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Funerary archaeology in Qatar: old data and new discoveries

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Summary
This paper reports preliminary findings from select re-analyses and new excavations conducted under remit of the project 'Human Populations and Demographics in Qatar from the Neolithic to the Late Iron Age' (performed in cooperation with Sidra Medicine, the Department of Biology of the University of Rome Tor Vergata, and Qatar Museums Authority). Due to the absence of large settlements, our understanding of pre-Islamic societies in Qatar has until recently been extremely limited. However, progress in bioarchaeological research methods offers new possibilities to address this knowledge gap. Several thousand pre-Islamic burials can now be used as an important resource to elucidate the relationship between population dynamics and socio-cultural changes in pre-Islamic Qatar. In addition to analysis of previously excavated skeletal remains, new excavations can be conducted in carefully chosen cemeteries from different pre-Islamic periods, thereby allowing bioarchaeological samples to be retrieved from undisturbed burial contexts.

Keywords: mortuary practices, ritual burial, bioarchaeology, pre-Islamic Gulf, Qatar

Introduction

Since the 1950s, several archaeological missions have been undertaken in the state of Qatar with the aim of gathering information about the past populations of the Peninsula. Most of these projects were dedicated to registering archaeological remains so that these could be documented and protected. As the most visible elements of archaeology in Qatar, grave mounds have often been subject to excavation, but until recently these have not undergone detailed study. Prior research efforts have also focused mainly on the grave structures themselves, while the buried individuals have received far less attention (Baldoni et al. 2021), meaning that very few human remains have been studied and reported to date (Tillier 1985; Hublin, Tillier & Vandermeersch 1988). In addition, antique robbing activities have resulted in many grave mounds being mostly empty upon excavation, which makes accurate dating extremely difficult.

Based on the arid climate and regional lifestyle, prehistoric populations are understood to have been nomadic groups who left burial mounds but did not establish permanent dwellings. While this explanation may explain the lack of major settlements in this region, many questions about the populations of the area remain unanswered. Previously collected data report only information regarding sex and age at death (Konishi, Gotoh & Akashi 1988; 1989; 1994; Madsen, Jensen & Højlund 2017a; 2017b). Now, using in-depth morphological assessment of the available bone elements combined with detailed analysis of ancient biomolecules (ongoing), we will be able to gather more accurate information on the origin, migration patterns, relationships, admixtures, lifestyles, dietary habits, and health status of the pre-Islamic populations of Qatar.

The interdisciplinary project 'Human Populations and Demographics in Qatar from the Neolithic to the Late Iron Age' is funded by the National Priority Research Program (NPRP10-0208-170411) of the Qatar Foundation. This study aims to conduct the first detailed analysis of skeletal remains from the prehistoric populations of Qatar. Starting with sampling of previously excavated human remains, this project combines archaeology with anthropological analyses, both morphological and biomolecular. Providing more detail, the morphological analysis will enable a reconstruction of the biological profile (assessment of sex and age at death, stature estimation) as well as the development of musculoskeletal stress markers and

health status of the analysed individuals (Pinhasi & Mays 2008; Mays 2010; Baldoni et al. 2021). Biomolecular analyses will focus on carbon and nitrogen stable isotope analysis from bone proteins and ancient DNA (aDNA) analyses (Brown & Brown 2011). These data will also be integrated with geochemical analyses (Sr stable isotope analysis from tooth enamel and soil samples) to generate the first bioarchaeological evidence base for Qatar, which will lead to a better understanding of human prehistory throughout the wider region. This research paper provides a description of the new excavations, integrated with the previous ones and their findings conducted within the project 'Human Populations and Demographics in Qatar from the Neolithic to the Late Iron Age', although no anthropological or geochemical data will be presented as the analyses are still ongoing.

Old data and typology of pre-Islamic graves

The first burial mound excavations in Qatar were performed in the 1950s and 1960s by the Danish Mission at Umm Al Maa[1] (Kjaerum et al. 2017), taking place in the north-west, at Ras Abrouq (Madsen, Jensen & Højlund 2017a) along the western coast, at Ras Al Matbakh (Madsen, Jensen & Højlund 2017b), on the eastern coast, and at Al Mezrooah (Madsen et al. 2017), in the east-central region of Qatar. These excavations were followed by the British Archaeological Mission's excavations in 1973 which investigated burial mounds in Daasa (Buckley 1978a) and Ras Abrouq (Buckley 1978b), both situated on the western coast of Qatar. Later, the French Archaeological Mission also excavated several burial mounds along the eastern coast at Wadi Al Jalta in Al Khor (Midant-Reynes 1980; 1985), and reported the first anthropological study of human bones recovered from these sites (Tillier 1985; Hublin, Tillier & Vandermeersch 1988).

