl (Bo) | 10 YR 8/4 - very pale brown<br>10 YR 8/3 - very pale brown |
| Fig. 11l | Open bowl (Bo) | 5 YR 7/6 - reddish yellow<br>7.5 YR 7/6 - reddish yellow |
| Fig. 11m | Open bowl (Bo) | 2.5 YR 6/6 - light red<br>2.5 YR 6/6 - light red |
| Fig. 12a | Everted rim cooking pot (Cs) | 5 YR 6/8 - reddish yellow<br>5 YR 7/2 - pinkish grey |
| Fig. 12b | Everted rim cooking pot (Cs) | 5 YR 6/6 - reddish yellow<br>7.5 YR 5/4 - brown |
| Fig. 12c | Holemouth cooking pot (Ch) | 5 YR 6/6 - reddish yellow<br>5 YR 5/4 - reddish brown |
| Fig. 12d | Everted rim cooking pot (Cs) | 5 YR 7/8 - reddish yellow<br>5 YR 6/6 - reddish yellow |
| Fig. 12e | Holemouth jar (Jh) | 10 YR 7/4 - very pale brown<br>10 YR 7/4 - very pale brown |
| Fig. 12f | Holemouth jar with punctuate pattern (Jh) | 5 YR 6/8 - reddish yellow<br>5 YR 7/6 - reddish yellow |
| Fig. 12g | Holemouth jar (Jh) | 10 YR 8/4 - very pale brown<br>7.5 YR 8/4 - pink |
| Fig. 12h | Holemouth jar with incised decoration (Jh) | 7.5 YR 8/3 - pink<br>5 YR 7/6 - reddish yellow |
| Fig. 12i | Everted rim jar (J) | 7.5 YR 5/1 - grey<br>10 YR 5/1 - grey |
| Fig. 12j | Everted rim jar (J) | 7.5 YR 6/6 - reddish yellow<br>5 YR 6/6 - reddish yellow |
| Fig. 12k | Everted rim jar with incised decoration (J) | 2.5 YR 6/6 - light red<br>2.5 YR 6/6 - light red |
| Fig. 12l | Everted rim jar (J) | 10 YR 8/3 - very pale brown<br>10 YR 8/2 - very pale brown |
| Fig. 12m | Everted rim jar (J) | 7.5 YR 8/4 - pink<br>7.5 YR 8/6 - reddish yellow |
| Fig. 12n | Everted rim jar with impressed band decoration (J) | 2.5 YR 6/3 - light yellowish brown<br>10 YR 7/2 - light grey |




*11. Cups, bowls and jugs from Dhahrat Umm al-Marrār (vessel form designations adapted from Cole [1984]): (a)-(e) cups (Bd), (f) jug (Ja) and (g)-(m) open bowls (Bo) (drawn by J. Jones, A. Caywood and J. Anders).*

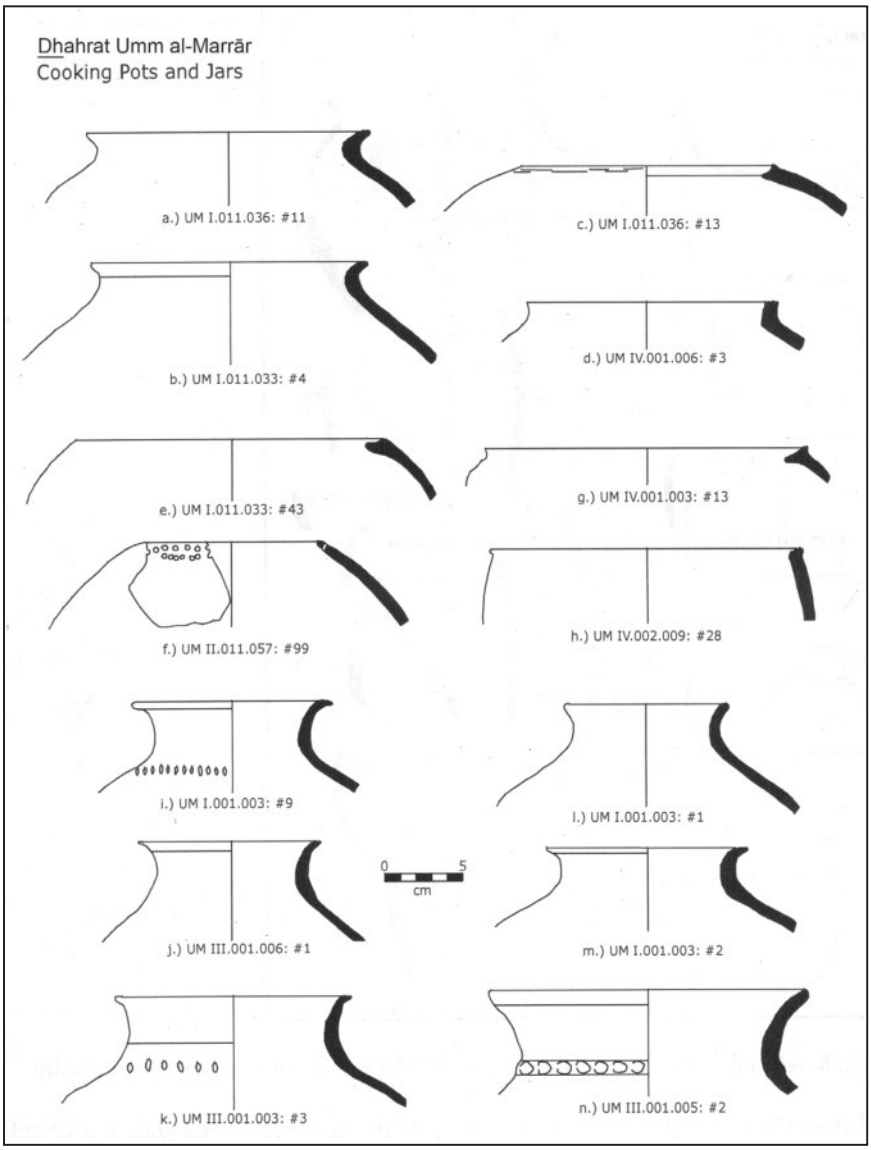
material was recovered, presumably because of the shallow sediments which inhibited organic preservation.

The chipped and ground stone tools and ceramic forms at Umm al-Marrār provide indirect evidence for the harvesting, processing and food storage activities characteristic of an agricultural subsistence regime. The presence of chipped stone sickle blades made on both locally available raw material and non-local high quality chert attests to the harvesting of grains. The ground stone assemblage at Umm al-Marrār consists predominantly of slab and boulder mortars made from fossiliferous chert, silicified limestone, vesicular basalt, fine-grained basalt and sandstone, mirroring the assemblage from Tall Abū an-Niʿāj (**Table 6**).

**Discussion**

*The Enclosure Wall*

The founding of the Umm al-Marrār enclosure wall on deposits containing exclusively EB




*12. Cooking pots and storage jars from Dhahrat Umm al-Marrār (vessel form designations adapted from Cole [1984]): (a)-(b) and (d) everted rim cooking pots (Cs), (c) holemouth cooking pot (Ch), (e)-(h) holemouth jars (Jh) and (i)-(n) everted rim jars (J) (drawn by J. Jones and J. Anders).*

IV material culture supports a late 3rd millennium date for this feature. Its width far exceeds the dimensions of the domestic structures at the site or pastoral enclosures from other sites, and its location augments a naturally defensible hilltop position. The large stones in the founding course at Umm al-Marrār suggest that it could have supported a superstructure of substantial height. At Khirbat Iskander, a layer of small rocks in a shallow foundation trench still supported an eleven course stone wall to a height of at least three meters (Richard and Boraas 1988: 110). Thus, the Umm al-Marrār wall defines one of the few EB IV walled enclosures in the southern Levant, in contrast to numerous examples of Early Bronze II - III defensive systems. Other enclosure walls have been identified via survey at predominantly EB IV Jabal Rāḥīl, Khirbat Umm Rujum and ar-Raṣayfah, but Umm al-Marrār provides a rare example of an excavated EB IV settlement enclosure. Using a common Near Eastern estimate of 250 people per hectare, nearly 100 people may have lived within the enclosure wall at Umm al-Marrār, while a maximum of about 800 could be inferred from the 3.30 ha extent of the sherd scatter.

The walled village of Umm al-Marrār was contemporary with the longer occupied and unfortified village of Tall abū An-Niʿāj, which contains seven EB IV architectural phases within 3.5 meters of cultural deposits. As Palumbo notes (2001: 242), the EB IV landscape incorporated a

**Table 4:** Diagnostic Rim Sherd Counts and Frequencies from Dhahrat Umm al-Marrār (Vessel Form Typology Based on Cole [1984]).

| Ceramic Type | Count | Percent[1] |
|---|---|---|
| *Cups* | | |
| Bd – Straight Sided Cups | 181 | 27% |
| *Bowls* | | |
| Bo – Open Bowls | 98 | 15% |
| B - Indeterminate | 3 | 0.5% |
| *Cooking Pots*[2] | | |
| Cs – Everted Rim | 53 | 8% |
| Ch – Holemouth Rim | 36 | 5% |
| C – Indeterminate | 3 | 0.5% |
| *Storage Jars* | | |
| J – Everted Rim | 238 | 36% |
| Jh – Holemouth Rim | 28 | 4% |
| *Jugs* | | |
| Ja – Loop handled jugs, short necks | 11 | 2% |
| Jb – "Bottle necked" Jugs | 2 | 0.5% |
| Jg - Pitchers | 7 | 1% |
| Total | 660 | 99% |

1. Percentages may not add up to 100% due to rounding.
2. Cooking pots are characterized by dispersed, large, angular inclusions, including calcite and basalt, and a red-dish-brown-orange paste color.

**Table 5:** Animal Bone Frequencies from Dhahrat Umm al-Marrār Compared to Assemblages from Early Bronze IV Tall Abū an-Ni'āj and Middle Bronze II Tall al-Ḥayyat[1].

| Bone Frequencies (%) | | | |
|---|---|---|---|
| Animal | Umm al-Marrār | Tall Abū an-Ni'āj(1) | Tall al-Ḥayyat(1) |
| Sheep / goat | 55.6 | 55.5 | 54.5 |
| Pig | 15.6 | 30.9 | 20.8 |
| Cattle | 20.0 | 13.0 | 10.4 |
| Wild taxa | 8.9 | 0.6 | 14.3 |

1. Data from M. Metzger published in Falconer *et al.* 2004. NISP: Umm al-Marrār = 43, Tall Abū an-Ni'āj = approximately 15,000, Tall al-Ḥayyat = 12,798 for domestic contexts only.

**Table 6:** Comparison of Ground Stone Tool Assemblages from Dhahrat Umm al-Marrār and Tall Abū an-Ni'āj[1]

| Tool Types | Umm al-Marrār | Tall Abū an-Ni'āj |
|---|---|---|
| Slab Mortar | 44 (76%) | 38 (45%) |
| Boulder Mortar | 6 (10%) | 12 (14%) |
| Bedrock Mortar | 2 (3%) | 0 (0%) |
| Trough Mortar | 2 (3%) | 0 (0%) |
| Composite Mortar | 0 (0%) | 3 (4%) |
| Hand stone | 1 (1%) | 8 (9%) |
| Pestle | 0 (0%) | 1 (1%) |
| Indeterminate[2] | 3 (5%) | 23 (27%) |
| Total[3] | 58 (98%) | 85 (100%) |

1. Data provided by Jane D. Peterson. Most of the ground stone tools from Umm al-Marrār come from surface contexts, while those from Tall Abū an-Ni'āj are from excavation units. Hammer stones enumerated separately.
2. The larger number of indeterminate implements at Umm al-Marrār is because of the number of broken tools in this assemblage.
3. Percentages may not add up to 100% due to rounding.

variety of fortified and unfortified settlements, including some in naturally defensible positions, often in close proximity. Other unfortified sites around Umm al-Marrār include Tall Umm Ḥammād and possibly Khirbat al-Ḥammih. Nearby Tall Rās Ḥāmid is unfortified, but is located on a steeply sloped hilltop overlooking the Jordan valley.

Building on the proximity of fortified and unfortified settlements, Palumbo proposes that Umm al-Marrār and the potentially fortified sites of Jabal Rāḥīl, Khirbat Umm ar-Rujum and ar-Raṣayfah formed a defensive border between people living in fertile agricultural areas of the Jordan valley and (presumably) more pastoral people living in arid lands to the east. An evaluation of this border hypothesis would benefit from more details on the extent to which these walls were in use at the same time. For example, while the wall at Umm al-Marrār appears to date to late EB IV, the Khirbat Iskander enclosure went out of use prior to the latest period of occupation at the site (Richard 1990: 37). Nonetheless, the contemporaneity of occupation at Umm al-Marrār and lowland sites like Tall Abū an-Ni'āj indicates that fortified sites served localized defensive needs in the northern Jordan valley at the end of EB IV, perhaps as part of a broader regional matrix of walled and unwalled villages and hamlets.

*Domestic Architecture and Pottery*

A combination of rectilinear structures, the robust construction of the central building and the presence of pig bones suggests a sedentary occupation at Umm al-Marrār. This site thus joins a growing corpus of excavated sedentary EB IV sites from Jordan (Falconer, Fall, Metzger and Lines 2004). The distribution of architecture and differing investments of effort in its construction add greater detail to the domestic history of Umm al-Marrār. For example, architecture in Units 2, 4, 5 and the southern habitation area show domestic occupation both inside and outside the enclosure wall. Similarly, the more substantial construction of the walls in the central building illustrates a degree of architectural variability within the domestic structures.

The shallow deposits at Umm al-Marrār support the inference of a relatively short-term

occupation of this hilltop settlement. The intensity of occupation – judging from the depth of archaeological sediments – varied across the site, with shallow 10cm deposits to the north contrasting with deeper sediments and multiple phases of occupation preserved in 60cm of cultural deposits along the southern side. Close examination of intrasite deposition reveals an array of formation details within this time span, *viz*. differing intensities of occupation across the site, secondary deposition within abandoned structures and the remodeling of domestic spaces. In keeping with ethnographic studies, similar densities of rim sherds within the central building (20.53 per $m^3$) and in the midden (17.61 per $m^3$) suggest that people dumped garbage into this structure after it went out of use (Kamp 2000: 91). In contrast, the sherd density in loci immediately adjacent to the central building is 9.74 per $m^3$, suggesting unintentional deposition. The two phases of architectural construction in Area II allow us to see the dynamic creation, use and extensive remodeling of domestic spaces. For example, the occupation of Umm al-Marrār lasted long enough for people to install and then build over potentially long-lived features, such as the boulder and bedrock mortars of Phase 1 in the southern habitation area.

The relative frequencies of serving, storage and food preparation vessels in the pottery assemblages from two phases at nearby Early Bronze III Tall al-Ḥandaqūq South (Ḥandaqūq) and from three Middle Bronze Age phases at Tall al-Ḥayyāt provide a comparative framework for understanding changing Bronze Age village behaviors in the northern Jordan valley (**Table 7**). At al-Ḥandaqūq, a slight decline in the percentage of serving vessels is offset by modest increases in storage and food preparation vessels (Chesson 2000). At Tall al-Ḥayyāt, storage vessels predominate in the later three phases over generally consistent percentages of food preparation vessels and an increasing percentage of serving vessels (Falconer and Fall 2006).

An increase in storage vessels with tall necks and constricted openings is seen in the ceramic assemblages from all three sites. This form is appropriate for the long-term preservation of dry grains, fruits, legumes and liquids (Falconer 1995: 413; Joffe 1993). The increase in storage vessels as a percentage of the assemblage implies a greater investment of labor devoted to harvesting, processing and storage of these foods. The impact on household labor allocation and seasonal scheduling extends beyond the agricultural realm to ceramic production as well. As the tallest vessels in the assemblage, these jars would require more clay to construct than other forms, material that would need to be gathered, cleaned and tempered. Ethnographically, seasonal variation in temperature and humidity may delay some stages of pottery production. The steady ambient temperature needed to dry pots slowly before firing can limit vessel construction to warmer times of the year, rather than wet or dry ones (Arnold 1985: 71-77). To meet the increased demand for storage vessels, potters at Umm al-Marrār could have allocated more of their time to production, more people may have made vessels, or non-potters could have assisted with stages of production, such as gathering or preparing clay.

At Tall al-Ḥayyāt, the ratio of long-term to short-term storage vessels declined through the Middle Bronze Age (Falconer 1995: 413). Short-term food storage vessels have wide openings, in contrast to the constricted neck forms. At Umm al-Marrār, only 28 of 266 jar sherds represent ceramic forms with wide openings (**Table 4**). The low number of open storage forms relative to closed forms suggests that much of the agricultural output of Umm al-Marrār may have been stored, traded or consumed off-site. Several compositional studies provide data that support the local exchange of ceramics produced at Umm al-Marrār. For example, five jars produced at Umm al-Marrār were transported to Rās Ḥāmid, a 2 ha settlement in the mountains 4 km to the north-east (Jones 1999: table 9.4, 176) (**Fig. 1**). Another study identified two traded vessels, a cup and a jar, produced at Umm al-Marrār that were found at Tall Abū an-Niʿāj and Umm Ḥammād al-Gharbī respectively (Falconer 1987: 256).

The higher relative frequencies of serving vessels at al-Ḥandaqūq and Umm al-Marrār (64 to 76% of the analyzed ceramic assemblage) point to an emphasis on communal food preparation and consumption as an aspect of domestic life during the Early Bronze Age (**Table 7**). Most notably at Umm al-Marrār, sherds from straight-sided cups dominate the serving vessel

**Table 7:** Comparison of Serving, Storage and Food Preparation Vessel Frequencies from Dhahrat Umm al-Marrār, Tall al-Ḥandaqūq South and Tall al-Ḥayyat[1] (counts and % data shown where possible).

| | Serving[2] (bowls, cups, jugs) | Storage (constricted neck) | Food Preparation (cooking pots, open mouthed jars) |
|---|---|---|---|
| Tall al-Ḥayyat (Middle Bronze II - Phase 3) | 39% | 35% | 26% |
| Tall al-Ḥayyat (Middle Bronze II - Phase 4) | 23% | 50% | 27% |
| Tall al-Ḥayyat (Middle Bronze II - Phase 5) | 21% | 58% | 22% |
| Umm al-Marrār (Early Bronze IV) | 46%<br>302 | 36%<br>238 | 18%<br>120 |
| Tall al-Ḥandaqūq South (Early Bronze III - Phase IV) | 37%<br>201 | 26%<br>142 | 36%<br>197 |
| Tall al-Ḥandaqūq South (Early Bronze III - Phase III) | 42%<br>173 | 24%<br>97 | 34%<br>140 |

1. Two special use vessels from Tall al-Ḥandaqūq are excluded from this comparison because they have no EB IV parallels. The designation of serving, storage and food preparation vessels follows Chesson's schema (2000: 375) to facilitate comparison.
2. We adapted Cole's pottery typology to designate serving vessel forms B, Bd, Bo and all jugs. Storage vessels include constricted neck form J. Food preparation vessels include forms C, Cs, Ch and Jh. Holemouth jars (Jh) from Tall al-Ḥayyat are included in the storage category.

category (181 of 302 sherds). Based on their relatively small size and open form, we may imagine that people consumed individual servings of food or liquid from these vessels. The presence of so many cups at Umm al-Marrār points to the possibility that the consumption of small, individual servings had an enhanced role within the broader social milieu of Early Bronze IV. Eating together, whether from larger bowls or small cups, would have allowed people to establish or maintain social ties strained by the social dislocations arising from the Early Bronze III and IV population disaggregation.

*The Subsistence Economy*

Umm al-Marrār's geographic position close to the Jordanian foothills raises the possibility that subsistence exploitation at this settlement differed from the economies of villages located closer to the Jordan River. However, the relatively modest animal assemblage has a taxonomic profile very similar to that of Tall Abū an-Ni'āj, with a majority comprised of sheep / goat, plus some cattle and pig. Although pig bones are less frequent than at Tall Abū an-Ni'āj, this faunal profile clearly indicates that the households at Umm al-Marrār practiced sedentary farming in the fields around their hilltop village, possibly supplemented by local gazelle hunting. Abundant ground stone and debitage from locally available basalt, chert and limestone suggest that Umm al-Marrār's households produced expedient plant-harvesting and processing implements as components of their subsistence technology.

**Umm al-Marrār and the Early Bronze IV Period**

The pastoral nomadism attested to by the architecture and artifacts from hundreds of sites in the Negev and Sinai exemplifies the mobile component of Levantine society in the late 3rd millennium BC (see e.g. Cohen 1992; Cohen and Dever 1979, 1981; Palumbo 1990). The deep

stratigraphy at sites such as Tall Abū an-Ni'āj and Khirbat Iskander highlights contrasting examples of long-term occupation. Settlement continuity and the repeated division of domestic space over time is also seen by walls that persist through several architectural phases at Tall Abū an-Ni'āj (Czarzasty 2005). Any simple dichotomy of short-term occupation at pastoral sites and long-term habitation at agricultural sites is, however, belied by the presence of sites like Umm al-Marrār. Here, a combination of shallow deposits, domestic architecture, ceramic forms and fauna associated with agricultural subsistence attests to the movement of farmers over the landscape as they established new villages or moved into pre-existing ones. This evidence accords with the larger regional pattern of settlement establishment and abandonment in which 50% of EB IV settlements, both pastoral and farming ones, have no prior Early Bronze Age occupation (Palumbo 1990: fig. 11).

The rural community at Umm al-Marrār, though modest in size, participated in a diverse set of productive and subsistence activities that reinforced local and regional connections. For example, Umm al-Marrār's chipped stone assemblage includes tools made from both local and non-local materials. Based on the percentages of serving, storage and food preparation vessels, residents also devoted a substantial portion of their ceramic technology to long-term food storage and possibly to trade with nearby lowland villages. The balance of the pottery assemblage primarily includes serving vessels, suggesting the importance of food consumption in communal settings. A diverse set of contacts across a variety of environmental settings is reflected by the exchange of pottery with sites in the mountains to the east, as well as along the Jordan River to the west.

Dhahrat Umm al-Marrār provides invaluable comparative evidence for reconstructing Bronze Age rural society after the abandonment of larger Levantine towns in the late 3rd millennium BC. The architecture, features and artifacts from this settlement reflect a sedentary agrarian community engaged in food production and storage. The enclosure wall at Umm al-Marrār highlights the existence of easily defensible settlements within a larger suite of unfortified EB IV communities in the Jordan valley. These features thus mark points of continuity with the Early and Middle Bronze Ages, and emphasize the household and community adjustments used to cope with sociopolitical changes during a time of regional population disaggregation.

**Acknowledgements**

We would like to acknowledge the gracious assistance of the Department of Antiquities of Jordan, in particular its former Director-General Dr Ghazi Bisheh. We are thankful for the efforts and commitment of our field crew, including our Department of Antiquities Representative Mr Muhammad Abu Abileh, Caroline P. Davies, James D. Eighmey, Said Ennahid, Steve Schmick and several local Jordanian workmen, all of whom contributed greatly to the successful completion of the 1996 / 97 excavations at Dhahrat Umm al-Marrār. This fieldwork was funded by research grants from the National Science Foundation (Grant #SBR 96 00995), the National Geographic Society (Grant #5629-96) and the Wenner-Gren Foundation for Anthropological Research (Grant #6006). We thank Jane Peterson for the analysis of the Umm al-Marrār ground stone assemblage. Students in a Near Eastern Archaeology seminar at Franklin and Marshall College coded the vessel types in the ceramic assemblage.

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# THE ‘AYN GHARANDAL ARCHAEOLOGICAL PROJECT: A PRELIMINARY REPORT ON THE 2010 AND 2011 SEASONS

*Robert Darby, Erin Darby, with a ceramic report by Tiffany Key and Pamela Koulianos*

## Introduction

The site of ‘Ayn Gharandal lies *ca.* 100km north of the Gulf of ‘Aqaba, *ca.* 40km southwest of Petra and *ca.* 200m west of the mouth of Wādī Gharandal, on the eastern edge of the Wādī ‘Arabah (GPS N 30°05.187’, E 35°12.209’). Although the site has been visited by modern explorers (Frank 1934: 231-32; Glueck 1935: 39-40; Musil 1907: 193-97; Woolley and Lawrence 1915: 14-15) and archaeologists (Raikes 1985: 101; King *et al*. 1989: 207; Smith *et al*. 1997: 59-60; Henry *et al*. 2001: 1-19; Gibson 2007), the ‘Ayn Gharandal Archaeological Project (AGAP) has collected the first stratified materials to date. At present, the AGAP has recorded the ruins of a Late Roman *castellum*, bathhouse and aqueduct system, as well as other unidentified structures to the west of the fort, to the south of the bathhouse and on the rocky cliff overlooking the *wadi* system on the east side of the site.

It has long been believed that the name Gharandal is derived from *Arieldela* listed in the *Notitia Dignitatum* (*Or.* 34.44) as the location of the *Cohors II Galatarum* (Musil 1907: 195, n. 20). It also appears in the Beer Sheva Edicts as *Ariddela* (frag. V, line 5). Alternately, it has been argued that Gharandal in the southern Ghawr is a more likely candidate for *Ariddela* (Walmsley 1998: 433-41). A total lack of any evidence from ‘Ayn Gharandal confirming its identification leaves the ancient name of the place and the unit garrisoned there a matter of scholarly speculation.

Following the completion of the 2009 survey (Darby, Darby and Shelton 2010: 189-201), the AGAP carried out two seasons of excavations in 2010 and 2011.[1] The 2010 season focused on three squares (A:6/4; A:3/7; C:1/7) in the presumed Late Roman *castellum* and two squares (D:6/12; D:6/13) in the nearby *auxiliary* bathhouse situated *ca.* 60m east of the fort **(Fig. 1)**. Owing to the substantial amount of collapsed mudbrick and stone debris, we were unable to reach occupation layers in the fort during the 2010 season. However, excavations in the bathhouse in 2010 yielded a wealth of data and numerous unexpected finds. In 2011, we resumed excavation in the *castellum* and two sondages were completed in portions of two squares (B:1/1; B:2/1) along the east curtain wall in an effort to identify the main gate. In addition, we collected ceramic materials from the surface of Area D1, which overlooks the *wadi* system. The following report offers a brief synopsis of the findings from these areas and our initial interpretations of the data collected in 2010 and 2011 at ‘Ayn Gharandal.

## Research Agenda

The ‘Ayn Gharandal Archaeological Project (AGAP) seeks to contribute to our understanding of Jordan’s rich and diverse cultural heritage through documentation and publication of the archaeological materials and site of ‘Ayn Gharandal in Wādī ‘Arabah. Our long term project goals are as follows: (1) investigate the occupational history

1. The AGAP would like to thank the following institutions and persons for their continued support: the Department of Antiquities of Jordan, the American Center of Oriental Research, the ACOR Conservation Cooperative, the American Schools of Oriental Research, Dr Barbara Porter (Director of ACOR), Dr Christopher Tuttle (Associate Director of ACOR), Dr S. Thomas Parker (North Carolina State University), Dr John Oleson (University of Victoria) and Jihad Haroun, Rula Qussous, Dr Sawsan Alfakhry and Khalil Hamdan of the Jordanian Department of Antiquities.


*1. 2010 site plan with squares.*

of the site from the Nabataean to Early Islamic periods by means of systematic archaeological excavations and study seasons, (2) map and record its architectural remains using state-of-the-art technology, including both GPS and GIS, for inclusion in the MEGA-Jordan Database, (3) collect, analyze and publish the material culture recovered at the site and (4) preserve and protect the site and its ruins for future generations.

**Excavation Strategy for the 2010 and 2011 Seasons**

From the data collected in the 2009 survey, seven specific squares from three areas were selected for the initial season of excavations in 2010.[2] Two squares within Quadrant A (A:6/4; A:3/7) and a third in Quadrant C (C:1/7) are associated with the remains of the *castellum*, two lie in the ruins of the bath complex in Quadrant D (D:6/12; D:6/13) and the final two are located near what was thought to be a possible domestic structure, also in Quadrant D (D:11/7; D:12/7). The squares associated with the Domestic Structure area were closed almost immediately because the walls identified in 2009 proved to be the remains of modern bulldozing. Overall,

2. The 2010 season began on 7 June and ended on 27 June, consisting of one week of survey and topographical mapping, and two weeks of excavation. The personnel for the 2010 season included Robert Darby (University of Tennessee) and Dr Erin Darby (University of Tennessee), the project co-directors; Fawwaz Ishakat (Hashemite University) was the surveyor. The 2010 DoA representative was Abdullah Rawashda. The area supervisor for the fort was Dr Carrie Duncan (University of Missouri - Columbia), who supervised excavation in squares C:1/7 and A:3/7. Dr Byron McCane (Wofford College) was the square supervisor for A:6/4 and A:6/3, which were also opened in the fort. Robert Darby was the area supervisor for the bathhouse and oversaw excavation in squares D:6/13 and D:6/12. Finally, Dr Jennifer Ramsay (SUNY Brockport) had intended to oversee excavation in the possible domestic structure in squares D:11/7 and D:12/7 but was not able to work in the field due to injury. Dr Ramsay is also the team's archaeobotanist. Other field workers included nine *bedouin* as well as 26 students from Duke University, North Carolina State University, Elon University, Wofford College, State University of New York at Brockport and the University of British Columbia. Erin Darby directed the archaeological lab in 'Aqaba. Andi Shelton (independent scholar) performed the ceramic field readings at the close of the season, Dr Alysia Fischer (University of Miami - Ohio) performed the initial analysis of the glass, and Naif al-Zabin (American Center of Oriental Research) and Fatma Marii (Jordan Museum) conserved the site's coins and plaster *graffiti*.

squares were chosen based upon their potential for revealing important information about the construction, use and function of the structures contained within each area, as well as the nature and depths of the stratigraphic deposits at the site. In addition to excavation, we generated a 3D topographical map of the site **(Fig. 2)**.

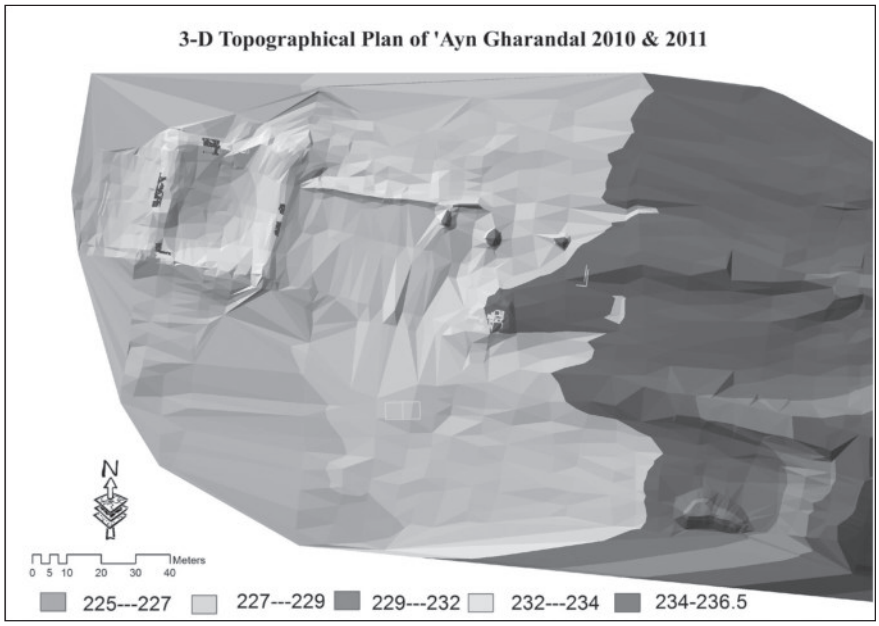
In 2011, three squares from the fort were the focus of the field season.[3] The three squares are within Quadrants A and C (A:6/4; A:3/7; C:1/7) and are associated with the remains of the *castellum.* These squares were started in 2010 and reached bedrock in 2011. In addition, two small probes were excavated (in B:1/1 and B:2/1) to ascertain whether the fort's gate was located in the east curtain wall. Finally, structures on the rocky outcrop overlooking the *wadi* system (Area D1) were surveyed in preparation for future excavation **(Fig. 3).**

## Results from the 2010 and 2011 Seasons

*The Late Roman Military Bathhouse*

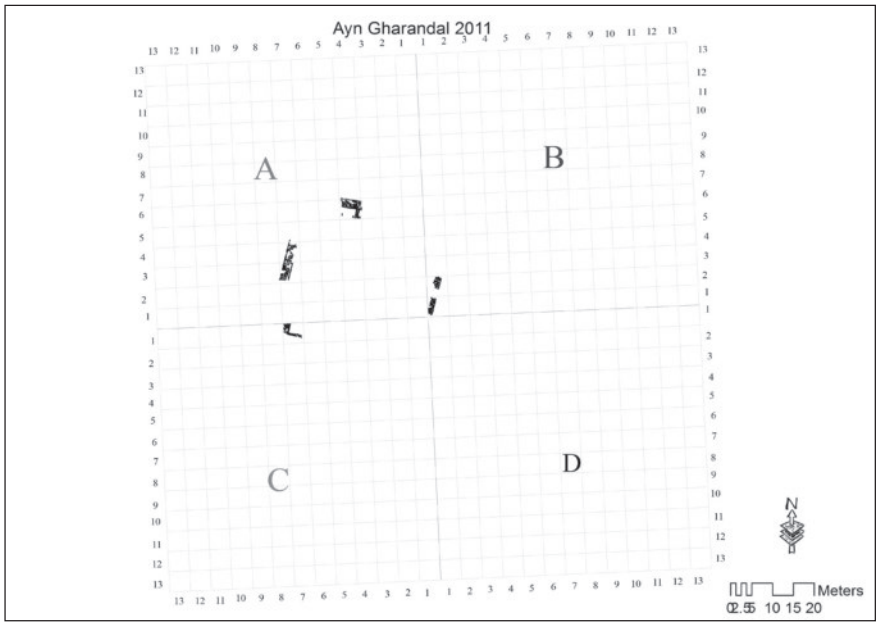
Excavation of square D:6/13 revealed two heated rooms of the bathhouse that had been partially exposed by looters. Recorded in the 2009 survey as the South and North Rooms, we can now securely identify the former as the *caldarium,* or hot room, and the latter as the *tepidarium,* or warm room. In addition, a third room was discovered adjacent to the North Room and probably served as the *frigidarium*.

Investigation of the South Room *(caldarium)* revealed that the recessed heating pipes (*tubuli*) were still intact in its east and north walls




*2. 3D topographic map of 'Ayn Gharandal.*

3. The 2011 season began on 30 June and ended on 28 July, consisting of four weeks of excavation and an additional surface survey. The personnel for the 2011 season included Robert Darby (University of Tennessee) and Dr Erin Darby (University of Tennessee), the project co-directors; Fawwaz Ishakat (Hashemite University) was the surveyor. The area supervisor for the fort was Dr Carrie Duncan (University of Missouri - Columbia), who directed excavation in square C:1/7. Craig Harvey (University of Victoria) was the square supervisor for A:6/4 in the fort. Abigail Turner (University of Texas-Austin) oversaw excavation in A:3/7 in the fort. Finally, Robert Darby directed excavation in the two test probes along the east curtain wall (B:1/1; B:2/1). Other field workers included 10 *bedouin* as well as two students from the University of North Carolina - Chapel Hill and Carleton College. Erin Darby directed the archaeological lab in Aqaba, and Tiffany Key and Pamela Koulianos (North Carolina State University) performed ceramic analysis. Following the field season, conservation of the coins, metal artifacts, pottery and plaster was completed by Naif al-Zabin (ACOR Conservation Cooperative, American Center of Oriental Research), preliminary analysis of epigraphic finds was begun by Dr Christopher Rollston (Emmanuel Christian Seminary) and analysis of the metal artifacts was completed by Dr Stephanie Hoss (Small Finds Archaeology). The site's archaeobotanical material is currently under investigation by Dr Jennifer Ramsay (SUNY Brockport) and the zooarchaeological materials are being analyzed by Dr Austin Hill (University of Connecticut). Finally, Dr Alysia Fischer (University of Miami - Ohio) is examining the glass finds and Dr Nathan Elkins (Baylor University) is analyzing the numismatic materials.




*3. Site grid with 2011 excavation squares.*

**(Fig. 4)**. We also uncovered a large plastered concrete fragment from the east wall containing at least two partial lines of Greek text and a *graffito* of a seated camel. Two additional *in situ* Greek *graffiti* were found adorning the east and west walls of the South Room. The delicate nature of these finds indicated that the South Room had not been exposed by looting as was previously thought (Darby, Darby and Shelton 2010: 189-201). Thus, excavations were halted before reaching floor level in an effort to preserve the inscriptions.

Clearing the North Room (*tepidarium*) of the bath complex confirmed that it had been looted to the level of its finely paved floor, a fact made apparent by the discovery of a large hole ripped through to the sub-floor hypocaust system, as well as several modern objects at floor level, including a juice box, a rusted road sign and a large metal pipe. Despite the looting, the majority of the North Room remains remarkably intact. All four of its walls are still partially retain their original plaster and contain numerous *in situ* heating pipes (*tubuli*). The walls (*ca.* 1m wide) are constructed of roughly hewn blocks bonded with concrete and survive to *ca.* 3m in height. In addition, the east and west walls are topped with two courses of finely cut ashlars from which once sprang a barrel vault **(Fig. 5)**.

Moreover, excavation also brought to light the full extent of two doorways that had been recorded previously at the level of their lintel stones (Darby, Darby and Shelton 2010: 189-201). One connects the North Room to a room lying to its west and the other connects the North and South Rooms. The presence of a door jamb in each of

*4. South Room / caldarium of the bathhouse with in situ tubuli, facing east.*

*5. North Room / tepidarium of the bathhouse, facing south.*

the doorways indicates the North Room could be closed off from the other two rooms, presumably to control the temperature of each **(FIG. 6)**. Thus, the South Room, with only one doorway, was in all probability the *caldarium*, while the North Room functioned as the *tepidarium*, a fact further illustrated by its connection with the unheated West Room.

*6. Door jamb and post with copper hinge in doorway between tepidarium and frigidarium.*

Only a small part of the West Room was uncovered in the 2010 season **(Fig. 7)**. The room was not visible in the 2009 survey, although we had observed that the wall separating the North and South Rooms continued to the west of the bathhouse. Excavation confirmed the presence of this West Room, which was – thankfully – spared from the looters. The identification of this room as the *frigidarium* is confirmed by the absence of *tubuli* in the walls and the presence of heavy paving stones that differentiate its floor from the suspended floor of the *tepidarium*.

Excavation of square D:6/12 uncovered a series of contiguous plastered mudbrick and stone walls forming the north, east and west walls of a rectangular shaped room that stands immediately south-west of the heated rooms of the bathhouse. The room featured an exceptionally well-preserved paved stone floor surrounded on the north and west by a channel, 0.75m in depth and 0.50m in width, with a drain on either end. The form follows the typical plan of a Roman *latrina*. Moreover, the *in situ* plaster lining the north and west walls appears to have extended to a uniform level, *ca.* 0.5m above the drainage channel, suggesting that a wooden installation, perhaps a multi-seat toilet bench, once adorned the room (**Fig. 8)**. The location of the latrine adjacent to the *balneum* probably allowed the latrine to make secondary use of water exiting the bath. Additional walls of the bath complex were also revealed immediately north of the latrine; these walls comprise at least two more rooms whose functions are, as yet, unknown.

*Special Finds from the Bathhouse:* Graffiti *and* Tubuli

Graffiti

While the architecture of the bath and its hypocaust system was exciting, one of the most important discoveries of the 2010 season was a corpus of well-preserved charcoal *graffiti* found *in situ* adorning the walls of the bathhouse; additional fragments were recovered from the surrounding debris. The discovery of the *graffiti* came first from the South Room or *caldarium*. The large fragment of plaster and concrete bearing the *graffito*, which apparently broke off from the east wall of the South Room, measures slightly less than a meter long and a half meter at its widest. It contains at least two partial lines of Greek text, which are currently under analysis, and a partially preserved zoomorphic figure.

*7: West Room / frigidarium of the bathhouse, facing south.*

*8. The latrina facing north.*

Based upon the distinctive rendering of the hind leg and foot, the image is clearly intended to represent a dromedary, possibly indicating the function of the site as a caravan stop **(Fig. 9)**.

Between the North and South Rooms, the west interior face of the doorway also contained a faded but discernible depiction of an ancient boat. The vessel is shown with its bow facing left and at a slightly upturned angle. It has a large triangular sail and what seems to be a small flag or sail extending right from the top of its mast **(Fig. 10)**. The hull of the ship is that of a traditional Roman sailing vessel with a curved prow and stern. In addition, two long rudders extend outward. Like the camel image, the boat may also be associated with the important role that the site played in the Late Antique regional trade network that transported imported goods between the ports at Ayla and Gaza by means of camel caravans running along Wādī ʻArabah.

The largest group of *graffiti* was found in the West Room / *frigidarium*. Excavation of this room uncovered two complete lines of an *in situ* Greek inscription flanking the doorway, several other faint or partial Greek texts and at least five additional figural *graffiti*, depicting both humans and animals. The *graffiti* decorate the small plastered wall to the south of the doorway leading to the Northern Room and are found at varying heights. Two naked human figures, one possibly


*9. Graffito of seated camel from the South Room / caldarium.*

*10. Graffito of Roman sailing vessel from doorway between tepidarium and caldarium.*

holding a strigil, appear on the lower portion of the wall. Next to them a possible Chi Rho is flanked by an additional as yet unidentified object / figure, while a schematized camel, a detailed fish and a possible ostrich are also present on the wall. To the north of the doorway, additional text can be seen emerging from the baulk. The south wall of the West Room also depicts two anchors and a circular emblem, along with an additional line of Greek text. At present all textual and figural *graffiti* are in the process of analysis for future publication.

Tubuli

Large numbers of *tubuli*, both fragmentary and complete, were recovered from the bathhouse in 2010. These consisted of two broad types: rounded rectangular / oval *tubuli* with thumb-hole perforations and round pipes more commonly associated with hydraulic installations **(Figs. 11 - 12)**. In addition to the excavated materials, both types of *tubuli* were found *in situ* lining the walls of the two heated rooms. The *tepidarium* appears to have been fitted primarily with the round 'water pipe' variety, while the *caldarium* featured the more traditional oval version. The reason for this choice remains unclear. Further study of the *tubuli* from 'Ayn Gharandal may shed light on this and other questions.

*The Late Roman Castellum*

In 2010, three squares (A:6/4; A:3/7; C:1/7) were opened in the *castellum*, which were completed during the 2011 season. Owing to the large deposits of wind-blown sand, squares were initially laid out at 5x5m; 0.5m balks were retained after clearing the first 0.5m of sand. Owing to the extensive mudbrick collapse and sand deposits, as well as the shorter season in 2010, we did not reach substantial occupation levels until 2011.

*11. Rounded rectangular / oval heating pipe with thumb-hole perforation recovered from the bathhouse in 2010.*

*12. Round heating pipe of the 'water pipe' variety recovered from the bathhouse in 2010.*

That having been said, at the very end of the 2010 season we identified the remains of a later cist burial. In 2011, this burial proved to be one of several burials located along the west wall of the fort **(Fig. 13)**. In fact, one such burial cut through the north baulk of square A:3/7, which required us to open the adjacent square (A:4/7) in order to excavate the body properly. In the process of excavating the burial visible in the balk, we uncovered yet two more burials in A:4/7, giving a total of five burials from the 2010 and 2011 seasons combined. The burials vary in size and dimensions, but all were poor in grave goods, with the exception of one burial shroud. Most of the bodies lie on their right sides facing south - southeast and seem to reflect various times and ages of death. The lack of consistency in burial technique and spatial organization indicates the bodies were probably not interred as part of a planned cemetery but were the results of separate *ad hoc* burials associated with this general area.

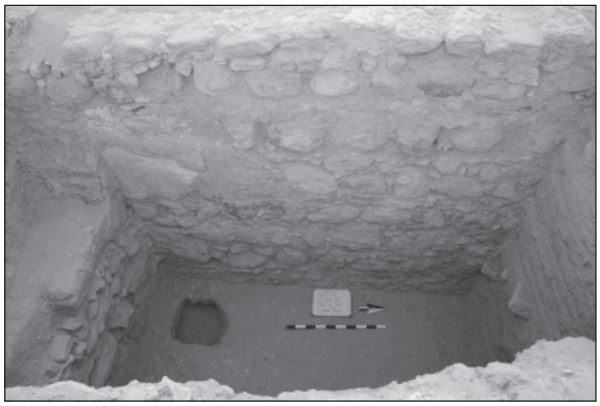

*13. Later cist burial from square A: 3/7 excavated in 2010.*

Aside from the later burials, the majority of data from the excavation relate directly to the Roman and Byzantine periods. We were able to ascertain the entire depth of the deposits inside three of the four curtain walls (north, west and south). Moreover, we were able to record the full measurements for the north, west and south curtain walls, which were preserved to *ca.* 3m in height and *ca.* 2m in width. They are made of a rubble and mud core with alternating boulder and chink facing courses that rest on stone socles *ca.* 0.1-0.2m wider than the walls. The stone walls appear to have been topped with mudbrick, which may have stood at a much higher elevation to judge from the amount of collapse excavated in the 2010 and 2011 seasons.

Additionally, we identified interior partition walls in two of the three squares (A:6/4; A:3/7), confirming that rows of rooms lined the fort walls and faced onto an open courtyard, as is common in other Late Roman *castella*. The partition in A:6/4 consists of mudbrick resting on a short stone socle only a few courses in height, while that in A:3/7 is a more substantial stone wall topped by mudbrick **(Figs. 14-15**). In both squares, the partition walls survive to approximately the same height as the curtain wall of the fort (*ca.* 3m). The third square (C:1/7) contained an additional stone wall as well, however, the discovery of a staircase on its west face and its proximity to the south-west corner tower suggest it may have provided access to the tower **(Fig. 16)**.

We also uncovered several unexpected architectural features in the 2011 season. Excavation exposed a line of stone arches parallel with the north curtain wall in square A:6/4 **(Fig. 17)**. The

*14. Square A: 6/4, east wall of the fort with mudbrick partition wall in foreground.*



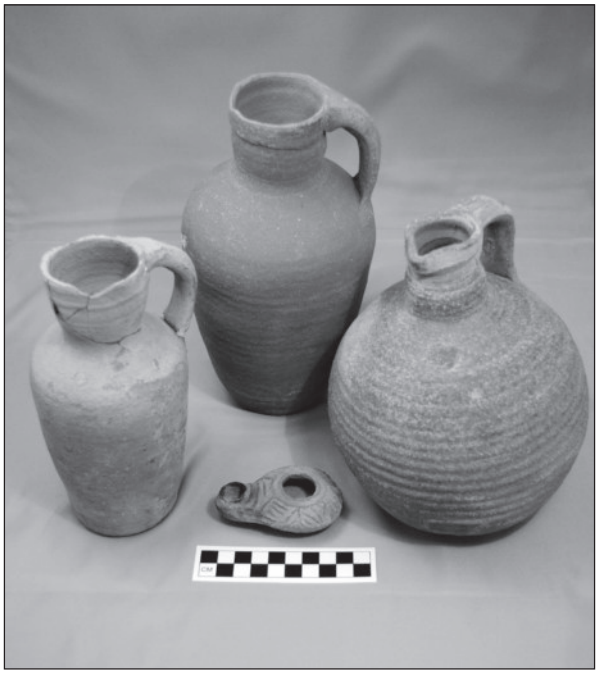
*15. Square A: 3/7, west wall of the fort with stone and mudbrick partition wall visible to left.*

*16. Square C: 1/7, south wall of the fort with stone wall and staircase.*

arches span *ca.* 2.81m from pier to pier and were built of roughly hewn *voussoirs* that were finely finished on only one face. Gaps between the *voussoirs* were filled with packing stones. The arches appear to have supported ceiling beams in at least two rooms in A:6/4, one of which also yielded an assemblage of three complete vessels and an oil lamp **(Fig. 18)**. The arches may provide evidence for a second storey along the north wall of the fort.

Excavation in all three squares revealed numerous fragments of painted plaster. More particularly, square A:3/7 yielded extensive remains of finely painted Greek *dipinti* that had fallen from the west curtain wall in antiquity **(Fig. 19)**. The plaster fragments varied in size, but many contained several partial lines of legible text formed in clearly organized registers. Thus far, conservation efforts have preserved enough of the text to suggest the *dipinti* may be the remains of an official inscription set within a *tabula ansata*. Given the delicate nature of the remains and their importance, epigraphic analysis is ongoing.

17. Remains of a stone arch in square A: 6/4 with an in situ jug visible directly below.



18. Ceramic assemblage recovered from square A: 6/4 in 2011.

19. Remains of the Greek dipinti from square A: 3/7 with Abigail Turner.

Finally, although we previously hypothesized that the fort's gate lay in the north curtain wall (Darby Darby, and Shelton 2010: 189-201), excavation in A:6/4 revealed that we had observed not the gate, but damage to the exterior face of the wall. In 2011, two sondages excavated in Area B produced conclusive evidence for an arched gate in the center of the east curtain wall **(Fig. 20)**. The debris within the soundings contained at least one finely cut *voussoir* with a mason's mark, suggesting that many materials may be recoverable in future excavation, including a possible building inscription.

*Survey of D1*

During the 2010 season, additional areas of the site were surveyed with GPS / GIS technology and, where appropriate, incorporated into the site grid. To the east of the main site and sitting on the ridge of the *wadi* is a large conglomeration of mud brick atop the sandstone. We had observed this area only on the

20. Sondage in square B: 2/1 with remains of a gateway in the east wall of the fort.

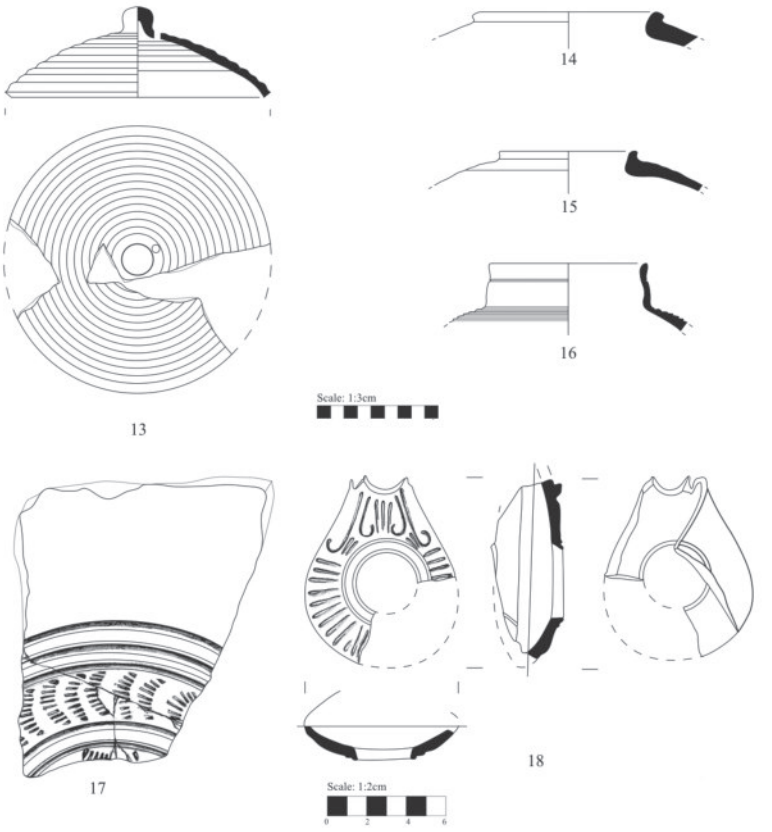
last day of the 2009 season. The area included an extensive scatter of pottery, with numerous Nabataean sherds. In addition, possible tombs are visible near the top of the mound, as well as built ashlar construction and mudbrick construction. In 2011 we noted that additional looting had taken place since the 2010 season, as indicated by looters trenches adjacent to the exposed architectural features. In response, we collected surface pottery from this area, now designated Area D1, in order to prepare for possible excavation with the aim of preventing further damage to the remaining materials.

**Preliminary Ceramic Report (Tiffany Key and Pamela Koulianos)**

*Ceramic Report from the 2010 Season*

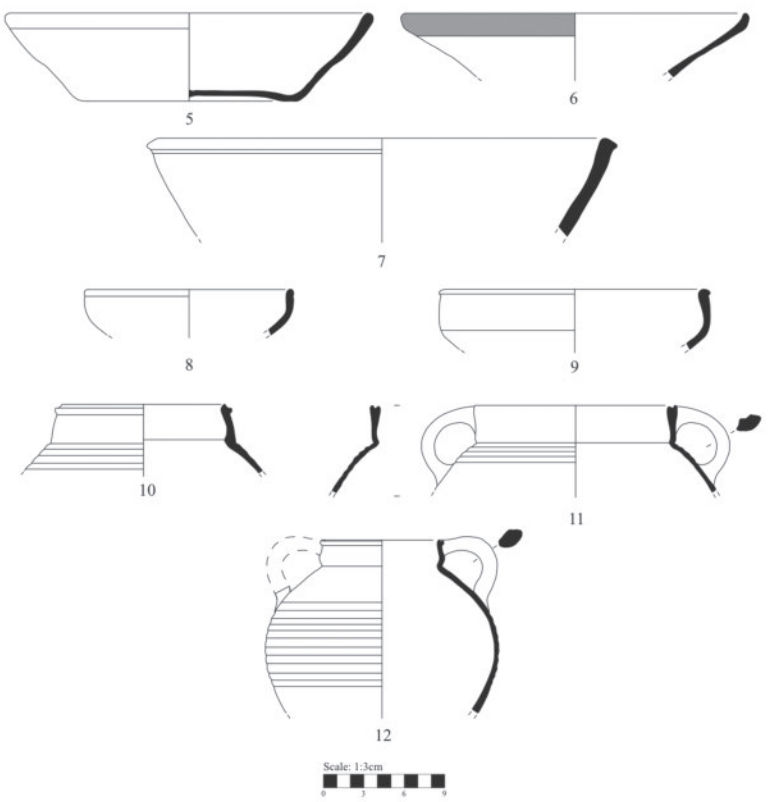
In the 2010 field season of the AGAP, a total of 1,117 sherds were collected from three areas of excavation: the fort, the bathhouse and an area originally identified as a domestic structure. The majority of sherds collected at the site were coarse wares (n = 1,011), which constitute *ca.* 90% of the site's pottery, while only a small percentage were fine wares (n = 69), or *ca.* 6%. The 2010 season was examined in the field by Andi Shelton and was later brought to the ceramics lab at North Carolina State University in Raleigh, North Carolina, USA. Subsequent to the 2011 season, the pottery from both 2010 and 2011 was analyzed together, a representative sample of which is depicted at **Figs. 21-23**.

The 2010 season yielded the site's first excavated pottery (**Table 1**). After reviewing the




| Image | Vessel Type | Combine | Reg. Number | Ware | Paste | Exterior | Interior | Information |
|---|---|---|---|---|---|---|---|---|
| 13 | Lid | A:6/4.3321.25 | 102,071 | AILA-1a | 5 YR 6/6 | 5 YR 8/3 | 5 YR 6/6 | |
| 14 | Amphora | D:6/13.1203.13 | 100,508 | GAZA | 7.5 YR 6/6 | 7.5 YR 6/6 | 7.5 YR 6/6 | Class 48 |
| 15 | Amphora | C:1/7.3102.7 | 100,446 | GAZA | 7.5 YR 4/4 | 5 YR 5/6 | 7.5 YR 5/4 | Class 48 |
| 16 | Amphora | A:3/2.3205.14 | 100,321 | IMPORT | 10 YR 8/4 | 5 YR 6/6 | 5 YR 6/6 | Class 63 |
| 17 | Bowl | A:6/4.3321.25 | 102,073 | ARS | 5 YR 6/6 | 5 YR 6/6 | 5 YR 5/8 | Hayes F59, Stamp |
| 18 | Lamp | D:6/13.1200.6 | 100,525 | IMPORT | 5 YR 7/4 | 2.5 Y 8/2 | 5 YR 7/6 | |

*21. Pottery recovered from the 2010 and 2011 seasons.*



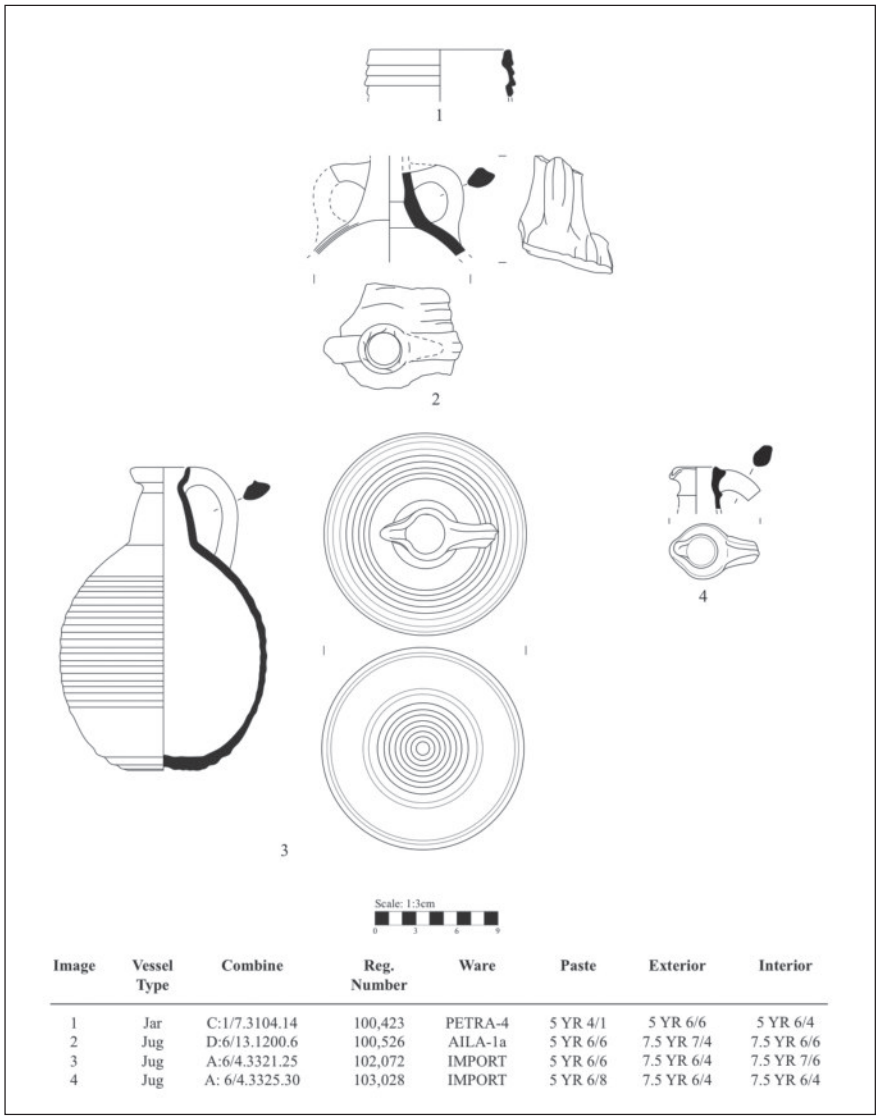

| Image | Vessel Type | Combine | Reg. Number | Ware | Paste | Exterior | Interior | Information |
|---|---|---|---|---|---|---|---|---|
| 5 | Bowl | A:6/4.3321.25 | 102,070 | PETRA-4 | 5 YR 5/8 | 10 YR 8/2 | 7.5 YR 6/4 | |
| 6 | Bowl | D:6.13.1208.21 | 102,539 | PETRA-4 | 5 YR 5/6 | 7.5 YR 6/6 | 7.5 YR 6/6 | 10 YR 5/2 |
| 7 | Bowl | D:6/13.1208.21 | 100,536 | PETRA-4 | 5 YR 6/8 | 7.5 YR 6/4 | 7.5 YR 5/2 | |
| 8 | Bowl | D:6/13.1203.13 | 100,510 | AILA-1a | 5 YR 6/6 | 2.5 Y 8/3 | 5 YR 7/6 | |
| 9 | Bowl | D:1.1 | 100,277 | PETRA-4 | 5 YR 6/6 | 2.5 Y 8/3 | 5 YR 7/4 | |
| 10 | Cooking Pot | A:3/7.3200.2 | 100,330 | PETRA-4 | 5 YR 6/6 | 5 YR 6/6 | 10 YR 6/3 | |
| 11 | Cooking Pot | D:6/12.1100.2 | 100,549 | AILA-3 | 2.5 YR 5/8 | 5 YR 4/1 | 5 YR 5/2 | |
| 12 | Cooking Pot | A:6/4.3321.25 | 102,069 | KARAK-5 | 10 YR 7/4 | 10 R 5/1 | 10 YR 7/4 | |

*22. Pottery recovered from the 2010 and 2011 seasons.*

ceramic assemblage it was not surprising that most of the sherds were of Ayla coarse ware. 'Ayn Gharandal's proximity to Ayla would help explain the prominence of Ayla ware pottery, although 'Ayn Gharandal has yielded some Ayla ware fabrics that are relatively uncommon at Ayla itself. These and further provenience studies may shed light on the trade relations between the two sites along the 'Arabah trade route. In contrast to the numerous coarse ware sherds, only a small number of imported fine wares were found, including one African Red Slip (ARS) and two Eastern Sigilatta A (ESA) sherds.

The majority of the 2010 material was limited to surface finds and wind-blown sand deposits. Of the squares open in 2010, those in the fort reached approximately 1m below the modern ground surface. As a result, dating these upper levels was difficult owing to the limited amount of material produced in the excavation. Although excavation in the bathhouse progressed deeper than that in the fort, these loci presented a mixture of materials that dated from the 2nd to the 6th-7th centuries AD, with a small amount of residual sherds that could be dated from the 1st century BC to the 1st century AD. These finds are not surprising given the fact that most earth loci in the bathhouse were comprised of sterile soil or wind-blown sand.

A relatively small collection of amphorae was recovered from the 2010 excavation (**Table 2**). The majority of the 28 sherds found were




| Image | Vessel Type | Combine | Reg. Number | Ware | Paste | Exterior | Interior |
|---|---|---|---|---|---|---|---|
| 1 | Jar | C:1/7.3104.14 | 100,423 | PETRA-4 | 5 YR 4/1 | 5 YR 6/6 | 5 YR 6/4 |
| 2 | Jug | D:6/13.1200.6 | 100,526 | AILA-1a | 5 YR 6/6 | 7.5 YR 7/4 | 7.5 YR 6/6 |
| 3 | Jug | A:6/4.3321.25 | 102,072 | IMPORT | 5 YR 6/6 | 7.5 YR 6/4 | 7.5 YR 7/6 |
| 4 | Jug | A: 6/4.3325.30 | 103,028 | IMPORT | 5 YR 6/8 | 7.5 YR 6/4 | 7.5 YR 6/4 |

*23. Pottery recovered from the 2010 and 2011 seasons.*

**Table 1:** Indicators from the 2010 Season (imported ware includes any coarse ware not labeled as Ayla, Nabataean or Central Jordan ware).

| Area | Square | Ayla Ware | Nab. Semi-fine Ware | Nab. Fine Ware | Nab. Painted Fine Ware | Nab. Course Ware | Imported Ware | Central Jordan Ware | TOTAL |
|---|---|---|---|---|---|---|---|---|---|
| **Fort** | **C:1/7** | 9 | 4 | 16 | 2 | 5 | 6 | 1 | **43** |
| | **A:3/7** | 13 | 7 | 6 | 0 | 10 | 3 | 2 | **41** |
| | **A:6/4** | 20 | 2 | 6 | 0 | 12 | 5 | 1 | **46** |
| **Bath** | **D:6/12** | 5 | 1 | 4 | 0 | 4 | 2 | 1 | **17** |
| | **D:6/13** | 13 | 0 | 0 | 0 | 7 | 5 | 7 | **32** |
| **Dom. St.** | | 1 | 1 | 0 | 0 | 0 | 0 | 0 | **2** |
| **TOTAL** | | **61** | **15** | **32** | **2** | **38** | **21** | **12** | **181** |

**Table 2:** Imported amphorae discovered during the 2010 excavations.

| Area | Square | Gaza | Egypt | Palestinian | Unidentified Ribbed | Ayla | Unidentified Amphorae | TOTAL |
|---|---|---|---|---|---|---|---|---|
| **Fort** | **C:1/7** | 1 | 0 | 0 | 0 | 0 | 1 | **2** |
| | **A:3/7** | 0 | 0 | 0 | 0 | 0 | 1 | **1** |
| | **A:6/4** | 2 | 1 | 0 | 0 | 1 | 0 | **4** |
| **Bath** | **D:6/12** | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| | **D:6/13** | 15 | 0 | 1 | 1 | 0 | 2 | **19** |
| **Dom. St.** | | 2 | 0 | 0 | 0 | 0 | 0 | **2** |
| **TOTAL** | | **20** | **1** | **1** | **1** | **1** | **4** | **28** |

from the bathhouse complex and, of these, Gaza amphorae dominated, while unidentified imports formed the second largest group **(**see **Fig. 21: 16** for an example of the latter**)**. Two Gaza amphorae indicators were identified as Peacock and Williams Class 48 **(**see **Fig. 21: 14-15)**, dating to between the 3rd and 6th centuries AD. While the paucity of amphorae is unusual, this pattern resulted from the fact that excavation in the fort did not reach occupation levels in 2010.

*Ceramic Report from the 2011 Season*

In the 2011 field season, 4,095 ceramic sherds were collected, processed and analyzed. This assemblage represented finds from four squares located in the fort complex as well as material found from the surface survey collection of Area D1, a mound with architectural features near the site. At the start of the excavation, three goals were established for the ceramic investigation: (1) to determine the date of the collected material, (2) to identify the main production centers supplying the fort – as evidence for local pottery production has yet to be discovered – and (3) to begin to examine the usage of the fort complex from a ceramic perspective. In order to accomplish these goals a compilation of diagnostic and non-diagnostic sherds was retained from the excavation. Sherds were characterized in the field as belonging to one of four broad categories: Ayla ware, Nabataean ware, unidentifiable (or imported) ware and amphorae. **Table 3** displays the prominence of these forms by excavated area (excluding the survey area).

Chronological Range of the 2011 Pottery

Material from the 2011 excavations ranged broadly in date from the early 2nd to the 7th centuries AD. Three squares (C:1/7; A:3/7; A:6/4) reached bedrock, representing the lowest levels of the fort complex. In each of these areas, the lowest occupation levels were examined and a preliminary date range was determined. The lowest loci in squares A:3/7 and C:1/7 both

**Table 3:** Indicators from the 2011 season and the percentage of each category in the overall 2011 pottery assemblage.

| Area | Square | Ayla Ware Sherd Count and % | | Nabataean Ware Sherd Count and % | | Unidentified Ware Sherd Count and % | | Amphorae Sherd Count and % | | Total Sherds |
|---|---|---|---|---|---|---|---|---|---|---|
| **Fort** | **C:1/7** | 285 | 37.9% | 99 | 13.2% | 180 | 23.9% | 111 | 14.8% | **752** |
| | **A:3/7** | 258 | 18% | 98 | 6.8% | 952 | 66.3% | 17 | 1.2% | **1435** |
| | **A:6/4** | 499 | 36.7% | 175 | 12.9% | 378 | 27.8% | 28 | 2.1% | **1360** |
| | **A:4/7** | 35 | 40.2% | 18 | 20.7% | 16 | 18.4% | 1 | 1.1% | **87** |
| **AVG%** | | **1077** | **33.2%** | **390** | **13.4%** | **1526** | **34.1%** | **157** | **4.8%** | **3634** |

produced assemblages that were primarily Late Roman (106-324 AD). Typical Late Roman cooking pots with a deep groove on the rim, Gaza amphorae and pottery from the Kerak plateau are common in the lowest loci in both A:3/7 and C:1/7. In square A:6/4, the pottery from the lowest loci ranged from the Late Roman to Early Byzantine periods (324-491 AD.). This conclusion is based on the presence of Gaza and Egyptian amphorae, as well as a painted bowl resembling the Early Byzantine painted ware found at Roman Ayla; these forms occurred in the same loci as Late Roman cooking pot forms. Early Roman / Nabataean (63 BC-106 AD) pottery was also found in all areas of excavation, but the relative scarcity of such pottery and the fact that it occurs with pottery of a later date suggests it is largely residual.

Ceramic Analysis

Coarse ware bowls, jars / jugs and cooking wares were predominant, but a significant number of lamp fragments and amphorae survived in the corpus as well. Noteworthy is the absence of cooking bowls. This form, which first seems to make an appearance towards the end of the 1st century AD and exists throughout the Late Roman period (mid 4th century AD), is wholly absent from the corpus. Its absence, especially in the lower strata, may suggest that the dating of the fort tends towards the early part of the 4th century, as the cooking bowl tradition is in decline.

Pottery from three major production centers, *viz*. Ayla, Petra and the Karak plateau, has been identified. As can be seen in **Table 3**, approximately one-third of the material consists of typical Ayla ware **(**e.g. **Fig. 21: 13)**. Material that displays the characteristics of Nabataean pottery from Petra comprised the second most common ceramic ware at the site. Comparatively, pottery from the Karak plateau was minimal, yet its presence suggests that ‘Ayn Gharandal participated in an extensive trade network that stretched across modern day Jordan. Finally, the unidentifiable wares were present in both diagnostic and non-diagnostic sherds.

*Coarse Wares*

A large variety of coarse ware bowls were discovered in 2011 **(Fig. 22: 5-9)**, with the most common being a simple rounded rim bowl with a flat base **(Fig. 22: 5-6***)*. Cooking pots, however, appeared in the greatest abundance. The cooking pots at the site undergo a transition from the triangular rim design **(Fig. 22: 10)** of the early 1st and 2nd centuries AD, to the grooved rim **(Fig. 22: 11-12)** of the 3rd and 4th centuries AD and, finally, to the rounded and hooked rim design of the 4th and 5th centuries AD. Jars and jugs were almost as abundant as the cooking pots. One-handled jugs, most spouted, were the most common form preserved and dated to around the mid 4th century AD **(Fig. 23: 3-4)**. Large storage jar fragments were found in every square; however, diagnostic features were not preserved in many instances.

