

LONG-TERM SETTLEMENT TRENDS IN JORDAN'S NORTH-EASTERN BADIA: THE JABAL QURMA ARCHAEOLOGICAL LANDSCAPE PROJECT

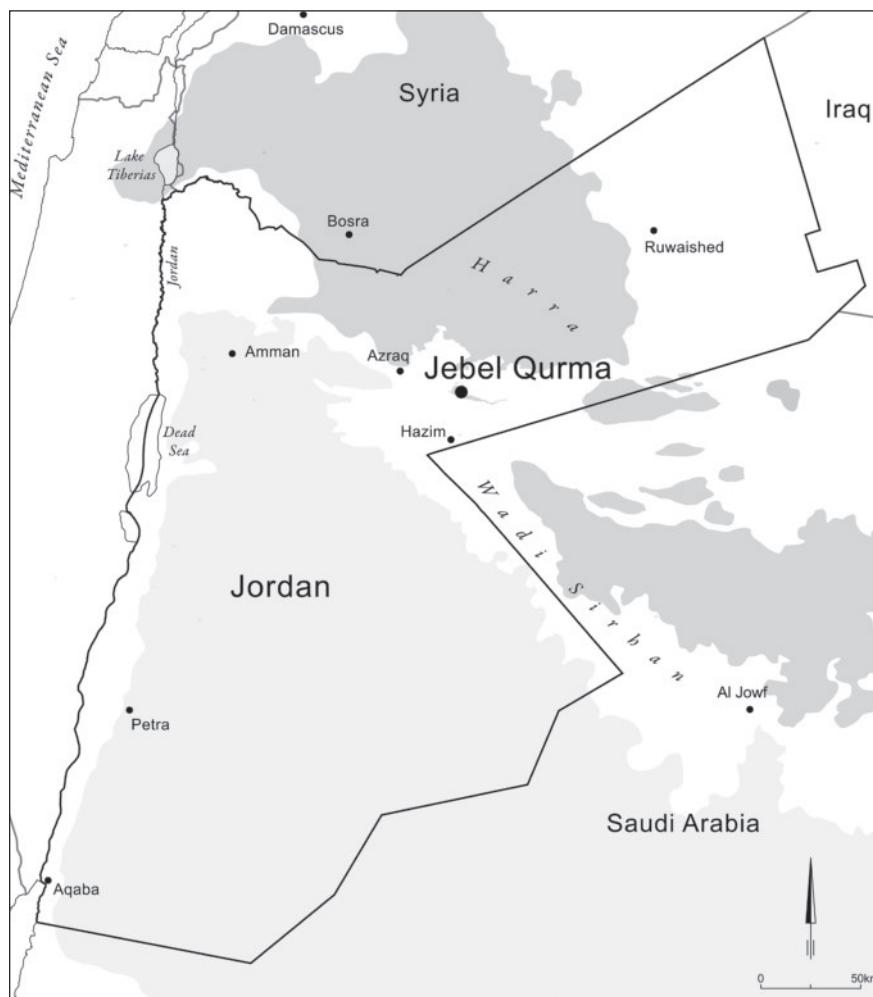
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New Research in the Jabal Qurma Region

The *Jabal Qurma Archaeological Landscape Project* started in 2012 as a new long-term research project, carrying out both survey and excavation in Jordan's north-eastern *badia*. It seeks to address local settlement and quotidian activities from a multi-disciplinary and multi-period perspective, and investigates how these

relate to the diverse landscape and environment. The project takes place under the auspices of the Faculty of Archaeology of Leiden University (The Netherlands), in close collaboration with the Department of Antiquities of Jordan.

The study area lies to the east of the small oasis town of Azraq (Zarqa Province; **Fig. 1**), is comprised of rough and rocky terrain, and mea-



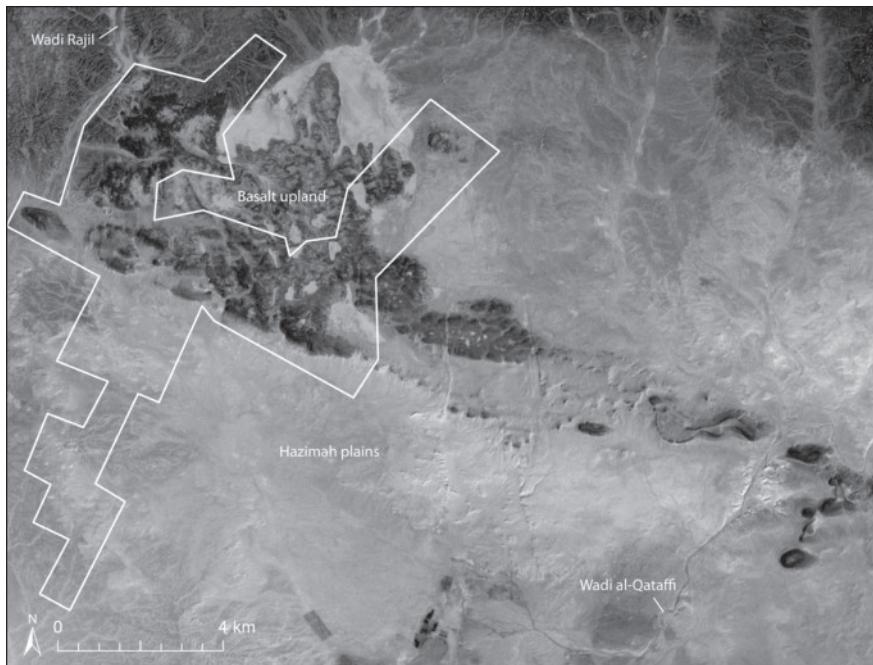
1. Map of Jordan, showing the location of the Jabal Qurma region.

