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The Archaeological Site of Mudhmar East (Adam, Ad-Dakhiliyah, Oman): Results from the 2019 Excavations

*Mathilde Jean, Maria Paola Pellegrino, Louise Bigot, Josselin Pinot, Victoria de Castéja &
Guillaume Gernez*

ABSTRACT:

Since 2015 the site of Mudhmar East (Adam, Ad-Dakhiliyah Governorate) has emerged as one of the major ritual complexes of the Early Iron Age (900-300 BCE) in Eastern Arabia. This paper presents the results of the latest excavations in 2019. Two areas were investigated. The excavation of Mudhmar East 3 on the jabal slope was completed and this area revealed three monumental walls associated with a complex stratigraphy. Numerous metal artifacts (weapons and snake figurines); and pottery, were recovered in secondary position. The campaign also focused on the grave sitting on the top of the hill, an area distinguished as Mudhmar East 6. This grave, which was badly preserved and had likely been reused, delivered little archaeological material. The 2019 excavation enabled a more thorough investigation of these two essential areas, greatly improving our understanding of this major Iron Age site in the history of Oman.

KEYWORDS: Early Iron Age; Oman; Monumental Structures; Copper Objects; Grave.

موقع المضمار الشرقي الأثري (أدم، الداخلية، عمان): نتائج تنقيبات ٢٠١٩م

ماتيلد جين، وماريا باولا بيليجرينو، ولويس بيغو، وجوسلين بينوت، وفيكيتوريا دي كاستيجا، وغيوم جيرنيز

الملخص:

منذ عام ٢٠١٥م، ظهر موقع المضمار الشرقي (أدم، محافظة الداخلية) كأحد المجمعات الطقوسية الرئيسية من العصر الحديدي المبكر (٩٠٠-٢٠٠ قبل الميلاد) في شرق الجزيرة العربية. يستعرض هذا البحث نتائج التنقيبات الأخيرة التي أجريت في عام ٢٠١٩م، وذلك بدراسة منطقتين، حيث تمت تكملة أعمال التنقيب في المضمار الشرقي (٢) على منحدر الجبل، وكشفت هذه المنطقة عن ثلاثة معالم ضخمة مرتبطة بطبقات معقدة. وقد تم العثور على العديد من الأدوات الأثرية المعدنية (الأسلحة، وتماثيل الأفعى) والفخار في وضع ثانوي. وركزت الحملة أيضاً على القبر الموجود على قمة التل، وهي منطقة تم تمييزها باسم المضمار الشرقي (٦). هذا القبر، الذي كان محفوظاً بشكل سيئ ومن المحتمل أنه أعيد استخدامه، لم يقدم سوى القليل من المواد الأثرية. وقد ساعدت تنقيبات عام ٢٠١٩م على إجراء دراسة أكثر شمولية في هاتين المنطقتين الأساسيتين، مما أدى إلى تحسن كبير في فهمنا لهذا الموقع الرئيسي من العصر الحديدي في تاريخ عمان.

الكلمات المفتاحية: العصر الحديدي المبكر؛ سلطنة عمان؛ المباني الأثرية؛ أدوات نحاسية؛ قبر

INTRODUCTION

The site of Mudhmar East is located about 20km east of Adam (Ad-Dakhiliyah Governorate). Previous seasons of excavation (since 2015) revealed one main pillared building (Building 1) and a second one with postholes (Building 2) whose exploration was completed in 2017. These results established Mudhmar East as a major Iron Age cultic site in Oman (Gernez, Jean, and Benoist, 2017; Gernez, Benoist, and Jean, 2017).

Mudhmar East 3, occupying a wide gully on the jabal slope, is a new area of the site being investigated since 2016. A small sounding dug in 2016 unearthed a remarkable amount of pottery revealing an Iron Age occupation in this place, whereas the upper part of the slope was excavated in 2017. Three postholes were found along with one large wall across the slope. The excavation was extended in 2018 down to the bottom of the jabal slope, finally revealing three large walls as well as plentiful objects including bronze weapons (about 4000 arrowheads, complete arrows, bow strings, daggers), bronze animal figurines (snake figurines and one bird), and a large amount of pottery. The area of Mudhmar East 3 and the whole site were occupied during the Early Iron Age, and it was undeniably related to ritual activities (Jean, Pellegrino, and Gernez, 2018). A grave (Mudhmar East 6) was also excavated on the top of the jabal, thus completing the excavation of the site.

AIMS OF THE 2019 CAMPAIGN

The aim of the January 2019 campaign was the completion of our investigation of the area on the jabal – Mudhmar East 3 – where three huge walls built across the gully had been previously identified in 2017 and 2018. One of the main goals was to complete the excavation at the bottom of the slope in order to expose the walls entirely, and to determine their preserved height.

We were also looking out for any other anthropic structure that might have been built on the slope, which could help us understand the

relation between the area of Mudhmar East 3 and Buildings 1 and 2 on the foothill (Figure 1). The distribution of artefacts in this area was also an important issue since the 2018 excavation had uncovered an unexpected amount of more than 4000 copper arrowheads. It was thus necessary to check whether arrowheads in such quantity were present over the whole area (Jean, Pellegrino, and Gernez, 2018). The abundance and location of objects uncovered at the bottom of the slope would bring additional data to help defining the area's function.

The second goal of the 2019 campaign was to excavate Grave 1 on the top of the mountain, in an area called Mudhmar East 6, in order to evaluate its state of preservation and to suggest a date (see Figure 1). Open questions remained, such as whether the grave and the site were contemporaneous, whether the grave had been built during the Early Iron Age, or if it had only been reused throughout the Iron Age.

MUDHMAR EAST 3: THE WALLS ON THE JABAL SLOPE

Archaeological structures

Excavations were carried out in 2019 on the slope in the area previously investigated in 2017 and 2018. Three walls had been found across a large gully cutting the mountain's slope, in order to uncover the north part of the area and expose the walls entirely (Figures 2 and 3).

The three walls, oriented NW-SE, are impressive in height and thickness. They are made of very large stone blocks (up to 1 to 1.30m long) of local limestone, similar to the Jabal Mudhmar limestone formation. Wall 5009, total length 7.60m and maximal height about 2m, is the best preserved. Wall 5022 is 6m long and 1m high, while wall 5028, about 0.60m high, appears to be badly preserved (Figure 4, Table 1). No other archaeological structure was identified in the excavated area.

THE ARCHAEOLOGICAL SITE OF MUDHMAR EAST (ADAM, AD-DAKHILIYAH, OMAN)

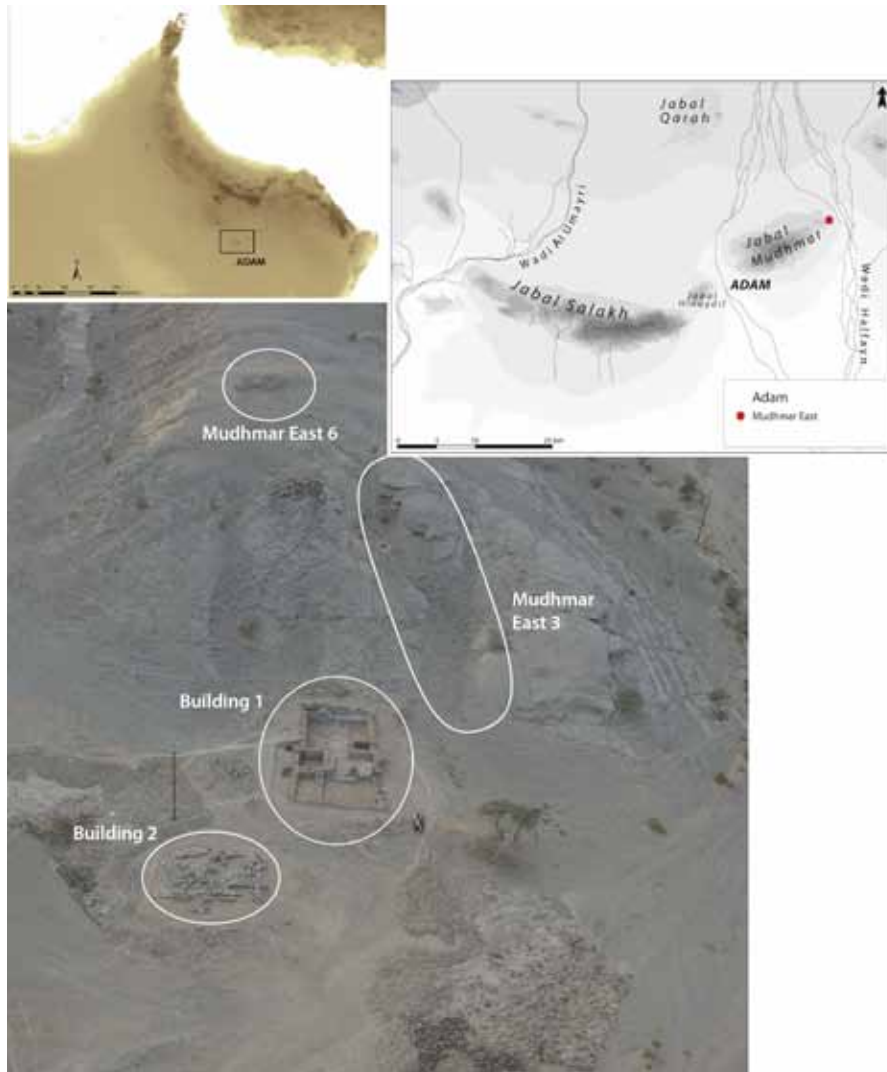


Figure 1: Location of the site of Mudhmar East and aerial view of the site indicating the excavated areas. The 2019 excavations focused on Mudhmar East 3 and Mudhmar East 6 (FAMCO).



Figure 2: Plan of Mudhmar East 3 at the end of the 2019 excavation (M. Jean/FAMCO). The three large walls are well visible.



Figure 3: *The three walls of Mudhmar East 3 at the end of the 2019 excavation, view from the east (M. Jean / FAMCO).*

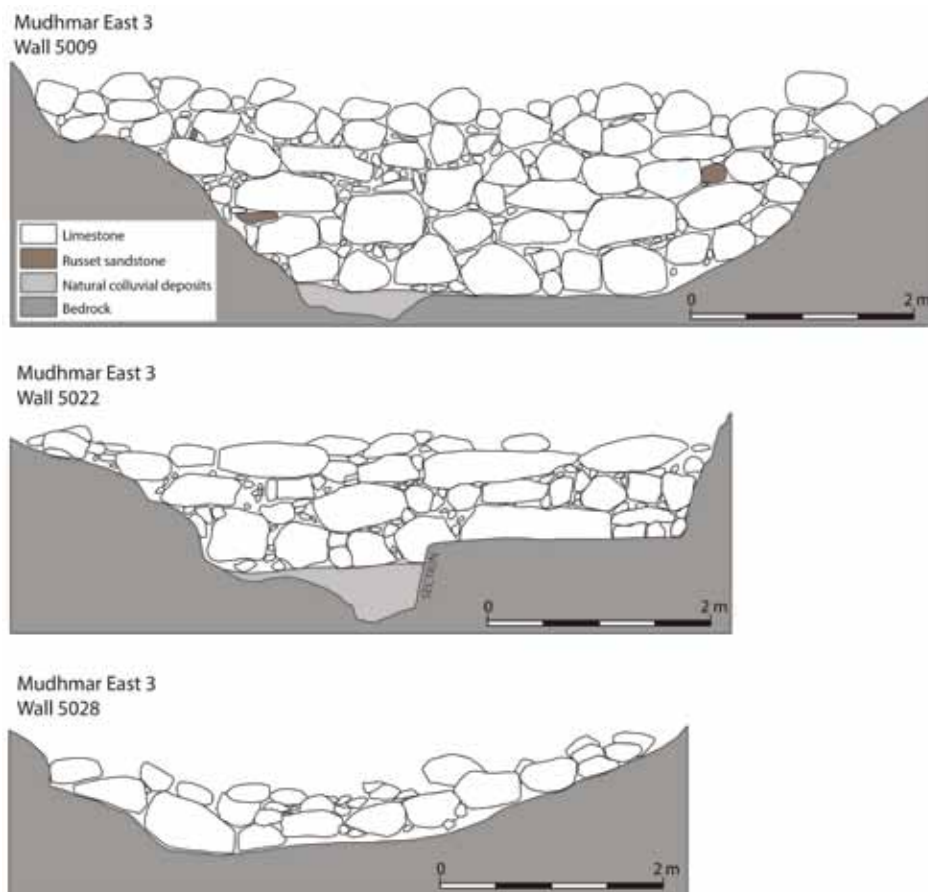


Figure 4: *Drawing of the eastern face of the walls of Mudhmar East 3 (M. Jean/FAMCO).*