At the end of the 1980s into the early 1990s, the Japanese Archaeological Mission to the Gulf excavated a limited number of graves at Umm Al Maa, while also reassessing several graves previously excavated by the Danish Mission in Qatar (Konishi, Gotoh & Akashi 1988; 1989; 1994). Umm Al Maa was again subject to renewed excavations over two seasons at the end of the 2000s, conducted by an archaeological team from Germany acting on behalf of the Qatar Museums Authority (Schreiber & Muhle 2008; Schreiber et al. 2009; Muhle & Schreiber 2012). From 2009 to 2014, members of the Qatar National Historic Environment Record (QNHER), a cooperative project between Qatar Museums and the University of Birmingham, investigated several grave mounds and other burial sites in different locations across Qatar, including Ras Eshairij (Cuttler et al. 2012a), Wadi Al Debaian (Bain et al. 2011a; Cuttler et al. 2014a; Izquierdo Zamora, Cuttler & Al-Naimi 2015; Izquierdo Zamora et al. 2015), Simaisma (Bain et al. 2011b; Cuttler 2011), Al Wakra (Cuttler et al. 2012b), Al Ghafat (Cuttler et al. 2014b), and Al Thakhira (Cuttler 2014c). The team also re-studied burial mounds in Wadi Al Jalta that had previously been excavated by the French Archaeological Mission to Qatar (Cuttler 2014d). In 2015, further burial mounds were subject to excavation during the South Qatar Survey Project of the German Archaeological Institute (Tiltmann & Meier 2015). The Department of Archaeology at Qatar Museums also conducted several excavations, mostly driven by development projects in different parts of Qatar, such as Al Wusail (Khulaifi 1988), Simaisma (Abdulhamid et al. 2011), Lesha (Yassin et al. 2016), Al Mebtaeda (Yassin et al. 2016), and Al Mezrooah (Sakal & Yassin 2018; Yassin 2018). Among these multiple projects, only the excavations by Japanese and German teams at Umm Al Maa were specifically dedicated to researching burial mounds, hence our knowledge of burial archaeology in Qatar remains limited.

Initial typology for Qatari burial mounds was drafted by the Japanese Archaeological Mission to the Arabian Gulf, based on six fresh excavations at Umm Al Maa, and ten restudied burial mounds originally excavated by the Danish Mission in Qatar. Four major types were differentiated at this time based on construction techniques, existence of an underground burial chamber, and overall position of the buried individual (Konishi, Gotoh & Akashi 1994: 1). This approach remained the only attempt to apply a basic classification until the QNHER team subsequently established a more detailed typology of pre-Islamic graves in Qatar (Cuttler, Al Naimi & Tetlow 2013). The QNHER typology has been subject to further modifications over the intervening years (Izquierdo Zamora, Cuttler & Al-Naimi 2015), with the latest publication describing ten different types (Cuttler &

[1] The geographic names used in the text are in accordance with the names used in the Qatar Cultural Heritage Information Management System (QCHIMS) of Qatar Museums Authority and as published by the Center for CGIS at the Qatar Ministry of Municipality.