sures about 16 by 21 kilometres, between Wādī Rajil in the west and Wādī al-Qataffi in the east (Fig. 2). The highly arid desert environment, with an average annual precipitation of less than 50 mm, is characterized by basalt-strewn uplands or *Harra* up to 80 metres in height in some places. It is jointly known as Jabal Qurma and (further to the east) Jabal Rijlat Suleiman. Extensive gravel plains extend to the north and south (Hazimah), alternating with mud flats of varying size, as well as low limestone ranges. The prominent table-mount of Jabal Qurma lies within the study area, close to Wādī Rajil, as does the adjacent Qurma Gap, a wide natural east-west corridor through the basalt barrier. Still further to the south-west is the flat, shallow depression of the Wādī Sirhān, a major, millennia-old caravan track and communication route between the Levant and the Arabian Peninsula.

Because of its harsh, dry landscape with no permanent sources of water, the Jabal Qurma region is rather uninviting and remains difficult to inhabit, except for the occasional Bedouin group. However, this picture may have been very different in antiquity, especially in the context of the astonishingly large number of archaeological finds in the area. Many hundreds of ancient sites and installations of different sizes dot the basalt landscape and the surrounding gravel plains. To add to this picture, there are

literally thousands of pieces of rock art and inscriptions in Safaitic and Arabic: the tangible testimonies of ancient peoples that roamed the *badia* in the past millennia. The north-eastern desert, it seems, was not always as forbidding and inhospitable as it is today.

However, the immense archaeological richness of the area was barely explored until two or three decades ago. Only recently has a renewed interest developed in the archaeology of the *badia*, although this has predominantly focused on the region's prehistoric remains (for a history of research see Betts, (ed.), 2013; and Müller-Neuhof 2014). The investigation of more recent, historical settlement evidence still receives (very) limited attention. The *Jabal Qurma Archaeological Landscape Project* aims to change this latter picture. With regard to its explicitly multi-disciplinary, multi-period perspective, the project addresses a series of key research issues for the *badia*, such as the reconstruction of long-term patterns of human activities across several environmental zones, exploring site and location preferences, and continuities and shifts in occupation through time. It also investigates the issues of both environmental and cultural marginality and its use in regional archaeology, together with the issue of settlement oscillations in the basalt wasteland through time; these are related to the alternating processes of sedentarisation and nomad-



2. Map of the Jabal Qurma region, indicating in white the area surveyed between 2012 and 2015 (Base image: Landsat 7 – courtesy of the United States Geological Survey).

isation, changes in environmental conditions, and/or shifts in economic and political organization. The exploitation of the desert landscape in relation to the implications of domestication processes in the Neolithic is also of interest, as well as continuities and changes to the burial practices of desert communities, the issue of long-distance trade and exchange and the role of caravan tracks, and the interaction between urbanized Roman and Nabatean polities versus the small-scale desert groups. Finally, the transition from the Roman-Byzantine era to the Islamic period and its impact (if any) on the local desert communities is considered, including the significance of rock art and inscriptions for pastoral nomadic communities in classical antiquity.

Investigation of the local archaeological record relies heavily upon the comprehensive use of high-resolution satellite imagery (both commercial IKONOS pictures and images available through Google Earth), and aerial photographs (available from the *Aerial Photographic Archive for Archaeology in the Middle East* (APAAME)). The remote-sensing data is complemented by investigations on the ground, using field survey and excavation in selected places. While previous archaeological surveys in the north-eastern *badia* were rather extensive in nature (see e.g. Betts, (ed.), 2013), an intensive surface reconnaissance was employed in the Jabal Qurma region to provide a detailed view of the local archaeological landscape. In this way, a substantial portion of the basalt uplands and the surrounding gravel plains in the Jabal Qurma area have been studied in detail during yearly field campaigns since 2012 (**Fig. 2**; cf. Akkermans *et al.* 2014; Huigens 2015). The research revealed proof of extensive settlement in many different periods, from prehistoric to modern times. Significantly, the sequence of regional occupation was not always continuous, but showed distinct punctuations; periods of abundant habitation alternated with long episodes of abandonment. The remainder of this article seeks to provide a brief overview for the local settlement sequence and its interruptions. It must, however, remain an interim evaluation, as most of the materials and their chronologies are still under study.

Neolithic and Chalcolithic Settlement in the Jabal Qurma Region

The evidence for prehistoric habitation in the Jabal Qurma region has been discussed at length elsewhere (Akkermans *et al.* 2014; Huigens 2015), yet it is useful to summarise the main trends here. The basalt uplands and the more distant gravel plains present a highly intact prehistoric landscape, in which hundreds of highly varied Neolithic and Chalcolithic settlement remains are preserved with remarkable clarity, ranging from the 9th to the late 4th millennium BC. The surface finds from our surveys demonstrated several major prehistoric habitation phases, often with limited overlap in site layout and material culture. Although chronological embedding for distinct assemblages remains problematic, significant changes from one phase to another suggest hiatuses in the regional settlement record.