Table 1: *Dimensions of the walls of Mudhmar East 3.*

	Length (m)	Maximal height (m)	Maximal thickness (m)
Wall 5009	7.60	2.00	1.50
Wall 5022	6.00	1.00	1.25
Wall 5028	5.30	0.60	1.00

Archaeological interpretation

Several hypotheses were considered for understanding these three large walls of Mudhmar East 3. Why were they built there, across the gully on the jabal slope? Why were they so massive? What is the link with other areas of the site? The hypotheses are discussed below and the most likely one is suggested according to results from the excavations. It is important to bear in mind that one of the 2018 results was the discovery in this area of an ancient natural spring dated to the Iron Age by ¹⁴C dating and tuff analysis supervised by T. Beuzen-Waller, geomorphologist (detailed results in a forthcoming publication).

The Fortification Hypothesis

The significant thickness, together with the large size of the stone blocks that were used to construct the walls, suggested they could be interpreted as fortification walls. However, the purpose of such walls in this place seems to have been quite unlikely. As a matter of fact, the site's main buildings stand at the bottom of the slope whereas the three walls sit on the steep-sided jabal slope. Thus, when one looks up from the bottom of the site, one sees that the walls are actually located to the side of the buildings rather than surrounding and protecting the buildings and the site. As a point of comparison, we can observe at the Iron Age forts of Husn Salut and Lizq how the surrounding fortification wall was clearly built in order to protect the site (Kroll, 2013; Avanzini and Degli Esposti, 2018). Moreover, there was no large archaeological structure found higher up on the slope, that would justify the construction of fortification walls in such a location. For these reasons, the fortification hypothesis seems unsatisfying.

The dam hypothesis

The size of the walls, their location and their association with an ancient spring could be an indication of a dam. But as far as we know, the only evidence of ancient dams in southern Arabia was found in Yemen during the pre-Islamic period (Charbonnier, 2012; Charbonnier and Schiettecatte, 2016). Yemeni dams are found in high mountain areas where the monsoon influence is substantial; they include a water crossing system and are made of masonry. None of these elements were identified in the walls of the Mudhmar East 3. Moreover, the Iron Age spring was probably a slow, maybe intermittently flowing spring. The aridity of the place, the smallness of the ancient spring and the construction methods of the walls are elements for rejecting the dam hypothesis.

The Terrace Hypothesis

Our last hypothesis is the most likely one to understand the function of the walls of Mudhmar East 3. Considering the size, the number and the tiered arrangement of the three walls on the slope together with the fill between them (horizontal to sub-horizontal strata, see the stratigraphic analysis below), it seems possible that they were containment walls for terraces. The large size of the stone blocks is striking at Mudhmar East 3. According to the local geomorphology, the blocks that are naturally detached from the jabal are smaller: the large size of the blocks seems to have been a deliberate choice from the builders. Comparisons with other terrace walls were investigated. At the LBA site of Masafi-5, for instance, the settlement terraces are made of smaller stone blocks (Degli Esposti and Benoist, 2015): it is likely that, in this case, the walls were made up of locally available materials. But could

the size of the blocks also indicate a functional difference? More evidence and comparisons are needed to take a stand on this question.

The combination of the walls and the Iron Age natural spring suggests a cultivated area. Some strata in the terraces' fill seem unsuitable for agriculture, but others were humid and loose when excavated – although containing a high number of pebbles. As indicated below in the stratigraphic analysis, we sampled sediment from these strata in order to look for any botanical remains that could support this hypothesis. At present we consider that the large walls of Mudhmar East 3 were built for terraces. But what were the terraces for? Cultic activities, cultivation, gardens, any other use that we did not yet identify? We still have to understand the reasons why the builders of Mudhmar East designed such large walls.

Stratigraphy

The stratigraphy of Mudhmar East 3 is long and varied, depending on the investigated areas: the upper part of the slope and several terraces. One of the main aims of this campaign was to complete the stratigraphic documentation using photographs and drawings. In order to do so, drawings were made of the west-east sections of Loci 5020 and 5023 that had been excavated in 2018 (Figures 5 and 6).

Section of Locus 5020: description of the strata (Figure 5)

1. Sub-surface colluvial stratum: beige silty matrix and dense angular pebbles (2-10cm).
2. Fine colluvial stratum: beige silty matrix and very dense fine small pebbles (0.5-3cm). The pebbles are angular and oriented in the direction of the slope. One arrowhead in this stratum in the section.
3. Brown silty matrix, more humid and loose, associated with dense medium pebbles (2-10cm).
4. Brown silty and humid matrix with dense pebbles of all sizes (1 to 20cm). One arrowhead in the section.

5. Beige-brown silty matrix and small pebbles (1-7cm).
6. Beige silty matrix and fine pebbles (1-3cm).
7. Beige silty matrix and medium pebbles (1-10cm).
8. Stratum of large collapsed stone blocks (30-40cm long), in a beige silty matrix. Collapsed stones from the walls?
9. Brown silty matrix, quite humid and loose, with heterogeneous coarse pebbles (3-20cm).
10. Fine and loose stratum with gravel and almost no pebbles.
11. Beige-brown silty matrix with medium-size pebbles (1-10cm). Early Iron Age pottery sherds.
12. Beige silty matrix with medium-size pebbles (1-10cm) and a few large pebbles (over 10cm).

Section of Locus 5023: description of the strata (Figure 6)

1. Sub-surface colluvial stratum: beige silty matrix and dense angular medium-size pebbles (2-10cm). Pebbles oriented in the direction of the slope. One Early Iron Age pottery sherd.
2. Stratum of large collapsed stone blocks (20-40cm long), in a beige silty matrix. Collapsed stones from the walls?
3. Medium colluvial stratum: beige silty matrix, medium-size dense angular pebbles (2-10cm).
4. Fine colluvial stratum: beige silty matrix and dense small angular pebbles (0.5-5cm), laying horizontally. One metal artifact in the section (copper alloy fragment).
5. Fine sub-horizontal stratum with dense gravel in a beige-brown silty matrix. Gravel is less than 2cm and the whole stratum is about 3cm thick.
6. Medium colluvial stratum: beige-brown silty matrix with medium-size angular pebbles (3-10cm), laying horizontally. Some Early Iron Age pottery sherds.

7. Beige silty matrix and large coarse pebbles (5-20cm).

Stratigraphic interpretation

The different features of the Mudhmar East 3 stratigraphy are shown in the sections of Loci 5020 and 5023. Notably, the strata consist mostly made of beige to brown silty sediment and angular limestone pebbles. The distinction between strata is mostly based on the density and size of the pebbles.

Section of Locus 5020 (Figure 5)

The section of Locus 5020 shows a high density of medium-size to large coarse pebbles. The upper strata are made of colluvial deposits and follow the slope orientation. Strata 5 to 8 abutting Wall 5022

look as though the sediment had been blocked against the wall – intentionally or not, it is not possible to tell yet. The remaining strata are sub-horizontally oriented.

In strata 3, 4 and 9 the matrix is silty, brown, loose and humid. The sediment seems to be quite different from the colluvial deposits. Samples were taken from these strata for ongoing analyses, to test the hypothesis of agricultural terraces that might have been built in this area in the Iron Age.

Stratum 10 is thin and fine. By comparison with stratum 5 in the section of Locus 5023, it might correspond to an occupation layer, but supporting evidence is still weak: no artifacts *in situ*, and no structure. Stratum 11 contains a number of Early Iron Age potsherds indicating an anthropic fill. Stratum 12 may be a natural colluvial deposit underlying the Iron Age occupation.

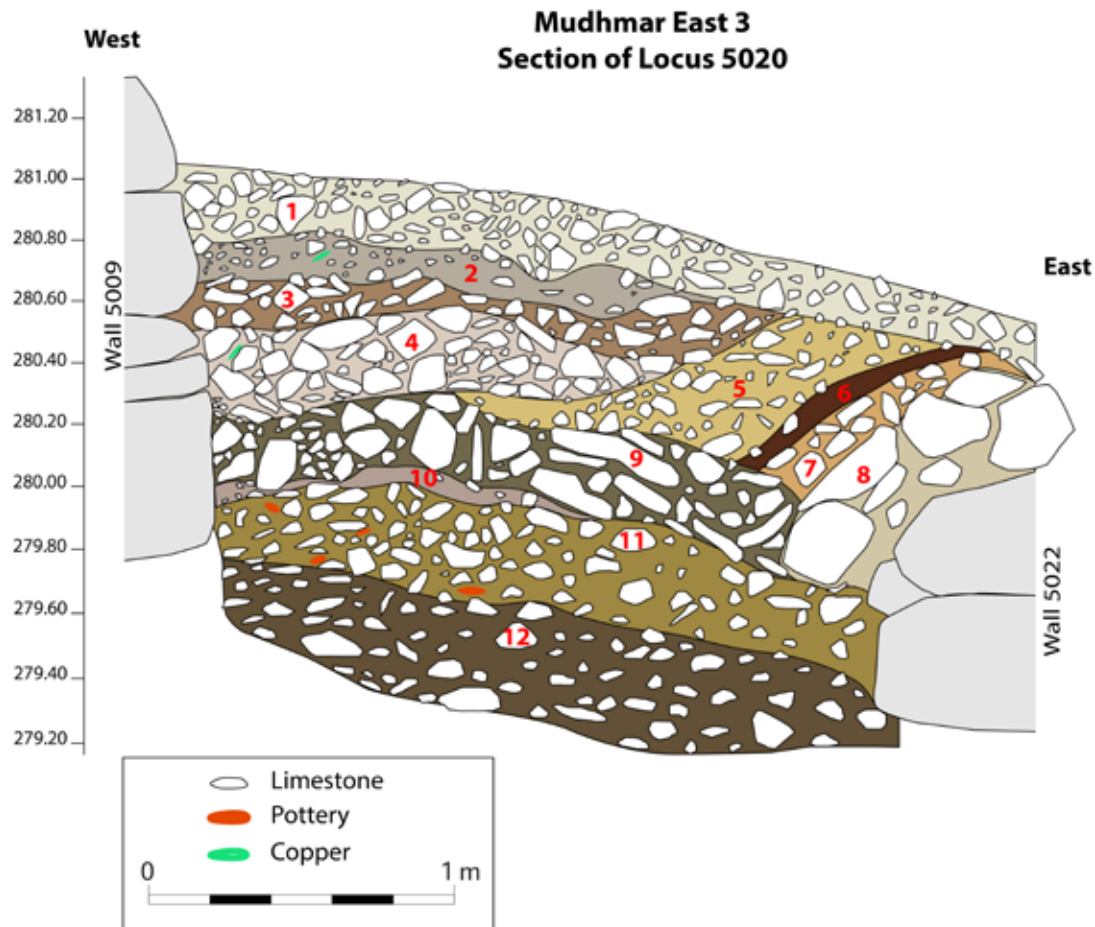


Figure 5: West-East Section of Locus 5020 (M. Jean/FAMCO).