*Amphorae*

A significant proportion of the ceramic corpus consisted of imported amphorae. Gaza represented the majority of identifiable amphorae, with Peacock and Williams Class 48 dominating the available diagnostic sherds. However, a significant number of Egyptian (Peacock and Williams Class 52 / 53) and Ayla amphorae were present as well. Many of the preserved amphorae sherds are currently unidentifiable, by either form or place of origin, although three types previously unattested at the site were added to the variety of forms, including a Peacock and Williams Class 41 amphora, two Class 44 ‘Late Roman 1’ sherds, and several Class 47 amphorae sherds. The data given in **Table 4** show the distribution of amphorae across the excavated squares of the site as well as the prevalence of various types of amphorae.

*Fine Wares*

Two important groups of fine ware come from the fort complex at ‘Ayn Gharandal. The first consists of the Nabataean fine wares, which were recorded separately from the Nabataean coarse wares in order to determine their abundance. Nabataean fine wares were separated into three different categories: painted fine wares, fine wares and semi-fine wares.

Unsurprisingly, these fine wares comprised a small portion of the overall ceramic material and added little information to the dating of each locus. Only three painted fine ware sherds were recovered in 2011: a body sherd of Dekorphase

**Table 4:** Imported amphorae discovered during the 2011 excavations.

| Area | Square | Gaza | Egypt | Ayla | Unidentified Ribbed | Other Amph. | TOTAL |
|---|---|---|---|---|---|---|---|
| **Fort** | C:1/7 | 29 | 4 | 4 | 2 | 72 | **111** |
| | A:3/7 | 1 | 0 | 1 | 0 | 15 | **17** |
| | A:6/4 | 6 | 8 | 10 | 1 | 3 | **28** |
| | A:4/7 | 0 | 0 | 0 | 1 | 0 | **1** |
| **TOTAL** | | **36** | **12** | **15** | **4** | **88** | **157** |

4 (2nd-3rd centuries AD) found during the survey of Area D1, a body sherd of Dekorphase 3a 20-70) AD) and a body sherd of Dekorphase 3c (100-150 AD).

A second category includes the imported wares, such as Eastern Sigilatta and African Red Slip. Three ESA sherds were identified; two were non-diagnostic body sherds and one was a closed-form ring base. Three ARS sherds were found during the 2011 excavations. A body sherd and a simple base were not identified, while the third was a Hayes Form 59 base (320-380 AD) with double circular designs as well as two rows of fan-like stamped patterns **(Fig. 21: 17)**.

Additionally, *unguentaria* were uncovered in the fort but, although they were distributed across two squares, they were non-diagnostic and residual. **Table 5** below shows the number of fine ware sherds per square from the 2011 season.

Ceramic Materials from the Surface Survey of Area D1

During the 2011 season, a survey was conducted on a mound in close proximity to the fort and bath complex of the main excavation. This survey area, Area D1, presented a unique mix of ceramic material that varied from the main site. The material from this survey ranged in date from the Chalcolithic and Early Bronze Age to the Early Byzantine period. These sherds were not only the earliest found at 'Ayn Gharandal, but were also the only hand-made ceramics (with the exception of a single hand-made Axumite sherd discovered in the fort). As is noted in **Table 5**, a range of fine wares was discovered in this area as well.

## Conclusions

In conclusion, several observations can be made based on the 2011 material. First, there is a paucity of imported fine wares. While a few African Red Slip sherds and Eastern Sigillata sherds are present, their presence is minimal. Given the probable dating of the fort to the Late Roman period, the limited presence of Nabataean painted fine ware is understandable.

Second, the wealth of amphorae present at the site, especially Gaza amphorae, suggests that one of 'Ayn Gharandal's primary functions was trade. Unlike the 2010 season, which yielded a total of 28 amphorae, the 2011 season produced 155 amphorae sherds, with an overwhelming majority located in square C:1/7. The significance of this deposition has yet to be determined, but will be further examined as more areas of the

**Table 5:** Fine wares from the 2011 excavations.

| Area | Square | Nab. Painted Fine Ware | Nab. Fine Ware | Nab. Semi-fine Ware | Unguentaria | African Red Slip | Eastern Sigilatta A | TOTAL |
|---|---|---|---|---|---|---|---|---|
| **D1** | | 1 | 8 | 44 | 0 | 0 | 2 | **55** |
| **Fort** | C:1/7 | 2 | 2 | 12 | 0 | 0 | 1 | **17** |
| | A:3/7 | 0 | 11 | 8 | 1 | 0 | 0 | **20** |
| | A:6/4 | 0 | 21 | 9 | 3 | 2 | 0 | **35** |
| | A:4/7 | 0 | 6 | 0 | 0 | 0 | 0 | **6** |
| **TOTAL** | | **3** | **48** | **73** | **4** | **2** | **3** | **133** |

fort are excavated in the coming seasons.

Finally, a number of lamps and lamp fragments were excavated in 2011. Most did not yield enough surface area to be identifiable. However, several south Jordan lamps were discovered **(**for a comparable type from 2010, see **Fig. 21: 18)**, including one in the assemblage recovered from A:6/4 **(Figs. 18, 24)**. Future seasons will help shed light on the relationship between these lamps and the function of various rooms within the fort, particularly when such objects are found directly on occupation horizons.


*24. South Jordan lamp from the square A: 6/4 assemblage recovered in 2011.*

**Preliminary Phasing of 'Ayn Gharandal based on the 2010 and 2011 Seasons**

Excavation within the fort has established a preliminary phasing consistent across all three squares, though the phases in the south are lower in elevation than those in the west and north owing to the sloping topography of the alluvial deposit upon which the site was constructed. Based on preliminary ceramic readings, we hypothesize that the earliest preserved occupational strata date from the end of the 3rd century to the beginning of the 4th century and that all areas were continuously occupied through the 4th and 5th centuries with no major abandonment or destruction phases. After the 5th century the fort appears to have been abandoned, followed by successive layers of gradual collapse. At this time there is no evidence for major earthquake damage, conflagration or rebuild. There is evidence for subsequent small-scale squatters' fires as well as burials, though these produced little ceramic material and will be dated by means of radiocarbon determinations on charcoal and textiles. At present we assume these phases are considerably later than the fort's main period of occupation.

**Summary and Plans for Future Excavation and Preservation**

*Summary*

As a result of the 2010 and 2011 excavation seasons, we have not only confirmed the architectural layout of both the fort and the bathhouse, but have excavated the first stratified material from the site in the *ca.* 110 years since 'Ayn Gharandal's 'rediscovery' by western explorers to the region. The fort is a typical Late Roman *castellum* (*ca.* 40 x 40m) with four projecting corner towers. The curtain walls are lined with rooms along their interior, separated from each other by smaller partition walls. The excavated materials from the fort and bathhouse suggest a date of occupation from the late 3rd and early 4th centuries to the 5th or 6th centuries AD. Furthermore, excavated remains from the interior rooms of the fort indicate some variation in room function, with ash and domestic pottery concentrated along the north wall and amphorae along the south wall. The purpose of the rooms adjacent to the west wall is still in question. However, the presence of finely painted Greek *dipinti* suggests an official function, perhaps as a *principia* or headquarters for the garrison stationed at 'Ayn Gharandal.

We have also identified three rooms of the Late Roman bathhouse, namely the *caldarium*, *tepidarium* and *frigidarium*. From within the structure we have documented the bath's exceptionally well preserved tubulation system and plastered walls, and outside of the bathhouse we recorded the remains of the *latrina*. Additionally, excavation revealed a corpus of *graffiti*, both figural and textual, from the walls of the bathhouse. Given the type of materials used in its construction, the orientation of the bathhouse with the fort and the data collected through excavation, we can conclude that the bathhouse was likely built contemporaneously with the nearby *castellum* (Darby forthcoming).

The analysis of ceramic materials suggests that 'Ayn Gharandal was an active trading station along the 'Arabah valley, as indicated by the presence of pottery from Ayla, Petra, Gaza and the Karak plateau. This interpretation is further supported by the large number of amphorae found in the *castellum*. Conversely, the extremely small percentage of imported fine wares uncovered in 2010 and 2011 suggests that 'Ayn Gharandal inter-

acted most closely with the local and regional network of Late Roman forts / caravan way-stations and the nearby towns of *Arabia* / *Palaestina Tertia* rather than markets outside the province.

In sum, the data collected by the AGAP thus far implies that the fort and accompanying bathhouse were heavily used by those involved in regional trade. Evidence from the site may also suggest that the Late Roman army both policed and controlled the goods travelling between the ports at Ayla and Gaza, as well as the towns of *Palaestina Tertia*. Finally, as is the case with comparable sites in the region (Cohen and Israel 1996: 110-16; Davies and Magness 2008: 102-12; Smith 2010: 143-52), control of the water resources at 'Ayn Gharandal is further testament to the Roman army's domination of the regional trade network, which would surely have been dependent on access to the series of springs that line Wādī 'Arabah.

*Future Plans*

In 2013 we will continue excavations in the fort and bathhouse in order to further our understanding of both structures. Squares in the fort will be opened adjacent to those completed in the 2011 season; new squares will be excavated in one of the corner towers and in the gate. Work in the bathhouse will continue to expand on the excavations completed in 2010. In forthcoming seasons, AGAP also plans to incorporate GPR with the goal of identifying possible outlying structures to the south and west of the fort. In addition, we are planning a large conservation program for the bathhouse that may include 3D mapping of its architecture and sub-floor material, as well as wall consolidation, dependent on the needs of the DoA (Darby and Darby 2010). Ultimately, we expect that future work at the site will contribute to answering a number of larger research questions related to the Late Roman army's role in commerce, trade and natural resource management in *Arabia* / *Palaestina Tertia* during the 3rd and 4th centuries as well as the complex relationship between 'Ayn Gharandal's local inhabitants and its garrison.

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# THE 2011 EDOM LOWLANDS REGIONAL ARCHAEOLOGY PROJECT (ELRAP): EXCAVATIONS AND SURVEYS IN THE FAYNĀN COPPER ORE DISTRICT, JORDAN

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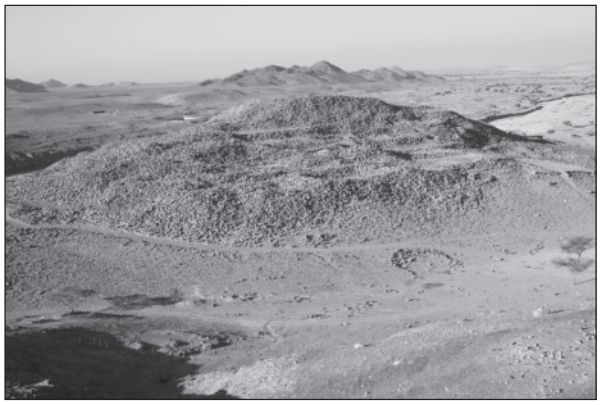
**Introduction**

The Edom Lowlands Regional Archaeology Project (ELRAP) is a deep-time investigation of the role of mining and metallurgy on the evolution of societies in the copper ore rich Faynān district in southern Jordan, directed by T.E. Levy and M. Najjar. From 2002 to 2009, research focused primarily on the Iron Age (*ca.* 1200-500 BC), one of the most intensive periods of copper production in the ʻArabah valley that separates modern Israel and Jordan. In addition to the ELRAP, there have been three other recent, large-scale research projects in the Faynān region: (1) the Deutches Bergbau Museum's (DBM) archaeometallurgy project, directed by Andreas Hauptmann (Hauptmann 2007), (2) the Council for British Research in the Levant (CBRL) Wādī Faynān Landscape Survey, directed by Graeme Barker, David Gilbertson and David Mattingly (Barker *et al*. 2007b) and (3) the Early Prehistory of Faynān Project, directed by Bill Finlayson, Steven Mithen and Mohammad Najjar (Finlayson *et al*. 2011). What distinguishes the ELRAP from other projects is our application of new digital technologies for archaeological research to carry out large scale excavations in order to contextualize the socio-cultural context of ancient mining and metallurgy (Levy 2010; Levy *et al.* 2008; Levy and Najjar 2008).

The main focus of the ELRAP has been the investigation of mining and metallurgy during the Iron Age (Ben-Yosef *et al*. 2009a; Ben-Yosef *et al*. 2010; Ben-Yosef *et al*. 2009b; Levy *et al*. 2012; Levy and Najjar 2007; Levy *et al*. under review). Additionally, over the past eight years our team has carried out excavations at a Pre-Pottery Neolithic B site (Levy in prep.) Early Bronze Age sites (Levy *et al*. 2002; Muniz 2007) and sites of other periods. One of the main aims of the new 2011 ELRAP expedition in Faynān was to investigate Khirbat Faynān (KF, Biblical Punon, Roman / Byzantine Phaino; 30° 37.6' N, 35° 30' E) as the possible social and economic center of copper production during the 10th and 9th centuries BC. Large-scale excavations at Khirbat an-Nuḥās demonstrated that it was the primary center of smelting and processing in the region (Ben-Yosef 2010; Levy *et al*. 2012; Levy and Najjar 2008; Smith 2009). However, the logistical and political center of copper production during these key centuries has eluded researchers. In addition, we wish to expand our research to explore the potential socio-economic role of Khirbat Faynān in copper production during other periods, such as the Early Bronze Age, and Nabatean / Roman periods. Furthermore, we wish to clarify how socio-political organization changed during when the region fell under Byzantine and Islamic control.

To complement the deep-time research goals of our new project at Khirbat Faynān (Levy and Najjar 2007) (**Fig. 1**), in 2011 we also carried out ten soundings of agricultural terrace walls in the immediate vicinity of the site, a pedestrian survey of the Buwayridah springs in the southernmost part of our research area and small probes at the Early Bronze Age copper manufactory at Khirbat Ḥamrat Ifdān and the Middle Islamic copper production village of Khirbat Nuqayb al-Asaymir. Here we present the first preliminary report on these research efforts.

In addition to an overview of notable discov-

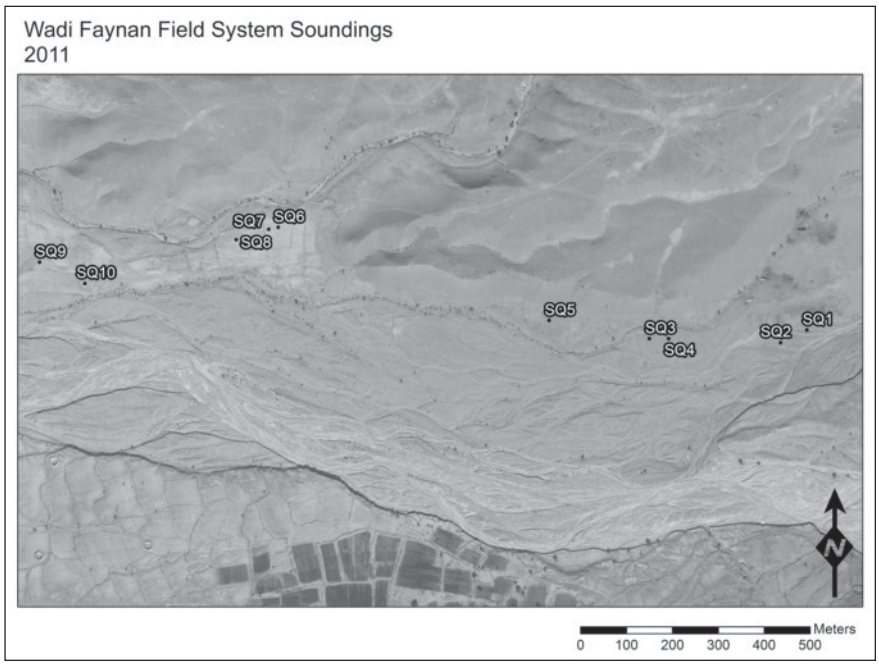


*1. Khirbat Faynān (Biblical Punon) seen from the helium balloon photographic system designed by UC San Diego undergraduate students for this project, November 2011.*

eries from our excavations and surveys, an extensive discussion of how three novel techniques complemented the ELRAP is presented. First, a geophysical survey elucidated potential excavation obstacles. Second, a digital chemistry unit consisting of X-Ray Fluorescence and Fourier Transform Infra-red Spectroscopy units yielded important data with which to form conclusions in the field regarding excavated contexts. Third, a Light Detection and Ranging unit provided a high-resolution point cloud for scanning the different sites.

**Faynān Agricultural Terrace Excavations**

As part of our comparative study of differences in subsistence strategies used in the lowlands and highlands of Edom, test excavations were carried out on ten terraces around Khirbat Faynān (**Fig. 2**). The landscape of Wādī Faynān has been extensively modified with agricultural field systems and terraces for managing floodwaters and erosion. Recently, the Council for British Research in the Levant (CBRL) completed a systematic survey of the field systems and noted concentrations of ceramics from the Early Bronze Age to Islamic periods (Mattingly *et al*. 2007). Agricultural terraces have also been recorded in the highlands of Edom. However, like the Faynān field systems, it is difficult to determine the date of use and construction of these features based on concentrations of ceramics alone owing to complications in site formation processes. Dating methods generally involve indirect dating by systematic surface collection of ceramics that may have been deposited during episodes of manuring (Given 2004; Wilkinson 1989). Direct dating is not usually possible because of the paucity of radiocarbon samples associated with terrace walls and the difficulty in finding a chronologically constrained sample. However, recent applications of Optically Stimulated Luminescence (OSL) methods (Avni *et al*. 2006; Bishop *et al*. 2004; Porat *et al*. 2006, 2012) to date archaeological features have been used as a successful alternative to traditional




*2. Overview Google Earth satellite image of Wādī Faynān field systems WF442 and WF443.*

dating methods. Thus, ten test excavations were carried out that complement previous systematic surface collection in the area and the trench excavation at Khirbat Faynān described below.

The ten excavated trenches will contribute to our explanation of the history of farming on the Faynān agricultural terraces (**Fig. 3**). The primary goal of our excavations was to collect samples for Optically Stimulated Luminescence (OSL) dating of agricultural terraces and to that end we were successful. A total of 28 OSL samples were collected. In addition, we collected sediment samples for analysis of pollen, grain size and phytolyths. These future analyses will contribute to our understanding of ancient paleoclimate and subsistence practices, especially when combined with the existing survey and excavation record.

**Buwayridah Springs Survey**

The Buwayridah Springs Survey focused on an area in the southernmost portion of the Faynān district that has received little attention, despite its potential for long term human occupation. Our working hypothesis is that the Buwayridah springs played an important role in ancient trade routes in the area. The springs are part of the Wādī al-Fayḍ catchment area that begins in the highlands and empties into the ʻArabah valley. This survey is a continuation of the Wādī al-Fayḍ Survey begun in 2009. Wādī al-Fayḍ flows from the highland plateau in a westward direction for approximately 20 km, eventually reaching the Buwayridah spring zone situated in an area dense with sand dunes on the eastern margin of the Wādī ʻArabah valley. The survey of the Buwayridah spring zone will yield an important data set for testing the relationship between regional-scale economic processes and small-scale economies, because this area is also part of ancient Iron Age Edom – and the core settlement area of the later Nabataean kingdom – as well as an important part of the Roman / Byzantine periphery (el-Khouri 2008).

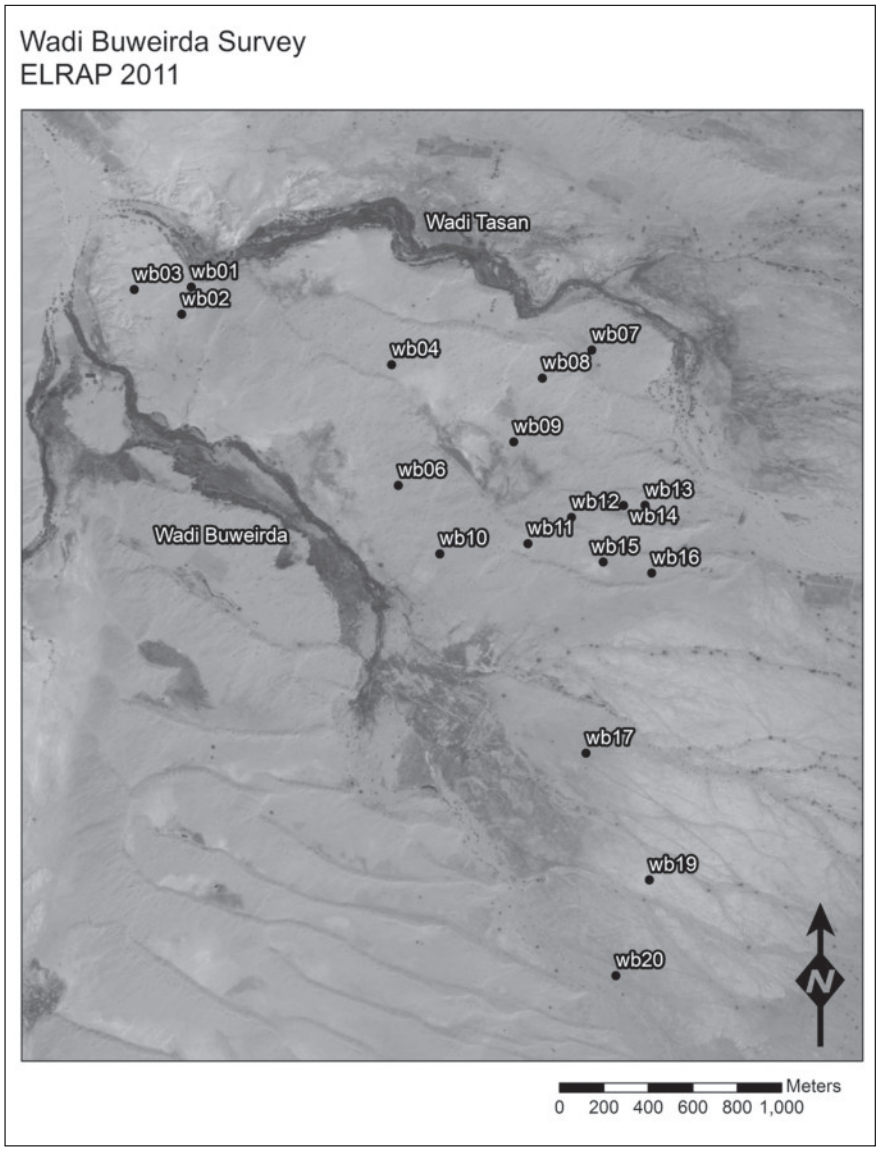

*3. Ancient terrace wall uncovered below the modern surface, WF 442 (Trench 7).*

Our survey methodology consisted of systematic, intensive surveying of 100 % of the area within the survey boundaries, as well as systematic surface collection and mapping at sites and other features. The survey boundaries included an area of five square kilometers between Wādī Buwayridah and Wādī Tasān (**Fig. 4**). Surveyors recorded site locations using a handheld Garmin Oregon 450 GPS. Digital photos were taken of all sites and features; attributes were recorded on a standardized data form developed in 2009. Information was recorded on the size, site type, geomorphology and environmental surroundings of the site. The survey team used a combination of systematic surface collection and targeted collection strategies, depending on the terrain, size, density, time constraints and other factors.

18 sites were recorded during the archaeological survey of Buwayridah springs (**Table 1**). Because the area is extensively covered by sand dunes, the sites consisted mostly of artifact scatters located near the dune margins. Poor visibility was the most influential variable in our ability to locate sites. Thus, it is quite possible that many more sites are covered by the Buwayridah sand dunes, some of which are upwards of 10-15 meters high (**Fig. 5**).

*Summary*

The Buwayridah Springs Survey was the first systematic archaeological survey of the Buwayridah springs zone. There is great potential for future discoveries in the Buwayridah springs area. Because




*4. Map of survey area showing the sites recorded. Wādī Tasān (northern wadi) marks the northern boundary of the survey area, while Wādī Buwayridah (southern wadi) represents the southern boundary. The survey area = ca. 5km2.*

the current survey only covered a small area between Wādī Buwayridah and Wādī Tasān, a larger survey will likely find more sites. The periods most represented in the Buwayridah springs area are the Late Prehistoric, Early Bronze Age and Roman / Byzantine periods. Further analysis of the artifacts collected will be required to better understand the occupation history in the survey area, as well as to interpret site function and how each site relates to the regional settlement pattern in Faynān.

**Khirbat Nuqayb al-Asaymir - A Middle Islamic Period Copper Production Village**

*Area X: Major Building Complex*

Introduction

The 2011 season marks the beginning of ELRAP's investigation of the final phase of copper production in Faynān at Khirbat Nuqayb al-Asaymir (KNA; 30°40'31" N, 35°26'48" E), a copper-smelting site of the Middle Islamic Period (*ca.* 1000-1400 AD). A probe was made in Area X, a building and its associated slag heaps that made up the center of copper production at the site. Area X consists primarily of a single five-room building and adjacent mounds of copper slag to the east, just outside the entrances to the building. The excavation area was in the north-western portion of the building and was bounded by two walls, Wall 105 and Wall 108. The walls are built out of local dolomite, with chinking stones inserted at semi-regular intervals. Although visually striking (**Figs. 6**-7), the

**Table 1**: Sites recorded in the 2011 survey near the junction of the Wādī Tasān and Wādī Buwayridah.

| Site Number | Northing | Easting | Site Size ($m^2$) | Periods | Site Type |
|---|---|---|---|---|---|
| WB001 | 723267 | 3383372 | 18000 | Early Roman, Islamic | Artifact scatter, Campsite |
| WB002 | 723226 | 3383253 | 11000 | Neolithic, Roman, Islamic | Lithic scatter (production site?) |
| WB003 | 723031 | 3383365 | 3100 | Prehistoric, Roman/ Byzantine | Artifact scatter (pottery and flint tools, debitage) |
| WB004 | 724051 | 3383048 | 175 | Early Bronze | Artifact scatter, possible hearth |
| WB006 | 724099 | 3382509 | 900 | Roman/Byzantine + | Pot Drop |
| WB007 | 724843 | 3383140 | 1300 | Neolithic | Artifact scatter, small settlement |
| WB008 | 724629 | 3382976 | 1100 | unknown | artifact scatter |
| WB009 | 724528 | 3382702 | 1900 | Early Prehistoric | lithic scatter |
| WB010 | 724257 | 3382217 | 7500 | Early Bronze | Artifact scatter, small settlement |
| WB011 | 724592 | 3382269 | 500 | Classical | Sherd scatter |
| WB012 | 724758 | 3382395 | 600 | Classical | Artifact scatter (ceramics and ground stone) |
| WB013 | 725060 | 3382450 | 1700 | Classical | Artifact scatter (ceramics, glass, ground stone) |
| WB014 | 724988 | 3382441 | 2500 | Classical | Artifact scatter (ceramics, glass, ground stone) |
| WB015 | 724927 | 3382144 | 3500 | unknown | Artifact scatter (lithics, ceramics, ground stone) |
| WB016 | 725113 | 3382133 | 2600 | Classical | Artifact scatter (ceramics, lithics, ground stone) |
| WB017 | 724839 | 3381340 | 2 | late Classical + | Pot Drop |
| WB019 | 725100 | 3380786 | 350 | Early Prehistoric | lithic scatter |
| WB020 | 724985 | 3380387 | 2400 | unknown | sherd scatter |

construction of the walls shows the importance of practical over aesthetic concerns in the construction of the building.

The probe was conducted to answer several questions. Initially, we wished to test a hypothesis put forward by Hauptmann (2007: 126-127) that the Area X building may have housed a mineshaft. We also wanted to better understand both the nature and chronology of metal production at KNA. Over the course of nine days working at KNA, we excavated an area of 7x3m to a maximum depth of *ca.* 1.2m. All loci, including topsoil loci, were completely sieved through a ¼" mesh to retrieve as much excavated material as possible.

In terms of chronology, the excavations revealed – as we had suspected – that copper production at KNA occurred during a single phase, local Stratum X2, after which the site seems to have been abandoned. Although datable artifacts

*5. Overview of WB07, showing the large sand dunes that surround the site.*

*6. KNA Furnace 120, showing the slag pit (front) and replaceable granite facing, as well as the red mortar fill.*

from the Area X probe were scarce and radiocarbon dating has not yet been performed, we suggest, based on earlier analyses of ceramics from survey (Jones *et al*. in press) that Stratum X2 should be dated to the Middle Islamic IIa period, or the first half of the 13th century AD.

The Shaft Furnace

Rather than a mineshaft, the Area X excavation revealed something much more exciting: the remains of a copper-smelting workshop, complete with a well-preserved, stone-built shaft furnace (L. 120) abutting Wall 108 (**Fig. 6**). The dimensions of the furnace itself are roughly 1x1.6m, with a slag pit *ca.* 0.75m in diameter to the east. The western, permanent portion of the furnace is constructed of local dolomite, the same material as the walls of the Area X building, with a replaceable facing made primarily of granite, now very decayed. Between the permanent structure and the replaceable facing is a layer of red, iron-rich sediment. FTIR analyses revealed this to be iron-rich loess with relatively high clay content, which was used as mortar between the two parts of the furnace. This layer is now very decayed and the mortar has run off in large quantities into the slag pit. The plan of the furnace is similar to Early Islamic II (800-1000 AD) shaft furnaces at ʻArja in Oman, specifically from Site 103 (Weisgerber 1987: 155), which suggests that this type of furnace was both widespread in the Islamic world and also long-lived. It is also interesting to note the superficial similarities between this furnace and the stone-built, mortar lined furnaces at Timna 2, dated by Rothenberg (Rothenberg 1990: 16-35) to the Late Bronze Age, but which yielded Early Islamic period radiocarbon dates (Rothenberg 1990: 71; Ben-Yosef 2010: 671).

Air seems to have been provided to the furnace in two ways. First, from the outside of the building a small, built opening is visible at the bottom of Wall 108 (**Fig. 7**), in the section of this wall opposite the furnace. This is likely intended to take advantage of the winds blowing into the site from Wādī Nuqayb al-Asaymir to the west; both this and the proximity of sources of copper ore in this *wadi* (WAG 56 and 57 [see Levy *et al.* 2003]) help to explain the placement of the Area X building. Second, a partial bellows tube was found *in situ* in locus 131, to the north-east of the furnace, and this would have provided more direct air from the front. Textile and rope finds in L. 119 and L. 130 respectively may represent the very fragmentary remains of cloth bellows attached to these ceramic bel-


*7. An aerial view of KNA Area X taken from the ELRAP balloon aerial photography platform, with rooms labelled. The slag heaps east of the Area X building are visible in the photo. The 2011 probe was carried out in Room 3.*

lows tubes. Although no tuyère fragments were found during the excavation in Area X, a single example was surface collected from the slag heaps outside the building (**Fig. 7**). It is wheel-turned and fired to buff, with large, rocky inclusions throughout.

The placement of the furnace and the finds nearby clarify how the Area X building was used. The fact that the furnace is located on the west wall of the building, away from the entrances at the east, suggests that the building was at least partially open. The eastern portion of the building – Rooms 1 and 4 – may have been roofed, but the western portion could not have been. Likewise, the relatively low density of slag in the excavated part of Area X, as well as the almost complete lack of technological ceramics other than the bellows tube in L. 131, suggest that waste from the furnace was removed from the building and dumped on the slag heaps outside. Considering this, it is somewhat surprising that a large lump of partially processed copper was found discarded in the north-western corner of the building. It is not clear if this was awaiting reprocessing at the time the site was abandoned, or was hastily discarded after a failed smelt close to the time the building went out of use.

Summary

Based on the evidence outlined above, it is certain that the Area X building was devoted primarily to copper smelting, which to our sur-

prise took place in the building itself. Based on the way the shaft furnace appeared before excavation, it is likely that the other piles of rock collapse along the walls of the building are the remains of metallurgical installations, and it is even possible that another furnace is present in Room 2. It cannot be entirely ruled out that some mining activities took place in Room 5, but this is an unlikely function for that room and we would suggest that most, if not all, ore for the site came from the mines of Wādī Nuqayb al-Asaymir. Given the intensity of copper production in Room 3, it is unlikely that it was roofed. In fact, most of the Area X building was probably unroofed. Currently, we place the copper production in Area X in the first half of the 13th century A D, following analyses of our previous survey data.

**Khirbat Ḥamrat Ifdān**

*Area Q*

Large-scale excavations were carried out at Khirbat Ḥamrat Ifdān (KHI; 30°39'41" N, 35°23'33" E) in 1999 and 2000 (Levy *et al*. 2002; Muniz 2006). These excavations revealed the best-preserved Early Bronze Age III - IV (EB III-IV; *ca*. 2500-2000 BC) copper manufactories in the ancient Near East. Thousands of casting moulds (final product and ingot), copper objects, ceramic vessels and artifacts related to EBA metallurgical process came to light. Sometime after the EB III occupation at the site, but before the EB IV period (*ca*. 2300 BC), the site suffered a massive earthquake that effectively sealed over 70 rooms, courtyards and other architectural features at the site. This 'Pompeii effect' has made KHI a unique site in the history of Old World metallurgy and the archaeology of the southern Levant.

The 2011 excavation at KHI had two primary objectives. First, we wanted to further clarify the stratigraphy from past seasons at KHI. Second, we sought to provide a basis for the regeneration and new geo-referencing of the spatial data collected during past seasons. In order to meet our first objective we planned a small probe with a 1 meter wide baulk adjacent to what was identified as Area H in the 1999 and 2000 seasons (**Fig. 9**). Based on the results of this season's excavation, we confirmed the division of the site into four strata. Stratum I represents occupations from the Iron Age to Islamic periods. Stratum II dates to the Early Bronze IV occupation. Stratum III represents the primary occupation of the site during the Early Bronze III. Stratum IV represents the first use of the site with a mixture of pottery from the Early Bronze I and, possibly, Early Bronze II. The second objective was initiated using our aerial photography system, coupled with GPS and Total Station readings at the site. Once all of the spatial data has been integrated with aerial imagery taken during the 2011 season, the complete KHI dataset will be ready for more detailed spatial analysis.

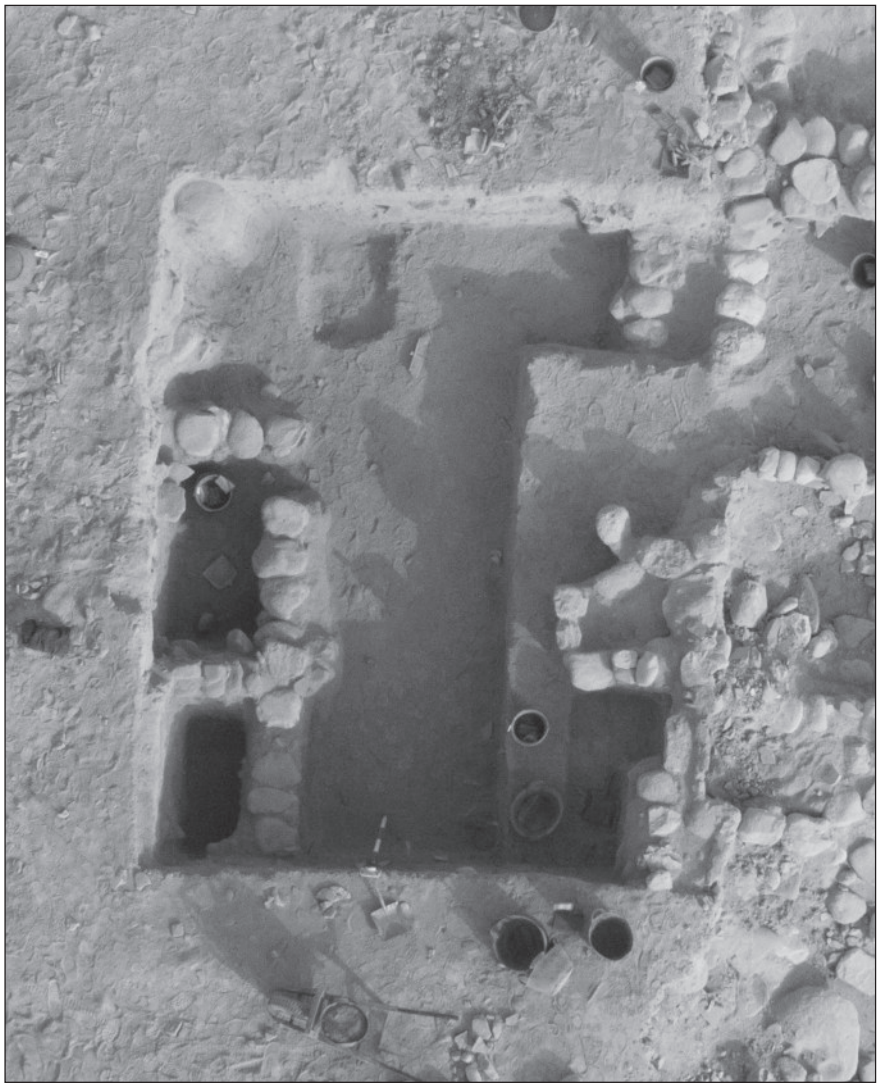
The 2011 excavations at KHI took place over nine days of work at the site using the ELRAP recording system (Levy and Smith 2007). Unlike the earlier large-scale excavation, every locus was sieved completely so as to try to retrieve as much excavated material as possible, especially lithics. One artifact of particular note was a copper axe found sealed under the upper layer of mud-brick collapse (**Fig. 8**). Below the collapse were layers that contained large amounts of ash. The collapse provides further evidence for the earthquake identified in previous excavation seasons (Levy 2002: 425) (**Fig. 9**). The copper axe is very similar in form to one of the Khirbat al-Batrāwī copper axes described by L. Nigro (Nigro 2010) and other axes found in past seasons at KHI (Levy *et al*. 2002). The formal similarity between the axes suggests that KHI was the production site for these axes before distribution to other EB III settlements.


*8. Copper axe head with parallels to Khirbat al-Batrāwī.*

**Khirbat Faynān**

*Area 16*

The 2011 season was designed to give us an introduction to the challenges and stratigraphy of Khirbat Faynān (Biblical Punon, Roman / Byzantine Phaino; 30°37.6' N, 35°30' E) as the beginning of a planned, long-term excavation



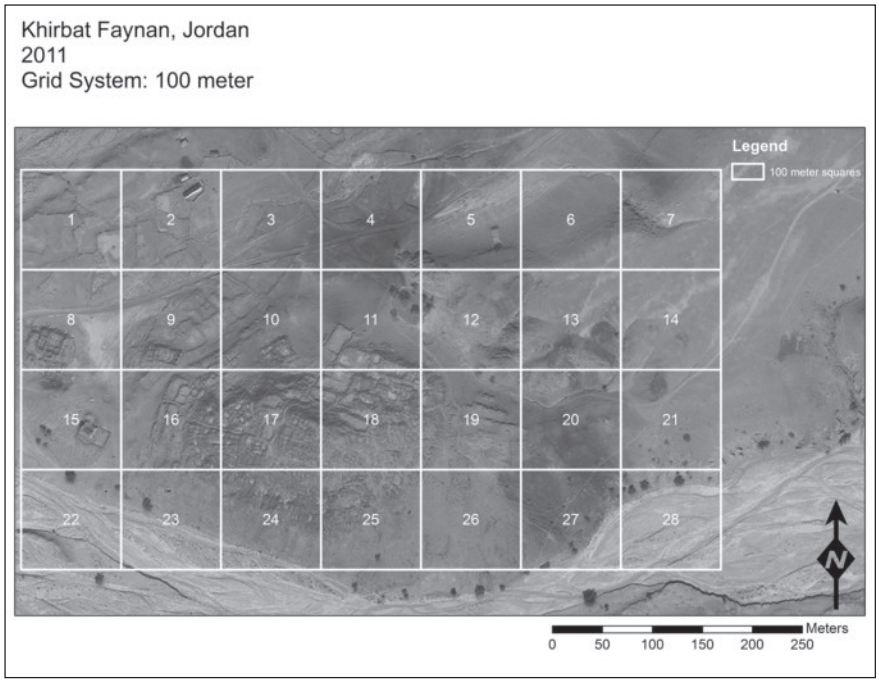
*9. Aerial Photograph of 2011 probe (Area Q) at Khirbat Ḥamrat Ifdān close to completion of excavation. All the walls seen here date to the EBA.*

project. To begin the project, we decided it best to open a 5x40 meter trench on the west side of the *tall* (**Figs. 10-11**). The trench started at the base of the *tall*, below the first surface architecture on the *tall* proper and ended before the obvious, dense later occupation higher up on the *tall*. For three weeks before excavation began, a geophysical survey was conducted to provide a preview of what to expect in some of the excavated areas and to test the feasibility and practicality of continued geophysical survey in the future. Depending on the archaeological context, we employed four different sieving strategies. For the uppermost layers of fill we did not sieve at all. In contexts without any clear occupational definition we used a one to five sieving strategy. As we approached floors we would sieve every other *quffa* (Ar. "rubber bucket"). All excavated sediment associated with floors and living surfaces was sieved through ¼ mesh. The allocation of stratigraphic units is still in a very preliminary stage as 2011 represents the first excavation season at KF. Owing to the steep western slope in Area 16, the focus of our excavation, deeper and more extensive exposure will be required to establish a unified stratigraphic sequence of the mound. Here a relative stratigraphic system, based on separate 5x5m units is utilized.

*Geophysical Survey at Khirbat Faynān*

Full characterization of archaeological sites by conventional archaeological methods can take years. Furthermore, coring and excavations, the most common methods for archaeological assessment, are intrusive. Therefore, non-intrusive geophysical techniques are used to map the

*10. Oblique aerial view of excavation Area 16 in relation to the rest of Khirbat Faynān mound.*




*11. Grid system employed at the new excavations at Khirbat Faynān superimposed on Bing satellite image.*

shallow subsurface of smaller zones of interest for subsequent detailed excavations. Among these techniques – based on previous results in the same area (Witten 2000) – we decided to use EMI (Electromagnetic Induction) and ERT (Electrical Resistivity Tomography).

Among many applications, electromagnetic induction instruments are used for near-surface archaeological investigations and the detection of buried structures such as building foundations, as well as for the detection of highly conductive metallic objects. The system used in this campaign is a Profiler EMP-400 (GSSI, USA), which is a digital, portable, multi-frequency electromagnetic induction sensor. The system bandwidth extends from 1 kHz to 16 kHz.

ERT is very popular in archaeological investigations and was also employed. The success of the method depends on the difference between the resistivity properties of the potential archaeological targets (walls, roads, buildings etc.) and the surrounding environment (Leucci and Negri 2008). We used the Syscal Pro resistivity meter (Iris Instruments, France) with 48 electrodes

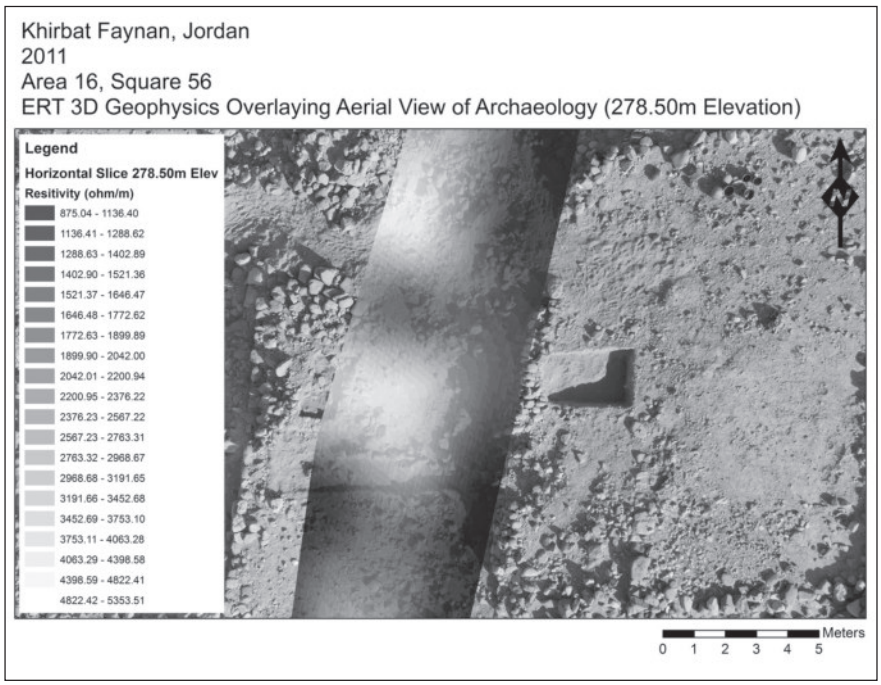
spaced at 0.5 meter.

Three different sets of 2D ERT lines (24 electrodes at 1 meter separation each) were collected over three sides (north, east and west) of the Khirbat Faynān mound (**Fig. 12**). The main objective was to obtain vertical sections up to 6 meters along the mound in order to investigate the different layers and hopefully distinguish cultural from natural layers. The position of every electrode was measured with a total station in order to correct the ERT lines for topography. On the other hand, a small 3D ERT survey was collected over a grid to be excavated. The 3D ERT survey used a set of parallel 2D profiles with a separation of 0.5 meter between electrodes. After collection, data were sent to Geostudi Astier (Livorno, Italy) for inversion and generation of final maps. The main purpose of the 3D ERT survey was to direct the excavation and give as much information as possible beforehand. **Fig. 12** (below) illustrates some of the ERT results.

*Snap-Shot of Key Excavation Areas and Finds from Khirbat Faynān*

Early Bronze Age Settlement (Square 16-57)

One of the most exciting discoveries in 2011 was a large number of well-built foundation walls dating to the Early Bronze III in the upper portion of the excavation (**Fig. 13**). It can be divided both vertically into building phases based on architecture and horizontally according to activity areas based on artifact distributions. Three building phases were recorded: a more recent *ad hoc* enclosure visible on the surface and two distinct building phases that date to the Early Bronze Age. Two distinct construction phases are visible in the structure of the walls running north to south, allowing for the division of the middle section into two sub-strata for the Early Bronze occupation. The local stratigraphy for the area of Square 57 with the EBA buildings contains Strata 16-57-1, 16-57-3a, 16-57-3b and 16-57-4. Three definite rooms were identified with potential rooms existing to the north and south of the excavation area. The rooms were numbered from north to south: Rooms 4, 5 and 6. The middle section is best defined as the area between Walls 1129 and 1135. In the west, abutting Wall 1049 – that forms the boundary between Squares 56 and 57 – is another fill, but much deeper. The western fill contained a mixture of material with ceramics ranging from the Iron Age to Byzantine periods in a mixed context. Interestingly, in this fill, the Early Bronze Age is nearly completely absent until just above the basal layer. Between the early and later fills is a sterile fill. The eastern portion of Square 57 includes Strata 16-57-1, 16-57-2a, 16-57-2b, 16-57-2c and 16-57-4. The western portion of the




*12. Geophysical ERT data superimposed on aerial photograph taken with the ELRAP balloon system. Ground truth excavations revealed a small room, with a range of Byzantine artifacts.*

square is best defined as the area between Walls 1049 and 1129.

The square was excavated piecemeal in fragments over the course of the excavation, which led to confusing descriptions of the archaeological record. The fragmentary nature of the excavation in Square 57 was the result of trying to excavate around the only superficial architecture at the site, consisting of Walls 1127 and 1130. Excavation in the square began with a roughly 1 x 1 meter probe in the north-west corner of the square into Stratum 16-57-4. Next, the eastern portion of the square was excavated to the basal gravel layer. In neither of these probes was subsurface architecture detected. Eventually, the area over the rectilinear Early Bronze structure was excavated as a single unit, leaving space between the different probes for small baulks. It was decided to extend the excavation to include the full extent of the 10 x 10 meter square in order to clarify fully the extent of the EB settlement area. Owing to logistical reasons, we did not finish excavating the northern half of the square until the southern half was finished. Initially, the southern half of the square was divided into sections informed by our observations of the horizontal stratigraphy in Square 57. Other than Early Bronze III pottery, few finds were identified. The discovery of well-preserved buildings dating to the EB III is especially important at KF because it provides evidence for a large settlement in the main Faynān valley during the area's first peak in copper production (**Fig. 13**). While the site of Wādī Faynān 100 was initially thought to be an EBA settlement over 11 hectares in size (Wright *et al*. 1998), definitive evidence for the site being a large habitation site did not come to light. According to a British team (Barker *et al*. 2007a: 237-238), the main exposure of EBA structures at WF 100 was in Operation 4 and even there no single structure could be defined. The recently discovered well-constructed room complex and *in situ* ceramic assemblage from KF both point to the importance of this site as the potential settlement center in the Faynān valley during the 3rd millennium BC.

*13. Early Bronze Age (III) room complex found at Khirbat Faynān. This is the first major EB (ca. 3,400 - 2,000 BC) settlement evidence found at this large settlement.*

Iron Age Finds (Square 16-54)

It is difficult to make generalizations about the stratigraphic development of the entire site because the slope of the excavation trench is considerable. Here we focus on one square to characterize the topsoil because of a single outstanding artifact that came to light. The finds from the topsoil of Square 16-54 were a mix of material assumed to have washed down the *tall* over time. Notably, in the surface finds / scrape from Locus 1001 we found a remarkable ceramic Iron Age head / mask figurine with some parallels to a 9th century BC final product casting mould found at Khirbat an-Nuḥās (Levy 2008: 249-251) (**Fig. 14**). It is also similar to anthropomorphic figurines found at the late Iron Age 'Edomite' site of Horvat Qitmit (Beit-Arieh 1995). While a good stylistic parallel exists, the lack of a good context for the KF find does not allow for a definitive temporal assignment.


*14. 'Edomite' figurine head removed during the topsoil scrape in Square 16:54.*

Nabataean to Byzantine Settlement (Square 16-56, Room 3)

The relatively flat surface behind a terrace wall half way up the excavation trench made it conducive to the detailed ERT survey briefly described above. Indications of a small walled enclosure were seen with this geophysical investigation. At a depth of *ca.* 50cm, excavations in this area revealed a room is in the north-western corner of Square 16-56, between Walls 1031 and 1032, and the well-built terrace wall, Wall 1048. Both Wall 1031 and 1032 are two row walls preserved to a height of two to four courses, made primarily of limestone, basalt and granite in a boulder and chink construction. Terrace Wall 1048 is of similar construction, but is much deeper and preserved to a height of seven to 12 courses. It is possible that, like Wall 1124, this wall belongs to an earlier construction phase and was reused as part of the later Room 3.

The primary occupation of Room 3 belongs to Stratum 56b-3. After clearing the Stratum 56b-3a fill, the edges of a *ṭābūn*, L. 1103, emerged. This installation takes up almost half of the excavated portion of the room and is constructed of buff clay. The *ṭābūn* belongs to Stratum 56b-3b, as do the foundations of Walls 1031 and 1032. The occupation of Room 3 seems to belong entirely to this stratum, which is tentatively dated to the late Roman and early Byzantine periods (**Fig. 15**).

Below the foundations of the walls and the Stratum 56b-3b surface is another potential surface belonging to Stratum 56b-3c. This stratum contains a single course wall constructed entirely of a line of standing stones, Wall 1126, which is likely connected to Wall 1125, although as Wall 1032 was not removed this is not certain. *ṭābūn* 1103 is dug into the surface of Stratum 56b-3c and is built around the pre-existing line of Wall 1126. This stratum, tentatively dated to the Nabataean and earlier Roman periods, was rich in copper finds and contained three copper bracelets, as well as a leaf-shaped pin or pendant bearing the image of a woman (**Fig. 16**).

*15. Room 3, Area 16-56 with ṭābūn still filled with ash.*

**Chemistry Lab Studies in the Field**

The ability to carry out micro-archaeological analyses of excavated material is rapidly becoming a key element of the 21st century archaeological tool box (Weiner 2010). During the 2011 field season, we used a digital chemistry lab to conduct in-field analyses of several types of material. This method yielded data that could improve the site supervisors' understanding of the sediments and anthropogenic and cultural materials being excavated. Chemical analysis helped guide aspects of the excavations and enhance our interpretations of those data. The ELRAP chemistry lab made use of two techniques for chemical characterization of samples. These included: (1) a Bruker Tracer III-V Portable Handheld


*16. Copper pendant depicting a standing woman. As it was associated with a clasp-pin, it seems to have been a broach.*

XRF (X-Ray Florescence) Spectroscope, which allows researchers to gather data on the elemental composition of a sample. The Bruker Tracer III-V can be set up using different combinations of filters, voltage (KeV) and amperage (micro-amps) in order to optimize the instrument to read elements within different ranges of atomic mass. Where applicable, the instrument settings used are noted in this report. (2) Chemical analysis of samples in the field was augmented with the addition of a technique previously untested by the ELRAP, *viz*. infrared spectroscopy. We used a Thermo-Nicolet iS5 FTIR (Fourier-Transform Infrared) Spectroscope, which allows researchers to examine chemical bonds and compounds within a sample. All FTIR samples were tested using FTIR-grade Potassium Bromide (KBr) as a matrix to form pellets. The ELRAP team gathered and analyzed samples of sediment, rocks, cultural deposits, slag, lithics, ceramic objects and metal artifacts during the 2011 season. Here we summarize the 2011 applications at several metal production sites, the study of toxic metals found in sediment samples obtained in the surveys described above and characterization of a systematic geological collection from the study area.

*Khirbat Nuqayb al-Asaymir Chemistry*

13 sediment samples from Khirbat Nuqayb al-Asaymir were analyzed during the 2011 season, along with 16 samples of slag. Sediment samples were collected specifically from excavation loci and unusual deposits, while slag samples were picked randomly out of all the slag collected from the site. All sediment samples were analyzed by FTIR, while only half of them were analyzed using XRF. The majority of the sediment samples proved to be typical loess soils, with higher relative amounts of quartz and calcite and lower relative amounts of clay than the loess standard provided by the Weizmann Institute. One sediment sample proved to be almost entirely composed of quartz sand, and one sample could not be identified. Most of the sediment samples analyzed with XRF contained relatively high levels of iron, which is consistent with (1) the fact that comparatively iron-rich copper ores were smelted at KNA (Hauptmann 2007: 183) and (2) the run-off from the iron-rich mortar used in the shaft furnace. Most sediment also contained small amounts of copper, manganese and strontium; trace amounts of lead were identified in all but one sample.

Slag samples from Khirbat Nuqayb al-Asaymir were only tested with XRF. The slag samples were all tested using the machine's green filter (0.006" Cu, 0.001" Ti, 0.012" Al) at 40 KeV and 15 micro-amps, without the vacuum system. Trials were all either 180 or 300 seconds long. The majority of the samples were shown to contain high levels of both copper and iron, although three of the samples contained significantly higher amounts of copper than iron. All samples contained significant levels of manganese; small to trace amounts of calcium, lead, strontium, nickel and zirconium were also identified in numerous samples. The archaeological context of these slag samples, in addition to their chemical composition, suggests that they may be the result of an unsuccessful smelting operation. Most importantly, such high levels of copper are unexpected in slag that had been well-smelted. It is unlikely that these slag samples are particularly representative of the composition of slag after successful smelting, but this sample may be a good reference for the general elemental composition of the ores that were mined and smelted at Khirbat Nuqayb al-Asaymir.

*Khirbat Ḥamrat Ifdān Chemistry*

During the 2011 season, 32 sediment samples from Khirbat Ḥamrat Ifdān were analyzed in the digital chemistry lab, along with 39 slag specimens. As at KNA, sediment samples were gathered specifically to test chemical compositions of certain strata and deposits. The sediment samples from KHI were all analyzed with FTIR. The results showed that a majority of the samples were fairly typical loess soils, but that they contained very high levels of calcite relative to the other standard loess components, quartz and clay. Six of the sediment samples also contained elevated levels of quartz. Four of the samples were shown to contain a significant amount of a silicon dioxide polymorph, possibly indicating the presence of phytoliths in those areas. Two samples may contain wood ash or other burned organic material, but this was not established definitively. The nine sediment samples that were also tested with XRF contained mainly strontium and calcium, with varying amounts of iron.

Four samples had moderately high iron levels, while the other five contained small amounts of iron. Six sediment samples also contained small amounts of zirconium, copper, manganese and potassium. One sample contained small but significant amounts of sulphur and three samples contained very small to trace amounts of bromine, a poison.

Of the 39 slag samples from KHI chosen for XRF analysis, 27 were chosen at random from all the material collected during excavation. The other 12 specimens were selected specifically to give a representative sample from part of the site's stratigraphic sequence. These slag samples were all tested with the XRF using the machine's green filter (0.006" Cu, 0.001" Ti, 0.012" Al) at 40 KeV and 15 micro-amps, without the vacuum system. Trials were all either 180 or 300 seconds long. Two specimens were chosen from each of six loci and all specimens were tested non-invasively. Thus, several surface assays were collected for each specimen, but none of the specimens were crushed or homogenized. The slag from KHI was shown to contain very high levels of manganese, along with highly varied amounts of both copper and iron. Interestingly, most specimens contained either extremely high or extremely low levels of iron. This may indicate either a change in the efficiency of iron smelting over time, differential extraction of this material, or simply differential amounts of iron in ores that were smelted for copper production. Only seven specimens contained high or moderately high levels of copper, although copper was present in small to trace amounts in almost every specimen. Virtually all of the slag samples also contained strontium, zirconium and calcium in varying amounts. Very small to trace amounts of nickel, zinc, chlorine, yttrium, molybdenum and lead were also present in some samples. No samples were shown definitively to contain arsenic, as has been reported by other researchers. The confusion over this issue is most likely due to the fact that the main absorption peaks for arsenic (K shell electrons) and lead (L shell electrons) fall at the same place in the wavelength graph.

*Wādī Faynān Agricultural Terrace Chemistry*

38 sediment samples from the agricultural terraces at Wādī Faynān 442 were analyzed during the ELRAP 2011 season. Of these sediment samples, all 38 were tested with FTIR and six were randomly selected for analysis with XRF. The samples came from three areas: Trench 7, Trench 9 and Trench 10. FTIR analysis showed that the soil from all levels except the lowest strata of each trench was extremely similar. The sediment is very similar to the Rehovot loess standard from the Weizmann Institute standard library, except that it contains significantly less of the clay component and correspondingly higher relative amounts of both quartz and calcite. Some of the specimens had slightly higher amounts of calcite relative to quartz, or *vice versa*, and this appears to be a function of their proximity to lower sandy strata. The lowest strata in each trench contained very high levels of quartz, most likely due to quartz-rich sand prevalent in the sediment matrix. The six sediment samples tested with XRF were tested using the machine's green filter (0.006" Cu, 0.001" Ti, 0.012" Al) at 40 KeV and 15 micro-amps, without the vacuum system. All trials were 180 seconds long. These six samples contained primarily calcium, strontium, zirconium and iron. Five of the six samples contained high or moderately high amounts of iron. Other elements that were present in small to trace amounts in some samples were copper, nickel, manganese and yttrium.

*Poisons Test*

12 of the sediment samples from Wādī Faynān 442 were also tested using the XRF red filter (0.001" Cu, 0.001" Ti, 0.012" Al) at 40 KeV and 29 micro-amps. These trials were all 300 seconds long. These settings optimize the XRF spectroscope to excite the elements arsenic, bromine, lead and mercury, meaning that any amount of these elements that is present will be clearly visible in the spectra. These elements are poisons and their presence in agricultural soils would profoundly affect the health of both agricultural crops and the population subsisting on those products. Of the twelve samples tested for the presence of these poisons, only one contained more than a trace amount of any poison. This specimen contained a very small amount of lead. Including this specimen, five samples showed lead present in trace amounts. Eight samples contained trace amounts of bromine, six samples contained trace amounts of arsenic and

one sample contained a trace amount of mercury. One sample contained no visible amount of any poison. These results suggest that the soils of Wādī Faynān 442 do not contain poisons in any significant amount, certainly not in quantities sufficient to alter drastically the health of populations subsisting on agricultural products grown here. While these results are preliminary, they contradict assumptions that the Faynān region was polluted at levels that were detrimental to settlement in the region (cf. Pyatt *et al*. 2000).

*Tabular Scrapers Experiment*

Analyses of ten tabular scraper fragments collected from three sites were conducted. Four of the tabular scrapers were recovered from Wādī Buwayridah 10, one from Wādī Buwayridah 1 and five from excavations at Khirbat Ḥamrat Ifdān. These chipped stone artifacts are unifacial scrapers made on pieces of tabular flint and are especially common at Chalcolithic and Early Bronze Age sites (Fujii 2011; Rosen 1997). The scrapers were each tested with eight trials on the XRF and two trials with FTIR. Small samples were taken from the cortex and chert material of each specimen, and were then pressed into KBr pellets for FTIR analysis. Two XRF trials were made on the cortex and the chert sides of each specimen, at two machine settings. The first setting used the machine's green filter (0.006" Cu, 0.001" Ti, 0.012" Al) at 40 KeV and 15 micro-amps, without the vacuum system. This setting optimizes the machine to excite higher-mass elements, from iron to niobium. The second setting used the machine's blue filter (Ti filter) at 15 KeV and 29 micro-amps, with the vacuum system. These settings optimize the XRF to read low-mass elements, from magnesium to iron. All XRF trials were run for 300 seconds each.

The purpose of this experiment was to determine the utility of XRF and FTIR for lithic studies. Specifically, the project's aim was to examine whether combining XRF and FTIR methods would allow researchers to identify a specific chemical fingerprint for different chert sources. Unfortunately, the results of these tests only confirm that more experimentation is necessary before the usefulness of combining these technologies can be thoroughly assessed. The data obtained by the experiment show that the ten specimens are all extremely similar to one another. It may be possible that the specimens tested in this experiment came from the same tabular flint source and are therefore similar or identical in chemical terms. Furthermore, it may also be the case that chemical differences between the specimens cannot be seen with these technologies.

FTIR analysis was only able to show that each chert sample was more similar to other cherts than to any other chemical compound from current project libraries. FTIR analysis of the samples' cortex showed that areas in direct contact with the chert portion of each specimen were very similar to the chert itself, while areas further out contained high levels of calcite and lower levels of chert. The various peaks visible in the XRF spectra varied in width slightly from specimen to specimen, but it is unclear whether this variation is due to sample-to-KBr ratio, variations in the chemical composition of each sample or other causes, or indeed whether this variation is significant or not. These data do not allow any conclusions to be drawn regarding the similarity or dissimilarity of the flints used at each site to one another, or to other flints from the region.

XRF analysis of these specimens also yielded inconclusive data. Virtually all the XRF trials run on the chert side of the specimens showed high to moderately high levels of silicon, small to very small amounts of strontium and very small to trace levels of iron, nickel, calcium, aluminum and potassium. Some specimens also contained trace levels of manganese, copper, and / or chlorine. Unfortunately, neither these trace elements, nor the more common elements, nor the ratios of the various elements correspond in any significant way with the different sites from which the specimens were recovered. The XRF trials run on the cortex side of each scraper yielded similar data; all trials run on the cortex appear identical to the trials run on the chert side of that artifact, except with regard to higher levels of calcium, increasing in direct proportion to the thickness of the cortex in the area towards which the X-Ray beam was directed.

Although the results obtained from this experiment are inconclusive, they should be compared to spectral data from chert samples from elsewhere in the region and further afield. Such comparison will provide a greater frame of ref-

erence within which the significance of these results – or lack thereof – may be understood.

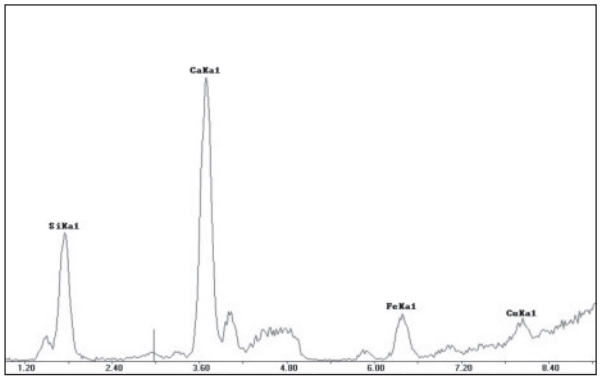
*Geology Sample Reference Collection*

The most significant project undertaken in 2011 by the digital chemistry lab was the creation of a spectral library from the project's geology sample reference collection. In previous seasons, 40 different samples of rocks typical of the Faynān region were collected and their provenience identified by Jordanian geologist Ibrahim Rabb'a, who published the 1:50,000 geology map of the Faynān region (**Fig. 17**) (Rabb'a 1994). During the 2009 season, each sample was tested using XRF. This season, the samples were re-tested with XRF in their whole (unground) and pulverized states. Limestones, dolomites and granites were sampled with the machine's green filter (0.006" Cu, 0.001" Ti, 0.012" Al) at 40 KeV and 15 micro-amps. Sandstones were sampled with the blue filter (0.001" Ti) at 15 KeV and 29 micro-amps. For each sample, two readings were taken from the unbroken specimen and two more from the specimen ground and homogenized. Each reading was run for 300 seconds. A small amount from each specimen was also ground and pressed into a KBr pellet and sampled using the FTIR spectroscope. These spectra now form a searchable digital reference library that can be used by researchers to compare the chemical compositions of samples collected in the field to those of the reference collection, allowing for rapid identification and sourcing of geological materials.

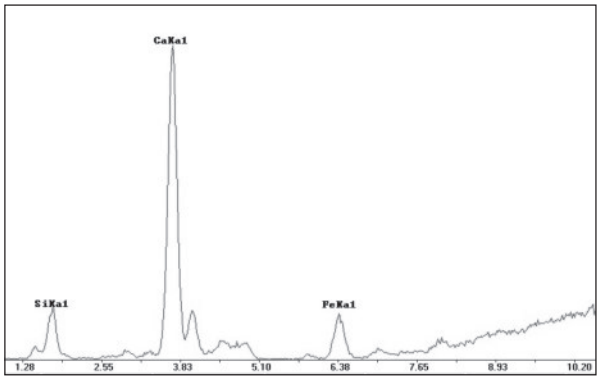
The usefulness of the digital reference library was tested in the field by comparing geological samples collected from the Khirbat Faynān *tall* site to the reference spectra (**Fig. 18**). The Khirbat Faynān samples were originally collected and tested with XRF and FTIR in order to establish a baseline for magnetrometry and ground-penetrating radar tests that were performed at the site. By establishing a basic understanding of the elemental and mineral composition of the major geological components of the site - and therefore their general resistivity, conductivity and metal content - the geophysics team were able to more accurately understand and interpret their data. Comparison of the five Khirbat Faynān geological samples to the Southern Levant Digital Geological Reference Library yielded one 89 % match, three matches above 95 % confidence and one sample that did not match any of the reference samples above 52 %. This test shows that although the geology reference samples provide an excellent baseline for the identification of many samples, the digital reference library could be improved in future seasons by the collection, identification and spectral sampling of additional geological specimens from the Faynān region and further afield. In particular, local rock formations should be sampled, along with any known sources of clay, flint, materials used for ceramic temper and local flora.

*Sampling of Copper Objects and Special Finds*

14 copper objects and one ceramic special find, a figurine head (45/90035; **Fig. 14** above), were recovered from the site of Khirbat Faynān. The single copper axe (522/60122; **Fig. 8** above) recovered from Khirbat Ḥamrat Ifdān in 2011 was also sampled. These 16 objects were tested with XRF in order to study their elemental composi-




*17. XRF spectrum of 'Calcareous Sandstone - High Calcite' geology reference sample.*




*18. XRF spectrum of 'Ferruginous Sandstone' geology sample from Khirbat Faynān (surface grab sample).*

tion. The ceramic figurine head was tested with the instrument's green filter (0.006" Cu, 0.001" Ti, 0.012" Al) at 40 KeV and 15 micro-amps. Two tests were run at 180 seconds each. These settings optimize the instrument to read higher-mass elements from rubidium to niobium, enabling researchers to view and analyze ratios of the elements rubidium, strontium, yttrium, zirconium and niobium, which are often present in trace amounts in ceramic artifacts and therefore can be of use in sourcing pottery. The tests showed that the figurine head contained a small amount of iron, along with trace amounts of copper, strontium and zirconium. Future comparison with spectra obtained from local clay sources may allow researchers to ascertain the original provenience of this artifact.

The copper items were tested using the XRF's yellow filter (0.001" Ti, 0.012" Al) at 40 KeV and 4.5 micro-amps. These settings optimize the instrument to identify metals. All tests were run for either 180 or 300 seconds. The copper axe from Khirbat Ḥamrat Ifdān proved to contain extremely high amounts of copper, with only a trace amount of iron present. No tin or other hardening material was present in the spectra, indicating that this object was most likely not intended as a utilitarian object.

Of the 14 metal objects from Khirbat Faynān, four were copper-colored coins (383/90388). These four coins contained high levels of copper, but also contained significant amounts of lead and very small to trace amounts of both tin and iron. The lead, tin and iron most likely served to harden the metal of the coins, contributing to their preservation. This alloy is also similar to the one used in debased Roman brass coinage of the late 1st and 2nd centuries AD, which replaced zinc with lead and tin (see Kallithrakas-Kontos *et al*. 1993: 267). However, without further analysis and in the absence of a reading from a numismatics expert this can only be regarded as an intriguing speculation.

One of the copper objects recovered from Khirbat Faynān was a bell (298/90288). This object contained extremely high levels of copper, with small amounts of iron and lead, and a trace amount of calcium, suggesting that is local. Five copper objects were in the shape of bracelets. These bracelets all contained extremely high levels of copper, small to very small amounts of iron and very small to trace amounts of manganese and lead. One specimen (127/90117) contained a moderately high level of zinc. This piece was the only bracelet made of a flattened piece of metal; the others were rounded like thick wires. The added zinc may have allowed the metal to be more pliable or stronger in thinner shapes.

Two of the metal objects recovered from Khirbat Faynān were in the shape of pins (539/90529; 398/90388); a third appeared to be either a very large pin or a nail (128/90118). These three objects all contained high levels of copper. The large pin or nail also contained very small amounts of iron and lead. In addition to extremely high copper levels, the two smaller pins contained small amounts of silver and very small to trace levels of iron, lead and bromine. With regard to these objects, areas with higher amounts of silver also contained higher levels of bromine. It is likely that the bromine was either present in the silver ores used by the metalworkers, or it was used somehow in the creation of these metal objects.

The final metal object from the site of Khirbat Faynān was a copper pendant. The pendant contains a female figure in relief (540/90530; see **Fig. 16** above) and was found in association with several small crimped metal clasp-like fragments. Like the small metal pins described above, the pendant and its associated metal fragments contained high levels of copper and moderately high amounts of silver. They also contained very small to trace amounts of iron, lead and bromine. Also like the pins, the bromine levels in the pendant and fragments increased in areas of higher silver content. It is possible that the silver could have been plated over the copper core of the pendant; the silver may have been imported to Faynān.

The testing of these objects with XRF provided a great deal of useful information for identifying the metal and chemical composition of these artifacts. In the future, it may also be useful to compare the spectra obtained through these tests with samples of other ancient metal objects or more modern objects in order to gain a more detailed understanding of their manufacture.