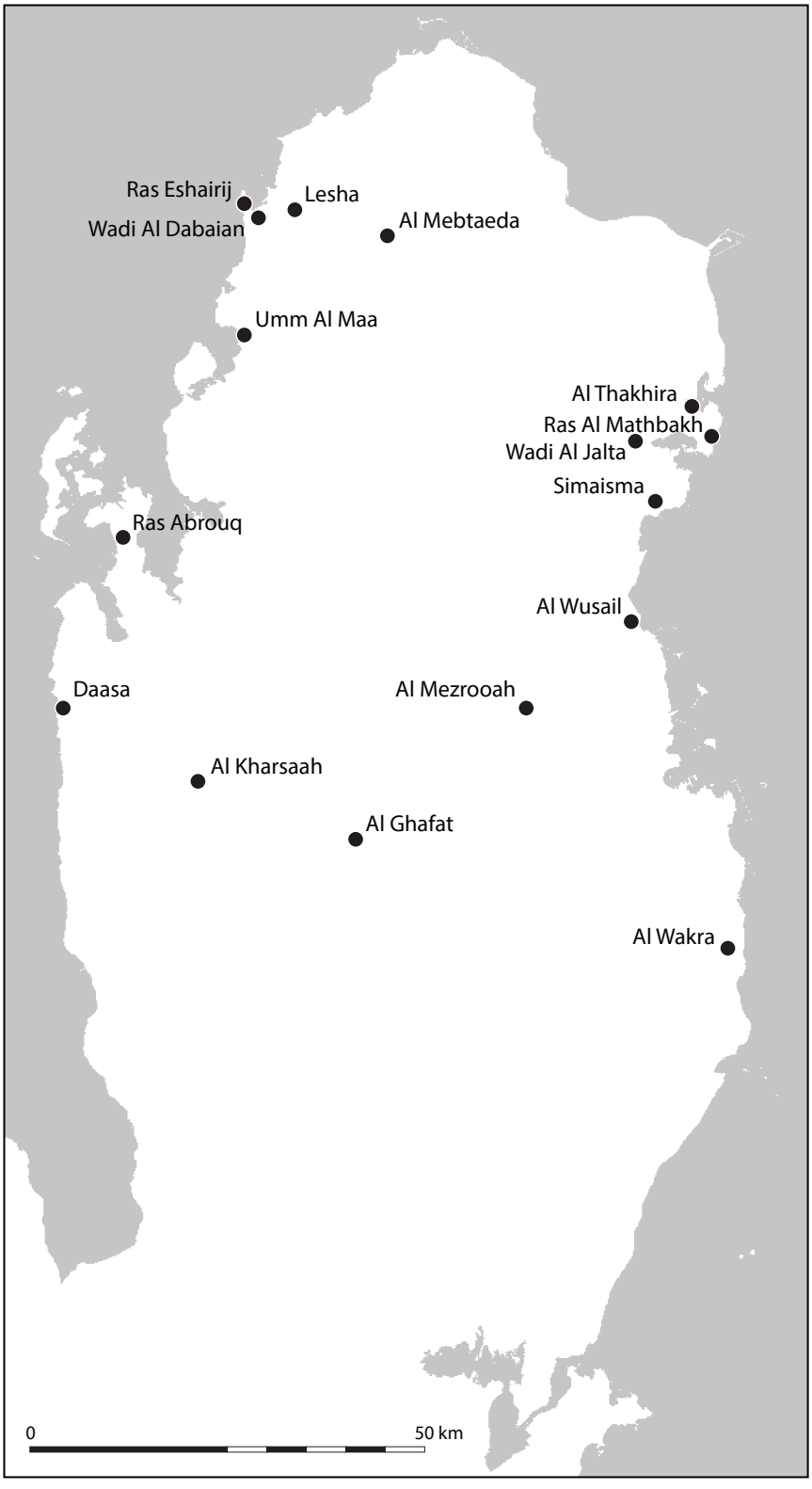

Figure 1. *A map of Qatar showing the sites mentioned.*

Izquierdo Zamora 2019), although various issues and some confusion still remain.[2]

In the current project, individuals from previously excavated graves were newly analysed using a morphological approach, with some also being selected for biomolecular analyses including genomics and stable isotope ratios in bone proteins and tooth enamel, thus enabling reconstruction of diet and geographic origin. Furthermore, the chronology of graves in Qatar has long been a point of discussion, since very few of these have been subject to radiocarbon dating until now. In the current study, new methods of bone and teeth bioapatite analysis will be applied to date pre-Islamic Qatari graves and buried individuals with unprecedented accuracy.

New discoveries at Wadi Al Debaian cemetery

The archaeological site of Wadi Al Debaian is located at the north-west tip of the Qatar Peninsula, *c.*3 km south-west of the Al Zubarah archaeological site (Fig. 1). This wadi is the largest in north-west Qatar and extends *c.*5 km inland. Palaeo-environmental investigations have revealed that this site was located on the edge of a shoreline, due to higher sea levels around the late sixth millennium BC. Today, the Wadi Al Debaian site is *c.*1.5 km away from the coast and is known as one of the earliest archaeological sites in Qatar. This multi-period site was initially excavated between 2011 and 2014 by the QNHER team, which documented remains from between the mid-sixth and mid-third millennia BC based on radiocarbon dating. No major settlement remains were discovered, except for basic middens, pits, hearths, and post holes.

Systematic test pitting at the site during 2011 and 2012 revealed the existence of a cemetery (HAR20775) consisting of simple pit graves. The QNHER team excavated one grave thoroughly (after Cuttler [5004] hereafter HAR20775-Grave 4) and documented the existence of three other possible graves. HAR20775-Grave 4 was oriented north-north-west–south-south-east and measured *c.*1.65 x 1.10 m. It contained a flexed skeleton in foetal position on its right side, facing west, with the head placed towards the north. This was the first time this type of grave had been documented in Qatar, since all previously documented graves were of the stone-built cairn or tumulus type (Cuttler, Al Naimi & Tetlow 2013). This new grave type, which did not feature any superstructure or marking, was designated Type 9 (Izquierdo Zamora, Cuttler & Al-Naimi 2015).

The new activities of the Qatar Museums team concentrated on fully excavating three possible grave cuts previously discovered by the QNHER team. Pits were excavated into the natural gypsum layer and partly also into the Eocene limestone bedrock. There were no markings or lining of the graves with stones, etc. The Qatar Museums team was able to excavate two of these grave cuts with intact burials (Fig. 2).

HAR20775-Grave 1 is located at the eastern part of Trench 27E and was partially excavated and backfilled by the QNHER team in 2012. The maximum dimensions of the grave cut were 1.6 x 0.6 m and 0.43 m in depth. The buried individual was placed in a smaller cut at the base of the grave with dimensions of 1.1 x 0.45 m. This was probably created to keep the body in an extreme foetal position without leaving any surrounding space. The head of the deceased individual was placed to the north, facing west, and the body was resting on its right side, resembling the previously excavated HAR20775-Grave 4. Maximum dimensions were 0.9 x 0.4 m. Almost all bones were present although not perfectly preserved. The skull was still lying on its right side, while both arms were folded up and lying on top of each other, with the left arm positioned over the right. The open hands were placed in front of the skull, again on top of each other. It seems that a long cylindrical object, perhaps a pin, was placed diagonally between the hands. The material of this object is still not entirely clear, but overall dimensions were 20 cm long and 0.5 cm thick. A perforated pearl bead was also found during screening of the grave fill around the skull. This bead represents the oldest pearl ever found in Qatar. The lower limbs exhibited an extreme flexed position, being

[2] The newly introduced Type 10 was named as Type 8c (Cuttler & Izquierdo Zamora 2019: table 3.1 and fig. 3.2). It seems that the authors were confused as to whether to introduce it as a new type or as a subtype of Type 8. This is also clearly visible as the QNHER 20784, one of the only two representatives of Type 10, was assigned to Type 8 in another part of the text (2019: 59). Furthermore, there is a misconception about the sitting position of the deceased as assumed by the authors. Although figure 11 in the publication of the Japanese team seems to show a sitting person (Konishi, Gotoh & Akashi 1994: fig. 11) it was never mentioned or described as such in the text but 'A corpse is put in a flexed position possibly with some funerary objects on the bottom of the pit...' (1994: 7). Furthermore, it is not anatomically possible to put a deceased person in a sitting position in a hollow grave chamber without any support.

