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The Early Bronze Age in the Hajar oases: new investigations of the settlement, funerary, and monumental site of al-Dhabi 2 (Bisya, Oman)

Mathilde Jean, Martin Sauvage, Olivia Munoz, Victoria de Castéja, Théo Mespoulet, Josselin Pinot & Kaïna Rointru

Summary
The development of monumental architecture (oasis towers), organized settlements, and new funerary structures are markers of the emergence of social complexity in the culture of Magan in the Hafit and Umm an-Nar periods. Bisya is one of the largest sites in central Oman where this phenomenon may be observed. The French Archaeological Mission in central Oman (FAMCO) is undertaking a new research programme at al-Dhabi 2 (Bisya, ad-Dakhiliyah, Oman), a site gathering Early Bronze Age (EBA) monumental, settlement, and funerary architecture. In 2022 the complete plan of the structures unveiled the site's organization, with a large tower on a hill, a built settlement area in the foothills, and several Hafit and Umm an-Nar tombs. Excavations were carried out in the settlement area (150 m^2) to study the architecture and confirm the domestic nature of the remains. The pottery assemblage is typical of the Umm an-Nar period, although earlier occupation layers may have been reached. Finally, two excavated tombs yielded preliminary results on the funerary landscape at Early Bronze Age Bisya. This project opens up broad perspectives for future research at al-Dhabi to gain a better understanding of the social and cultural evolution of proto-historic communities in south-east Arabia.

Keywords: Oman, Early Bronze Age, settlement, tomb, tower

Introduction

Bisya (ad-Dakhiliyah governorate, Sultanate of Oman) is a modern village located 30 km south of Bahla. It is known as one of the most significant heritage places in central Oman — the Iron Age fortress of Husn Salut and the Bisya visitor centre are becoming important tourist areas. Omani and international researchers have been investigating the region for decades. Regarding the Early Bronze Age (EBA), the Hajar project explored occupation sites (Orchard 1994; 2000; Orchard & Stanger 1999) and the Italian Mission to Oman (IMTO) excavated a tower at Salut ST1 (Degli Esposti 2016).

In the Oman peninsula, the EBA, including the Hafit (3200–2700 BC) and Umm an-Nar periods (2700–2000 BC), was a time of important changes towards a more complex society through the development of agricultural practices and the birth of oases (al-Jahwari 2009; Tengberg 2012; Munoz 2017; Beuzen-Waller et al. 2018); the evolution of funerary practices (Bortolini & Munoz 2015); the creation of monumental and settlement architecture (Cleuziou & Tosi 2020); the local production of crafts such as pottery (Méry 2000) and metallurgy (Weisgerber 1983; Giardino 2019); and integration into the macro-regional maritime economy (Méry et al. 2017; Cleuziou & Tosi 2020; Frenez 2020). Monumental architecture is represented by the construction of large circular towers, a phenomenon which seems limited to the foothills of Jabal al-Hajar. A few sites contain archaeological evidence of all these innovations: Bat (adh-Dhahirah governorate, Sultanate of Oman; Thornton, Cable & Possehl 2016; Cocca et al. 2019), Hili (Abu Dhabi Emirate, United Arab Emirates; Cleuziou 1989; Cleuziou, Méry & Vogt 2011), and Bisya (Orchard 2000; Degli Esposti 2016; Frenez et al. 2016) appear to be the three main EBA areas of inland population in the Oman peninsula.

In 2022 the French Archaeological Mission in Central Oman (FAMCO) began a research programme at Bisya focusing on the development of occupations in the southern foothills of Jabal al-Hajar through the ages, with a special interest in the Early Bronze Age. The mission's aim is to improve and expand the archaeological map of Bisya to help protect the local heritage. In collaboration