Neolithic occupation in the Jabal Qurma region began with the construction of a series of so-called ‘desert kites’. These are large, funnel-shaped installations consisting of two or more stone guiding walls, which converge on a star-shaped enclosure placed on the crest of a ridge or hill. The number of people required for the construction and efficient operation of these extensive installations for the hunt of large game must have been considerable, yet there is still conspicuously little evidence for campsites to accommodate these supposedly large groups.

More substantial sites for local habitation began to appear in the Late Neolithic period, around the middle of the 7th millennium BC, with the occurrence of the burin-related grouped enclosures and their often dense lithic distributions. The sites occur regularly in advantageous places on the edges of the basalt wasteland, within close proximity to water channels. The burin sites sometimes seem to have been placed inside the desert kites, suggestive of continued exploitation for hunting purposes many centuries or even millennia after their original construction.

Neolithic settlement in parts of the Jabal Qurma area increased significantly in the 6th millennium BC, with sizeable habitations, completely different in extent and layout from those of the previous periods, appearing. These extended up to ten hectares in size

and consisted of hundreds of small, circular or 8-sided, freestanding dwellings. These settlements perhaps had a population size in the order of several hundreds, and rank among the largest prehistoric sites known to date in Jordan and the wider Levant. They are not exclusive to the Jabal Qurma region, but have clear parallels elsewhere in Jordan's *Harra*, such as on the table-mounts in Wādī al-Qataffi and the Wisad Pools on the southeastern edge of the basalt expanse. Excavations at these sites have exposed a number of round or oval dwellings, which provided lithic assemblages of Late Neolithic types, as well as some ceramics of Yarmukian origin (Wasse *et al.* 2012; Rollefson *et al.* 2013; Rowan *et al.* 2015).

Another major phase of prehistoric settlement in the Jabal Qurma region is represented by several dozen circular stone structures up to 70 metres wide, with extensive enclosures in the centre, and surrounded by an outer ring of small, round, horseshoe-shaped or 8-sided 'huts' (**Fig. 3**). These sites, often referred to as 'wheels' or 'jellyfish' because of their shape (Betts 1982; Kennedy 2011), often occur in groups of two to seven installations on the high grounds at the edge of the basalt range, and tend to face onto the mud flats and large open plains. The high locations offered extensive views over the surrounding countryside, and could be highly advantageous with regard to safety, herd control, or hunting. The exact use of the wheel structures is still unknown, although it has been suggested that the central areas of the enclosures

functioned as animal pens, whereas the outer circles of round structures provided protection and shelter for family units (Betts 1982: 31). More recently, it has been proposed that the wheels were funerary monuments because of the cairns they often contain in their interiors (Kennedy 2011: 3189). However, based on the many pieces of Safaitic rock art on and around the cairns, there is reason to believe that the cairns date to (much) later periods, and bear no direct relation to the original wheels.

Since none of the wheels have been excavated, their precise date within the local habitation sequence remains unclear. The lithic assemblages found on their surfaces resemble local Late Neolithic technologies and typologies. The occurrence of handmade pottery in small, but consistent quantities at the wheels may equally argue for a date in the Late Neolithic period, although a (much) later date in the Chalcolithic period is equally tenable. Recent OSL dates taken from wheels in the nearby Wisad area allow for a similar range from the Late Neolithic to Chalcolithic and Early Bronze Age (Athanassas *et al.* 2015).

Surveys conducted in the Hazimah gravel plains and along its low limestone ridges revealed a series of late prehistoric enclosures, in relatively close proximity to each other. The roughly circular or oval enclosures are between 17 and 44 metres across, with the larger ones divided into smaller interior compartments. Relatively rich artefact assemblages were found in and around the enclosures, mostly consisting



3. Two Wheels at sites QUR-143 (Left) and QUR-144 (Right). These installations are between 60 and 70 m across (aerial photograph: David Kennedy, courtesy of APAAME).

of chipped stone, but also some ground-stone tools, and pottery with impressed decoration and ledge handles, which are reminiscent of Chalcolithic ceramics elsewhere in the southern Levant.

The Hazimah enclosures with their low and roughly piled, irregular walls may have been little more than clearances for temporary shelters. The numerous tools discovered in them, however, point towards their frequent reuse, perhaps on a seasonal basis by pastoralists. The concentration of these enclosures in parts of the Hazimah plain suggests that relatively large groups of people regularly resided together.

An Early Bronze Age I Cemetery and the ‘Long Gap’

A unique find was the extensive burial field in and around the site of QUR-186, comprised of some 50 small, low cairns, up to 2.2 m across and up to 1.2 m high (Fig. 4). Excavations have been carried out at 25 cairns, four of which each yielded a single pottery vessel (Fig. 5). The ceramics closely resemble those found in the cemeteries near Madaba and the Dead Sea, such as at Bāb adh-Dhra and Fifā (see for example Schaub and Rast 1989; Chesson and Schaub 2007), suggestive of a date from Early Bronze Age I for this cairn field.