Section of Locus 5023 (Figure 6)

In Locus 5023 pebbles are fewer and smaller than in Locus 5020. Strata 1 and 3 are colluvial deposits. Stratum 2 consists of large collapsed blocks, possibly coming partly from Wall 5022. Strata 4 to 7 are horizontal, supporting the idea of terraces in this place. Stratum 5 is very thin and made of fine gravel; it corresponds to the base of Wall 5022 and might have been an occupation layer of the terrace. Stratum 6 may still be an anthropic fill as an Iron Age potsherd was stuck in the section. Stratum 7 may be the natural colluvial deposit underlying the Iron Age settlement.

The examination of the West-East stratigraphic sections perpendicular to the walls of Mudhmar

East 3 shows a sub-horizontal layout of the fill, supporting the hypothesis of terrace walls. The upper strata are made of collapsed materials and colluvial deposits. Anthropogenic materials such as copper artifacts and Early Iron Age pottery were identified quite deep in the stratigraphy. The deepest strata could correspond to natural colluvial material.

Artifacts

The 2019 excavation in Mudhmar East 3 uncovered few artifacts in comparison with the previous two years, and similarly none was found *in situ*. However, the finds are consistent with previous results and with an Early Iron Age occupation. The artifacts may be divided into four main classes: pottery, metal, shell and stone.

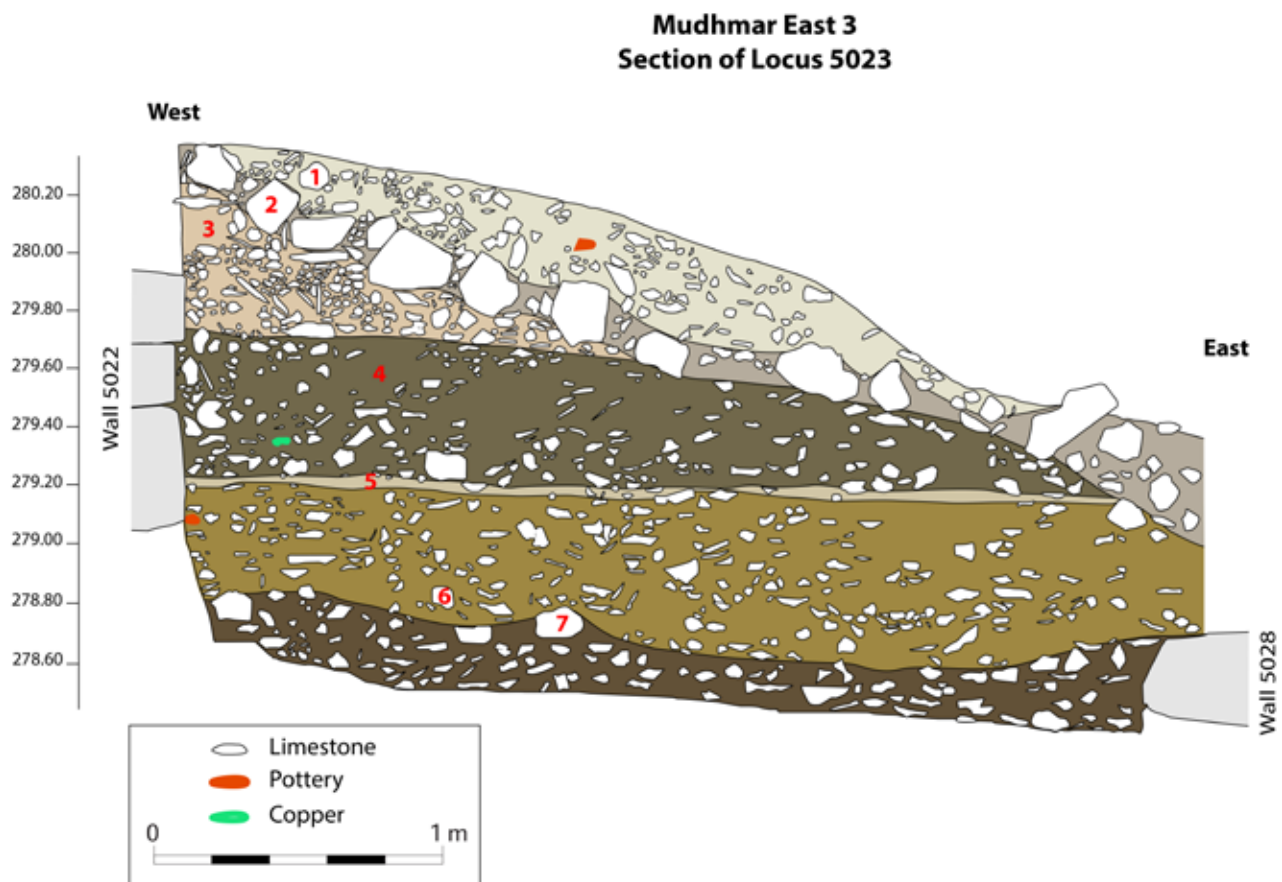


Figure 6: *West-East Section of Locus 5023 (L. Bigot/FAMCO).*

Pottery

Few pottery sherds, and only 14 diagnostic ones, were collected in 2019. The pottery is fairly homogeneous and corresponds to the Early Iron Age (1100-600 BCE); it is consistent with the whole ceramic assemblage already studied at the site (Jean, Pellegrino and Gernez, 2018). No new shape was identified. The pottery assemblage mostly includes Iron Age common wares. Most of the fragments are from common orange ware, a common fabric of bright orange to brownish colour, sometimes with a grey core, showing a moderate to abundant amount of black, white and red grits, and some vegetal imprint. Most of the pots were probably handmade using the coiling technique, and some of them show traces of finishing as indicated by tiny horizontal lines on the surface. Surfaces are usually matte. Some potsherds have a thin red, black or brownish

slip, generally with a matte finishing.

Previous studies on the pottery of Mudhmar East 3 put forward a division into broad categories: domestic, cultic, and uncommon shapes (Jean, Pellegrino and Gernez, 2018). The domestic ware includes open shapes such as bowls and large open vessels, which are the most frequent, and storage jars. Only one fragment of handled-bowl was found in 2019. Uncommon shapes are represented by suspension bowls and tube-spouted jars (Figure 7). The latter are unknown in other ceramic assemblages of the Iron Age sites in the UAE and Oman, except at Salut where a large number of similar examples were found by the Italian Mission in the earliest layers of the Iron Age phase at Qaryat Salut, dated around 1300-1100 BC (Tagliamonte and Avanzini, 2018: p. 348, fig. 5) and Husn Salut (Degli Esposti and Condoluci, 2018:51).



Figure 7: Uncommon shapes from the 2019 excavation in Mudhmar East 3: spouted vessel with lugs along the rim and suspension bowl (FAMCO).

Metal

All metal artifacts found during this campaign are made of copper or copper alloy. Most of them are arrowheads (145), but we also found a complete miniature arrow, a bow string, an axe-head, three snake figurines, a needle, a perforated disc and several other fragments. The number of arrowheads is very small in comparison with the finds of 2018 (3875 arrowheads). The entire assemblage of Mudhmar East 3, with more than 4000 arrowheads, is unique in Oman and possibly in the Middle East, as far as we know (Gernez et al., in prep.).

Arrowheads

All arrowheads present a short tang with rectangular section and a long point with a flat mid-rib. It is important to note that in most cases the tang seems to be unfinished: the tang seems to be unfinished because its unbeveled tip is unfit for hafting. Three main types can be defined according to the shape of the point: foliated (=biconvex) (types Ar2 and Ar7 according to Yule, 2018: 54-55) (Figures 8 and 9 (first line top)), triangular (similar to types Ar5 and Ar6, apart from the midrib, here flat) (Figure 9 and Figure 10 (top)) and large angular (=pentagonal/hexagonal) (type Ar9) (Figure 10). There seems to be a kind of continuum between the two first types, but the angular type is clearly different. Finally, two arrowheads are different from the rest, one with very short point and the other being completely flat and thin (Figure 10, bottom right). Arrowhead types may be compared to those found in most other Early Iron Age sites in Eastern Arabia, for instance 'Uqdat al-Bakrah (Yule, 2018:56) and Jebel al-Buhais tomb BHS 30 (Jasim, 2012:103, fig. 128). Given the whole assemblage from Mudhmar East 3 (see also Jean et al., 2018), there is no doubt that the deposit can be dated from the Iron Age. However, this does not necessarily mean that all the elements were produced exclusively during this period: indeed, some may have been kept for a long time and placed among more recent votive offerings. Some arrowheads differ

from the others and could be older, such as the very short one and the two engraved ones (similar to the Yule types Ar1 and Ar2) whose types and signs are said to belong to the Late Bronze Age (Magee 1998) and possibly dating to the Wadi Suq period (Yule and Vogt, 2020). The complete study of this corpus is in progress and could contribute to the typochronology of arrowheads in the region (Gernez et al., in prep.).

Of the total number of arrowheads, three (=2%) display incised geometric signs in the space between the base of the blade and the top of the tang. These signs, which were probably made with a small chisel, associate several elements: an oblique cross or a star in the middle, one or two dashes below and above it. In two cases, another sign was added above the others: one is a triangle and the other is a double rank of three oblique dashes. Such decorated arrowheads had already been found at Mudhmar, and we noticed that most of them looked different from the general corpus in terms of type, shape, quality and finishing. For instance, a beveled tang is an indication that the arrowhead may have been handled, which was not the case for the numerous classical "Mudhmar" arrowheads. As mentioned previously, in Oman and the UAE, incised arrowheads are well-known during the Late Bronze Age (Magee 1998) and possibly earlier given some evidences presented by Yule and Vogt (2020), but it is difficult to understand their meaning. While usual interpretations are workshop marks or an indication of the owner (including political authority), one should also consider a possible symbolic, apotropaic or even a good-luck charm. Other interpretations proposed by Magee (1999:354) are belomancy (divination with incised arrow) or chance game, known in pre-Islamic and Early Islamic times.

Arrow

One complete model arrow was found (Figure 11: 1). It is smaller than the one previously discovered at Mudhmar East 3 (Jean, Pellegrino, and Gernez, 2018:135-136) and its fletching is marked by four incised lines only.