*Summary and Future Directions for Chemistry Research*

The 2011 addition of the FTIR spectroscope to the ELRAP Digital Chemistry Lab was a major improvement to the lab this season. In conjunction with the XRF spectroscope, the FTIR

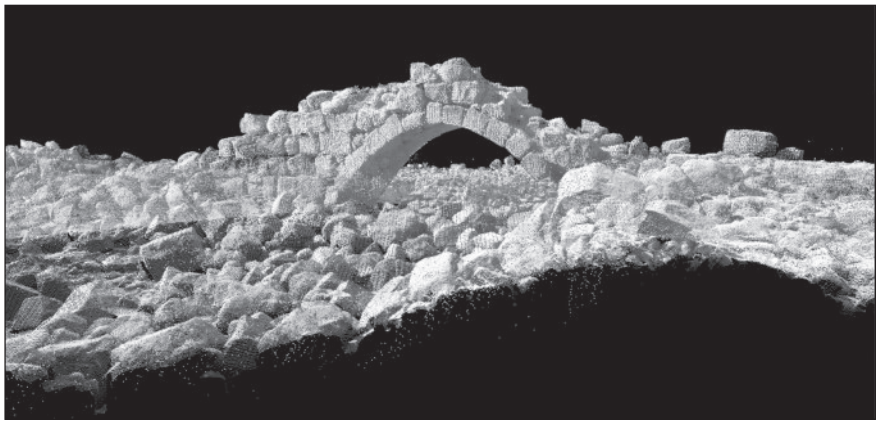
instrument allowed the research team to collect more detailed data regarding the chemical composition of many different kinds of artifacts, archaeological materials and cultural sediments. The establishment of a searchable spectral library of local and regional geological samples will allow the ELRAP team to develop a more accurate understanding of the local landscape and the ways in which ancient populations interacted with this landscape. In particular, one important undertaking for future seasons should be the expansion of the spectral library; categories such as ceramics, lithics, clays and other materials should be strategically sampled for future comparison. Overall, the combination of X-Ray Florescence and Fourier-Transform Infrared Spectroscopy allowed the ELRAP team to gain a more complete understanding of the chemical properties of many different objects and sediments. These two techniques complement one another very well, because in many areas where one is insufficient, the other is quite useful. There are also many areas in which the use of both techniques is helpful. Nevertheless, there are certain problems - such as the analysis of lithic objects - that will require much more experimentation before serious progress can be made.

**Terrestrial Laser Scanning in the Field**

The unique ancient landscape of Jordan's Faynān district is a prime candidate for the application of a LiDAR (Light Detection and Ranging) survey as a High Definition Documentation (HDD) tool. The potential threat of modern mining and development puts some of the sites in the region at risk of destruction. However, the main goal of using LiDAR in Faynān is to create a 'digital scaffold' on which many different datasets can be embedded, analyzed and visualized (Petrovic *et al*. 2011). During the 2011 ELRAP field season, nine sites and their surrounding environs were laser scanned with terrestrial LiDAR using a Leica Scanstation 2 (Model HDS 4050). These nine sites include: Khirbat Faynān, Khirbat Nuqayb al-Asaymir, Khirbat Ḥamrat Ifdān, Tallit Ifdān, Umm al-'Amad, Khirbat al-'Irāq, survey site JS001 on Jabal Ṣuffāḥah and survey site JS002 on Jabal Suffāḥah, as well as a digital model of the Calit2 Digital Archaeology Lab in Shawbak. Khirbat Faynān, Khirbat Nuqayb al-Asaymir, Khirbat Ḥamrat Ifdān and Tallit Ifdān are located within the *wadi* systems of the lowlands between Wādī 'Arabah and the Sharāh mountains, while the latter four sites and the digital lab are located in the Edom highlands of the Sharāh mountains. Here we describe the LiDAR work carried out at Khirbat Faynān and the unique ancient Roman mining complex at Umm al-'Amad overlooking the Faynān valley.

*Khirbat Faynān*

Khirbat Faynān was the primary focus of the 2011 LiDAR survey and the majority of time on the scanning calendar was allotted to this *ca.* 15 hectare site (**Fig. 19**). The site's heavy concentration of architecture and considerable size were significant stumbling blocks in carrying out its successful scanning. In particular, the geomorphological shape of the *tall* and its several plateaus precluded the use of central targets that would have been visible from all areas of the site (hence the pre-season decision to utilize free-station scanning without targets). Unregistered traverse targets were, however, used during daily set-ups to speed up the field



*19. Screenshot of 2011 LiDAR scan of the so-called monastery complex at Khirbat Faynān. The date currently rests on a single late 6th century AD inscription found in the building (Sartre 1993).*

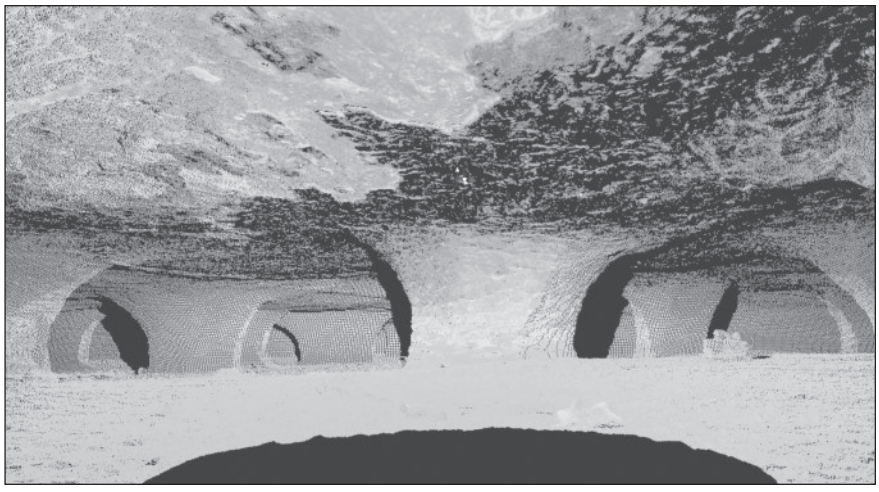
registration of daily point clouds from the data collected. A large-scale, stitched point cloud of approximately four and a half billion points was ultimately created of the 130 scans taken from Khirbat Faynān. Such a large point cloud can only be manipulated in Visicore, the point manipulation software developed as part of an associated ELRAP project with UC San Diego (Petrovic *et al*. 2011). This point cloud dataset will provide the 'data scaffold' needed for future excavation and survey work at KF.

*Umm al-'Amad Roman Mining Complex*

Umm al-'Amad (Ar. "the mother of pillars") was first recorded by Nelson Glueck in the 1930s (Glueck 1935) and, aside from an occasional wanderer, has had little documentation since. While our team was in the field in 2011, this Roman period site fell under threat from on-going road construction for the possible renewal of mining work in the Faynān district. Thus, Umm al-'Amad was added to the scanning itinerary at the last moment and preparations were made for scanning it with very little consideration of what the site would be like on its scanning day (16 November 2011). The low cavern entrance and interior galleries precluded use of the standard tripod. Likewise, the complex galleries of columns ruled out the use of targets without significant, time-wasting backtracking (**Fig. 20**). Therefore, a specially designed 'quadropod' was utilized for the day and the free-station method of scanning continued to be employed for expediency and efficiency's sake in the field, leading to considerable time spent post-processing the data in the lab. Power for the interior scans of the cave system and one of the exterior scans was provided by portable car batteries. The final scan was completed using a generator positioned two terraces above the caves on the face of the mountain, connected to the scanner via a very long extension cord. Although the mines go into the mountain for approximately 150 meters, given the time constraints of the single day allowed for scanning, only five interior scans were made of the primary galleries and two scans of the exterior. This provided both landscape context and was an attempt to fill in parts of the front of the mine where the roof was too low for the scanner (even on the 'quadropod'). This resulted in approximately 5/8 of the cave being scanned. Scans at Umm al-'Amad were done at 2 x 2 cm resolution on a 10 to 15 meter range, thereby collecting approximately eight million points. This LiDAR scan provides an important record of this unique ancient mining complex - perhaps the largest in the eastern Roman empire (Mattingly 2011: 181).

**Conclusion**

This preliminary report summarizes a new archaeological research project that focuses on excavations at Khirbat Faynān - the largest settlement site in Jordan's Faynān copper ore resource zone. While our previous (2002 - 2010) research focused on studying the network of Iron Age copper extraction and processing sites (Levy *et al*. 2012), Khirbat Faynān provides a unique opportunity to investigate the social and political center of copper exploitation from the Early Bronze Age to late historic times. The 2011 expedition to KF discovered an important



*20. Screenshot of LiDAR scan inside Umm al-'Amad Roman mining complex. Note the crate on the right side of the image for scale. The ceiling in this area is c. 1.8 meters in height.*

Early Bronze Age settlement (*ca.* 2,500-2,000 BC), Iron Age remains including a unique anthropomorphic statuette head (*ca.* 1,200-500 BC) and a Roman / Byzantine mortuary complex. New 'cyber-archaeology' methods were employed, including digital acquisition tools such as LiDAR, GPS, geophysical surveys and a special helium balloon automated platform for geo-referenced digital photography. On-site chemical characterization tools including XRF and FTIR were employed for real-time micro-archaeology studies. A survey was conducted in the Buwayridah springs area to the south of Wādī Faynān and ten agricultural terrace systems were sampled for dating and geochemical data. As a prelude to the month-long excavation at KF, small soundings were carried out at the Early Bronze Age copper production site of Khirbat Ḥamrat Ifdān and the mediaeval Islamic period settlement at Khirbat Nuqayb al-Asaymir in order to obtain stratigraphic and dating samples. All of these research activities contribute to the underlying goal of the ELRAP expedition: to study the changing role of ancient mining and metallurgy on the evolution of societies in southern Jordan from Neolithic to Islamic times.

**Acknowledgements**

We are grateful to the Department of Antiquities (DoA) of Jordan for their help and interest in the 2011 ELRAP expedition, in particular Jehad Haroun, Khalil Hamdan, Qutaiba al-Dasouqi, and especially Abdelrahim al-Dwikat and Zouhair Zoubi who served as DoA representatives to our project. Thanks also to Barbara Porter (Director) and Christopher Tuttle (Associate Director) of the American Center of Oriental Research (ACOR), 'Ammān for their help and support. Members of most of the *bedouin* tribes from the Qurayqirah / Faynān villages participated in the excavations at KNA, KHI and KF. These include the Amarin, Azazmeh, Rashaidah, Zayadin and al-Manajah tribes. We are grateful for their help and the support of the local tribal tourism co-operatives who are important stakeholders in the archaeology and cultural heritage goals for the Faynān region. Funding for this project came from the National Geographic Society (Grant #8974-11), Committee for Research and Exploration; National Science Foundation IGERT (Integrative Graduate Education and Research): Training, Research and Education in Engineering for Cultural Heritage Diagnostics (NSF 0966375), Center of Interdisciplinary Science for Art, Architecture and Archaeology (CISA3), California Institute of Telecommunication and Information Technology (Calit2) San Diego Division; Cyberinfrastructure, Portable NexCAVE and Archaeological Research. Calit2 Strategic Research Opportunities (CSRO) grant program; NSF grant EAR - Geophysics, 09-539; the Jerome and Miram Katzin Family Foundation; and the Norma and Reuben Kershaw Family Foundation. A special thanks is due to Ramesh Rao, Director, Calit2 San Diego Division for his support of the ELRAP expedition. We deeply appreciate the hard work carried out by the undergraduate students enrolled in the UC San Diego Middle East Archaeology Field School that forms part of the ELRAP research endeavour.

The 2011 ELRAP expedition was directed by Thomas E. Levy and Mohammand Najjar. The survey at Buwayridah springs and excavations of agricultural terraces in the Khirbat Faynān hinterland was supervised by Kyle Knabb. The excavation at KNA was supervised by Ian Jones, with assistance from Aaron Gidding and Kathleen Bennallack. Paige Kohler, Jessica Linback, Anne Snyder, Leah Trujillo, Karine Muschinske, James Darling, Christopher Hipwood, Justin Mann, Paul Verhelst, Ross Davison and Teresa Holland all participated as student volunteers on the excavation. The excavation at KHI and KF was supervised by Aaron Gidding, assisted by Ian Jones and Kathleen Bennallack. Paige Kohler, Jessica Linback, Anne Snyder, Leah Trujillo, Karine Muschinske, James Darling, Christopher Hipwood, Justin Mann, Paul Verhelst and Ross Davison all participated as student volunteers on the excavation.

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# THE PALAEOLITHIC SEQUENCE OF WĀDĪ ṢABRĀ: A PRELIMINARY REPORT

*Daniel Schyle and Juergen Richter*

## Introduction: History of Research

In 1983, several Upper and Epipalaeolithic sites were recorded during a Neolithic survey in Wādī Ṣabrā (Gebel 1984, 1988; Schyle and Uerpmann 1988).

During the establishment of the 'Our Way to Europe' Collaborative Research Centre (www.SFB806.de) in 2007, which aims to investigate the possible migration routes of modern man from Africa to Europe and the palaeoenvironmental conditions of this migration, these Palaeolithic sites were suggested for further investigation. The sites represent ideal locations for such research, as the finds occur embedded in thick *wadi* deposits, in close association with terrestrial palaeoclimate archives of specific local relevance.

Field seasons were spent in Wādī Ṣabrā in summer / autumn 2009, autumn 2010 and autumn 2011 by a joint team from the Universities of Aachen (geosciences) and Cologne (prehistory). Preliminary geoscientific results have been published by Bertrams *et al*. (2012).

## The Archaeological Sites

The sites recorded so far belong to the time span between the Lower Palaeolithic and Neolithic. The focus of fieldwork was Wādī Ṣabrā, which is divided by a dry 'waterfall' into a lower part around al-Anṣab and an upper part immediately south of the spring of Ṣabrā. An additional site was tested near the village of aṭ-Ṭaybah (**Fig. 1**).

## Lower Wādī Ṣabrā

*adh-Dhāhir*

The oldest finds discovered so far in Wādī Ṣabrā were found in 2010 on an old limestone surface close to the edge of the lower Wādī Ṣabrā, about 500m south of al-Anṣab.

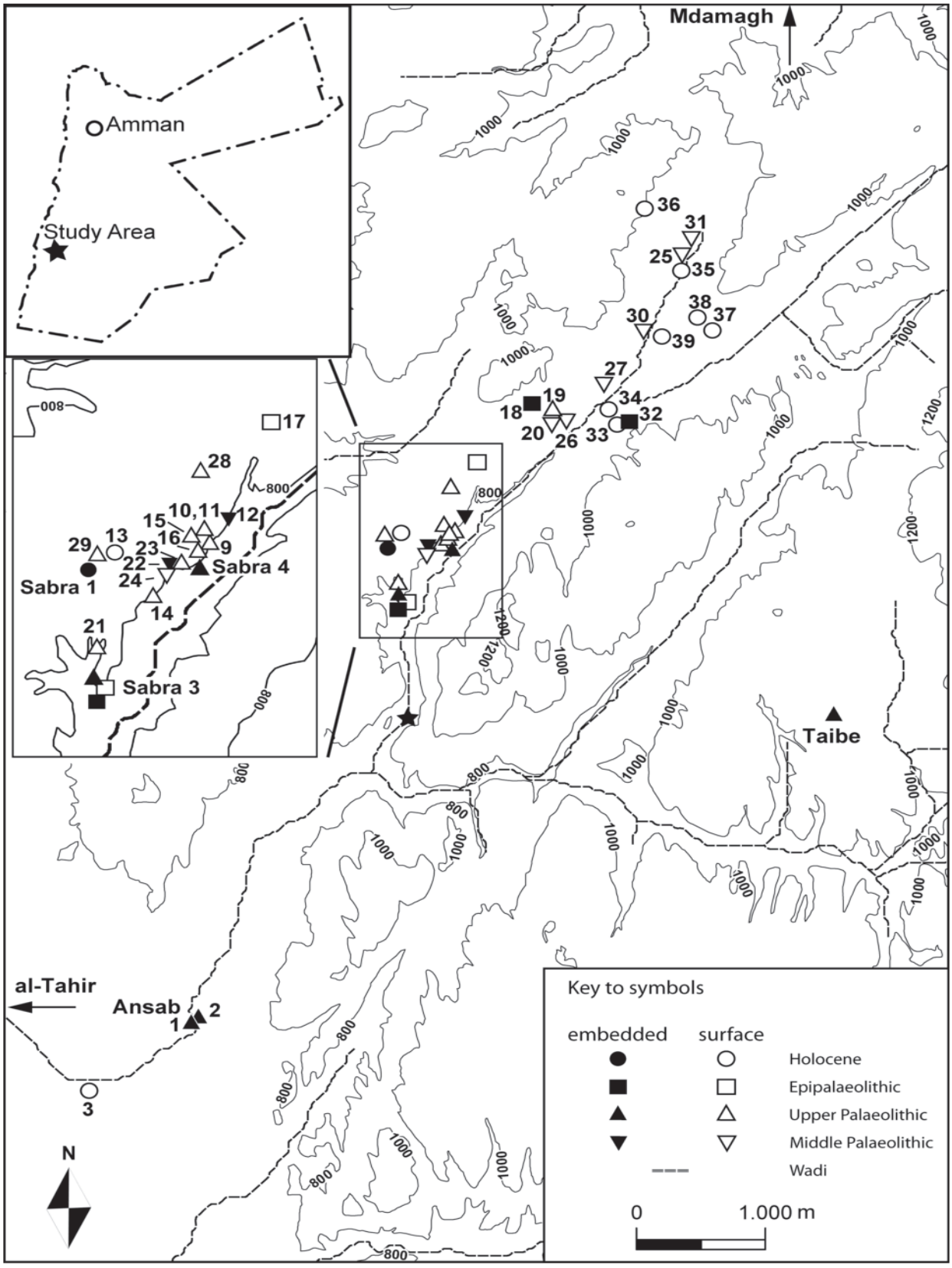
The site is located along a track leading out of the *wadi* to the east, finally ending at the road from Rājil to Wādī 'Arabah. On the north side of the track, large chunks of flint are scattered over an area of roughly 200x500m (**Fig. 2**). Several handaxe preforms were discovered amongst these chunks. Subsequent survey of the site yielded a mixed assemblage of handaxe preforms and Levallois points and cores, as well as some substantial blades with large, plain platforms. Characteristic artefacts were collected and their co-ordinates recorded by GPS. Clearly, this natural flint occurrence was exploited from the Lower Palaeolithic onwards, perhaps even until Chalcolithic times.

*Site of al-Anṣab*

al-Anṣab 2

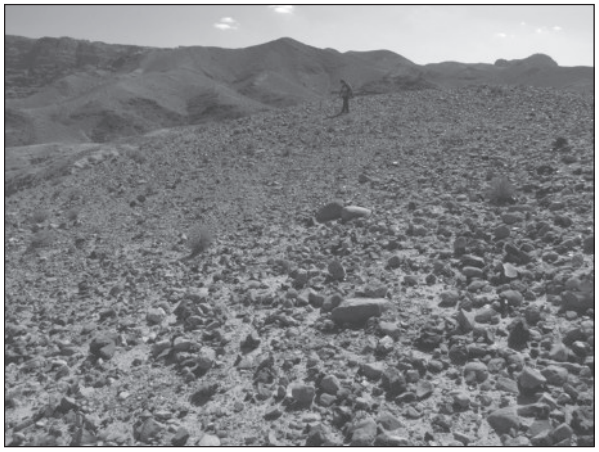
Discovered in 1983 (Schyle and Uerpmann 1988), the site is located close to tilted limestone formations which include numerous flint seams and block the outlet of Wādī al-Anṣab, an eastern tributary of Wādī Ṣabrā, some 1,000m upstream from adh-Dhāhir (**Fig. 3**). Thick deposits in the tributary *wadi* are held back by the limestone ridge and have thus been protected from erosion.

The fieldwork in 2009 was dedicated to the previously known Early Ahmarian occurrence at al-Anṣab 1. Although we spent almost three weeks at the site, carrying out 3D mapping (**Fig. 4**), local surveys, the excavation of several geoscientific and two archaeological sections, this work did not result in the discovery of any finds other than the previously known Early Upper Palaeolithic material.




*1. Distribution of sites in Wādī Ṣabrā; star indicates location of 'waterfall'.*

As a result, in 2010 we decided to limit our work at al-Anṣab to small-scale geoscientific sampling. However, in spring 2010, unusually heavy rains exposed additional find spots close to our 2009 excavation area. Unfortunately, these were only discovered towards the very end of the 2010 field season and only one day was available in which to assess the surface scatters. Two of them turned out to be superficial. However, at the third, densely packed artefacts were found outcropping from a steep slope of *wadi* deposits. A sounding revealed a small secondary deposit of well-preserved artefacts without organic remains. This occurrence was designated al-Anṣab 2.



*2. adh-Dhāhir from the west; note large chunks of flint in foreground to right.*

At first sight, the artefacts reveal a very similar technology to that of the Initial Upper Palaeolithic assemblage excavated from layer B of Ṭawr Ṣadaf in Wādī al-Ḥasā (Fox 2003), *viz*. laminar, convergent blanks with large plain platforms occurring together with predominantly flat single or opposed platform cores. Despite being relatively large, the recovered assemblage includes only a single tool: a burin (**Fig. 5**).

The positioning of this secondary deposit of apparently Initial Upper Palaeolithic artefacts slightly *above* the Early Upper Palaeolithic Ahmarian layer is for the moment far from being understood. It might indicate a general sloping and increased erosion of the deposits downwards to the *wadi* bottom, or perhaps two phases of sediment accumulation, separated by a major erosional event.

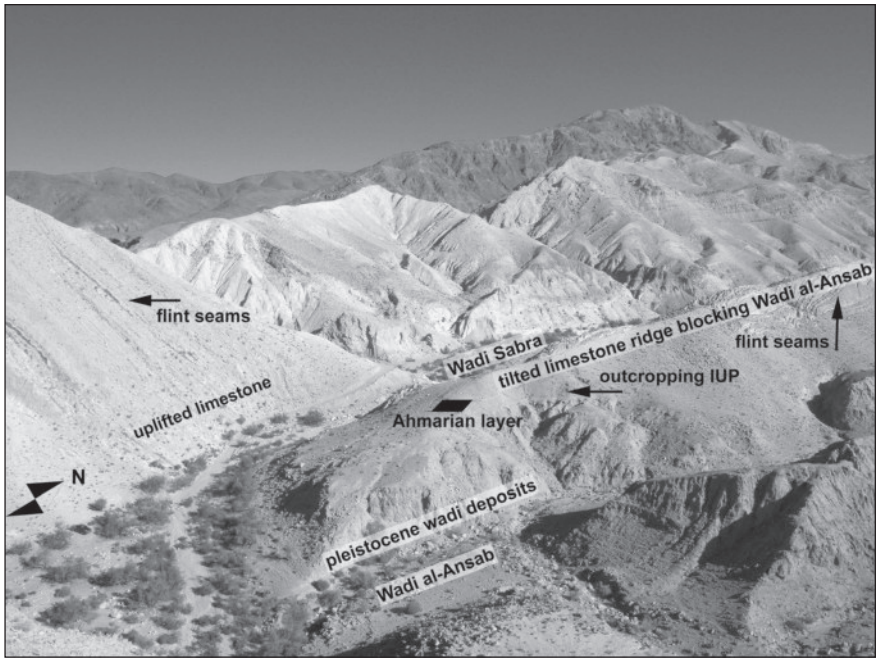
*Upper Palaeolithic*

al-Anṣab 1

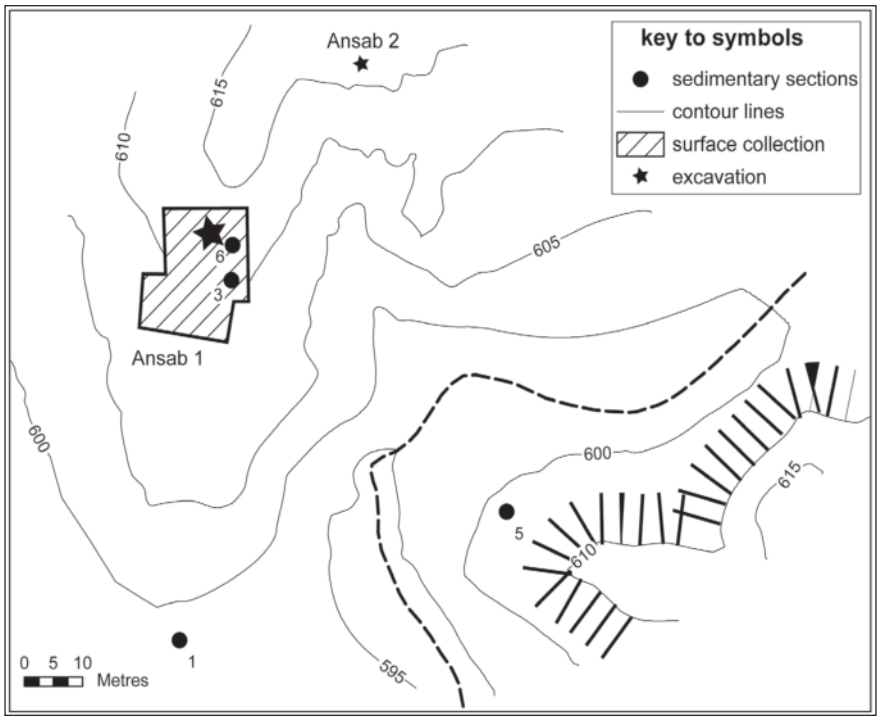
The true *in situ* record at al-Anṣab starts with the Early Upper Palaeolithic Ahmarian layer on the surface of the remnant.

In spring 2009, we noticed two natural sections with outcropping Upper Palaeolithic artefacts. In summer / autumn 2009, the site was gridded, surface collected and the two natural sections with adhering eroded artefacts – potential outcrops of *in situ* layers – were cleaned and excavated.

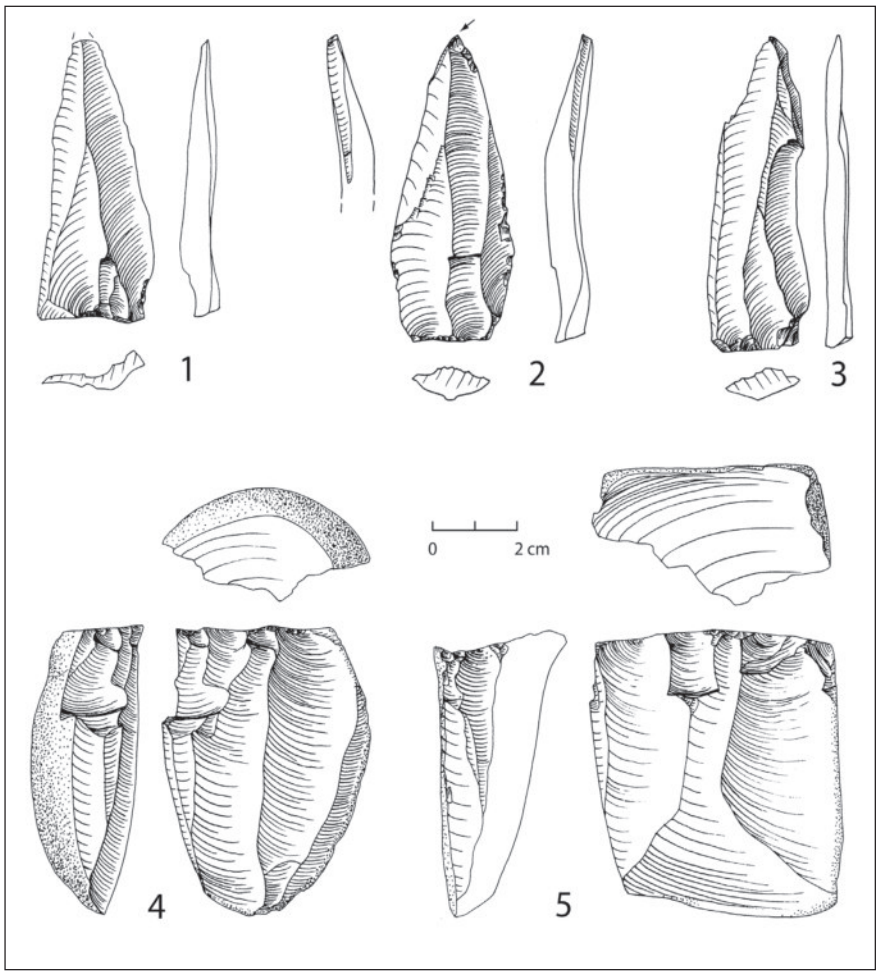
After excavation it turned out that only the



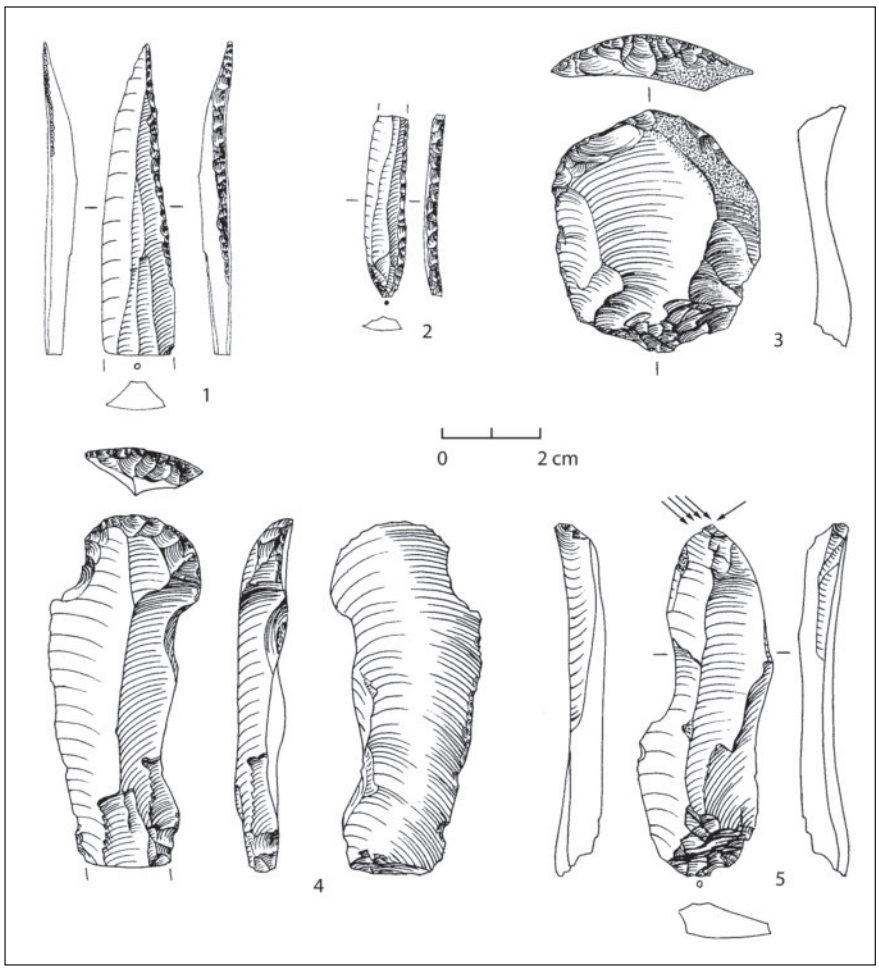

*3. View of al-Anṣab to the northwest before excavation.*




*4. General map of the al-Anṣab site.*




*5. al-Anṣab 2: (1, 3) blades with large plain platforms; (2) burin on blade; (4 - 5) cores.*




*6. al-Anṣab 1: (1 - 2) fragments of El Wad points; (3 - 4) endscrapers; (5) burin.*

upper natural section represented a true *in situ* layer, which was marked by a band of black sediments and high artefact densities. The preliminary results of the lithic analysis indicate Early Ahmarian technology and typology: a single soft hammer reduction strategy for straight, elongated, thin, curved blades and bladelets from single platform cores with an acute platform angle. Blades are much more numerous than flakes. The tool types include numerous El Wad points (**Fig. 6**), some of them with steep lateral retouch or backing (and in very variable sizes), and simple endscrapers on blades. Core trimming elements have frequently been used as blanks for the production of endscrapers and burins. Carinated pieces are present but rare.

The high proportion of cores and core trimming elements, and the low proportion of tools indicate that a main activity at this site was the knapping of flint from nearby outcrops. However, the dark grey cultural layer, complete range of tools and presence of (a very few small) bone fragments[1] represent other activities as well.

One OSL sample from above and six samples from below the cultural layer were dated to ~33 ± 6 ka (Klasen forthcoming). Specific methodological problems related to the low radionuclide contents of the sediments surrounding the samples resulting in rather imprecise dates. Being statistically of the same age, regardless of their stratigraphic position, the dates seem to indicate a rapid accumulation of the remnant's sediments. The overall date is broadly compatible with the archaeological assessment of the occupation layer.

**Upper Wādī Ṣabrā**

A larger number of sites are known from

1. The only taxon identified so far is gazelle (H. Berke [Institute of Prehistoric Archaeology, University of Cologne] pers. comm.).

the upper part of Wādī Ṣabrā, about two hours' walk south of the Nabataean settlement of Ṣabrā. During the 2009 field season, we identified several new Upper and Epipalaeolithic occurrences. Surface collections and small-scale excavations were carried out at Ṣabrā 4 - Palm View 1 and 3 (Upper Palaeolithic) and at Ṣabrā 3 (Late Upper and Early Epipalaeolithic). In 2010 we made the first Middle Palaeolithic finds at Ṣabra 2010 / 4, completed the excavation at Ṣabrā 4 - Palm View 3 and surveyed the Pleistocene remnants of the upper Wādī Ṣabrā from its source in the north to its constriction in front of the 'waterfall' (**Fig. 1**).

*Middle Palaeolithic*

In 2009, a few Middle Palaeolithic artefacts were found as more or less isolated single finds on the surface or within secondary deposits, e.g. *wadi* terraces. As a result, a main objective of the 2010 field season was to search for Middle Palaeolithic (MP) artefacts associated with sediments of the same time period. We succeeded in identifying a few locations within the upper Wādī Ṣabrā where MP artefacts were collected from the surface of *wadi* deposits, suggesting a MP or earlier date for at least some of the lowest parts of those deposits. At two locations, there is the potential for preservation of MP finds within *in situ* deposits.

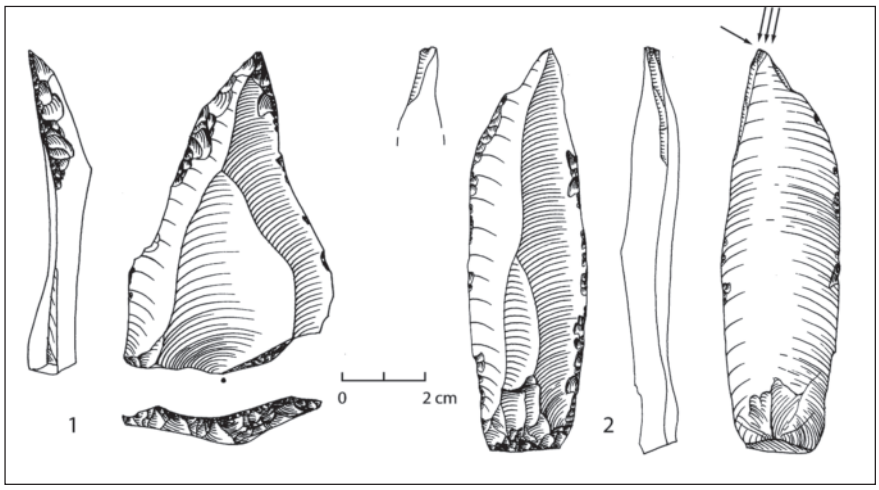
Ṣabrā 2010 / 4

This was the first discovery of fresh Middle Palaeolithic artefacts in 2010. Some were found in an erosional channel, but one artefact – a well-preserved typical Levallois point – was picked up from the top of the *wadi* sediment remnants, being the first evidence for the presence of Middle Palaeolithic deposits at the base of the sequence of Pleistocene sediments in Wādī Ṣabrā. In most parts of the adjacent erosional channel, the Middle Palaeolithic pieces were mixed with artefacts of apparently Upper Palaeolithic technology. Apart from the Levallois point (**Fig. 7.1**), they include a large Levallois blade with facetted butt in 'chapeau de gendarme' shape and a small Levallois core. There are some other blades with large, plain platforms, struck using a hard hammer technique, which may also belong to the Middle Palaeolithic component of the finds (**Fig. 7.2**). However, the presence of several blades with punctiform butts indicates an Upper Palaeolithic component amongst the finds from the erosional channel.

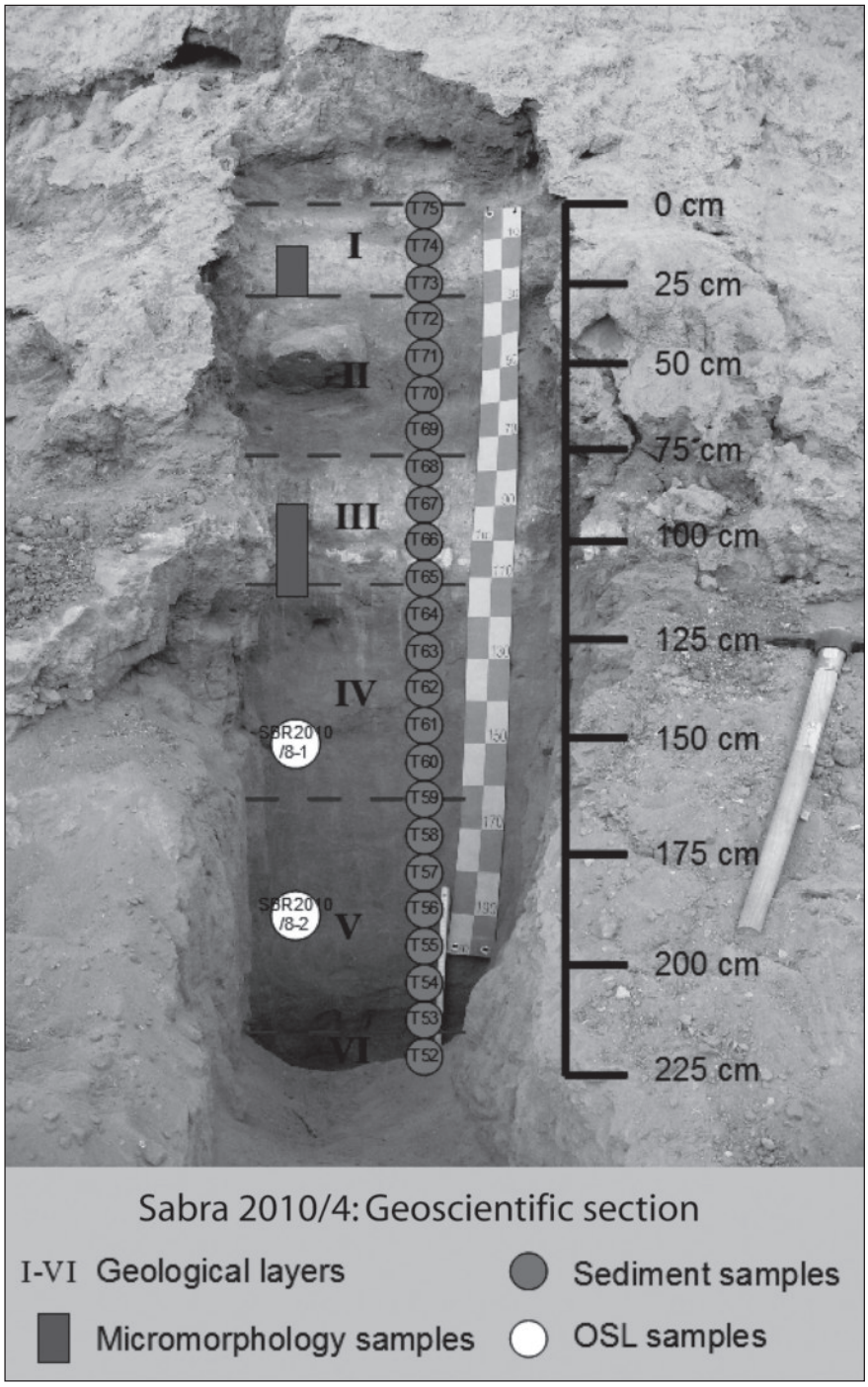
Subsequently, we cleaned the section of deposits above the location of the Levallois point. This revealed two concreted calcareous horizons, of which the upper (**Fig. 8.I**) contained two (undiagnostic) artefacts and might thus represent the layer from which the Levallois point originated. An additional geoscientific section (**Fig. 8**) was dug a few meters away from the location of the archaeological finds. The dating of two OSL samples taken from below the lower calcareous layer (III) is in progress.

Ṣabrā 2010 / 15

Another assemblage of about 20 artefacts of laminar Middle Palaeolithic technology was collected in 2010 in several erosional channels on a remnant a few hundred metres downstream from 2010 / 4. In contrast to the artefacts from al-Anṣab 2, most of the blanks (including two




*7. 2010 / 4: Middle Palaeolithic artefacts collected from the surface of the Pleistocene sediments.*




*8. Stratigraphic section at Ṣabrā 2010 / 4; layer VI rests on bedrock.*

Levallois points and a burin) have facetted butts. In spite of an intensive search, we were not able to locate an *in situ* layer from which these artefacts might have been eroded.

*Upper Palaeolithic*

Sabrā 4

A large, dense surface scatter of Upper Palaeolithic artefacts in a fresh state of preservation on a terrace in an intermediate position within the *wadi* deposits had already been noted in 1983 and was then designated Ṣabrā 4 (Schyle and Uerpmann 1988).

Having relocated the site in spring 2009, we searched for *in situ* deposits. During this activity we located two other separate occurrences

*9. Ṣabrā 4 - PV1 as relocated in spring 2009, seen from the east. The large surface scatter of artefacts is to the left of the person. The stratigraphic section was dug later (summer 2009) towards the centre of the remnant.*

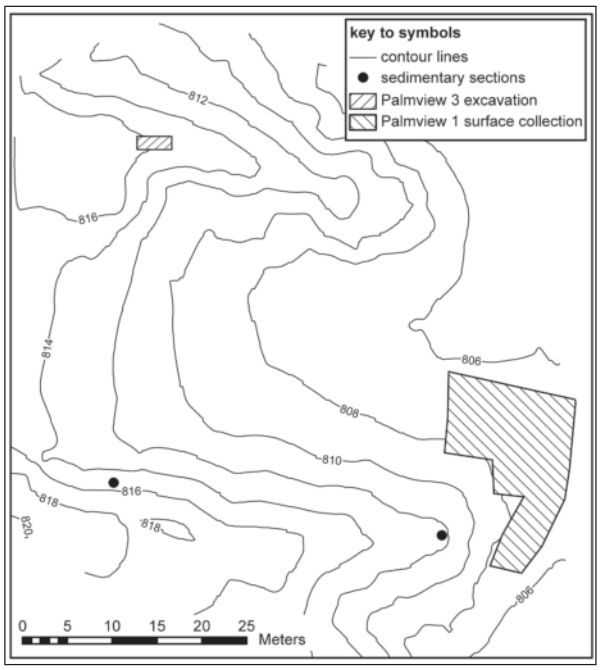
of Upper Palaeolithic artefacts eroding out of the *wadi* deposits nearby. The sites were named Ṣabrā 4 – Palm View 1-3; Palm View 1 designated the extensive surface scatter. In summer / autumn 2009 we carried out a detailed 3D recording of the site complex topography, collected about half the large surface scatter of Palm View 1 and started an excavation at Palm View 3, located on a very small remnant spur within the *wadi* deposits. This yielded a lithic assemblage from an *in situ* cultural layer, which also contained bone fragments[2]. Additionally, several geoscientific sections were dug nearby.

In 2010, the remaining parts of Palm View 3 were finally excavated, as was the location at Palm View 1 where artefacts were found eroding from the base of the stratigraphic section dug in 2009. Furthermore, the vicinity of Ṣabrā 4 was intensively resurveyed, which led to the discovery of several additional occurrences of Upper Palaeolithic artefacts.

Ṣabrā 4 - Palm View 1

This is the large surface scatter that led to the discovery of the site complex in 1983. Artefacts are spread on a terrace within the *wadi* deposits over an area of approximately 30x10m. The terrace is overlooked by a remnant with an almost vertical west-facing natural section (**Fig.9**).

In summer 2009, about half of the surface scatter was completely collected and a stratigraphic section dug into the natural section of

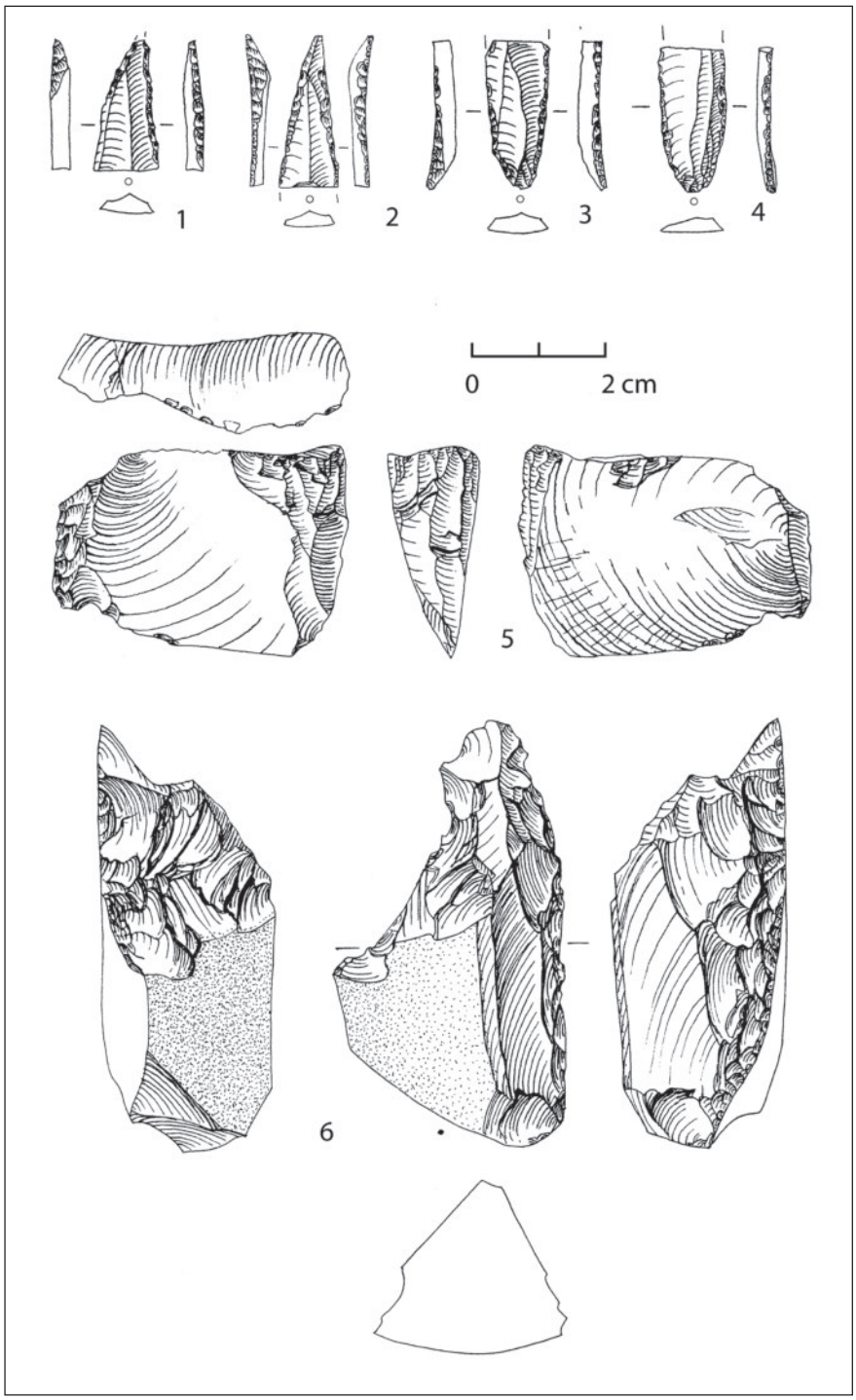



*10. Contour plan of Ṣabrā 4 - PV 1 and 3, showing areas of excavation (PV 3) and surface collection (PV1), as well as stratigraphic sections.*

the remnant, from its top to the top of the terrace (**Fig. 10**). During this activity, no artefact-bearing layer could be identified within the section. In 2010, the section was extended further down into the extremely cemented material of the terrace. A few artefacts and a piece of charcoal were recovered from this cemented layer, so it might be assumed that the origin of the artefact spread on the surface is within the upper part of the terrace. However, owing to the lack of bone and low density of artefacts from the section, the artefacts remaining within the sediment might not be preserved *in situ*.

The Palm View (PV) 1 assemblage (**Fig. 11**) is significantly different from the finds recovered at al-Anṣab. Amongst the debitage and tools, flakes are almost twice as numerous as blade/lets. Carinated pieces, including nosed, shouldered and carinated scrapers, as well as carinated burins (18% of tools), are much more numerous than at al-Anṣab. A particular characteristic is the occurrence of numerous 'combined' tools, which in most cases are 'recycled' pieces, e.g. a scraper transformed into a burin after exhaustion.

2. The list of taxa from Palm View 3 identified so far by H. Berke is somewhat longer than at al-Anṣab and includes an unidentified equid, gazelle, wild sheep, fallow deer and wild cattle.




*11. Selected tools from PV 1: (1 - 4) El Wad point fragments; (5) burin de vachons; (6) carinated scraper.*

The technology and typology of this assemblage clearly warrant further discussion within the context of the Levantine Aurignacian, even after the recent redefinition of the latter (Belfer-Cohen and Goring-Morris 2003; Goring-Morris and Belfer-Cohen 2006; Williams 2006).

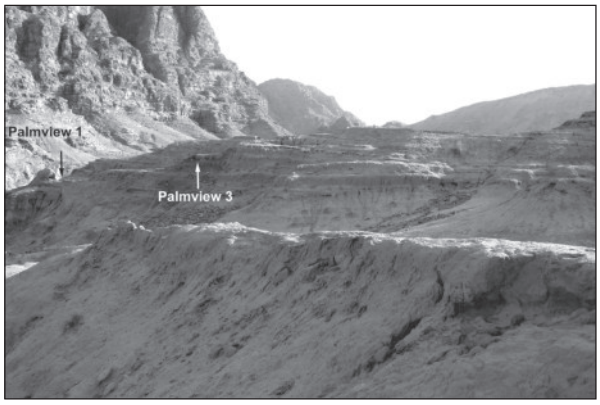
Sabrā 4 - Palm View 3

The occurrence of PV 3 was first noticed in spring 2009 as a thin band of dark sediment containing lithics, bones and charcoal, lying within a small spur of *wadi* sediments less than 5 m in length and 1m in width, which protruded out to-

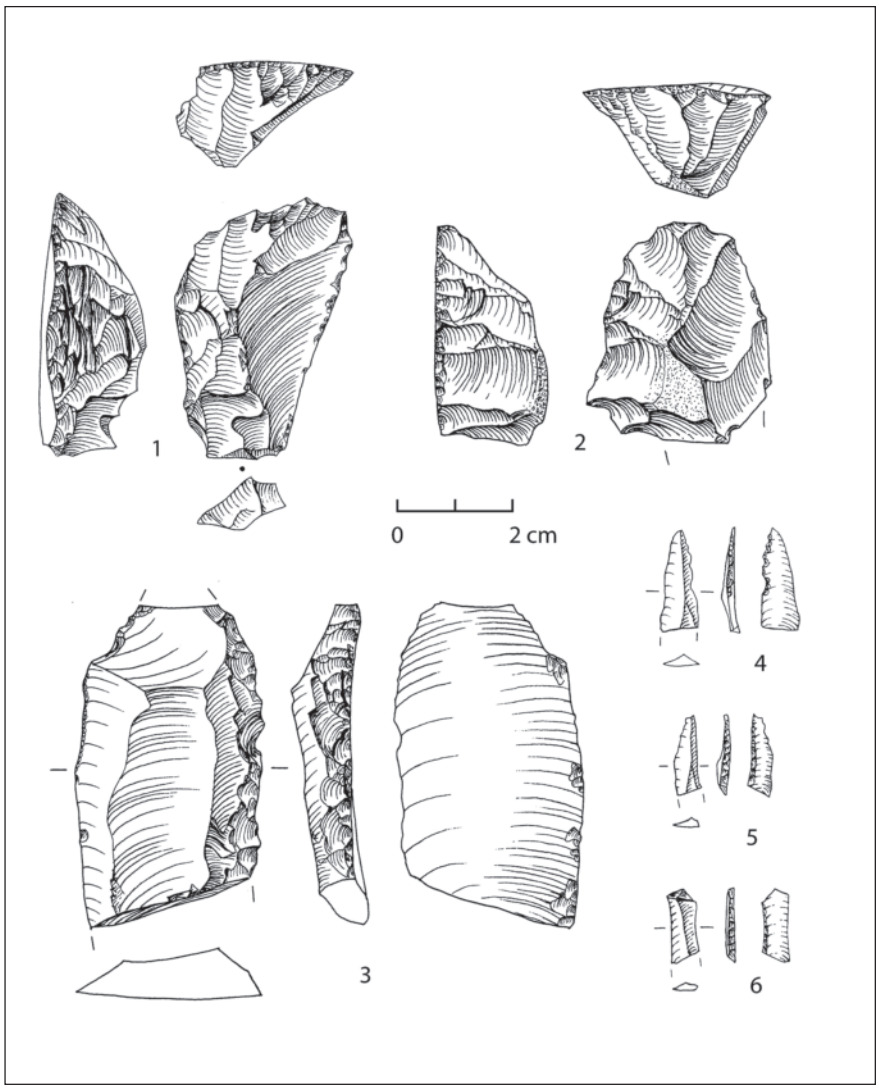
wards the east. The stratigraphic position of PV 3 is above the level containing artefacts at PV 1 (**Figs. 10, 12**). The spur was completely excavated during the summer 2009 and autumn 2010 field seasons.

The lithic assemblage recovered is rather small (*ca.* 450 artefacts only, excluding chips) and shows similarities, as well as differences, with the assemblage from PV 1 (**Fig. 13**).

The flake/blade ratio amongst the debitage is almost identical to PV 1 but, amongst the tools, blade/lets slightly predominate at PV 3. Carinated pieces are present, but are less common at PV 3 compared to PV 1. Whereas small El Wad points are numerous at PV 1, they are completely absent at PV 3. In contrast, small comma-shaped, inversely retouched bladelets ('Dufour bladelets') are numerous at PV 3, but do not occur at PV 1. Their absence at PV 1 might simply be the result of their very small size, i.e. they've been washed away from the PV 1 surface; indeed, the carinated pieces suggest




*12. The sites of PV 1 and PV 3 as seen from the north.*




*13. Selected tools from PV 3: (1 - 2) carinated scrapers; (3) blade fragment with Aurignacian retouch; (4 - 6) inversely retouched bladelets.*

that they should have been present before erosion. However, the absence of El Wad points at PV 3 cannot be explained by preservation issues. Finally, the high percentage of 'combined' tools at PV 1 is not repeated at PV 3.

The high flake/blade ratio and the moderate to high frequencies of carinated pieces and inversely retouched bladelets respectively associate the PV 3 assemblage with the Levantine Aurignacian. However, its 'aurignacoid' traits are not as pronounced as at PV 1. OSL and radiocarbon samples from the site are under analysis.

'Dufour bladelets' constitute an important part of the tool assemblage from the lower levels of Mdamagh rockshelter near Petra, which was excavated in 1983 (Schyle and Uerpmann 1988).

Other Upper Palaeolithic Occurrences

Upper Palaeolithic artefacts can be found on the surface at many locations, most of them around the site complex of Ṣabrā 4 (**Fig. 1**). The 2010 survey of the upper Wādī Ṣabrā located several additional Upper Palaeolithic occurrences, but without the discovery of another *in situ* site. In most cases, artefacts were found spread over the surface of Pleistocene deposits. At some locations, they were embedded within the deposits but without associated organic material and with artefacts frequently being in an upright and therefore secondary position.

The larger collections (**Fig. 1.7, 1.9, 1.14-16**) all have more or less 'aurignacoid' characteristics. They include typical carinated and nosed scrapers, carinated burins and small El Wad points, and are thus similar to the assemblage from PV 1.

The largest assemblage was collected at 2010 / 6 (**Fig. 1.14**), a site which was noted in 1983 and designated Ṣabrā 8 or 9. Many artefacts are spread within an active minor – but rather steep– erosional channel on the eastern slope of the *wadi* deposits towards the recent *wadi* bottom. The channel has isolated a huge sandstone outcrop, which originally may have provided some shelter almost in the centre of the *wadi* basin. Unfortunately, any *in situ* sediments that may originally have been adjacent to the eastern face of this rock outcrop have been removed by this channel. However, towards the recent *wadi* bottom, a narrow spur of *wadi* sediments, separated by the channel from the sandstone outcrop, is still preserved. Within this spur, two horizons of embedded artefacts could be identified. These are not associated with any organic material and the low density of finds suggests that they are not *in situ*. However, they might represent the periphery of destroyed *in situ* layers originally deposited close to the now denuded sandstone outcrop. The upper horizon seems to have been almost completely destroyed, with only a few artefacts still remaining embedded. A single Qalkhan point picked up on the surface of the sediments at this location hints at an Early Epipalaeolithic affiliation for the upper horizon.

The lower horizon displayed a higher density of artefacts, most of them spread on the surface of the remaining body of sediment, as well as some which were still in place within it. However, some of the latter were found upright, indicating secondary deposition. We systematically collected all the artefacts from the surface of the sediments around the outcrops of this lower horizon and cleaned a small section of the remnant; the finds within the erosional channel were not collected.

Analysis of the artefacts is still in progress, but the collection shows unmistakable 'aurignacoid' characteristics very similar to the assemblage from PV 1. The few single pieces picked up here in 1983 were tentatively classified as Ahmarian; this must now be rejected in light of the much more numerous recent finds.

It is worth noting that we have so far not found any unequivocal evidence for the presence of an (Early) Ahmarian site within the upper Wādī Ṣabrā. Whether this is the result of a sedimentation hiatus, or is caused by the present state of erosion – leaving Earlier Upper Palaeolithic sediments inaccessible in this area – will be clarified through investigation of the geoscientific sections cut at different locations in the upper Wādī Ṣabrā.

*Late Upper and Epipalaeolithic Sites*

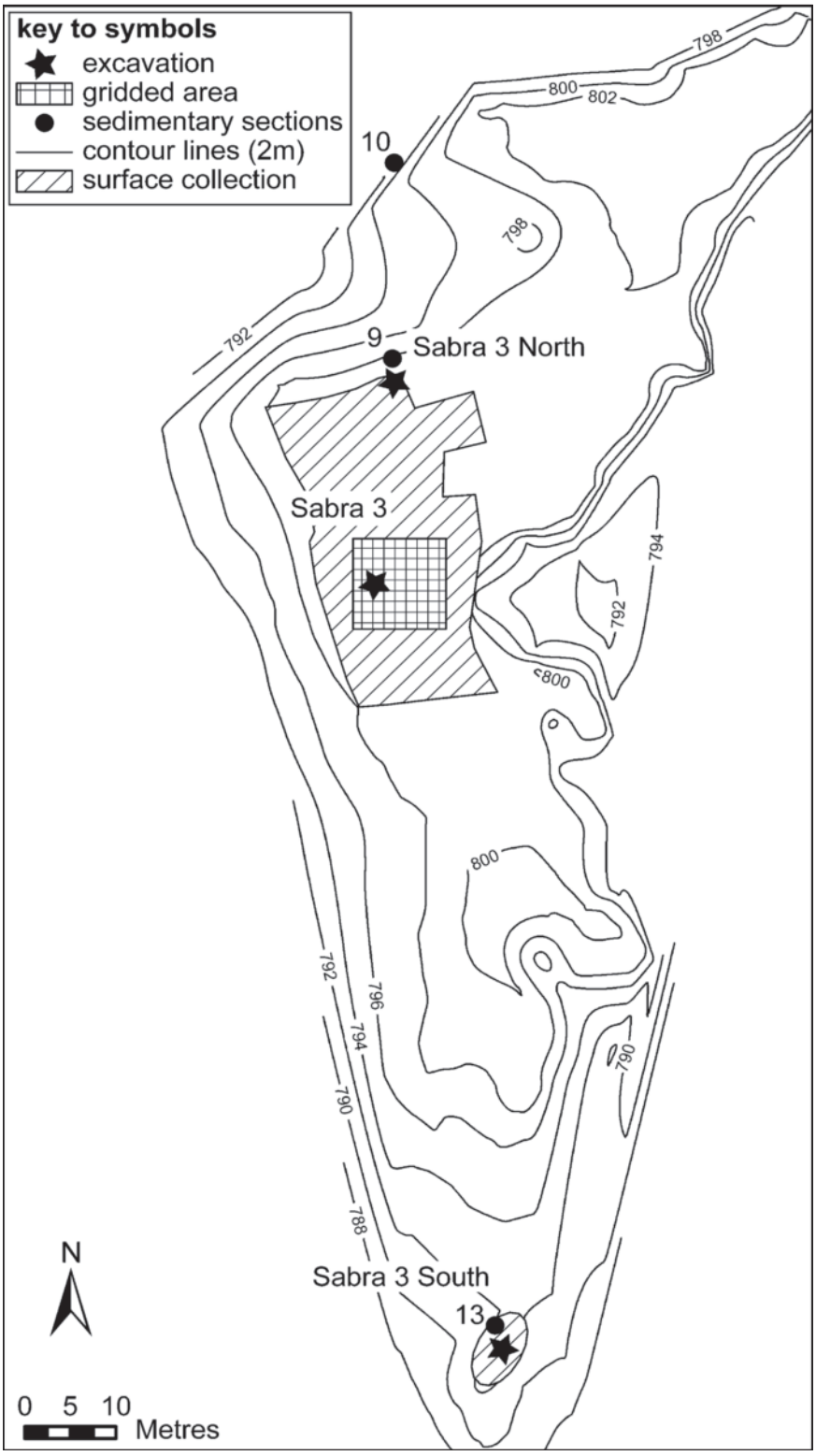
Ṣabrā 3

Further downstream, about 500m south of Ṣabrā 4, another site complex was recorded at a locality designated Ṣabrā 3 in 1983 (**Fig. 14**).

On top of the *wadi* deposits in this location, a small Epipalaeolithic assemblage was surface collected in 1983 and designated Ṣabrā 3 (Schyle and Uerpmann 1988; now designated Ṣabrā 3

Centre). Further artefacts had been brought to the surface by erosion since that time, which were noticed in 2008 and systematically collected in summer / autumn 2009. Additionally, a small trench was opened across the surface scatter to look for any remains left *in situ*.

In spring 2008 we also noticed lithic artefacts apparently eroding from a black layer



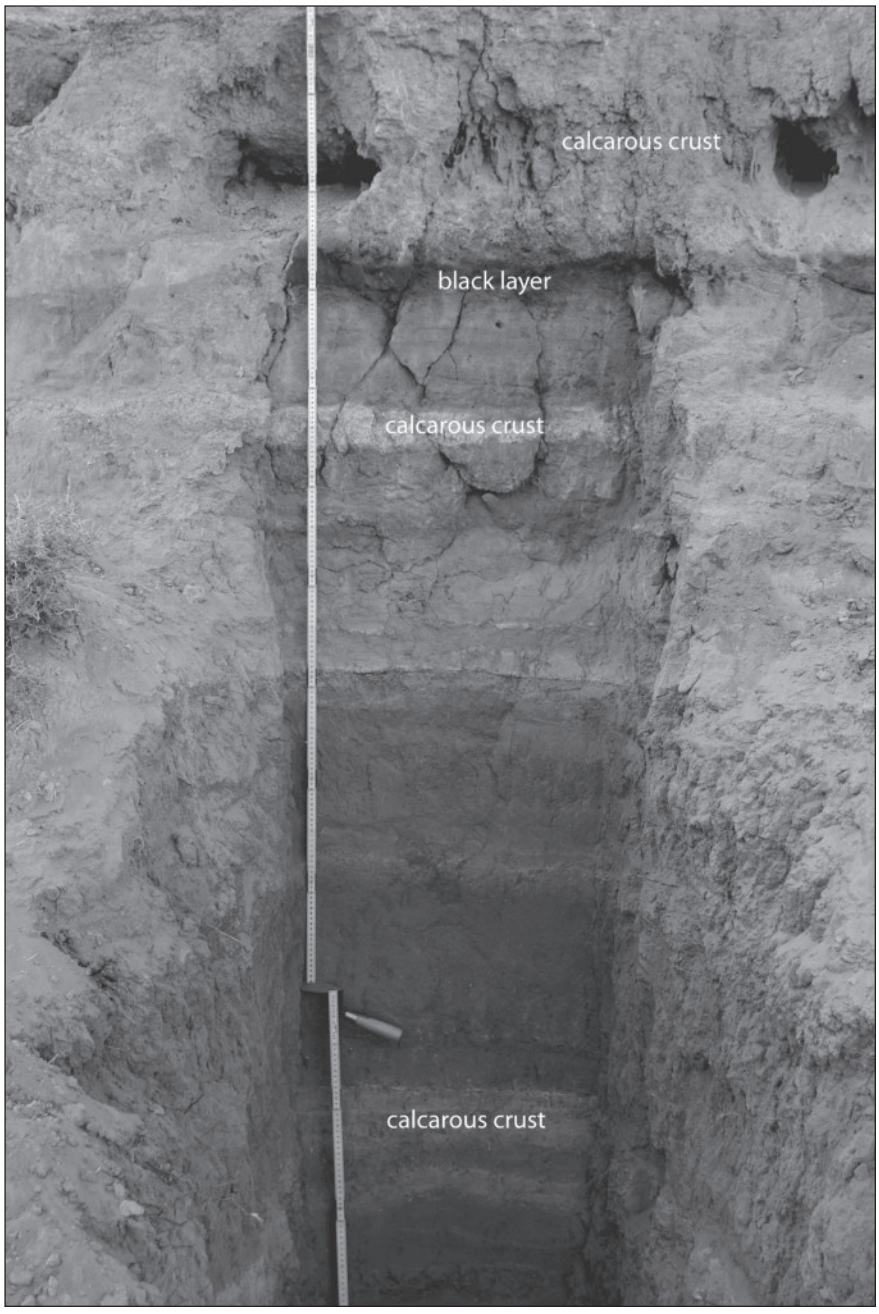

*14. General map of the Ṣabrā 3 site complex.*

about 0.5m below the surface of the *wadi* deposits (**Fig. 15**). This occurrence was designated Ṣabrā 3 North. From a cursory inspection of the finds scattered over the steep slope below the natural section (we did not collect any artefacts in 2008), it was clear that these artefacts were of Upper or Epipalaeolithic technology, although no diagnostic types could be found.

An Early Epipalaeolithic assemblage was excavated from a small remnant of *wadi* deposits located 50m further downstream of the southern end of the main body of contiguous *wadi* deposits. This occurrence was also discovered in spring 2008 and designated Ṣabrā 3 South.

Ṣabrā 3 North

The black layer noticed in 2008 (**Fig. 15**) is covered by a heavily cemented deposit (the calcareous crust from which the Ṣabrā 3 finds are eroding), which in 2009 we found ourselves unable to excavate without mechanical assistance. In 2010 we tried again, but had to give up




*15. Geoscientific section at Ṣabrā 3 North.*

again after the excavation of ½ m², the cemented layer being too hard and too thick to remove on a larger scale. Instead, we collected a sample of artefacts from the adjacent western slope of the *wadi* deposits. Extensive geoscientific sections were excavated at this location in 2009, covering the whole sequence of sedimentation down to bedrock.

Artefact density within the excavated portion of the site is quite high (*ca.* 350/ m²); there are many burnt flint fragments, a few pieces of charcoal and occasional bone fragments, suggesting good *in situ* preservation. However, diagnostic tools are still lacking; so far, tools consist exclusively of simple endscrapers, whether from the excavation or surface collection. The proportion of blades and flakes amongst the debitage is almost even. Two carinated cores were recovered; the remainder are relatively small, single platform bladelet cores. As a result, the exact cultural affiliation of the assemblage remains unclear, but a general final Upper Palaeolithic classification is likely.

Ṣabrā 3 South

In spring 2008, numerous small flints and bones[3] eroding out of the top of this small remnant were noticed. In summer / autumn 2009 we collected the surface around the remnant and excavated what remained of what must originally have been an *in situ* cultural layer. This deposit was preserved only at the very top of the remnant, along a narrow 'spur' of approximately 5x0.5m². It was completely excavated by sieving the sediment recovered from ¼ m² (**Fig. 14**). Additionally, a geoscientific section was cut into the mound to link its sequence of deposits with the main body of contiguous deposits further north. The small remnant of Ṣabrā 3 South lacks the heavily cemented calcareous crust present on top of the *wadi* deposits at Ṣabrā 3 and above the black layer discovered at Ṣabrā 3 North. It may be that the cultural layer at Ṣabrā 3 South was originally below – in stratigraphic terms – the assemblage found on top of the calcareous crust at Ṣabrā 3. However, this still needs to be confirmed by sedimentological analyses which are still in progress.

The small assemblage recovered (just 55 objects) can be attributed to the Early Epipalaeolithic Kebaran / Nebekian industry (**Fig. 16**). It is dominated by backed bladelets, with narrow, obliquely truncated variants being the most numerous type. A few of them display microburin scars below the truncation, but there are also a few true La Mouillah points. Finely ('Ouchtata') retouched bladelets also occur. The remainder consists of truncated as well as broken backed bladelets. The non-microlithic tools include a few massive denticulated scrapers, which might also be classified as small flake cores, and a few burins.