The burial cairns were all constructed in the same way. First, the small, low, corbelled burial chamber was made; second, the burial chamber was surrounded by a ring of large, sometimes stacked stones. Finally, the space between the chamber and the outer ring was filled in with stones, adding both stability and visibility to the cairn. In some cases, the burial chamber was

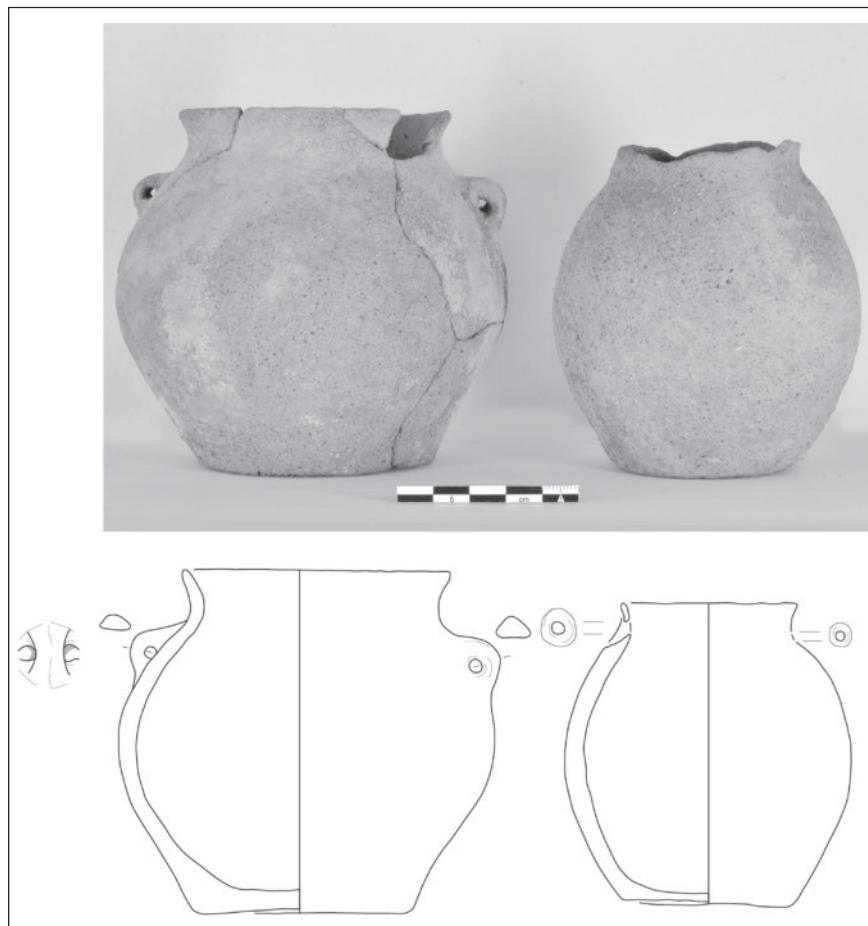


4. Cairn at the Early Bronze Age I cemetery, QUR-186 (Scale: 50 cm).

corbelled in its entirety, while in other cases it was covered by one or more large, flattened slabs. The burial chamber was always roughly round in layout, about 0.7-1 m in diameter and 0.4-0.7 m high; hence, the chamber cannot have been used for extended position burial, but must have facilitated contracted burial, with the deceased resting on their side. Unfortunately, preservation of the skeletal remains in the tombs was very poor and restricted to a few small fragments or no bone at all.

The cairn field is situated high on the slope of a basalt-covered hillock, with a magnificent, wide view over Wādī Rajil below. The cairns were set into much earlier enclosures of a Late Neolithic type, with large concentrations of concave truncation burins in places. The latter suggest a date in the late 7th millennium BC (*cf.* Betts, (ed.), 2013). The cairns stood in the centre of the enclosures, or were partially built on their walls, suggesting that the Neolithic enclosures were re-used solely for burial and not for habitation in the Bronze Age; the habitation site(s) associated with the cairns remain unknown.

At present, the Early Bronze Age I graves represent the final phase of prehistoric occupation in the Jabal Qurma region, roughly dated to *ca.* 3000 BC. The abandonment of the cemetery – and, by association, the places for the living who buried their dead here – seems to have ushered in what we have termed the ‘Long Gap’. During this period, we see wholesale evacuation of the Jabal Qurma region for some 3000 years, from the early 3rd millennium BC until the Safaitic habitations around the beginning of the Common Era. Significantly, apart from the graveyard mentioned above, our surveys have been unable to identify sites dating to the Bronze Age or the Iron Age in the Jabal Qurma region until now. These results are despite an intensive, full-cover reconnaissance strategy, which aimed to document both highly visible sites with relatively dense artefact scatters and small, ephemeral locales with a handful of finds and low visibility. The apparent absence of find spots from the 3rd to the 1st millennium BC is remarkable and as yet unexplained, although few and disparate sites from these periods can be found elsewhere in the *Harra*. Notable examples come from the Late



5. Pottery vessels found in Early Bronze Age I cemetery (Drawings: Akemi Kaneda).

Chalcolithic / Early Bronze Age I rock shelter at al Hibr (Betts 1992; Betts and Martin 2013), and the Iron Age settlements and graveyard in the vicinity of Qaf and Ithra at the onset of the Wādī Sirhān (Adams *et al.* 1977: 36).