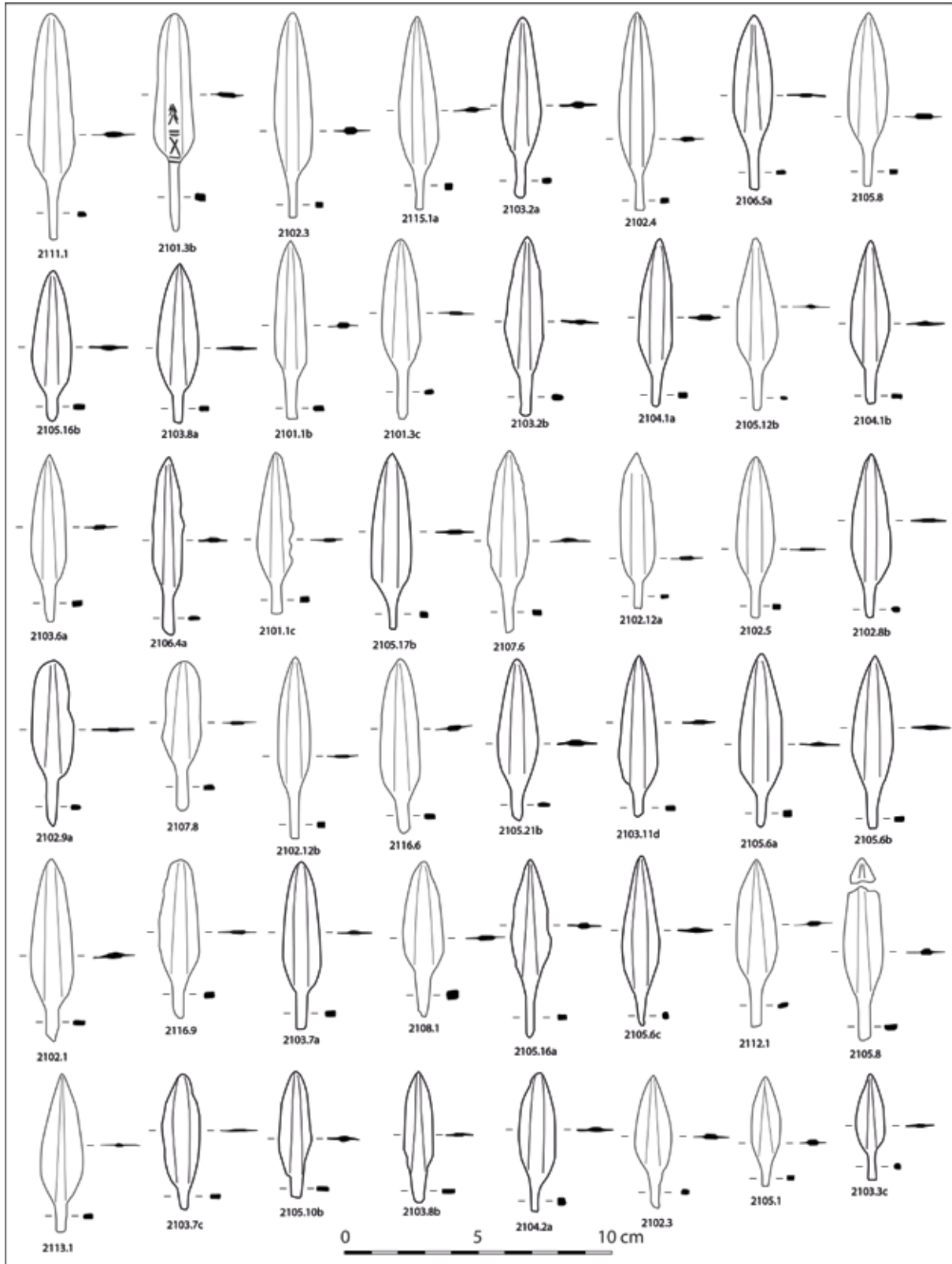


Figure 8: Foliated copper arrowheads discovered in Mudhmar East 3 during the 2019 season (G. Gernez/ FAMCO).

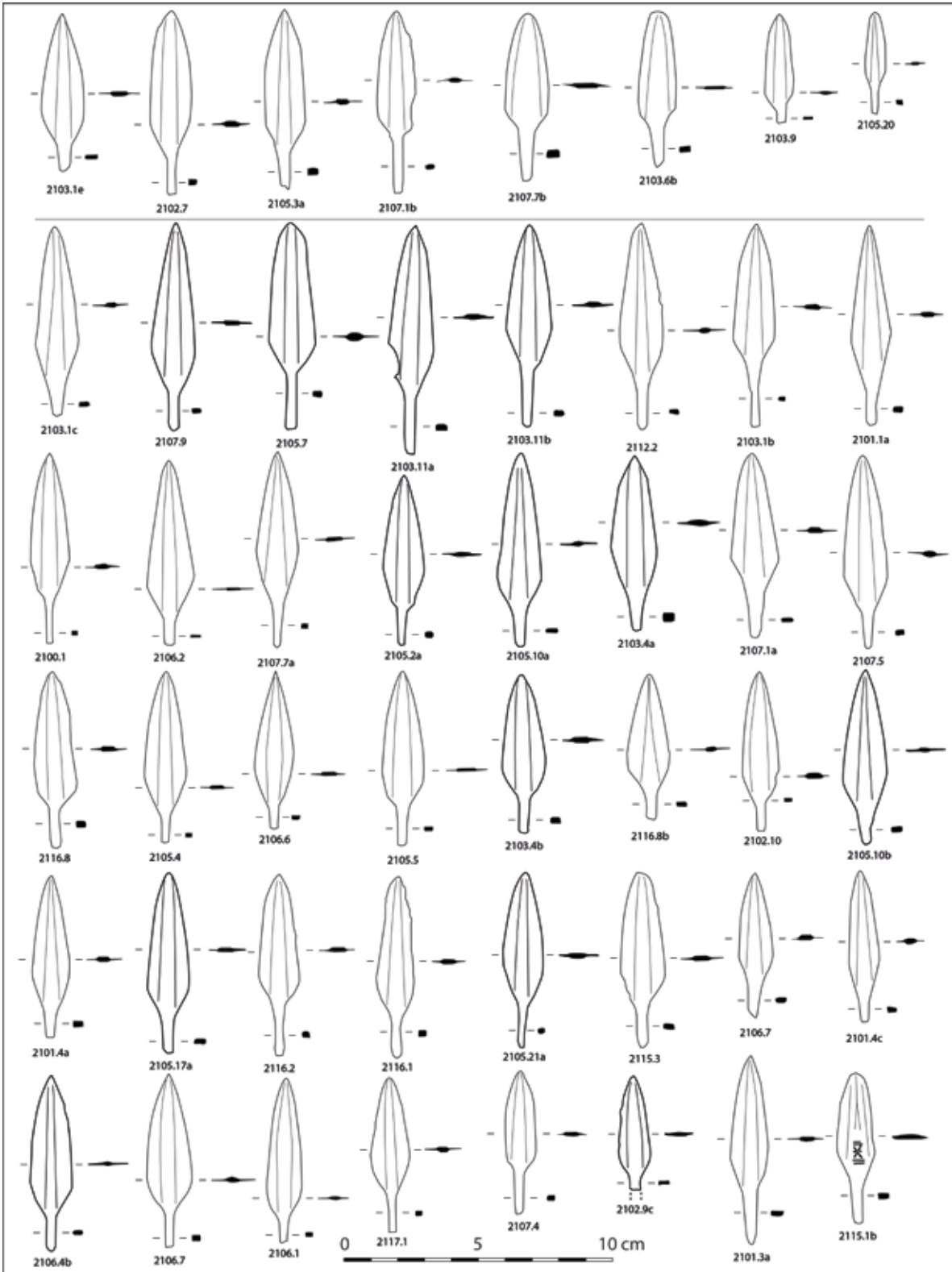


Figure 9: Triangular copper arrowheads discovered in Mudhmar East 3 during the 2019 season (G. Gernez/ FAMCO).

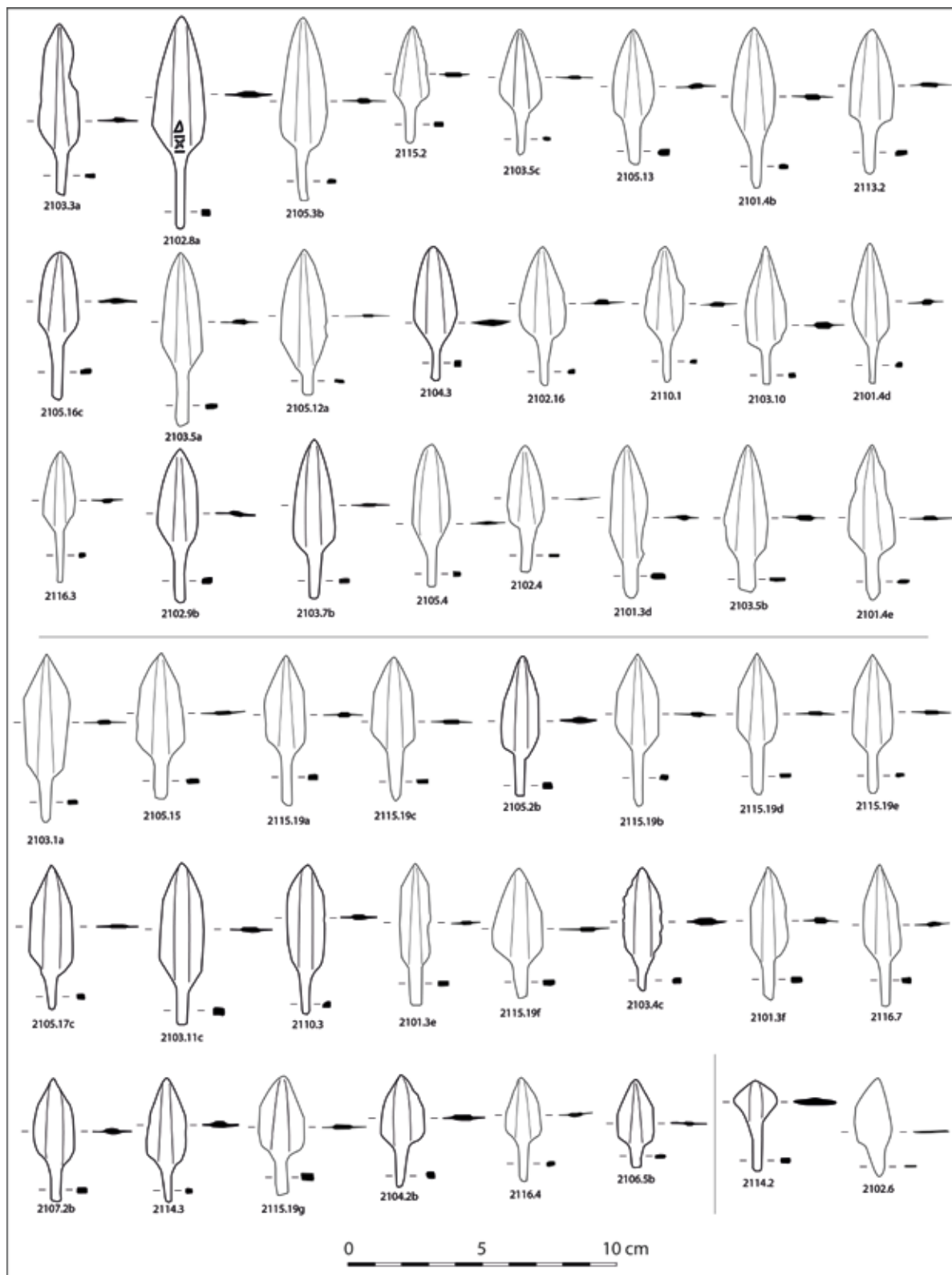


Figure 10: Triangular and large angular copper arrowheads discovered in Mudhmar East 3 during the 2019 season (G. Gernez/FAMCO).



Figure 11: Copper, stone and shell artifacts discovered in Mudhmar East 3 during the 2019 season (G. Gernez/ FAMCO).