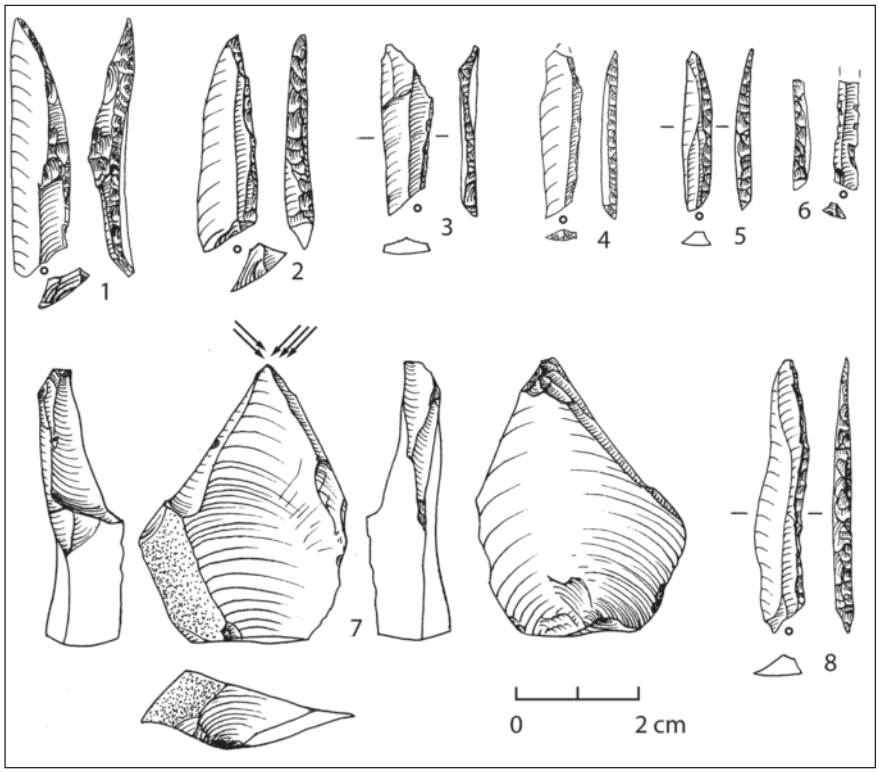
Sabrā 3 Centre

A thin scatter of artefacts was found scattered across the surface of the calcareous crust over an area of approximately 500 square metres, with an area of slightly higher artefact densities within a square of only 10x10m (**Fig. 18**).

Even initially, it was clear that the artefacts on the surface were distributed according to relief, with the highest artefact densities being found in shallow depressions or along shallow erosional channels. We established a grid of 10x10m within the area of highest artefact density, which we collected in 1x1m squares. Additionally, the surrounding area was collected using larger, arbitrarily sized collection areas of between 7 and 20 square metres. Overall surface artefact density was very low: the most productive 1x1m square yielded just 35 artefacts, and the richest collection area not more than an average of three artefacts per square metre. These richest areas corresponded to shallow basins, where artefacts had gathered as a result of erosion.

Seven square metres were excavated to a depth of up to 20cm to investigate whether or not *in situ* deposits might be preserved. Excavation of the hard calcareous crust proved to be very arduous and time-consuming, and was therefore called off on logistical grounds. Subsurface artefact densities within the excavated 1x1m squares were considerably higher than on the surface (up

3. Ṣabrā 3 South has a small but seemingly varied bone assemblage, which includes a medial fragment of a bone point. The taxa identified by H. Berke include an unspecified equid, wild cattle, gazelle, wild sheep, fallow deer, wild boar and bear.




*16. Selected tools from Ṣabrā 3 South: (1 - 2, 6, 8) obliquely truncated backed bladelets; (3 - 4) trapezes; (5) arched backed and obliquely truncated bladelet; (7) burin.*

to 170 artefacts per square metre), but the artefacts were distributed within the upper 10cm of sediment, without preservation of organic material or any evidence of anthropogenic features. As a result, it has so far not been possible to locate any *in situ* remains, although the possibility cannot be discounted that they may be preserved in some parts of the site.

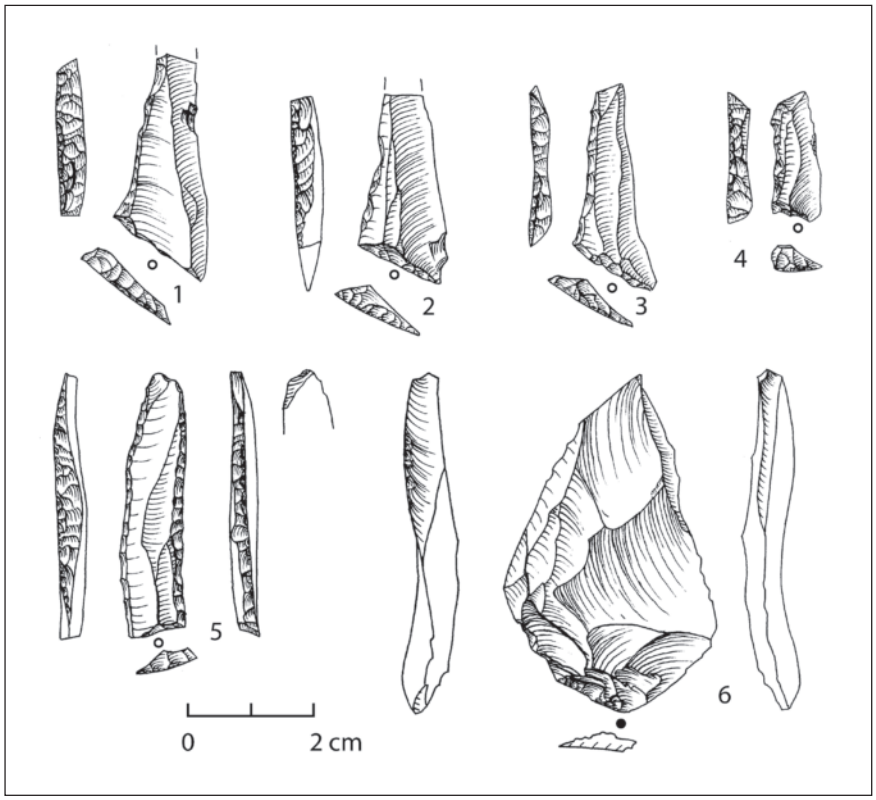
The assemblage recovered so far is very homogenous and corresponds with the finds made in 1983 (**Fig. 17**). Amongst the tools, largish 'microliths' predominate by far. Backed and truncated pieces, among them several Qalkhan points and asymmetric trapezes, are the most frequent types. The use of the microburin technique is attested by a single La Mouillah point, as well as several retouched 'piquant trièdres' still visible on the truncated ends of the microliths. Similar Qalkhan assemblages (Henry 1981) are known from Jordan (Garrard *et al*. 1986; Henry 1982) and Syria (Cauvin 1981). Individual Qalkhan points were also found on the surface during our survey of Wādī Ṣabrā at 2010 / 6 (**Fig. 1.14**) and 2010 / 9 (**Fig. 1.17**).

The dating of the Qalkhan is still far from satisfactory, but its stratigraphic position between a lower Early Kebaran / Nebekian and an upper Nizzanan assemblage (only the latter is adequately radiocarbon dated, to between 19 and 18 ka at Wādī Jīlāt 6 [Garrard *et al*. 1986; Byrd 1994a]) suggests an early Epipalaeolithic date immediately after the LGM. The remainder of the Stone Age archaeology in Wādī Ṣabrā is represented at the small but rich site of Ṣabrā 1, which was test excavated in 1983 (Schyle and Uerpmann 1988; Gebel 1988) and contained finds from the Middle and Late Epipalaeolithic (Geometric Kebaran; Natufian) to Early Neolithic (PPNA / EPPNB).

Additional Late Epipalaeolithic sites were found during the 2010 survey, namely an (Early?) Natufian surface lithic scatter on exposed bedrock about 1 km north of Ṣabrā 1 (**Fig. 1.17**) and (Late?) Natufian finds, including bones, still embedded in sediments forming a very steep slope adjacent to the sandstone cliffs of the eastern bank of Wādī Ṣabrā at 2010 / 25 (**Fig. 1.32**).

Additional Neolithic finds from 2010 are represented only by single isolated arrowheads. Two Early PPNB notched specimens were collected at 2010 / 26 (**Fig. 1.33**) and a single final PPNB or Late Neolithic type was found at 2010 / 5 (**Fig. 1.13**).

**Sites Beyond Wādī Ṣabrā**




*17. Selected tools from Ṣabrā 3 Centre: (1 - 3) Qalkhan points; (4) trapeze; (5) obliquely truncated backed bladelet; (6) burin.*

Additional sites in the surroundings of Wādī Ṣabrā were also visited in summer / autumn 2009. These include the site of Abū Shāhir, near the spring of 'Ayn adh-Dhawī, which also was discovered in 1983 and at that time looked set to yield an *in situ* Initial Upper Palaeolithic occurrence. Unfortunately we were not able to relocate the site until the very end of the summer / autumn 2009 season. The few artefacts recently collected indicate a likely Final Neolithic / Chalcolithic (rather than Initial Upper Palaeolithic) date for the site.

Finally, a rock shelter near aṭ-Ṭaybah (discovered and recommended to us by H-G. Gebel) was visited on the last day of our stay at Wādī Mūsā in 2009. In a similar topographic situation to Ṣabrā 1, *viz*. sediments leaning up against a steep sandstone cliff and protected by fallen blocks, we collected a few artefacts eroding out of the deposits, including backed bladelet fragments, a backed point and several *outils communs*. These indicated another Upper to Epipalaeolithic occurrence, which was tested during the 2010 season.

We carried out a detailed topographic survey, including 3D measurement of the surrounding ground surface, and established a grid prior to excavation of the westernmost of the three artefact concentrations observed, which was designated Ṭaybah 3. It consists of a remnant of sediments accumulated against the north-western 'wall' of a deep valley cut into the Ram sandstone. The sedimentary remnant is seriously endangered by erosion, mainly in the form of seasonal flash floods. Several archaeological layers have been widely exposed and abundant artefacts are scattered on the ground surface between the huge sandstone blocks covering and protecting the site.

The excavation area measured 4x1m, with a maximum depth of 2m. The trench was oriented to north-west. The excavation started at the steep, south-western slope of the sediment mound. 'Steps', each with an area of 0.5m$^2$, were excavated in order to expose a section through the stratigraphy. This consisted of 12 lithological horizons, designated layers A to M, which were represented by different grades of fine and intermediate sands of aeolian and fluvial origin. Enrichment of calcium carbonate eventually cemented four out of 12 sandy layers (L, J, F and C), indicating the existence of buried or eroded

surfaces. Layer L represents redeposition of reworked calcareous fragments, thereby suggesting a sedimentary hiatus of unknown duration.

Five archaeological horizons were identified (layers B, C, E, G and M), at least two of them (C and G) with a fair degree of bone preservation. On the basis of a preliminary assessment of the finds currently under analysis, the finds from the upper four layers are similar; the few artefacts from the lowest archaeological horizon (M) remain undiagnostic. Remnants of a fireplace were unearthed from the lower part of layer C (Square 5/23 b). Charcoal and burnt artefacts should permit radiometric dating of the structure.

In technological terms, the lithic industry is characterised by rather simple bladelet production adapted to the low quality of the utilised raw material, which is presumably of local origin. The bladelets were struck from single platform cores on small nodules or pebbles, or from clumsy burins on thick truncated flakes with a minimum of preparation. This is reflected in the varied shapes of the resulting bladelets. The tools consist mainly of small, short endcrapers, as well as a few endscrapers on larger flakes. The abovementioned large burins were most probably used as cores for bladelet production. Marginally obverse retouched bladelets are the most numerous type present. In this regard, the assemblage resembles the Late Ahmarian or Masraqan assemblages from Wādī al-Ḥasā (Coinman 2003) or Ohalo (Nadel 2003). However, the *chaîne opératoire* of the bladelet production seems to be somewhat more sophisticated and standardised at the latter sites.

**Conclusions and Prospects**

Archaeologically, the first two field seasons focused on the excavation of previously known sites. The second season continued work at some of these (Ṣabrā 3 and 4) and started new excavations at aṭ-Ṭaybah and Ṣabrā 3 North. Additionally, a systematic survey was carried out along the upper part of Wādī Ṣabrā.

These two seasons in Wādī Ṣabrā have provided us with a rich body of data which are currently under analysis. The preliminary archaeological results suggest that within Wādī Ṣabrā, archaeological finds associated with *wadi* deposits span the time from the Middle Palaeolithic to Early Neolithic. The area is thus ideal for diachronic analysis of human occupation and land use, in close association with terrestrial palaeoclimate archives, from MIS 3 until the beginning of the Holocene.

This does not mean that the whole period between *ca.* 50,000 and 10,000 years ago is continuously represented in the Wādī Ṣabrā area by sediments and finds. We have assemblages representing each archaeological stage of the sequence as a *pars pro toto*, but it is clear that the earlier part of the sequence in particular is much less well-represented by finds than the later part. This becomes particularly apparent when the assemblages are related to the temporal axes involved. There are only two assemblages representing the earliest (IUP and Ahmarian) part of the Upper Palaeolithic, which have to be 'stretched' over a time span of almost 20,000 years. A rather unexpected result, however, is the comparatively high density of sites dating to the period between 30,000 and 24,000 years ago, represented by the numerous 'aurignacoid' occurrences clustering in the upper Wādī Ṣabrā basin. Hitherto, the Levantine Aurignacian has been almost unknown in Jordan and is not well represented in other parts of the southern Levant. The similarly high frequency of sites dating to the LGM and its aftermath is comparable with other areas of the southern Levant, although the temporal peaks of site frequency within this time range seem to be distributed slightly differently from what we know west of the Jordan valley. In particular, the start of the post-LGM climatic amelioration, which is represented west of the Jordan valley by a marked increase in site numbers attributed to the Geometric Kebaran and Mushabian, seems to be represented in Jordan only by a few Middle Hamran sites in the Rās an-Naqab basin (Jones 1983) and isolated, single occurrences in Wādī Rum (Copeland and Hours 1970), the Azraq basin (Garrard 1998), Wādī al-Ḥammih (Edwards *et al*. 1988) and Wādī Ziqlāb (Maher 2011).

At present, it is difficult to interpret these shifting *foci* of site distribution. They might simply be caused by differences in site preservation or the state of research on either side of the Jordan valley. However, we do know of at least one other manifest shift of settlement from west to east at the end of the MPPNB, which was related to the emergence of LPPNB 'megasites' in

Jordan, so it might also be that similar phenomena occurred earlier as well.

**Acknowledgements**

Our work in Wādī Ṣabrā benefitted from the help and co-operation of many persons. The Department of Antiquities of Jordan provided exemplary administrative support. We thank the late Fawwaz al-Khraysheh and Ziad al-Sa'ad (Directors General of the DoA in 2009 and 2010) for their kind permits and interest in our work. Khalil Hamdan (DoA 'Ammān) ensured that the necessary administrative papers were received in time. In the field, particular thanks are due to Talal al-Ammareen (DoA Wādī Mūsā) who not only saved us from drowning in a heavy flash flood during our first visit in spring 2008, but also repeatedly helped us in later seasons to organise the thousand small things necessary for work and the acquisition of a degree of comfort in a remote area. The spartan conditions in Wādī Ṣabrā were shared by DoA inspectors Amer Bdour and Mohammed al-Marahleh in 2009 and by Adnan Rafaiah and Hussein Dahbour in 2010. We are very grateful for their patience with us and their compassion in the field. Thanks are also due to Zeidan Kafafi (Yarmuk University, Irbid) for his advice and help, and for introducing us to Maysoon al-Nahar (University of Jordan, 'Ammān) who gave us constant support during our work. We are also indebted to H-G. Gebel, who first identified the site of aṭ-Ṭaybah and suggested it to us for excavation.

Finally, we particularly acknowledge the assistance of Nadine Assmann, Anne Barusic, Hanne Decker, Hannah Parow, Thomas Wolter (University of Cologne), Christa Hunsalzer and Michael Lemke (RTWH, University Aachen) for the hard work of excavation, the competent support and survey photographs taken by Michael Baales (Ruhr University, Bochum), the compassion and geoscientific know-how of our colleagues Manuel Bertrams, Frank Lehmkuhl, René Löhrer and Jens Protze from RTWH, University Aachen and, last but not least, the vital job of our 'water man' and guard Haroun Ali Salem al-Faqeer (Umm Ṣayḥūn).

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# TALL ABŪ AL-KHARAZ
# THE SWEDISH JORDAN EXPEDITION 2011: FOURTEENTH SEASON
# PRELIMINARY EXCAVATION REPORT

*Peter M. Fischer and Teresa Bürge, with contributions by D. Blattner, M. Alrousan, S. Ahmed, C. Böhm and A. Abu Dalo*

## Introduction

The fourteenth season of excavation at Tall Abū al-Kharaz was carried out with the kind support of the Department of Antiquities and its acting Director General Fares al-Hmoud between 18 September and 13 October 2011. The 2011 project was devoted to the well-preserved Iron Age I compound from Area 9 which was partly exposed in 2009 and 2010 (see Fischer and Feldbacher 2009, 2010, 2011). It was anticipated that the continued excavation north of the compound would produce additional Early Iron Age material for the fourth volume on Tall Abū al-Kharaz (Fischer forthcoming). The collection of first-class radiocarbon samples from closed floor contexts had as usual, high priority.

Expansive consolidation work was carried out after the 2010 season of excavation under the supervision of the Department of Antiquities and architect M. Al-Bataineh. Fourteen rooms with walls which are still standing upright to a height of more than 2m were cleaned and consolidated. Restoration work will be initiated as soon as the entire compound is exposed.

In 2011 two sub-areas were opened in Area 9: one as Trench LVIA-D to the north of Trenches LIIB and LIVA from 2010, and the other west of Trench LI from 2010 as Trenches LVIIA-D and LVIIIA (see **Fig. 1**).

The 2011 team consisted of 28 persons including P. M. Fischer (director), T. Bürge (assistant field director), H. Ta'ani (foreman, trench master), M. Al-Bataineh (surveyor, draughtsperson). Trench masters were S. Ahmed, D. Blattner, C. Böhm, R. Feldbacher, F. Luckscheiter and S. Scherzer. A. Pihl was assistant trench master during the second half of the campaign. The representative of the Department of Antiquities was Z. Ghnaimat. The expedition was further backed up by the inspector of Pella, N. Khasawneh. Additional support was provided by S. Esbeihat (cook). The brothers Y. (pottery washing) and S. Suleiman Musa (transportation) assisted. Twelve local workers from Pella, al-Mashāri' and al-Yābis were engaged in the excavations.

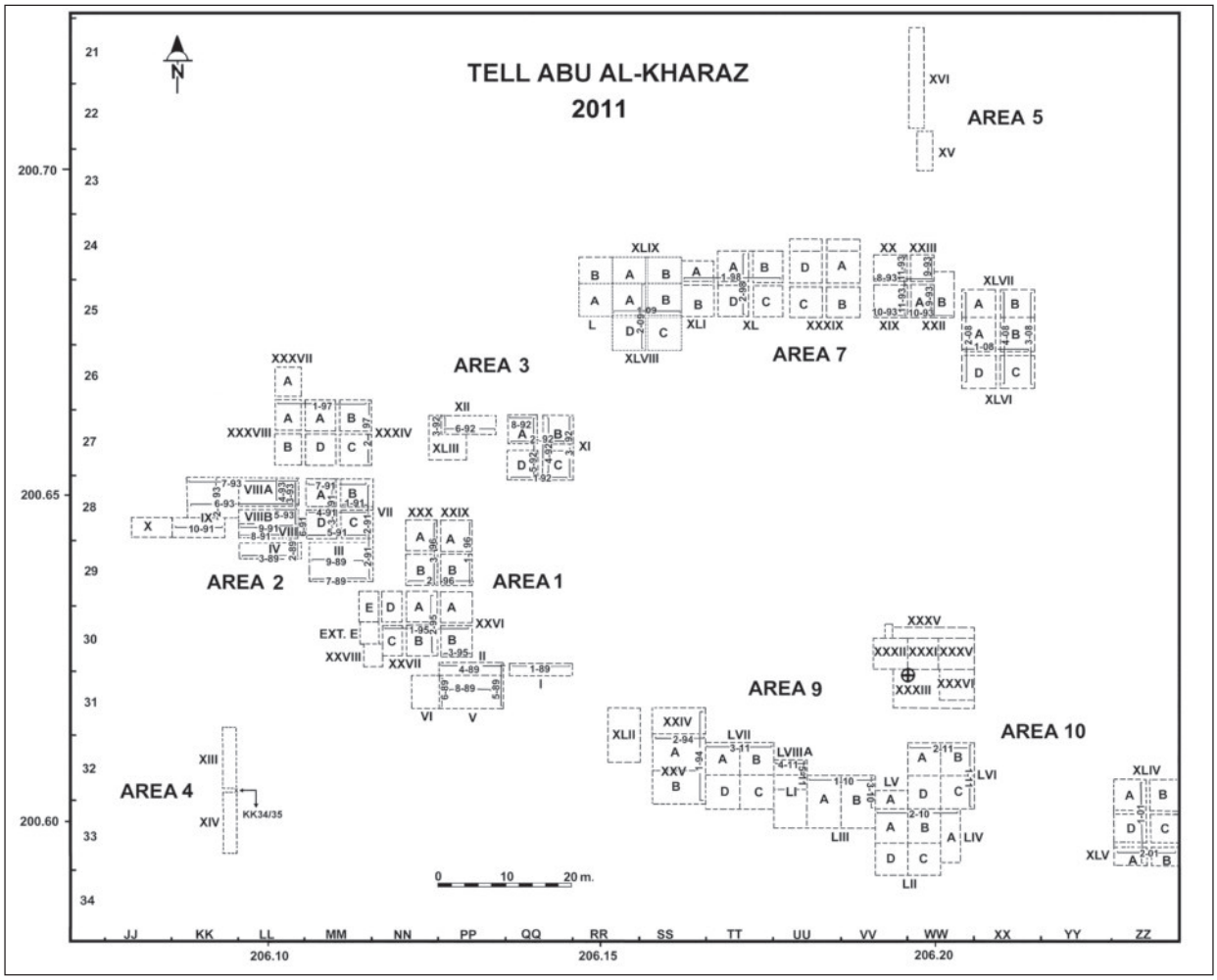
The Royal Court, represented by T.R.H. Prince Raad Ibn Zaid and Princess Majda Raad, and the Swedish Embassy headed by H.E. C. Sparre again showed interest in our work and provided support. With the kind permission of the Department of Antiquities Mohammad Alrousan, anthropologist from the Department of Archaeology and Anthropology of the Yarmouk University in Irbid, gave support in the investigation of four skeletons, most likely earthquake victims, from the Late Bronze Age. Amongst visitors were those from Zarqa University and the Department of Antiquities. The staff of the Swedish Embassy in Amman were given a guided tour of Tall Abū al-Kharaz.

## Results from the 2011 Excavations in Area 9

### 1. The North-Eastern Part: Trenches LVIA-D (Fig. 1)

*Background*

The compound which was exposed in 2009 and 2010 dates to Iron Age I according to six radiocarbon dates from the floor of Stratum 1C[1] which are all between roughly 1200-1000




*1. Overview Google Earth satellite image of Wādī Faynān field systems WF442 and WF443.*

BC. The results from 2009 encouraged us to extend the 2010 excavations eastwards and a total of 28m represented by Trenches LI-LV were opened during these two seasons. In 2011 the area was extended to the north by Trenches LXVIA-D and to the west by Trenches LVIIA-D and LVIIIA. The opened up area slopes 2.78m in 38m from east to west, and 2.9m in 15m from north to south.

Unfortunately three deep looters' pits, approx. 3m wide, were dug in the area after the 2009 excavations, thus destroying three complete rooms: numerous broken vessels were found around the pits. Other areas also suffered from extensive looting due to the fact that the tall is privately owned and not the property of

1. Stratum 1 C is built directly on the Late Bronze Age city wall. The term "Stratum" should only be considered as a term of convenience for use during the field work and in the preliminary reports (see Fischer 2006: 26). It is used to designate a level of occupation regardless of the area and numbered as it is excavated. From 1989 to 1994 consecutive numbering of the strata was used in the preliminary reports submitted to ADAJ. Nevertheless, it was later decided that Stratum 1 A, B … designate the phases from Iron Age. Since we discovered pre-Iron Age phases during the 2011 season of excavation Stratum 0 A, B... was introduced for post-Iron Age layers of occupation, viz. mainly Late Roman, Byzantine and Islamic structures. Stratum 2 with sub-divisions is reserved for the Late and Middle Bronze Ages, and Stratum 3 with sub-divisions for the Early Bronze Age. All these divisions and sub-divisions are only valid in the preliminary reports. The final phasing for the Early, Middle and Late Bronze Ages is in Fischer 2006a,b; 2008. There are six sub-phases for the Early Bronze Age (IA,B; IIA,B; IIIA,B), two sub-phases for the Middle Bronze Age (IV/1 and 2) and four sub-phases for the Late Bronze Age (V-VIII). The final phasing of the Iron Age will consequently start with Phase IX, which corresponds to Stratum 1 C, i.e. the earliest Iron Age occupation.

the Department of Antiquities: thus no guard was installed on the site before 2010. Thanks to the kind intervention by the former Director General of the Department of Antiquities, Z. Al-Saad, a guard was installed after the excavation in 2011: since then no new looters' pits have been discovered.

*Stratum 0A-C*

The architectural remains of two occupational phases, most of them just below a thin layer of colluvial soil, were relatively well-preserved despite their superficial positions. There is a structure consisting of two rooms to the north (W657, 652, 651, 656). Two windows, each 1m wide, open up the rooms to the south, viz. towards where the Wādī al-Yābis flows. This structure was clearly built in two phases (Stratum 0A and B): the lower part is well-constructed of relatively small rounded stones whereas the upper part is built of large blocks of stone, obviously deriving from the collapsed "White Building" to the north which represents an Iron Age tower that was reused during later periods (Fischer 1991; Ingemarsdotter 1997; Fischer 1998).

South of this structure is a courtyard where numerous vessels were found. A staircase leads towards the east and a bench is built along a 1m wide wall, W653. There are two spaces and a bench against this wall to the south (W654, 655, 658).

To judge from the pottery the building was used in Byzantine (Stratum 0A) and Abbasid (Stratum 0B) times.

Two walls (W663, 664; Stratum 0C) appear below the Byzantine layer (Stratum 0B). The date of these walls is difficult to assess because the excavations did not continue below the foundation of the 0A-B structure to the north: it was decided to preserve this structure for the time being.

*Stratum 1A*

This occupation layer is related to the corresponding stratum from the excavations in 2010. There is one stone-paved room which represents the continuation of the stone-paved space from 2010 (L212, 214). There are additional spaces to the north and west of the latter (W617, 662, 659), the function of which is not totally clear: they most likely represent a courtyard and another domestic area.

The majority of the sherds are from the second part of the Iron Age but a few intrusive sherds dating from the late Roman/Byzantine and Abbasid periods were also found. There are no other finds of chronological significance.

*Stratum 1B*

Only a few loci and some walls were exposed before the excavations came to a halt (W666, 636). According to the pottery and radiocarbon this stratum belongs to the end of Iron Age I or possibly the beginning of Iron Age II.

*Stratum 2*

A test trench was dug north of W649 (see the excavation report from 2010). Finds of interest were four skeletons: the uppermost was only partially preserved whereas the lower three were almost complete. Two of them seem to embrace each other. One young female had an earring of bronze close to her left *processus mastoideus.* There was also a collared bead of bone amongst the bones. Our interpretation of the find circumstances rules out a tomb but suggests instead that we are dealing with earthquake victims (see Appendix 3, the osteological report). The date of this event is placed in the Late Bronze Age on the evidence of a few associated pottery sherds.

*Stratum 3*

Below the skeletons we reached a mudbrick wall (W674), below which had been built directly upon bedrock. The level of the bedrock is -3.13m which demonstrates that there is a natural terrace just above the Iron Age I (Stratum 1C) compound to the south (the floor level of Stratum 1C just 2m to the south is 4.60m). The pottery is exclusively Early Bronze Age.

**2. The Western Part: Trenches LI, LVIIA-D and LVIIIA (Fig. 1)**

*Stratum 1A*

A partly exposed wall and two *ṭawābīn*, which were built close together, belong to this phase of occupation. The northern one, approximately 0.7 m in diameter, is well-constructed and stands on a stone bench. Larger stones in front of the *ṭawābīn* were used as working surfaces. Pottery points to a date in Iron Age II.

*Stratum 1B*

A long wall (W613), running east-west, and other poorly preserved walls, together with a *tabun*, belong to this phase. Dating from the pottery is not unambiguous, but a date around Iron I/IIA is suggested.

*Stratum 1C* (**Figs. 2 and 3**)

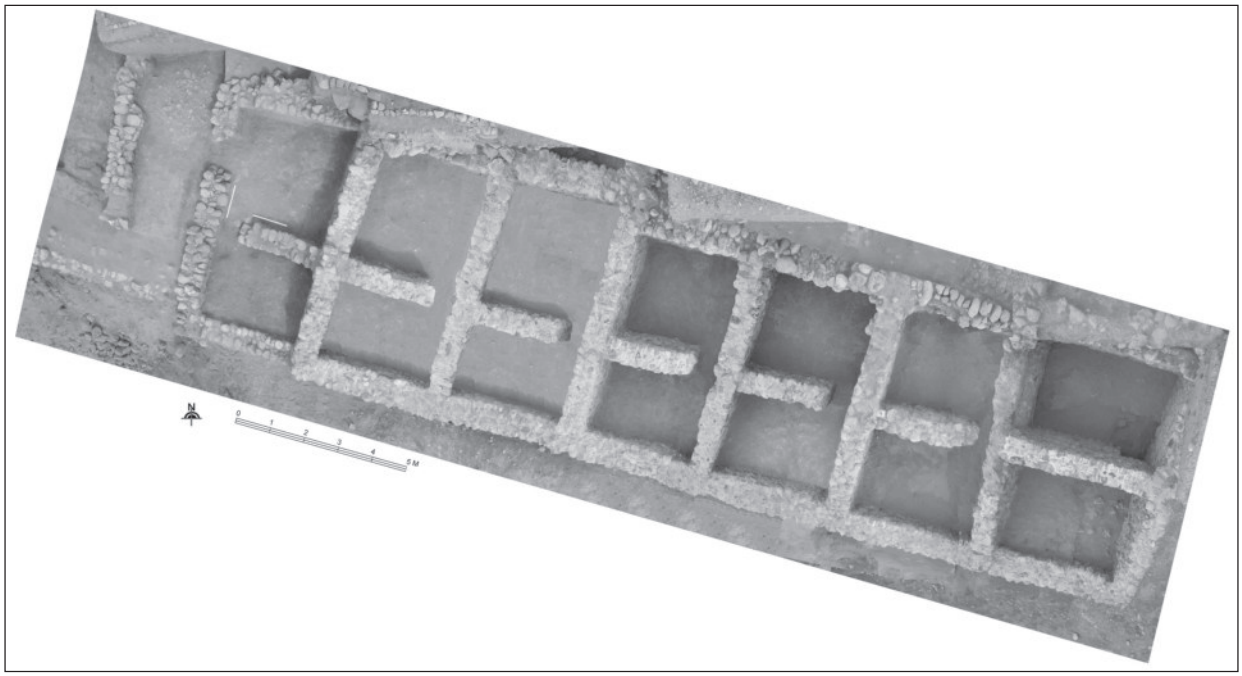
Room 1 belongs to the Iron I compound, which was partly excavated in 2009-2010 and consolidated in 2011 (**Fig. 2**). This room is one of the three rooms that were looted after the 2009 season. The southern part was totally emptied by the looters whereas the northern part was partly intact.[2] A depot of fine clay in the eastern part of the room and several broken unfired vessels point to the production of pottery or at least the storage of unfired vessels and raw material. This room contained a considerable amount of charcoaled wood possibly indicating wooden shelves where the unfired vessels were stored. Samples from wooden posts were sent to the Cornell Tree Ring Laboratory, Cornell University, USA.

Room 1 is the only one of the 14 rooms hitherto excavated that has two entrances: the "standard" opening between Rooms 1 and 2, but here in the western part, which contrasts with the other 12 excavated rooms, where the openings are always to the east. The second entrance, which is the only one so far from the outside of the building, is 1 m wide. The irregularity of the corner stones may possibly imply that this "entrance" was opened after the destruction of the compound. The following finds derive from Room 1: a stone pestle, a basalt weight (?) with a cylindrical depression at the bottom, a spearhead and a vessel of alabaster/calcite from which the neck and rim are missing (N1423).

West of the compound is another complex with a different layout but with an identical direction of the walls. This complex comprises at least six rooms with several hearths. An unusual find was made just to the north of W668, namely a fired clay figurine of a lion (N1424; **Fig. 4**).

*Stratum 2*

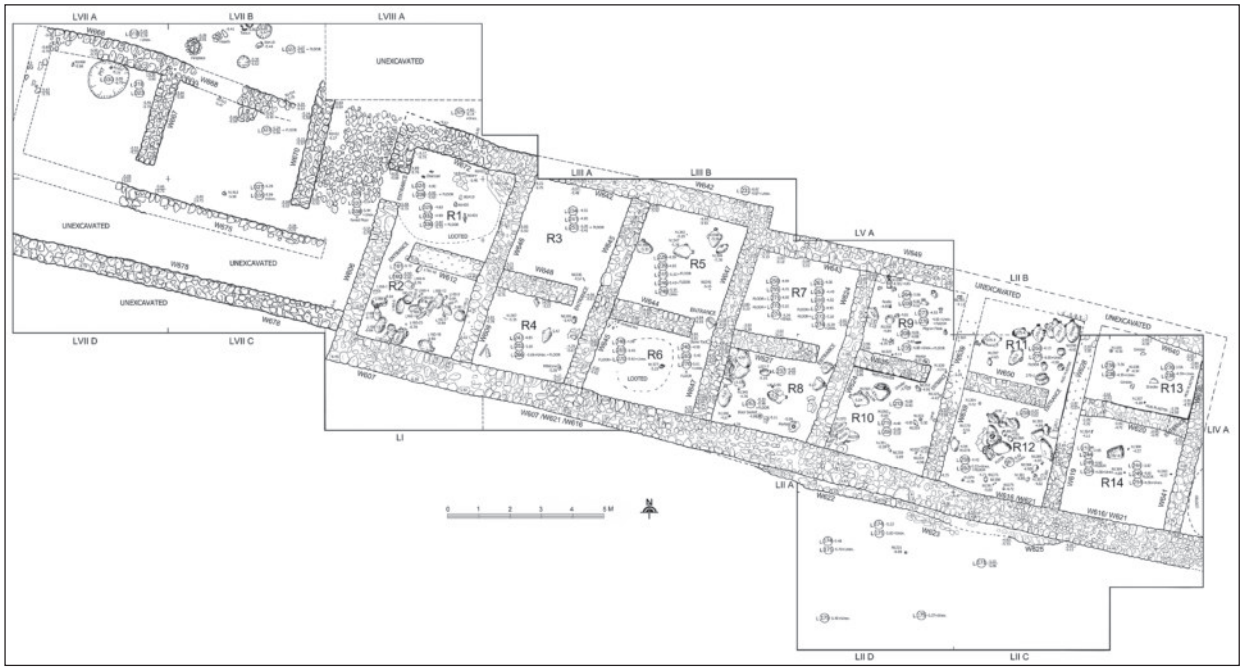
There are no architectural remains which could be ascribed with any certainty to the Late Bronze Age. There are, nevertheless, impressive vessels of Chocolate-on-White Ware and other wares that clearly belong to the Late Bronze Age destruction layer of Phase V which is dated to after 1450 BC (see Appendix 1).[3]



*2. Photograph of the consolidated Iron Age I compound.*

2. A sizable heap of sherds from the looting was found around Room 1 when the excavations were resumed in 2010.

3. See also Appendix 2 on the Middle and Late Bronze Age ovens.




*3. Stratum 1C (Phase IX), Iron Age I compound.*


*4. Early Iron Age figurine of a lion.*

*Stratum 3*

A few walls (W676 and 677[4]) with associated Early Bronze Age pottery were exposed at the end of the 2011 season of excavation in the most south-westerly part of the opened area. Related to these walls were Hole-mouth jars and Metallic Ware (burnished) juglets of a type which has been traced petrographically to the Mt. Hermon area in southern Lebanon (Fischer 2008: 284-288). One of the juglets is a new type at Tall Abū al-Kharaz (**Fig. 5:25**). This layer of occupation belongs either to Phase II or III ac-

4. W677 is most likely not a separate wall. It may represent the collapsed superstructure of W676.

cording to the internal phasing at Tall Abū al-Kharaz.

**Future Objectives**

Guarding of the site has been granted by the Department of Antiquities, which will facilitate the continuation of the project. Consolidation of the well-preserved architectural remains has high priority and has been carried out on the majority of the exposed walls. Further investigations of Area 9 will take place in the future.

**Appendix 1: Late Bronze Age Pottery from the 2011 Season of Excavation** *(T. Bürge)*

**Introduction and Context**

An impressive collection of Late Bronze Age pottery including some more less complete vessels was found in Area 9 in the northern parts of Trenches LVIIA and B and LVIIIA during the 2011 season of excavation at Tall Abū al-Kharaz:[5] 24 complete or almost complete vessels and diagnostic parts of vessels. These include Chocolate-on-White Ware (CW; most of them with figurative and/or ornamental decoration), other monochrome and bichrome decorated wares, one of them with figurative decoration, and plain wares. No architectural structures could be associated with this material (see also main article); therefore it may be assumed that only this "Late Bronze Age *insula*" was left intact after destruction due to Iron Age building activities.

**Description of the Pottery, Parallels and Discussion (Fig. 5)**

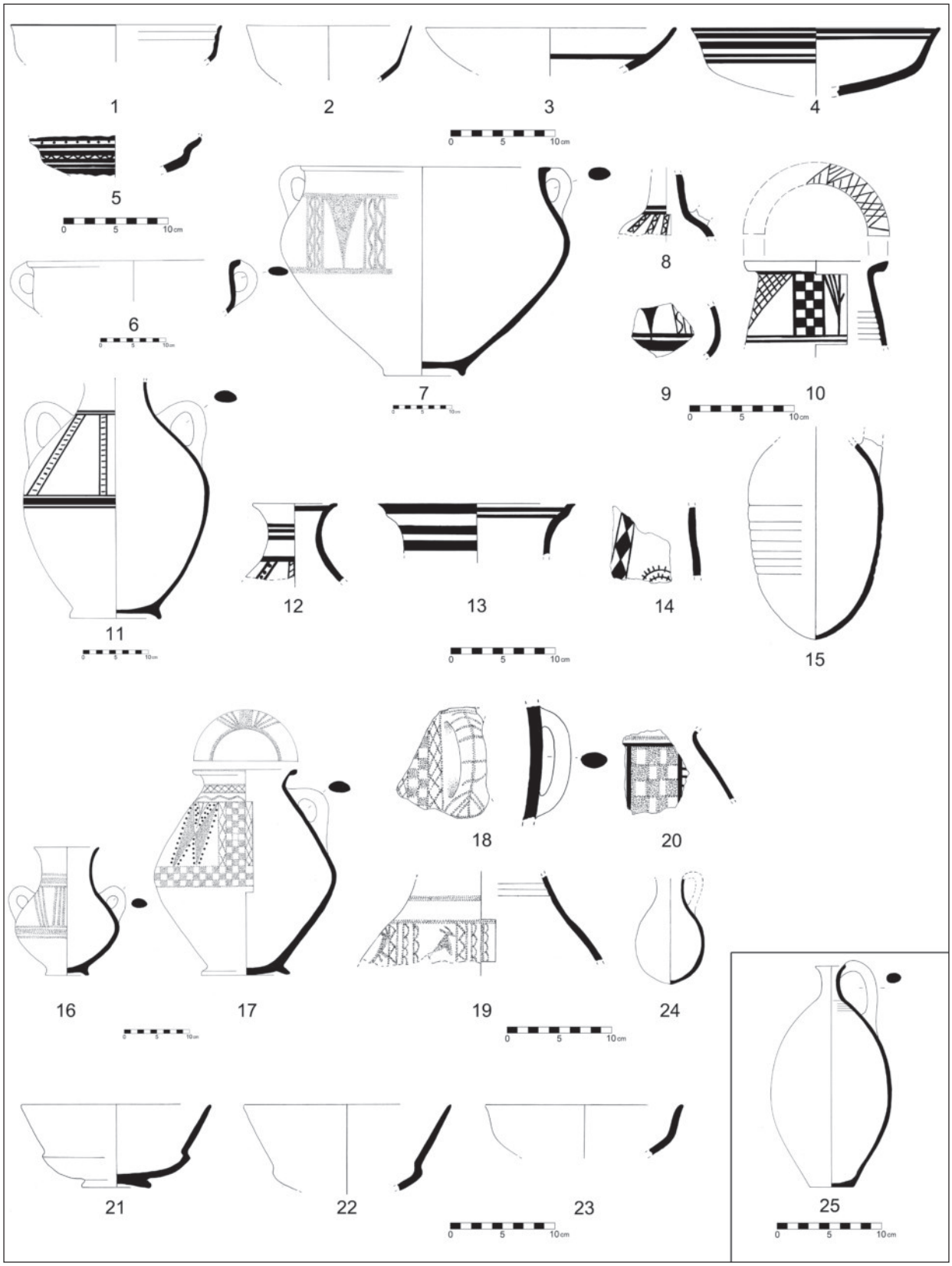
*1. Chocolate-on-White Ware*

The largest group of Late Bronze Age pottery from this area is represented by vessels of what is known as Chocolate-on-White-Ware (**Figs. 5:1–15**). This ware is in general defined by its thick white (or pink through yellowish white to light grey) wheel-burnished slip and reddish-brown ("chocolate-brown") decoration[6]. This late Middle and Late Bronze Age ware has been classified by Fischer in six groups according to shape, decoration and manufacturing technique (see Fischer 2006a: 260–262, Table 52). The vessel types range from rounded (**Fig. 5:3**) and carinated bowls (**Figs. 5:1, 2, 4**), chalices (**Fig. 5:5**) and kraters (**Figs. 5:6, 7**) to jugs or jars (ovoid and biconical; see **Figs. 5:8–15**). Most of the decorative patterns on the vessels belong to the standard repertoire and include straight horizontal and crossed lines, framed wavy lines, downward-pointing triangles, rhombi linked end-to-end, chequerboards, ladder-motifs and dots. All these vessel types and patterns are well attested within the Chocolate-on-White Ware repertoire from Tall Abū al-Kharaz (Fischer 2006a: 255–280) and also at some other sites, such as Beth-Shean (Mullins 2007: 396–398, 417), Pella (Hennessy 1985, Bourke *et al.* 2006: 50–51) and Tall Dayr ʻAllā (van der Kooij and Ibrahim 1989: 91, fig.4). The patterns appear – generally independently from the vessel shape – in a wide variety of combinations thus making most of the vessels unique. However, L314-5 (**Fig. 5:8**), L327-2 (**Fig. 5:9**) and L318-1 (**Fig. 5:12**) have close parallels concerning vessel shapes and decorations at Tall Abū al-Kharaz (for L314-5 see Fischer 2006a: 137, fig. 146:5; for L327-2, see 119, fig. 124:1; 168, fig. 195:3 and for L318-1, see 118, fig. 123:1) and Pella (for L314-5 see Smith and Potts 1992: 75; pl. 57:4; for L327-2 see McNicoll 1982: pl. 112:7; Bourke *et al.* 2006: 50, fig. 43:1). There are also two vessels with figurative decorations amongst the material from 2011: one motif is depicted on the exterior of a biconical jug (L327-3, **Fig. 5:10**) with a unique pattern of crossed lines on the rim and exterior. It shows stylized palm trees (see parallels in Ben Tor *et al.* 1997: 216, fig. III.17:10; Fischer 2006a: 68, fig. 55:6). The other decoration (L318-3, **Fig. 5:14**) presumably was painted on a jug or jar and might also show a part of a palm tree or – according to a closer parallel from Tall Dayr ʻAllā (Franken 1964: pl. Ia; also van der Kooij and Ibrahim 1989: 91, fig. 4) – of an acacia.

The vessel types, decorative patterns and the carefully executed decoration allow an attribution of the material from 2011 to the Chocolate-

5. Two more diagnostic fragments of Late Bronze Age vessels were discovered in Trenches LVIC and D, which are well distant from the aforementioned Trenches and are residual remains from later occupation phases. These two fragments will not be considered.

6. For further characteristics, criteria of classification, origins and general discussion see Fischer 1999, 2003 and 2006a: 257–260; Maeir 2007: 286–289; Mullins 2007: 396–399.




*5. Late Bronze Age pottery from Phase V (1–24); Early Bronze Age Metallic Ware juglet (25).*

on-White II sub-group. A bowl (L318-2, **Fig. 5:2**) belongs to the Eggshell Ware group.[7]

*2. Other Decorated Wares*

This group includes monochrome and bichrome decorated vessels, which cannot be attributed to Chocolate-on-White Ware (**Figs. 5:16–20**). The decorative patterns of this group of vessels include horizontal, vertical and cross lines, wavy lines, rhombi, framed zigzag lines, running semicircles, chequerboards, herringbones and double triangles surrounded by black dots. One of them, a biconical jug (L322-1; **Fig. 5:17**), has a sophisticated bichrome decoration combining chequerboards, double triangles, dots, wavy lines and cross lines/rhombi and attests to the high standard of craftsmanship. Both typical Chocolate-on-White vessel shapes and decoration also occur on other wares (or *vice versa*). This becomes especially obvious in the case of jug L313-6 (**Fig. 5:16**): Its shape is characteristic of CW (see e.g. Fischer 2006a: 117, fig. 221:1; Schilk in Fischer and Feldbacher 2010: fig. 8:1; Smith and Potts 1992: 75, pl. 57:5), and the pattern resembles examples from the CW in this group of pottery, but it has an orangish-red slip, quite different from that of CW, and reddish-brown decoration. One fragment of a closed vessel (L327-4, **Fig. 5:19**) – presumably a jug or a jar – shows two ibexes or gazelles leaning against framed zigzag lines and semicircles. These animals are frequently depicted on pottery of the Late Bronze Age (e.g. in Beth-Shean: Maeir 2007: pl. 11:1 or on a chalice from Tall Dayr ʻAllā van der Kooij 2006: 216, fig. 13b).[8] Since these animals are most often shown directed towards a tree, it may be asked whether the zigzag lines and semicircles next to them (on our example) might be highly stylized depictions of trees.

*3. Plain Wares*

These vessels are undecorated and belong to the usual pottery repertoire of the Late Bronze Age; such as carinated and S-shaped bowls N1410 (**Fig. 5:21**), L315-1 (**Fig. 5:22**) and L318-5 (**Fig. 5:23**).[9] While small dipper-juglets occur from the Middle Bronze Age[10] to the Iron Age with only small variations,[11] the light yellow, coarse fabric of juglet N1418 (**Fig. 5:24**) clearly belongs to the Late Bronze Age.

**Dating and conclusion**

The great majority of the Late Bronze Age vessels found 2011 have parallels in Tall Abū al-Kharaz, Phase V, corresponding roughly to LB IA – B (Fischer 2006a: 371). This is also the period during which CW II and Eggshell Ware flourished. Its destruction can be dated to the mid-15th century (Fischer 2006a: 372–373; 374, table 70; Fischer 2006b: 241, table 1). As regards Beth-Shean, vessels of the Chocolate-on-White ware type mainly occur in Stratum R-2 (Mullins 2007: 398), which is also dated to LB IA – B (see Mazar 2006 (ed.): 13, table 1.2). The material from the tombs from Pella does not provide any exact dates as it was dated in relation to material from Tall Abū al-Kharaz (Fischer 2003: 57), but their approximate dating is not contradictory to the dates from Tall Abū al-Kharaz and Beth-Shean (see Potts 1992: 69). In summary: there are no objections in attributing our material to Tall Abū al-Kharaz Phase V.

**Appendix 2: Middle and Late Bronze Age Clay Ovens from Tall Abū al-Kharaz** *(D. Blattner)*

**Introduction**

The aim of this study is to associate the clay ovens from the Middle and Late Bronze Ages found at Tall Abū al-Kharaz with the fairly mod-

7. This type is mainly represented by thin-walled bowls, which show the same characteristics as Chocolate on White Ware and can despite their lack of decoration be attributed to the Chocolate on White Ware group (Fischer 1999: 11; id. 2003: 51–52; id. 2006: 266).
8. They often occur in combination with palm trees; cf. the sub-chapter by Amiran 1970: 161–165 with examples.
9. See typology of Tall Abū al-Kharaz in Fischer 2006a: 218–222; 220, fig. 256; 221, fig. 257; typology of Beth-Shean in Mullins 2007: 401, fig. 5.2.; 410–413. Dating of these bowls is difficult if the base is missing – furthermore, concave disk bases occur in all Late Bronze Age Phases of Tall Abū al-Kharaz and are therefore not indicative.
10. See typology of Tall Abū al-Kharaz in Fischer 2006a: 238 fig. 271: according to him (ibid: 239) earlier shapes are characterized by shorter necks and less marked shoulders, which makes an attribution of our juglet to Phase IV or V most likely; also typology of Middle Bronze Age juglets from Beth-Shean in Maeir 2007: 275–276 and Late Bronze Age in Mullins 2007: 433–434. In fact, the vessels from the Late Bronze Age seem to be the closest to our example.
11. See typology of the juglets from Beth-Shean in Mazar 2006: 367–368.

ern ethnological evidence from the Near East in order to find out if there are any traits that could be included in the interpretation of archaeological contexts.

**Ethnological Evidence**

There are two types of oven from our archaeological contexts, the *ṭābūn* and the *tannūr*. The main differences are in their general shape and the way they were heated.

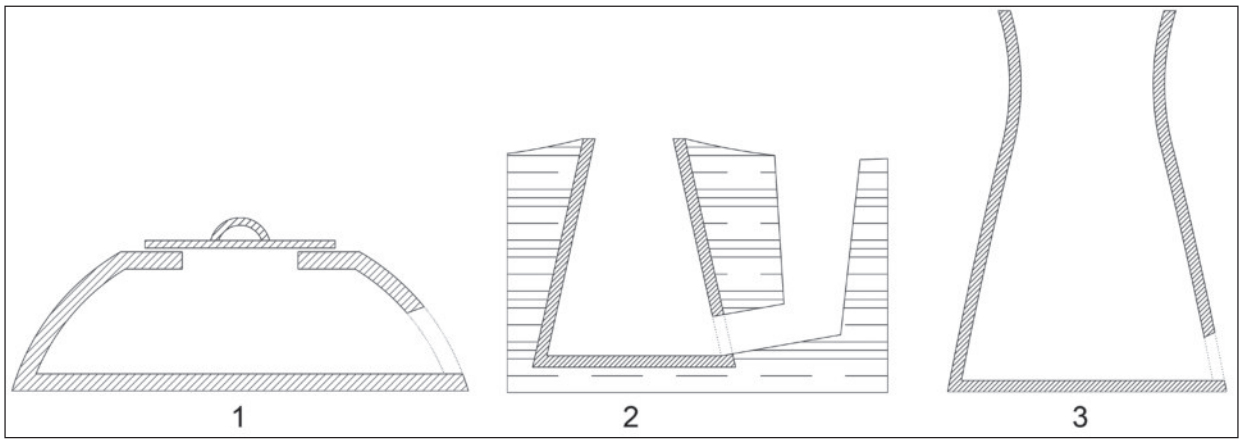
The standard *ṭābūn* (pl. *ṭawābīn*; **Fig. 6:1**) may be described as a hemispherical structure which is formed out of a mixture of clay and chaff (Dalman 1935: 75). It can be embedded a few centimetres into the floor (ibid, see also Mulder-Heymans 2002), and has a diameter between 0.7 and 1.1m and an average height of 0.3 m (Dalman 1935: 75, 78; McQuitty 1984: 261). Commonly, *ṭawābīn* are constructed with an opening on the top (*bāb*), for putting the bread in and taking it out of the oven (Dalman 1935: 83). Some *ṭawābīn* have an opening on the side (*tannūr*) for reasons of fire control (Dalman 1935: 78, Mulder-Heymans 2002). Fuel, most likely small branches of wood, is inserted into the *ṭābūn* in order to heat it up, prior to the baking process (McQuitty 1984: 261, Dalman 1935: 79). When a sufficient temperature is reached the ash is raked out, the *tannūr* is closed and the bread is put onto the floor (*Qā'*) of the *ṭābūn*. The floor of the *ṭābūn* is usually covered with pebbles or sherds, or just made of smoothed clay (Dalman 1935: 76, 78; McQuitty 1984: 261). After the opening on the top is closed with a lid (*ghaṭā*) the entire oven is covered with a slowly burning mixture of dung and chaff to assure a constant temperature on the inside (Dalman 1935: 83; McQuitty 1984: 261).

Depending on the size of the *ṭābūn* up to 15 pieces of bread (diameters from approximately 15 to 25cm and thicknesses of 1.0 to 1.5cm) can be made in one baking process. Dalman (1935: 83) writes about "very big *ṭawābīn*" in Golan, in which about 40 pieces could be produced at once, which would imply an oven diameter of approximately 1.35m. Dalman (1935: 74–79) also differentiates between *ṭawābīn* which are made with or without a floor. Another important observation by Dalman (1935: 77) is that these ovens are never placed in the living areas of the household, but always in "oven houses". Since heating up a *ṭābūn* is a very time-consuming process, which is usually started in the evening before baking, they are commonly shared by several families (Dalman 1935: 79; Mulder-Heymans 2002).

The other type of oven is the *tannūr* (pl. *tanānīr*), which is made of the same clay and chaff mixture as the *ṭābūn*. It has a cylindrical form, which narrows at the top and ends in an opening similar to that of the *ṭābūn*. It was either placed above-ground or partly underground (Dalman 1935: 88).

Both types are heated from the inside and produce bread of 0.4 to 0.5m in diameter and about 3mm thick (Dalman 1935: 105). Through the top opening the formed dough is smacked against the inside of the heated *tannūr*, using a special tool, similar to a cushion, and is finally removed using the same tool.

The underground *tannūr* (**Fig. 6:2**) is first manufactured and then put into a hole in the




*6. Schematic drawings of various ovens. 1. Ṭābūn. 2. Tannūr. 3. "Above-ground" tannūr.*

ground which is dimensioned to fit it (Dalman 1935: 88). Since a certain air draught is required, there is often a tunnel at the bottom of the *tannūr*, connected to a pit next to it (Dalman 1935: 89). It has an average diameter of 0.49 to 0.6m and is between 0.7 and 1m high.

The "above-ground" *tannūr* (**Fig. 6:3**) is predominantly set a few centimetres into the floor and has an opening at the bottom (menfas) the function of which is to control the fire on the inside and also to provide air (Dalman 1935: 92). The heights range from 0.6 to 1.25m; the diameters vary between 0.3 to 0.4m at the top and between 0.5 to 0.9m at the bottom (Dalman 1935: 91, 92, Mulder-Heymans 2002). Big *tanānīr*, used in commercial bakeries, can reach heights of up to 1.9m with diameters of around 0.7m (Mulder-Heymans 2002). A special form of the above-ground *tannūr* is the "egg-shaped" *tannūr*, whose opening points at an angle to the front of the top of the oven, to facilitate the baking process (Dalman 1935: 93, 94).

Today *tanānīr* are no longer used in the north of Jordan (McQuitty 1984: 261), but they are quite common in Syria, where even *tanānīr* manufacturers exist (Mulder-Heymans 2002). The ovens there are commonly placed in oven houses or against walls in order to protect the oven from wind and rain: exceptions are, however, reported from the Chabur area, where the ovens are placed some 100m away from other buildings, and built into a clay and stone structure (Mulder-Heymans 2002).

## Archaeological Evidence – Material and Discussion

This study focuses on the most interesting features of the Middle and Late Bronze Age ovens from the site and the ethnological and archaeological evidence will be compared.

**Table 1** demonstrates that the first appearances of *ṭawābīn* and *tanānīr* at Tall Abū al-Kharaz are in contexts belonging to Phase IV/2 (end of the Middle Bronze Age), which

**Table 1**: The clay ovens from Tall Abū al-Kharaz (data from Fischer 2006a).

| No | Phase | Area | Trench | Locus | Diameter (m) | Location | Reinforced | Type | Preserved height (m) | Additional information |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | IV/2 | 1 | XXVII A/B | 160› | 0.9 | SE of courtyard | x | *tannūr* | 0.6 | free standing but next to wall, next to (grain?) silo, surrounding area covered with ash |
| 2 | IV/2 | 1 | XXIX A | 306 | 1,8 | open space, (yard?) | | | | large oven, dark ash |
| 3 | IV/2 | 2 | IV | 3 | 0.9 | shelter next to courtyard | x | *tannūr* | 0.3 | surrounded by pebbles |
| 4 | IV & V | 7 | XXII B | 105› | 0.8 | NE of courtyard | ? | *ṭābūn* | | constructed against city wall |
| 5 | IV/2 | 9 | XLII | 143 | 0.7 | open area (disturbed) | x | *tannūr* | 0.32 | |
| 6 | V | 1 | XXVI A | 142 | 0.9 | NW of courtyard | | *tannūr*? | 0.39 | free standing |
| 7 | V | 1 | XXVII A | 154› | 0.7 | SE of courtyard (roof supported) in niche | | *ṭābūn* | 0.42 | part of "bakery" |
| 8 | V | 1 | XXVII A | 157 | 0.7 | "baking house" | x | *tannūr* | 0.27 | part of "bakery", ash inside |
| 9 | V | 1 | XXVII A | 158 | 0.9 | "baking house" | x | *tannūr* | 0.3 | part of "bakery" |
| 10 | V | 2 | IX | 365 | 1,03 | SW corner of courtyard | | *tannūr* | 0.55 | two openings at the base, one slightly higher |
| 11 | V | 9 | XXIV | 100 | 0.74 | baking/ cooking chamber | x | *tannūr* | 0.25 | protected by at least three walls, next to fire place (kitchen ?) |
| 12 | V | 9 | XLII | 139 | 0.7 | NW corner of courtyard | x | *tannūr* | 0.25 | next to rectangular structure, opening at the base |
| 13 | VI | 1 | XXVI A | 122 | 0.5 | courtyard/ open space | | *ṭābūn* | 0.15 | |
| 14 | VI | 10 | XLIV A | 83 | 0.6 | open space, (disturbed) | x | *tannūr* | 0.19 | |
| 15 | VII | 2 | III | 45› | 0.9 | open area | x | *tannūr* | 0.2 | |
| 16 | VII | 3 | XI A | 56 | ~ 0.7 | S corner (?) of courtyard | x | *tannūr* | 0.4 | constructed of EB sherds, next to circular stone structure |
| 17 | VII | 3 | XI A | 97 | 0.3 | in between two walls | x | *tannūr* | 0.2 | |

dates from the first half of the 16th century BC (Fischer 2008: 374). The first *tanānīr* from Tall Irbid belongs to the same time period (McQuitty 1984: 261). It seems as if this type of oven has been introduced to Tall Abū al-Kharaz or the region as a whole during this period, since the only evidence of Early Bronze Age baking facilities is hearths (Fischer 2008: 31-244).

None of the published ovens was found undamaged or even complete – the best preserved one, from Area 1 (Locus 160; Fischer 2006a: 46-47), was preserved up to a height of 0.6m with a diameter of 0.9m. Another fairly well-preserved oven is from Area 2 (Locus 365; Fischer 2006a: 100-101): it has an outer diameter of 1m and an inner diameter of 0.86m, and a reconstructed height of 0.8m.

The diameter of the ovens ranges from 0.3m to about 1m, with the exception of a large oven found in Area 1 (Locus 306; Fischer 2006a: 45-46, 51) which has a diameter of 1.8m. What purpose it fulfilled cannot be answered with certainty, since no similar features have been found so far.

**Table 1** also shows that the oven form most frequently found at Tall Abū al-Kharaz seems to have been the *tannūr*. From 16 definable ovens only three were *ṭawābīn*, all of them from different periods, indicating that the two oven forms existed simultaneously. It is noticeable that the so called bakery in Area 1 was equipped with two *tanānīr* and one *ṭābūn*. Since the bread produced by the two types of ovens is different, it seems that the owners of this bakery wanted to provide both types of bread for their customers.

Moreover we may state that all of the excavated ovens were either placed in open areas, like courtyards, or in separate oven houses, but in almost every case (exceptions: ovens 5, 13, 14, 15) against or near a wall, which is very similar to the ethnological evidence described above.

Interesting features can be studied in the above-mentioned *tannūr* from Area 2 (Locus 365). It has a big diameter and two openings on the bottom, one of them slightly higher than the other one and of rectangular shape, whereas the bottom opening seems to be typical of a *tannūr*. There are several possible explanations for this feature. One of the holes could have been used as an air vent and the other could have been used to provide the oven with "fuel" or to put in the bread. Since the oven is not completely preserved, there might have been an opening at the top.

Another feature of the excavated ovens is the reinforcements with pottery sherds on the outside, which certainly also functioned as a heat-preserving method. Surprisingly, only the *tanānīr* were equipped with pottery reinforcements, which is demonstrated by the finds from Area 1: whilst *tanānīr* were reinforced, the *ṭābūn* (from the same context) is not. Consequently the reinforcement with pottery sherds can be considered as a feature, only seen in *tanānīr*.

**Conclusions**

Regarding the considerable similarities between the ethnological and the archaeological data about clay ovens, some conclusions may be drawn.

1. There is continuity in material culture and tradition from the Middle and Late Bronze Ages until today.
2. Ovens were and still are in most cases positioned on the outside of buildings and living areas. Exceptions are the oven houses, which provide parallels to our installations.

The evidence from the Iron Age at the site will be studied in a future project. It will be interesting if the above suggestion, i.e. that only the *tanānīr* from this period were reinforced with pottery, stands up to further examination.

**Appendix 3: Human Skeletal Remains from 2011** *(M. Alrousan, S. Ahmed, C. Böhm and A. Abu Dalo)*

**Introduction and Context**

In the eastern part of Trench LVIIC in Area 9 four partially preserved human skeletons were discovered during the excavations in 2011. These individuals are the first human remains from a settlement context at Tall Abū al-Kharaz.

Skeletal remains provide valuable information on the biological data of the individual concerned and help to reconstruct the living conditions at any site. These include diet (Smith 1984: 39-56; Eshed *et al*. 2006: 145-159; Alrousan and Perez-Perez 2008: 45-59), activity pattern (Larsen 1997; Weiss 2007: 931-940), demography (Eshed *et al*. 2006: 145-159), climatic changes (Al-Shorman 2002: 7-26) and burial rit-

uals (Al-Shorman 2007).

On the basis of accompanying archaeological finds, for instance pottery sherds, a bronze earring and the associated structures, the finds were assigned to the Late Bronze Age. Moreover, the discovery of ash and fragmentary pottery indicated that we were dealing with a destruction layer.

This bioarchaeological study aims to analyze the skeletal remains, in order to expand our knowledge of the people who lived at Tall Abū al-Kharaz during the Late Bronze Age.

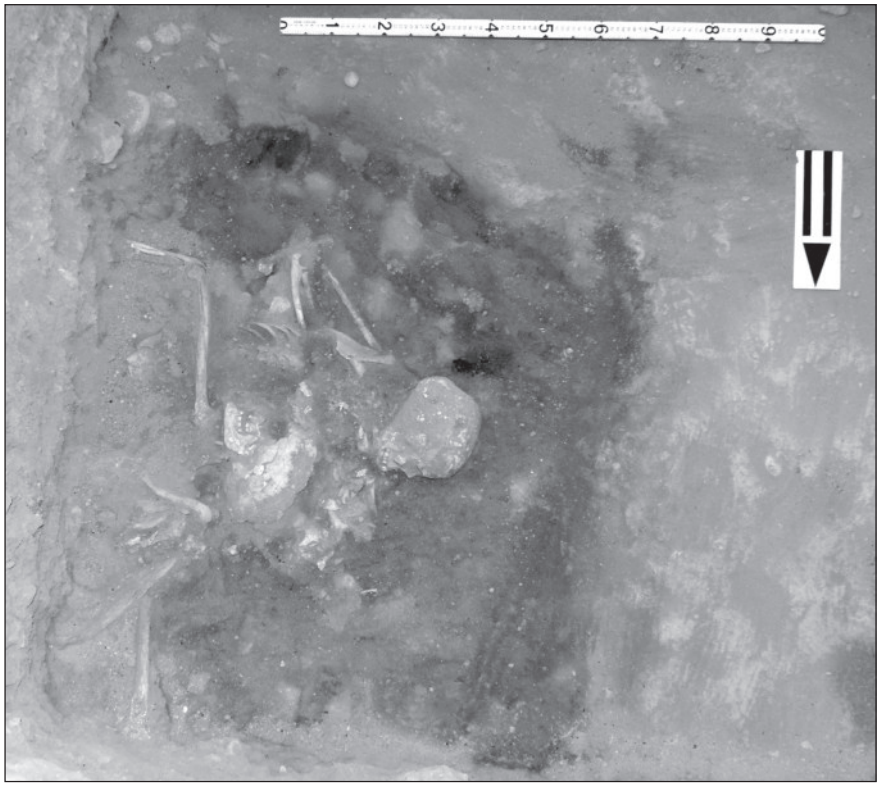
**Materials and Methods**

Four human skeletons are the basis of this study. The remains were in part poorly preserved due to the specific conditions of this context.

The uppermost individual was the most poorly preserved, possibly due to a later disturbance. The lower three individuals were almost fully preserved. They were found in such a way that two of the individuals lay close together in an apparent embrace (**Fig. 7**). These two individuals lay with their faces turned towards each other. The more southerly lay prone with the head turned towards the north, the more northern one supine and with the head turned south. However, the lower limbs of these two individuals could not be completely excavated due to lack of time because they continued into the eastern section. The fourth skeleton, which also continued into the (northern) section, lay a little to the north: a cranium with the teeth preserved and parts of the spinal column, the ribs and a shoulder joint could be secured.

A collared bead of bone was found amongst the bones on the level of the uppermost, poorly preserved, skeleton. The lower three individuals were lying upon an ash layer. Spots of ash and scattered sherds were found amongst them, which seem to indicate that some kind of destruction had taken place. A bronze earring was found beneath the left mastoid process of the southerly skeleton of the "embracing" pair.

Sex and age had to be determined *in situ* due to the poor state of preservation, while further analysis took place in the laboratory. Determination of gender was performed based on pelvic morphology and morphology of the skull according to Brothwell (1986). The age of each individual was determined and calculated using techniques based on morphology of the pubic symphysis and dental eruption as presented by Bass (1987), Ubelaker (1987) and White



*7. Two of the skeletons embracing each other.*

(1991) and Fischer (1980).

Diagnosis of pathological lesions or changes was based on previous studies by Steinbock (1976), Aufderheide and Rodrigues-Martin (2005). Paleopathology is an important source of information on the life of past people which allows us to draw conclusions about their state of health, the diseases that affected them and their culture (Steinbock 1976; Larsen 1997). The diagnosis of paleopathological conditions is difficult, since the process of pathogenesis takes a long period of time to have a noticeable effect on the skeletal system. The dental remains were examined for pathological traits (Molnar 1971: 175-190; Eshed *et al*. 2006: 145-159; Fischer 1980).

**Results and Discussion**

The first and uppermost skeleton was in such a poor state of preservation that neither age nor sex could be determined using anthropological techniques. Examination of the two embracing individuals points to a male and a female. The estimated age of the male, lying further to the north, is about 30-35 years. The individual lying further to the south with the head facing north appeared to have been an adult woman. Neither age nor gender of the fourth individual could be determined due to the poor state of preservation and the absence of important skeletal parts.

The only pathological feature found in the four individuals of the study is the occurrence of osteophytes, while lipping appears on the vertebrae of the male adult. Some of the cervical vertebrae of the adult male display a particular degree of osteophyte formation on the upper margin of the articular surface. This kind of marginal lipping may be the result of carrying heavy loads on the upper back (Bridges 1994: 83-93).

Heavy activities leave marks on skeletal remains, especially in the area of muscle attachments. Extra bone growth or enthesopathy of the muscle attachment of the ribs of the adult male could be demonstrated. It is known that the extra bone growth develops due to heavy demand on the muscle or to musculoskeletal stress (Hawkey and Merbs 1995: 324-338). From this, one can infer that the heavy demand on the intercostals muscles may have been due to regular and strenuous physical stress.

The next important aspect is the dental state. Dental remains are the best preserved remains in the archaeological context, since they possess the material properties to withstand environmental conditions. The study of the dental status allows the reconstruction of many important aspects of living conditions, such as diet (Alrousan 2011), age (Hillson 2001; Fischer 1980), culture (Molnar 1971: 175-190; Smith 1984: 39-56; Eshed *et al*. 2006: 145-159) and evolution (Christensen 1998: 333-360). Dental wear indicates what type of food was consumed by ancient people and helps us to learn about their food processing techniques. The shape and degree of wear are strongly associated with a subsistence economy (Eshed *et al*. 2006: 145-159; Alrousan 2009). The teeth of the two adult individuals displayed heavy wear of oblique form. This type of wear indicates a society based on agriculture, although the flat form is also commonly found amongst people whose economy was based mainly on hunting and gathering (Smith 1984: 39-56; Eshed *et al*. 2006: 145-159). The presence of specific tools which were used to process food, for instance, grinding stones and pestles, indicates that agriculture was the backbone of the economy in the Late Bronze Age (see Fischer 2006a: 306-320, 357, 358).

The two embracing adults exhibit caries as a result of carbohydrate consumption (Larsen 1984: 367-392; Lubell *et al*. 1994: 201-216) and fractures of the mesial or distal parts due to extensive wear (Fischer 1980). The archaeological findings of the Late Bronze Age at the site suggest that the people consumed significant amounts of plant remains and various types of grain like emmer wheat, einkorn wheat, barley, as well as beans, lentils, flax and olives (Fischer 2006b: 173).

The presence of traumatic lesions in the ancient human populations is well documented (Lovell 1997: 139-170; Hart 2005: 1-6; Fischer 1980). A radial fracture in the skull of the adult male may have been the cause of death of this individual, since this fracture occurred *ante mortem* without any signs of healing. According to Byers (2002) and Hart (2005), this type of fracture resulted from blunt trauma, possibly due to a falling rock that struck the cranial vault.

## Conclusion

Four human Late Bronze Age skeletons were discovered at Tall Abū al-Kharaz. Two of them, an adult man and a woman, were well preserved and in an apparent embrace. Because of the poor state of preservation the age and gender of the other two skeletons could not be determined. The position of the skeletons may indicate that they belonged to one family. DNA analysis could be made to prove or disprove this assumption. The presence of an ash layer, ash spots and broken jars associated with the skeletal remains and also the possibly lethal cranial fracture of the adult male suggest that they died under falling structures, possibly caused by an earthquake.

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# THE CAIRN OF HĀNĪ: SIGNIFICANCE, PRESENT CONDITION AND CONTEXT

*David L. Kennedy (with the assistance of Karen Henderson)*

"Are we not the people of a black, dark land and the folk of a stony desert with rock barriers and expanses of sand?" (*Carmina Hudsailitarum,* ed. Kosegarten 1854: 160, l. 7, quoted by Littmann, *Thamud und Safa* 1940: 98).