Renewal of Settlement from the Late Hellenistic to the Umayyad Periods

Preliminary analysis of the material finds collected during our annual surveys indicates a major renewal of settlement in the Jabal Qurma region from the late Hellenistic to the Umayyad periods, *ca.* 2nd century BC to the 8th century AD. With regards to the Long Gap, it seems evident that occupation in this period was by newcomers to the Jabal Qurma area; where they came from and why they colonized the region is still elusive.

The domestic habitations of the 1st millennium AD took the form of both stone-walled enclosures and irregular clearances about 20-50 metres across and free of basalt

rocks, which probably served for short-lived camping activities. The sites may have had shelters of perishable materials such as hides or cloth, although we were unable to identify separate tent remains or the like, perhaps due to the common re-use and re-working of the campsites in later periods (see below). The camps are mostly situated in secluded areas at the foot of the basaltic uplands or in deep valleys.

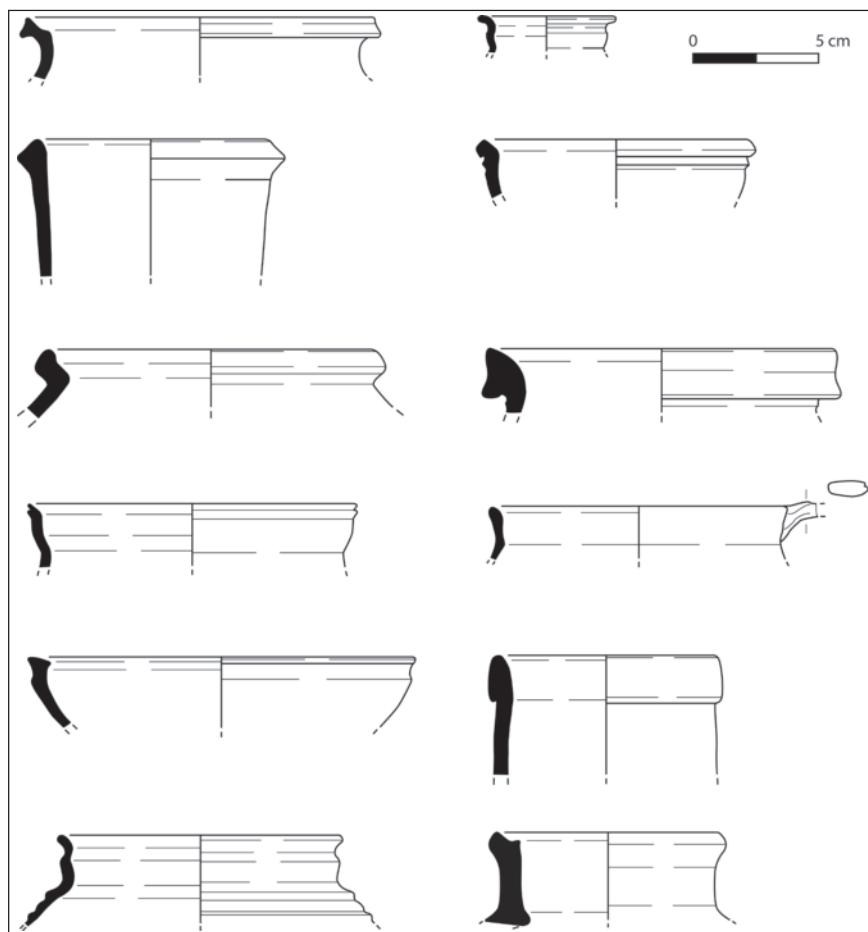
Ceramics were regularly found in the campsites, although in small quantities, ranging from a handful of pieces to a few dozen sherds at the most. Although it is evident that the use of pottery was limited at each site, it appears that nearly every site, large and small, had access to it; pottery, it seems, was a rather ordinary product amongst desert communities. Although the ceramics have yet to be studied in detail, preliminary analyses indicate there are close connections to the stratified assemblages from the south-western Levant. There are a few sherds

belonging to the Late Hellenistic and Early Roman periods, with the majority from the Late Roman, Byzantine, and Umayyad periods (**Fig. 6**). The ceramics from the Jabal Qurma region were predominantly wheel-made, red or grey-black coloured, mineral tempered, and often had a corrugated surface. They were mainly comprised of cook pots and storage jars, while typical luxury products such as Nabataean Fine Ware and terra sigillata were wholly absent. In addition to the undoubtedly imported wheel-made pottery, there were some handmade, dark-brown, coarsely finished, and heavily basalt-tempered ceramics (local products?).

The valley floors, the edges of the mud flats and the lower slopes of the basalt hills were the foci of daily living and domestic activity, while the surrounding high plateaus and the summits of the basalt-covered table-mounts were preferred areas for disposal of the dead. These high locales are littered with various sized burials cairns, and represent a veritable landscape of the dead.