Snake figurines

Three figurines of undulating snakes (Figure 11: 3-5) supplement the large corpus discovered at Mudhmar (Jean, Pellegrino, and Gernez, 2018). One is cast and the two others are cutouts from metal sheet. Snake figurines are typical of Iron Age cultic sites in the entire region (Mouton, Benoist, and Cordoba, 2012), even if two were also found in Susa (Iran) in a layer of the 12th century BC (Amiet, 1966:384). In the UAE and Oman, they are known at Salut (Sasso, 2018:301), 'Uqdat al-Bakrah (Yule, 2018:126), al Qusais (Taha, 2009:13, pl. 59), Masafi (Benoist et al., 2011:154, fig. 11-12) and Saruq al-Hadid (Weeks et al., 2017:49, fig. 19).

Axe

A single copper/bronze axe (Figure 11: 6) was discovered on the slope. It is socketed, like the famous axes from Building 1 that were associated with bows (Gernez, Jean, and Benoist, 2017:109), but is smaller in size, with a plain shape and a narrower blade. Fitting parallels are known at Salut (Degli Esposti, Renzi, and Rehren, 2016:84, fig. 4a), and 'Uqdat al-Bakrah (Yule, 2018: pl. 3-4, n°92-98).

Bow string

The bow string is thin and has a circular section. It is similar to the few ones previously found at Mudhmar, both in Building 1 (Gernez, Jean, and Benoist, 2017:109) and in area 3 (Jean, Pellegrino, and Gernez, 2018:135).

Other metal finds

The function of a small perforated circular and convex plate cannot be established (Figure 11: 8): it might be part of a musical instrument (a sistrum), a decorative element for a garment or, considering the relevance of weaponry at Mudhmar 3, a miniature shield. The needle (Figure 11: 2) has its eye formed by the bending of the tip. Such objects are rare in Oman. Parallels are known at 'Uqdat al-Bakrah (Yule, 2018:119, fig. 4.27). The waste fragment (Figure 11: 7) can be added to the other

similar slags and fragments discovered at Mudhmar East, especially in Building 2. Even if they could indicate that casting was practiced near the site, they may be a part of the deposit, with a symbolic and/or economic value. Scrap metal is indeed not rare among material deposited in cultic context during the Early Iron Age: for instance, at Bithnah copper slags were found near an altar (Benoist et al., 2015:26) and at Masafi-1 two jars buried in the pillared building contained ingots and furnace bottoms (Benoist et al., 2015:28).

Shell

Four shell medallions and worked shell discs were found (Figure 11: 11-14). Three of them are undecorated, but one bears an incised flowered pattern. As none of the Mudhmar East 3 artifacts was found *in situ*, we are unable to establish exactly where they came from. However, they are very typical of the Early Iron Age (Weeks et al., 2019), usually in funerary contexts such as Dibba (Caputo and Genchi, 2016), al-Buhais (Jasim, 2012:fig. 83), Saruq al-Hadid (Weeks et al., 2017:35 and 56, fig. 3 and 24). The larger one is very similar to an object found at al-Buhais BHS 66 (Jasim, 2012:185, fig 220:15).

Flint and stone

Stone objects are rare in this area. We found a single small flint flake (Figure 11: 10) and a worked, concave smooth stone (Figure 11: 9) that may have been used as a sharpener or a polisher.

MUDHMAR EAST 3: CONCLUSION AND PERSPECTIVES

The 2019 campaign in Mudhmar East yielded important new results about the organization of the site, along with some new artifacts. According to our interpretation, the excavations led to the discovery of a terrace system overhanging the main buildings of the site. Three terrace walls were built with large limestone blocks across a gully on the slope. The terraces were then filled in: the anthropogenic fill for the upper terrace included a very high amount

of pottery and aeolian silty sediment, while the two lower terraces were filled in with silty sediment, medium limestone blocks and little pottery. Thick colluvial strata overlying the original terraces were deposited after the Iron Age occupation. The colluvial sediments included a very large quantity of archaeological artefacts, including the largest set of copper arrowheads (4000) ever discovered in Oman, snake figurines (about 50) and ornaments.

The probable terrace system was likely built during the Iron Age, as indicated by the consistent pottery assemblage. But what were the terraces for? No archaeological structure was found on the terraces, except three postholes on the upper one. The presence of an ancient spring contemporaneous with the site suggests some vegetation on the terraces, as already known from other sites such as Salut (Tagliamonte and Avanzini, 2018:349; Degli Esposti et al., 2019:102). The sediment samples that were collected for analysis will hopefully provide some botanical remains and help prove this hypothesis. Micromorphological sampling was not possible because of the coarseness of the strata.

It also seems that objects were deposited into karstic cavities along the slope during, or at the end, of the occupation of the site. About 4000 arrowheads were presumably hidden in the karstic cavity linked to the water spring (Loc 5021; Figure 2), located on the southern edge of the gully and overhanging the upper wall (wall 5009). It is likely that part of the arrowheads was gathered in a pot with horizontal lugs along the rim, whose sherds were found in the area, along with snake figurines and some ornaments. The deposits may have been votive offerings – as indicated by the snake figurines and the bow string, which is quite unique – but also a kind of hoard, given the high amount of valuable copper. Likewise, could one assume that this unique quantity of arrowheads corresponds to a kind of proto-currency? Such a hypothesis needs to be carefully explored and argued. This requires typological, morphometrical and composition analyses, and research is still in progress (Gernez, et al., in prep.). Weapons and tools as proto-currency are known in China (knives and spade money)

during the 1st millennium BCE (Hartill, 2005:53-76) and Early Iron Age so-called “armorican socketed-axes” from Brittany are sometimes said to have this same function (Briard 2001:41-45).

The site was abandoned after the Iron Age occupation, and several episodes of substantial runoff occurred. As water flowed down from the karstic system and cavities, the hidden deposits were transported along with colluvial sediments. The thousands of arrowheads were thus probably discovered in a secondary context, and we suggest that the primary context could be the karstic cavity linked to the spring where the artifacts were deposited. The colluvial strata were formed over the terraces, mixing sediment, pebbles and archaeological artifacts, leading to the formation of the site as we discovered it when we began the excavations.

MUDHMAR EAST 6: THE GRAVE

It is now well-established that the main period of occupation of Mudhmar East was the Early Iron Age and that the site’s function was likely cultic, and surely not funerary. Nevertheless, the site is related to the more ancient Early Bronze Age funerary landscape: numerous Hafit/bee-hive tombs were identified during the survey program (in 2009) on the crests and lateral slopes of surrounding hills and mountains (Giraud and Gernez, 2017) (Figure 12).

The area of Mudhmar East 6, on the top of the mountain ridge, hosts an ancient grave, tagged as Grave 1, which may have been built in the Early Bronze Age. As most Early Bronze Age Hafit/bee-hive tombs, Grave 1 delivered some bone remains and shows evidence of reuse, robbing and dismantling at different times over two millennia, from the Early Bronze Age to the Iron Age (Bortolini and Munoz, 2015: 67).

Iron Age artifacts were collected on the surface around the grave and during the cleaning of the tomb structure, including 11 bronze arrowheads, one shell medallion and many potsherds of common orange Iron Age ware. This is evidence for the presence of Iron Age occupation on the top of the jabal, even if

the archaeological context is not precise enough to prove the funerary reuse of the grave during the Iron Age. However, these finds are clearly consistent

with the material recovered from Early Iron Age sites in the region and mainly from Mudhmar East 3 and Building 1 (see below).

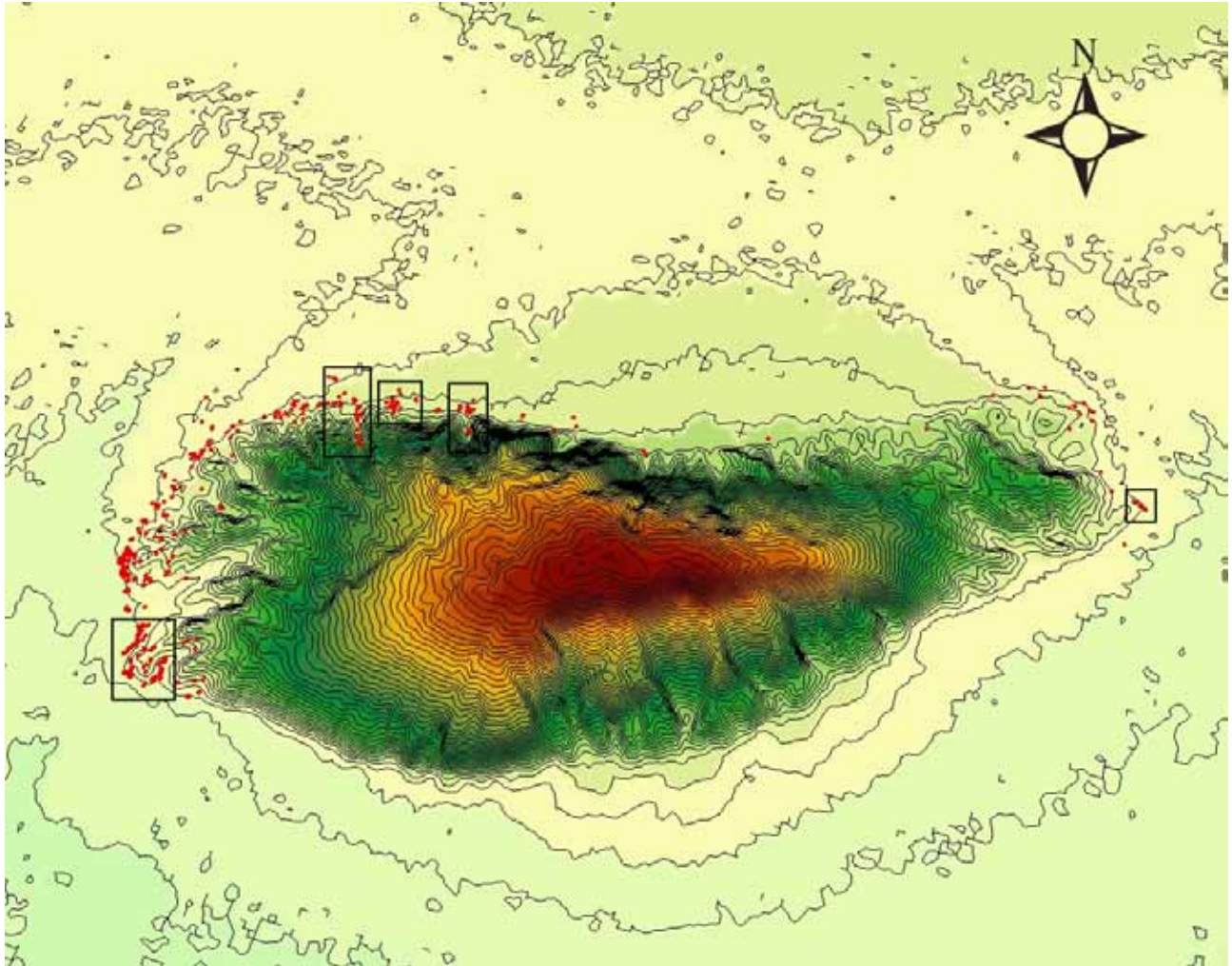


Figure 12: Location of the archaeological sites surveyed in Jabal Mudhmar (J. Giraud/FAMCO)

Grave 1 also shows evidence of modern reoccupation, possibly dating to the Late Islamic period. Specifically, a circular structure (2,50 x 2,80m) was built on top of the grave in its middle, using collapsed medium/large stone blocks from the tomb. The dry-stone wall of the modern occupation is made of four rows of large blocks and sparse medium-size, slightly corbelled stones. This structure can be interpreted as an old Bedouin storage structure, or as a gun shelter (Figure 13).