*Ḥarrat ash-Shām, the Basalt Desert of north-eastern Jordan, is strewn with thousands of stone structures; cairns are the most common but few have ever been systematically investigated. The Cairn of Hānī, identified some 60 years ago, is a rare example of a 'Safaitic' cairn with an intact burial which was then systematically excavated and published. Very few other cairns have been excavated since then and the Cairn of Hānī remains by far the most important and informative. Sadly it is now being damaged and may soon be destroyed. The aims of this article are to review the significance of this important cairn, to report on its parlous present condition and to place it in the context of both the handful of other excavated cairns in the region and of the numerous other ancient stone-built structures visible from the air within its immediate orbit.*

**Introduction**

The Jordanian 'panhandle' is thickly strewn with ancient stone-built structures, especially in the great lava field known as Ḥarrat ash-Shām which sprawls across the region from southern Syria to northern Saudi Arabia. Ever since RAF pilots began overflying this so-called Basalt or Black Desert in the 1920s, scholars have been aware of the extent and considerable number of the most striking of these structures: the so-called kites (Maitland 1927; Rees 1929; cf. Kennedy 2011). There are, of course, many more site types (below): wheels, pendants, 'camps', long meandering walls of unknown purpose and thousands of cairns. These last are often overlooked (cf. Betts 1982: 32-3); alongside the kites and wheels they seem modest in size and character – often being no more than a heap of collapsed stones. Some RAF pilots thought they were watchtowers on the Roman roads of the region (Rees 1929: 391-92), but it is unlikely that was the case except in a very few instances. For many years it was debated whether or not they were burial cairns; it now seems clear that some were and some were not.

At their best these cairns can be impressive, i.e. substantial structures, constructed of stone slabs raised in a circular tower-like form. (In some parts of 'Arabia' they are called tower tombs or turret tombs [De Maigret 2009: ch. 18], hence the supposition they may in some instances have been watchtowers [above]). The result is a carefully built chamber in which human remains were deposited. Most are conical mounds of field stones several metres in diameter. Other cairns are components of the pendants that are now being recorded in large numbers across Ḥarrat ash-Shām and more widely throughout interior 'Arabia'. In this case, the large burial cairn has a 'tail' of small cairns attached. The tail comprises anything from a handful to several dozen cairns and their construction ranges from a simple heap of stones to more carefully built rectangular 'pillars' of stones, *viz*. box cairns.

Cairns and pendants with intact burials are seldom found. It is usual to find that the chamber has been breached, though in a few cases there may still be some bones scattered nearby if the robbing is recent. A relatively common feature is the presence of ancient graffiti scratched on to one or more of the stones of a cairn or on stones

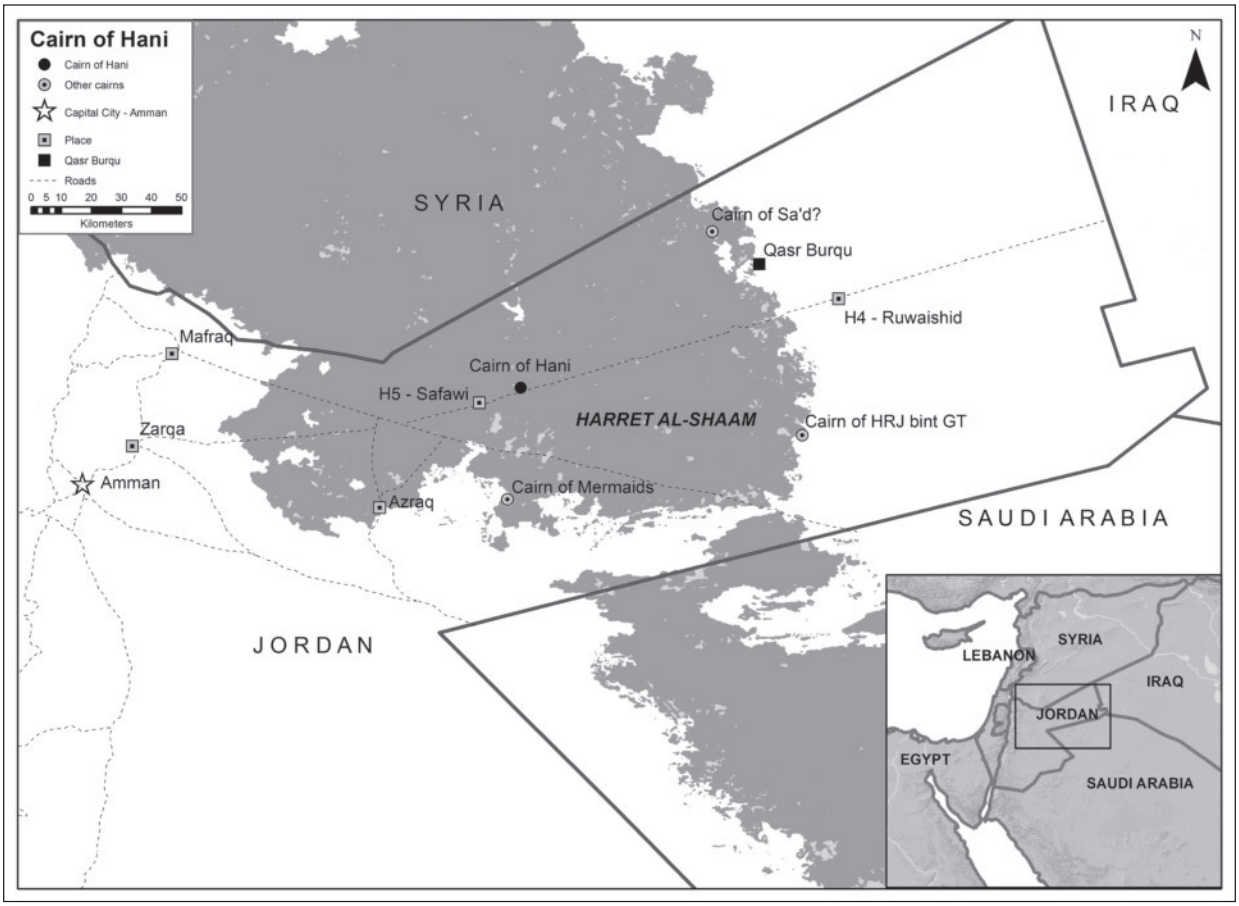
or outcrops nearby. The latter are commonly dated to the period *ca.* 1st century BC to 4th century AD (Macdonald 2005a: 70), but there are numerous clear examples of burial cairns around Bronze Age settlements in the wider Ḥarrat ash-Shām (e.g. Braemer *et al.* 2004), a reminder that these structures belong to many periods.

The profoundly inhospitable nature of the Basalt Desert has proven no protection to these sites. Alongside damage caused by the bulldozing of tracks, those sites thought to be possible sources of antiquities are being attacked and their archaeological importance damaged or lost. This is also true of the Cairn of Hānī.

**The Cairn of Hānī**

The Cairn of Hānī is located *ca.* 12.5km from aṣ-Ṣafāwī town centre, east along Route 10 (aṣ-Ṣafāwī to ar-Ruwayshid) and approximately 340 metres north of the highway **(Fig. 1)** (see Appendix). Excavated in 1951, it is a rare example of a cairn excavation and, in this case, one that had not been robbed. A notable feature is that the internal structure is rectilinear rather than circular. As we shall see, it had a number of other unexpected and exciting features, and remains a rich source of information. As the excavator observed (Harding 1953a: 9): "This is the first Safaitic cairn to be excavated, and the results make it desirable that more should be done."

Stones in, on or very close to the cairn included 174 inscriptions: 172 in Safaitic text, one Latin and one modern Polish. Further inscriptions, apparently practice texts, were found just to the north-west and eight of those were published (#174 - #181). Several more texts were published by Harding in this article which do not belong to the Cairn of Hānī: #182 - #191 and #194 come from a cairn *ca.* 1.5km south-west of that of Hānī, #192 - #193 were included in error and are actually from the Baghdad Museum,




*1. Map locating the 'panhandle', Ḥarrat ash-Shām, Pumping Stations H4 and H5, Baghdad highway and the cairn sites discussed (drawing Rebecca Banks).*

#195 - #197 are from a third cairn south of H5 / aṣ-Ṣafāwī and #198 - #200 are from yet another cairn, this time located south of the old highway (republished as Winnett 1957: #995, #1002 and #998). (For clarification I am grateful to Michael Macdonald [pers. comm. 20110416]). A handful of stones (16+) have drawings, including those from the practice group and two omitted by Harding but published later (Macdonald 1980: 192, pls CXX-CXXI). Popular are simple motifs found widely on Safaitic rock art, such as the series of seven parallel lines or seven dots and the circular sun or sunburst. The seven lines or dots in a row often occur next to Safaitic inscriptions, especially when enclosed by a cartouche where the seven lines are drawn across the border. The dots are often arranged in patterns with an accompanying little stick figure. Because there is no known meaning, they are generally labelled as 'apotropaic' (cf. Winnett and Harding 1978: 25-27). A few drawings depict various animals, most notably on the much-discussed engraving apparently showing a kite in use during a hunt (below), which is now housed at the museum in al-Mafraq.

Most of the inscriptions describe a familial relationship and then say that the person either helped to build the cairn or that they "grieved for Hānī". The excavators therefore anticipated a male burial but were surprised to find a female too.

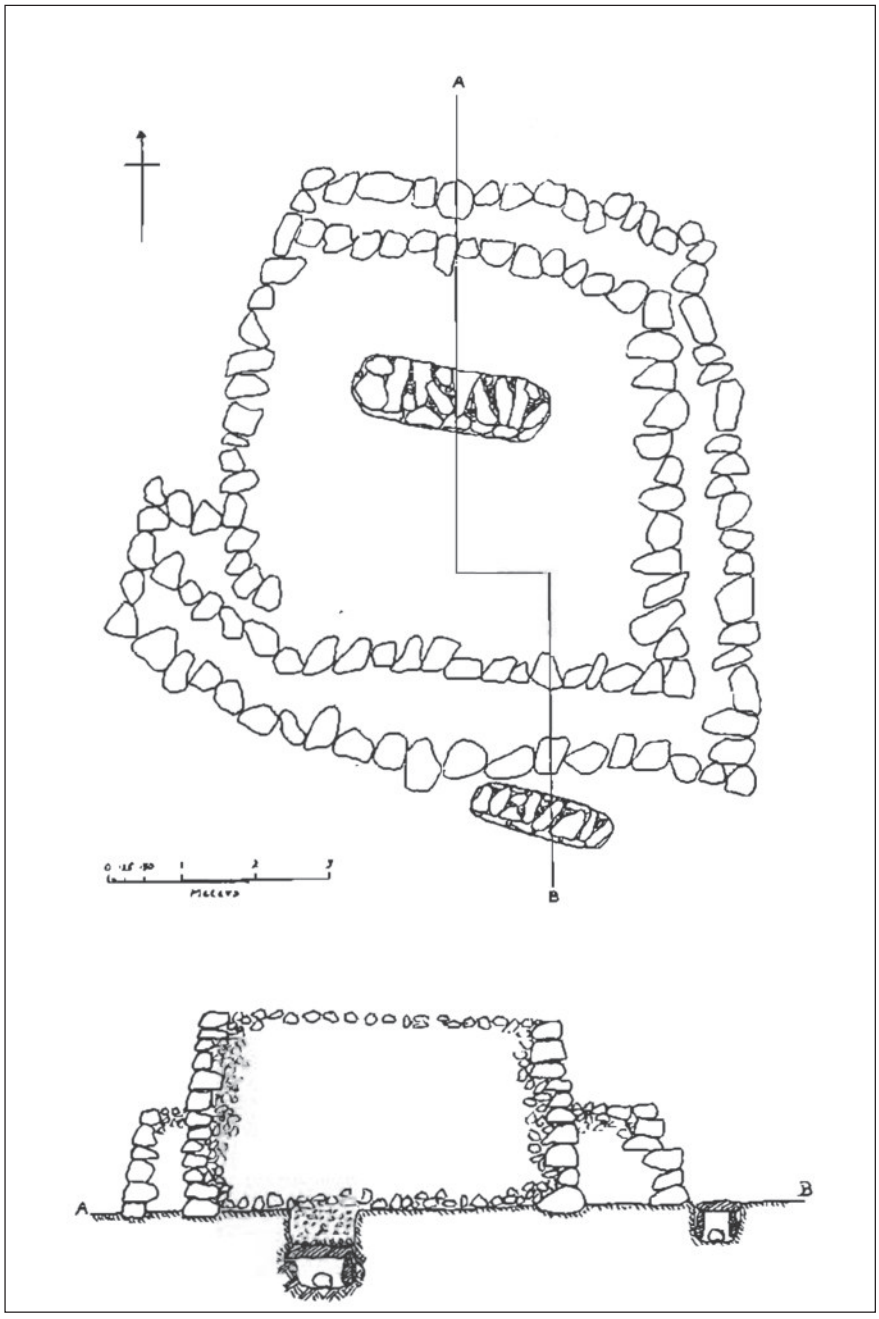
Two texts name the dedicant and the cairn ("For Hānī son of 'Aqrab son of Hānī son of Hayār, and the cairn" [Harding 1953a: 15, #1-#2]); Hānī is also named in no less than 95 further inscriptions. 18 were set up by close relatives (brother, cousin, nephew – but no son) and 77 (or 79) by friends (This seems the correct count to be derived from Harding's confusing reports of numbers). The texts were inscribed by members of 21 different lineages (translating the Safaitic word *'l* more accurately as lineage rather than tribe [Michael Macdonald, pers. comm. 20110416]) – an unparalleled 'gathering of the clans'.

Excavation revealed the likely sequence of construction. First a rectilinear structure – roughly aligned with the points of the compass – was built from field stones, creating a courtyard. A second circuit was then constructed outside the north, east and south faces, seemingly as a buttress but less high (**Fig. 2**). Finally, the courtyard and the space between the two walls were filled with stones to create a low conical cairn covering the entire structure. It is thought the raising of the cairn was carried out over a lengthy period. In honour of Hānī, filler stones would have been placed by visitors; many had been incised with a message or picture and one of these was built into the south-east corner of the rectilinear structure itself.

Two graves were found: the male (Hānī) under the courtyard of the inner rectilinear structure and the female to the south, outside the supporting wall (**Fig. 2**).

The woman, presumed to be an intimate relation of Hānī, was found in a small, shallow, stone-lined grave cut into the desert soil. It was oriented roughly east-west. The body was laid supine with the head to the west (280°) and the face looking south. The left arm was crossed over to the opposite shoulder, the right arm stretched out down the side of the body. It was apparently not clothed or wrapped. Finds included a few poor blue beads and one mother-of-pearl bead around the neck, a bundle of cloth containing what appeared to be eye paint, a wooden comb and, on the front of the skull, the remains of a leather band. The grave was covered with stones, 19 of which were inscribed (Harding 1953a: 11). There is no clear pattern in what these say: eight refer to Hānī but the remainder have varied messages and, collectively, these stones may represent no more than a random group of rocks in the vicinity which visitors placed over the woman's grave.

The grave of Hānī was cut deep into the courtyard of the cairn, through the soil and into the underlying bedrock. It was covered in stone slabs, then a layer of mud and larger stones with a fill of loose soil, small stones and rock chippings lying approximately 55cm deep above that. The body was well preserved, with black hair on the skull and the remains of a beard. Like the female, it was supine, with the head to the west (280°), face turned south, the left hand across to the opposite shoulder and the right arm extended by the side. A deliberately broken wooden bowl, a staff (which looked as if it had been deliberately sawn into five pieces before burial), a water skin and a seemingly incomplete iron ladle were buried with him. Unlike the female grave, there

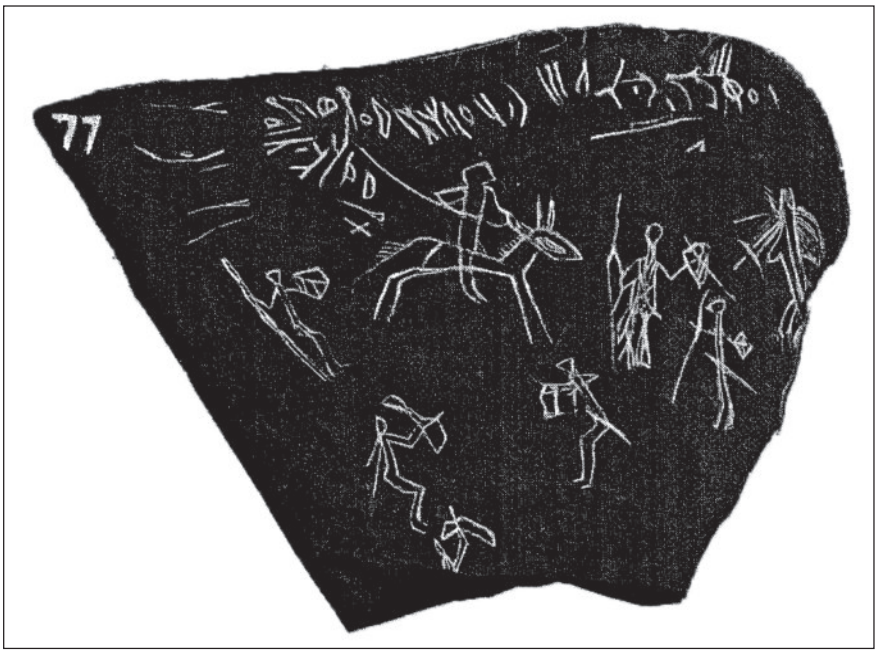



*2. Cairn of Hānī; Harding's excavation plan (Harding 1953a: 10, fig. 1).*

were no inscriptions on any of the rocks in or immediately over the burial.

The pathologists' report estimated the woman as standing 1.52m (just under 5 feet) tall. Hānī they measured as 1.67m (5 feet 6 inches). They estimated both at 35-50 years of age (Shanklin and Dark 1953: 59). Ages are notoriously difficult to estimate, though the survival of complete sets of teeth supports the supposition that both were younger adults at the time of death.

No cause of death is offered for the female. On the other hand, Harding twice gives the cause of death for the male as an arrow wound (1953a: 8: "…Hānī was apparently killed by an arrow…"; cf. 32). He offers no reference but is presumably basing this on the pathologists' report, which was published independently in the same periodical. What that says, however, is: "There is a conspicuous sagittal scar 30mm long above the right eye. It is seen as a linear depression of the outer table of the frontal bone. The wound was likely caused by a sharp instrument




*3. Rock drawing showing what seems to be a battle scene (Harding 1953a: #77).*

and sustained in life, for it is healed and there are no ragged edges" (Shanklin and Dark 1953: 59).

Although Hānī had apparently received a wound caused by a 'sharp instrument', it was explicitly said not to have been the cause of death. He may have been killed in battle – there are several references in the texts from the cairn to killing and violent death (#71, #72, #76, #103, #154; cf. #194) and #77 seems to be a battle scene in which two of the warriors have bows (**Fig. 3**), but that is speculation. Harding's belief in a fatal arrow wound appears to be based on a misunderstanding of the medical term 'sagittal scar' (*sagitta* [Latin] = "arrow"): "'Sagittal' in the context of the pathologists' report means in the sagittal plane, i.e. the anatomical position of the wound" (Dr Paul Bannan, pers. comm. 20110408) and has nothing to do with the shape or cause of the wound.

The pathologists concluded: "A study of these bones and the dentition suggests that this is the skeleton of a large, relatively tall, very muscular male between the ages of thirty-five and fifty years" (Shanklin and Dark 1953: 59).

**Significance of the Cairn of Hānī**

The Cairn of Hānī was and is of considerable historical interest. It was the first Safaitic cairn to be excavated and is still one of only six to have been excavated in Jordan's Basalt Desert. Even at the time, the excavation, its rich findings and Hānī's identification as some sort of "holy man or *darwīsh*" (Harding 1953a: 9) were unexpected and caught the attention of a wider audience than usual (Harding 1953b).

Notable were the structure at the core of the cairn, the cutting of graves, their parallel orientation, the carefully laid out bodies, the grave-goods and the survival of some organic material.

The inscriptions were not just numerous but highly informative. Harding was able to construct a family tree for Hānī with 32 family members (1953a: 21). Hānī received tributes not just from a wide range of named relatives, but also from many others; the stones collectively name no less 21 different tribes (or clans). A particularly interesting feature is the suggestion, based on 19th and 20th century practice, for continued visits and commemoration for perhaps years after initial interment, *viz*. a nomadic people returning to the same area on a seasonal basis.

Although the broad dating of Safaitic texts has been arrived at from research over a wide area and large numbers of inscriptions, the presence of a Latin inscription is a useful reminder that Hānī and the many people named in the texts, and thousands more like them, were the nomads who lived on or beyond the limits of the Roman provinces, in this case the provinces of Arabia and Syria. Here we not only confront the usually faceless and nameless nomads, but also find them to have a complex societal structure

(cf. Macdonald 1993).

Another item that adds to the importance of the Cairn of Hānī is a depiction of what appears to be a kite, one of the hunting traps that abound in the Basalt Desert. The drawing shows an enclosure, animals and hunters with an associated inscription in Safaitic (Harding 1953a: 30-31, #73 and pl. VI). The drawing and text have been discussed and cited extensively in the context of the lengthy debate about the purpose and date of kites. The drawing is one of a handful – and by far the most detailed – apparently depicting kites and their use for hunting, though the matter remains controversial (Harding 1956; Betts and Helms 1986; Betts and Helms 1987: 55-6, 61-2; Echallier and Braemer 1995: 57-58; Fowden 1999: 127-129; Betts and Yagodin 2000: 33; Macdonald 2005: 333-339). This is not the place to survey the extensive literature and varying interpretations, other than to bring out that the date implied by the drawing and Safaitic text (*ca.* 1st century BC to 4th century AD) is much later – perhaps by several thousand years – than when kites are thought to have been first constructed. As such, it represents crucial evidence for their continued if not continuous use over a long period.

**Present Condition**

As Harding noted (1953a: 8), it was surprising (even in 1951) that the cairn had not been robbed, as it was so close to the highway and had a track leading to it. In the 1950s the walls were in a fairly good state of preservation and the inscriptions most likely largely *in situ*. The removal during the excavation of the covering rocks undoubtedly made it more vulnerable, but as late as the 1970s it was seemingly little changed (Michael Macdonald, pers. comm. 20090905).

Today the cairn is very much changed. In comparison to the photographs taken by Harding, its current state is disappointing (**Fig. 4**). Indeed, Harding explicitly notes that the natural desert covering of boulders came right up to the edge of the cairn. Now bulldozer tracks come up to the structure and some of the surrounding landscape boulders are heaped against it, so that it is not immediately recognizable. This is particularly evident in the aerial photographs in which swathes of boulders have been pushed right up to the edge, and some of them are piled onto the south side of the cairn with complete disregard for the original structure (**Fig. 5**). Despite its significance, the Cairn of Hānī seems never to have been included in the database of archaeological sites for Jordan, JADIS, and the submission offered for inclusion in the new database, MEGA-J, has not been used.

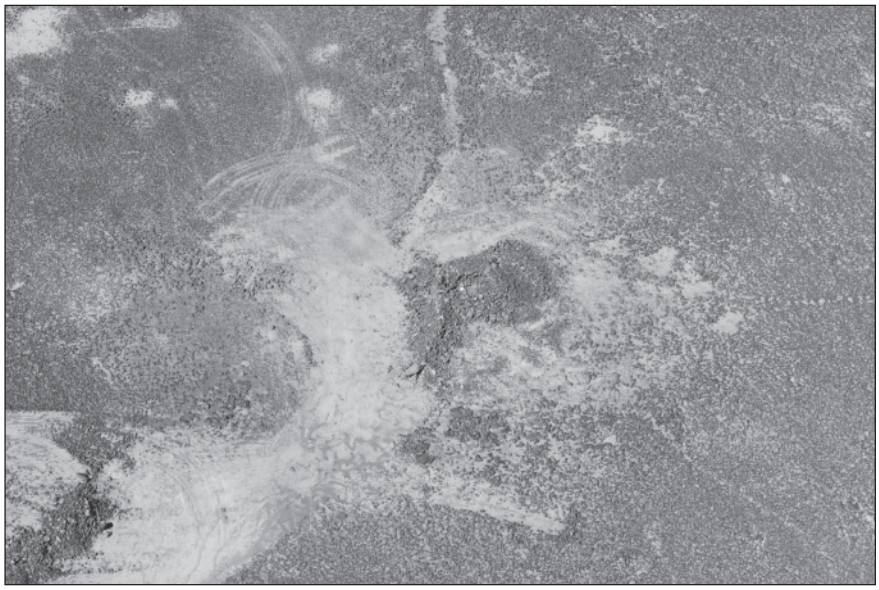
Many of the inscriptions were removed by Harding and by a more recent Director-General, Dr Fawwaz al-Khraysheh, for display in museums. At least 28 are still present in a group just to the south-east of the structure, on the edge of a bulldozed track (**Figs. 5** and **6**). In short, barely a sixth of the 181 inscriptions recovered from the cairn itself are still to be seen on site.

The cairn's location so close to a busy highway and the clear evidence both there and all along this road for road-working and seemingly casual bulldozing pose a serious threat.

**Other Excavated Cairns**

Many cairns are marked by inscriptions

*4. Cairn of Hānī in (a) 1951 (from Harding 1953b: fig. 4) and (b) 2009 (photo Karen Henderson).*



*5. Aerial view of the Cairn of Hānī looking west-north-west; the inscriptions remaining on the site are largely at left foreground (APAAME_20090928_DLK-0537C).*

*6. Inscribed rocks lying south-east of the cairn (#135, #136 and #161) (APAAMEG_20091014_DLK-21).*

found in them, on them or nearby; these often include the words *bana* ("build") and *wajama* ("grieved for"). Neither term specifically implies a tomb or burial; one might just be an expression of grief, while the other does not mean that a tomb has been built – possibly just a monument to the deceased. However, as it yielded two burials, the excavation of the Cairn of Hānī gave powerful support to the belief that the larger cairns at least were burial sites. Nevertheless, even now only a few more cairns have been fully excavated in Jordan, with varied results.

*The Cairn of Sa'īd*

The Winnett and Harding expedition to Ḥarrat ash-Shām in 1958 - 1959 recorded 50 large cairns in the area north-west and south-west of Pumping Station H4 (modern ar-Ruwayshid) on the Baghdad highway from Mafraq to Iraq (**Fig. 1**). 4,567 Safaitic inscriptions were recorded in and around these cairns (Winnett and Harding 1978: 6), of which 480 were subsequently published by Oxtoby (1968), for whom this was #9.

Two adjacent cairns just north-west of Qaṣr Burqu' were excavated by Harding in 1959 (**Fig. 1**). These were selected as it was thought one might be the grave of a named individual whose name, Sa'īd son of Saḥāb, was found in inscriptions on a stone nearby (Harding 1978: 243) (see Appendix).

Cairn A was closest to the inscriptions men-

tioning Sa'īd. It had a few further inscriptions on its surface but there were none in its make-up. Contrary to expectations, no burial was revealed in the excavation.

Cairn B, which may be thought of as the Cairn of Sa'īd, did include a burial and further inscriptions. However, Harding's hopes that the site would produce a wealth of information like that of Hānī were disappointed. Writing in 1978 (243), many years after his excavations of the Cairns of Hānī (1951) and Sa'īd (1959), he explained this difference by noting that the Cairn of Sa'īd was built on a rocky ridge of basalt so that the body had to be laid on a constructed platform, while Hānī had been buried on an open flat plain which had relatively soft soil. However, this is incorrect; as noted above, the female grave beside Hānī was certainly cut into the soft soil, but that of Hānī was cut through the soil and he was buried in a rock-cut grave covered by stone slabs. Moreover, Harding goes on (1978: 243) to explain that beneath Sa'īd Cairn A there was "native soil … undisturbed and filled with very large basalt boulders" and that his team excavated between the latter to a depth of a metre. In short, there seems no reason to suppose that those who buried Sa'īd could not have dug a grave into the soil had they so wished, or cut into rock if they preferred a rocky location. They evidently chose not to do so.

Nevertheless, Cairn B / Cairn of Sa'īd did have parallels with the Cairn of Hānī. Two more texts dedicated to Sa'īd were found almost immediately the excavation began, bolstering the belief that the body of a young man interred there was that of Sa'īd. The burial chamber consisted of a circular platform surrounded by a wall of field boulders. A second concentric wall surrounded this and it seems the inner chamber and the space between the two concentric walls was gradually filled with stones over a period of time to create the low cone-shaped cairn. The body was laid on the platform within an outline of stones to create something akin to a cist grave. The head was to the west (250°).

Of the positioning of the body, Harding (1978: 246) notes that "the only thing it has in common with that of Hānī is that the body was laid on its right side, head west." This is a puzzle: his description of the remains at the Cairn of Hānī clearly state they were both laid on their backs, i.e. supine. The head of Sa'īd was separated from the body and moved and the face was missing. The back of the skull seemed to have been struck by a sharp instrument. No textiles or any grave goods were reported, with the exception of an iron ferule found in the debris above the remains. No pathology report seems to have been commissioned.

Whereas 97 of the 198 Safaitic texts at the Cairn of Hānī referred to him by name, only 11 of 500 recorded texts at and around both Cairns A and B referred to Sa'īd. The familial and tribal connections between those who left the inscriptions were also less evident (Harding 1978: 246).

*Cairn of KhRJ bnt GhTh (Khārij bint Ghawth).*

Two cairns were excavated in 1980 at a location 40 kilometres south-south-west of Pumping Station H4 / ar-Ruwayshid, on the eastern edge of the Ḥarrat ash-Shām lava field (Clark 1981). The location can be identified as being at the northern edge of Qā' Abū al-Ḥuṣayn (cf. Clark 1976: 113 and 116, figs 1 and 3; cf. Clark 1979). The cairns were identified during a 1976 survey for Safaitic inscriptions which recorded 176 texts at this location. These particular cairns, situated *ca.* 50m apart, were chosen for excavation because a nearby inscription referring to a woman implied she might be buried in one of them; the prospect of a female burial and epigraphic evidence was enticing.

Cairn 1 seems to have been built from stones collected right beside it – unlike the Cairn of Hānī (above). 56 inscriptions were discovered around it but none seem to refer to the cairn or its occupants.

Excavation yielded two male burials. Unlike Hānī and Sa'īd, both were disarticulated and disturbed; it appears that the bodies had simply been laid on the desert surface and were then covered with rocks to protect them from animals. Later still, the long bones of both had been gathered and stacked between the two burials. Burial 1 was supine and seemingly oriented north-south. Burial 2 was also supine but no orientation was recorded. Although the cairn is on a ridge, excavation continued in the soil beneath to a depth (calculated from figures on pp. 237, 239) of about 25cm, but no pit or further burial was located. Finds were few and undated.

Cairn 2 was apparently formed by creating a

crude circle of boulders on the ground and heaping stones up outside it. After the burials were placed inside, more stones were heaped on top inside this ring, gradually raising it to form a cairn which still stood 1.6m high at the time of excavation.

Cairn 2 contained the bones of seven individuals, mostly in a state of disarticulation and in highly disturbed stratigraphy. Three were found amongst the heaped stones and are explained as later intrusions. At the heart of the cairn, inside the ring (above), a rough irregular platform of stones was found set on the ground, upon which were found the remains of a young female, an infant and a male aged 40-55 (Burials 1-3). Next to the platform, however, was what seemed to be the principle burial (Burial 4) in a shallow pit, *ca.* 25cm deep, of a female of 'middle age' whom the excavators tentatively identified as the woman of the inscription: *KhRJ bnt GhTh*. Michael Macdonald (pers. comm. 20110331) notes: "Given that vocalizations of names in Ancient North Arabian inscriptions are entirely speculative and are usually based on using the vowels in Arab names with the same consonants, one could vocalize (the name) as Khārij bint Ghawth".

Burial 1 (the young female on the platform) was disarticulated, but lay supine with an apparent north-south orientation. The male (Burial 2) and infant (Burial 3) remains were jumbled. Burial 4, the 'middle aged' woman in the shallow pit, was also disarticulated but the excavators thought it was oriented north-west-south-east.

Numerous objects including bronze, iron, beads, glass and shell were discovered, including an 'eye make-up applicator', a bracelet and spatulas. Dating largely pointed to the Roman-Byzantine period.

101 inscriptions were found, six on or in Cairn 2 and a dozen that may refer to the cairn or its occupant(s). Three explicitly refer to KhRJ bnt GhTh, e.g. CNSIJ 620: "For Khārij daughter of Ghawth she of the tribe of TM, and this is the (her) cairn."

Clark (1981: 254) suggests the burial of KhRJ probably post-dates that of the two adults on the platform.

*Cairn of the Mermaids*

The most recently explored cairn is this one situated on Jabal al-Muqalla (Majalla), overlooking the broad expanse of the mudflat known as Qāʿ al-Muqalla / Majalla on Wādī Rājil (**Fig. 1**). The area had previously been surveyed by Betts (1982), but this specific cairn was only explored and published recently (Bikai 2009). The latter recorded 77 stones with 125 inscriptions, but no burials were found. Bikai concluded that the cairn was used as a meeting place and possibly a 'notice-board' or gathering place for religious ceremonies. He identified "206 different persons, 85 of them belonging to one family consisting of 13 generations" (Bikai 2009: 226). The largest group of named people are those associated with Basa. Once again tribes (or perhaps just clans or families) are named.

Distinctive is the frequency with which the 37 drawings include nude women with long hair and arms raised at shoulder height and forearms bend upwards – dancers or worshippers rather than the misleading 'mermaids' as none of these figures has a fish tail **(Table 1)**.

**Discussion**

Although only six individual cairns have been excavated – and two of these had no burials – it is apparent that there is no particular pattern to the burials. The shape and size of the cairns vary. For example, that of Hānī has a rectangular chamber; bodies can be oriented differently, but the two at the Cairn of Hānī are closely aligned with each other and lie very nearly east-west. Bodies can be laid out on soil, on benches or pavements, or are buried in small cists. Although it is somewhat reliant on the ability of the environment to preserve artefacts, there is no particular pattern to the number or type of grave goods that are found with the bodies.

Amongst the inscriptions there is a consistency of repeated words *rujum* ("cairn"), *bana* ("built for") and *wajam* ("grieve / mourn for"). The total number of texts in each case is very considerable, though they may be the outcome of repeated visits over a number of years. Certainly the presence of inscribed stones amongst the boulders of the cairn suggests that we should be cautious. The three intrusive burials encountered by Clark in his Cairn 2 (above) is a reminder that nomads / *bedouin* frequently buried their dead in existing cairns, as well as in the towers of abandoned Roman forts and other such convenient

**Table 1**: Details of graves and burials excavated in the Jordanian Ḥarrat ash-Shām.

| Cairn | Cairn and Chamber | Inscriptions | Grave | Burials | Body position | Orientation | Age | Cause of Death | Grave Goods |
|---|---|---|---|---|---|---|---|---|---|
| Hani | Circular and conical mound<br>Rectilinear chamber within secondary partial rectangle | 198 (97 naming Hani) | Rock-cut shaft | Male | Both supine with left arm across body to right elbow; face turned south | 280° | 35-50 | Unknown | Extensive - including organic material (textile, leather, wood) |
| | | | Grave cut into soil | Female | | 280° | 35-50 | Unknown | |
| Sa'd Cairn A | Circular and conical mound<br>No chamber | 500 (11 naming Sa'd) | | 0 | | | | | |
| Sa'd Cairn B | Circular and conical mound<br>Circular chamber within secondary ring<br>Platform | | On platform, body surrounded by rocks | 1 | "Body was laid on its right side, head west"; head removed | 250° | Unknown | Back of skull struck by a sharp instrument | Iron ferule |
| Khârij Cairn 1 | Circular and conical mound | 56 | Laid on desert surface | Male 1<br>Male 2 | Both supine but disarticulated; long bones later moved | N-S<br>-- | Unknown<br>Unknown | Unknown<br>Unknown | Very few |
| Khârij Cairn 2 | Circular and conical mound<br>Circular chamber<br>Crude platform | 101 (three referring to Khârij bint Ghawth) | Irregular platform of stones on the ground | Female 1<br><br>Male<br>Infant | Supine; disarticulated<br>Jumbled<br>Jumbled | N-S | 'Young'<br><br>40-55<br>-- | Unknown<br><br>Unknown<br>Unknown | bronze, iron, beads, glass and shell and included an 'eye make-up applicator', bracelet and spatulas. 'Roman-Byzantine' |
| | | | Shallow pit | Female 2 (Khârij?) | Disarticulated | NS-EW? | 'Middle age' | Unknown | |
| | | | | 3 later (recent?) intrusions | | | | | |
| Mermaids | Circular and conical mound | 77 stones with 125 inscriptions | | 0 | | | | | |

structures (Parker 2006: ch. 23).

The Cairn of Hānī is still hugely significant, not least because of the state of preservation of the two burials and the information on the cairn that allowed for the identification of one of the bodies as Hānī. Added to this is that from many hours flying over this region, the impression gained is that cairns seldom exist that have not been looted, damaged or destroyed. Thus, the chance to excavate one is rare indeed. The architecture of the cairn is also significant: it clearly shows forethought in the shape, position of the burials and orientation of the cairn itself. Furthermore, it is the only one that is rectangular rather than round. This is the only burial where the grave was neither laid on the surface nor dug into the desert soil, but was cut through the soil and the underlying basalt. The rock-cut chamber was then shaped and a flanged rim provided around part to accommodate the covering slabs. This is surely an indicator of the very high status of the deceased. It may also be worth noting that where other cairns had later inclusions and burials, the Cairn of Hānī remained undisturbed.

We may add that the female burial outside the enclosure of the Cairn of Hānī suggests this burial is later, after Hānī had been interred and his cairn had begun to grow from added stones and inscriptions.

The treatment of the bodies is interesting. Despite differences in the way they were encountered by the excavators, it is clear that some formality was present for the original burial, *viz*. platforms, ring of stones and cist-form, cut into the soil or even rock. Outstanding, of course, is the treatment of the two bodies at the Cairn of Hānī: head almost due west, supine, face turned to the south and left arm across body to rest on right arm. Even if the two bodies were interred simultaneously, it suggests that a deliberate pose was selected, which presumably had some significance.

Although a small textile wrap and some leather survive in the female grave at the Cairn of Hānī, there is no trace of clothing as such there or at any of the other cairns discussed here. This may well be simply a matter of unsuitable preservation conditions.

Hānī's hair survived, black and extending 'well down below the neck'. Harding suggests this is unusual, but in the associated rock art at the Cairn of Hānī there are two examples of male figures with long hair (Harding 1953a: #78, #80). There was no hair surviving on Hānī's female companion, nor on any other skeleton excavated. We may note, however, that female figures in the contemporary rock art generally have very obvious long and thick hair, often standing

out thickly to the sides (Harding 1953a: #79; Bikai 2009: figs 5, 7, 10, 11, 15, 21).

Harding observes (1953a: 12) that: "It is surprising to find a naked woman depicted in (Cairn of Hānī) no. 79". However, the rock art around the Cairn of the Mermaids now includes many examples and it is common elsewhere (Nayeem 2000: 337, figs 339, 344-7, 349-56, 386, 388-90; Macdonald 2012: passim). The standing style with raised arms is familiar. There are many parallels in Arabian rock art for both male and female figures with arms upraised in this same position (Macdonald 2012: passim; cf. Nayeem 2000: 335-7, figs 339, 344-7, 349-56, 386, 388-90). It is highly unlikely these are goddesses, but whether we are dealing with dancers, 'cheerleaders' or even mourners is unclear (Macdonald 2012).

Features of everyday life are present in the inscriptions, most of which have been noted and discussed before. Whether or not Hānī was killed violently, other skulls show traces of violent blows and the inscriptions and rock art attest to regular fighting.

Harding reports that he took particular note of the fact that the surrounding basalt boulders still came right up to the cairn itself; his Palestinian colleague, Hasan Awad, told him that stones are customarily bought from some distance away to be placed on the cairn (Harding 1953a: 8). This is not borne out at the other cairns.

Harding (1953a: 8) mentions that Winnett pointed out that most inscriptions are found on the eastern side of cairns. We may add, too, that at the Cairn of Hānī there was no outer wall on the west side, where the form of the walls suggests an entrance at the south-west corner. Clark's excavation of his Cairn 1 found an apparent entrance on the south-west side. At the Cairn of Hānī, both bodies had their heads to the west (280°) and the head of Sa'īd was also to the west (250°). The apparent precision in the orientation of the bodies (280°, 280° and 250°) should not be pressed; 'west' is probably the intention, facing the setting sun.

Finally, we should reiterate the points made by Clark (1981: 254):

*"In the case of many of the Safaitic inscriptions sites, despite the presence of the texts near a cairn, the absence of any references in these which might relate to a burial at the site would suggest that not all of the cairns do cover burials, or that not all of the cairns are to be attributed to the Safaitic peoples. Of course it should be remembered that the practice of erecting cairns over the dead was not unique to these people nor to any one period of time. Thus some of the cairns may be earlier and some later than the Safaites, or they may have reused earlier cairns or had their own reused in turn."*

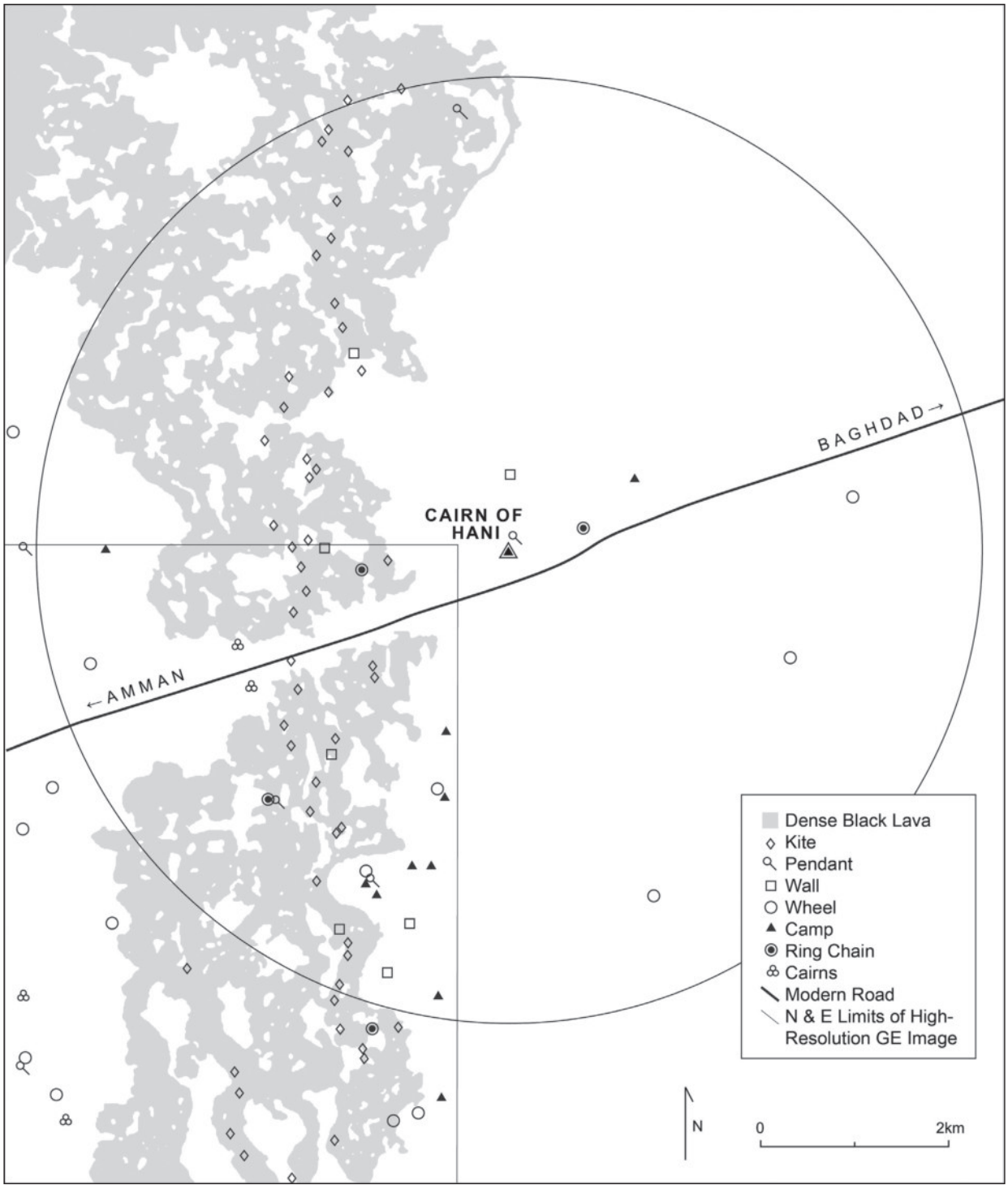
In short, many cairns may never have been for burials and many may belong to periods before or after the relatively brief centuries when inscriptions were being cut. Multiple burial and commemorative practices are probably included in the thousands of cairns in Ḥarrat ash-Shām.

**The Context of the Cairn of Hānī**

Within a 5km radius of the Cairn of Hānī, three-quarters is generally of too poor quality on Google Earth (GE) to complete a comprehensive survey. Although intensive recent aerial reconnaissance in the immediate vicinity of the cairn is still in progress, it has already revealed a considerable number of structures. 72 'sites' have been identified, mainly on the west side where there is a thick north-south belt of dense lava (**Fig. 7**). They can be divided into seven categories: kites, pendants, ring chain walls, cairn fields, wheels, camps and meandering walls.

First – and entirely in this western half – are 36 (perhaps 38) kites. Indeed, the Cairn of Hānī falls near the centre of four adjacent map sheets (aṣ-Ṣafāwī, al-'Awsajī, Shubayka and 'Abid) which collectively have one of the highest concentration of kites in the Jordanian part of Ḥarrat ash-Shām, *viz*. 187, 67, 128, 55 respectively – a total of 437 to date (**Fig. 8**).

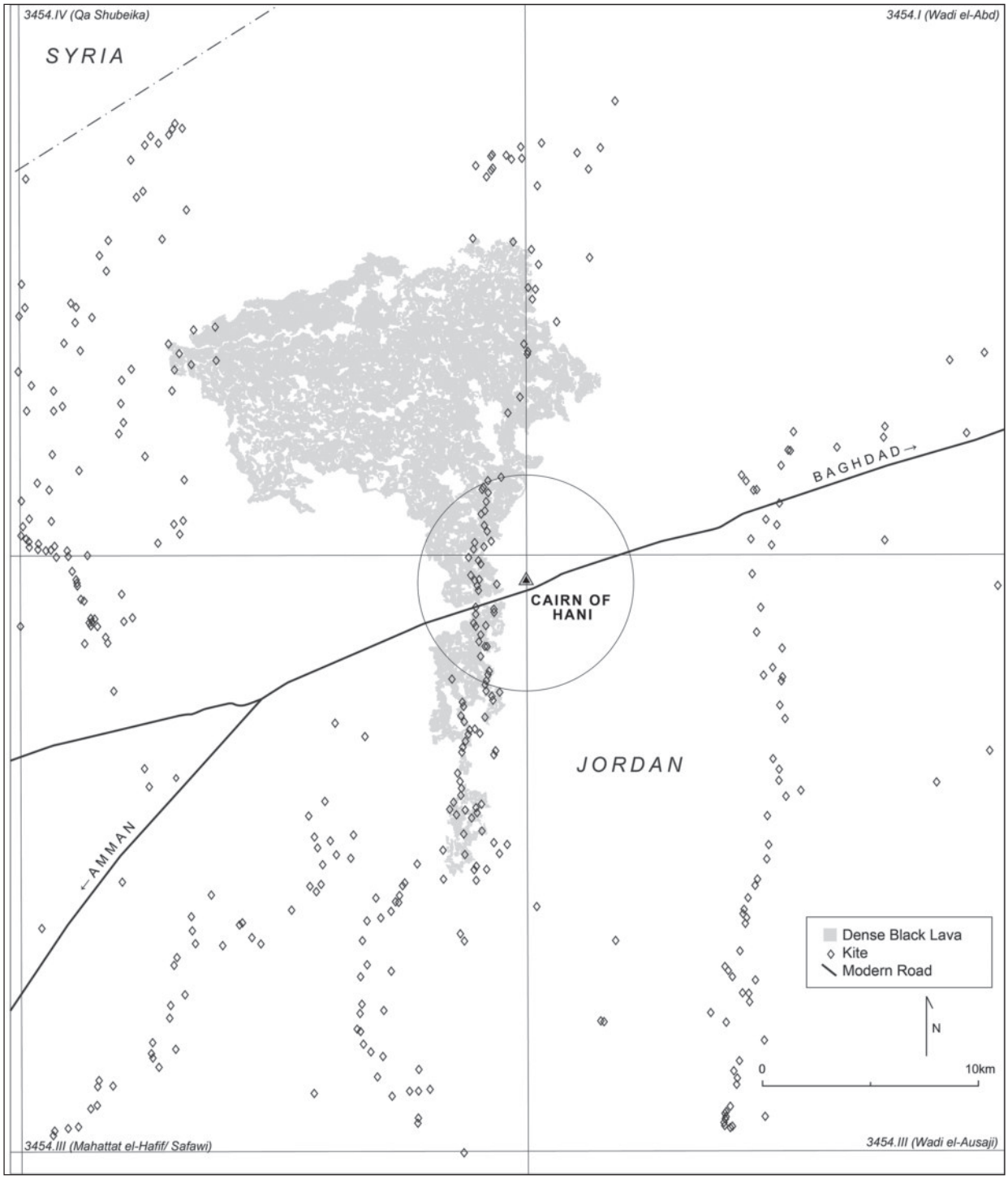
All of the kites within the 5km radius are situated in the belt of dense basalt rather than in the thinner cover found more widely. Moreover, the kites in this area are large and highly complex (**Fig. 9**). Many have been built over or rebuilt, with the ghosts of previous walls visible beneath or nearby (**Fig. 10**). Many have massive enclosures ('heads') and a relatively unusual feature in this area is to have three or more 'hides' side-by-side along one wall. Seen from above one is also struck by the immense tangle of guide walls ('tails'); each kite seems to have multiple tails and these often intersect both with others of the same kite and its neighbours. As is well




*7. Ancient stone structures within a 5 km radius of the Cairn of Hānī (drawing Matthew Dalton).*

known, the dating of kites is highly problematic. However, a recent survey of evidence seems to confirm a Pre-Pottery Neolithic date for the beginnings of kite use, with ethnographic evidence suggesting that some may have been in use right up until the early 20th century (Helms and Betts 1987: 54-5; Betts 1998: 195-200; Betts and Yagodin 2000: 32-3; cf. Betts 1982: 32; Helms and Betts 1986; Echallier and Braemer 1995: 54; Nadel *et al*. 2010).

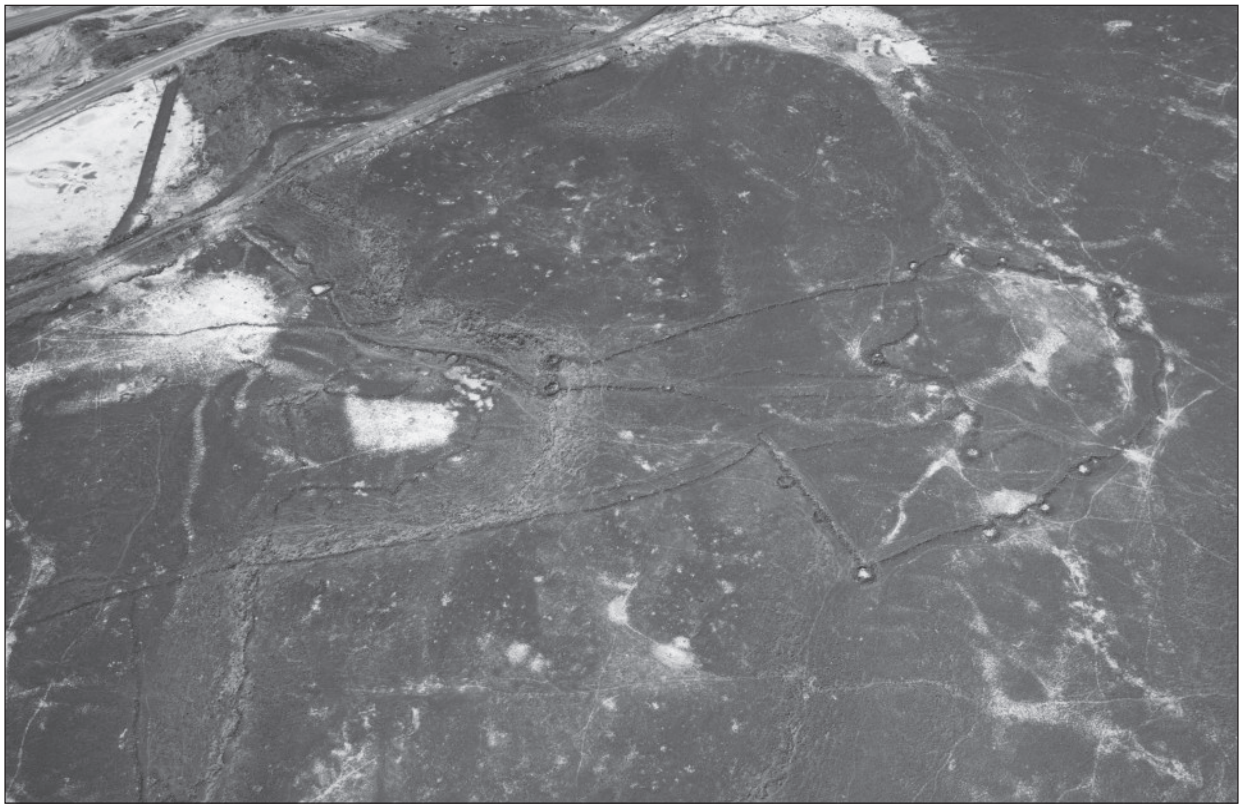
Second are the pendants, al-ʻAwsajī Pendant 3, located 150m north of the cairn (**Fig. 11a**),



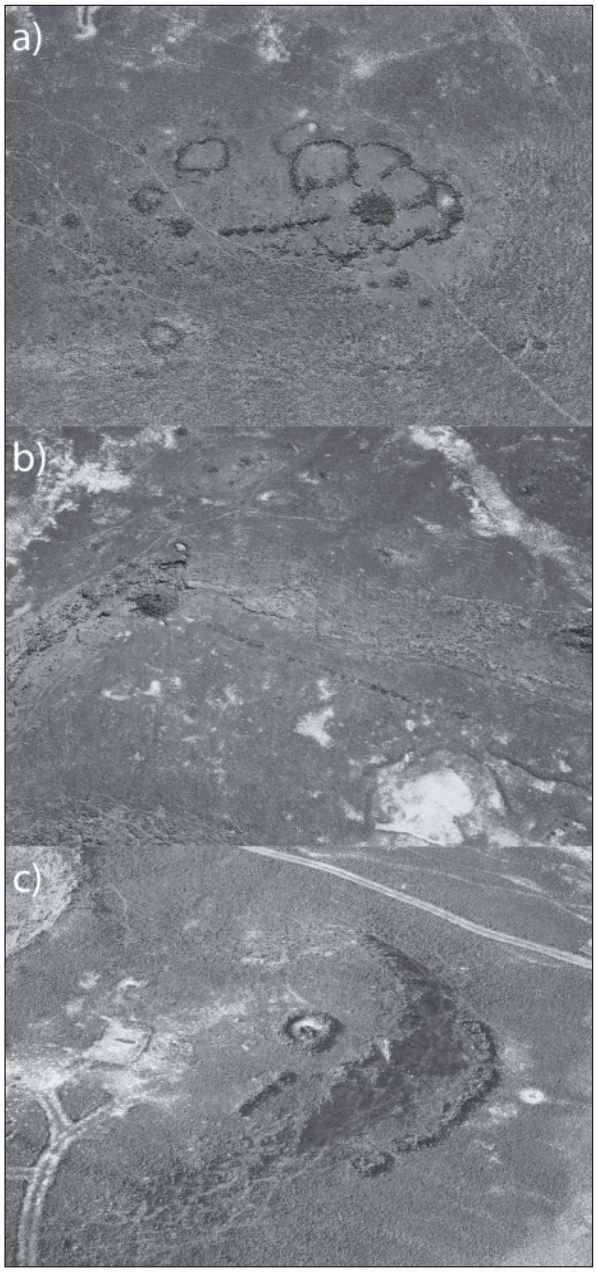

*8. Distribution of kites within the 2,600 km2 of four adjoining map sheets (aṣ-Ṣafāwī, al-'Awsajī, Shubayka and 'Abid). The circle represents a 5 km radius of the Cairn of Hānī (cf. Fig. 7) (drawing Matthew Dalton).*

is relatively small, with eight clearly separate small cairns in a tail leading to the larger 'head'. Although the Cairn of Hānī does not have a tail, the proximity of a pendant with a tail of small cairns, each presumably commemorating subsequent visits to the area, is notable. Only three other pendants have been noted within this 5 km radius. Shubayka Pendant 5, *ca.* 5km to the north (**Fig. 11b**), has a very long tail of small, well-defined cairns and is placed along a promi-

*9. Aṣ-Ṣafāwī Kite 118, a highly complex kite 3km south-west of the Cairn of Hānī (APAAME_20100601_DLK-0043).*



*10. Aṣ-Ṣafāwī Kite 35, showing traces of earlier kite beneath (APAAME_20090928_RHB-0492).*




*11. Pendants near the Cairn of Hānī: (a) al-'Awsajī Pendant 3 (APAAME_20090928_DLK-0531C), (b) Shubayka Pendant 5 (APAAME_20090928_RHB-0579C), (c) aṣ-Ṣafāwī Pendant 30 and aṣ-Ṣafāwī Ring Chain 12 (APAAME_20100601_DLK-0041C).*

nent ridge. Aṣ-Ṣafāwī Pendant 30, 35km to the south-west (**Fig. 11c**), is most interesting as a wall encloses the 'head' of this shorter pendant, thereby creating a bull's eye cairn; it also sits on a ridge above a ring chain site (below). Aṣ-Ṣafāwī Pendant 21 lies next to a wheel discussed below (**Fig. 17**).

Ring chain walls are rare, but most of the 31 now recorded by the Aerial Archaeology in Jordan project are found in this same area: 13 of them in the aṣ-Ṣafāwī map area alone and three within 5km radius of the Cairn of Hānī. They consist of small adjoining and often overlapping semi-circular or ring walls. Two sub-types are found within the 5 km radius, which are related in character but hugely different in scale. Aṣ-Ṣafāwī Ring Chain 12 (**Fig. 11c**) has been noted already (above); aṣ-Ṣafāwī Ring Chain 13 (**Fig. 12**) is 1.6km east of the Cairn of Hānī. There is a large (obviously looted) circular cairn at one end and it sits on a high ridge above the rest of the landscape.

Starting just 500m east of the Cairn of Hānī, however, is a site very different in scale though similar in concept. Al-'Awsajī Ring Chain Wall 1 is unique in scale and complexity (**Fig. 13**). Despite its twists and turns, and the loss of part to the modern highway on the south, it is possible to calculate that the 'chain' runs for over 4km (**Fig. 14**). The enclosed area is highly irregular but covers some 490 ha. There is even less evidence with which to date this or any other ring chain wall. As noted above, Ṣafāwī Ring Chain 13 is overlain by a large cairn which might suggest a pre-Roman date. Overlying the present example is what is identified as a nomad camp (**Fig. 13**). A brief visit on the ground noted pottery identified as 4th-6th century AD from photographs (Kehrberg, pers. comm. 20100525). More usefully in terms of possible dating evidence, al-'Awsajī Ring Chain Wall 1 overlies what appears to be a kite tail. This last point can be supported: *ca.* 21km south-south-east of the Cairn of Hānī, another example – al-'Awsajī Ring Chain Wall 2 – overlies the head of al-'Awsajī Kite 21. In short, al-'Awsajī Ring Chain Wall 1 may date somewhere between the Pre-Pottery Neolithic and the Roman period.

Fourth, there is the huge cairn field – aṣ-Ṣafāwī Cairns 12 – situated 3km west-south-west of the Cairn of Hānī (**Fig. 15**). This cairn field is now in three separate parts, interrupted by the old highway, modern bulldozing and now the new highway. The original undamaged field would have extended over an area of *ca.* 3.75km$^2$. Some cairns have certainly been destroyed by the two parallel highways and bulldozing on both sides. Still visible are *ca.* 1,300

*12. Aṣ-Ṣafāwī Ring Chain 13 (APAAME_20100601_DDB-0074C).*

small cairns; the original total may have run to nearly two thousand. These cannot be burial cairns; they are very simple, cone-shaped piles of stones (**Fig. 16**). Although an intensive survey has not been undertaken, there do not seem to be any inscriptions associated with them, nor can they be attributed to any particular period. Their large numbers in close proximity is surely significant. There is a possibility that they are commemorative – lapidation – but the huge number is daunting.

Next are a handful of wheels. Only seven have been noted so far but there are almost certainly more in the unexplored part of the 5km radius around Hānī's Cairn. The most common form in this instance is that of a crude circle with spokes, around the outside of which is a circle of small cairns, *viz*. a wheel with cairn ring. While the distribution of kites is exclusively on the belt of thick basalt to the west of the Cairn of Hānī, almost all the wheels lie in the east, within the thinner basalt-covered area. The most likely explanation for wheels is that they served a funerary purpose. In the wider area wheels abound, with almost 100 in the aṣ-Ṣafāwī area alone.

Nine sites defined as 'camps' lie within the 5km radius. These have been provisionally identified as the seasonal camp sites of nomads and were probably little different in the 20th century compared to 1,000 or 5,000 years ago. al-'Awsajī Camp 1 appears in **Fig. 13**. The distribution pattern of camps is interesting: none lies on the dense basalt belt occupied by the kites, but they are found close by on the thinner basalt surface. As noted above, al-'Awsajī Camp 1 has pottery of the 4th-6th centuries AD. Seasonal camps are implied by some of the inscriptions found around the Cairn of Hānī (Harding 1953a:


*13. Al-'Awsajī Chain Wall 1 looking south; al-'Awsajī Camp 1 is left of centre (X) and overlying the tail of a possible kite (APAAME_20100601_SES-0051).*


*14. Al-'Awsajī Chain Wall 1 (drawing Rebecca Banks).*

#102 - "And he kept watch for his brother [who was] following his camels … And he encamped here the year in which Rabib'el escaped" [cf. Macdonald 1992]).

Finally, there are long sections of meandering wall which, though intersecting with kites, do not seem to be part of them. Indeed, by cutting across their tails the walls block entry to the trap. There is no obvious explanation for these walls here or anywhere else in Ḥarrat ash-Shām where they are common. Perhaps they can be thought of as landscape art – except that the form is only

*15. Aṣ-Ṣafāwī Cairns 12 (APAAME_20100601_SES-0043).*

visible from above (**Fig. 18**).

Although the Cairn of Hānī can be dated reasonably closely, many of the other structures are much harder to date and most seem older. In short, the Cairn of Hānī was built in a landscape already extensively littered with stone structures, some of which may still have been in use.

Although this section is primarily concerned with the context of the Cairn of Hānī, it is worth noting that aerial photography and Google Earth (**Fig. 19**) show similarly rich contexts for the other sites, especially the Cairn of the Mermaids.

The latter lies on the left bank of the broad Wādī Rājil, marked at that point by lava outcrops, *viz*. Jabal al-Muqalla / Majalla, upon one of which the cairn lies. Within a 5 km radius lie 13 kites, 10 wheels, five pendants and eight walls. In addition to the inscriptions and rock art published by Bikai, a recent visit noted scores of further inscriptions and rock art drawings of people and animals (including two of aurochs).

**Conclusion**

Despite the richness of the archaeological landscape in the Jordanian Ḥarrat ash-Shām and the immense numbers of Safaitic inscriptions and items of rock art, relatively little excavation has been undertaken both to investigate the nature of the numerous cairns, to record and interpret the burials, and to attempt to relate them to the inscriptions and art. That is surely a desideratum. The nomads of the region were the people within, on and beyond the porous borders of the Roman Empire. They appear infrequently in literature and in occasional Greek and Latin inscriptions. Later still, they emerge as powerful military allies to be courted and employed. Archaeology offers the opportunity to balance the one-sided and often misleading image of these people, both by investigating what they have to say of themselves in word and art and through the physical remains of the people and their structures.

We may now go further thanks to aerial imagery. The cairns, often unimpressive at ground level, can be put in the context of a larger archaeological landscape. Although much of this is undated, it is often clearly older than the cairns be-

*16. Aṣ-Ṣafāwī Cairns 12 (APAAMEG_20090922_DLK-78).*

ing discussed here. To the nomads of the Roman period, the traces would have been clear enough, being part of the "altered earth" (Bradley 1993), a feature of their world and the 'works' of their distant predecessors. Just how much was already old is unknown. Certainly the kites are likely to be much older, but the drawing alongside inscription #73 (above; Harding 1953a: 30-31 and pl. VI) implies that some kites at least were still being used as animal traps. It is notable, too, that there is a growing corpus of Safaitic rock art from this period that depicts what seem to be kites in use (Betts and Helms 1986; Macdonald 2005b; Van Berg 2004; LeMaitre *et al*. 2008; cf. Bar-Oz 2011). Both pendants and wheels can regularly be seen in this area overlying kites; pendants seem to overlie wheels implying they are younger still. As for the ring chain walls, little can be said beyond noting that they seem to be contemporary with or earlier than the Roman period. They have no obvious practical purpose and may – like the walls that abound in the basalt desert – be thought of as some kind of landscape art. Further mapping and detailed analysis of both site types across the entire Ḥarrat ash-Shām may help clarify the situation.

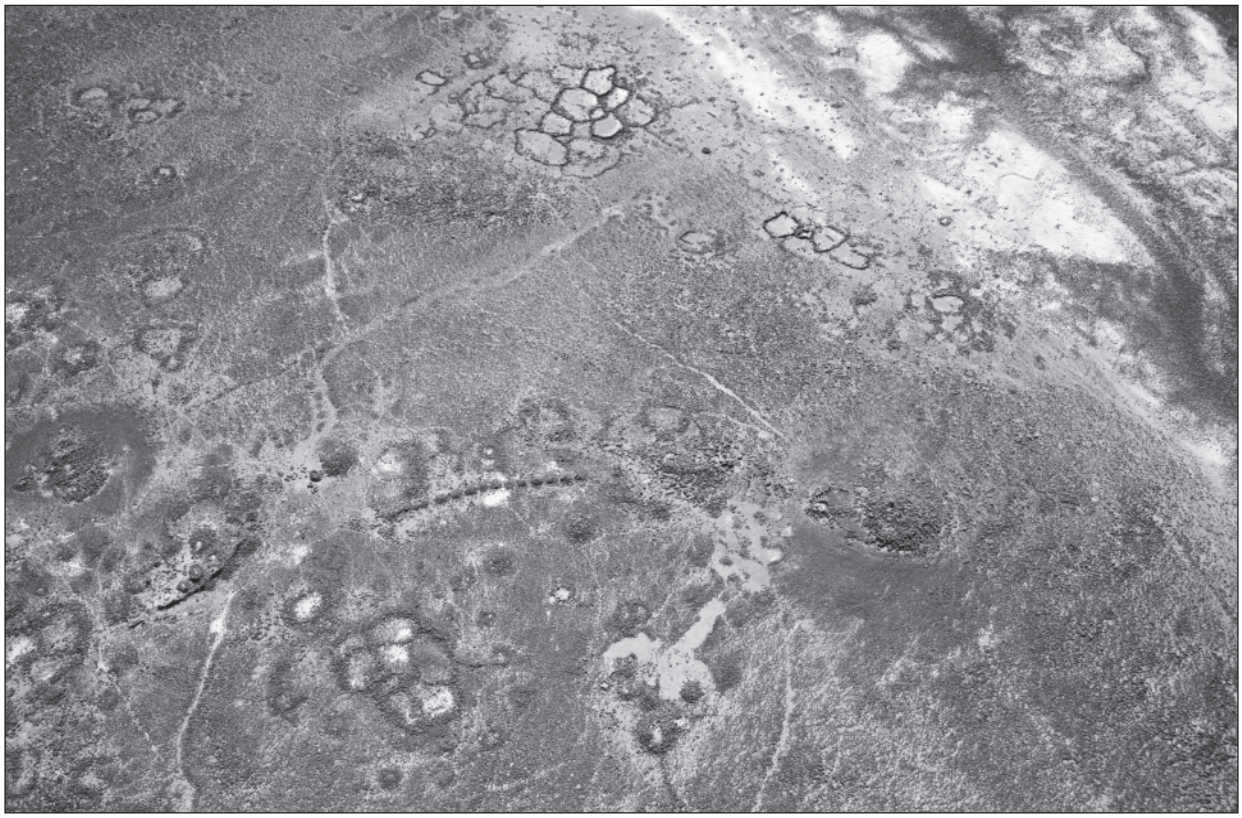
**Appendix: Locating the Cairns**

*Cairn of Hānī*

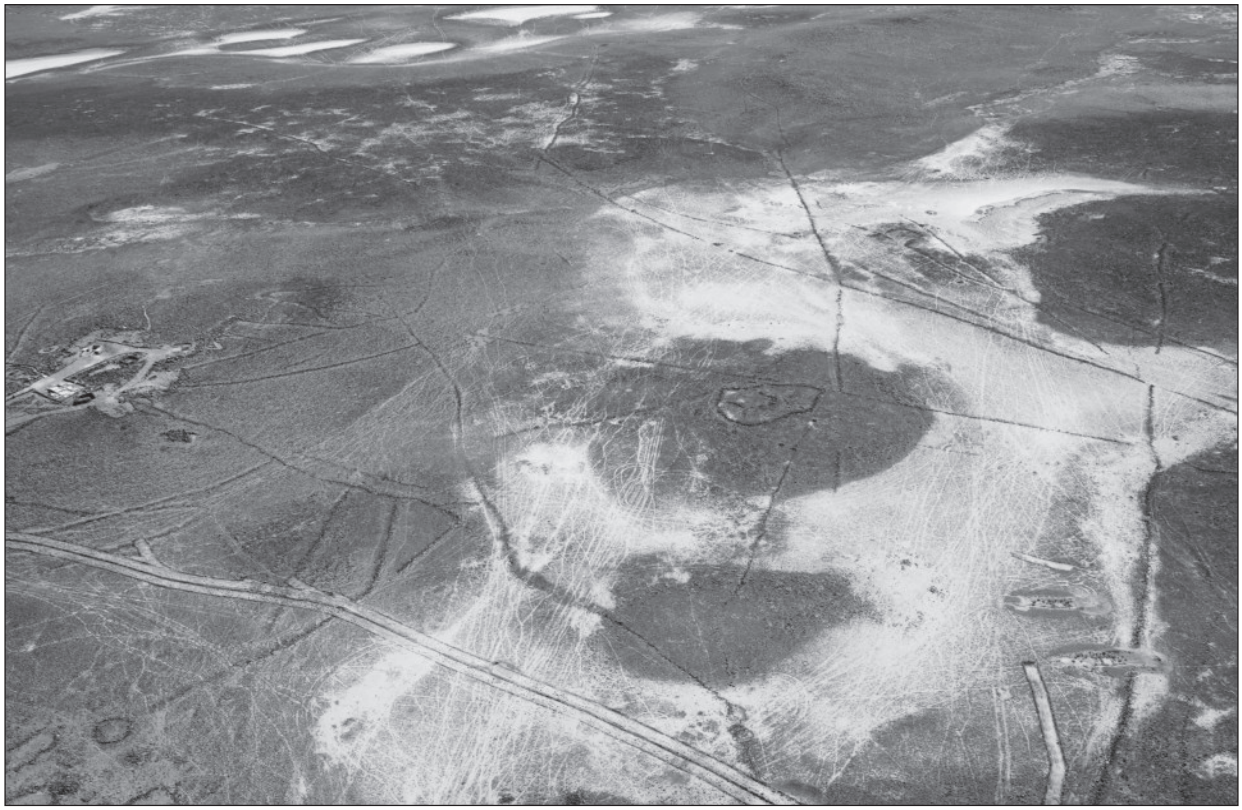
Inevitably, given the availability and reliability of maps in 1950, Harding's location is difficult to pinpoint. Moreover the landmarks of that period, especially the highway, have changed and confused the issue. Thanks to Michael Macdonald (pers. comm. 20090905) it was possible to refine the search area and, as a result of a flight over the area and a ground visit, locate the cairn at 32°14'17.932" N 37°14'57.535" E; lat. = 32.2383143675 lon. = 37.2493152899; 37S 335056.47m E 3568196.04m N; CR684351 (Maḥaṭṭat al-Ḥafīf [aṣ-Ṣafāwī]).