Figure 2. *Wadi Al Debaian Graves 1 and 2.*

placed directly in front of the abdomen while the feet were outstretched. As was also the case in HAR20775-Grave 4, the skeleton was covered with a deposit of fine-grained and compact silty brown sand, and above this by compact rocky sand mixed with gypsum crystals. This top layer probably represents the material that was dug out to create the burial pit, thus making it extremely hard to distinguish the grave cut.

Approximately 1 m east of HAR20775-Grave 1 lies HAR20775-Grave 2, where again no clear grave cut could be identified, although maximum dimensions were 1.1 x 0.7 m and 0.47 m. The individual was placed in a smaller cut with dimensions of 0.9 x 0.65 m, arranged in a foetal position on the left side and facing east. The skeletal elements were poorly preserved in comparison with HAR20775-Grave 1 and HAR20775-Grave 4, with only the skull, ribs, and long bones sufficiently preserved to evaluate position. This grave did not contain any grave-goods.

In general, it can be noted that HAR20775-Grave 1 and HAR20775-Grave 4 displayed similarities in orientation and position, although the individual in HAR20775-Grave 1 was buried in an extreme foetal position. The individual in HAR20775-Grave 2 was similarly oriented but was facing east instead, thus indicating that the direction of the face was not a ritual element. The perforated pearl bead (Fig. 3) found in HAR20775-Grave 1 is particularly important as this connects Wadi Al Debaian with other archaeological sites across eastern Arabia, where pearls have previously been found in Neolithic graves (Charpentier, Phillips & Méry 2012).

Based on the radiocarbon dates from an overlying firepit and three fragments of 'Ubaid -type ceramics from the fill of the HAR20775-Grave 4, the QNHER team suggested dating this cemetery to the late Neolithic period (Izquierdo Zamora et al. 2015). It is hoped the teeth bioapatite collected from the individuals in HAR20775-Grave 1 and HAR20775-Grave 2 will provide

Figure 3. *Wadi Al Debaian, perforated pearl bead from Grave 1.*

clearer results and date the cemetery more securely. These samples are still under examination.

A new cemetery at Al Kharsaah

Al Kharsaah (HAR5047) is located *c.*55 km west of Doha, directly north of the homonymous village. It contains five large burial mounds built on a raised shoreline overlooking an area with several *riyadh* (fertile depressions).

The burial mounds form two distinct groups. The eastern group consists of two mounds with a rectangular stone-built extension to the south. The western group consists of one similar burial mound with a rectangular stone-built extension to the south, accompanied by two further mounds, built side by side and seeming to overlap each other. All burial mounds are approximately 2 m in

Figure 4. *Al Kharsaah, a general view of the grave mounds during excavation.*

Figure 5. *Al Kharsaah, Grave 1.*

height and 8–10 m in diameter. The two overlapping burial mounds were chosen for excavation as these seemed to be the least disturbed.

HAR5047-Graves 1 and 2 were both covered by a layer of crushed limestone fill which gave a hard shell to the mound. The original cover was probably not made of stones only but a mixture of crushed stone and sediment. The sediment seems to have been blown and washed away over millennia so that today only a stone layer is visible on the surface. After the removal of the outer layers, it became clear that there was a long rectangular structure situated between the two burial mounds, having been covered with the eroded fill of the mounds and therefore not initially visible. This structure was another grave chamber that held a ritual animal grave and was registered as HAR5047-Grave 3 (see below). After partially excavating the mounds (Fig. 4), it became clear that HAR5047-Graves 2 and 3 were the first to have been constructed. HAR5047-Grave 1 was later attached to the eastern side of HAR5047-Graves 2 and 3 without damaging their structure. Based on this discovery, it is possible to interpret the rectangular stone-built extensions to the south of other graves as ritual animal graves.

HAR5047-Grave 1 was constructed around a central and oval-shaped burial chamber 3 x 2.5 m (Fig. 5). The chamber itself consists of a burial pit dug in virgin soil and partly into bedrock. The base of the burial pit was flattened so that a smooth rock surface was constructed. Above the burial pit and following the same outlines, a stone wall was constructed in order to raise the height of the chamber. In terms of construction this corresponds to QNHER Type 8 (Cuttler & Izquierdo Zamora 2019). Intriguingly, the chamber walls were built using a thick white gypsum mortar. The wall tapers slightly so that a bell-shaped hollow room rises above the burial pit which was then sealed with limestone capstones ranging from 1.5–6 cm thick up to 1.3 x 0.8 m

in size. Three of these were used to form the roof of the HAR5047-Grave 1 chamber and were still intact by the time of the excavation. The entire stone-built part of the grave chamber was then covered with a layer of white gypsum. Around this chamber a circular wall was built, which respected the pre-existing structures of HAR5047-Graves 2 and 3. In the inner part, this circular wall was built as a dry wall. The area between the ring wall and chamber was filled with a crushed limestone, silt, and sand mixture to build the burial mound. The mound was then covered with a thin gypsum layer onto which flat stones were placed and covered again with gypsum mortar. Finally, the entire mound was covered with a mixture of crushed limestone, silt, and sand. Unfortunately, the grave had clearly been disturbed as this chamber was damaged on its north-west side, from where grave robbers are thought to have entered. While digging for the entrance, they appear to have cut through an iron sword that was embedded into the outer surface of the grave chamber and covered with a thick layer of gypsum (Fig. 6). Around 40 cm of this sword was still *in situ* by the time of the excavation, while fragments of the remaining parts were found spread around the area where the grave robbers entered. This is the first time that the ritual of adding a sword to the outer surface of a grave has been documented in Qatar, and probably also throughout the wider region.