The disturbance suffered by Grave 1 in modern

times is also confirmed by the building of a second structure (2,20 x 2,50m), named Grave 2 (Figure 14), which is located 1m to the south-east of Grave 1. At first it looked like a tomb surrounded by a circular stone wall. The structure is actually made of a simple circular wall of medium/large stones, similar to the ones used for the Islamic construction that had been built on top of Grave 1. No human remains and no goods were recovered inside or around the second structure; therefore the excavation recorded Grave 2 as a modern feature.



Figure 13: 3D model of Grave 1 showing evidence of a modern structure on top of the ancient grave (X. Desormeau and J. Pinot/FAMCO).



Figure 14: Orthophotograph of the late circular enclosure (J. Pinot and X. Desormeau/FAMCO).

Tomb structure

The presence of the aforementioned late structure on top of the grave as well as the possible reoccupation of the area during the Iron Age raises questions about the original layout of the grave. The collapsed stones and the modern cairn erected over the ancient tomb were removed before the actual excavation of the grave, so as to aid the comprehension of the ancient tomb structure, despite its badly preserved walls.

Grave 1 was built on the bedrock that clearly appears on the surface inside the chamber, slightly sloping from west to south-east. The general layout

of the grave comprises a series of irregular concentric walls whose maximal diameter is ca. 5m. The walls were single faced with roughly hewn blocks used for the outer face, and small angular stones in the filling between the walls' faces. The inner wall was built on two rows with selected stones arranged in regular courses. The first row consists of medium-size and a few large stone blocks, while the second row is made of flat stone slabs (20/25 x 50cm).

Neither paving nor entrance was observed in the outer wall, so it can be assumed that access to the burial chamber was completely closed. The burial chamber is oval-shaped, with smoothed angles, measuring 1,97 x 1,62m (Figure 15).

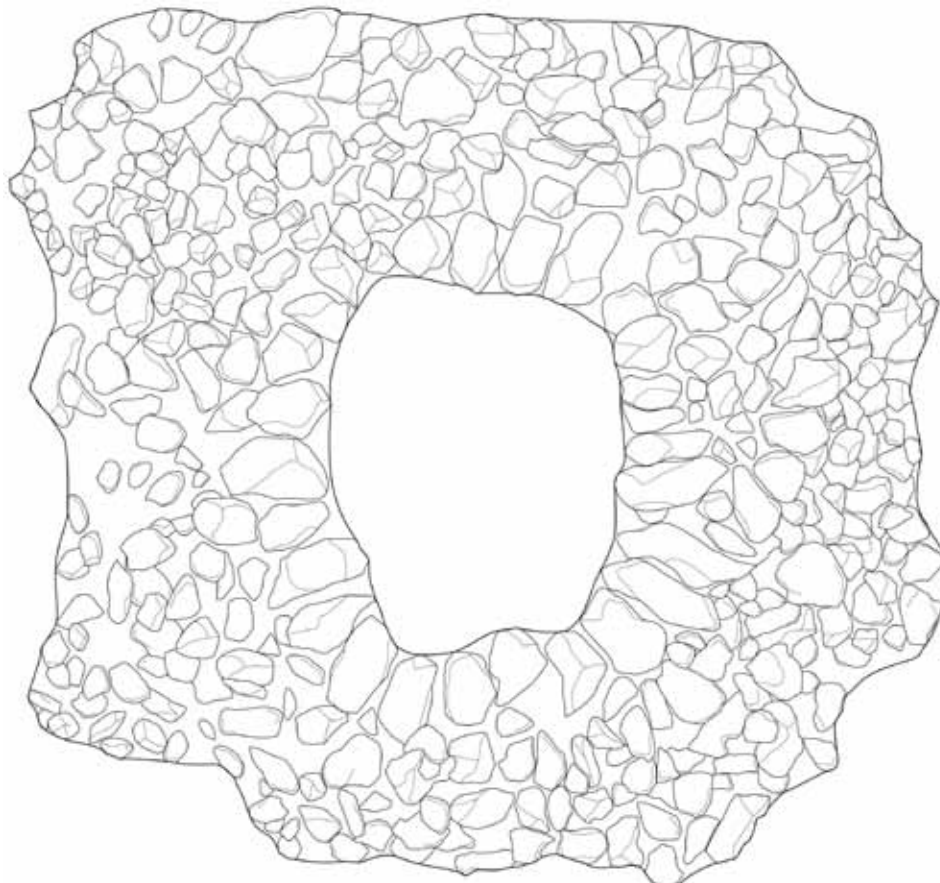


Figure 15: Plan of Grave 1 in Mudhmar East 6 at the end of the excavation (M.P. Pellegrino/FAMCO).

The filling inside the chamber mainly consists of a thick layer of soft beige loam mixed with stone chips and a few stone blocks (US 3004). A few fragmentary and scattered skeletal remains were collected in this context (Figure 16). When the grave was reused/robbed, the bones and accompanying goods were probably pushed aside. An almost complete small pottery vessel that can be dated to the Wadi Suq period (Figures 17 and 20:3004.1), three ceramic fragments, one carnelian bead and a bronze fragment were also recovered from this context. Below US 3004, a soft, light beige sandy loam soil, 0,14 m thick, covered the bedrock (US 3005). A fragmentary bronze/copper razor was recovered in this stratum.

Preliminary anthropological data

The anthropological study was led by Elodie Germain. The results are based on a preliminary study of the bones. 575 bone fragments were unearthed in the tomb chamber. Most of them were badly preserved and fragmented, limiting the determination of the bones. It was thus not possible to obtain precise data about the sex and age of the deceased (Figure 16). At least one adult (or sub-adult) and one immature were identified. The minimal number of individuals (MNI) which could be represented by the bones is 2, but this could be an underestimation due to the poor preservation of the bones.



Figure 16: Scattered and fragmentary human bones found in the burial chamber of Grave 1 (M.P. Pellegrino/FAMCO).



Figure 17: An almost complete vessel (3004.1) from the burial chamber (M.P. Pellegrino/FAMCO).

Artifacts

The objects discovered during the removal of the modern structure and the following cleaning of the ancient grave enable us to confirm the probable reuse of Mudhmar East 6 during the Iron Age. Eleven complete, slightly corroded copper alloy arrowheads were collected (Figure 18). This homogeneous set may be compared to the arrowheads from Mudhmar East 3 (see above).

In addition, a flat and sharpened copper alloy artefact that was recorded could be a fragmentary scraper or razor (Figures 18 and 19:2). Similar objects are known from the Early Bronze Age in the Indus valley and Central Asia, as well as in Eastern Arabia at Tell Abraq (Potts, 2000:76). For the Late Bronze Age and Early Iron Age, similar artefacts were discovered at al-Buhais BHS 1 and BHS 3 (Jasim, 2012:18, fig. 7 and 35, fig. 36), ‘Uqdat al-

Bakrah (Yule, 2018:pl. 21.343), Bawshar (Yule, 2018:116) and al-Wasit (Yule and Weisgerber, 2015:38, fig. 10.R4 and pl. 15:71-72). A fragment of copper alloy stem supplements the corpus of copper/bronze objects (Figure 19:3).

The limited ceramic assemblage reveals that, very likely, the tomb was used repeatedly throughout different periods. The first, very poorly preserved fragmentary vessel can be dated to the Hafit period; it is reminiscent of Mesopotamian ware that is usually found in funerary contexts. This ware is easily recognizable by its shape and by a thin purple slip covering the beige fabric (Figure 20:3000.4). The other, almost complete, vessel is a short-necked miniature jar made of fine orange fabric, which can probably be related to the “céramique semi-fine” (Méry, 2000) (Figures 17 and 20:3004.1). Parallels may be found in several tombs from the second

millennium BC, such as SH 1 (Donaldson, 1984, fig. 6), SH 99 (Vogt and Franke-Vogt, 1987: fig. 32.9) and Mereshid (Benoist et al., 2002: pl. 5:1), where similar vessels are mainly dated to the Wadi Suq period.

Aside from metal artifacts and pottery, a few other objects were discovered. A worked shell medallion (Figure 19:4) typical of Iron Age II displays on its front side deeply excised rosette patterns and traces of red coloured inlays of stone or paste. This category of shell discs is seemingly restricted to south-eastern Arabia in the Iron Age (Weeks et al., 2019).

Two complete carnelian beads were also recorded from Grave 1 (Figures 18 and 19:5-6). Both have

a biconical longitudinal section. Such beads are widely known throughout south east Arabia, but the archaeological contexts span such a wide chronological range that they cannot help with the dating of Grave 1. Their production covers the whole second millennium until, at least, the second half of the first millennium BC. For similar beads, see for instance al-Buhais BHS 1 (Jasim, 2012:19, fig. 9).

Finally, one large and thin flint biface (Figure 19:1) was probably used as a scraper or a knife. This type of lithic tool is known at Ras al-Hadd HD-5 from the middle of the fourth millennium BC onwards (Charpentier, 2001: fig. 4), and seems to have been quite frequent on coastal prehistoric sites of Oman.