*Cairn of Sa'īd*

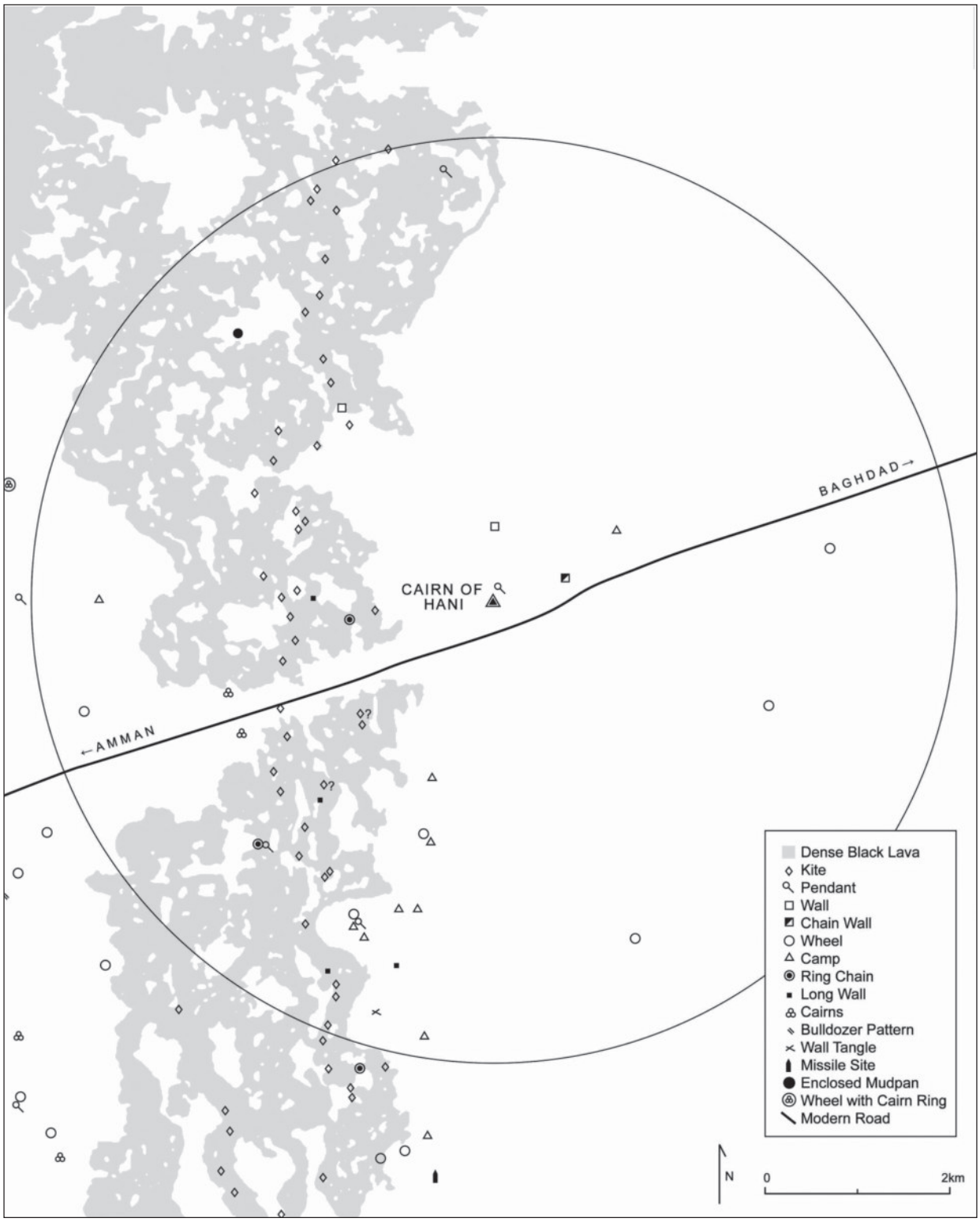
The cairns lie at approximately 32°42'50.00" N 37°49'40.00" E; lat. = 32.7138888889 lon. = 37.8277777778; 37 S 390140.61m E 3620176.78m N; CS202901 (Qaṣr Burqu'). Inferred from Harding's (1959 n. 2) location:



17. Aṣ-Ṣafāwī Wheel 70 and aṣ-Ṣafāwī Pendant 21 (APAAME_20090928_RHB-0425).



18. Al-ʻAwsajī Walls 6; this tangle lies 8km south-south-west of the Cairn of Hānī (APAAME_20090928_DLK-0294).




*19. Map showing distribution of the principal site types discussed within 5km of the Cairn of Hānī; the area delineated in the south-west quadrant is that of highest resolution on Google Earth (drawing Matthew Dalton).*

"Map reference approx. CS 9020 on Damascus Sheet of 1: 500,000 World Map."

*Cairn of KhRJ bint GhTh*
Approximateposition32°5'47.74"N38°5'27.84" E; lat. = 32.0965954093 lon. = 38.0910675911; 37 S 414235.03m E 3551504.03m N; DR515142 (Qā' Abū al-Ḥuṣayn).

*Cairn of Mermaids*
Approximate position 31°54'16.07" N 37°12'33.14" E; lat. = 31.9044628456 lon. = 37.2092046278; 37 R 330662.39m E 3531245.09m N; CR312316 (Wādī Rājil).

**Acknowledgements**

I am grateful to Rebecca Banks, Don Boyer, Matthew Dalton, Karen Henderson, Sandra Ottley and Stafford Smith for references, drawings and research support. Vincent Clarke kindly read the text in an earlier draft and offered valuable comment. Especially to be thanked is Michael Macdonald, whose unsurpassed knowledge and understanding of Safaitic texts and their context both saved me from errors and enriched this article in many places. None of these is responsible for the final result.

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المملكة الأردنية الهاشمية

# حولية دائرة الآثار العامة

## المجلد (٥٦)

عمّان
٢٠١٢

## حولية دائرة الآثار العامة

**تصدر عن دائرة الآثار العامة، ص.ب ٨٨، عمان ١١١١٨ المملكة الأردنية الهاشمية**





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٣٠ دولاراً أمريكياً (خارج المملكة) بالإضافة إلى أجور البريد.





تقبل المقالات حتى ٣١ أيار (مايو) من كل عام حسب التعليمات الواردة في هذا المجلد وتُرسل على العنوان التالي:

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**ص.ب ٨٨**

**عمان ١١١١٨ – الأردن**

فاكس: ٤٦١٥٨٤٨ ٦ ٩٦٢+

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تعنى **حولية دائرة الآثار العامة** بالبحوث المختصة بالتراث الحضاري للأردن والمناطق المجاورة، بما في ذلك تقارير التنقيبات الأثرية ونتائجها.
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يُسلم النص على قرص حاسوب، إضافة إلى نسخة مطبوعة يكون تباعد الأسطر فيها مزدوجاً، والرجاء إضافة نسخة محفوظة على شكل Rich Text Format على قرص الحاسوب. كما يجب أن تكون المسودة بشكلها النهائي دون إجراء تغييرات كبيرة لاحقاً.

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# الفهرس

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# الدكتور عبدالكريم الغرايبة (١٩٢٣ – ٢٠١٤ م)

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ولـد الشـيخ المعلـم، الـذي رأى أن تسـمية الدكتـور لا تليق بـه لأنها مصطلـح غربـي لا يتفـق وثقافتـه العربيـة، واسـتحضاره للمحطـات التاريخيـة العربية الرحبة، فـي حزيران من عـام ١٩٢٣م في بلدة المغير التـي تبعـد حوالـي ١٣ كيلومتـراً إلى الشـمال الشـرقي من مدينـة إربد فـي شـمالي الأردن. وهو الإبن البكر لشـيخ عشـيرة الغرايبـه "محمود باشـا الخالـد". وأمـا والدته فهي السـيدة "أمينة الغرايبـة" إبنة عم وإبنة خالـة لزوجها. ولـه من الإخوة ثلاثة هـم (طريف ووائـل وفيصل) ومن الأخوات ثلاث هن (نهاد وسعاد وبثينة). عمل والده في عدد من الوظائف الحكومية في عهد الأمارة ، منها: مدير ناحية عجلون، وقائم مقام في كل من جرش ومأدبا، ورئيساً لبلدية إربد. وكانت بداية التعلم وهو طفل في القرية على يد أحد الكتّاب هو "الشيخ علي خليل".

نتيجـة لتعدد أمكنة عمل الوالـد أضطرت العائلة إلى التنقل والترحال ممـا تـرك أثـراً في طبيعـة حياتها. إذ تنقـل الإبن عبد الكريم بـين عدد من المـدارس في مـدن إربد ومادبا وعجلون والسـلط ، وعـاش أحياناً وحيداً فـي بعضهـا وهو فـي عمـر الطفولة، وحتـى حينمـا أصبح يافعـاً. فحين كان والـده يعمل في عجلون سـكنت عائلته هناك لكـن عبد الكريم أضطر للذهاب وهو في سن العاشرة أي في عام ١٩٣٣م إلى المدرسة في مدينة إربد، فاستأجر له والده هناك غرفة ليسكن فيها وحيداً، معتمداً في تدبير شؤون حياته اليومية على نفسه. كذلك الأمر حصل معه عند التحاقه عام ١٩٣٩م بمدرسة السلط الثانوية. هذا الأمر أفاده كثيراً في الاعتماد على نفسه، وفي القدرة على مجابهة صعوبات الحياة.

وبعد أن تخرج في صيف عام ١٩٤١م من مدرسـة السـلط الثانوية بنجاح، أرسله والده في عام ١٩٤٢م لدراسة الطب في الجامعة الأمريكية في بيروت، وسمح له في مطلع العام الدراسي ١٩٤٤/١٩٤٥م وبعد أن اجتـاز كل المتطلبـات المؤهلة لدخـول هذا التخصص بالتسـجيل فيه. لكن الرياح لا تجري بما تشتهي السفن، إذ أضطر لتغيير تخصصه بعد أن بدأ بالتدريب العملي على دراسـة تشـريح جسم الانسان. ويبدو أن أعصابه لم تتحمل رؤية تشـريح جسـم إنسـان، فوقع مغشـياً عليه أكثر من مرة، إضافـة إلـى أنه أصيب بمرض "حمى الدنجي" ففرض عليه حجر صحي لبعـض الوقت مما تسـبب في تأخره عـن متابعة محاضراته مـع أقرانه، فقـرر الانسـحاب من دراسـة الطب والتحـول إلى دراسـة التاريخ. وفي شـهر حزيران من عـام ١٩٤٧م أنهى دراسـة البكالوريوس في التاريخ، وعـاد إلـى بلـده واضعـاً نصب عينيـه متابعـة الدراسـات العليـا في هذا التخصص، ولقي هذا التوجه تشجيعاً كبيراً من والده.

سـافر عبـد الكـريم فـي شـهر أيلـول مـن عـام ١٩٤٧م إلـى لنـدن، والتحـق بكلية الدراسـات الشـرقية الأفريقيـة (School of Oriental and African Studies) فـي جامعـة لندن، قضى فيها ثلاث سـنوات ونصف مبتعثاً على حسـاب الحكومة الأردنية. وأثناء دراسته تتلمذ على يد نخبة من علماء الآثار المشهورين من أمثال ماكس مالوان (زوج الأديبة المعروفة أغاثا كريسـتي)، ومورتيمر ويلر، وجوردون تشايلد؛ والتاريخ مثل بيرنارد لويس المتخصص بدراسـة العـرب والعثمانيين. وبنظرنا أن خلفيته العلمية هذه، والمنهج الذي تتلمذ عليه، كانا وراء ربط دراسة الآثار بالتاريـخ حين انشـاء هذا القسـم في عام ١٩٦٢م فـي الجامعة الأردنية. ليس هذا فقط، فقد كان وراء إنشاء متحف للآثار في الجامعة.

حصـل عبد الكريم علـى درجة الدكتوراة في عام ١٩٥١م من جامعة لنـدن، عـاد بعدها إلـى الأردن ليقدم نفسـة للخدمـة في مـلاك الدولة، إذ كان ملتزمـاً للعمـل فيهـا مقابل ابتعاثـه. وبنـاء عليه صدر قـرار بتاريخ ١٩٥١/٧/١م بتعيينـه مفتشـاً للآثار فـي دائرة الآثار العامـة الأردنية، والتـي كان مديرهـا فـي ذلـك الوقـت الانجليـزي "لانكسـتر هـاردنج". لكـن صاحبنا لم يجد أن طبيعـة العمل في هذه الدائـرة تتوائم ومؤهلاته العلميـة، خاصـة مع قلة إمكانيـات الدائرة المالية والفنية فـي ذلك الوقت، فعـزم الأمر علـى تركها. ومن حسـن طالعه أنه تلقى في نيسـان من عام ١٩٥٣ عرضـاً من الجامعة الأمريكية في بيروت للقيام بدراسـات تتعلق بتاريـخ وجغرافيـة بـلاد الشـام، فحصـل علـى إعـارة مـن دائـرة الآثار

الأردنيـة والتحـق بعملـه الجديد هنـاك. لكن تشـاء الأقـدار أن تتصل به جامعـة دمشـق عارضة عليـه تدريس مـادة تاريخ العـرب الحديث فيها، ففـرح كثيراً بالعرض، فتقدم بطلـب للجهات المختصة في الأردن لإعفاءة من التزامه بالخدمة في دائرة الآثار العامة، لكن طلبه رفض، فغادر البلاد دون تسـوية للأمـر. بنـاء عليه أصـدرت الحكومة قـراراً باعتبـاره فاقداً للوظيفـة، وطالبته بتسـديد إلتزاماته المالية المتبقية عليه، فقام بتسـديدها حسب الأصول.

عمل صاحبنا سـنتين كاملتين (١٩٥٣-١٩٥٥م) في جامعة دمشق، لكن حنينه للوطن غلبه، فعاد إلى البلاد حيث عين رئيسـاً لقسـم التشريع فـي ديـوان الموظفين. فوقف مرة أخـرى حائراً ماذا يفعـل، فهذه الوظيفة لا تناسـب دراسـته وخبرتـه العمليـة. فـداوم علـى مضـض فيهـا، حتى جاءه الفرج بعد شـهرين من بدئه العمل إذ طلبته جامعة دمشـق رسـمياً مـن الحكومة الأردنية للعمل معـاراً فيها، فوافقت الحكومـة بعد أن قبلت استقالته من عمله في ديوان الموظفين.

عـاد عبدالكـريم مـن جديـد إلى مـا يهـوى، مهنـة التدريـس والعمل الجامعي. لكن وبعد اسـتقر به المقام في جامعة دمشـق، وجد من تسـكن قلبه "بيهمان عارف العنبري" وهي من أسرة دمشقية وتزوجها في آذار مـن عـام ١٩٥٦م. وأنجبا ولداً وحيداً هو الطبيـب الدكتور رائد الذي ولد في ١٣/١٢/١٩٥٧م في دمشـق. لكن الأمر لم يسـتقر على هذا الحال، فبعـد تعريـب الجيـش الأردنـي والاسـتغناء عـن الموظفـين الأجانـب في الأردن في عام ١٩٥٦م، عين عبد الكريم الغرايبه مديراً عاماً لدائرة الآثار بتاريـخ ١/١٠/١٩٥٦م. وكان مـن أولـى أولوياتـه وضع يـد الحكومة الأردنيـة على مخطوطات البحر الميت التي أكتشـفت فـي قمران وغيرها، فقـام على جمع ما اشـترته بعض البعثات والجمعيـات الأجنبية من تجار الآثـار، وأحضرهـا إلى عمّـان لتحفظ في "متحف الآثـار الأردني" المبني علـى جبـل القلعة عوضاً عـن وجودها في متحف "روكفلـر" في القدس. وطبعـاً هذا الأمر لم يرق لبعض النـاس فنقل من عمله مديراً للآثار للعمل فـي وزارة التربية والتعليم. فاسـتنكف عن العمـل، فاعتبر فاقداً للوظيفة للمرة الثانية. غادر بعدها الأردن عائداً للتدريس في جامعة دمشق. وبقي في دمشـق حتى عام ١٩٦١ عندما التحق بجامعة الرياض لتدريس مادة التاريخ فيها.

صدرت الإرادة الملكية السـامية بتأسـيس الجامعـة الأردنية في عام ١٩٦٢م، وكان الدكتـور عبـد الكـريم الغرايبـة أول المعينيـين فيهـا، بعـد الأسـتاذ الدكتـور ناصرالدين الأسـد/رئيس الجامعة، وبقـي فيها حتى عام ١٩٩٧م. عين بعدها أسـتاذ شـرف في الجامعة حتـى وفاته في عام ٢٠١٤م. من هنا نرى أنه واكب إنشـاء الجامعة منذ نشـأتها، فبالإضافة للتدريـس وتأليف الكتب والأبحاث، عمل فـي أكثر من وظيفة إدارية فيها تدرجـت من رئيس قسـم، وعميد، ونائب رئيس، وقائـم بأعمال الرئيس. كما أنه عين في عام ٢٠٠٦م عضواً في مجلس الأعيان الأردني.

اسـتطاع المرحـوم الدكتور عبد الكريم الغرايبـه أن يضـع بصمته في كتابة تاريخ العالم العربي، وهو يعدّ من أبرز المؤرخين العرب في العصر الحديـث. ولـم يقتصر اهتمام الدكتـور الغرايبه العلمي علـى الأردن، فقد كان شاملاً لكل الوطن العربي. وله من الأبحاث والدراسات الكثير، لكننا ندرج أدناه بعضاً منها:

١. تطور مفهوم النضال العربي الحديث، مطبعة جامعة دمشق ١٩٥٩م.
٢. مقدمـة تاريـخ العـرب الحديـث (الجزيرة العربيـة والعـراق)، مطبعة جامعة دمشق عام ١٩٦٠م.
٣. إفريقيـا العربيـة فـي القـرن العشـرين، مطبعـة جامعـة دمشـق عـام ١٩٦٠م.
٤. العرب والأتراك، مطبعة جامعة دمشق عام ١٩٦١م.
٥. سوريا في القرن التاسع عشر، معهد الدراسات العربية عام ١٩٦٢م.
٦. قيام الدولة السعودية، معهد الدراسات العربية عام ١٩٧٤م.

لقد عرفت الدكتور الغرايبة منذ التحاقي عام ١٩٦٧م طالباً في قسم التاريـخ والآثـار في الجامعة الأردنيـة، وعملت تحت إمرتـه أميناً لمتحف الآثار في الجامعة (١٩٧٢-١٩٧٧م)، وتعاملت معه وأنا أكاديمياً. وكان طيلة هذه المدة منحازاً إلى تدريس التاريخ العربي، وكان كثيراً ما يحدثنا عن دراسـته في جامعة لندن وعلاقته مع أسـتاذه مالـوان وزوجته أغاتا كريستي، وعن مشاركته مع كاثلين كنيون في حفريات أريحا، وكيف أنه أصر على أن تكون مخطوطات البحر الميت في عمّان. ولا زلت أذكر قولته المشـهوره "التاريخ مادة متفجرة وأقوى من القنبلة النووية". كانت كل جلسة مع الدكتور الغرايبة درساً في التاريخ القديم والحديث والمعاصر. وكان يعـرف الناس والأحداث عن ظهر قلب، فذاكرته بقيت متوقدة حتى وفاتـه. ولا زلت أذكر أنني أرسـلت لـه بحثا متعلقاً بخليج الاسـكندرونة للتقييـم (حين كنت رئيسـاً لهيئة تحرير مجلة أبحاث اليرموك/ سلسـلة العلـوم الإنسـانية والإجتماعيـة)، فاعتـذر عن تحكيم البحـث، وكتب إلي جملة قصيـرة يقول فيها "أرجو ألا تحرجني بتحكيم هذا البحث، فخليج الاسكندرونة وفلسطين بالنسبة إلي أخوات".

هـذا هو أبـو الرائد الأسـتاذ الجامعـي، والباحث العروبي، والشـيخ المعلم. رحمه الله وأسكنه فسيح جناته.

أ.د. زيدان كفافي

# قصر الطوبه:
# شاهد حي على سقوط دولة بني أمية

أحمد لاش

The excavations and survey works in this project have revealed the location of some quarries which were used for the limestones production, to construct the lower courses of Tuba Palace as well as the places of mud bricks and mortar preparation, in addition to identify the location of some late Umayyad isolated houses. Most of the archaeological evidences in Tuba Palace (pottery dating and architectural studies) were leading us to date the monument to the late Umayyad period. In addition to few pottery scattered in the area dated to the late Byzantine and early Umayyad period.

According to the deep study of the social and political Umayyad history (especially in Transjordan) in addition to comparison study between Qasr Tuba and the incomplete late Umayyad structure in the Jordanian desert like Qasr Al-Mushatta and 'Ayn Al-Sawda reservoir (in southern Azraq) and by focusing on the Caliph Walid II history 743-744 A.D

I believe that Qasr Tuba related to Caliph Waleed II era 743-744 A.D. and he decided to built it because of nostalgia feeling to this desert, which he lived in when he was still stalker prince in the Caliph Hisham era. But as a result of his death in 744 A.D. and the Umayyad dynasty collapsing five years later that, this huge monument was not completed.

**مقدمة**

بداية أود أن أتقدم بجزيل الشكر لدائرة الآثار العامة ممثلة بمديرها العام في ذلك الوقت الدكتور المرحوم فواز الخريشة الذي أتاح لي فرصة القيام بأعمال المسح والتنقيب في قصر طوبة الأثري، وكذلك للإخوة العمّال الذين تعاونوا معي طيلة مدة العمل، حيث أقمنا خلالها مخيمنا بجانب القصر لمدة ٨٣ يوماً. كما أشكر الزميل قتيبة الدسوقي لقيامه باعداد المخططات والرسومات الخاصة بالمشروع. ولا أنسى شكر الدكتور رافع الحراحشة لما قدمه لي من دعم ومشورة وكذلك الدكتور أديب أبو اشميس الذي لم يبخل عليّ بأي مشورة أومساعدة خلال فترة العمل وقيامه بتأريخ الفخار المكتشف في الموقع، لهم مني جميعاً جزيل الشكر والإمتنان. وأود أن يعذرني القاريء الكريم على الاسهاب في بعض التفاصيل والوصف المعماري وذلك لندرة الكتابات والدراسات التي تناولت قصر الطوبة من حيث القياسات والأبعاد، مما قد يسهل على أي باحث في المستقبل الاستفادة منها.

يعتبر العمل في موقع قصر الطوبه من الفرص الثمينة والتي ساعدني حسن حظي لأكون ممن أتيحت لهم هذه الفرصة، لما يشكله العمل في هذا الموقع من أهمية تاريخية وأثرية، لما يتميز به هذا القصر من طرز البناء غير الشائعة في الأردن، ويشاركه قصر المشتّى في هذه الصفة، فقد بني في قلب الصحراء الأردنية من الطوب المشوي على أساسات من الحجر الجيري بعقود برميلية، ليشكل ميزة إضافية لطراز العمارة الأموية في آخر أيامها، حيث شكلت البادية الأردنية موئلاً لأمرائهم وخلفائهم، احتضنتهم في أوقات الرخاء والشدة، فعشقوها وفتنوا بجمالها، وطيبة أهلها وإكرامهم لمن نزل أرضهم، فلم يخونوا ويغدروا من عاهدهم حتى آخر لحظات عهدهم. ومن أبرز الخلفاء الأمويين الذين ارتبط اسمهم بهذه البادية وبوادي الغدف والأزرق تحديداً، الخليفة الوليد بن يزيد بن عبد الملك، والذي شكلت سيرته لغزاً لما احتوته من روايات متضاربة ليس من السهل تميز وجه الصواب فيها أوالخطأ، وما حقيقة شخصيته؟

## الوليد بن يزيد بن عبد الملك، الخليفة اللغز

لا نستطيع الحديث عن التاريخ الأموي في الأردن دون الحديث عن الصحراء الأردنية والقصور الصحراوية، والتي كان لها نصيب وافر من حياة خلفاء بني أمية وأمرائهم وخصوصاً الخليفة يزيد بن عبد الملك وإبنه الوليد، والذي يعتبر من أكثر الخلفاء الأمويين الذين اقترن اسمهم بمناطق الصحراء الأردنية وبالأخص منطقة الأزرق ووادي الغدف. وبدون إدراك أوشعور تجد نفسك تنجذب لشخصية الوليد بن يزيد، هذا الأمير الأموي الذي بدأ حياته في صغره أميراً مدلّلاً ومترفاً، وفي

شـبابه محاربـاً مبعداً عن عمه الخليفة هشـام بن عبد الملـك، وفي خلافته التي لم تتجاوز السـنة وثلاث شـهور محاصراً ومقتولاً ويطاف برأسـه في شـوارع دمشـق، بعد أن قتل بأيدي أبناء عمه من المروانيين، وغدر به أقرباؤه من السفيانيين.

وبمـا أن التاريخ يكتـب بعد فترة من حدوثه، وبمـا أن تاريخ الخلفاء يدخـل فـي التاريـخ السياسـي، والـذي بالعـادة يكتبـه المنتصـر، وحيث أن نظـرة النـاس إلـى الخلفاء والحـكام لا تتعـدى إحدى إثنـين؛ إما ملاك أوشـيطان، فقـد كانـت الرغبة فـي معرفـة الشـخصية الحقيقيـة للأمير والخليفـة الوليد بن يزيد بـن عبد الملك من الأمور الصعبة. فكتّاب التاريخ في النهاية هم من البشـر، وكلٌ له ميوله وهواه، ومن سوء حظ الوليد بن يزيـد أن كثيراً مـن كتاب التاريخ الذين أشـاروا إليه لـم يكونوا محايدين وموضوعيـين عنـد الحديث عنه، لما لهـم من أهواء تتعـارض مع أن يذكر الوليـد بصفات حسـنة، وبذلك تكون شـهادتهم فيه مجروحـة. فقد نعت الوليـد بن يزيـد في كتاباتهم بالفسـق والفجور والإلحـاد وإدمان الخمر والإستخفاف بأوامر الله، وتم تصويره على أنه خال من أي حسنة. مثال على ذلك الكتّاب العباسـيون كالجاحظ في رسـالته الأموية والتي جارى فيها العباسيين في سخطهم وبغضهم لبني أمية، ومن الرواة التاريخيين مـن كان مـن اليمنية والذيـن يكنّون كرهاً كبيـراً للوليد، وهـم من القبائل التـي خرجت عليه وشـاركت فـي قتله، إنتقامـاً منه لقتلـه زعيمهم (خالد بـن عبد الله القسـري)، فمعظـم رواة اليمنية وعلماؤهـم من طي وهمدان والأزرد، ركـزوا علـى الصفات السـلبية على الإشـارة إلى في شـخصية الوليـد وعملـوا علـى تهويلهـا. كذلك فعـل رواة الشـيعة مثل المسـعودي والذهبـي وابـن شـاكر، الذيـن ركـزوا علـى أخبار الوليـد اللاهيـة. وابن عساكر من الرواة المتأخرين الذين أخذوا الأخبار كما هي ولم يتحقق من الـرواة ولا السـند، واهتم الطبري بنقل الرواية كما هـي غير مهتم بمتنها ومكتفياً بقوة السند. لكن هذا لا يمنع من وجود رواة معتدلين مثلً خليفة بن خيـاط والبلاذري الذين ركزوا على الأحداث السياسـية والعسـكرية قـي حياة الوليـد، وغزواته وأعماله والعمـال والموظفين في عهده، وكذلك المشـاريع التي قام بها خلال خلافته، وسـردوا السيرة الذاتية والرسمية لـه دون تحيز إلى جانـب دون الآخر، فكانت رواية الخيـاط من الروايات المعتدلة دون تحيز أوتخريب.(عطوان١٨٩١).

ومـن أهـم الكتـاب الحديثـين الذيـن اهتمـوا بحيـاة الوليد بـن يزيد، الدكتور حسـين عطوان في كتابه "الوليد بـن يزيد عرض ونقد" وهومن الأعمـال المهمـة التـي بحثت في سـيرة الوليـد، والتي أفدت منهـا في هذا البحث فائدةً جمّة.

فقـد ولد الوليد بن يزيد سـنة ٩٠ هجريـة، وأوصى له أبوه بالخلافة من بعد عمه هشـام بن عبد الملك وهوابن إحدى عشـرة سـنة، ومات أبوه وهوابـن خمس عشـرة سـنة (الطبـري ٧: ٢٠٩)، ليخلفه عمه هشـام بن عبـد الملك، والذي كان يعتبر نفسـه أحق بالخلافـة من عمر بن عبد العزيز (الطبـري ٦: ٥٥١، عطوان ١٩٨١: ٣٨١)، ومـن أخيه يزيد بن عبد الملك، فكان يرغب في عزل الوليد من ولاية العهد ليولي ابنه مسـلمة بن هشـام من بعده (الطبري٧: ٢٠٩)، ولكن هذا لم يكن بالأمر السهل لما للوليد من بيعـة فـي عنقه وفي أعنـاق الناس، فـكان من مصلحته أن تسـوء صورة الوليـد فـي أعين العامة، وتشـيع أخبار فسـقه ومجونه بـين الناس، حتى يتقبلوا مسـألة خلعه. فانتشـرت الأخبار التي تصفـه بالمجون والبعد عن الديـن بين الناس، حتى يذكر الطبري أن هشـام قد ولاّه الحج سـنة ١١٩ هجريـه (الطبـري٧: ٢٠٩)، فحمل معه الكلاب فـي صناديق، وحمل معه قبـة عملها على قـدر الكعبة ليضعها على الكعبة ويجلس فيها، وحمل معه خمـراً. وفـي نفـس المصـدر يذكر الطبري أن هشـام قـد ولاّ ابنه مسـلمة والمكنـى أبا شـاكر على الحج سـنة ١١٩ هجرية (الطبـري٧: ٢١٠). من الملاحظ أن في هذه الرواية مبالغة وتصرف من غير المنطقي أن يصدر من أمير له قدر من العلم والثقافة والمعرفة السياسية. في حين يشير المدائني أن هشـام ولاّ الوليد على الحج سـنة ١١٦ هجريـة، ويذكر عنه البلاذري "أن الوليد انتدب عيسـى بن مقسم ليصلي بالناس" فيما ينفي ابن خياط ذلـك ويؤكد أن الوليد هوالـذي أقام الحج، وأن ابن يقظـان وهوأحد رواة اليمنيـة ومـن غلاة الشـيعة هوالـذي ذكـر أن الوليد قد انتدب عيسـى بن مقسـم ليصلي بالنـاس (عطـوان ١٩٨١: ٢٩٥). وهذا مثال بسـيط على تضارب الروايات التاريخية حول شخصية الوليد في حادثة واحدة.

ومـن الإنصـاف عندمـا نتحـدث عـن الوليـد أن نعاملـه كإنسـان فيه من الحسـنات كما فيه من السيئات مراعين النشـأة التي نشأ فيها والظروف التي مرت عليه والتي كان لها الأثر الكبير في تكوين شـخصيته وما نتج عنه من أفعال.

فقـد ولـد الوليد أميراً من أمراء بني أمية، فأبـوه الخليفة يزيد بن عبد الملك، وأمه زينب بنت محمد بن يوسـف، أخوالحجاج بن يوسـف الثقفي، وقـد عـرف عن أبـوه حبـه للهووالغنـاء، وذكـر شـغفه بسـلاّمه وحبابه جاريتيـه (الأغانـي ٤: ٢٤٨)، أما أمه فقد كانت ثالـث زوجات أبيه، وكان الوليـد إبنهـا البكـر، وقد شـغفت به لمـا كان يتميز به من حسـن الصورة وجمـال المظهر، فقد وصف الوليد بأنه كان ربعة القد، أبيض اللون، قوي البنيـة، منفرداً في وسـامته، حتـى أقنعت أبيه أن يجعلـه نائبه الثاني بعد هشـام، مقدمـاً إياه على أخيه الأكبر عبدالله، مـن زوجته الأولى (الأغاني ٥: ١٢٤، عطوان ١٩٨١: ٣٣) .

وبهذا نشـأ الوليد حياة الدلال والترف كأقرانه من أمراء بني مروان في ذلك الوقت، وقد مات أبوه وهوابن خمس عشـرة سـنة، وهوما نعرفه بسـن المراهقة، وما يشـكله هذا السـن بالنسـبة لأمير ثري امتـاز بجمال المظهـر والفروسـية والقـوة البدنيـة وولعه باللهووحبه لسـماع الشـعر وقوله. وقد اشـتهر بحبه العذري لسلمى بنت سعيد بن خالد، وقد رفض أبوها أن يزوجها له عندما كان ولياً للعهد "ربما بأمر من هشام" (عطوان ١٩٨١: ٧٣) فهام بها حباً وتناقلت الناس أشعاره بها، حتى أنه يذكر في أحد أشعاره أنه تخفى بزي بائع زيت حتى يتمكن من مشاهدتها (الأغاني ٧:٢٩)، ولـم يتزوجها حتى أصبح خليفة، ولم تطل عنده إلا فترة وجيزة حتـى مرضـت وماتـت فحزن عليهـا حزنـاً شـديداً ورثاها فـي كثير من قصائده (الأغاني ٧: ٣١، عطوان ١٩٨١: ٨٦).

وكما أشـرنا سـابقا فإن هشـام كان راغباً في تولية إبنه مسـلمة من بعـده بدلاً من الوليـد، فكان من مصلحته أن يظهـر الوليد بصورة الماجن البعيد عن الدين (عطوان ١٩٨١: ٢٩٤)، وعمل على ترسيخ هذه الصورة فـي أذهـان النـاس، فـازداد الخـلاف بين الوليـد وعمـه هشـام، واحتدم الصدام بينهما، وكان الوليد مناكفاً لعمه هشـام، معتداً بنفسـه، فلم يقبل أن يعزل نفسـه أوأن يعقد لمسـلمة بن هشام من بعده (الطبري ٧: ٢٠٩)،

معتمداً على شرعيته لما له من بيعه في أعناق الناس وما له من دعم من عمه مسلمة بن عبد الملك، وظل على هذا الحال حتى وفاة عمه مسلمة بن عبد الملك، والذي يذكر بعض المؤرخين أنها كانت سنة ١٢٠ هجرية (خليفة بن خياط ٢: ٥١٩) والبعض الآخر يذكر أنها كانت سنة ١٢١ هجرية (البداية والنهاية ٩: ٣٢٩)، فأحس الوليد بأنه قد فقد سنداً مهماً، وخشي من بطش عمه هشام به، وأن يتآمر على قتله (الأغاني ٧: ٦٤، عطوان ١٩٨١: ٣١٣)، فقرر الخروج إلى البادية، حيث يجمع المؤرخون على أنه نزل في الأزرق، فيورد الطبري "أن الوليد خرج وخرج معه ناس من خاصته ومواليه فنزل بالأزرق بين أرض بلقين وفزارة على ماء يقال له الأغدف".(أنساب الأشراف٢:٣١٢، الطبري ٧: ٢١١، عطوان ١٩٨١: ٣١٤).

كما ورد أنه نزل في منطقة زيزياء، حيث يذكر الطبري "أنه كان يطعم من صدر من الحج بمنزل يقال له زيزياء ثلاث أيام ويعلف دوابهم" (الطبري ٧: ٢١٧).

وخلال فترة وجود الوليد في البادية الأردنية اشتد الخلاف بينه وبين عمه هشام، حتى قطع هشام عنه وعن أعوانه ما لهم من أعطيات (الطبري٧: ٢١١)، وطلب منه أن يرسل إليه مؤدبه (عبد الصمد بن الأعلى) وعندما أرسله له عذبه حتى مات (أنساب الأشراف ٢: ٣١٢ ، عطوان١٩٨١: ٣١٦)، فأصبح الوليد في ضائقة مالية وصعبة حياته، ولم يقبل أن يخلع نفسه إلى أن مات هشام سنة ١٢٥ هجرية وتولى هوالخلافة من بعده.

وعندما تولى الخلافة قام بالإنتقام من كل من حاربوه وشجعوا هشام على خلعه.

وإن كانت فترة خلافته قصيرة، فقد ذكر عنه أعمالاً تصب في صالحه، فيذكر أنه "أجرى على زمني أهل الشام وعميانهم وكساهم، وأمر لكل واحد منهم بخادم، وأخرج لعيالات الناس الطيب والكسوة، وزاد الناس جميعاً في العطاء ١٠، وزاد أهل الشام بعد زيادة العشرات عشرة عشرة، وزاد من وفد إليه من أهل بيته في جوائزهم الضعف، ولم يقل في شيء يسأله لا" (الطبري ٧: ٢١٧).

كما تألف أهل مكة والمدينة وأرضاهم، وأعاد لهم ارزاقهم وحقوقهم المدنية التي سلبها إياهم هشام.

وقام ببناء بعض المنشآت المائية بالشام، للنهوض بالزراعة وزيادة رقعة الأراضي الزراعية، وأقام جسر الوليد وشيّد مشروع أسيس المائي (الحموي ١: ٢٧٢، عطوان ١٩٨١: ٣٦٣).

كما قام بمحاربة الذين يدعون إلى القدرية، كما غزى جزيرة قبرص وخيّر أهلها من اختار جوار المسلمين فيرحل إليهم، ومن اختار جوار الروم فيرحل إليهم، فاختارت طائفة جوار المسلمين، وأخرى اختارت جوار الروم (الطبري ٧: ٢٢٧).

وقد اشتهر عنه مبالغته في ترفه واهتمامه في نفسه ومظهره وثيابه خلال فترة خلافته (الطبري ٧: ٢٣١)، وكأنه أراد أن يعوّض نفسه عما لحق به من كدر العيش أثناء حياة التبدي التي عاشها نتيجة الضغوطات التي مارسها عليه عمه هشام.

وقد استغل الطامعون في الحكم من أمراء بني أميه ما رسخ في أذهان الناس من صورة الوليد الماجن اللاهي، الفاسق البعيد عن الدين.

فكان أن انقسم البيت الأموي بين أمراء صغار رغبوا في خلع الوليد، وازاحته عن الحكم، إما انتقاماً لما نكل بهم، كأبناء عمه هشام، أوأمراء مغامرين رأوا أحقيتهم بالحكم من الوليد، ومن هؤلاء الأمراء يزيد بن الوليد بن عبد الملك واخوانه بسر ومسرور وعمر وروح وابراهيم، وكذلك عاصم وعبدالله ابنا عمر بن عبد العزيز، بالإضافة إلى عبد العزيز بن الحجاج بن عبد الملك وأمراء آخرون.

والقسم الآخر من أمراء البيت المرواني هم الأمراء الكبار، الذين رأوا في خلع الوليد بداية لنهاية حكم بني أمية وتنازعهم على الحكم وضياع دولتهم، ومنهم العباس بن الوليد بن عبد الملك ومبشر بن الوليد بن عبد الملك ومروان بن محمد بن الحكم وسعيد بن عبد الملك بن مروان ويزيد بن سليمان بن عبد الملك ومروان بن عبدالله بن عبد الملك (عطوان ١٩٨١: ٤٠١-٤٠٣).

وكان من أشد الأمراء خطراً على الوليد، ابن عمه يزيد بن الوليد بن عبد الملك والمعروف بيزيد الناقص "لأنه أنقص الناس الزيادة التي زادهم إياها الوليد" (الطبري ٧: ٢٦١)، حيث عرف عنه الدهاء والمراوغة وأظهار التنسك والزهد، في حين يصفه البعض بأنه كان قدرياً (الطبري ٧: ٢٩٨).

وقد سعى هؤلاء الأمراء بزعامة يزيد بن الوليد على تأليب الناس على الوليد، واستفادوا من سخط القبائل اليمنية عليه بعد قتله زعيمهم خالد بن عبدالله القسري (الطبري ٧: ٢٣٧)، واستغلوا خروجه من دمشق وخروج الكثير من الأمراء منها نتيجة لتفشي وباء الطاعون باحثين عن السلامة في مناطق البادية، فزحفوا إلى دمشق بزعامة يزيد بن الوليد، والذي استولى على مسجدها وعلى بيت المال (الطبري ٧: ٢٤١)، ونادى بنفسه خليفة للمسلمين وألّف من حوله الناس.

فجاء الخبر إلى الوليد وهوبالأغدف (الطبري ٧: ٢٤٣) فأشار عليه بعض من حوله بالتوجه إلى حصن البخراء، والذي يقال أنه من أعمال تدمر(الطبري ٧: ٢٤٤)، فسيّر إليه اليزيد جيشاً بقيادة عبد العزيز بن الحجاج بن عبد الملك، ونادى بالناس من يخرج إلى الفاسق وله ألف درهم فالتف حوله أقل من ألف رجل، ثم نادى بالناس من ينتدب إلى الفاسق وله ألف وخمسمائة فانتدب إليه ألف وخمسمائة رجل (الطبري ٧: ٢٤٣)، ومن ثم زحف جيش عبد العزيز بن الحجاج بن عبد الملك إلى الوليد في البخراء، ومما زاد في صعوبة موقف الوليد، خيانة قادته العسكرين له عند وصول جيش عبد العزيز له، فقد خانه الوليد بن خالد وانضم لجيش عبد العزيز مقابل خمسة آلاف دينار ومثلها للأبرش (الطبري ٧: ٢٤٩)، كما انقلب عليه معاوية بن أبي سفيان بن يزيد بن خالد مقابل عشرين ألف دينار وأن يولوه الأردن ويشركوه في الأمر (الطبري ٧: ٢٥٠).

ومن أشهر ما دار بينه وبين خصومه من حوار في آخر لحظات حياته وهومحاصر في حصن البخراء، أنه نادى فيهم "أما فيكم رجل شريف له حسب وحياء أكلمه فقال له يزيد بن عنبسه السكسكي، كلمني، فقال له: من أنت؟ قال: أنا يزيد بن عنبسه. قال: يا أخا السكاسك ألم أزد في أعطياتكم؟ ألم أرفع المؤن عنكم؟ ألم أعطي فقراءكم؟ ألم أخدم زمناكم؟ فقال: إننا لم ننقم عليك من أنفسنا، ولكن ننقم عليك من انتهاك ما حرم الله، وشرب الخمر، ونكاح أمهات أولاد أبيك، واستخفافك بأمر الله. قال:

حسبك يا أخا السكاسك، فلعمري لقد أكثرت وأغرقت، وإن فيما أحل لي لسعة مما ذكرت" (الطبري ٧: ٢٤٦). وكأن الوليد استهجن واستعظم هذه التهم التي يرمونه بها.

وفي رواية أخرى أنه قال "لعمري أغرقت وأكثرت، أما والله لا يرتق فتقكم ولا يلم شملكم ولا تجتمع كلمتكم" (الطبري ٧: ٢٤٧).

ثم رجع إلى الدار وأخذ مصحفاً وقال: يوم كيوم عثمان. وأخذ يقرأ. فتسلقوا عليه الدار، فكان أول من علا الحائط يزيد بن عنبسه السكسكي، ولم يرضى الوليد أن يشهر سيفه عندما طلب من السكسكي ذلك، وقال له "لوأردت لكانت لي ولك حالة فيهم غير هذه" . فنزل من الحائط عشرة، منهم السرّي بن زياد بن أبي كبشه وعبد السلام اللخمي، فضربه عبدالسلام على رأسه، وضربه السرّي على وجهه، واحتز أبوعلاقه القضاعي رأسه (الطبري٧: ٢٤٦)، كما قاموا بقطع كفه اليسرى، وكان يزيد بن الوليد بن عبد الملك قد جعل في رأسه مئة ألف (الطبري ٧: ٢٥٠)، فأرسلوها إليه، وقيل أن كفه سبقت رأسه.

كما تم التمثيل بجثته بعد قتله، فعلق رأسه أمام المسجد بعد صلاة الجمعة، ثم وضعت على رمح وطيف بها في شوارع دمشق (الطبري ٧: ٢٥١).

وهكذا قتل الوليد بن يزيد بعد أن حكم مدة سنه وثلاث أشهر وفي بعض الروايات سنة وشهرين و٢٢ يوم، وكان ذلك يوم الخميس لليلتين بقيتا من جماد الآخرة سنة ١٢٦ للهجرة الموافق ١٧ نيسان ٧٤٤ ميلادية (الطبري ٧: ٢٥٢)، بطريقة أقل ما يقال عنها إنها بشعة، ولا تمت لأخلاقيات الإسلام بصلة من تشويه وتمثيل، ولم يعلم الذين ساروا في خلعه، أنهم يخلعون حكم بني أمية ويقوضون أركانه.

فهل قتل الوليد مظلوماً؟ وهل كان فاسقاً ماجناً؟ مستخفاً بالدين كما اتهمه أعداؤه؟ وهل كل ما ألحق به من أخبار هي صحيحة؟

بالنسبة لي يوجد الكثير من عدم الإطمئنان لهذه الأخبار. فمعظم الرواة التاريخيون كتبوا عن الوليد ولم يعاصروه، وقد كان للكثيرين مصلحة في أن يبدوالوليد بهذه الصورة، فعمه هشام أراد الخلافة لإبنه مسلمة من بعده (الطبري ٧: ٢٠٩)، وكذلك الأمر بالنسبة لأبناء عمه هشام الذين أرادوا الإنتقام منه على ما فعل بهم أثناء خلافته، ويزيد بن الوليد أراد الحكم لنفسه، فأراد على أن يظهر بمظهر الأمير الورع الذي خرج على الخليفة الفاسق، والقبائل اليمنية أرادت خلعه إنتقاماً منه لقتله زعيمهم خالد بن عبد الله القسري. أما التاريخ السياسي لبني أمية فقد كتب في فترة بني العباس، والذين كان من مصلحتهم أن يبدوخلفاء بني أمية بهذه الصورة، حتى يعطوا الشرعية لحكمهم، فوجدوا في سيرة الوليد مادة خصبة لإعلامهم الموجه، ولمن أراد أن يتزلفهم من الكتّاب، وكذلك الأمر بالنسبة للرواة من الشيعة والخوارج من الصفّرية والإباضية.

وقد يكون الوليد قد طبع على عيشة اللهومتمتعاً بما له من مزايا الأمير الأموي، وابن الخليفة، وولي عهد عمه، وما به من صفات الجمال والشباب والقوة والفروسية وولعه بالصيد، وحبه سماع الشعر وقوله. وقد تكون هذه الظروف قد جعلت الوليد يزيد في لهوه عن أقرانه من الأمراء، ولكن أن يصل به اللهووالمجون إلى هذا الحد الأسطوري الذي رواه خصومه عنه، فهوأمر يدعوإلى الشك. حتى أن الخليفة العباسي المهدي، عندما ذكر عنده أن الوليد كان فاسقاً زنديقاً قال: "إن خلافة الله عنده أجلٌ من أن يجعلها في زنديق" (ابن كثير ٩:١٠).

وروي عن أم الدرداء أنها قالت فيه "قتل الخليفة الشاب من بني أمية بين العراق والشام مظلوماً، لم يزل طاعة مستخف بها ودم مسفوك على وجه الأرض بغير حق" (ابن كثير ٩:١٠)

وكأن لعنة قتل الوليد قد رافقت الأمويين وكأن نبؤته لما سيصير حالهم بعد مقتله قد صدقت إذ لم يدم حكم بني أمية بعد مقتل الوليد أكثر من خمس سنوات من الاضطراب، تعاقب فيها ثلاث خلفاء على الحكم. فقد مات يزيد بن الوليد بن عبد الملك بعد مقتل الوليد بخمسة أشهر، إثر إصابته بمرض الطاعون، وجاء من بعده أخوه ابراهيم والذي لم يطل به الأمر حتى خلع نفسه وتنازل عن الحكم بعد خروج مروان بن محمد عليه، والذي لم يطل حكمه حتى سقطت دولته ودولة بني أمية على يد العباسين سنة ١٣٠ للهجرة.

ولقد كان لمقتل الوليد بن يزيد انعكاساته السلبية على بيت الخلافة وعلى الدولة، فقد تفسّخت الأسرة الأموية وتناحر أبناؤها للفوز بالحكم، واستفحل الخصام بين رأس الدولة وأمصارها، فقد خرج أهل حمص على يزيد بن الوليد، وكذلك فعل أهل الأردن وفلسطين (الطبري ٧: ٢٦٢)، كما خرجت أرمينيا وأذربيجان والجزيرة بزعامة مروان بن محمد على حكم يزيد بن الوليد وأخوه إبراهيم من بعده (الطبري ٧: ٢٨١).

كما اشتعلت العصبية القبلية بين المضرية من تميم وقيس واليمنية والربعية في الشام والعراق والحجاز واليمن وخراسان.

وقد استغلت الجماعات المعارضه مثل الشيعة والعباسيين والزبيريين والخوارج من الصفّرية والإباضيه في العراق واليمن والمغرب هذه الظروف، وأصبحت الفرصة مواتية للعباسيين، فوثبوا على دولة بني أمية وأخذوا الحكم منهم، وقاموا بتصفية أمرائهم (عطوان ١٩٨١). وبهذا كان مقتل الوليد بن يزيد بن عبد الملك بمثابة حجر الزاوية الذي انهارت دولة بني أمية بإزالته.

وقد تكون الأعمال المعمارية التي تنسب إلى الوليد بن يزيد في البادية الأردنية، مثل قصر المشتّى وقصر الطوبه وبركة عين السودا في الازرق، مثال على مشاريع أراد الوليد القيام بها في فترة خلافته، ولم يمهله القدر على إكمالها، فتوقف العمل في هذه المشاريع مع توقف حياته وهوفي ريعان الشباب (إذ لم يتجاوز عمره الخامسة والثلاثين سنة)، ولم يتسع الوقت لمن جاء بعده من خلفاء بني أمية لإتمام هذه الأعمال نظراً لانشغالهم بقتال بعضهم، لتصبح أطلالاً تشهد على توقف العمران الذي بدأه الأمويين بمقتل الوليد بن يزيد.

وأغلب الظن أن الوليد قد شرع في هذه الأعمال خلال فترة توليه للخلافة، وليس عندما كان أميراً متبدياً في الصحراء، لما تحتاجه إقامة هذه المشاريع من أموال طائلة، بعكس ما كان يعانيه من ضائقة مالية في تلك الفترة، وخاصة بعد قطع عمه هشام الأعطيات عنه عندما كان أميراً، فمن المرجّح أن قصير عمره قد تم بناؤه عندما كان متواجداً في المنطقة في الفترة التي كان ما يزال فيها أميراً، وبالنسبه لما يرد ذكره عن الوليد بأنه تواجد في أكثر من منطقة في تلك الفترة مثل الغدف، فمن المحتمل أنه كان يستعمل الخيام أوبيوت الشعر كعادة أهل البادية، أما عندما أصبح

خليفة فمن المحتمل أنه أراد أن يقيم في هذه المناطق مباني تتناسب مع مكانته الجديدة وكأنه أراد أن يقوم بهذه المشاريع لما سكن في قلبه من ألفه وعشق لهذه المناطق، عندما كان متبدياً فيها، فظل يحن إليها، وأراد أن يكون له فيها أماكن يتردد عليها كلما ناداه الشوق لهذه البادية.

وبالنظر إلى المواقع الأثرية التي تعود إلى الفترة الأموية في منطقة الأزرق نلاحظ وجود قصير عمره، والذي يبعد عن الأزرق مسافة ٣٠كم، ويقع في وادي البطم، وينسب إلى الوليد بن يزيد. كما يوجد موقع عين السل، إلى الشمال من قلعة الأزرق على بعد ٢كم تقريبا، والذي يبدوأنه أقرب ما يكون إلى مبنى ضمن أرض زراعية، يتم في أحد أجزائه عصر الزيتون لاستخراج الزيت، وقد يكون لهذا المبنى بدايات تعود للفترة الرومانية المتأخرة والبيزنطية، ومن ثم أعيد استخدامه في الفترة الأموية، وهو بحاجة إلى مزيد من أعمال التنقيب والدراسة لاستيفاء المعلومات عنه، ولا نستطيع في الوقت الحالي أن نحكم إذا ما كان قد استعمل من قبل الوليد بن يزيد أم لا.

كما وجدت في قلعة الأزرق أثناء أعمال التنقيب كسر فخارية تدل على أن القلعة قد شهدت نوعاً من أشكال الاستيطان في الفترة الأموية، ولكن لا نستطيع أن نجزم إذا كان الوليد قد استقر بها أم لا. أما فيما يعرف حالياً بالأزرق الجنوبي، فيوجد فيه بقايا بركة مائية ضخمة تقدر مساحتها حوالي ٤٥ دونم، عثر في جزء من جدارها الشرقي على حجارة منحوتة بأشكال هندسية عليها نحوتات نباتات وحيوانات، يرجّح الدكتور غازي بيشه أنها تعود إلى الفترة الأموية (بيشة ١٩٨٣: ٧-١٤)، وهذا ما يذهب إليه (كلود فيبر) أيضاً. ويوجد على طرف هذه البركة امتداد لبقايا جدار يمتد بشكل طولي حول المسطحات المائية ليصل طوله الظاهر إلى ٥كم تقريباً، وكأنه بقايا لمشروع مائي ضخم ربما لم يكتب له الإكتمال، وقد ورد في بعض المصادر أن الوليد بن يزيد في إحدى المرات في آخر أيام خلافته وفي إحدى مجالسه، كان قد همس في أذن أحد أعوانه، فلما سئل فيما كانا يتحدثان، قيل إنه كان يسأله عن النهر الذي حفره في الأردن، كم بقي منه (الطبري ٧: ٢٤٨).

والتي قد تكون اشارة ضمنية لهذه البركة.

## أعمال المسح والتنقيب في قصر طوبه الأثري

تم اختيار موقع قصر طوبه الأثري للقيام بمشروع يشتمل على أعمال المسح الأثري للقصر ومحيطه، والتنقيب الأثري في مناطق مختارة ضمن منطقة المسح، وكذلك توثيق المظاهر المعمارية لما تبقى من أجزاء القصر، عن طريق الرسم والرفع المساحي وعمل المخططات الكنتورية. وقد استمر المشروع ٨٣ مدة يوما من تاريخ ٨/١٨ ولغاية ٢٠٠٩/١١/٩.

بناءً على خطة العمل الموضوعة لهذا المشروع فقد بدأنا أعمال المسح الأثري للموقع والمنطقة المحيطة به اعتبارا من ٨/١٨ وقد بلغت منطقة المسح ٧كم$^{٢}$ وعرض ٣كم$^{٢}$، وذلك بهدف توثيق كافة المظاهر المعمارية ضمن هذه المنطقة ومعرفة مصدر المواد الأولية اللازمة لبناء القصر (من تراب لعمل الطوب والحجر والجير ومصادر المياه ومناطق صناعة هذه المواد) بالإضافة إلى توثيق المظاهر المعمارية في القصر، وقد تم تحديد خمسة مناطق خلال هذا المسح، احتوت كل منطقة بدورها على عدد من النقاط.

المنطقة الأولى

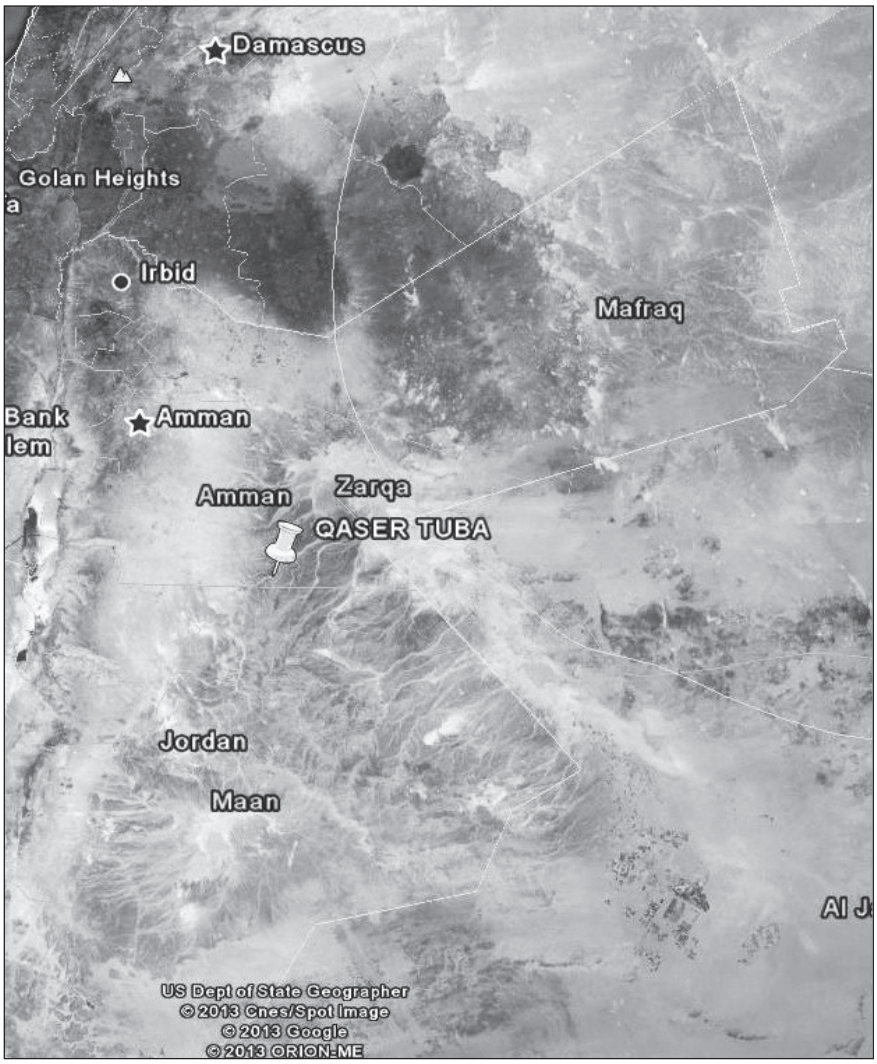
وتشمل منطقة القصر والتي تقع ضمن الإحداثيات التالية: ٢٦٨٨٦٩ شرقا و٣٤٦٨٢٦٩ شمالا. وترتفع عن مستوى سطح البحر ٧٤٣م **(الشكلين ١ و٢)**.

حيث يعتبر قصر طوبة من القصور الصحراوية الأموية غير مكتملة البناء، والذي بني على سيل وادي الغدف، ويبعد عن عمان ١٢٠كم باتجاه الجنوب الشرقي، وعن الشارع الرئيسي المؤدي إلى العقبة من منطقة سواقة الغربية ٥٠كم، ويبعد ٩٦كم إلى الجنوب من منطقة الأزرق وحوالي ٤كم عن قصر الخرّانه، و٥٢كم عن قصير عمرة و٧٠كم عن قصر المشتى، وأول من أعاد اكتشافه عالم الآثار التشيكي موزيل Alois Musil سنة ١٨٩٨.

ومن بقايا الأساسات يتضح أن هذا القصر كان معد ليبنى بشكل مستطيل بطول ١٤٠م عرض ٧٢م. وقد قامت دائرة الآثار العامة بعدد من المشاريع لحماية هذا الموقع وترميمه كان آخرها ما قام به مكتب آثار القصور الصحراوية عام ٢٠٠٧، حيث تم خلال هذا المشروع عملية تنظيف للموقع، وحماية الموقع من خلال جمع كسر الطوب المنتشره وتغطية الأساسات المكشوفة بالتراب، وعمل ساتر ترابي على حافة الوادي الذي يمر من جنوب القصر، وذلك لإيقاف تدفق مياه الوادي إلى القصر، بالإضافة إلى أعمال التوثيق لبعض المظاهر المعمارية التي ما زالت قائمة فيه.

ويبدوأن القصر كان مصمم ليتكون من قسمين متناظرين، متشابهين في التقسيم، يربطهما ممر، بالإضافة إلى بوابتين في الجهة الشمالية.

ومن خلال المظاهر المعمارية المتبقية، يتضح لنا أن القصر كان معد ليبنى من الطوب المشوي، وأساسات من الحجر الجيري، والأسقف عبارة عن عقود نصف برميلية. يختلف عدد مداميك أساسات البناء من الحجارة الجيرية من جدار إلى آخر، ففي الجدران الخارجية في الواجهة الشمالية يصل عدد المداميك الحجرية من الخارج إلى ١١ مدماك، وفي الداخل ٧ مداميك كما في الجدار رقم (١) في **(الشكل ٣)**، حيث يصل سمك الجدران في القصر إلى ١٤٠سم الذي بني من مداميك حجرية عددها من الخارج أكثر من الداخل، ثم استكمل البناء بالطوب المشوي، أما جدران الغرف الداخلية فقد بنيت فوق ٤ مداميك من الحجر الجيري، واستخدام الحجر الجيري في المداميك السفلية، لقدرة هذا الحجر على تحمل العوامل الطبيعية، كالأمطار والسيول أكثر من الطوب، وخاصة في الجدران الخارجية حيث عدد المداميك الحجرية أكثر منها في الداخل، ومع هذا يلاحظ أن نوعية الحجر المستخدم ليست ذات كفاءة عالية على تحمل العوامل الطبيعية، حيث تعرضت للتآكل بشكل ملحوظ، ويبدوأن هذه هي طبيعة الحجارة المتوفرة في هذه المنطقة. أما الطوب المستخدم فمعدل حجم الواحدة ٢٥×٢٥سم وسمكها من ٦-٨سم، ولكن نظرا لتقنيات صناعة الطوب في تلك الفترة، فإن قياساته كانت مختلفة ما بين ٢٤×٢٥سم أو ٢٥×٢٦ سم أو ٢٥،٥×٢٦سم، كما توجد آثار بقايا قصارة تغطي الطوب، وخاصة فوق السقف البرميلي الذي




١. خارطة الأردن موضح عليها موقع قصر طوبة .

يغطي الغرفة رقم ١ و٢، أما المونة المستخدمة في البناء فهي من نفس العناصر الطبيعية الموجودة في الموقع وتركيبتها تختلف من جزء إلى آخر، فالمونة في الأساسات معظمها من رمل السيل المخلوط بالحصى الصغيرة والرماد والجير، وقد استخدمت هذه المونة كصبة نظافة أيضا تحت الأساسات في المداميك السفلية، وفي المداميك العليا استخدم الطين المخلوط مع الجير.

وبناءً على المخطط المرسوم للقصر والأجزاء المتبقية منه والتي أعدّها كريزويل (**الشكل ٣**)، فقد تم تقسيم القصر إلى قسمين: شرقي وغربي ويبدوأن ما تم بناؤه من القصر هو أجزاء من الجزء الغربي فقط، مثل الغرف من ١ إلى ٦ والغرفتان المحيطتان بالبوابة، وبعض الأجزاء الغربية بالإضافة إلى الجدار الشمالي، أما الجزء الشرقي فلا يبدوأن البناء به قد اكتمل إنما اقتصر على بناء الأساسات فقط ولوأن أعمال البناء قد اكتملت لعثرنا على بقاياها أوبقايا انهيارها، كما هو الحال في الجزء الغربي (**الشكل ٤**). ويبدو من المخطط أن الجزء الغربي كان مكون من أربع أجنحة وساحة فضائية رئيسية، والجزء الشرقي كان معد ليتكون من ثلاث أجنحة وساحة فضائية رئيسية، أما من المخطط الذي وضعه Musil فيظهر أن القصر معد من ثلاث أقسام وثلاث ساحات رئيسية (**الشكل ٥**). والسور المحيط بالقصر كان معد ليتخلله ١٤ برج نصف دائري لتكون دعامات لهذا الجدار.

ويتكون الجزء الغربي من القصر من ٢٨ غرفة وساحة فضائية رئيسية في وسطه و٤ ساحات فضائية أصغر حجماً في كل جناح، وقد رمز لكل مظهر معماري في الجزء الغربي بحرفL، ولكل مظهر معماري في الجزء الشرقي بحرفR (**الشكل ٣**). وفي الجزء الغربي يبدوأن ما تم انجازه من البناء هوالجناح الأول، وقد كان مكون من سبع غرف وساحة وسطية، أربع من هذه الغرف متناظرة في الشكل والمساحة وتفصلهما الساحة الوسطية، ومن الغرفة رقم ٣ يوجد مدخل يؤدي إلى الغرف ٥ و٦ في الزاوية الشمالية، ومنها ومن الساحة الوسطية يوجد ممر يؤدي إلى الغرفة رقم ٧ وهي الغرفة الرئيسية في هذا الجناح.

أما الغرف ١ و٢ و٣ و٤ ما زالت قائمة في هذا الجناح، ويبدوأن ما تم انجازه من هذه الغرف هما الغرفتين ١و٢ واللتان تم عمل سقف لهما، حيث يبدو أن العمل قد توقف في هذا البناء قبل أن يتم عمل سقف للغرف ٣ و٤، فلا توجد بقايا انهيار الطوب داخل الغرف ليستدل منها

٢. صورة جوية لقصر طوبة، التقطت من قبل David Kennedy.

على أن هذه الغرف كانت مسقوفة (علماً أن السقف في الغرف ١ و٢ ما زال قائماً) وكذلك عند بناء السقف يتم رفع الجدار الوسطي بين الغرفتين بالإضافة إلى الجدار الشمالي ليرتكز عليهما السقف في حال بنائه وكذلك ليشكل الجدار الوسطي عنصر ربط بين الغرفتين، فلو كانت الغرفتين ٣و٤ قد تم عمل سقف لهما لكان الجداران الوسطي والشمالي قد تم رفعهما لمستوى السقف أو لكان ارتفاعهما أعلى مما هوعليه الآن، فليس من السهولة أن يسقط الطوب من هذه الجدران التي ما زالت قائمة وارتفاعهما على نفس ارتفاع بقيّة الجدران في الغرف ٣ و٤.

أما بالنسبة للغرف ١ و٢ فإن مساحتهما شبه متساوية فالطول ٨،٢٠م والعرض ٤،٦م، أما الإرتفاع من أعلى نقطة في السقف إلى الأرضية فهو ٩،١٠م وارتفاع الجدران حتى بداية السقف البرميلي ٦،٦م.

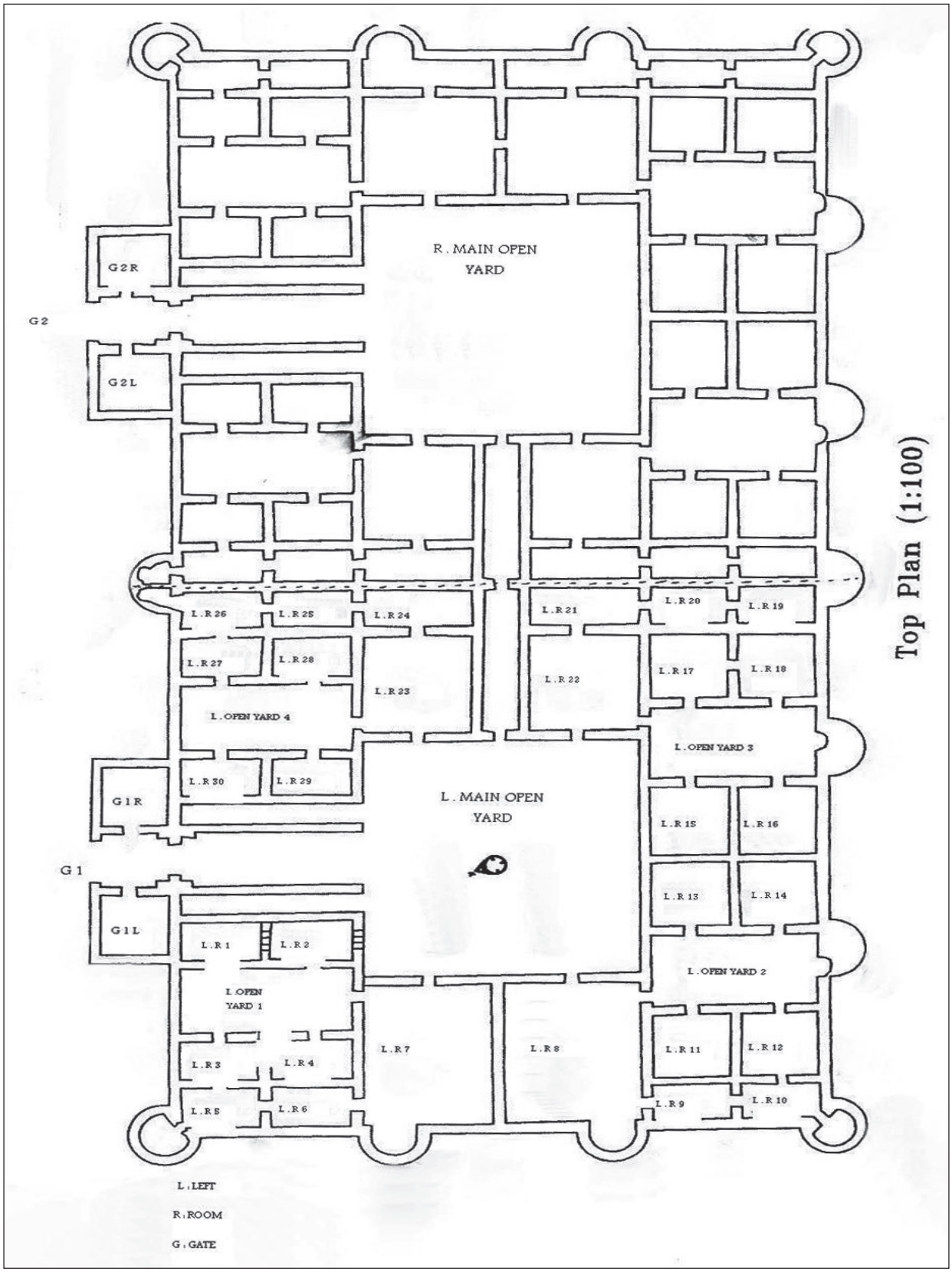
أما الساحة الفضائية الفاصلة بين الغرف فطولها ١٧،٨م وعرضها ٧،٩٥م أما ارتفاع جدرانها المتبقية فهي ٣–٤م، في حين أن ارتفاع جدارها الشمالي من ٢،٧٠م إلى ٢،٧٥م.