Inside the chamber nearly all the contents had been moved and the entire grave chamber was filled with rubble, comprising a mixture of washed-in sediment and damaged bone fragments. However, at the base of the grave pit the right arm and feet bones of a skeleton were still intact and *in situ*. This allowed a reconstruction of the body's position within the chamber as follows: the body was placed into the chamber in a crouched position on its right side. Based on the position of the arm, the head must have been placed towards the north-west, with the face turned towards the south-west. The arms

Figure 6. *Al Kharsaah, an iron sword embedded into the gypsum plaster of Grave 1.*

Figure 7. *Al Kharsaah, Grave 2.*

were bent while the open hands were placed in front of the face. Thankfully some grave-goods were overlooked by the robbers, which allowed us to excavate a gold earring and two iron objects *in situ* at the southern edge of the chamber. A further iron fragment, subsequently identified as a tiny buckle, and the gold earring suggest that this grave must have had a rich inventory before it was robbed.

HAR5047-Grave 2 was built in a very similar way to HAR5047-Grave 1, although here the gypsum was not white but pale brown in colour as it was probably mixed with sand (Fig. 7). The ring wall and the stone coat of the mounds were in parts better preserved than HAR5047-Grave 1. The chamber was oval (2 x 2.5 m) and covered with three flat white limestone capstones, one of which was found to be broken and collapsed inside the chamber, indicating that the grave chamber was originally hollow. Compared with HAR5047-Grave 1, the chamber of HAR5047-Grave 2 is smaller and rounder, but built in essentially the same way. This grave had also been robbed, with the skeleton on the bottom of the grave having been displaced and the skull crushed. Scattered fragments of iron and bronze objects were found but none of these appeared to be *in situ* as was the case for HAR5047-Grave 1. The position of the skeleton was not easy to establish, but since the leg bones were located in the southern part of the grave, the skeleton was probably also arranged in a crouched position with the head towards the north and the legs to the south.

HAR5047-Grave 3 was discovered between HAR5047-Graves 1 and 2, marked with an upright standing flat stone on its north side. To the south of this, a stone-built chamber measuring 0.6 x 1.8 m was discovered, having been constructed leaning towards HAR5047-Grave 2. The fill of this chamber was very compact, including hard silty sand and small stones. In the bottom of the chamber at a depth of 0.9 m, the complete skeleton of a camel was recovered (Fig. 8).

Figure 8. *Al Kharsaah, Grave 3.*

The camel was in a natural resting position, which was visible in the bent front and back legs and the position of the spine and ribs. During excavation, it became clear that the live camel had been led into the grave pit and forced to sit. The burial of a live animal was also suggested by the slope at the southern end of the grave which would have allowed the camel to step into the chamber without significant effort. After the camel was seated, it must have been slaughtered and its neck placed backwards. The southern end of the chamber was then blocked with a large piece of ashlar limestone, which also partly covered the camel's body. Beside the adult camel more smaller bones were found, which probably belonged to a young camel. This animal grave chamber was built in a similar way to the human graves. A simple pit was dug into virgin soil, above which a superstructure consisting of at least two courses of large ashlar limestone was built. The whole was covered with the same fill as the human graves and also partly covered with the same lime plaster used in HAR5047-Grave 1. An upright standing marker stone was then set on the northern end of the camel grave. On the camel's hip the remains of a woven matt were discovered, which may have been the remnants of a saddle pad. A shell and metal fragments were also found in the same area, which might have formed part of the camel's saddle. Camel graves in connection with human graves are mainly known from Oman (Curci & Maini 2017) and the UAE during the Iron Age and late pre-Islamic period (Mashkour 1997; Uerpmann 1999; Jasim 2007). Also in Qatar, Danish archaeologists found two similar graves in Al Mazrooah containing the remains of a camel and another animal (either camel or horse) buried in their own stone chambers to the south of a human burial (Madsen et al. 2017). It is assumed, in the case of HAR5047-Grave 2, that the camel was the mount of the buried individual and was sent with this person to the afterlife. The tradition of adding camels

Figure 9. *Al Kharsaah, Grave 4 older burial.*

as a companion to the dead is known from pre-Islamic poetry (King 2009).