Although it is often difficult to date the cairns based on surface material alone, we tentatively attribute a range of tombs to the early 1st millennium AD. These include, firstly, the monumental ‘tower tombs’, which can be up to 2–3 m in height and up to 6 m in diameter, and which consist of a round burial chamber and a corbelled roof, carefully made of large, flattened basalt slabs. These cairns usually occur in relative isolation on high locations with visual prominence, such as on hill tops and the edges of basalt plateaus (**Fig. 7**). They are often associated with (very) high quantities of Safaitic inscriptions and petroglyphs, conventionally dated between the 1st century BC and the 4th century AD (*cf.* Al-Jallad 2015 for a recent evaluation of the Safaitic texts).

A second type of burial which we provisionally date to the early half of the 1st millennium AD are the low, circular ‘ring cairns’, each with a round or oval opening (‘ring’) at the top which encircles an interior platform. The ring cairns may range from small



6. Selection of Late Hellenistic to Early Islamic pottery sherds from the Jabal Qurma region (drawings: Akemi Kaneda).



7. Tower tomb remains on a hilltop overlooking Wādī Rajil
(Scale: 50 cm).

features 1.50-2 m in diameter and 0.8-1 m high to installations 4-5 m across and up to 1.50 m in height. These cairns occur throughout the basalt range; however, in contrast to the tower tombs, they also occur in places with low visibility. They are regularly (but not always) provided with Safaitic inscriptions or rock engravings.

A third type of burial, found only at the site of HAZ-27 in the Hazimah plains until now, consists of a linear string of at least ten low graves, each with a lining of limestone blocks and filled in with flint gravel. Several graves appear to have been recently looted, and the debris contained many bronze and iron ornaments, as well as coarse pottery dating to the 3rd or early 4th century AD (Huigens 2015: 189-190).

Rock Art

Our investigation of the Jabal Qurma region has yielded abundant epigraphic and iconographic data, in the form of thousands of petroglyphs, inscriptions in (mostly) Safaitic, and combinations thereof (Fig. 8). These are



8. Safaitic inscription with associated depiction of a horseman.

conventionally dated from the 1st century BC to the 4th century AD; however, this date is unsatisfactory, as the practice of writing may have started earlier and ended later (*cf.* Al-Jallad 2015: 18). The many inscriptions give proof for astoundingly widespread (and unexplained) literacy in the desert in the early 1st millennium AD. They inform us about a number of cultural practices, such as tribal affiliations, lineages, social relationships, pastoralist activities, and daily life. The rock art, which often occurs in association with the inscriptions, is predominantly figurative in nature, and one can clearly recognize the depicted subjects: wild and domestic animals, warriors, horsemen, camel caravans, dances, hunting scenes. The iconography contains information about important features from daily life that is rarely apparent in the archaeological record.

In short, this unique visual culture of text and image constitutes an essential and unrivalled source of information to assess local pastoralism. It offers a rare insight into the pastoralist communities who made use of the many campsites in the Jabal Qurma area, and who built the funeral monuments (cairns) for their dead, while continuously migrating from one region to another with herds of camels and sheep (*cf.* Macdonald 1993; Al-Jallad 2015). Many questions, however, remain open, such as the relevance of inscribing their landscape in such fashion and abundance? Who produced the many carvings and for whom? In terms of distribution, what was the relationship between the carvings and the many habitation sites, burials, pathways, etc.?

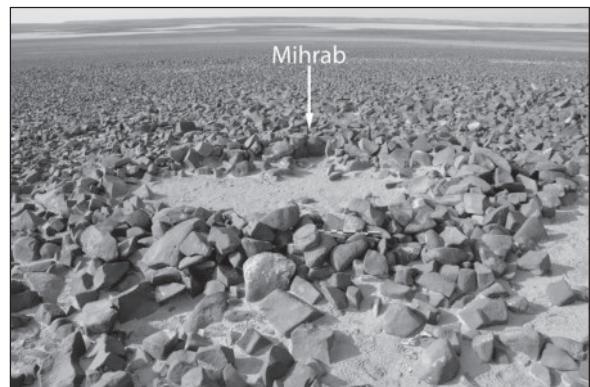
Mamluk Campsites and ‘Desert Mosques’

Evidence for settlement in the Jabal Qurma region after the Umayyad period is patchy and highly discontinuous. Based on the survey data, we must conclude that the Jabal Qurma region was practically deserted from the late 8th to the 13th century AD. Subsequently, local habitation was renewed for a relatively short period in the late 13th and 14th century AD, during the Mamluk period. Small quantities of Mamluk glazed and painted pottery, as well as some pieces of glass, were found at sites on the edge of the mud flats and wadis, and along camel tracks crossing the basalt. In addition, there are several dozen

Arabic inscriptions on basalt stone in or around the sites, most of which appear to belong to the 14th century, as many of the inscriptions carry Hijri dates. Indicative of widespread literacy in the desert in the late medieval period, the texts usually consist of prayers or simply bear the names of individuals and their tribal affiliation.