وبالنسبة للغرف ٤ و٥ فهما بنفس مساحة الغرف ١ و٢ إلا أن معدل ارتفاع جدرانها هو٤م.

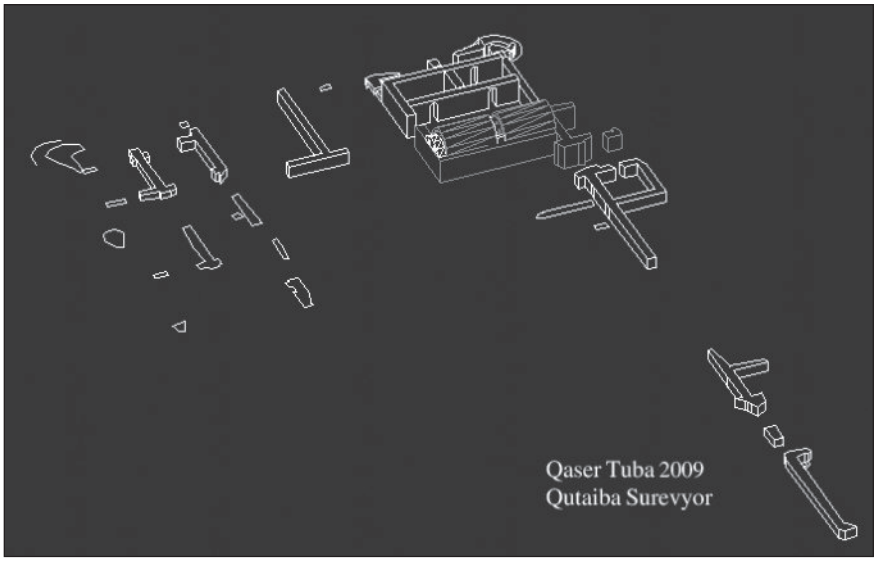
أما المداخل المؤدية للغرف ١ و٢ و٣ و٤ فتظهر بها حنيات في أعلاها يبدو أنه كان يفصلها عن الجزء السفلي من الباب حجر عرضي، ويبدو أن جميع هذه الحجارة قد تم أخذها من الموقع في فترات سابقة، فعندما زار Musil الموقع سنة ١٨٩٨ لم تكن هذه الحجارة موجودة باستثناء حجري غرفتي البوابة الشمالية (**الشكل ٦**). أما الإرتفاع الكلي لهذه المداخل حتى نهاية الحنية العلوية من الداخل فهو ٣٥٠سم، في حين أن الارتفاع لغاية ما يعتقد أنه كان يوجد حجر عرضي فهومن ٢٢٠–٢٣٧سم (وذلك لعدم وجود أرضيات على مستوى واحد من الطمم وكذلك نسبة التدمير عند إزالة الحجر العرضي كبيرة، أما عرض هذه الأبواب فهو ١٢٠سم وسمكها من ١٣٠–١٣٥سم، أما البوابة الرئيسية المؤدية إلى الساحة الفضائية فيبدوأنه قد تم عليها عملية ترميم في سبعينيات القرن الماضي، ويبلغ عرضها ٢١٨سم وسمكها ١٤٠سم وارتفاع الحجر الذي تم ترميمه ٢٣٠سم.

كما يوجد بقايا فتحة دائرية في أعلى الجدار الوسطي بين الغرفتين ١ و٢ ويبدوأن قطرها كان يبلغ ٤٠سم تقريباً.

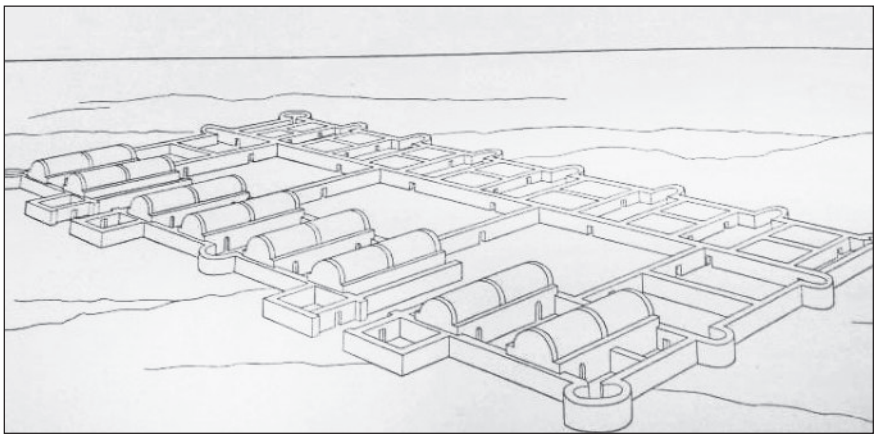
بالنسبة للبوابة المؤدية إلى القسم الغربي من القصر فيبدو أنه كان يحيط بها غرفتين، شمالية أخذت الرقم G1L وجنوبية أخذت الرقم G1R (**الشكل ٣**)، أما الغرفة الشمالية فلم يتبقى منها سوى كتلة معمارية منزوعة الحجارة في الجزء الشرقي من المدخل وبقايا الجزء الغربي من المدخل، في حين أن الغرفة الجنوبية G1R مازالت جدرانها قائمة، إلا أن مدخلها منزوع الحجارة، وكذلك المداميك الحجرية في أساساتها متآكلة على ارتفاع مداماكين حوالي ٧٠سم، وعند زيارة Musil للموقع سنة ١٨٩٨ كان يغطي ظهر المدخلين حجر عرضي، تظهر عليه الزخارف الإسلامية، وهوموجود الآن في متحف الأردن، وإلى الجنوب من هذه الغرفة تمتد بقايا الجدار رقم ٥ بطول ٢٣،٥م، أساساته السفلية متآكلة أيضاً. يبلغ طول هذه الغرفة ٧م وعرضها ٦،٩٠م وارتفاع جدرانها ما بين ٢،٨٥م–٢،٦٠م.




٣. مخطط لقصر طوبه كما وضعه كريزويل (اضيفت ارقام الغرف من قبل المؤلف).




٤. مخطط ثلاثي الأبعاد للأجزاء المتبقية من القصر.



٥. مخطط لقصر طوبه كما تصوره Musil.

هذه هي الأجزاء الرئيسية المتبقية من القصر، أما باقي أجزاء القصر فلم يتم بناؤها أصلاً، كما في معظم الجزء الشرقي، إنما تم الإكتفاء بعمل الأساسات لها، أوأجزاء تم بناء جزء منها في الجزء الغربي من الموقع وتعرضت للإنهيار بسبب العوامل الطبيعية مثل الجدران ٢٠ و٢١ و٢٢، والجدار الوسطي بين الغرفتين ٧ و٨ والجدار الغربي للساحة الفضائية الرئيسية في الجزء الشمالي، وجدران الغرف ١١ و١٢ و١٣ و١٤.

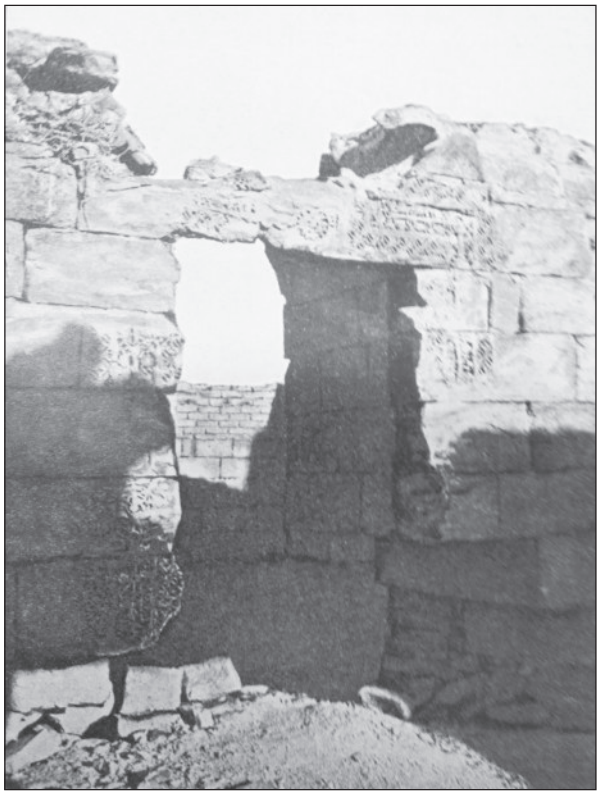
أما بالنسبة للعناصر المعمارية القريبة من القصر، يوجد بقايا سدّان مائيّان لحجز الماء قرب القصر على طرف سيل وادي الغدف.

السد الأول: يبعد ١٠٠م تقريباً عن الزاوية الجنوبية الغربية للقصر، ويمتد باتجاه شمال جنوب بطول ٦٣م ومعدل عرضه من ٢،٨٠–٣م ويصل أقصى ارتفاع له ١م، يتكون من مدماك إلى ثلاث مداميك، وهومبني من حجارة السيل الضخمة، شبه الدائرية يصل قطر بعضها إلى اكثر من ١٢٠سم **(الشكل ٧ أ)**.

السد الثاني: يبعد ٢٥٠م تقريباً عن الزاوية الشمالية الغربية للقصر **(الشكل ٧ب)**، ويمتد باتجاه شرق غرب، بطول ٣٦،٥م ومعدل عرضه ١،٨٠م، يتكون من مدماك إلى ثلاث مداميك ليصل ارتفاعه من ٤٠–١١٠سم، وهوكما في السد الأول مبني من حجارة السيل الضخمة. إن بناء السدين على مقربة من بعضهما وعلى هذا الشكل يوحي وكأنهما بنيا لحجز الماء فيما بينهما لاستخدامها في عملية البناء (كما يعتقد السيد أديب أبوشميس).

من أهم الملاحظات المعمارية التي تم ملاحظتها في هذا القصر من خلال المخططات المرسومة للأساسات والأجزاء المتبقية منه هي:

- لم يعثر على أساسات مسجد داخل حرم القصر كما في كثير من القصور الإسلامية.
- ا يوجد آثار لبئر ماء داخل الموقع لاستخدامات الشرب، فليس من السهولة جلب مياه الشرب من الآبار في الجهة الشمالية والتي تبعد من ٢،٥–٣كم عن القصر، أواستخدام مياه السيل، ولكن قد يكون عمل البئر داخل الموقع قد تأخر لحين الإنتهاء من بناء القصر الذي لم يتم أصلاً.
- لا يبدو مما هو متبقي من أساسات القصر وجود آثار حمّام سواء لقضاء الحاجة أوللاستحمام، وللتأكد من هذا فإن الموقع بحاجة إلى دراسة معمارية عميقة، وهذه الخدمات بالعادة تكون بحاجة إلى تمديد القنوات المائية التي تكون بالعادة قبل الإنتهاء من عمل الأرضيات، وبما أن العمل بالبناء قد توقف قبل الإنتهاء من البناء فقد يكون هذا سبب عدم البدء ببناء الحمامات.
- قد تكون الغاية من بناء القصر هو مشتى، حيث أن القصر مبني من



٦. العتبة العلوية لمدخل الغرف كما صورها Musil.

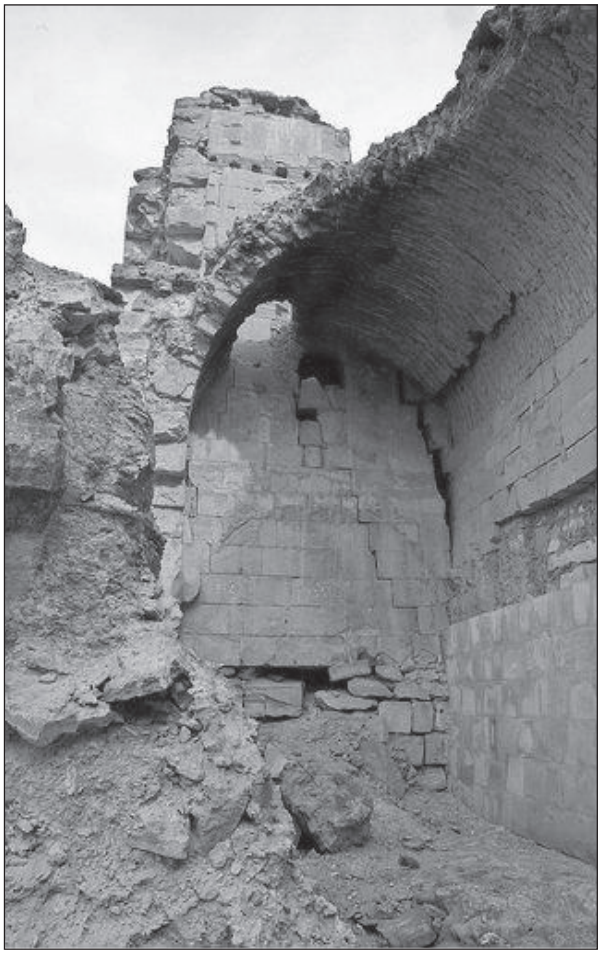
الطوب المشوي ويمتد باتجاه شمال غربي إلى جنوب شرقي، بعكس اتجاه الرياح السائدة في المنطقة التي في العادة تكون غربية، وفي الأجزاء المبنية مثل الغرف ١ و٢ لا يوجد نوافذ سوى نافذتين طوليتين صغيرتين في أعلى السقف في الجهة الجنوبية من الغرفة رقم ١ ونافذتين مقابلتين لها من نفس الجهة في الغرفة رقم ٢، بعكس ما نراه في قصر المشتى من وجود فتحات التهوية الدائرية أسفل الجدران لجلب الهواء البارد، كما يشكل الجبل الواقع إلى الشرق الذي بني القصر على سفحه ساتراً للموقع من الرياح الشرقية الباردة في فصل الشتاء (أنظر **الشكل ٢٤**).

- الموقع مشابه لحد كبير لقصر المشتى من حيث طراز ومواد البناء إلا أن قصر المشتى قد يكون معد ليستخدم كمصيف.
- يبدو من مخطط القصر أيضا أنه قد بني من جزئين متناظرين، في الجزء الغربي ٤ أجنحة منفصلة شبه متساوية، وفي الجزء الشرقي ثلاث أجنحة، اثنان شبه متساويان في المساحة وواحد رئيسي أكبر حجماً، فقد يكون أحد الجزئين لاستقبال الزوار والوفود والآخر للاستخدامات الخاصة.
- الغرف الطولية ذوات الأسقف نصف برميلية كما في الغرف ١ و٢ تتوزع في الجهة الشمالية بشكل متناظر شبه متكرر على أربعة أجنحة.
- أما السبب وراء اختيار منطقة وادي الغدف لبناء القصر فيها فتعود إلى أن هذه المنطقة بعيدة نوعاً ما عن التجمعات السكانية، وعن طرق المواصلات التي كانت تمر من وادي السرحان إلى الأزرق إلى أم القطين وبصرى ثم إلى دمشق، أومن الأزرق إلى عوينـد فالخرانة فالقسطل فعمان فالبلقاء، أوعبر طريق الحج الشامي. أما اختيار هذا الموقع بالذات يعود أنه كما يبدوقد بني فوق منطقة شبه مستوية، قريبة من مصدر مائي، تتوفر حولها الجبال التي تحتوي على الحجارة اللازمة لعملية البناء، كذلك التربة الصالحة لعمل الطوب، والحجارة الطباشيرية اللازمة لعمل الجير.

أما عملية البناء بالطوب المشوي فهي من الطرق غير الشائعة في منطقة شرق الأردن، والذي تتوفر فيها مصادر متنوعة من الحجارة المناسبة للاستخدام في عملية البناء، مما يغني عن عملية تصنيع الطوب وشويه والبناء به، وما قد تتطلبه هذه العملية من جهد مضاعف، بينما كانت طريقة البناء بالطوب المشوي منتشرة في مناطق بلاد الرافدين والجزيرة الفراتية، حيث مصادر الحجارة أقل وفرة منذ أقدم العصور وحتى العصر الحديث. والسؤال هوكيف امتد تأثير هذه الطريقة في البناء لمناطق البادية الأردنية في نهاية الفترة الأموية، وقد يكون السبب

٧أ. السد رقم ١.

٧ ب. السد الثاني.



٨. قصر الحير الشرقي في سوريا.

في ذلك هوعودة جزء من القبائل اليمانية التي كانت متمركزة في العراق منذ ولاية الحجاج بن يوسف الثقفي، والتي عاد جزء ليس قليل منها من العراق إلى سوريا والأردن، وخاصة إلى منطقة البلقاء، وذلك خلال فترة خلافة سليمان بن عبد الملك، حيث كان معظم سكان جنوب سوريا (منطقة سهل حوران والأردن) من القبائل اليمانية (بيشة ١٩٨٣: ٥-٧). وقد يكون هذا التأثير العمراني قد جاء مع تلك القبائل إلى سوريا والأردن في نهاية العصر الأموي، مع إضافة استخدام الحجارة الجيرية في المداميك السفلية من البناء كما في قصر الحير الشرقي وقصر الحير الغربي في سوريا (**الشكل ٨**) والذي يعود لفترة خلافة هشام بن عبد الملك، و في مسجد جبل سايس الذي يعود للفترة (من ٧٠٠ إلى ٧٢٥م) (**الشكل ٩**) وكذلك في قصري المشتى والطوبة، ونلاحظ التشابه أيضاً في حجم الطوب المستخدم في قصر الطوبة مع حجم الطوب المستخدم بالعراق في نهاية الفترة الأموية وخلال الفترة العباسية، ففي منطقة الكرخ كانت أبعاد الطوب (الطابوق) ٢٧,١×٢٧,٢×٦,٣سم، أما في منطقة سامراء فكانت أبعاد الطوب ٢٥×٢٥×٧سم (رؤوف ١٩٩٨: ٣٠٢-٣٠٥) كما يبرز التأثير في الطراز المعماري لقصر طوبة بمواقع من العراق تعود إلى القرن السادس الميلادي كما في شكل المداخل في موقع تاج كسرى والذي شابه تماماً شكل المداخل في قصر طوبة (**الشكلين ١٠ و١١**).

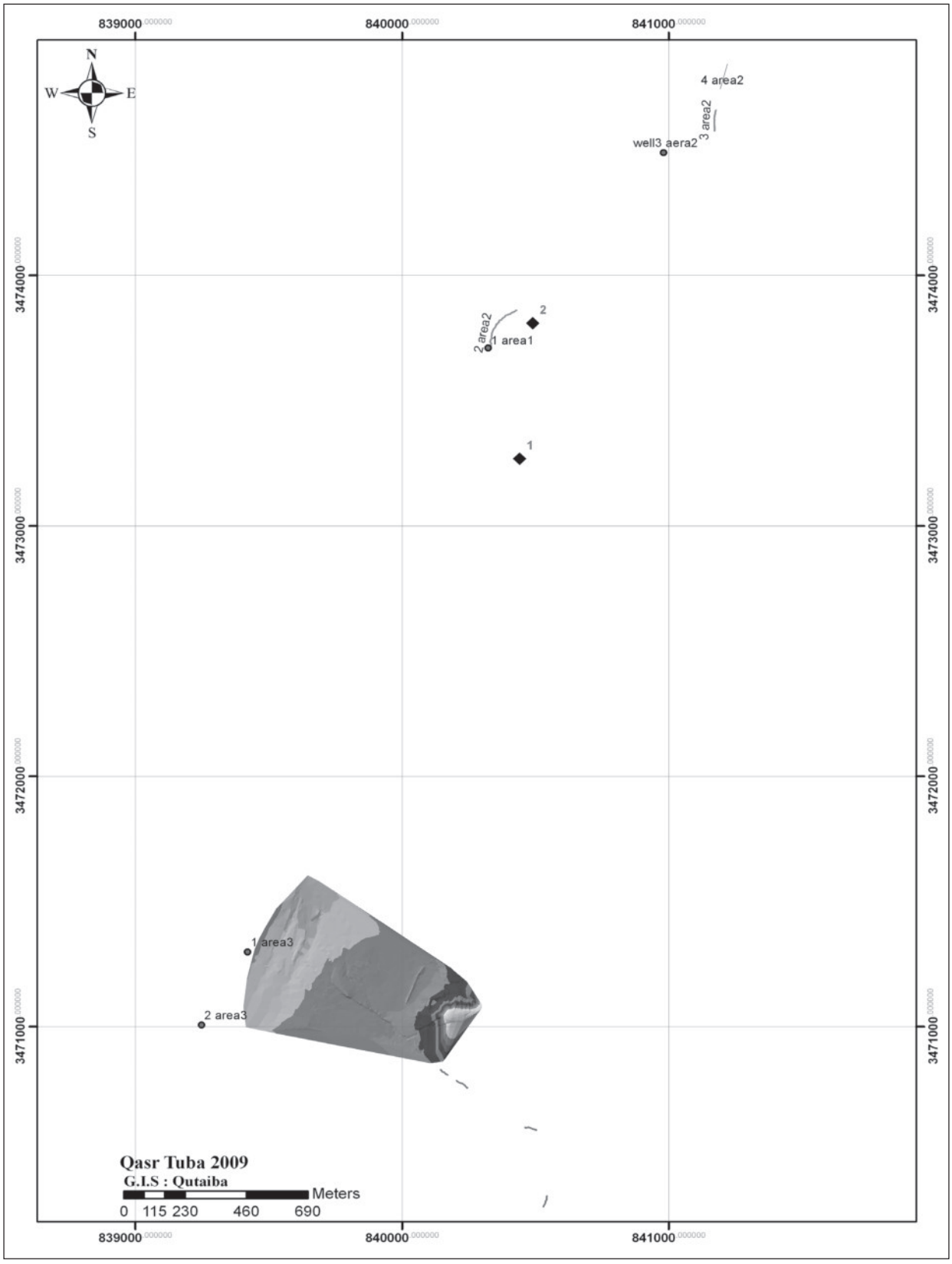
ولمعرفة مناطق جلب المواد الأولية اللازمة لبناء القصر، قمنا بعمل مسح أثري حول منطقة القصر، بشكل مستطيل بطول ٧كم وعرض ٣كم أي بمساحة ٢١كم$^{٢}$ (**الشكل ١٢**). حيث تم تقسيم هذه المنطقة إلى خمسة مناطق رئيسية، كان موقع القصر المنطقة رقم (١). وكما أشرنا سابقاً فإن بناء مثل هذا القصر يتطلب توفر عناصر البناء الرئيسية وهي، الحجر الجيري والتراب الصالح لعمل الطوب والجير والماء. وجزء كبير من هذه المواد قد تم العثور عليها في منطقة المسح رقم (٢)، الواقعة حول منطقة الآبار الموجودة إلى الشمال من القصر على بعد ٢-٣كم.

٩. مسجد جبل سايس في سوريا.

١٠. مدخل موقع تاج كسرى في العراق.

١١. مدخل من قصر طوبة.

ويبدوأن البنّاء الذي قام ببناء القصر قد ركز اهتمامه في بادئ الأمر على تحديد منطقة تواجد التراب الصالح لعمل الطوب بالدرجة الأولى ثم الحجارة الجيرية، والتي تتواجد بشكل جيد على حافة جرف الوادي الواقع إلى الغرب من البئر الأول والثاني، وجريان الماء في هذا الجرف قد كشف للبنّاء توفر مادة الحجر في هذا الجرف والتي تماثل نوعية الحجارة التي بنيت منها الأساسات الحجرية في القصر، وفوق طبقات الصخر في هذا الجرف تظهر كميات من التراب القليل الشوائب الذي




١٢. مخطط منطقة المسح الأثري.

يصلح لعمل الطوب **(الشكلين ١٣ و١٤)**

ومن خلال أعمال المسح لهذا الجرف (النقطة (٢) في المنطقة ٢) تبين وجود آثار تحجير فيه، وتم حفر ثلاث آبار في هذه المنطقة يصل عمقها إلى أكثر من ٣٠ م وذلك لتوفير كميات كافية من الماء التي تلزم لعمل عجينة الطين، وهذا يدلنا على أن وادي الغدف لم يكن مستمراً في جريانه طوال العام، وإلا لما كانت هناك حاجة لحفر هذه الآبار، أما القول بأن هذه الآبار لاستخدامات الشرب فهو تفسير غير عملي، وذلك لبعدها عن موقع القصر، كذلك يكفي حفر بئر واحد لتوفير مياه الشرب.

وعند عمل الطوب يفضل أن يتم عجن الطوب قرب منطقة تزويد المياه في منطقة شبه مستوية، والتي يبدوأن المنطقة أمام الآبار من الجهة الشرقية تصلح لذلك، كما أن عملية شوي هذا الطوب لا بد من أن تكون في نفس المنطقة فليس من المعقول نقل عجينة الطوب لشويه في مكان آخر نظراً لثقل وزنه، فالأفضل أن يتم عمل أفران الشوي في نفس المنطقة، والتي يبدوأن آثار هذه الأفران قد اندثر بفعل عوامل الزمن، وما تتعرض إليه المنطقة من تدفق مفاجيء للمياه في فصل الشتاء مما يؤدي إلى خروج المياه عن مجر السيل، ومع ذلك فقد تم العثور على كسرة صغيرة من جزء من فرن للشوي في هذه المنطقة، والتي قد يكون هنالك الكثير منها إلا أنها طمرت بفعل العوامل الطبيعية وما يسببه فيضان مجرى السيل من جلب للأتربة.

يبدو أنه كانت تتم في هذا الموقع عملية عجن التراب بالماء وعمل قوالب الطوب ثم شويه ثم نقله إلى موقع البناء حيث تصبح أقل وزناً.

وإلى الشرق من البئر الثالث تم ملاحظة وجود عملية تحجير في

١٣. منطقة جلب حجارة البناء.

١٤. آثار عمليات التحجير عن قرب.

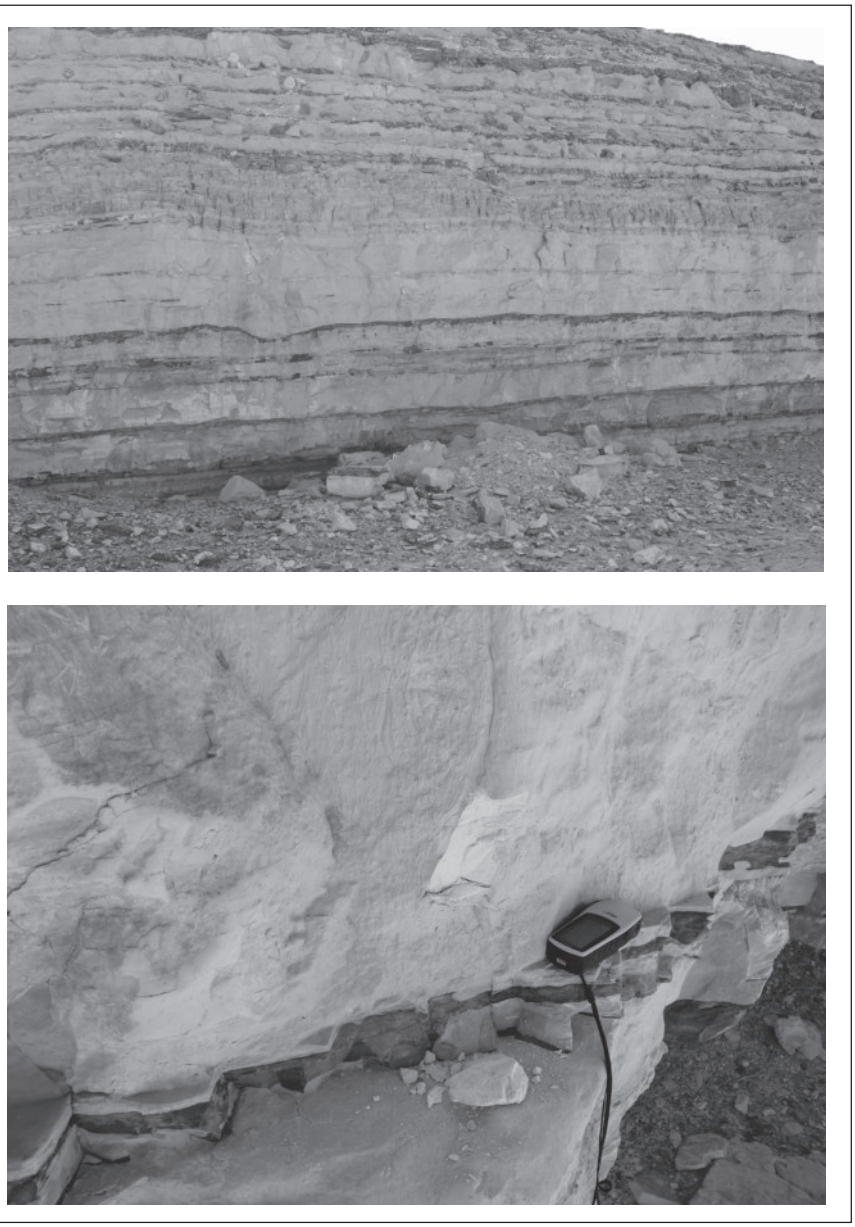
جبلين متجاورين يتشكلان من صخور طباشيرية تتخللهما طبقات من الصوان، وهذه الصخور الطباشيرية من المواد الجيدة لعمل الشيد الذي يستخدم في عمل مونة البناء والقصارة (وقد أخذت هذه المنطقة اسم النقطة (٣) في المنطقة (٢) (**الشكل ١٥**).

وقد لوحظ خلال عملية المسح في هذه المنطقة وجود الكثير من آثار التخريب بحثاً عن الدفائن مما أدى إلى تدمير مظاهر معمارية يبدوأنها كانت موجودة مثل النقطة رقم (١) حيث يظهر استخدام الجرافات في عملية الحفر ويظهر آثار حجارة تستخدم في البناء مبعثرة عند أكوام التراب الذي تم تجريفه إلى الغرب من البئر رقم (١).

أما بالنسبة للآبار الثلاثة الموجودة في المنطقة رقم (٢) فهي محفورة بالصخر الطبيعي وقد بني لها خرزات لترتفع فوهتها عن سطح الأرض، وهي مطوية من الداخل بالحجارة على أعماق مختلفة، ويلاصق كل بئر حوض لنشل الماء منه، وقد تكون استخدمت الحيوانات لرفع المياه من هذه الآبار نظراً لعمقها.

**البئر الأول**: وهوالأقرب إلى القصر ويقع ضمن الإحداثية ٢٦٩٥٨١ شرقاً و٣٤٧٠٢٧٣ شمالاً ويبلغ عمقه أكثر من ٣٠م منها ٤،٣٠م مبنية من الحجر والباقي محفور بالصخر، ويبلغ قطره ٢،٨٥م وعرض جداره ١،٢٥م وارتفاعه المتبقي عن سطح الأرض ٧٠سم، ويلاصقه من الجهة الغربية بقايا حوض ماء مربع الشكل مقصور من الداخل، مساحته ٤،٥م ×٥م وعمق أجزائه المتبقية ٧٥سم. وتظهر عليه آثار التخريب البشري.

أما **البئر الثاني**: والذي يقع شمال البئر الأول (وتجاوره أربع شجرات كبيرة الحجم) فيبلغ عمقه أكثر من ٣٠م أيضاً منها ٣،٦٠م مبنية من الحجر والباقي محفور بالصخر الطبيعي، ويبغ قطره ٢،٣٠م وعرض جداره من ١١٠سم إلى ١٢٠سم، ويلاصقه من الجهة الجنوبية بقايا



١٥. مناطق الصخر الطباشيري.

حوض دائري الشكل قطره ٦،١٧م، وهوكما البئر الأول معرض للتخريب البشري، ويوجد له بقايا كتف ساقية ترتفع ٩٦سم عن خرزة البئر بعرض ٣٦سم، وترتفع خرزة البئر عن سطح الارض من٨٢سم إلى ١١٠سم والبئر كان مقصور من الخارج ويبدوأنه كان له غطاء حيث يظهر في أعلى الخرزة بقايا حفة عرضها ٦سم (**الشكل ١٦**).

أما **البئر رقم ٣**: يقع شمال البئر الثاني بحوالي ٨٠٠م، وعمقه الكلي ٢٠،٧م، منها ٣،٧٥ مبنية من الحجارة والباقي محفور بالصخر ويبلغ قطره ٢،٣م وعرض جداره من١٢٠–١٤٠سم، ويلاصقه من الجهة الغربية بقايا حوض ماء مربع الشكل مقصور من الداخل أبعاده المتبقية ٤٠،٤م×٤٥،٤م، وهومعرض للتخريب البشري كما في الآبار الأخرى، وترتفع خرزته عن سطح الأرض ٦٠سم.

كما تم رصد مناطق أخرى قد تكون استخدمت لجلب الحجارة والجير وهي قريبة من القصر ضمن المنطقة رقم (١) وهي النقاط ١ و٢ و2A في (**الشكل ١٢**)، وكذلك مناطق تنتشر فيها ما يشبه الأحواض المبنية من الحجر إلى الجنوب الغربي من القصر قرب مجرى الوادي، (النقاط ٣ و٤) والتي قد تكون استخدمت لعجن مادة الجير بعد طحنه لاستخدامه في مونة البناء مع التراب والرماد في بعض الأحيان وخاصة تحت الأساسات الحجرية السفلية، كما توجد بقايا أحواض ملاصقة للقصر في الزاوية الجنوبية الغربية والتي يبدوأنها استخدمت لنفس الغاية.

ومن خلال المسح الأثري للمنطقة (٣) والواقعة في الجهة الغربية لمجرى السيل إلى الجنوب الغربي من القصر، لوحظ وجود منطقتين تنتشر بهما بقايا الطوب المشوي، من نفس الطوب المستخدم في بناء القصر، وقد اعطيت الأولى اسم (النقطة ١) وتقع ضمن الاحداثيات ٣٤٦٨٣٥٨ شمالاً و٢٦٨٤٥٣ شرقاً والتي وجد فيها بقايا أساس جدار مبني من الطوب، إلا أن المنطقة قد تعرضت للتخريب من قبل الباحثين عن الدفائن، وتبلغ مساحة هذه النقطة ٦م×١٢،٥م، وعرض الأساس الظاهر ٤٦سم. وإلى الجنوب من هذه النقطة تقع النقطة رقم (٢) ضمن نفس المنطقة، ضمن الاحداثيات ٣٤٦٨٠٧٧ شمالاً و ٢٦٨٢٦٤ شرقاً، وتنتشر حولها بقايا كسر الطوب المشوي كما في النقطة السابقة، والتي يظهر أنها كانت تحتوي على مظهر معماري تعرض للتدمير من قبل الباحثين عن الدفائن أيضاً. وتبلغ مساحة هذه النقطة ٧،٥م ×٨م وتنتشر حولها بعض كسر الفخار. كما تنتشر حولها بقايا قبور اسلامية تبدو حديثة، قد تعود للقبائل البدوية التي تتنقل في هذه المناطق،.أو قد تكون مظاهر معمارية استخدمت من قبل الأشخاص اللذين عملوا في مشروع بناء القصر كالمهندسين والفنين.

أما المنطقة رقم (٤) والتي شملتها أعمال المسح فتقع ضمن الاحداثيات ٢٦٨٨٠٨ شمالاً و٣٤٦٧٠٣٨ شرقاً. فقد عثر فيها على بقايا مظهر معماري يثير الكثير من الاستفهامات، وهوعبارة عن بقايا تجويف في الصخر قد تعرض للتخريب من قبل الباحثين عن الدفائن، يحتوي على بقايا حنية محفورة في الصخر بشكل شبه مربع، وآثار حنية أخرى بجانبها، وثلاث حنيات أخرى بجوارهم من الجهة الشمالية قد دمرت بالكامل أيضاً، وعند مشاهدة هذا التجويف يبدو وكأنه مدفن بيزنطي، وهذه من الأمور المثيرة للإستغراب، فمن المعروف أن بناء القصر يعود إلى الفترة الأموية، وذلك من المصادر التاريخية وطراز البناء وبقايا بعض كسر الفخار، فوجود مدفن بيزنطي بقربه قد يكون دلالة على أن بعض العاملين في إنشاء هذا القصر كانوا من النصارى.

أما المنطقة رقم (٥) فهي تبعد حوالي ٣كم إلى الجنوب من القصر على الطرف الشرقي من مجرى السيل، وقد لوحظ بها وجود نقطتين تنتشر حولهما بقايا قليلة من الطوب المشوي كالذي استخدم في بناء القصر، والذي قد يكون تم جلبه من موقع القصر في فترات لاحقة لاستخدامات فردية.

كما لوحظ من خلال أعمال المسح للمنطقة التي حددت خلال هذا المشروع، انتشار لبقايا كسر صوانية مشغولة قد تعود على فترات العصور الحجرية القديمة، ولكنها ليست متركزة في منطقة معينة، والتي قد تعود إلى مواقع من العصور الحجرية القديمة قد تم نقلها بفعل مياه السيل.

وللتأكد من نتائج هذه المسوحات كان لا بد من القيام ببعض

١٦. البئر رقم ٢.

التنقيبات في أجزاء محددة داخل الموقع وفي مناطق المسح خارج حدود الموقع، ولذلك قمنا بعمل شبكة مربعات داخل حرم الموقع بمساحة ١٠×١٠م لكل مربع.

وقد بدأنا العمل في المربعين F٦ وE٦ في الجزء الجنوبي الغربي من الموقع، حيث يبدو من خلال السطح وجود آثار تبدو وكأنها بقايا أحواض.

ومن خلال أعمال التنقيب تم بالفعل الكشف عن بقايا أحواض عددها إثنان تمتد بشكل طولي من الغرب إلى الشرق (**الشكل ١٧**)، وما زالت أساساتها واضحة، وعلى ما يبدو أنهما بنفس الحجم، وما زالت بقايا الطين المتصلب باقية فيهما، ويفصلهما عن بعضهما ١٣٠سم، وقد بنيت هذه الأحواض من الحجر الجيري من صف واحد ومدماك واحد من الحجارة، يتراوح ارتفاعها من ٤٠–٤٥سم، وجزء كبير من هذه الحجارة لم يعد موجود في مكانه، ولم يبقى سوى الأساسات التي عملت بشكل صبّة نظافة من الجير المخلوط بالرماد والحصى الكبيرة والمتوسطة الحجم، ويصل عرض هذه الأساسات إلى ٦٠سم، أما حجم الحوض الأول الذي يقع في الجهة الجنوبية فيتراوح طول المتبقي منه من ٦،٥٥–٧،٢٠م والحوض الثاني إلى الشمال منه فيتراوح طوله من ٦،٦٠م–٧،٥٠م، أما عرض هذه الأحواض فهو متساوي بحيث يبلغ ٢،١٠م.

ويبدوأن هذه الأحواض قد تم استعمالها لعملية تجهيز الطين اللازم للقصارة أو لعمل المونة المستخدمة بين الطوب في عملية بناء القصر.

كما تم اختيار موقع آخر للتنقيب، النقطة ١ في المنطقة رقم ٣، والذي يبعد حوالي ٤٠٠م إلى الغرب من القصر، حيث لوحظ آثار بقايا طوب متناثر حوله، ويظهر أن أجزاء من هذا الموقع قد تعرض للعبث من قبل الباحثين عن الدفائن (**الشكل ١٨**).

ومن خلال أعمال التنقيب به تم الكشف عن بقايا خمس طبقات أثرية كما ظهرت أساسات مبنى يتكون من سبعة جدران، ومدخله من الزاوية الجنوبية الغربية، بحيث يظهر البناء بشكل يشبه حذوة الفرس، يبلغ طوله بالكامل ٧،٦٠م وعرضه ٥،٩٥م، أساساته من الحجر الجيري الهش ومبني فوقها الطوب المشوي، ويبدو أن البناء كان يتكون من جزأين

١٧. منطقة تحضير عجينة المونة.

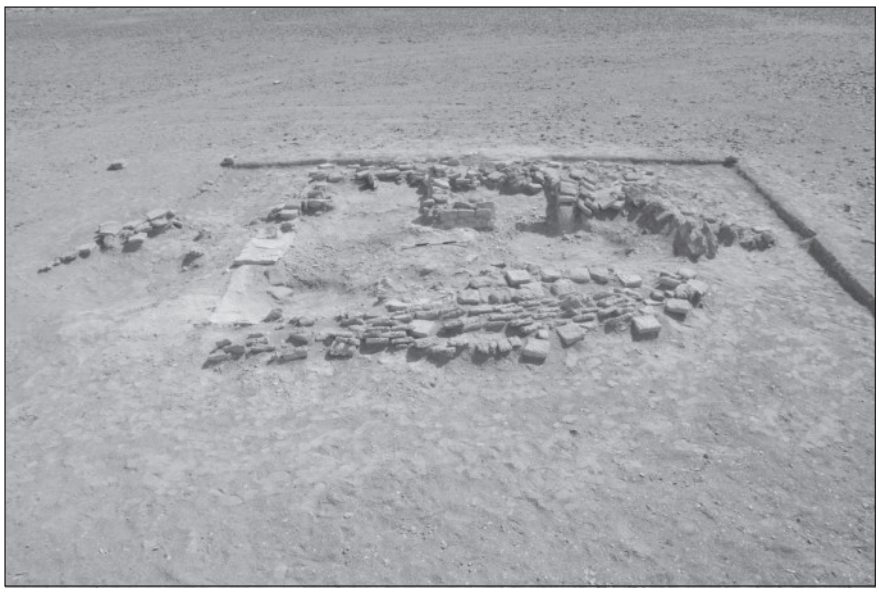
١٨. منزل رقم ١ قبل التنقيب.

متداخلين الأول بشكل حرف L معكوسة طوله ٥،٩٥م وعرضه ٤،٤٠م، والجزء الثاني بشكل شبه مربع طوله ١،٩٠م وعرضه ١،٨٥م، ويبدوأن أرضية البناء بالكامل كانت مغطاة بطبقة من البلاستر تم رصفها فوق طبقة من الحصى الصغيرة، التي قد يكون تم جلبها من تربة السيل، أما طبقة البلاستر في الجزء الثاني من المبنى فيظهر عليها آثار حرق مما يدل على أن هذا الجزء من المبنى كان مخصصاً للأغراض المنزلية مثل الطبخ، وقد تم إزالة عدد كبير من قطع الطوب المشوي المنتشرة في الموقع، ومن أهم هذه القطع بقايا لبنة من الطوب عليها آثار صليب حفر بأصبع اليد قبل الشوي، ويبغ طول هذه الطوبة ٢٦سم وعرضها ٢١سم، أما طول الصليب فهو٢١سم وعرضه ١٨سم **(الشكل ١٩)**، وقد تكون الغاية من هذا المبنى هو استخدامه من قبل عمال البناء (**الشكل ٢٠**)، ويبدو من أجزاء الطوبة التي وجد عليها آثار صليب، أن العاملين في بناء القصر قد يكون بعضهم من النصارى، مع العلم بأن البناء يعود إلى الفترة الأموية ومن المعروف أن كثير من القبائل العربية كانت على الديانة النصرانية في تلك الفترة.

واستكمالاً لأعمال التنقيب فقد تم اختيار منطقة أخرى للتنقيب بها وهي النقطة ١ في المنطقة رقم ٤ والتي تبعد ١،٤٠٠كم إلى الجنوب من القصر، ومن النظرة الأولى يتضح بأن هذه المنطقة تشكل تجويف في الصخر الجيري، ويبدو أنها تعرضت للتخريب عن طريق الحفر بالجرافات، وتم ترك كميات هائلة من الطمم أمام هذا الموقع، الذي يشبه المدافن البيزنطية **(الشكل ٢١)**.

وللتأكد من ذلك بدأنا بإزالة الطمم من أمام وداخل هذا التجويف، ليتضح لنا أننا أمام تجويف يتكون من ثلاث حجرات في كل حجرة بقايا تجويفات **(الشكل ٢٢)**، ويبلغ طول هذه الحجرات مجتمعة ١٠،٣٠م، من المؤسف أن التخريب في هذا الموقع كبير جداً. وقد قمنا بتوثيق ما تبقى من هذا الموقع، فالحجرة الأولى يبلغ طول فتحتها ٣،٦٦م وارتفاعها من

١٩. الطوبة التي حفر عليها اشارة الصليب.



٢٠. المنزل رقم ١ بعد التنقيب.

١،١٠–١،٢٠م، أما طول الحجرة من الداخل فيبلغ ٣،٧٥م وعرضها ٢،٨٠م وارتفاعها ٢،٢٢م، وهي بيضاوية الشكل، وأرضيتها مغطاة بطبقة من البلاستر، وتحتوي على تجويفين الأول بحالة شبه سليمة، يبلغ عرضه ٨٠سم وارتفاعه ٥٨سم وعمقه ٦٠سم، أما التجويف الثاني فهو شبه مهدم، يبلغ عرضه ٨٠سم وارتفاعه ٦٠سم وعمقه ٥٠سم، ويبدوأن التخريب في هذه الحجرة لم يقتصر على الفترات الحديثة بل في فترات سابقة أيضاً، حيث عثر على بقايا طبقات من الحرق في الطبقات السفلى من الحجرة، والتي استخدمت من قبل البدوفي فترات سابقة، كما عثر على مخلفات أغنام في الطبقات العليا.

أما الحجرة الثانية، والواقعة في الوسط، فيبلغ طول فتحتها ٣،٠٥م وارتفاعها ١،٣٣م، أما طول الحجرة من الداخل فهو ٣،٤٥م وعرضها ٢،٤٣م وارتفاعها ١،٣٠م، وتحتوي على ثلاث تجويفات متجاورة معظمها مهدم .

التجويف الأول يبلغ عرضه ٧٧سم وارتفاعه ٩٠سم وعمقه ٤٧سم

والتجويف الثاني يبلغ عرضه ٨٠سم وارتفاعه ٨٠سم وعمقه (من جهة واحدة) ٤٧سم، أما التجويف الثالث فيبلغ عرضه ٧٠سم، وارتفاعه وعمقه غير واضح بسبب التدمير.

أما الحجرة الثالثة (في الجهة الشمالية) فيبلغ طول فتحتها ٢،٨٢م وارتفاعها ٨٠سم

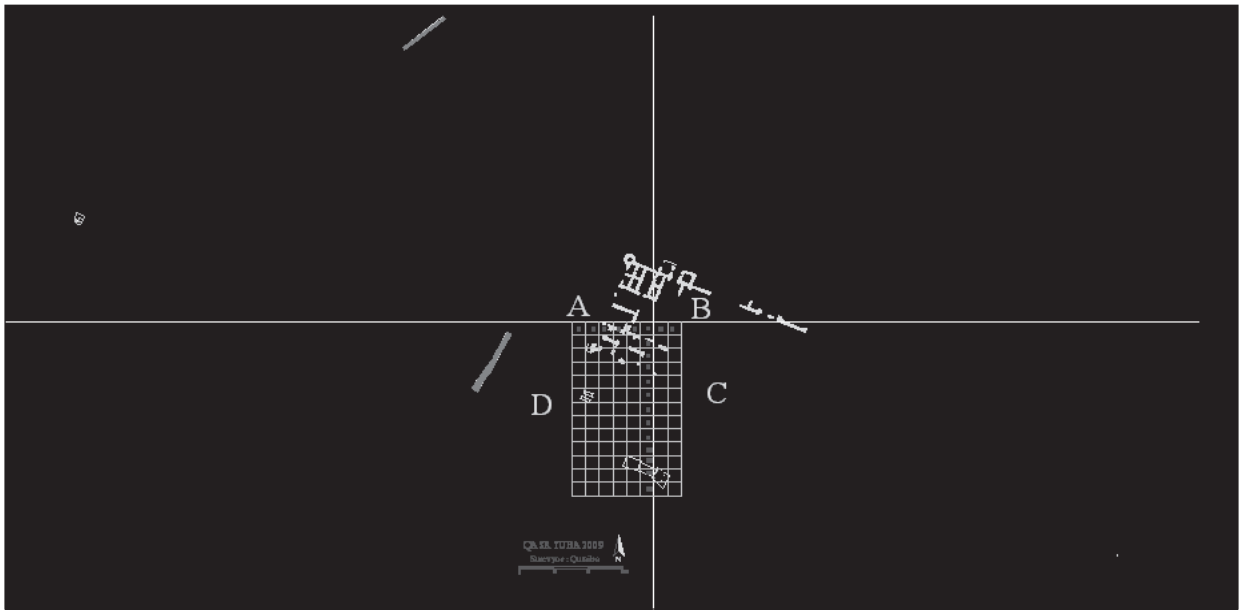
أما طولها من الداخل فيبلغ ٣،٥٠م وعرضها ٢،٨٠م وارتفاعها ١،٠٧م، وتحتوي على بقايا تجويفين، الأول يبلغ عرضه ١،٣٣م وارتفاعه ٧٥سم وعمقه ٥٠سم.

أما الثاني فيبلغ عرضه ١،٣٥م وارتفاعه ٨٠سم وعمقه ٣٠سم

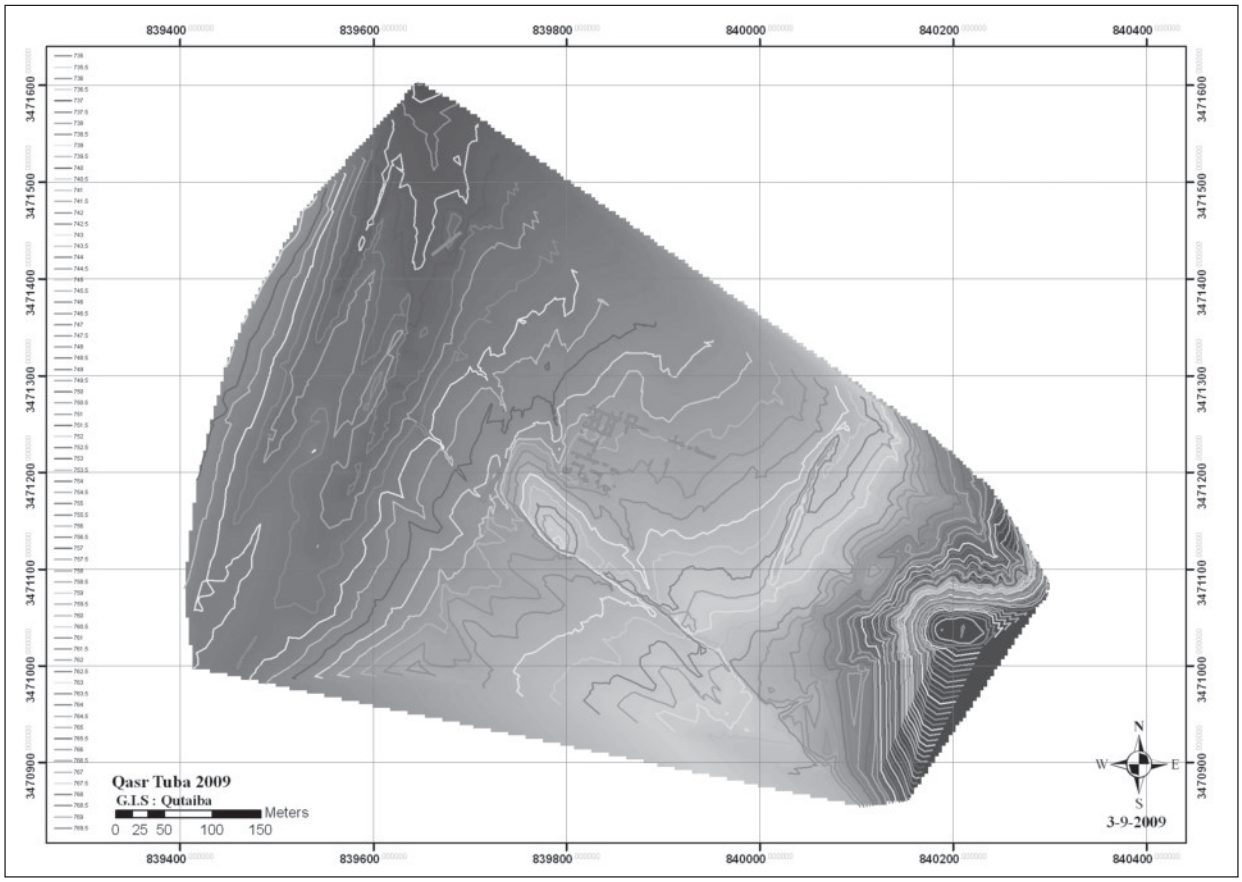
أما أرضيات الحجرات الثانية والثالثة فهي من نفس طبيعة الصخر التي نحتت به وهو الحثان الأبيض. وقد عثر أمام الحجرة الثالثة على حجر جيري أبيض مشذب، طوله ١،٠٤م وعرضه ٥٤سم وسمكه ١٥سم، قد يكون استخدم كحجر إغلاق.

إن عملية الكشف عن هذا الموقع تطرح الكثير من الإستفهامات، فهل كان استخدام هذا الموقع كمدفن؟ ولكن الحجرة الأولى لا تعطي انطباع بذلك، فارتفاعها يصل إلى ٢،٢٢م ، وارتفاع التجويفين فيها عن سطح الأرضية يصل إلى اكثر من ١٢٠سم وعمقهما لا يتجاوز ٦٠ سم، كما وتوجد بقايا آثار حرق بسيطة فوق الأرضية، فهذه الحجرة بشكلها الحالي لا تعطي إنطباع بأنها حجرة دفن، أما بالنسبه للحجرتين ٢ و٣ فقد تكونان قد استخدمتا كمدفن وهي احتمالية واردة، ولكن هل كان العاملون في بناء القصر معظمهم من النصارى؟ وهل تتناسب عدد تجويفات الدفن (والبالغ عددها ٧) مع الفترة الزمنية التي استغرقها بناء هذا الجزء من القصر والتي تقدر بسنة ؟ أم هل كان هذا العدد من الموتى نتيجة وباء مثل الطاعون (والذي كان منتشراً في تلك الفترة)؟ إلا أنه من المعروف أن الوليد بن يزيد والذي ينسب إليه بناء القصر قد قتل قبل أن يصل وباء الطاعون إلى هذه البلاد!

بالنسبه لرأيي الشخصي (والذي قد يحتمل الخطأ) أن هذا الموقع قد استخدم كمدفن خلال الفترة البيزنطيةحيث تتوفر أدلة على استيطان بشري في منطقة الطوبه يعود إلى تلك الفترة، وذلك من خلال بعض كسر الفخار التي تعود إلى الفترة البيزنطية، والتي عثر عليها في محيط القصر، ولكن يبدوأن هذا المدفن كان قد تعرض للتدمير في فترة لاحقة، وقد يكون بعض العمال الّذين عملوا في بناء القصر قد وجدوا في استخدام إحدى هذه التجويفات كمأوى لهم من الظروف الجوية الباردة أمراً ممكناً، وخاصةَ أن التجويف الصخري موجود فما عليهم سوى توسعته وتعميقه قليلاً، وهذا ليس بالأمر الصعب نظراً لسهولة الحفر في مثل هذا النوع من الصخور، حيث يتضح وجود طريقتين من الحفر داخل هذه الحجرة، فطريقة الحفر على مستوى التجويفين الموجودين تختلف عن طريقة الحفر على المستوى السفلي من هذه التجويفات، ومن ثم قاموا بتغطية الأرضية بطبقة من البلاستر. وهذا مجرد رأي يحتمل الخطأ والصواب.




٢٣. شبكة المربعات




٢٤. مخطط كنتوري للموقع.

ومن أعمال التنقيب داخل الموقع الأثري قرب القصر، فقد تم التنقيب في المربع A١٣ في المنطقة C وفي المربعات A١٢ وB١١ من المنطقة D إلى الشرق من منطقة الأحواض (**الشكل ٢٣**)، حيث تم الكشف عن أساسات لثلاثة مظاهر معمارية متجاورة بشكل طولي من الغرب إلى الشرق وكلها مربعة الشكل كما الغرف، والملاحظ أن معظم أساسات هذه الغرف مبنية من الحجر الجيري، ولا يوجد بقايا استخدام طوب مشوي كما في باقي أجزاء القصر، مما قد يشير إلى احتمالية أن تكون هذه المظاهر المعمارية غير مكتملة البناء كما هو الحال في باقي أجزاء القصر (**الشكل ٢٥**)، ويبلغ طول هذه الغرف مجتمعة ٢٩،١٠م.

وقد قمنا بتوثيق هذه الغرف وأخذ قياساتها، حيث بدأنا بالغرفة الأولى من الجهة الشرقية، والواقعة ضمن المربع A١٣ المنطقة C وقد بلغ عرضها ٦،٤٠م وطولها ٥،٥٠م وسمك جدارها الشرقي ٨٠سم، وسمك جدارها الجنوبي والغربي ٧٠سم، ومدخلها من الجهة الشمالية وأبعاده غير واضحة حيث أن جدران هذه الغرفة باستثناء الجدار الغربي مبنية من الحجر الجيري الهش، في حين أن جدران باقي الغرف مبنية من الحجر الجيري الصلب المتوسط الحجم مثل الحجارة المنتشرة في مجرى السيل.

أما الغرفة الثانية في الوسط والواقعة ضمن المربع A١٢ في المنطقة D فيبلغ طولها ١٢،٧٠م وعرضها ٧م وسمك جدرانها ٧٠سم. في حين أن الغرفة الثالثة والواقعة في الجهة الغربية يبلغ طولها ١٠،٩٠م وعرضها ٩،٤٠م، ومعدل سمك جدرانها الشرقي والغربي من ٩٠سم إلى ١م، في حين أن سمك جدرانها الشمالي والجنوبي ٨٠سم، ومن الملاحظ أن جدارها الشمالي أساساته منقطعة، إما أنها غير مكتملة أوأنها مدمرة، على العكس من الجدار الجنوبي والذي أساساته متصلة ويتراوح ارتفاعه من ٢٠إلى ٦٠سم.

ولم يتم الكشف عن بقايا أرضيات، ومن المحتمل أنها غير موجودة أصلاً، فمن المرجح أن هذه الغرف لم يتم استكمال بنائها، لعدم وجود ردم يدل على ذلك، ومعظم كسر الفخار التي تم العثور عليها كانت حول أساسات هذه الغرف من الخارج، وقد قام السيد أديب أبو اشميس بتأريخها إلى الفترة البيزنطية المتأخرة. في حين أن معظم كسر الفخار التي عثر عليها في منطقة القصر تعود إلى الفترة الأموية المبكرة والمتأخرة، أما كسر الفخار التي عثر عليها في النقطة رقم ١ في المنطقة رقم ٣، والتي يعتقد أنها ربما تكون منزل لأحد المشرفين على البناء فمعظمها تعود إلى الفترة الأموية المتأخرة.

وبعد الإنتهاء من أعمال التنقيب قمنا بتغطية المناطق التي تم التنقيب فيها بطبقة من البلاستك ثم بطبقة من التراب، وذلك لحمايتها من تأثير العوامل الطبيعية.

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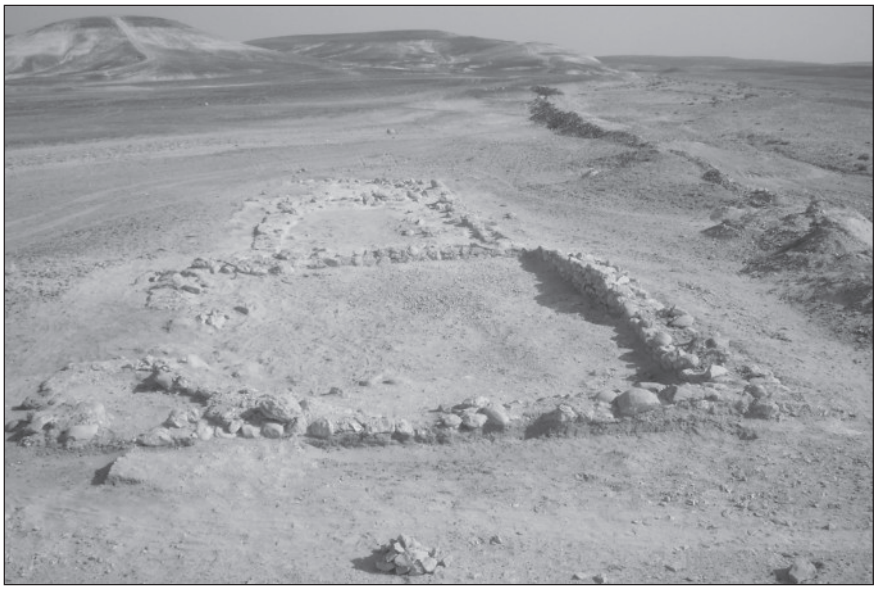

٢٥. أساسات منازل في حرم القصر.


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# مشروع المسح الأثري التقييمي لحالة المواقع الأثرية في محافظة إربد الفترة (١٨ايلول إلى ١٨ تشرين ثاني ٢٠١١م)

إسماعيل ملحم

**الموقع**

تقع محافظة إربد في الجزء الشمالي الغربي من المملكة الأردنية الهاشمية، وتبلغ مساحتها (١٦٢١ كم). وتتنوع تضاريسها ما بين الجبل والسهل والغور، كما يتواجد بها عدد من الأنهر والأودية كنهر الأردن ونهر اليرموك، وأودية كوادي العرب ووادي زقلاب ووادي الطيبة ووادي الجرم ووادي اليابس ووادي ابو زياد، وجميعها تشكل مصدرا مهما للتزود بالمياه والزراعة.

تتكون المحافظة من تسعة ألوية هي: قصبة اربد، بني كنانة، الرمثا، بني عبيد، المزار الشمالي، الكورة، الطيبة، الوسطية والأغوار الشمالية.

**ماهية المشروع**

جاء مشروع المسح الأثري لمحافظة اربد في موسم ٢٠١١م انسجاما مع استراتيجيه دائرة الآثار العامة في إعادة تقييم حالة المواقع الأثرية في المملكة، ومنها المواقع المنتشرة في محافظة اربد، والتي يقدر عددها بحوالي ٣٠٠ موقع اثري من جميع العصور التاريخية، والتي مسحت غالبيتها خلال العقود الماضية، قبل أكثر من ثلاثين عاما من قبل بعثات أثرية أجنبية ووطنية، غير أن تعاظم المد السكاني والعمراني وتوسع المشاريع الإنشائية من طرق وأنظمة مياه وصرف صحي وشبكات اتصالات وكهرباء وغيرها أدت جميعها إلى تغيير كثير من مظاهر السطح، ومست بالضرر بعض المواقع الأثرية، أضف إلى التعديات التي تتعرض لها الآثار من قبل لصوص الآثار في العديد من المواقع، والتي تشكل مخاطر جمة على هذه المواقع وعلى التراث العالمي.

في ضوء هذه التحديات فان تقييم المواقع الأثرية بشكل دوري أصبح ذو أهمية وأولوية في أهداف العمل الأثري الذي تمارسه دائرة الآثار العامة للمساعدة في اتخاذ القرار المناسب في حماية المواقع، والمشاركة في إعداد خطط التنمية العمرانية.

**أهداف المشروع**

١. إعادة تقييم وضع المواقع الأثرية.
٢. تحديد المخاطر أو المشاكل التي تواجه المواقع الأثرية.
٣. جرد المواقع الأثرية مع الإفادة من المسوحات السابقة.
٤. بناء قاعدة معلومات محدثة عن المواقع الأثرية.
٥. طرح حلول عاجلة أو بعيدة المدى عن حالة المواقع الأثرية.

**منهجية العمل**

أجرت دائرة الآثار العامة من خلال مديرية آثار اربد مشروع المسح الأثري التقييمي في محافظة اربد خلال الفترة من ١٨/ ٩ إلى ١٨/ ١١/ ٢٠١١م، وشمل خمسة ألوية هي: قصبة اربد، المزار، الطيبة، الوسطية وبني عبيد، بإشراف د. إسماعيل ملحم مدير آثار اربد وعضوية فريق فني من كل من: محمد الخالدي (مدخل بيانات)، إبراهيم حسين الزعبي (مصور)، وعدد من خريجي تخصص الآثار وهم: د. زياد طلافحة، محمد ديباجة، محمد عزام، خالد دلالعة، مراد المشعور، محمد الدويري، احمد الرحيل، والسائقون: رائد فرح ومجدي طعاني ومحمد حماد.

تم استخدام أسلوب المسح الانتقائي للمواقع، وإخضاعها للمسح التقليدي من خلال التجوال فيها ورصد المعالم الأثرية بأنواعها إضافة إلى انتقاء عينات من الكسر الفخارية والصوانية المشغولة لمعاينتها والتعرف إلى الفترات التي مرت على الموقع.

تم توثيق أهم المعالم بالتصوير والرسم الكروكي واخذ الإحداثيات، واستخدم لغاية تدوين المعلومات نموذجا موحدا (بطاقة معلومات). كما تم رصد أهم المشاكل أو المخاطر التي تواجه المواقع الأثرية مثل: الزحف العمراني، التعديات، التجريف، تمدد الكسارات والمحاجر، فتح الطرق والانهيارات وغيرها.

**نتائج المسح الأثري**

**أولاً: لواء المزار الشمالي**

تم مسح حوالي ١٤ موقعا في لواء المزار الشمالي، وهي إما على شكل تلال أو خرب أو بقايا معالم عمرانية اكتسحها العمران الحديث، فيما يلي ملخص لحالة بعض هذه المواقع:

**١. تل رمراما (مرامة)**

يقع هذا التل في بلدة المزار الشمالي على ارتفاع ٨١٦م عن سطح البحر على الإحداثيات:

N 32.47805

E 035.79578

وهو تل واسع تقدر مساحته بحوالي ٤٠ دونما، وأراضيه مملوكة للمواطنين، وقد زرعت أجزاء منه بالأشجار المثمرة. ينتشر على سطحه

حولية دائرة الآثار العامة ٥٦ (٢٠١٢)

كسر فخارية من عصور مختلفة منها: البرونزي، الحديدي، الروماني، البيزنطي، الأموي، المملوكي والعثماني، كما توجد أساسات جدران ودعامات حجرية كلسيه للأعمدة، وعمود كلسي بطول ٢م ملقى على الأرض، إضافة إلى وجود أجزاء لعدد من الجواريش البازلتية.

من ابرز الإشكاليات التي تواجه هذا التل حاليا الزحف العمراني الحديث على سفوحه والتعديات من قبل لصوص الآثار **(الشكل ١)**.

**٢. خربة صمد (قرية صمد التراثية)**

تقع خربة صمد في القرية التراثية وهي مجموعة مباني سكنية مهجورة معظمها مهدم نتيجة الإهمال، هجرت في ستينات القرن الماضي، وهي تمثل الحقبة العثمانية الأخيرة، ويتواجد في موقع هذه القرية العديد من الكهوف وآبار المياه والقطع الحجرية المشغولة المعاد استخدام بعضها في المباني التراثية مثل: ركائز قاعدة الباب وحجارة البناء وحجارة الحنت (الاسكفة).

شوهد في الخربة بقايا رقعة فسيفساء بيضاء اللون وكسر فخارية من العصور: الروماني، البيزنطي، الأموي، المملوكي والعثماني.

يرتفع الموقع عن سطح البحر حوالي ٩١٠م، ويقع على الإحداثيات:

N 32.45970

E 035.83095

من ابرز المباني التراثية المميزة في هذه الخربة منزل يعود للمدعو (سليمان العبدو النمري) كان عضوا في البرلمان العثماني، وعمل سقف المبنى بشكل نصف برميلي، واستخدم فيه الحجارة الصغيرة (الريش). الإشكاليات التي تواجه الموقع هي الإهمال للمباني التراثية وحدوث انهيارات جزئية سنوية فيها، مما يعني ضياع نماذج مهمة من التراث العمراني الذي أعاد استخدام المرافق الأثرية من آبار وكهوف وحجارة بناء، مما يستدعي توثيقها وترميم نماذج منها.

أهم المكتشفات أثناء المسح هي العثور على حجر بناء عليه نقش من أربعة حروف يونانية، ركب في زاوية احد المباني التراثية، ويقرا السطر الأول من النقش اسم شخص (ثيوس) **(الشكل ٢)**.

إحداثيات موقع هذا النقش:

N 32.45938

E O35.83120

ملكية الأراضي في القرية التراثية للمواطنين.

**٣. البركة الرومانية / صمد**

تقع البركة الرومانية جنوب قرية صمد التراثية على ارتفاع ٦٨٠م عن سطح البحر على الإحداثيات:

N 32.45739

E 035. 83027

وهي الآن عبارة عن بركة مضلعة الشكل مساحتها حوالي ٣٠٠ متر مربع، أعيد بناؤها بالاسمنت، وعمل لها اقنية لتجميع مياه المطر ولسقي المواشي، وقد كانت سابقا مبنية من الحجر المشذب - حسب ما أفاد سكان القرية.

ملكية قطعة الأرض المقامة فيها البركة تعود لخزينة المملكة / دائرة الآثار العامة، وتقدر مساحتها بحوالي ٥ دونمات.

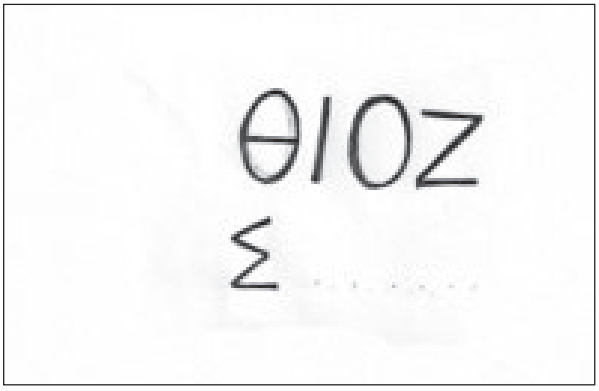
الإشكاليات التي تواجه الموقع هي طمس المعالم الأثرية القديمة واستبدالها بالاسمنت، مما يستدعي دراسة إمكانية إعادة هيئتها القديمة وترميمها **(الشكل ٣)**.