HAR5047-Grave 4 is a circular cairn consisting of medium-sized stones (*c.*10–20 cm), 2.4 m in diameter and *c.*10–15 cm in height, located between the larger grave mounds. This grave was also subject to excavation as it displayed a different type of burial. While larger stones surround the cairn, smaller stones were placed in the middle and some at the edges. This cairn grave brought the most surprising results as here two skeletons were retrieved, buried one on top of the other. Both skeletons showed different positions, which might indicate that they belong to different burial traditions. The grave itself was built as a circular stone mound around an oval grave-pit oriented east–west. In this pit a skeleton (individual 1) was placed in an extreme crouched foetal position (Fig. 9). The skeleton lay on its right side, while the skull was placed to the west, facing south. The front part of the skull was damaged by rodent disturbance. The second skeleton (individual 2) was found almost on the surface of the grave, placed between the stones of the pre-existing grave while damaging the stone circle on its eastern side (Fig. 10). This burial was also oriented east–west, but with the body resting on its back and outstretched, probably with arms crossed over the abdomen. Since this grave was situated very near the surface, most of the bones were highly fragmented. Unfortunately, there were no grave-goods to provide clues as to the date of this burial. In general, it can be said that HAR5047-Grave 4 was possibly built and reused during the late Iron Age, while the cemetery with larger grave mounds dates to the Seleucid/Parthian period, as suggested for a burial mound in Al Mezrooah, where two ritual animal burials (a camel and a horse/camel) were also discovered (Madsen et al. 2017). Bone and teeth bioapatite collected from all individuals will bring more clarity to the dating of the different grave types and therefore to the stratigraphy of the cemetery.

Figure 10. *Al Kharsaah, Grave 4 younger burial.*

How the buried individuals in HAR5047-Grave 4 related to each other is a key question still to be answered by this ongoing project. Stable isotopes and aDNA analyses will, it is hoped, shed more light on the relationship between these individuals and their possible origin and ancestry. For now, it is clear that within the same cemetery, multiple types of graves were built and different burial rituals performed. Further studies might clarify why the individual in HAR5047-Grave 2 — and probably also in the other large unexcavated grave mounds — was buried alongside an animal whereas the individual in HAR5047-Grave 1 was not. The discovery of a sword outside HAR5047-Grave 1 is also noteworthy as this represents a unique burial ritual.

Conclusions and perspectives

The study of previously excavated human remains and current discoveries offer new information relating to the prehistoric population of Qatar. The anthropological analyses and radiocarbon dating of the individuals are still in progress. The latter will be provided by the bone and teeth bioapatite samples, as usually bone collagen is not sufficiently well preserved. This new dating method was already successfully implemented in neighbouring countries to date human remains. Based on this data we will be able to identify chronological differences within the cemeteries and even within the same grave, which makes the samples collected from Al Kharsaah cemetery extremely important.

The newly excavated graves also documented distinct construction techniques (gypsum mortar), grave-goods (pearl bead), and rituals (camel grave, sword on grave chamber) that require further study. In general, it would seem important to recatalogue previously excavated graves and relevant data (size of mound, size of chamber/pit, orientation, grave-goods). This will help to resolve current typological

problems while also adding new criteria to existing typologies.

During the new excavations, the archaeology team of Qatar Museums carefully collected bone samples including petrous bones and teeth which will be used for aDNA analysis. Very soon, morphological and molecular analyses will also be extended to the newly excavated individuals.

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References

Abdulhamid M., Yassin K., Abd Yunus S. & Arrock H. 2011. Report on the first season of the rescue excavations conducted at Aerospace City, north of Smaisma. Doha: Qatar Museums Authority. [Unpublished circulated report.]

Bain K., Bates R., Cuttler R., Dodds N., Momber G., Roberts H. ... Tetlow E. 2011a. Excavation of cairns north of Wadi Debay'an. Pages 68–95 in Qatar National Historic Environment Record and Remote Sensing Project, Stage 3, historic landscapes and palaeoenvironments, terrestrial and marine analysis, QNHER Vol. 3, 2010–2011. Doha: Qatar Museums Authority. [Unpublished circulated report.]

Bain K., Bates R., Cuttler R., Dodds N., Momber G., Roberts H. ... Tetlow E. 2011b. An inhumation from Aerospace City, Smaisma, near Al-Khor, eastern Qatar. Pages 146–150 in Qatar National Historic Environment Record and Remote Sensing Project, Stage 3, historic landscapes and palaeoenvironments, terrestrial and marine analysis, QNHER Vol. 3, 2010–2011. Doha: Qatar Museums Authority. [Unpublished circulated report.]

Baldoni M., Al-Hashmi M., Bianchi A.E., Sakal F., Al-Naimi F., Leisten T. ... Tomei S. 2021. Bioarchaeology-related studies in the Arabian Gulf: Potentialities and shortcomings. *Homo* 72/1: 17–32.

Brown T. & Brown K. 2011. *Biomolecular archaeology. An introduction.* Oxford: Wiley-Blackwell.

Buckley D.G. 1978a. The Excavation of two cairns at Al-Da'asa. Pages 76–79 in B. de Cardi (ed.), *Qatar archaeological report: Excavations 1973*. Oxford: Oxford University Press.

Buckley D.G. 1978b. The Excavation of seven burial cairns on the Ras Abaruk peninsula. Pages 120–135 in B. de Cardi (ed.), *Qatar archaeological report: Excavations 1973*. Oxford: Oxford University Press.

Charpentier V., Phillips C. & Méry S. 2012. Pearl fishing in the ancient world: 7500 BP. *Arabian Archaeology and Epigraphy* 23/1: 1–6.