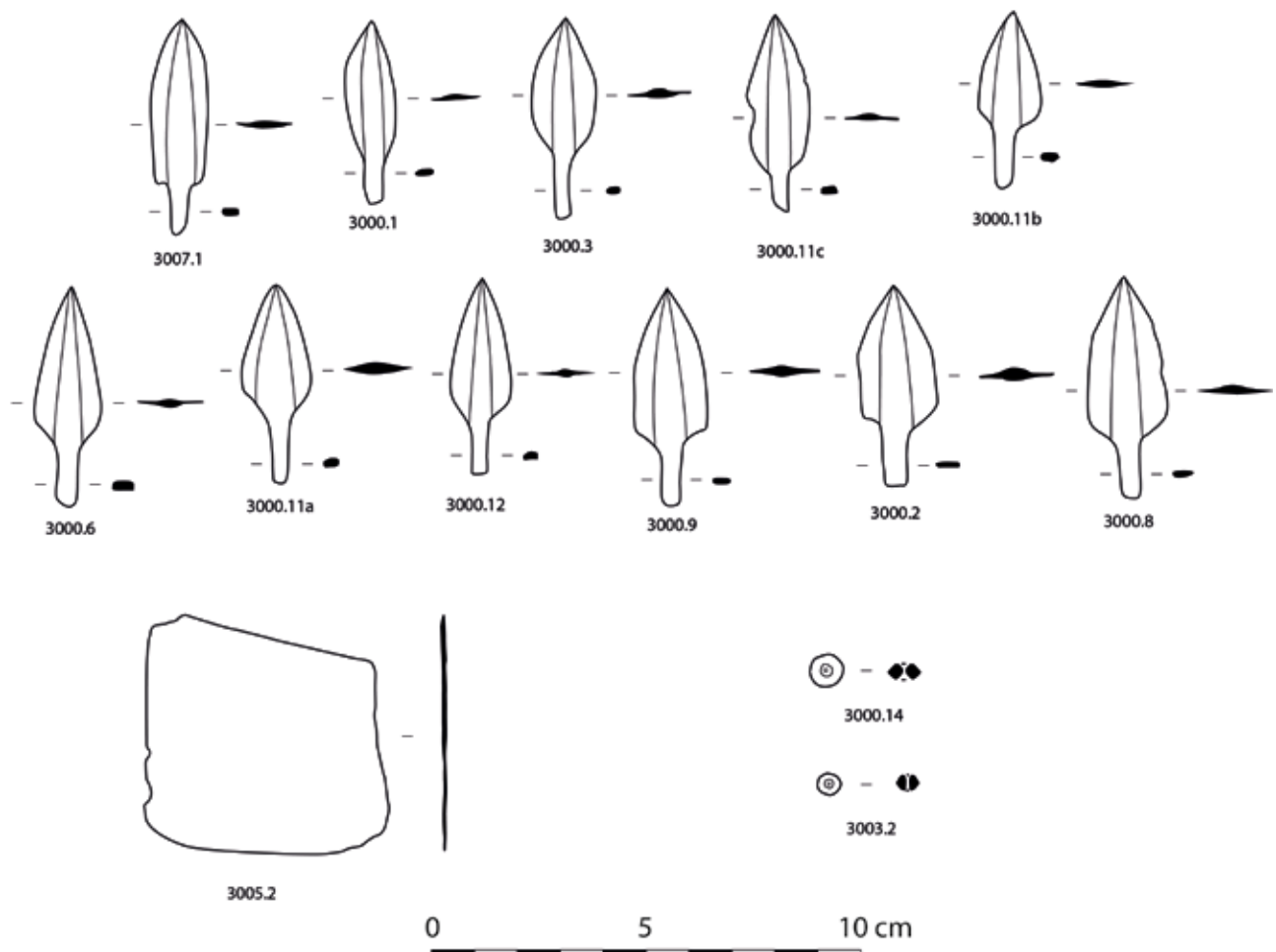


Figure 18: *Bronze objects from the excavation of Grave 1 (J. Pinot /FAMCO).*

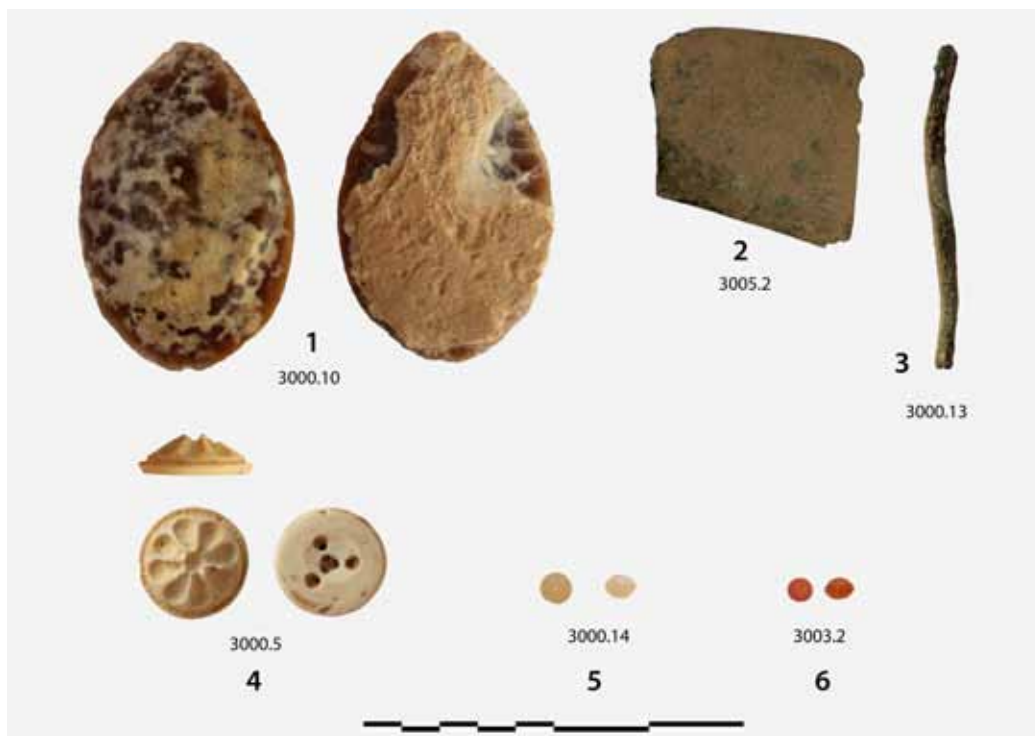


Figure 19: *Other finds and ornaments from Grave 1 (G. Gernez/FAMCO).*

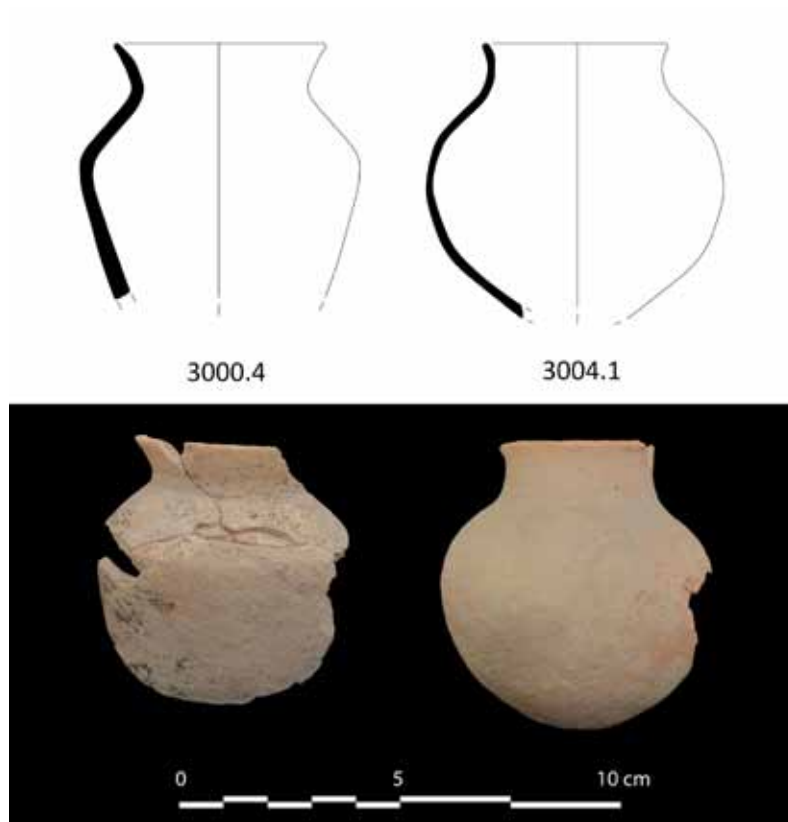


Figure 20: *Pottery from the burial chamber of Grave 1 (M.P. Pellegrino and J. Pinot/FAMCO).*

Mudhmar East 6: conclusions

All in all, considering the scarcity of grave goods and the many disturbances related to the reuse of the grave over a long period of time, dating Grave 1 is extremely difficult. However, considering its architectural features, various parallels can be proposed, that suggest an Early Bronze Age date (Yule and Weisgerber, 1998; Al-Jahwari, 2013).

The discovery of Iron Age materials around Grave 1 raises again the issue of the reuse of Bronze Age tombs in later times, a common occurrence in the region. A remarkable continuity in burial sites over long periods of time is witnessed at Adam, 20

km west of Mudhmar East. In the necropolises of Adam North and Adam South, funerary structures dated from the Umm an-Nar period to the Late Iron Age were excavated in the same graveyards (Gernez and Giraud, 2017).

Finally, the presence of Grave 1 in Jabal Mudhmar as well as other tombs in the surrounding area confirms that the distribution of these type of graves materializes the widespread occupation of the territory along seasonal routes, and a radial deployment towards the central mountain chain, between the coast, the desert margins and the mountains (Figure 21).

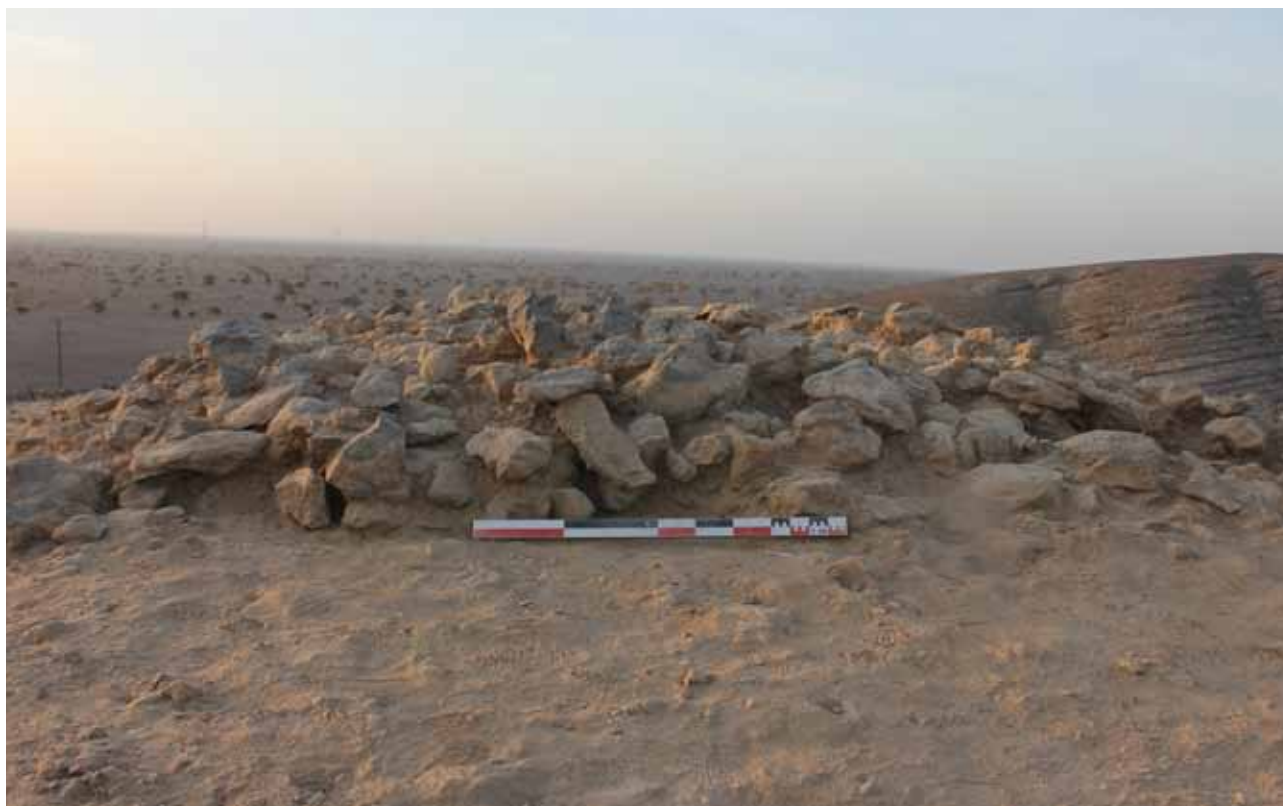


Figure 21: *Grave 1 after excavation, from the north-east (M.P. Pellegrino/FAMCO).*

GENERAL CONCLUSION ON THE 2019 EXCAVATION

Mudhmar East is a major site in the history of Adam and the Rub al-Khali margins. The main buildings already revealed an exceptional cultic

site of the Early Iron Age. The 2019 excavation in Mudhmar East offers major new results from newly excavated areas of the site, on the slope and on the top of the jabal at Mudhmar East 3 and Mudhmar East 6. The entire occupation of the site is thus better known and characterized.

In Mudhmar East 3, on the jabal slope, three massive walls were uncovered. Their unusual size is indicative of a high investment in building and a presumably relevant role of these structures in the function of the site. Several hypotheses were explored to understand the purpose of the area. The dam and fortification hypotheses were rejected. The most convincing one is the construction of terraces overhanging the buildings. Additionally, excavation at Mudhmar East 3 revealed numerous artefacts, especially bronze/copper weapons and pottery sherds. The whole assemblage points to an Early Iron Age date consistent with the occupation of the buildings.

Field activities also included the exploration of Mudhmar East 6 and the excavation of Grave 1 on top of the jabal. The tomb revealed reuse at several times from the Bronze Age to the Late Islamic period, although with a probable change in its destination. Its discovery leads to a better comprehension of the area's burial landscape, and offers insights on the burial practices of each period and culture.