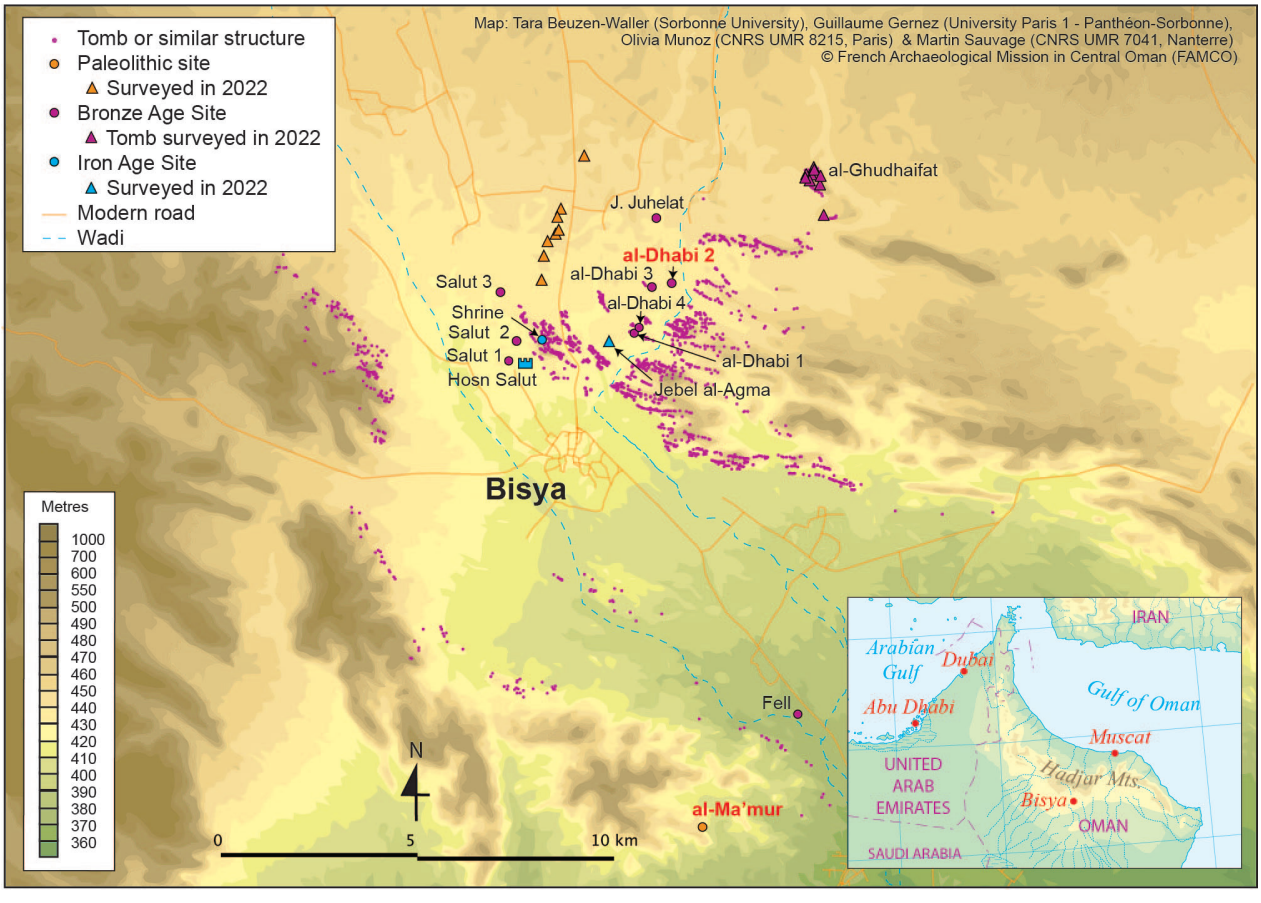

FIGURE 1. *An archaeological map of the region of Bisya, ad-Dakhiliyah Governorate, Sultanate of Oman (© FAMCO/T. Beuzen-Waller, M. Sauvage, G. Gernez).*

with Oman's Ministry of Heritage and Tourism (MHT), a survey programme from the Palaeolithic[1] to the Islamic era is being implemented both remotely and on site (Fig. 1). For the Early Bronze Age, there are so far nine identified towers in Bisya, along with thousands of Hafit type tombs and at least six Umm an-Nar type tombs. Evidence of human settlement is mainly found in two areas: al-Dhabi, on the north-eastern side of Bisya, and Salut, to the west.[2] At al-Dhabi, there are five identified towers, four of them located in the hills and one in the plain. FAMCO began excavations in 2022 in the largest area at al-Dhabi, called al-Dhabi 2, which includes a large tower, a settlement area, and multiple tombs. This paper presents the results of the investigations led at al-Dhabi 2 in 2022[3] including the site's topographic survey, the trenches in the settlement area, and the excavation of two Hafit type tombs.

Al-Dhabi 2: topographic survey

The topographic work aims to geolocate all the visible archaeological structures identified during the foot survey.[4] Together with drone orthophotography, it provides a precise map of the site, especially of the

[1] The prehistoric investigation is led by Amir Beshkani (UMR 7041 ArScAn-AnTet, Nanterre).

[2] At Salut, there are three known monumental circular towers. Salut tower 1 (ST1) was excavated by IMTO in the 2010s (Degli Esposti 2016) and Salut tower 2 (ST2) was excavated under the direction of Guillaume Gernez from 2016 to 2019 (publication pending).

[3] The 2022 fieldwork lasted from 5 to 30 January 2022.

[4] The topographic study was carried out by Martin Sauvage, Théo Mespoulet, and Ayoub al-Ouffi using a hand-held GPS and a total station.