Curci A. & Maini E. 2017. Zooarchaeological analysis of two dromedaries (*Camelus dromedarius* L.) from Late Iron Age graves in Wādī ʿUyūn at Sināw (al-Sharqiyyah, Sultanate of Oman) (poster). *Proceedings of the Seminar for Arabian Studies* 47: 67–74.

Cuttler R. (ed.). 2011. An excavation of human remains associated with a cairn scatter at Simaisma, Near Al Khor, Eastern Qatar. Reconstruction of the Late Pleistocene and Holocene depositional systems and paleogeography of Qatar, Stage 2, data analysis, assessment and potential, QNHER Vol. 2, 2011–2012. Doha: Qatar Museums Authority. [Unpublished circulated report.]

Cuttler R.T.H. & Izquierdo Zamora A. 2019. Burial archaeology in Qatar: Landscapes, chronology, and typological change from the Neolithic to the late pre-Islamic. Pages 41–75 in K.D. Williams & L.A. Gregoricka (eds), *Mortuary and bioarchaeological perspectives on Bronze Age Arabia*. Gainesville, FL: University of Florida Press.

Cuttler R., Al Naimi F. & Tetlow E. 2013. Typological and chronological variation of burial in Qatar: 'Ubaid to late pre-Islamic (poster). *Proceedings of the Seminar for Arabian Studies* 43: 99–110.

Cuttler R., Delaney L., Bain K., Dingwall L., Crassard R., Nash H. ... Roberts H. 2012a. Archaeological survey and excavations at the Oryx Farm, Rás 'Ushayriq. Pages 48–63 in Qatar National Historic Environment Record and Remote Sensing Project, Stage 4, historic landscapes and palaeoenvironments, terrestrial and marine analysis, QNHER Vol. 4, 2011–2012. Doha: Qatar Museums Authority. [Unpublished circulated report.]

Cuttler R., Delaney L., Bain K., Dingwall L., Crassard R., Nash H. ... Roberts H. 2012b. Excavations to the South of Al Wakra 2012. Pages 89–124 in R. Cuttler, K. Bain,

E. Tetlow, E. Keiran & J. Lewis, Messaieed New Port. Marine archaeological assessment, terrestrial survey and terrestrial excavation 2011–2012, Qatar National Historic Environment Record, Event 117. Doha: Qatar Museums Authority. [Unpublished circulated report.]

Cuttler R., Bain K., Crassard R., Delaney L., Dingwall L., Gamble M. ... Izquierdo Zamora A. 2014a. Prehistoric archaeology in Wadi Debay'an, north west Qatar, Events 66 & 67. Pages 134–149 in Qatar National Historic Environment Record and Remote Sensing Project, Stage 5, historic landscapes and palaeoenvironments, terrestrial and marine analysis, QNHER Vol. 5, 2012–2014. Doha: Qatar Museums Authority. [Unpublished circulated report.]

Cuttler R., Bain K., Crassard R., Delaney L., Dingwall L., Gamble M. ... Izquierdo Zamora A. 2014b. Extensive survey and excavation near Al Ghafat, Event 191. Pages 108–130 in Qatar National Historic Environment Record and Remote Sensing Project, Stage 5, historic landscapes and palaeoenvironments, terrestrial and marine analysis, QNHER Vol. 5, 2012–2014. Doha: Qatar Museums Authority. [Unpublished circulated report.]

Cuttler R., Bain K., Crassard R., Delaney L., Dingwall L., Gamble M. ... Izquierdo Zamora A. 2014c. Excavations at Al Thakhira, Event 180, prehistoric burial QNHER 20598. Pages 178–179 in Qatar National Historic Environment Record and Remote Sensing Project, Stage 5, historic landscapes and palaeoenvironments, terrestrial and marine analysis, QNHER Vol. 5, 2012–2014. Doha: Qatar Museums Authority. [Unpublished circulated report.]

Cuttler R., Bain K., Crassard R., Delaney L., Dingwall L., Gamble M. ... Izquierdo Zamora A. 2014d. The excavation of Neolithic burial cairns at Wadi Al Jalta, Event 179. Pages 172–175 in Qatar National Historic Environment Record and Remote Sensing Project, Stage 5, historic landscapes and palaeoenvironments, terrestrial and marine analysis, QNHER Vol. 5, 2012–2014. Doha: Qatar Museums Authority. [Unpublished circulated report.]

Hublin J-J., Tillier A.M. & Vandermeersch B. 1988. Étude du squelette humain découvert a Khor (Qatar). Pages 185–194 in M.L. Inizan (ed.), *Mission archéologique française à Qatar.* ii. Paris: Éditions Recherche sur les civilisations.

Izquierdo Zamora A., Cuttler R.T.H. & Al-Naimi F.A. 2015. Prehistoric and pre-Islamic burial archaeology in Qatar: New results and perspectives (poster). *Proceedings of the Seminar for Arabian Studies* 45: 159–173.

Izquierdo Zamora A., Cuttler R., Al-Naimi F.A. & Owens L. 2015. Between rocks and a hard place: Prehistoric funerary practices at Wādī Ḍebayʿān, northern Qatar. *Arabian Archaeology and Epigraphy* 26: 1–11.

Jasim S. 2007. The excavation of a camel cemetery at Mleiha, Sharjah, U.A.E. *Arabian Archaeology and Epigraphy* 10: 69–101.