To sum up, the 2019 excavation in Mudhmar East highlighted new zones of the site. The probable total extent of the archaeological area is documented; pedestrian surveys all around the site did not, so far, reveal any other feature that might be investigated. The main occupation clearly dates to the Early Iron Age (buildings and terraces). The site nevertheless had already been occupied earlier as a burial place and was part of a wider Bronze Age funerary landscape. Mudhmar East was an important place for several millennia and represents a major site of Oman's heritage. The site offers new light on the history of the desert margins of Oman.

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BIBLIOGRAPHY

Al-Jahwari, N. S. (2013) "The Early Bronze Age funerary archaeological landscape of western Ja'alan: results of three seasons of investigation", *Arabian Archaeology and Epigraphy*, vol. 24, 2, pp. 151-173.

Amiet, P. (1966) *Elam*, Auvers-sur-Oise: Archée.

Avanzini, A., and Degli Esposti, M. (eds.) (2018) *Husn Salut and the Iron Age of South East Arabia. Excavations of the Italian Mission to Oman 2004-2014*, Arabia Antica 15, Roma: "L'Erma" di Bretschneider.

Benoist, A., Bernard, V., Brunet, O., and Hamel, A. (2011) "The Iron Age occupation in Masafi: Report on two seasons of excavation". In Potts, D., and Hellyer, P. (eds.) *Fifty Years of Emirates Archaeology. Proceedings of the Second International Conference on the Archaeology of the United Arab Emirates*, pp. 148-159, London: Trident Press.

Benoist, A., Colson, M., Dalongeville, R., and Elies, S. (2002) *Archaeological investigations in Fujairah 2000: A first preliminary report*, Report submitted by the French Archaeological Mission to the Department of Antiquities of Fujairah, Lyon/Nanterre: CNRS.

Benoist, A., Le Carlier de Veslud, C., Goy, J., Degli Esposti, M., Armbruster, B., and Attaelmanan, A.G. (2015) "Snake, copper and water in south-eastern Arabian religion during the Iron Age: the Bithnah and Masafi evidence". In Arbach, M. and Schiettecatte, J. (eds), *Pre-Islamic South Arabia and its Neighbours: New Developments of Research. Proceedings of the 17th Rencontres Sabéennes held in Paris, 6-8 June 2013* (British Foundation for the Study of Arabia Monographs, British Archaeological Reports), pp. 21-36, Oxford: Archaeopress.

- Bortolini, E., and Munoz, O. (2015) “Life and Death in Prehistoric Oman: Insights from Late Neolithic and Early Bronze Age Funerary Practices (4th-3rd mill. BC)”, in *The Archaeological Heritage of Oman. Proceedings of the Symposium Held at the UNESCO, September 7th 2012*, pp. 61-80; Muscat: Ministry of Heritage and Culture of the Sultanate of Oman.
- Briard, J. (2001) “Les objets paléomonétaires de l’Europe atlantique protohistorique”, *Revue Numismatique*, vol. 157, pp. 37-50.
- Caputo, F.P., and Genchi, F. (2016) “Seashell discs from the Early Iron Age graves of Daba (Dibba, Sultanate of Oman)”, *Proceedings of the Seminar for Arabian Studies*, vol. 46, pp. 41-44.
- Charbonnier, J. (2012) “Les barrages-poids des régions montagneuses d’Arabie du sud au cours de la période préislamique”, *Chroniques yéménites*, vol. 17.
- Charbonnier, J., and Schiettecatte, J. (2016) “Les barrages des hautes-terres”. In Charloux, G., and Schiettecatte, J. (eds) *Yémen, terre d’archéologie*, pp. 190-199, Paris: CEFAS, Geuthner.
- Charpentier, V. (2001) “Les industries lithiques de Ra’s al-Hadd”, *Proceedings of the Seminar for Arabian Studies*, vol. 31, pp. 31-45.
- Degli Esposti, M., and Benoist, A. (2015) “More on Masafi ancestors: the Late Bronze Age site of Masafi-5”, *Proceedings of the Seminar for Arabian Studies*, vol. 45, pp. 57-74.
- Degli Esposti, M., and Condoluci, C. (2018) “Husn Salut in the Iron Age”. In Avanzini, A., and Degli Esposti, M. (eds) *Husn Salut and the Iron Age of South East Arabia. Excavations of the Italian Mission to Oman 2004-2014*, Arabia Antica 15, pp. 301-330, Roma: L’“Erma” di Bretschneider.
- Degli Esposti, M., Renzi, M., and Rehren, T. (2016) “Iron Age metallurgy at Salūt (Sultanate of Oman): a preliminary note (poster)”, *Proceedings of the Seminar for Arabian Studies*, vol. 46, pp. 81-88.
- Degli Esposti, M., Tagliamonte, E., Sasso, M. and Ramorino, P. (2019) “The Late Iron Age of central Oman (c.300 BC–AD 300) – new insights from Salūt”, *Proceedings of the Seminar for Arabian Studies*, vol. 49, pp. 97-113.
- Donaldson, P. (1984) “Prehistoric tombs of Ra’s al-Khaimah”, *Oriens Antiquus*, vol. XXIII, pp. 191-312.
- Gernez, G., Benoist, A., and Jean, M. (2017) “The Iron Age in Adam. The discovery of a ritual complex near Jabal Mudhmar”. In Gernez, G., and Giraud, J. (eds) *Taming the Great Desert: Adam in the Prehistory of Oman*, pp. 81-101, Muscat: The Archaeological Heritage of Oman, Ministry of Heritage and Culture.
- Gernez, G., Bigot, L., Jean, M., and De Castéja, V. (in prep.). *The four thousand arrowheads from Mudhmar (Oman, Early Iron Age)*.
- Gernez, G., Jean, M., and Benoist, A. (2017) “The discovery of a new Iron Age ritual complex in Central Oman: recent excavations near Adam”, *Proceedings of the Seminar for Arabian Studies*, vol. 47, pp. 101-116.
- Gernez, G., and Giraud, J. (2017) “A tale of two graveyards. The excavations of protohistoric funerary sites in Adam”. In Gernez, G., and Giraud, J. (eds) *Taming the Great Desert: Adam in the Prehistory of Oman*, pp. 49-80, Muscat: The Archaeological Heritage of Oman, Ministry of Heritage and Culture.
- Giraud, J., and Gernez, G. (2017) “The new funerary landscape during the beginning of the Early Bronze Age in Adam, Jabal Salakh and Jabal Qarah”. In Gernez, G., and Giraud, J. (eds) *Taming the Great Desert: Adam in the Prehistory of Oman*, pp. 55-60, Muscat: The Archaeological Heritage of Oman, Ministry of Heritage and Culture.
- Jasim, S.A. (2012) *The necropolis of jebel Buhais. Prehistoric discoveries in the Emirate of Sharjah. United Arab Emirates*, Sharjah: Departement of Culture and Information.
- Hartill, D. (2005) *Cast Chinese Coins*, Victoria: Trafford Publishing.
- Jean, M., Pellegrino, M. P., and Gernez, G. (2018) “New evidence of Iron Age ritual practices in central Oman: 2017 excavations in Mudmār East, near Ādam”, *Proceedings of the Seminar for Arabian Studies*, vol. 48, pp. 125-140.
- Kroll, S. (2013) “The Early Iron Age Fort at Lizq, Sultanate of Oman”, *Zeitschrift für Archäologie Aussereuropäischer Kulturen*, pp. 159-220, Wiesbaden: Reichert Verlag
- Magee, P. (1998) “The chronology and regional context of late prehistoric incised arrowheads in southeastern Arabia”, *Arabian archaeology and epigraphy*, vol. 9, 1, pp. 1-12.

Magee, P. (1999) "A proposed function for late prehistoric incised arrowheads in Southeastern Arabia", *Isimu*, vol. 2, pp. 353-363.

Méry, S. (2000) *Les céramiques d'Oman et d'Asie Moyenne : une archéologie des échanges à l'âge du Bronze*, Paris : CNRS Editions.

Mouton, M., Benoist, A., and Cordoba, J. (2012) "Le serpent, gardien du cuivre et des eaux de la montagne d'Oman ?". In Giraud, J., and Gernez, G. (eds) *Aux marges de l'Archéologie. Hommage à Serge Cleuziou*, Travaux de la maison René Ginouvès 16, pp. 387-404, Paris: De Boccard.

Potts, D. (2000) *Ancient Magan. The secrets of Tell Abraq*, London: Trident Press.

Sasso, M. (2018) "Metal Objects". In Avanzini, A., and Degli Esposti, M. (eds) *Husn Salut and the Iron Age of South East Arabia. Excavations of the Italian Mission to Oman 2004-2014*, Arabia Antica 15, pp. 301-330, Roma: L'Erma di Bretschneider.

Tagliamonte, E., and Avanzini, A. (2018) "New data from the renewed excavation at Salūt: the Iron Age settlement (Qaryat Salūt)", *Proceedings of the Seminar for Arabian Studies*, vol. 48, pp. 339-351.

Taha, M.Y. (2009) *The discovery of the Iron Age in the United Arab Emirates*, Abu Dhabi: Ministry of Culture, Youth and Community Development.

Tagliamonte, E. and Avanzini, A. (2018) "New data from the renewed excavation at Salūt: the Iron Age settlement (Qaryat Salūt)", *Proceedings of the Seminar for Arabian Studies*, vol. 48, pp. 339-351.

Vogt, B., and FrankeVogt, U. (1987) *Shimal 1985-1986, Excavation of the German Archaeological Mission*

in Ras al-Khaimah, UAE, Berliner Beiträge zum Vorderen Orient 8, Berlin: Dietrich Reimer Verlag.

Weeks, L., Cable, C., Franke, K., Newton, C., Karacic, S., Robert, J., Stepanov, I., David-Cuny, H., Price, D., Bukhash, R.M., Radwan, M.B., and Zein, H. (2017) "Recent archaeological research at Saruq al-Hadid, Dubai, UAE", *Arabian Archaeology and Epigraphy*, vol. 28, pp. 31-60.

Weeks, L., David-Cuny, H., Avanzini, A., Lischi, S., Genchi, F., Caputo, F., Al-Ali, Y.Y., and Boraik, M. (2019) "Worked and decorated shell discs from southern Arabia and the wider Near-East", *Arabian Archaeology and Epigraphy*, pp. 1-26.

Yule, P., and Weisgerber, G. (2015) "Al-Wasit Tomb W1 and other Sites: Redefining the Second Millennium BCE Chronology in South-Eastern Arabia". In Yule, P. (ed.) *Archaeological Research in the Sultanate of Oman*, Der Anschnitt Beiheft 28, pp. 9-108, Bochum: Verlag Marie Leidorf.

Yule, P. (2018) "The finds". In Yule, P., and Gernez, G. (eds) *Early Iron Age Metal-Working Workshop in the Empty Quarter, al-Zāhīrah Province, Sultanate of Oman*, Universitätsforschung zur prähistorischen Archäologie 316, pp. 33-146, Bonn: Habelt-Verlag.

Yule, P. A., and Vogt, B. (2020) "Do South-Eastern Arabia's Earliest Extant Copper-Alloy Arrowheads date to the Wadi Suq Period?", *Journal of Global Archaeology*, vol. 1, pp. 1-49.

Yule, P. A., and Weisgerber, G. (1998) "Prehistoric tower tombs at Shihr/Jaylah, Sultanate of Oman", *Beiträge zur Allgemeinen und Vergleichenden Archäologie*, vol. 18, p. 183-241.

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