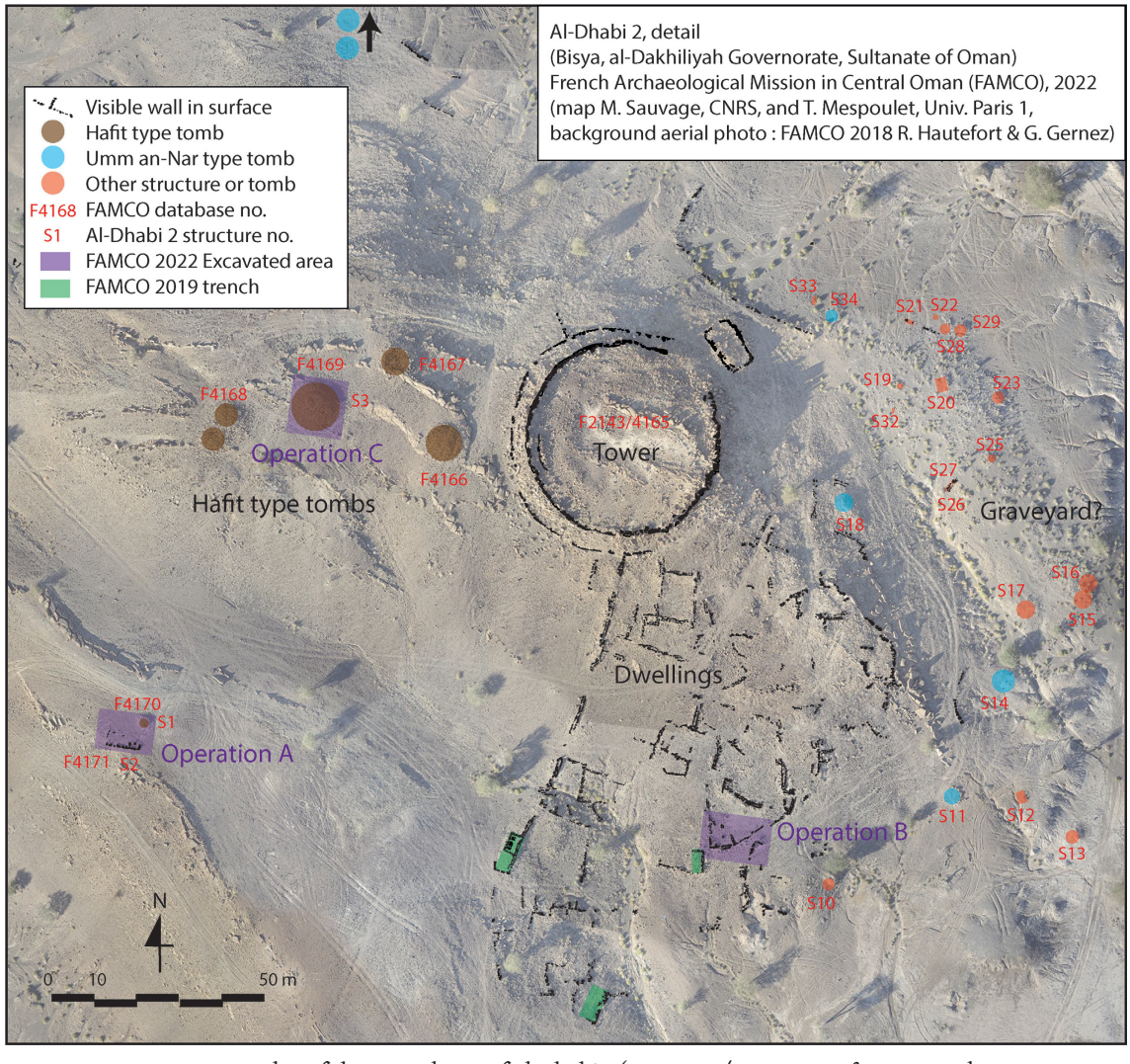

Figure 2. *A plan of the central part of al-Dhabi 2 (© FAMCO/M. Sauvage & T. Mespoulet; background orthophotography by R. Hautefort & G. Gernez, 2018).*

walls, and reveals the general layout of the occupation (Fig. 2). Al-Dhabi 2 appears to be an organized site with a clear functional layout, displaying distinct monumental, funerary, and settlement areas. Some areas are densely occupied while others have no built remains. Some parts of the site are enclosed by stone walls, suggesting that the settlement was planned. The site is organized around a rocky hill — the structures are not yet dated and are not necessarily contemporaneous. The most visible structure is a monumental circular tower located on the hill. To the west of the tower are five stone-built Hafit type tombs on the crest of the hill. The settlement area is located on the south-eastern edge of the tower, in the foothills; it is delimited by a long stone wall to the west and by a wadi to the east and south. The settlement area seems to have been densely occupied, given the multiple identified walls often arranged orthogonally, forming rooms and buildings. East of the settlement, several structures, often resembling cairns, are positioned in the wadi; some of them might be tombs but their exact nature remains to be determined. Finally, north of the hill the settlement is less dense: there are a few walls and possibly Umm an-Nar tombs.