All of the Mamluk-period habitation sites in the Jabal Qurma region have been re-used since the early 20th century by Bedouin groups for tent construction and camping. With regard to their specific location in the *harra* and their close relationship to places selected much later by Bedouins for temporary stays, we suggest that the Jabal Qurma sites with medieval ceramics were short-term campsites as well, with tents as the main units for living. The remnants of what appears to be a small Mamluk-period tent have been exposed at the site of QUR-210, inside a much earlier, Neolithic enclosure, which perhaps served as a windshield. The tent installation was comprised of a series of elongated, irregularly shaped heaps of basalt blocks, which demarcated a roughly rectangular, sandy area about 7 m long and 5 m wide. The rectangular area for the tent's construction had several shallow, round fireplaces, sunk to a depth of about 5-15 cm. Two radiocarbon dates were obtained for charcoal from two separate hearths, yielding a date of 1190-1280 AD and 1270-1390 AD respectively (*lab.* inventory nos. GrA-61122 and GrA-61121, 95% probability). The site was probably used intermittently for habitation during the Mamluk period.

In addition to the tent remains, a number of Mamluk open-air 'desert mosques' have also been uncovered, usually placed at a prominent location a few hundred metres away from the settlement area (see e.g. Avni 1994 on the early mosques in the Negev). These either occur in the form of rudimentary installations, with a small cleared area bounded on its southern side by a single low wall, with a *mihrab* niche in its centre, or in the form of more elaborate structures measuring about 6 by 6 metres, with walls up to one metre high. They are also provided with a *qibla* wall (such as at the site of QUR-999; Fig. 9). The 'desert mosques' usually have brief Mamluk-period inscriptions in the form of prayers. In a few cases, the builders of the mosques identified themselves, such as



9. Mamluk-period 'desert mosque' at the site of QUR-999 (Scale: 50 cm).

at the site of QUR-162, where one text reads: "The House of Allah constructed by Jowab bin Rabea bin Salama in the year 792" (Hijri date, i.e. 1389/1390 AD).

The Ottoman Period and Beyond

The local revival of settlement in the Mamluk period seems to have been rather short-lived, lasting only from *ca.* 1250 to 1400 AD. The Jabal Qurma area subsequently seems to have become largely (though not entirely) devoid of settlement once more, with only a handful of sites attributed to the Ottoman period between the 15th and the 19th century. Proof of Ottoman habitation is limited to fragments of glazed pottery, Chinese porcelain, clay pipes and coins at clearances for infrequent and dispersed camping sites in the basalt. Local Ottoman-period occupation, it seems, was incidental and *ad hoc*, rather than organized and continuous. Remarkably, Arabic inscriptions on stone are entirely absent in the region during this time, in sharp contrast to dozens of texts from the preceding Mamluk period.

Only from the late 19th and, particularly, 20th century, onwards does the intensity of occupation in the Jabal Qurma region increase substantially. In this period, Bedouin communities, whose abandoned campsites can be found everywhere in the *harra* and beyond, regularly frequented the area. With their extensive clearances and installations of various kinds, the sites are almost always located on the edges of mud flats, on low ground along the wadis, and in the open Hazimah plains in front of the basalt range. Small occupations also occur on the high plateaus deep inside the basalt

region. Importantly, the sites often occur at the same locations as earlier, Medieval or Classical-period, campsites. They usually comprise one to six tents, although larger sites occur as well, each of which is often clearly outlined by stones. We cannot be certain whether tent use was contemporaneous, but it is most likely that the actual area in use at each campsite at any given moment was probably smaller than first appears.

Many Bedouin campsites yield considerable quantities of refuse, such as plastic, cloth, shoes, metal tools, glass, and industrially made coffee cups, often associated with clearly defined tent outlines (**Fig. 10**). They also often provide clues for more precise dating, in the form of coins, datable bullet cartridges, inscribed tin cans, etc. Significantly, Bedouin groups in the Jabal Qurma area have produced large numbers of so-called tribal marks on stone (*wusūm*) as well as Arabic inscriptions, many of which carry dates; interestingly, some periods are much better represented than others. Texts from the 1970s to the early 2000s are manifold, whereas there are currently no inscriptions dating from the 1960s, and only a few from the 1950s and 1940s. Bedouin inscriptions from earlier decades are extremely rare, with only a handful from the late 1920s located on the prominent table-mount of Jabal Qurma itself.

The substantial boom in dated inscriptions from the 1970s onwards quickly came to an end at the turn of the last century. In fact, the Jabal Qurma region seems to have entered another period of large-scale abandonment since the beginning of the 21st century, due to socio-



10. Recently abandoned Bedouin tent place on the edge of the basalt landscape (Scale: 50 cm).

political circumstances, (for example, increased sedentarization of the local Bedouin groups, and the interruption of long-range migration due to the closure of borders), as well as environmental change. It is probably not without significance that the modern desertion of the Jabal Qurma area coincides with the recent 15-year drought in the Levant (1998-2012), which is the driest in the past 500, if not 900, years (Cook *et al.* 2016).

Discussion

The preliminary results presented above provide evidence for a (very) long and diverse sequence of settlement in the Jabal Qurma region, from prehistoric times until the present day. Until now, archaeological research in the north-eastern *badia* at large has focused upon the many prehistoric installations, with little or no attention given to later, historic occupations in the region (see for example the recent overviews in Betts, (ed.), 2013; Müller-Neuhof 2014). However, the *Jabal Qurma Archaeological Landscape Project* explicitly takes the latter into full consideration. We employed a highly intensive survey strategy in the field in order to gain insights into the full diversity of archaeological remains and periods in our study area. In this way, we were able to identify sites that have been dramatically understudied in the north-eastern *badia*, such as the many Late Antique campsites comprised of little more than thin scatters of pottery sherds in cleared areas. Remarkably, many of the Late Antique find spots occurred in the same areas as the remains of modern Bedouin campsites. While the study of recent (20th century) settlement in the *badia* is relevant in itself, it also enables the identification of ancient remains that would otherwise remain unnoticed.