**٤. تل العبد (تل زنبوط)**

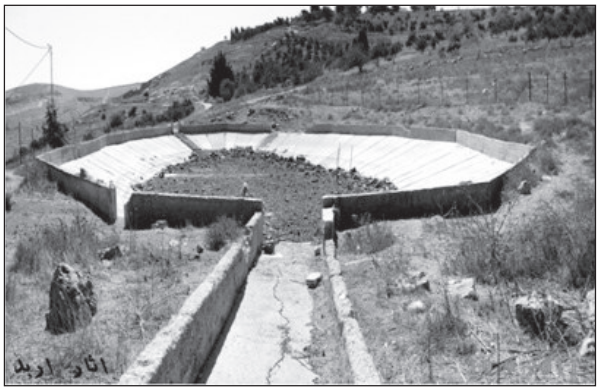
يقع هذا التل شرق بلدة صمد وجنوب شرق بلدة الزعترة على الطريق الرئيسي المعبد بين اربد وعجلون، ويرتفع عن سطح البحر ٩٥٧م، ويقع على الإحداثيات:

N 32.44077

١. صورة جوية، تل رمراما.



٢. نقش يوناني، قرية صمد التراثية.



٣. البركة الرومانية المعاد استخدامها / صمد.

E 035.84764

تقدر مساحة هذا التل بحوالي ٧ دونمات، ويوجد عليه تراكم معماري لأساسات جدران، إضافة إلى انتشار كسر فخارية من عصور مختلفة منها: العصر الحجري النحاسي، العصر البرونزي المبكر، العصر البرونزي المتوسط، العصر الحديدي، العصر الهلينستي، العصر الروماني، العصر البيزنطي، إضافة إلى كسر صوانيه مشغولة.

يواجه هذا التل إشكاليات ومخاطر منها، تمدد عمل الكسارات في المنطقة المجاورة له بشكل واسع ووجود تعديات للصوص الآثار **(الشكل ٤)**.

### ٥.خربة داريا

تقع هذه الخربة جنوب شرق بلدة الزعترة وشرقي الشارع الرئيسي المعبد الواصل بين اربد وعجلون، وينتشر في هذه الخربة العديد من الكهوف والمدافن المنحوتة في الصخر الطبيعي، إضافة إلى كنيسة مكتشفة سنة ١٩٩٥م من قبل دائرة الآثار العامة، وتحتفظ هذه الكنيسة بأجزاء من جدرانها إضافة إلى العثور على أرضيتها الفسيفسائية الملونة التي شملت إشكال هندسية ونباتية، وتؤرخ لحوالي القرن السادس الميلادي.

من ابرز الإشكاليات التي تواجه هذه الخربة وموقع الكنيسة هي الإهمال للكنيسة المكتشفة وانهيار أجزاء من جدرانها، وتعرض الموقع لتعديات لصوص الآثار، إضافة إلى توسع أعمال الكسارات الموجودة في المنطقة **(الشكل ٥)**.

٤. تل العبد/ صمد.

٥. خربة داريا/ الكنيسة.

يرتفع الموقع عن سطح البحر حوالي ٩٠٤م، ويقع على الإحداثيات:

N 32.44255

E035.85732

### ٦.خربة سراس

تقع خربة سراس شرق بلدة المزار بحوالي ٧كم، وترتفع عن سطح البحر حوالي ٩٥٣م، وتقع على الاحداثيات:

N 32.44116

E 35.81301

تقدر مساحة الخربة بحوالي ٣٠-٤٠ دونم، وهي مملوكة في أجزاء منها للمواطنين وأجزاء أخرى لخزينة الدولة/ أحراج، حيث يتواجد بها أشجار بلوط معمرة، إضافة إلى أشجار مثمرة. وشوهد في هذه الخربة وجود أساسات جدران بارزة عن سطح الأرض وكهوف وآبار مياه ومدافن منحوتة في الصخر احدها زين مدخله برسوم نافرة للبؤتين بينهما إكليل، كما شوهد نقش حجري عليه أحرف يونانية تحمل اسم شخص يدعى (انالوس ابن تموس) **(الشكلان ٦، ٧)**. ويمثل على الأغلب شاهد قبر من الحجر الكلسي.

تنتشر على سطح تربة هذه الخربة كسر فخارية من العصور: الروماني، البيزنطي، الأموي والمملوكي. وتمثل الكسر الفخارية المملوكية أكثرها كثافة، مما يشير إلى احتمال أنها كانت إحدى القرى المملوكية المزدهرة.

إن أهم الإشكاليات التي تواجه هذه الخربة هي الزحف العمراني وشق الطرق الجديدة وتعديات لصوص الآثار.

٦. نقش حجري، خربة سراس.

٧. نحت نافر على مدخل مدفن سراس.

**٧.خربة مسكايا**

تقع هذه الخربة شرق بلدة المزار بحوالي ٤كم جنوب وادي الجرون بحوالي ٢كم، وهي عبارة عن هضبة تشرف على عدة جبال وأودية حولها.

من المظاهر الأثرية في هذه الخربة أساسات جدران تعود على الأغلب للعصر المملوكي وبداية العصر العثماني، وينتشر على السطح كسر فخارية من هذين العصرين، كما لوحظ وجود آبار مياه عدد ٢.

استخدم في بناء أساسات الجدران حجارة كلسيّة قاسية اغلبها غير مشذب وذو تقنية بسيطة، كما توجد آثار تخريب قام بها لصوص الآثار في الخربة، ويحيط بالموقع الأثري أراضي مزروعة بالأشجار المثمرة.

إحداثيات هذا الموقع:

N 32.47235

E 035.82051

ويبلغ ارتفاعه عن سطح البحر حوالي ٧٣٠م.

**٨.خربة النقيع**

تقع هذه الخربة شمال بلدة عنبة بحوالي ٥كم، وترتفع عن سطح البحر حوالي ٧٠٣م، وتقع على الإحداثيات:

N 32.49466

E 035.76596

يتواجد في الخربة تراكمات لحجارة مشغولة، مما يشير إلى وجود جدران مهدمة، ولوحظ وجود أساسات جدران، كما شوهدت عدة ابار مياه، ومعصرة عنب منحوتة في الصخر.

ينتشر على السطح كسر فخارية من العصر الروماني والعصر المملوكي، وتمثل الحقبة الأخيرة فترة الاستيطان الرئيسية في الموقع.

يواجه الموقع خطر الإزالة نتيجة التمدد العمراني والتوسع في الاستصلاح الزراعي وقيام مواطنين بنقل حجارة الخربة لإعادة استخدامها في الجدران الاستنادية الحديثة.

**٩.خربة جبتون**

تقع هذه الخربة شمال غرب بلدة عنبة بحوالي ١كم، وترتفع عن سطح البحر حوالي ٥٩٢م، وتقع على الإحداثيات:

N 32.48712

E 035.74321

يوجد في الخربة أساسات جدران وبئر ماء وخزان ارضي منحوت في الصخر الطبيعي، كما شوهد عدة كهوف، ومحاولات تخريب من قبل لصوص الآثار. وينتشر على السطح كسر فخارية من العصرين الروماني والبيزنطي، بالإضافة إلى العصرين البرونزي المبكر والبرونزي المتوسط.

**١٠.خربة عياتا/دير يوسف**

تقع هذه الخربة في بلدة دير يوسف في الجهة الغربية الشمالية وبين بيوت المواطنين، وقد تم العثور في هذه الخربة على اثر تجريف قام به احد المواطنين في ساحة منزله دمرت أساسات الجدران، يتضح طول احدها حوالي ٩م، ويتضح في المقطع الترابي كسر فخار من العصر الحجري النحاسي والعصر البرونزي المبكر، إضافة إلى كسر صوانيه مشغولة. كما لوحظ في الجزء المجرف أرضية صخرية طبيعية مستوية فيها مجموعة من الحفر الصغيرة المستديرة، وقناة تصريف مياه مما يشير إلى كون هذه الأرضية كانت على الأغلب لمطبخ منزلي.

كما يتواجد في هذه الخربة وبين بيوت المواطنين عدد من الكهوف والآبار.

تقع هذه الخربة على الإحداثيات:

N 32.49140

E 035.79065

ويرتفع الموقع عن سطح البحر حوالي ٧٢٩م **(الشكل ٨)**.

**١١.تل جحفية**

يقع تل جحفية شمال بلدة جحفية، وتبلغ مساحته حوالي ٤ دونم، ويرتفع عن مستوى الشارع المعبد بجانبه حوالي ٨م. أما الموقع فيرتفع عن سطح البحر حوالي ٧٩٢م، ويقع على الإحداثيات:

N 32.49319

E 035.82084

أجريت في الموقع تنقيبات أثرية خلال السنوات ٢٠٠٢م-٢٠٠٧م من قبل بعثة مشتركة أردنية ألمانية. أرخت المعالم الرئيسية في التل للعصر البرونزي المتأخر والعصر الحديدي الأول والثاني، وتتمثل المظاهر المعمارية المكتشفة بحجرات متعددة وأساسات جدران ومصاطب حلقية حول التل استخدمت فيها الحجارة الصوانية بشكل رئيسي. من ضمن المكتشفات أساسات تؤرخ للعصر الأموي.

ابرز الإشكاليات التي تواجه الموقع هو انهيار العديد من الجدران نتيجة الإهمال وعدم الصيانة. أما ملكية الموقع فتعود لخزينة المملكة، دائرة الآثار العامة.

من ناحية اخرى يوجد رجم مستدير من حجارة الصوان بقطر حوالي ١٣م، ويقع هذا الرجم على بعد حوالي نصف كيلو متر **(الشكل ٩)**.

**١٢.خربة قابلة**

تقع خربة قابلة جنوب غرب بلدة زوبيا بحوالي ١كم، وهي خربة أثرية واسعة وتقع على ارتفاع ٨٢٥م عن سطح البحر، وعلى الإحداثيات:

N 32.426080


٨. مقطع في تل عياتا/ دير يوسف.

E 035.76436

يتواجد في الخربة العديد من المظاهر الأثرية والتي تمثل بمجموعها قرية متكاملة من العصرين الروماني والبيزنطي، حيث يتواجد تجمع سكني في الجهة الشمالية من الخربة مؤلف من العديد من أساسات الجدران التي استخدم فيها الحجر الكلسي المشذب، كما توجد فيها مقبرة واسعة تتضمن أكثر من ثلاثين مدفن جماعي، كل مدفن يضم عدد من القبور الفردية، عبث بها لصوص الآثار عبر السنوات الماضية، وهنالك بركتي ماء ضخمتين لكل منهما درج جانبي، أحداهما بقياس ١٧م × ١٩م، بعمق ٤م والأخرى ٢٢م × ١٥م، بعمق ٤م، ويبدو أنهما أصلا استخدمتا مقلعا للحجارة المشذبة.

كما تتضمن الخربة عدة كهوف وعدة آبار مياه، وشوهدت أربعة حجارة مشذبة في الوادي الذي يتوسط الخربة، ربما كانت شواهد قبور وعليها نقوش لأحرف يونانية.

من ابرز الإشكاليات التي تواجه هذه الخربة تعرضها للتعديات بشكل شبه يومي من قبل لصوص الآثار، مما يهدد معالمها بالدمار وخاصة التجمع السكني.

من ناحية أخرى تتوزع في إنحاء هذه الخربة العديد من أشجار البلوط مما يكسب الموقع جمالا طبيعيا. كما أن أجزاء منها مملوكة للمواطنين **(الشكل ١٠)**.

### ١٣.بركة رحابا

تقع هذه البركة في الجهة الجنوبية الشرقية من بلدة رحابا، وتبلغ أطوالها ١٤م × ١٥م، بعمق ١١م، وربما كانت أساسا كمقلع للحجارة

٩. تل جحفية.

١٠. مدفن في خربة قابلة.

واستخدمت لاحقا كبركة لتجميع مياه المطر، وهنالك اعتداء من قبل احد المواطنين ببناء منزله على حافة البركة، وهي من أراضي الخزينة.

تقع البركة على ارتفاع ٩٢٣م عن سطح البحر، وعلى الإحداثيات:

N 32.42046

E 035.79251

### ١٤.خربة حوفا المزار

تقع هذه الخربة غرب بلدة حوفا المزار، وهي عبارة عن هضبة ترابية، يتواجد فيها أساسات جدران وتراكم حجارة ساقطة معاد استخدامها عبر أكثر من عصر، وينتشر في الموقع الكسر الفخارية من العصور: المملوكي والعثماني، إضافة إلى نسبة اقل من العصرين الروماني والبيزنطي.

تقع هذه الخربة على ارتفاع ٧٣٩م عن سطح البحر، وعلى الإحداثيات:

N 32.49100

E 035.835070

### ثانيا: لواء الطيبة

تم مسح ١١ موقعا في لواء الطيبة متوزعة على أكثر من قرية من قرى اللواء، فيمايلي ملخص لأهم نتائج المسح بها:

### ١.خربة أبسر

تقع هذه الخربة بجوار بلدة أبسر أبو علي، وتقارب مساحتها حوالي ٢٠ دونما، وهي مملوكة جميعا للمواطنين. وتقع على ارتفاع ٣٧٠م عن سطح البحر وعلى الإحداثيات:

N 32.56140

E 035.72203

وتعتبر هذه الخربة الغنية بالمعالم الأثرية كالكهوف وآبار المياه وأساسات الجدران والمقابر، كما تنتشر على سطحها الكسر الفخارية من عصور مختلفة مثل: البرونزي المبكر، الروماني، البيزنطي، الأموي، الأيوبي والعثماني، كما شوهدت شظايا صوانيه مشغولة.

من المعالم المميزة في الخربة معصرة زيتون داخل كهف يصل طوله حوالي ١٢م، وفيه عدة حجرات وصهريج ماء مقصور، يغلب أنها تعود للعصر البيزنطي، وقد تعرض حوض درس الزيتون للتكسير من قبل لصوص الآثار.

كما شوهد أساس جدار يتضمن محراب مسجد، يغلب انه يعود للعصرين المملوكي والعثماني.

من الإشكاليات التي تواجه هذه الخربة تعديات لصوص الاثار عليها بين فترة وأخرى.

### ٢.خربة دير السعنة

تقع هذه الخربة شرق المقبرة الإسلامية للبلدة (بلدة دير السعنة) وتبلغ مساحتها حوالي ٣٠ دونما جميعها مملوكة للمواطنين.

تقع الخربة على ارتفاع ٤٨٧م عن سطح البحر وعلى الإحداثيات:

حولية دائرة الآثار العامة ٥٦ (٢٠١٢)

N 32.53375

E 035.75286

يتواجد في الخربة بقايا كنيسة بيزنطية لم ينقب بها لغاية ألان، وإنما قامت دائرة الآثار العامة بخلع جزء من الأرضيات الفسيفسائية ونقله للمتحف. شوهد في الخربة أساسات جدران وكهوف وآبار مياه، كما ينتشر على السطح كسر فخارية غالبيتها من العصرين البيزنطي والأموي، أضف إلى مكعبات الفسيفساء المتناثرة. وتعود جزء من ملكية أراضي الخربة إلى دائرة الآثار العامة.

إلى الجنوب من هذه الخربة توجد بركة مياه طمست معالمها جراء إقامة بناء حديث لأحد المؤسسات الحكومية.

### ٣. خربة برسينيا/ دير السعنة

تقع هذه الخربة على بعد حوالي ٣كم شرق بلدة دير السعنة، وتبلغ مساحتها حوالي ١٠.١٥ دونم، وقد أجرت جامعة اليرموك تنقيبات محدودة في الموقع أظهرت جدران وأرضيات مبلطة. يحيط بالخربة عدد من الأودية مثل: وادي كفرعان غرباً ووادي جمحة شمالاً. ويوجد في الخربة عدد من الكهوف والمدافن وآبار المياه المنحوتة في الصخر. وتؤرخ معظم المعالم الظاهرة للعصرين الروماني والبيزنطي. كما تنتشر في الموقع كسر فخار من العصور: البرونزي، الروماني، البيزنطي والمملوكي.

تقع الخربة على ارتفاع ٥٠٤م عن سطح البحر **(الشكل ١١)**، وعلى الإحداثيات:

N 32.53878

E 035. 76707

### ٤. تل الرومي (خربة الدحلة)

تقع خربة تل الرومي أو كما يطلق عليها السكان خربة الدحلة غرب بلدة الطيبة، ويتواجد بها عدد من الرجوم الحجرية يبرز منها ثلاثة استخدمت فيها الحجارة الصوانية، ويصل قطرها على التوالي: ١٠م، ١٣م، ١٤م، وكذلك أكثر من عشرين قبر دولمن جميعها مهدمة.

ينتشر على السطح كسر فخار من عصور مختلفة مثل: الحديدي، الروماني والبيزنطي. تعود ملكية أراضي الخربة للمواطنين.

تقع الخربة على ارتفاع ٣٦٥م عن سطح البحر **(الشكل ١٢)**، وعلى

١١. خربة برسينيا.

الإحداثيات:

N 32.55060

E 035.70345

### ٥. خربة صما (المقبرة)

تقع هذه الخربة في الجهة الجنوبية من بلدة صما، وهي مزروعة في غالبيتها بأشجار الزيتون، إضافة إلى وجود أشجار حرجية من البلوط.

يتواجد في الخربة مقالع حجر وكهوف ومعاصر عنب منحوتة في الصخر الطبيعي، كذلك توجد عدة قبور جماعية منحوتة في الصخر على غرار القبور الرومانية، وينتشر على السطح كسر فخارية من عصور مختلفة مثل: البرونزي، الحديدي، الروماني، البيزنطي والمملوكي. وقد وجدت أثناء المسح في الخربة تعليقه زجاجية صغيرة على شكل مزهرية بطول ٢سم ملقاة على التربة السطحية قرب مدفن عائلي، مما يشير إلى احتمال أنها احدى معثورات هذا المدفن الذي عبث به لصوص الآثار قبل سنوات طويلة.

يقع هذا المدفن على الإحداثيات:

N 32.56083

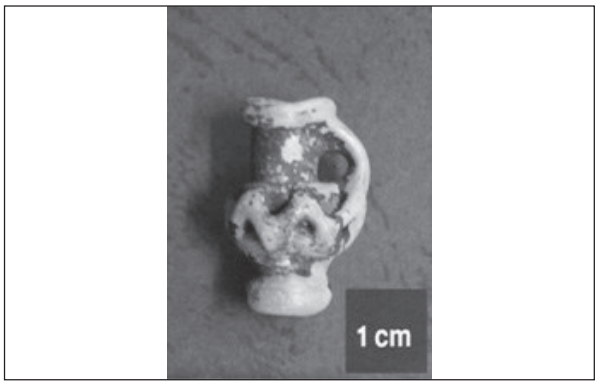
E 035.68576

إن أهم الإشكاليات التي تواجه هذا الموقع هو عبث لصوص الآثار بالموقع.

تقع الخربة على ارتفاع ٣١٢م عن سطح البحر **(الشكلان ١٣، ١٤)**،

١٢. خربة تل الرومي (خربة الدحلة)/ الطيبة.

١٣. مدفن في خربة المقبرة/ صما.




١٤. تعليقة زجاجية صغيرة/ صما.

وعلى الإحداثيات:
N 32.56083
E 035.68576

**٦. تل أبو الحصين/ مندح**

يقع هذا التل غرب بلدة مندح بحوالي ٤كم، ويرتفع عن سطح البحر حوالي ٢٧٥م، ويقع على الإحداثيات:
N 32.56188
E 035.66478

يحتل التل موقعاً استراتيجياً بإحاطته بعدد من الأودية. يتواجد في هذا التل أساسات جدران وآبار مياه منحوتة في الصخر ومقالع حجر. ينتشر على السطح كسر فخارية من عصور مختلفة مثل: العصر الحجري النحاسي، العصر البرونزي المبكر، العصر البرونزي المتوسط، العصر الحديدي والعصر المملوكي، كما شوهدت أجزاء جواريش بازلتية وعدد من الكهوف **(الشكل ١٥)**.

**٨. خربة أبو البلوط**

تقع خربة أبو البلوط جنوب بلدة الطيبة بحوالي ١,٥كم، وتقوم على هضبة صخرية، يحدها من الشمال والغرب وادي أبو الزعرور، وتقع جنوبها بلدة جنين الصفا على بعد حوالي ٢كم ويفصلهما وادي سحم. تقع هذه الخربة على ارتفاع ٣٦٨م، وعلى الإحداثيات:
N 32.53341
E 035.71843

يتواجد في هذه الخربة عدة كهوف وآبار مياه ومقالع حجر وخزانات ماء منحوتة في الصخر. كما تنتشر الكسر الفخارية على السطح والتي تعود لعصور مختلفة مثل: الحديدي، الروماني والبيزنطي. يجدر التنويه أن أراضي هذه الخربة تعود ملكيتها للمواطنين. من الإشكاليات التي تواجه هذه الخربة تعرض الموقع لتعديات من قبل لصوص الآثار لكنها محدودة.

**ثالثا: لواء الوسطية**

تم مسح احد عشر موقعاً في لواء الوسطية تتوزع في اكثر من منطقة في اللواء، فيمايلي ملخص لنتائج المسح:

١٥. تل أبو الحصين/ مندح.

**١. تل زرعه/ وادي العرب**

يقع تل زرعه في وادي العرب وهو احد الأودية الرئيسية في محافظة اربد، ويجاور التل سد وادي العرب الذي تخزن فيه مياه الشتاء والينابيع، كما يبعد التل عن بلدة الشونة الشمالية حوالي ٥كم شرقاً، وينخفض عن سطح البحر حوالي ١٩م، وعلى الإحداثيات:
N 32.61993
E 035.65606

تقدر مساحة التل حوالي ٤١ دونما وهو مملوك في معظمه لخزينة المملكة/ آثار، وتجري فيه أعمال تنقيب منذ عدة سنوات من قبل البعثة الأثرية الألمانية، وتم الكشف فيه عن آثار لأساسات جدران بيوت، ومرافقها، وتحصينات من العصرين البرونزي والحديدي، كما تم الكشف أيضا عن أساسات جدران من العصور: الهلينستي والروماني والبيزنطي والمملوكي، إضافة إلى مرافق معصرة زيتون بيزنطية.

يذكر أن التل كان على قمته نبع ماء متدفق يغذي سكان التل عبر العصور، ويغذي اقنية طاحونة حبوب من العصر العثماني، لكنه جف قبل سنوات.

تحتاج المعالم المكتشفة في هذا التل إلى صيانة وحفظ لما تمثله من تنوع في العصور، ويصلح الموقع كنموذج للسياحة الأثرية، ويحتاج إلى سياج يحيط به **(الشكل ١٦)**.

**٢. خربة زحر الغربية/ كفر أسد**

تقع هذه الخربة غرب بلدة كفر أسد بحوالي ٢,٥ كم، وتقع شمال الشارع المعبد المتجه نحو الغور الشمالي في مسار الطريق القديم، وهي عبارة عن هضبة ترابية صخرية ينتشر على سطحها بكثافة كسر فخارية من العصور: المملوكي (كثيف جدا)، الروماني والبيزنطي. تعود ملكية أراضيها للمواطنين.

ويلاحظ بوضوح كسر الفخار المملوكي وخاصة المزجج والملون والمحزز بالحزوز العريضة، كما تتواجد في الخربة مقاطع صخرية وقبور وكهوف وأساسات بناء، كما شوهدت مكعبات فسيفساء متناثرة بحجوم مختلفة.

كما يلاحظ في الخربة عدة ابار مياه وعدة معاصر عنب منحوتة في الصخر الطبيعي، وتتكون من أحواض هرس وتجميع كحوض الهرس الذي تبلغ أبعاده (٣٥٠سم × ٣٣٠سم) ويرتبط بحوض تجميع بقطر ١٣٠سم. أما معصرة العنب فتقع على الإحداثيات:


١٦. منظر لأساسات جدران، تل زرعة.

N 32.59541

E O35.69680

وتقع خربة زحر الغربية على ارتفاع ٣٣٩سم عن سطح البحر، وعلى الإحداثيات:

N 32.59373

E 035.69515

من الإشكاليات التي تواجه هذه الخربة تعرضها لتعديات لصوص الآثار المتكرر والزحف العمراني الحديث (**الشكل ١٧**).

### ٣.خربة صيدور الشرقية

تقع هذه الخربة في الجهة الشرقية من بلدة صيدور، وهي عبارة عن هضبة صخرية ترابية، وترتفع عن سطح البحر ٣٤٣م، وعلى الإحداثيات:

N 32.61271

E 035.69942

ينتشر على السطح كسر فخارية من عصور مختلفة مثل: الحجري النحاسي، البرونزي، الحديدي، الروماني، البيزنطي، الأموي والمملوكي. يلاحظ ان الخربة يتوسطها هضبة ترابية مميزة ما زالت بكرا ولم يعبث بها. من ابرز معالم هذه الخربة تشكيل صخري منحوت في الصخر الطبيعي أطواله ٢٨٠سم × ٣٠٠سم، بعمق حوالي ٣م، نحتت في ثلاث واجهات منه كوات جدارية على نمط بيوت الحمام ويقع على الإحداثيات:

١٧. منظر لإحدى معاصر العنب، خربة زحر الغربية.

١٨. خربة الخلة/ صيدور.

N 32.61245

E 035.69868

كما يوجد في الخربة عدد من الكهوف المنحوتة في الصخر الطبيعي (**الشكل ١٨**).

### ٤.تل القاق

يقع تل القاق جنوب تل زرعة الأثري على بعد ٣,٥ كم جنوبا، ويتبع اراضي بلدة صيدور ويرتفع عن سطح البحر حوالي ٨٨م، ويقع على الإحداثيات:

N 32.60315

E 035.66466

ينتشر على سطحه كسر فخارية من عصور مختلفة منها: الحجري النحاسي، البرونزي، الحديدي، الهلينستي والروماني. يوجد في التل عدد من الكهوف الصغيرة وأساس جدار تكشف من قبل لصوص الآثار. يعتقد ان هذا التل مازال بكرا ولم يعبث به. تقدر مساحة التل بحوالي ١٥ دونما، وأراضيه مملوكة للمواطنين (**الشكل ١٩**).

### ٥.خربة عراق الراهب

تقع هذه الخربة في مجرى وادي زحر جنوب غرب تل القاق بحوالي ١كم، ويوجد في الخربة حنايا منحوتة في الصخر الطبيعي عدد ٢، واقعة في السفح الشمالي للوادي، كما توجد حنية ثالثة غير

مكتملة النحت. تبلغ الأبعاد التقريبية للحنية الوسطى حوالي ٣٥٠سم عرض × ٢٣٥سم عمق وإرتفاع ٢٠٠سم، ويوجد داخلها كهف يحوي ستة قبور متوزعة في الداخل على ثلاث واجهات، قصرت جدران هذه الحنية بالجص. وربما كانت هذه الحنايا بمثابة صومعة لأحد الرهبان، واكتسبت اسمها من الوظيفة التي كانت تؤديها **(الشكل ٢٠)**. تقع هذه الخربة على ارتفاع ٢٥م عن سطح البحر، وعلى الإحداثيات:

N 32.60097

E 035. 66412

**٦.تل عسرين / كفر عان**

يقع هذا التل في الجهة الجنوبية الغربية من بلدة كفرعان، وعلى ارتفاع ٤٨٠م عن سطح البحر، وعلى الإحداثيات:

N 32.55083

E O35.74814

وينتشر على سطح التل كسر فخارية من عدة عصور مثل: الحجري النحاسي، البرونزي المبكر والبرونزي المتوسط، البرونزي الحديث والحديدي. كما توجد أساسات جدران. تضم الخربة عدة كهوف وآبار مياه وأحواض منحوتة في الصخر. كما شوهد حوضين بيضويين في الجهة الغربية من التل منحوتين في الصخر الطبيعي، يحتمل أنهما كانا يؤديان وظيفة عصر العنب في العصر الحديدي. تعود ملكية قطع الأراضي في الخربة للمواطنين. أهم الإشكاليات التي يتعرض لها هذا التل هو التعديات من قبل لصوص الآثار **(الشكل ٢١)**.

١٩. تل قاق / صيدور.

٢٠. موقع الدير في خربة عراق الراهب.

**٧.خربة تل أم زريق / وادي العرب**

هذه الخربة عبارة عن تل ترابي ضخم يقع في مجرى وادي العرب إلى الشمال الشرقي من تل زرعه على بعد ٢,٥كم، ويرتفع الموقع عن سطح البحر حوالي ٢٢م، ويقع على الإحداثيات:

N 32.62534

E 035.67141

ينتشر على سطح التل كسر فخارية من عصور مختلفة مثل: الروماني، البيزنطي، الأموي والمملوكي، ويتواجد في التل عدد من الكهوف، كما شوهد على قمته أساسات جدران لحجرة مستطيلة بقياس حوالي ٣٠٠سم × ٦٥٠سم، ويتواجد في الجهة الشمالية الغربية من تل أم زريق ثلاثة كهوف بشكل ملاجئ نحتت في الصخور الاحفورية حيث أن تركيبة الصخر من المستحثات **(الشكل ٢٢)**، وتقع هذه الملاجئ على الإحداثيات:

N 32. 62796

E 035.66782

**٨.كنيسة حوفا**

تقع هذه الكنيسة في بلدة حوفا الوسطية، والتي تبعد عن اربد حوالي ١٨كم، وقد كشف فيها في سنة ١٩٩٢م عن كنيسة بيزنطية تؤرخ للقرن السادس الميلادي، وقد رصفت أرضياتها بالفسيفساء الملونة بالأشكال الهندسية والنباتية، كما عثر فيها على نقشين باللغة اليونانية. يوجد بالقرب من الكنيسة معالم معصرة عنب ومدفن. أما أطوال الكنيسة فهي (١٥م × ٢٧،٥م).

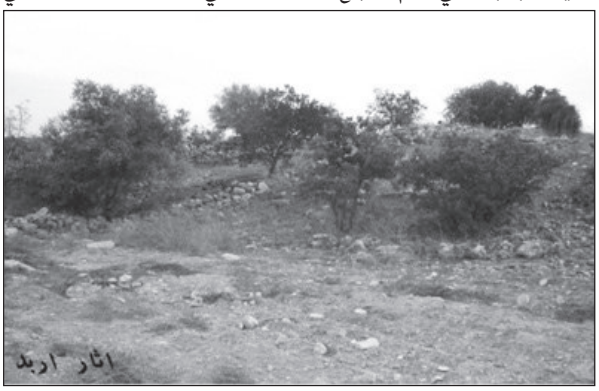
إن قطعة الأرض الواقعة فيها الكنيسة مملوكة لخزينة الدولة / آثار، وهي محمية بسياج ويتم الاشراف عليها ومتابعتها من قبل حراس الموقع **(الشكل ٢٣)**.

**رابعا: لواء بني عبيد**

تم مسح احد عشر موقعا في لواء بني عبيد تتوزع في أنحاء متفرقة من اللواء، فيما يلي عرض لنتائج هذا المسح.

**١.تل الحصن**

عبارة عن تل اثري ضخم يقع شمال بلدة الحصن مباشرة وجنوب مدينة اربد بحوالي ٥كم، وتبلغ مساحته حوالي ١٠٠ دونما منها حوالي




٢١. تل عسرين / كفر عان.

٢٢. تل أم زريق/ وادي العرب.

٨٢ دونم مملوكة لدائرة الآثار العامة.

ويقع هذا التل على ارتفاع ٦٧١م عن سطح البحر، وعلى الإحداثيات:

N 32.49100

E 035.87999

يتواجد في التل مخلفات أثرية من عصور مختلفة ابتداء من العصر البرونزي المبكر على الأقل وحتى العصر العثماني، وتنتشر على سطحه كسر فخارية من عصور مختلفة، إضافة إلى أساسات جدران. وقد أجرت جامعة اليرموك حفريات أثرية في التل في العامين ٢٠٠٨م و٢٠٠٩م كشفت عن أساسات جدران أموية في معظمها وأساسات بيزنطية.

وقد توزعت حفريات الجامعة على أكثر من مكان مما شكل تشويها للموقع. من ناحية أخرى شوهد دمار للجدران وانهيارات في المربعات المفتوحة نتيجة إهمال الموقع وعدم الصيانة.

كما يواجه الموقع إشكاليات متمثلة في تعديات لصوص للآثار، وكذلك تمدد المقبرة الإسلامية الحديثة باتجاه الأراضي المملوكة لدائرة الآثار العامة وبمساحة كبيرة تصل عدة دونمات مما يشكل تهديدا للآثار وطمس لمعالمه، إذ يحتاج هذا الأمر إلى معالجة سريعة من قبل المعنيين **(الشكل ٢٤)**.

### ٢.تل يعمون/ النعيمـــــــة

يقع تل يعمون الأثري جنوب بلدة النعيمة بحوالي ٣كم، وهو تل واسع وكبير، فيه مخلفات من عصور مختلفة مثل: البرونزي،الحديدي، الروماني، البيزنطي والأموي.

٢٣. جزء من فسيفساء كنيسة حوفا الوسطية.

وقد أجرت فيه جامعة اليرموك وجامعة اركنسون الأمريكية حفريات أثرية كشف من خلالها عن كنيسة بيزنطية ذات أرضيات فسيفسائية، ما زالت محفوظة في الموقع، ويتواجد في التل أساسات جدران وكهوف وآبار ومدافن من عدة عصور. أما ملكية الموقع فهي ما زالت للمواطنين.

يقع التل على ارتفاع ٨١١م عن سطح البحر، وعلى الإحداثيات:

N 32.39627

E 035.91216

من المعالم المميزة في تل يعمون مقبرة جماعية منحوتة داخل كهف كانت تحوي أصلا ٤٤ قبرا جداريا وثلاثة قبور عند المدخل في الخارج تعرضت للتكسير والهدم **(الشكل ٢٥)**. وتقع هذه المقبرة على الإحداثيات:

N 32.39646

E 035.91006

### ٤.خربة مراح أم الغزلان

تقع خربة مراح أم الغزلان جنوب بلدة الحصن على الطريق المؤدية إلى الكسارات، وهي عبارة عن هضبة صخرية طبيعية وتشرف على أراضي واسعة، ويتضح فيها كهوف ومقالع حجر ومعاصر عنب ورجوم حجرية، وتؤرخ معاصر العنب ومقالع الحجر إلى العصر الروماني - على الأغلب، أما الرجم المميز في الجهة الشرقية الجنوبية من الخربة فقد استخدم فيه حجر الصوان وهو بشكل دائري يبلغ قطره حوالي ١٤م إذ يحتمل انه يعود لنهاية العصر البرونزي وبداية العصر الحديدي. يرتفع الموقع عن سطح البحر حوالي ٨١٩م، ويقع على الإحداثيات:

N 32.45678

E 035.89177

### ٥.خربة حديجة/ الحصن

تقع هذه الخربة جنوب شرق بلدة الحصن بحوالي ٢كم، ويتواجد بها مجموعة من الكهوف التي استغلت بعضها سابقا من قبل الجيش، كما يتواجد بها خزان ماء ضخم منحوت في الصخر الطبيعي وينزل له بدرج، ويوجد في سقفه فوهة لإدخال المياه، مساحة الخزان حوالي ١٣م × ١٣م، كما تتواجد العديد من الكهوف في الجهة الشمالية والغربية من الخربة، وشوهد أساسات بيوت سكنية شمال خزان المياه. تقع هذه

٢٤. تل الحصن/ الحصن.

٢٥. جزء من جدران الكنيسة / خربة يعمون.

٢٦. منظر عام في خربة حديجا.

الخربة على ارتفاع ٧٦٨م عن سطح البحر، وعلى الإحداثيات:
N 32.45679
E 035.87510

من الإشكاليات التي تواجه هذه الخربة تعديات محدودة من قبل لصوص الآثار **(الشكل ٢٦)**.

### ٧.خربة الجدة / الحصن

تقع هذه الخربة على هضبة صخرية مجاورة لكلية الحصن الجامعية من الجهة الشمالية، وترتفع عن سطح البحر حوالي ٦٧٧م، وعلى الإحداثيات:
N 32.48558
E 035.90014

أجرت دائرة الآثار العامة حفرية أثرية في الموقع سنة ١٩٩٢م كشفت عن كنيسة ذات أرضية فسيفسائية تعود للعصر البيزنطي، اشتملت رسوماتها على أشكال حيوانية وآدمية وهندسية، ورغم تضرر أجزاء منها إلا أنها تعطي صورة واضحة عن مخططها البازليكي، وقد قامت دائرة الآثار العامة بنقل اللوحات الفسيفسائية إلى متحف دار السرايا / اربد، نظرا لتمدد العمران الحديث باتجاه الموقع المكتشف، وتقوم الآن في الحي المساكن الحديثة التي اختفت معها المعالم الأثرية. أما عن اللوحات الفسيفسائية المميزة فمن أهمها منظر قطف العنب بالمنجل.

### خامسا: لواء قصبة اربد

تم مسح حوالي ٤٣ موقعا في لواء قصبة اربد، وهو أغنى ألوية المحافظة بالمواقع الأثرية، وتتوزع هذه المواقع في معظم قرى اللواء، فيما يلي ملخص لحالة هذه المواقع.

### ١.تل اربد

يقع تل اربد في وسط مدينة اربد القديمة، ويرتفع عن سطح البحر حوالي ٦٠١م، ويقع على الإحداثيات:
N 32.55768
E 035.84799

يقوم على التل حاليا العديد من المباني الحديثة، ومنها متحف دار السرايا، وتقدر مساحة التل بحوالي ٢٠٠ دونم. وقد أجرت دائرة الآثار العامة حفرية في وسط ساحة المتحف كشفت عن أساسات جدران من حجر البازلت تعود للعصر البرونزي.

كما أجرت جامعة اليرموك حفريات في الجهة الشمالية من التل عام ١٩٨٦م كشفت عن أساسات مباني سكنية تعود للعصر البرونزي المتوسط، العصر البرونزي الحديث، العصر الحديدي والعصر البيزنطي. كما يتواجد في الجهة الغربية من التل بقايا سور المدينة القديمة الذي يعود إلى العصر البرونزي الحديث على الأقل، وهو مكون من حجارة صوانيه بشكل رئيسي، وبينها حجارة بازلتية وكلسية اصغر حجما، ويتكون السور من تسعة مداميك، ويقع على جانب الشارع المعبد المتجه إلى وسط المدينة، ويلاحظ أن الجزء الشمالي من هذا السور الممتد ١٧م متعرض للانهيارات نتيجة الانجرافات السنوية للتربة، ونظرا لتعرض أطراف التل لعمليات التجريف خلال اقامة المحلات التجارية والحرفية، مما يجعل هذا السور في دائرة الخطر مستقبلا، والحاجة إلى الصيانة. يقع هذا السور على الإحداثيات:
N 32.55862
E 035.84850

كما يقع على ارتفاع حوالي ٥٤١ م عن سطح البحر **(الشكل ٢٧)**.

### ٢.خربة سريس / اربد

تقع هذه الخربة على الجهة الشرقية للشارع المعبد المتجه من مدينة اربد إلى بلدة فوعرا شمالا، وهي من أراضي حي البارحة، وتقع على ارتفاع ٤٨٢م، وعلى الإحداثيات:
N 32.5814
E 035.83275

يوجد في هذه الخربة مدافن وكهوف وأساسات مباني كما عثر على كسر فخارية تعود للعصور الهلينستية، الرومانية، البيزنطية والاموية، وكذلك مكعبات فسيفسائية متناثرة من الحجم الكبير.

يقدر عدد المدافن في الموقع حوالي ٢٥ مدفنا وهي جميعها منحوتة في الصخر الطبيعي ومن نوع المدفن ذو المدخل العمودي المتفرع إلى قبرين مزدوجين، وربما تعود هذه المدافن إلى العصر البيزنطي نظرا لوجود طبقة فسيفساء ملونة. من الإشكاليات التي تواجه الموقع تعرضه للحفريات غير الشرعية والتخريب من قبل لصوص الآثار **(الشكل ٢٨)**.

٢٧. الجزء المتبقي من سور مدينة اربد القديمة في العصر البرونزي.

**٣. تل البطم (خربة عطروز)**

تقع هذه الخربة شمال غرب بلدة بيت رأس بحوالي ١كم، وترتفع عن سطح البحر حوالي ٥١٥م، وتقع على الإحداثيات:

N 32.60366

E 033.83902

أجرت دائرة الآثار العامة حفرية أثرية في الموقع كشفت من خلالها عن كنيسة ذات أرضيات فسيفسائية تعود للعصر البيزنطي، ومخططها العام بازليكي، واستخدم في البناء الحجر الكلسي المشذب، كما استخدم في المداخل الحجر البازلتي المشذب.

إن ملكية الأرض لهذا الموقع ما زالت للمواطنين، ورغم وجود حراس على الموقع إلا انه بحاجة إلى صيانة **(الشكل ٢٩)**.

**٤. خربة سموقة / أم الجدايل**

تقع هذه الخربة في بلدة ام الجدايل يجاورها جنوبا وادي عميق، وترتفع عن سطح البحر حوالي ٤٣٥م، وتقع على الاحداثيات:

N 32.59244

E 035.81453

يوجد في الخربة مجموعة من الكهوف ومقالع الحجر والأحواض ومعاصر للعنب منحوتة في الصخر الطبيعي، ومن المعالم المميزة في الخربة تجمع لعدة كهوف تفتح مداخلها على حيز مساحته ١٨م × ١١م وهي متعرضة للتصدع الانهيارات.

كما تتميز معصرة العنب بأنها مكونة من حوض هرس وأربعة أحواض تصفية متصلة جميعها بمصارف وترتبط بحوض تجميع. من


٢٨. احد المدافن الفردية في خربة سريس.

ناحية أخرى ينتشر في الموقع مجموعة من الكسر الفخارية التي تعود إلى العصرين الروماني والبيزنطي. ويرتفع وسط البلدة القديمة عن سطح البحر حوالي ٤٤٣م، ويقع على الإحداثيات:

N 32.60260

E 032.81820

**٥. تل ابو الحصين / حور**

يقع هذا التل في الجهة الجنوبية الغربية من بلدة حور، ويبعد عن مركز البلدة حوالي ٣كم، وهو عبارة عن تل واسع يطل على مجرى وادي دوقرة وججين، ويرتفع عن سطح البحر حوالي ٣٣٢م، ويقع على الإحداثيات:

N 32. 60360

E 035.75893

يحتوي التل على أساسات بناء وجدران استخدم فيها الحجر الكلسي. ويشاهد على السطح كسر فخارية من عدة عصور مثل: الهلينستي، الحديدي، الروماني والبيزنطي. كما توجد في التل عدة ابار للمياه. من الإشكاليات التي تواجه التل التعديات والحفريات غير الشرعية **(الشكل ٣٠)**.

**٦. تل اجحرة / فوعرا**

يقع تل اجحرة غرب بلدة فوعرا بحوالي ٢كم وهو تل اثري واسع المساحة، يقع على ارتفاع ٣٦٩م عن سطح البحر، وعلى الإحداثيات:

N 32.61602

E 035.74600

ويوجد على التل عدد من الكهوف والمقاطع الصخرية ومعاصر للعنب ومدافن. يشاهد على السطح كسر فخارية تعود لعدة عصور منها: الحديدي، الهلينستي، الروماني، البيزنطي والأموي **(الشكل ٣١)**.

**٧. تل سوم / سوم**

يقع تل سوم الأثري في الجهة الشمالية من بلدة سوم الذي تقدر مساحة بحوالي ٤ دونم، ويوجد على قمة التل مقبرة إسلامية حديثة، إضافة إلى ضريح للصحابي الجليل أبو الدرداء. ينتشر على سطح التل

٢٩. حنية كنيسة تل البطم (عطروز).

كسر فخارية من عصور مختلفة ابتداء من العصر البرونزي القديم مرورا بالعصور: الرومانية، البيزنطية والأموية. شوهدت على التل كسر وشظايا صوانيه مشغولة، وجزء من تاج عمود كورنثي ومكعبات فسيفساء متناثرة. يجاور هذا التل في الجهتين الشمالية والشرقية خربة أثرية تسمى خربة (الخلة).

يرتفع التل عن سطح البحر حوالي ٤٣٠م، ويقع على الإحداثيات:

N 32. 59013

E 035.79370

**٨.خربة الخلة (خربة سوم)**

تقع هذه الخربة في الجهة الشرقية الشمالية من بلدة سوم **(الشكل ٣٢)**، ويوجد بها عدد من الكهوف المنحوتة في الصخر الطبيعي، وقد استخدم بعضها سابقا من قبل الجيش، كما توجد في الخربة عدة مقالع حجر وآبار مياه ومدفن جماعي يضم حجرتي دفن تتوزعان على جانبي باحة متوسطة في صدرها كوة جدارية قوسيه الشكل، كما شوهد خزان ماء منحوت في الصخر قياساته حوالي ٩ م × ١٠ م × ارتفاع ٤ م وله فوهة في السقف. كما توجد العديد من الكهوف المستخدمة كحظائر للأغنام.

تؤرخ المعالم الأثرية في الموقع بشكل رئيسي للعصرين الروماني والبيزنطي مع وجود دلائل للسكن من العصر الأموي. ترتفع خربة الخلة عن سطح البحر حوالي ٣٩٦م، وتقع على الإحداثيات:

N 32.59072

٣٠. منظر عام لتل أبو الحصين، حور.


٣١. منظر عام لتل اجحرا في فوعرا.

E 035.79627

**٩.المدفن الملون بالفريسكو في سوم**

يقع هذا المدفن داخل كهف منحوت في الصخر الطبيعي الجيري في منطقة (كروم المزار) أو ما هو متعارف عليه لدى السكان المحليين باسم (الظاهرة).

يضم هذا المدفن (١٤) قبرا جداريا يتوسطه باحة بقياس ٥٣٠سم × ٦٤٠سم × ارتفاع ٢٥٠سم، ويبدو انه قبر عائلي.

زينت جدران هذا المدفن في باحته الداخلية برسومات ألوان الفريسكو (ألوان مائية) وتمثل أشكال نباتية وحيوانية مثل: أسد، حصان، نمر، كلب وغيرها، وكذلك شكل عمود ذو تاج كورنثي تقريبا، كما يتوسط باحة المدفن حجر مبخرة يرتفع ٩٦سم وقطره ٣٨سم. يتوسط الجهة الجنوبية من المدفن تجويف قوسي.

يوجد على أعلى المدخل الرئيسي المؤدي إلى المدفن نقش يوناني بطول ٢٠٠سم × ٢٦سم.

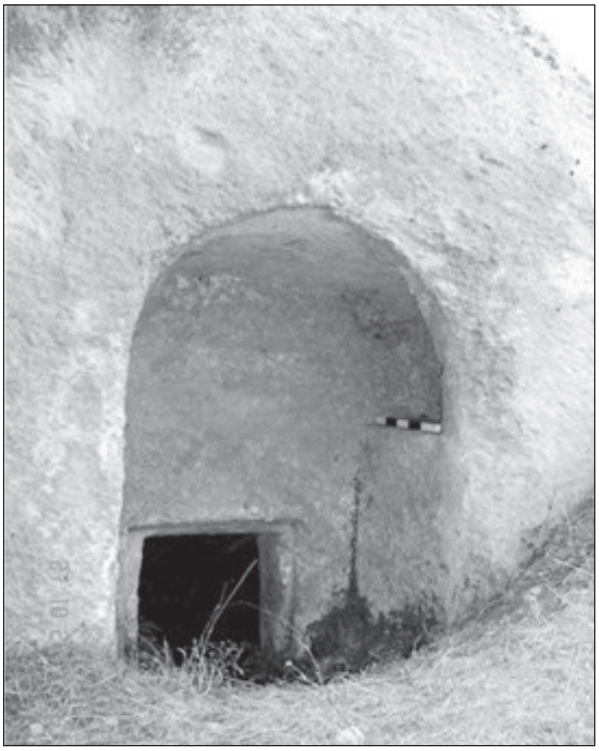
يؤرخ المدفن لحوالي القرنين الثاني أو الثالث الميلاديين. في عام ١٩٧٤م قامت حملة أردنية ألمانية مشتركة بالتنقيب والتنظيف في هذا المدفن ولم يعتن به بعد هذا التاريخ.

يقع هذا المدفن على ارتفاع ٤٠١سم، وعلى الإحداثيات:

N 32.59118

E 035.79014

من أهم الإشكاليات التي تواجه هذا المدفن هي تآكل وتلاشي ألوان الفريسكو بفعل الرطوبة وعدم الصيانة. أما قطعة الأرض الموجود فيها



٣٢. مدخل احد المدافن/ خربة سوم.

حولية دائرة الآثار العامة ٥٦ (٢٠١٢)

المدفن فهي مملوكة لخزينة المملكة / آثار، ومساحتها ١٠٠ متر مربع، أما رقم القطعة ١٣٨ حوض ٣ من كروم المزار **(الشكلان ٣٣، ٣٤)**.

### ١٠.تل المغير / المغير

يقع تل المغير في الجنوب الغربي من بلدة المغير، ويشرف على وادي راحوب الواقع غربه. والتل الأثري صغير الحجم نسبيا وتبلغ إبعاده حوالي ١٥٠م × ١٥٠م.

يقع التل على ارتفاع حوالي ٥١٩م عن سطح البحر، وعلى الإحداثيات:

N 32.60793

E 035.93364

تعود فترات هذا التل إلى العصور: الحجري الحديث، الحجري النحاسي، العصور البرونزية، الحديدي والهلينستي. وجد في التل أساسات جدران ومرافق خزين.

يقع التل بين مساكن المواطنين ويحتاج إلى سياج، حيث ان ملكيته عائدة لخزينة المملكة / آثار. أجريت في الموقع حفريات أثرية مشتركة بين جامعة اليرموك وجامعة توبنجن الألمانية في الموقع في عام ١٩٨٥م، وقد سبق وان قامت دائرة الآثار العامة بحفريات في التل في عامي ١٩٧٤م و١٩٧٥م لم يتم نشر نتائجها **(الشكل ٣٥)**.

### ١١.خربة البياض الغربي / راحوب

٣٣. مدفن سوم وعلى جدرانه بقايا الفريسكو.

٣٤. النقش الكتابي على مدخل مدفن سوم.

تقع هذه الخربة غرب نبع راحوب حوالي ١٥٠ مترا، وعلى ارتفاع ٤٤٥م، وعلى الإحداثيات:

N 32.60867

E 035.93005

تمتد الخربة حوالي ١٠٠ دونم، يحيط بجزء كبير منها جدار، واستخدم في بناءه حجر البازلت الأسود. ينتشر على السطح عدد كبير من كسر الفخار من عصور مختلفة منها: العصر البرونزي المتوسط والعصر الحديدي. وقد تعرض الموقع للتجريف من قبل أشخاص مجهولين مما أدى إلى هدم جزء من السور المحيط بالموقع من الجهة الشرقية.

من الإشكاليات التي تواجه الموقع تعرضه لحفريات غير شرعية بين فينة وأخرى. ان الموقع بحاجة إلى استكشاف وإجراء بعض التنقيبات الأثرية به.

### ١٢.وادي المعلقة / المغير

يقع وادي المعلقة جنوب خربة راحوب بحوالي نصف كيلومتر، ويوجد به عدد من الينابيع التي ما زال بعضها يتدفق والبعض الآخر جف نتيجة تشغيل الآبار الارتوازية المحيطة بالمنطقة.

يرتفع مجرى الوادي عن سطح البحر حوالي ٤٦٩م، ويقع على الإحداثيات:

N 32.60404

E 35.92785

من ابرز معالم هذا الوادي (عين المعلقة) ويستفاد من مياهها في ري البساتين وقد عمل نفق منحوت في الصخر فوق مجرى هذا النبع ويمتد النفق اكثر من ١كم ونهايته غير معروفة، يبلغ ارتفاع النفق حوالي ٣م، ويوجد داخله قناة ماء غير منتظمة لتصريف المياه. يعود تاريخ هذا النفق للعصر الروماني وأعيد استخدامه لاحقا عبر العصور.

من الإشكاليات التي يتعرض لها وادي المعلقة أعمال التجريف العشوائية من قبل المزارعين والمواطنين، فعلى سبيل المثال توجد مغارة بجانب النفق أزيل سقفها، وبقيت جدرانها الداخلية، وبها كوات صغيرة على نمط بيوت الحمام، كما تتناثر مكعبات الفسيفساء في البساتين المقابلة لمدخل النفق، مما يتطلب وجود رقابة مستمرة على الموقع من قبل

٣٥. منظر عام لتل المغير.

الحراس لحمايته **(الشكل ٣٦)**.

ومن المعالم المميزة في الوادي ربوة صغيرة تدعى ربوة الكنيسة تقع على الإحداثيات:

N 32. 60454

E 035.92405

**١٣.خربة ام الطواقي/ دوقرة**

تقع هذه الخربة شمال بلدة دوقرة، وترتفع عن سطح البحر حوالي ٣٨٤م، وتقع على الإحداثيات:

N 32.59738

E 035.75967

يوجد في الخربة كهف مميز مربع الشكل سقفه مفقود نحتت في جوانبه من الجهات الأربعة كوات صغيرة مربعة على نمط بيوت الحمام، كما يوجد في الجهة الجنوبية من هذا الكهف درج مكون من خمسة درجات. كما يوجد في الخربة عدة مدافن ومعصرة عنب منحوتة في الصخر الطبيعي مكونة من حوض هرس مستطيل وحوض تجميع دائري الشكل. تؤرخ هذه المعالم على الأغلب للعصر الروماني **(الشكل ٣٧)**.

**١٤.تل ججين/ ججين**

يقع تل ججين الأثري في وسط بلدة ججين، وتبلغ مساحته حوالي ٢ دونم. يقع على ارتفاع ٣٩٧م عن سطح البحر، وعلى الإحداثيات:

N 32.58575

E 035.77017

ينتشر على السطح كسر فخارية من عصور مختلفة مثل: البرونزي، الحديدي، الروماني، المملوكي والهلينستي. وقد تعرض جزء من هذا التل للتجريف.

**١٥.خربة الزيرقون/ المغير**

تقع خربة الزيرقون إلى الجهة الشرقية من بلدة المغير، وعلى ارتفاع ٤٩٧م عن سطح البحر، وعلى الإحداثيات:

N 32.58557

E 033.94870

تشرف خربة الزيرقون على وادي الشلالة في جهته الغربية، ويغطي الموقع مساحة تبلغ ٤٠٠م × ٣٠٠م وتحتوي بداخلها على مخلفات مدينة من العصر البرونزي القديم.

أجرت جامعة اليرموك بالتعاون مع جامعة توبنجن الألمانية حفريات في الموقع في السنوات ١٩٨٤، ١٩٨٥، ١٩٨٧م كشفت عن مخلفات معمارية من ابرزها سور المدينة الذي يبلغ عرضه ٧م يدعمه أبراج، إضافة إلى اكتشاف أساسات معبد وبيوت سكنية وآبار مياه عميقة.

تعرض الموقع إلى اعتداءات من قبل لصوص الآثار مما أدى إلى تخريب بعض المعالم. أما ملكية الأرض فهي لخزينة المملكة/ آثار **(الشكل ٣٨)**.

**١٦ .تل سال/ سال**

يقع تل سال الأثري في وسط بلدة سال، ويرتفع عن سطح البحر حوالي ٥٨٦ م، وعلى الإحداثيات:

N 32.56767

E 035.91130

يتواجد على ظهر التل قبور حديثة وخزان ماء ضخم يخدم سكان البلدة، من ابرز مظاهر السطح الأثرية وجود كسر فخارية من العصور: البرونزي، الحديدي، الروماني والأموي. كما تتواجد حجارة بازلتية كبيرة ومتوسطة مستخدمة في أساسات الجدران.

**١٧.خربة يريحة/ حوارة**

تقع هذه الخربة شرق بلدة حوارة بحوالي ٣كم ضمن امتداد السهول الزراعية، ولا يميزها سوى عدة كهوف وآبار مياه منحوته في الصخر الطبيعي وانتشار كسر فخارية من عدة عصور منها: البرونزي، الحديدي،الهلينستي، الروماني، البيزنطي، الأيوبي، المملوكي والعثماني.

تتعرض هذه الخربة لاعتداءات متكررة من قبل لصوص الآثار بحثا عن دفائن عثمانية. يبلغ ارتفاع الموقع عن سطح البحر ٥٤٣م **(الشكل ٣٩)**، وعلى الإحداثيات:

N 32.52671

E 035.94767

**١٨.تل كفريوبا**

يقع تل كفريوبا جنوب بلدة كفريوبا على الإحداثيات:

٣٦. مدخل نفق المياه في وادي المعلقة/ الغور.

٣٧. خربة ام الطواقي/ دوقرة.

٣٨. بقايا برج دائري، الزيرقون.

N 32.50708
E 035.80595

ويرتفع عن سطح البحر ٦٣٧م، وتدعى المنطقة الموجود فيها التل (الذهيبة) ويتواجد على التل رجم من حجارة الصوان، إضافة إلى أساسات جدران تتضح في مقاطع التربة المحاذية للشارع الرئيسي المتجه من اربد إلى كفريوبا، ومقاطع أخرى تكشفت نتيجة أعمال التجريف في الجهة الشمالية من التل. وينتشر على السطح كسر فخارية من العصر الحديدي.

من الإشكاليات التي تواجه الموقع وجوده في ملكيات خاصة، وان الزحف العمراني الحديث يتوسع على حساب التل مهددا الطبقات الاثرية.

**١٩.خربة قمرة/ مرو**

تقع هذه الخربة جنوب بلدة مرو بحوالي ٢كم، ويوجد بها عدد من الكهوف وأساسات جدران، ورقعة فسيفساء بين بيوت المواطنين، كما تنتشر في الخربة كسر فخارية من العصور: الروماني، البيزنطي والأموي، كما يرتفع الموقع عن سطح البحر حوالي ٥٢٩م **(الشكل ٤٠)**، وتقع على الإحداثيات:

N 32.61529
E 035.87732

٣٩. منظر عام للحفريات غير الشرعية في خربة يريحة.

**٢٠.تل البلد/ مرو (منطقة الخلة)**

تقع هذه المنطقة في وسط البلدة، وتعرضت أجزاء منها للتجريف كما هو الحال في الجهة الشرقية من الطريق العام الواصل بين مرو وحريما، حيث تتضح بقايا أساسات جدران ومدفن ذو حجرات متعددة، وبقايا ارضية فسيفسائية، كما يتواجد كسر فخار رومانية وبيزنطية وأموية. ترتفع المنطقة عن سطح البحر حوالي ٥٠٥م، وعلى الإحداثيات:

N 32.608920
E 035.88881

**٢١. تل الصنام/ علعال**

يرتفع هذا التل الأثري عن سطح البحر حوالي ٣٣٧م. ويقع على الإحداثيات:

N 32.66021
E 035.91576

ويقع هذا التل إلى الشمال من بلدة علعال بحوالي ٦كم وجنوب غرب بلدة ذنيبة، ويحاط الموقع بعدد من الأودية، ويتواجد فيه أساسات جدران وجدران استنادية، وعلى قمة التل حجارة كلسية مشغولة، والموقع متعرض للتخريب من قبل لصوص الآثار. ويعتقد انه يمثل حصن عسكري. ينتشر على سطح التل كسر فخارية من العصور: البرونزية، الحديدية، الهلينستية والرومانية. أما ملكية التل فتعود للدولة **(الشكل ٤١)**.

**٢٢.تل بيت يافا**

يقع هذا التل جنوب بلدة بيت يافا على بعد حوالي نصف كيلومتر وعلى الشارع الرئيسي المسمى طريق البترول، وهو تل صغير تبلغ مساحته حوالي دونم ونصف، ومكون من كوم من الحجارة الصوانية والكلسية. من ناحية اخرى فقد كشفت أعمال التخريب التي قام بها لصوص الآثار في الجهة الجنوبية من هذا التل عن أساسات جدران، غير ان الهدف المتوقع لهذا التل هو نقطة مراقبة واتصال لاسيما وانه ضمن مسار عدد من التلال مثل تل جحفية وتل الاشيعر، ويتواجد على السطح كسر فخارية تعود للعصرين: الحديدي و الأموي. يرتفع الموقع عن سطح البحر حوالي ٦٨٩م **(الشكل ٤٢)**، ويقع على الإحداثيات:

N 32.50645
E 035.79192

٤٠. احد المدافن في خربة قمرة.

**٢٣.تلة بيت يافا**

تقع هذه التلة داخل بلدة بيت يافا وبين مساكن المواطنين، وتبعد حوالي ١٠٠م إلى شمال شرق المقبرة الإسلامية **(الشكل ٤٣)**. ترتفع عن سطح البحر حوالي ٦٢٤م، وعلى الإحداثيات:

N 32.51985

E 035.79040

تم تجريف نصف هذا التل من قبل المواطنين وبقي النصف الشمالي الذي يشتمل على مصاطب حجرية من حجارة الصوان وحجارة كلسية مشذبة.

**٢٤.تل الاشيعر / زحر**

يحاذي هذا التل الشارع الرئيسي الذي يصل مدينة اربد بالأغوار الشمالية. تبلغ مساحته حوالي ١٦ دونما تقريبا، ويتواجد فيه أساسات جدران في اكثر من جهة وخاصة الشمالية والغربية، يتضح منها مدخل لمبنى، وينتشر على السطح كسر فخارية من العصور: الحديدي، الروماني والبيزنطي، كما يتواجد في الجهتين الجنوبية والشمالية وعلى بعد حوالي ٥٠م بقايا قبور الدولمن. تعود ملكيته إلى دائرة الآثار العامة. يرتفع هذا التل عن سطح البحر بحوالي ٥٤٢م **(الشكل ٤٤)**. ويقع جنوب بلدة زحر على الإحداثيات:

N 32. 3331

E 035.484

**٢٥.تل كفريوبا / كفريوبا**

يقع هذا التل في الجهة الجنوبية من بلدة كفريوبا، وتحديدا قرب مسجد حمزة بن عبد المطلب، تقدرمساحته بحوالي ١٢ دونما وسطحه مستوي ومنحدر، كما يوجد في الجهة الشرقية منه رجم من حجارة الصوان. يتواجد في التل أساسات جدران تتضح في مقاطع التجريف الحديثة في الجهتين الشمالية والغربية من التل، كما ينتشر على السطح كسر فخارية تعود إلى العصر الحديدي. يرتفع عن سطح البحر حوالي ٦٣٧م، ويقع على الاحداثيات:

N 32.50708

E 035.80575

**٢٦.بيت رأس**

تقع بلدة بيت راس شمال مدينة اربد، ويعد وسط البلدة القديم مركز البلدة الحديثة، ويقع اسفل مبانيها الحديثة آثار مدينة بيت راس التاريخية. وهي إحدى مدن الديكابوليس (المدن العشر) التي ارتبطت بحلف دفاعي اقتصادي في العصر الروماني، وكان اسم بيت راس القديم (كابيتولياس). لم يبق من اثار مدينة كابيتولياس سوى عدد من المعالم منها: البركة، السوق التجاري الروماني، المسرح المدرج، جزء من سور المدينة ونفق جر المياه وعدة من المدافن، كما عثر على مجموعة من القطع الحجرية المشغولة المتناثرة في مباني المواطنين. ترتفع عن سطح

٤١. تل الصنام/ علعال.

٤٢. منظر عام لتل بيت يافا.

٤٣. تلة بيت يافا بع تعرضعا للتجريف.

٤٤. منظر عام لتل الاشيعر/ بلدة زحر.

حولية دائرة الآثار العامة ٥٦ (٢٠١٢)

البحر حوالي ٥٩٨م، وتقع على الإحداثيات:
N 32.59792
E 035.85873

**٢٧.المسرح المدرج / بيت رأس**

يقع المسرح المدرج في الجهة الشمالية من بلدة بيت راس، وهو احدث اكتشاف اثري لمسرح روماني في تلك المنطقة، حيث أجرت به دائرة الآثار العامة حفريات أثرية منذ عام ١٩٩٩م إلى عام ٢٠١٠م كشفت عن معظم معالمه. يبلغ امتداد معالمه العمرانية حوالي ٧٠م شرق-غرب وحوالي ٥٤م شمال-جنوب بمساحة اجمالية تقدر بحوالي ٣٧٨٠ متر مربع، وتبلغ سعته من المشاهدين حوالي ٣٠٠٠ شخص، وهو يتكون من الأجزاء التقليدية للمسرح الروماني وهي: المنصة في المقدمة، الحلبة (الاوركسترا) في المنتصف، المقاعد المدرجة التي تتوزع حول الحلبة، منطقة تغيير الملابس، أبراج للمراقبة، ممرات بين المقاعد وعدد من الأقبية. أما تاريخ المسرح فانه يعود للقرن الثاني الميلادي. وقد اعيد استخدامه في العصر البيزنطي لأغراض أخرى غير الهدف المسرحي بدليل إغلاق مداخل المسرح وبناء سور المدينة بجانب جدار المسرح الشمالي. ويحتاج المسرح بكامل معالمه إلى صيانة وترميم، غير أن ابرز الإشكاليات التي تواجهه ان معظم مساحته واقعة بين مساكن المواطنين الحديثة، وان أجزاء قليلة من مساحة المسرح مملوكة لدائرة الآثار العامة (**الشكل ٤٥**). يرتفع عن سطح البحر حوالي ٥٧٣م، ويقع على الإحداثيات:
N 32.59856
E 035.85841

**٢٨.السوق التجاري الروماني / بيت رأس**

بقايا هذا السوق الروماني عبارة عن عدة حوانيت متجاورة تقع وسط بلدة بيت راس بجانب مسجد البلدة القديمة، يتكون السوق من تسعة حوانيت متجاورة تفتح على الجهة الشمالية، بنيت أسقفها على نظام العقود نصف البرميلية واستخدمت فيها الحجارة الكلسية المشذبة، ويعود تاريخه للقرن الثاني الميلادي. أجرت دائرة الآثار العامة في عام ٢٠٠٣م أعمال صيانة وترميم للموقع، كما تم الكشف عن بقايا كنيسة بيزنطية ذات أرضيات فسيفسائية في ساحة هذا السوق. تعود ملكية قطعة الأرض الواقع بها هذا السوق إلى دائرة الآثار العامة (**الشكل ٤٦**). ويرتفع عن مستوى سطح البحر حوالي ٥٧٣م، ويقع على الإحداثيات:
N 32.59856
E 035.85841

**٢٩.البركة الجنوبية / بيت رأس**

تقع هذه البركة في الجهة الجنوبية من البلدة القديمة، تتخذ شكلا مستطيلا إبعادها ٦٤م × ٤٤م ويصل عمقها حوالي ٩م، بنيت جدرانها من الحجر الكلسي، ويصل عرض الجدران حوالي ٢٨٢سم، ودعمت هذه الجدران عن طريق بناء العقود فيها، والتي من المحتمل انها متصلة بنفق بيت راس الذي كان يجلب لها المياه عند الحاجة. يعود تاريخها إلى العصر الروماني، وتحتاج إلى أعمال ترميم وتنظيف وتسييج حفاظا عليها (**الشكل ٤٧**). ترتفع عن سطح البحر حوالي ٥٧٧م، وتقع على الإحداثيات:
N 32.59725
E 035.85318

**٣٠.النفق**

يقع هذا النفق في الجهة الغربية من بيت رأس وعلى ارتفاع ٥٣٠م، وقد الحقت به التمددات العمرانية الحديثة أضرارا كثيرة. يمتد النفق مئات الأمتار في إطراف وداخل المدينة الاثرية حيث لا يقل طوله عن ٣٠٠م، وكان مزودا رئيسيا للمدينة بمياه الشرب، ومنها البركة الجنوبية للبلدة، يبلغ عرض النفق ٥.٤م وارتفاعه متفاوت ويصل إلى ٨م، وقد عملت فوهات في سقف النفق لإدخال المياه في موسم الشتاء. والنفق بكامله محفور في الصخر الطبيعي ويحتاج إلى استكشاف لمعرفة امتداداته الحقيقية وعلاقته بشبكة انفاق مدن الديكابوليس (**الشكل ٤٨**). يقع على إحداثيات:
N32.59692
E035.85010

**شكر وتقدير**

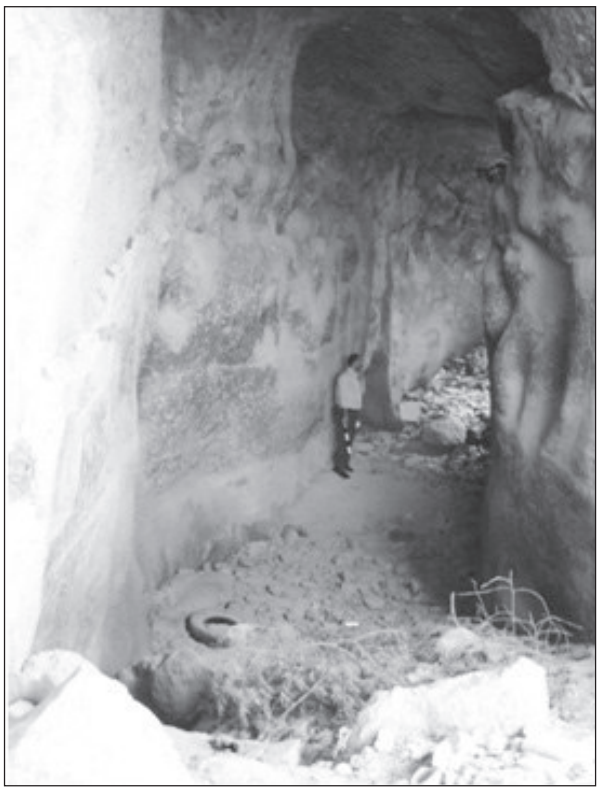
أتوجه بالشكر والتقدير للزميل إبراهيم حسين الزعبي على قيامه بتصوير المعالم الأثرية التي شملها المسح، والزميل محمد الخالدي على قيامه بأخذ إحداثيات المواقع التي شملها المسح واستخراج صور من موقع جوجل ارث، كما اشكر السائقين رائد فرح، مجدي طعاني ومحمد حماد على ما بذلوه جميعا من جهد.

٤٥. منظر عام لمدرج بيت رأس.

٤٦. منظر عام للسوق التجاري الروماني في بيت رأس.

٤٧. منظر عام للبركة في بيت رأس.

٤٩. فريق المسح الأثري أثناء زيارته لتل زرعة في وادي العرب.



٤٨. نفق بيت رأس.