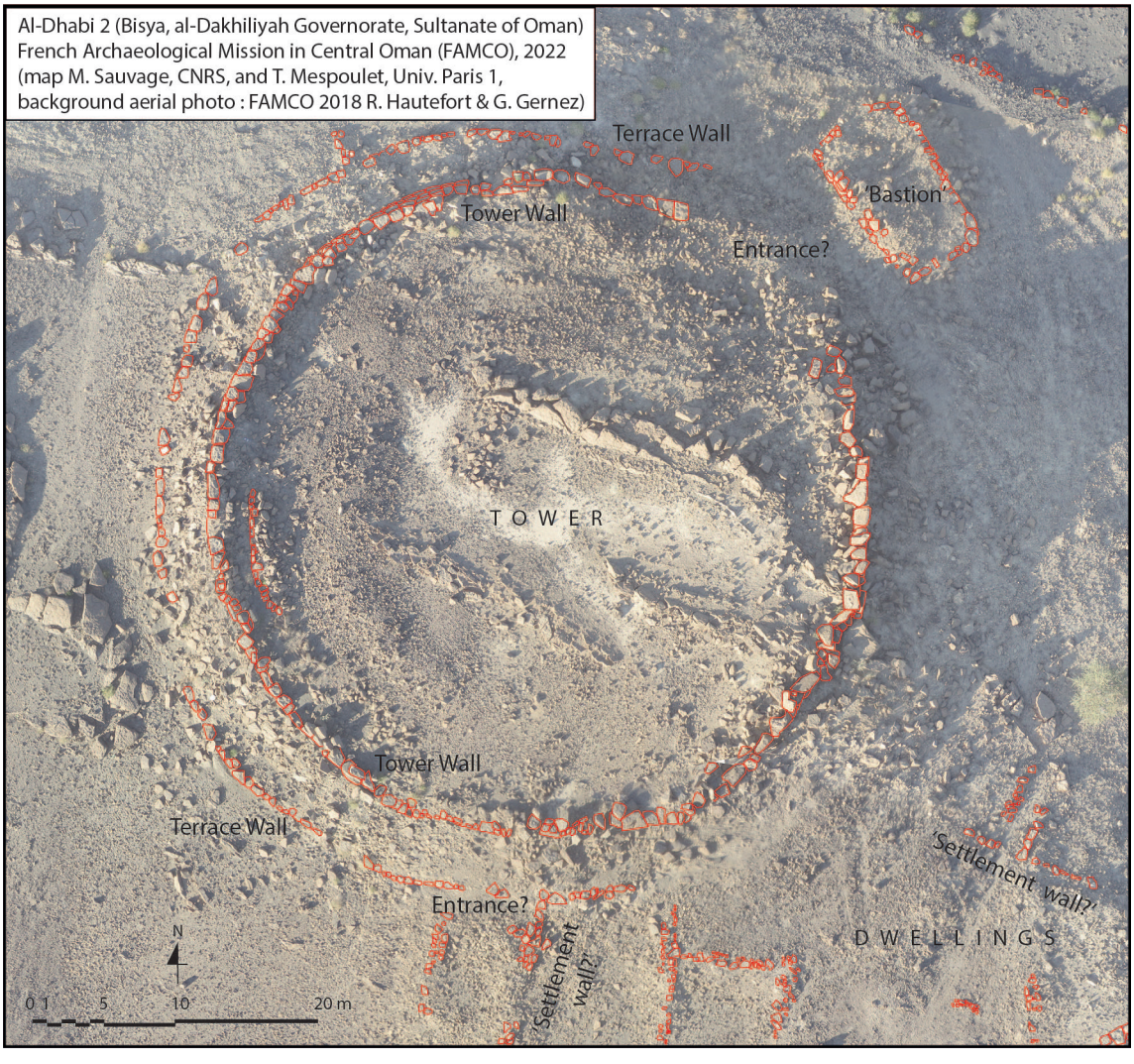

Figure 3. *A plan of the tower of al-Dhabi 2, located on the crest of the main hill (© FAMCO/M. Sauvage & T. Mespoulet; background orthophotography by R. Hautefort & G. Gernez, 2018).*

The topographic survey enables us to propose an initial description and analysis of the tower. This building is an almost perfectly circular structure consisting of two concentric walls, an internal wall measuring 45 m in diameter and an external wall, 55 m. The external wall is noticeably lower than the internal one and could be a terrace wall built to support the tower, as the whole structure is positioned on the crest of the hill. The tower wall is well preserved, up to five courses and 2.20 m high on the eastern side and about 1.50 m thick — most of its inner face collapsed inside the tower — while the terrace wall is three courses and 0.90 m high at best. The walls, made of limestone blocks probably extracted from the hill itself, are of large dimensions: 1–1.30 m long, 40–80 cm wide, and 20–50 cm thick. The blocks are arranged with smaller rubble and wedging stones, following the dry-stone method.

In view of the collapsed stones in and around the tower, it can be assumed that the elevation of the inner wall did not exceed its current best preservation by more than a course, that is, a total elevation of about 2 to 3 m. Moreover, in the present state of excavation the absence of fragments of sun-dried bricks at the foot of the wall — inside or outside — makes it difficult to

imagine an elevation of raw earth (mud bricks or cob) on the wall of the tower.

Inside the tower, a 5 m-long wall lies 2.70 m from the tower's circular wall. It is the only identified structure inside the building so far, aside from natural rocky formations and a sandy area that will be examined in the future.

A rectangular structure is associated with the tower on its north-eastern side, built with the same materials and using the same techniques as the tower, with a preserved height of 0.90 m. Its precise function is unknown, but its location on the non-inhabited side of the tower suggests a hypothetical fortification, such as a bastion, as already identified on Salut Tower ST2. Finally, we spotted two possible entrances to the tower, one associated with the 'bastion' and the other leading to the settlement area to the south.

From the topographic survey, the tower at al-Dhabi 2 (Fig. 3) appears to be one of the largest in the Hajar mountains, the inner wall measuring 45 m in diameter. The perfectly circular shape and the walls constructed of large stone blocks suggest elaborate building techniques, planned structuration, and the collective efforts of the community to achieve a common objective. The tower's internal layout and function are still unknown. Its location on the hill crest, visible from afar — especially from the north — and overhanging the settlement area might indicate a defensive purpose. Excavations will be carried out in this area in the coming years to provide further information in order to document and date this monumental architecture.

Settlement area: a dense Umm an-Nar occupation

The settlement of al-Dhabi 2 is located on the south-eastern side of the tower, in the foothills. To the west, a long straight wall stretching from the tower on the main hill to the southernmost part of the site delimits the area. A wadi flowing on the eastern and southern sides marks off the dwellings. The settlement is densely built and several walls were visible on the surface during the topographic survey. A 150 m² trench, named Operation B, was opened on the south side (Fig. 4).[5] The excavation aimed to confirm the domestic nature of the buildings, evaluate their state of preservation (stratigraphy, architecture, structures, artefacts), and provide the dating and relative chronology of the area.

The excavation revealed a dwelling with a complex plan and a preserved floor, dating to the Umm an-Nar period according to the pottery. The main building, only partly excavated, includes three spaces, probably consisting of a courtyard (L111, 68 m² excavated)[6] and two rooms (L128 and L131). The walls are preserved on one to three rows of stone blocks, up to a height of 45 cm. The discovery of earthen materials in the trench's fill suggests the presence of a mud/mud-brick elevation as the number of stone blocks is insufficient to reach the full height of the walls. Moreover, the top of the walls is flat suggesting it supported an elevation constructed of another building material. The walls are *c.*50–60 cm wide, and in some places up to 1 m wide (L116, interpreted as buttresses). Evidence of a white coating on the walls and floor of room L128 suggests that the walls were originally uniformly white (Fig. 5/B). Other fragments of a white coating were also found in collapsed layers. The identification of two thresholds made it possible to restore passageways in the building, one between the exterior and the courtyard, the second between the courtyard and the rooms, and to highlight a circulation path in the house. A deep trench in the northern part of the courtyard revealed the presence of the bedrock 20 to 50 cm under the archaeological layers in this area.

The structures, fireplaces, and artefacts from this building are related to domestic activities. There is no indication, so far, of craft production. In L131, five flat grinding stones were uncovered, lying one on top of the other along wall L129 (Fig. 5/C). This is probably an indication of food processing in this room. L128 is an L-shaped room of *c.*14 m² with an Umm an-Nar mud floor; lying on the floor were potsherds and a small copper punch (Fig. 5/D), as well as a fireplace in the centre of the room (L140). The courtyard (L111) includes several mud floors, fireplaces, and a circular structure (L122; Fig. 5/A) bounded by a mud wall and stones. The structure was full of carefully selected pebbles, all of the

[5] Excavation in Operation B was led by Mathilde Jean, Josselin Pinot, and Théo Mespoulet with the help of Ayoub al-Ouffi, Samir al-Abri, and Abdelrahim al-Hinai (MHT staff members), Salim al-Siyabi and Abdullah al-Hinai (students from Sultan Qaboos University), and five workers from Bisya.