Our research in the Jabal Qurma region has profited enormously from an extensive use of satellite images and aerial photographs; it goes without saying that remote sensing has become an essential tool in the study of the archaeology of the *badia* and beyond (see e.g. Kempe and Al-Malabeh 2010; Kennedy 2011). Nevertheless, it is likewise important to realize that intensive pedestrian survey (and excavation) remain the key to a detailed understanding of the nature and chronology of the local archaeological record and its past societies.

With regard to site numbers and sizes, the density of population in the area must have been very substantial in some periods. Significantly, the occupational sequence is not continuous, but characterized by alternating episodes of distinct habitation and regional abandonment. There is, for example, presently no convincing evidence for settlement in the Jabal Qurma region in either the Bronze Age or the Iron Age, pointing at a desertion lasting for perhaps as much as 3000 years – the so-called ‘Long Gap’. The cyclical rearrangement of settlement configurations are not restricted to prehistoric periods, but occur in later ages as well. Following a phase of local habitation from roughly the 2nd century BC to the 8th century AD (in the form of campsites, tombs and a massive production of rock art), there was another period of local abandonment for several hundred years from the late 8th century (Umayyad period) to the late 13th to 14th century (Mamluk period). The Mamluk revival (a series of camp sites and Arabic inscriptions in stone) was however short-lived, with widespread evacuation of the Jabal Qurma taking place once again from the 15th to the late 19th or even early 20th century, with proof only for infrequent and spread out camping.

The cyclical rearrangements of settlement in the Jabal Qurma region are still unexplained. Evidently, climate and environment, and changes therein, were perhaps crucial; while they may have substantially facilitated settlement in the Jabal Qurma area in some periods, they may have rendered the region wholly inhospitable in other periods. Although there is ample evidence for strong climatic and environmental oscillations in the wider Levant for the long period under consideration (*cf.* Cordova 2007), the way in which the north-eastern *badia* in particular was affected by such oscillations is still unknown, due to a lack of local environmental proxies (*cf.* Davies 2005; Rambeau 2010). Sparse evidence from botanical remains and palaeosoils from the Wisad Pools, situated to the east of the Jabal Qurma region, suggests that local conditions may have been more verdant during the Late Neolithic (Rowan *et al.* 2015). However, this conclusion needs to be further substantiated, with attention given to a much broader time frame.

Perhaps another determinant for long-

term settlement trends, as observed in the Jabal Qurma region, were regional economic and socio-political trends, including local production and exchange systems. Pastoral nomadic groups do not usually operate in isolation, but are tied economically to sedentary communities in villages and towns (see e.g. Dyson-Hudson and Dyson-Hudson 1980). The Azraq oasis may have been of relevance in this respect, as its occupational history is broadly in tune with settlement trends in the adjacent Jabal Qurma region. Both areas yield proof of abundant settlement in the Neolithic and Chalcolithic periods, both areas seem to have been completely abandoned during the Bronze Age and Iron Age, and both areas were re-inhabited in classical antiquity (for Azraq see e.g. Kennedy 1982; Lash 2009; Garrard and Byrd 2013 and references therein). While the Jebel Qurma region was frequented by pastoral nomads, the renewal of occupation in the Azraq basin in the 3rd century AD was presumably sedentary in nature, as shown by the Roman military installations at the site, as well as the substantial architecture from later periods (*cf.* Bisheh 1989; Watson and Burnett 2001). We may hypothesize that sedentary occupation of the Azraq oasis at least partially facilitated development of the pastoralist economies in the Jabal Qurma region. This interpretation perceives Azraq to be a focal node of interaction and exchange (see e.g. Sartre 2005: 239 for a similar perspective on the relationship between the Hawran and the Black Desert in general from the 2nd century AD onwards).

Acknowledgements

We wish to express our gratitude to the staff of the Department of Antiquities in Amman, Jordan, for its continuous support in both the preparation and realisation of the *Jabal Qurma Archaeological Landscape Project*. Particular thanks go to Dr. Munther Jamhawi (Director General), Akhtam Oweidi, Ahmad Lash, Husain Saleh, Wesam As-Said, Nasser Zoubi, Khaled Al-Janideh and Mohammad Mahmoud Atoom for their much-valued help. We also would like to thank the *Aerial Photographic Archive for Archaeology in the Middle East* (APAAME), in particular David Kennedy and Rebecca Banks, for the extremely useful aerial photographs of

the Jabal Qurma region. The 2012-2015 field seasons were accomplished with the support of the Faculty of Archaeology of Leiden University, the Netherlands Foundation for Scientific Research (NWO), the Netherlands Embassy in Amman, the Jordan Shale Oil Company, the Leiden University Fund (LUF/ Bijvanck), and Henk Rottinghuis; we are grateful for their invaluable sponsorship.

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