Khulaifi J. 1988. Preliminary report of the excavations at Al Wusail. Doha: Qatar Museums Authority. [Unpublished circulated report.]

King G. 2009. Camels and Arabian balîya and other forms of sacrifice: A review of archaeological and literary evidence. *Arabian Archaeology and Epigraphy* 20/1: 81–93.

Kjaerum P., Knuth E., Madsen H.J., Nielsen V., Højlund F., Uerpmann M. & Uerpmann H-P. 2017. Burial mounds at Umm al-Ma. Pages 49–66 in F. Højlund (ed.), *Danish archaeological investigations in Qatar 1956–1974.* (Jutland Archaeological Society Publications, 97). Aarhus: Aarhus University Press.

Konishi M.A., Gotoh T. & Akashi Y. 1988. Archaeological researches in the Gulf: A preliminary report of the excavations in Bahrain and Qatar, 1987/8 Season. *Orient* 24: 18–46.

Konishi M.A., Gotoh T. & Akashi Y. 1989. *Excavations in Bahrain and Qatar 1987/8, Gulf Archaeological Project Report II, Japanese Archaeological Mission to the Arabian Gulf.* (Occasional Papers, 3). Tokyo: Rikkyo University, Centre for Asian Studies.

Konishi M.A., Gotoh T. & Akashi Y. 1994. *Excavations at Umm al-Ma' burial field, Qatar 1990/91. Gulf Archaeological Project Report II, Japanese Archaeological Mission to the Arabian Gulf.* (Occasional Papers, 4). Tokyo: Rikkyo University, Centre for Asian Studies.

Madsen H.J., Jensen J.A. & Højlund F. 2017a. Burial mounds at Ras Abaruk. Pages 19–26 in F. Højlund (ed.), *Danish archaeological investigations in Qatar 1956–1974.* (Jutland Archaeological Society Publications, 97). Aarhus: Aarhus University Press.

Madsen H.J., Jensen J.A. & Højlund F. 2017b. A pot burial at Ras al-Matbakh. Pages 27–29 in F. Højlund (ed.), *Danish archaeological investigations in Qatar 1956–1974.*

(Jutland Archaeological Society Publications, 97). Aarhus: Aarhus University Press.

Madsen H.J., Jensen J.A., Uerpmann M., Uerpmann H-P. & Højlund F. 2017. Two burial mounds at Mezru'ah. Pages 49–66 in F. Højlund (ed.), *Danish archaeological investigations in Qatar 1956–1974*. (Jutland Archaeological Society Publications, 97). Aarhus: Aarhus University Press.

Mashkour M. 1997. The funeral rites at Mleiha (Sharja-U.A.E); the camelid graves. *Anthropozoologica* 25–26: 725–736.

Mays S. 2010. *The archaeology of human bones.* (Second edition). Abingdon: Routledge.

Midant-Reynes B. 1980. Fouilles de tumulus à Khor. Pages 103–110 in J. Tixier (ed.), *Mission archéologique française à Qatar: 1976–77, 1977–78.* i. Doha: Ministry of Information and Antiquities.

Midant-Reynes B. 1985. Un ensemble de sépultures en fosses sous cairn à Khor (Qatar): Étude des rites funéraires. *Paléorient* 11: 129–139.

Muhle B. & Schreiber J. 2012. Ein römisches Schwert aus dem Gräberfeld von 'Umm al-Mā', Qatar. Pages 373–383 in H. Baker, K. Kaniuth, & A. Otto (eds), *Stories of long ago. Festschrift für Michael D. Roaf*. Münster: Ugarit.

Pinhasi R. & Mays S. (2008). Advances in human paleopathology. Hoboken, NJ: John Wiley & Sons.

Sakal F. & Yassin K. 2018. Mazrooah burial mound excavation. *The British Foundation for the Study of Arabia Bulletin* 23: 17–18.

Schreiber J. & Muhle B. 2008. Excavations at the burial ground of Umm al-Mā, Qatar: Preliminary report on the first season, February–March 2008. Doha: Qatar Museums Authority. [Unpublished circulated report.]

Schreiber J., Daroczi T.T., Muhle B. & Ewersen J. 2009. Excavations at Umm al-Mā, Qatar: Preliminary report on the second season, 2008/2009. Doha: Qatar Museums Authority. [Unpublished circulated report.]

Tillier A-M. 1985. Tumulus de Khor – Étude anthropologique. *Paléorient* 11: 141–144.

Tiltmann S. & Meier D. 2015. The Cairn excavation. Pages 8–10 in The South Qatar Survey Project (SQSP). Qatari German joint archaeological fieldwork by QM and DAI. Spring Season 2015, final report. Doha: Qatar Museums Authority and German Archaeological Institute. [Unpublished circulated report.]

Uerpmann H. 1999. Camel and horse skeletons from prehistoric graves at Mleiha in the Emirate of Sharjah (U.A.E.). *Arabian Archaeology and Epigraphy* 10/1: 102–118.

Yassin K. 2018. Excavation of burial tomb at Mazroah, HAR20632. Doha: Qatar Museums Authority. [Unpublished circulated report.]

Yassin K., Al Noaymy S. & Kodi M. 2018. Report on the excavations for the Al Zubarah Road Development Project P16. Doha: Qatar Museums Authority. [Unpublished circulated report.]

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