[6] 'L' denotes 'locus', used to label structures such as walls, spaces, floors, pits, and fireplaces.

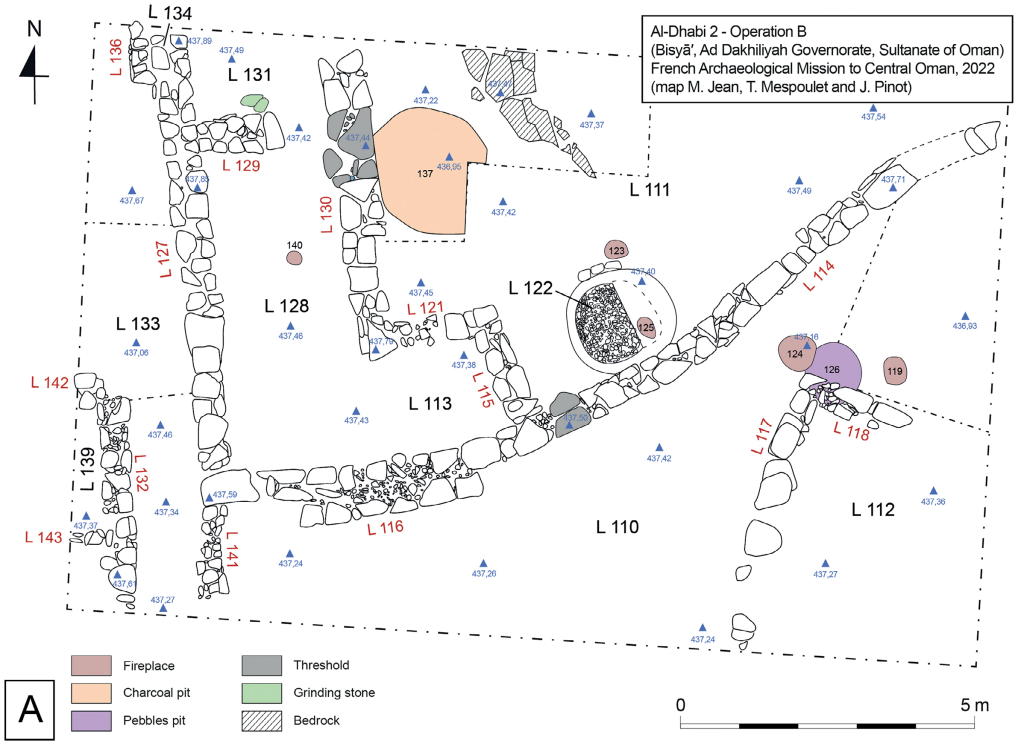

Figure 4. *Plan and orthophotograph of Operation B at the end of the 2022 excavation (© FAMCO/M. Jean, T. Mespoulet & J. Pinot).*

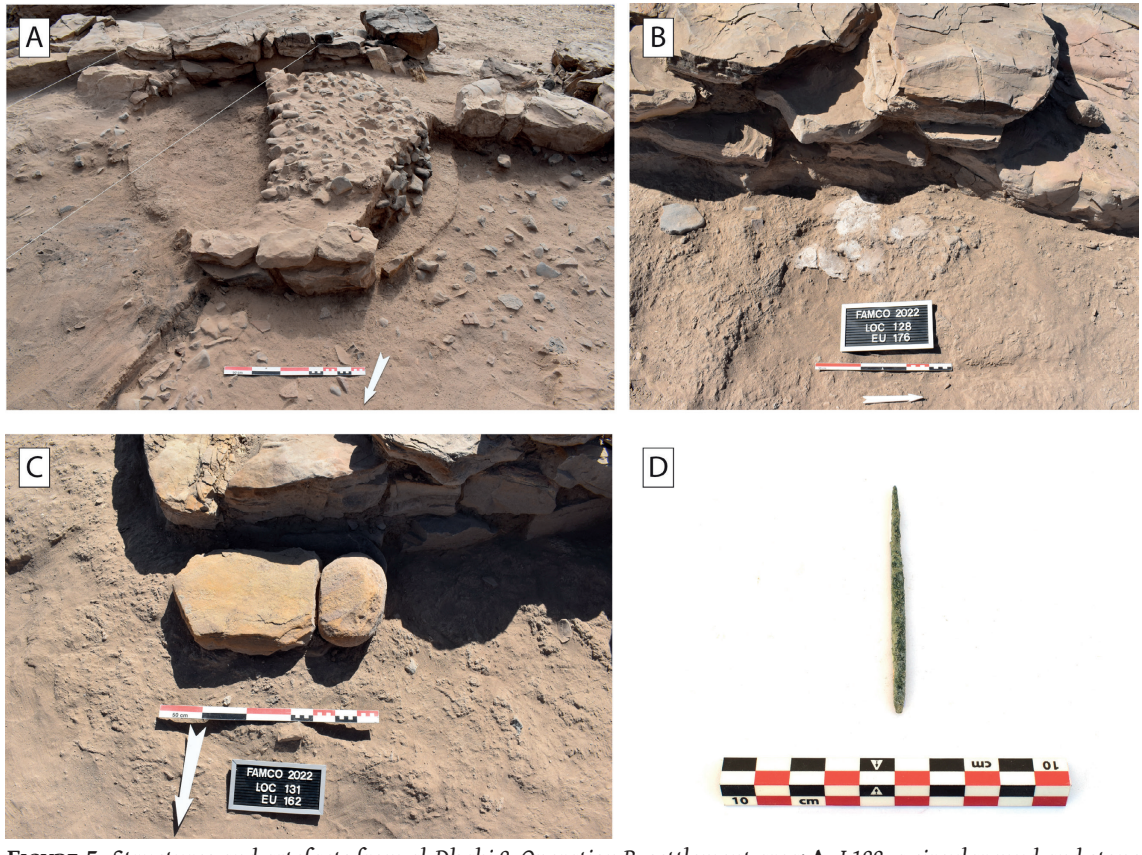

Figure 5. *Structures and artefacts from al-Dhabi 2, Operation B, settlement area:* **A.** *L122, a circular mud and stone structure full of pebbles in courtyard L111;* **B.** *the remains of white coating in room L128, against wall L127;* **C.** *two grinding stones in room L131, against wall L129;* **D.** *copper punch discovered on the floor of room L113 (© FAMCO/M. Jean, J. Pinot, T. Mespoulet).*

same size (*c.*15 cm) and rock type. The purpose of this structure is unclear but could be related to fire — for heating, cooking, or smoking; some ashes and charcoals were found around the structure even though evidence of burnt pebbles or mud was absent. A large charcoal pit (L137) partly excavated below the floors yielded abundant vegetal remains, mostly charcoals from 5 cm to microscopic size. Samples were collected to provide a radiocarbon dating of the pit, possibly earlier than the Umm an-Nar period, and for an anthracological study. Of the several pits excavated outside the building, pit L126 is particularly interesting as it was full of pebbles, some of which were burnt, and numerous potsherds from the Umm an-Nar period. This pit was probably related to the dwelling and may have been a contemporaneous rubbish area.

There are two other buildings in the southern part of the trench. To the south-west, building L132 is located slightly higher in the stratigraphy than wall L127 (Fig. 6/C) and is possibly later. Remains of a third building in the south-eastern edge of the area (L112) revealed poorly preserved architecture, probably later given that the walls rest on an Umm an-Nar pit (L126). Interestingly, operation B also revealed part of a narrow north–south street (L133) between walls L127 and L132 (Fig. 6). We explored this 1.2 m wide street over 4 m, including a 6% slope from north to south. Aside from the circulation between the dwellings, there is a channel in the centre filled with pebbles and potsherds to evacuate rainwater to the south and outside the settlement. A drain cuts across wall L127 to evacuate waste water from room L128 into the street. This drain/channel/street combination is a significant discovery given the current minimal knowledge of the circulation systems in the

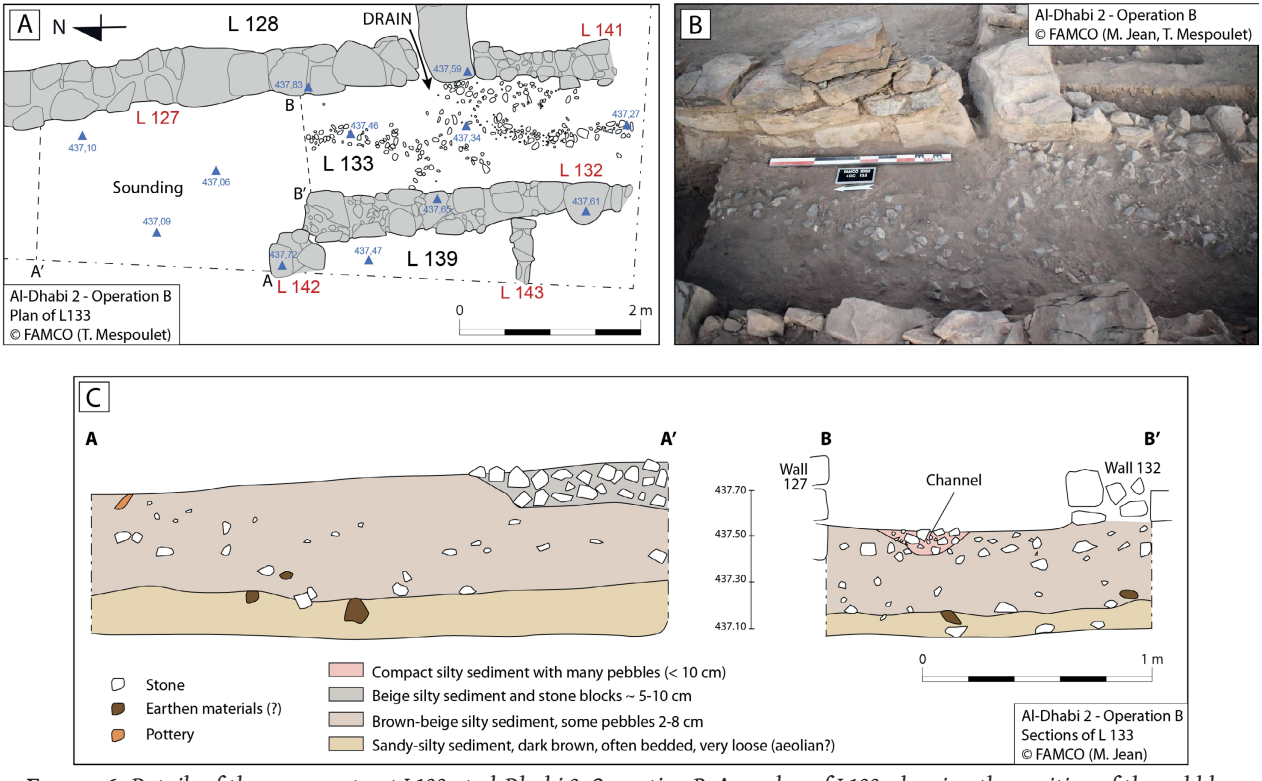

FIGURE 6. *Details of the narrow street L133 at al-Dhabi 2, Operation B:* **A.** *a plan of L133, showing the position of the pebbles in the centre of the lane and the drain coming from L128;* **B.** *a photograph of L133 at the end of the excavation, with the drain visible as an empty space in the architecture of wall L127;* **C.** *sections of the trench in L133, showing the concentration of pebbles in the central channel, about 10 cm deep (© FAMCO/T. Mespoulet & M. Jean).*

Umm an-Nar period. In a dense settlement area such as al-Dhabi 2, these circulation spaces certainly played an important role in the planning of the site, and this issue deserves further attention.

At least three occupation phases were identified in the settlement area from the 2022 excavation. The charcoal pit (L137) located under the floor of L111 is the oldest occupation, possibly earlier than the Umm an-Nar period. The main residential building is the second phase of the area, probably dating to the Umm an-Nar period. Finally, the two buildings located on the southern edge of the trench probably come slightly after the Umm an-Nar period or later, with the eastern building possibly being the most recent one. Radiocarbon analysis on charcoals from pit L137, fireplace L140 in room L128, and pebble-pit L126 will provide absolute dating for a more precise view of the al-Dhabi 2 settlement's chronology.

The pottery assemblage collected in Operation B includes 518 potsherds, of which 32% are diagnostic sherds (showing shape and decoration). Numerous sherds were found on the surface, in the street, and in other outside spaces. The areas that revealed the most significant amount of pottery are the largest: external spaces (L110), the street (L133), and the courtyard (L111). Interestingly, pebble-pit L126 also yielded a high amount of pottery: the potsherds are well preserved and several matches were identified between different excavation units in the pit, attesting to the uniformity of the structure. The few potsherds found on the floor of room L128 clearly belong to the Umm an-Nar pottery culture. The shapes are limited to open-mouth jars, which are clearly predominant, together with a few smaller pots and goblets (Fig. 7). Bases are mostly flat (Fig. 7/24–25) and a few ring-base sherds were uncovered (Fig. 7/22–23). Twenty percent of the sherds are painted with horizontal and wavy lines, some also bear applied decoration. The shapes and decoration are typical of Umm an-Nar pottery assemblages, with the

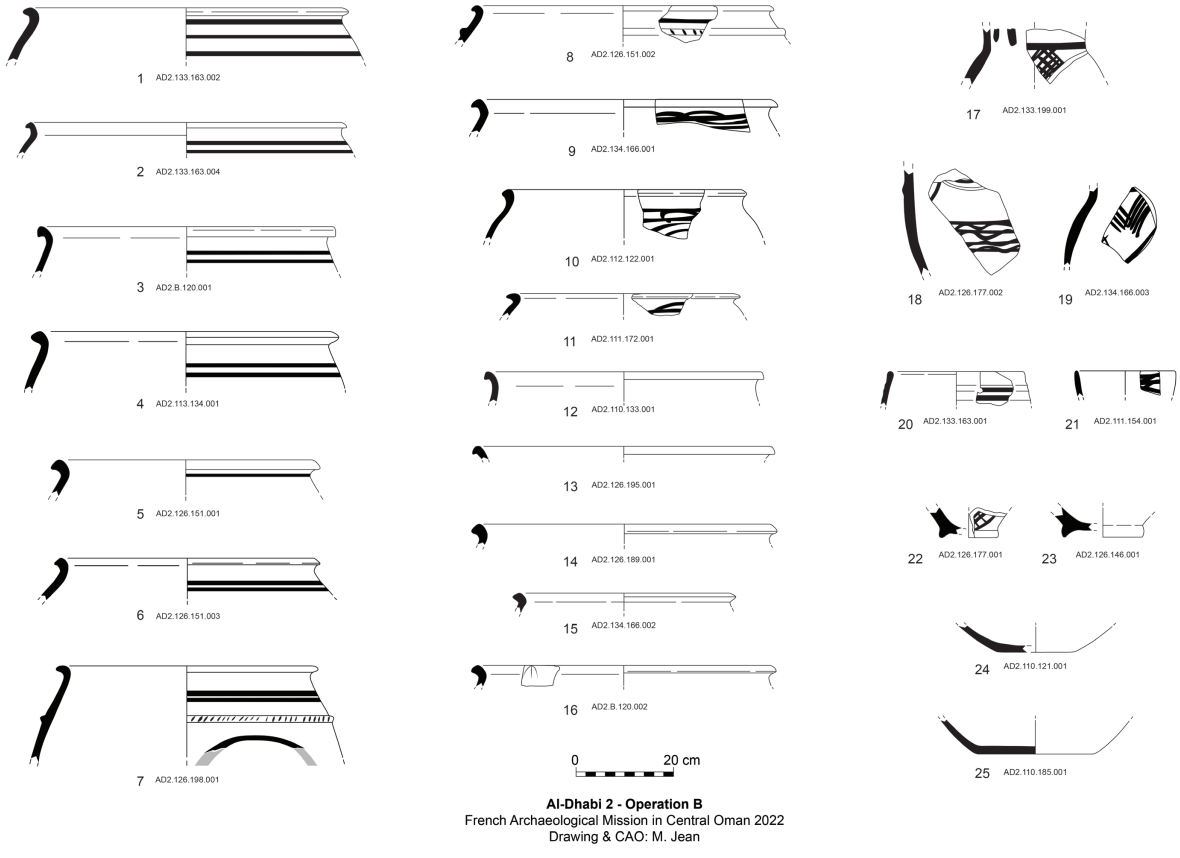

Figure 7. *Pottery assemblage from the settlement area, Operation B, al-Dhabi 2 (© FAMCO/M. Jean).*

closest parallels in Salut ST1 (Degli Esposti 2015; Méry et al. 2017: figs 4–7) and other well-studied sites in the Oman peninsula such as Bat (Swerida, Dollarhide & Jensen 2021: figs 3–5, 7; Schmidt & Döpper 2016: fig. 5), al-Zibah (Schmidt et Döpper 2016: figs 6–7), Hili (Méry 2000; Cleuziou, Méry & Vogt 2011), and Dahwa (Douglas et al. 2021: figs 17–18, 26).

According to Sophie Méry's classification (Méry 2000; Méry et al. 2017), the assemblage includes mostly beige and red sandy wares but very few sherds of fine red ware (Fig. 7/17, 19). One sherd displays an incised mark inside the rim (Fig. 7/16) representing a trident. To date, this pot mark is unique at al-Dhabi. However, similar signs are frequent on storage vessels from Maysar (Weisgerber 1984: 198, fig. 24.5) and also occur at Bat (Thornton, Cable & Possehl 2016: fig. 9.6.: E, U), Salut ST1 (Degli Esposti 2015: fig. 16), and Hili (Cleuziou, Méry & Vogt 2011: figs 82–83), indicating that pot-marking was a common practice in Umm an-Nar settlements for either domestic or craft purposes. Some scholars suggested comparisons with Indus practices from Shortugai (Francfort & Pottier 1978: figs 19–21) and Kalibangan (Cleuziou & Tosi 2020: fig. 158:3) that need further investigation. Finally, five black-slipped sherds could be imports (or local production?) of the Indus type black-slipped jars, showing contacts between al-Dhabi and the coastline and further north with the Indus culture — the presence of Indus potters at Bisya/Salut ST1 has already been suggested (Méry et al. 2017). A complete analytical programme will be implemented on the pottery assemblage from al-Dhabi 2 in the coming years to characterize the local production and evaluate

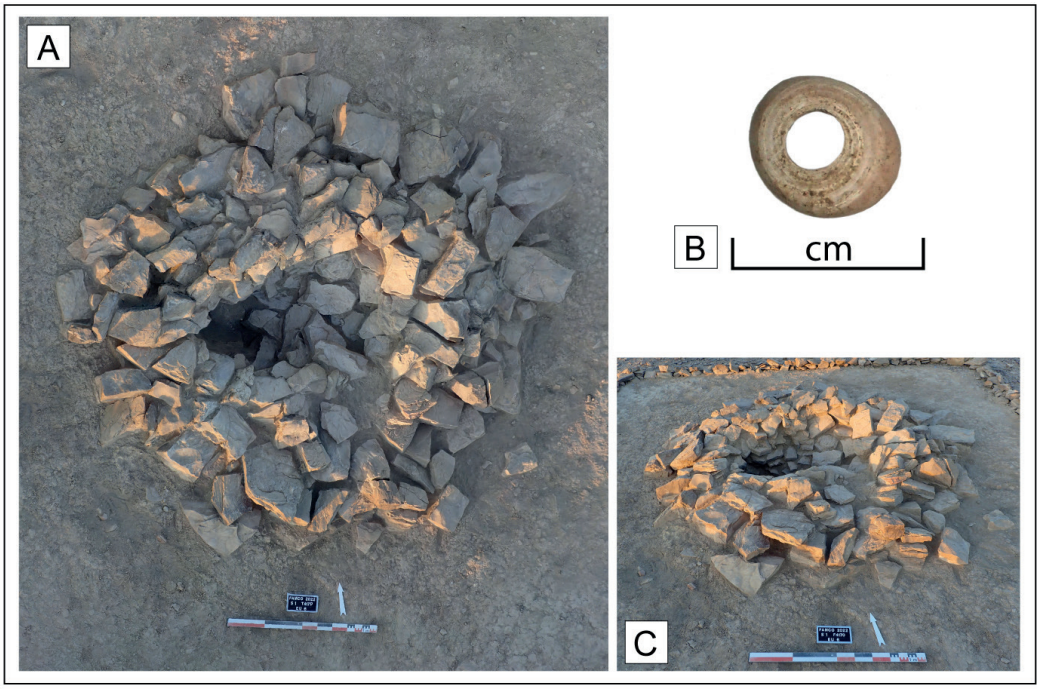

Figure 8. *Tomb F4170 from al-Dhabi 2:* **A.** *orthophotograph;* **B.** *shell bead;* **C.** *oblique view from the south (© FAMCO/O. Munoz).*

its integration into the regional Umm an-Nar pottery culture and macro-regional trade networks.

To sum up, operation B revealed a well-preserved EBA settlement with several buildings, walls, floors, and other structures. Artefacts — mainly pottery — are typical from the Umm an-Nar period; grinding stones attest to domestic activities such as food processing. Only two copper punches represent metallic artefacts and there is as yet no evidence of craft production in this part of the site.

Al-Dhabi 2 and the EBA funerary landscape

During the 2022 campaign, the FAMCO team conducted its first reconnaissance of the funerary structures at al-Dhabi 2,[7] excavated two Hafit type tombs, and carried out a foot survey of the necropolis at al-Ghudhaifat, previously identified by the MHT team. Several stone tombs were found at al-Dhabi 2, possibly belonging to the Early Bronze Age, including the Hafit and Umm an-Nar periods, and the Iron Age, as attested by previous work in the Bisya region. In 2022 excavations focused on two tombs that were assigned to the Hafit period based on their architectural typology. This period is crucial for understanding the emergence of the first agricultural societies in the Oman peninsula, and our research aims to obtain biological and cultural data in order better to understand this phenomenon in the Bisya region. To identify more accurately the possible differences underlying the distribution of the tombs, we excavated a tomb (F4170, Operation A) on the low terrace above the western plain and another (F4169, Operation C) on the most prominent point of the site, perched on the rocky ridge next to other three Hafit type tombs (see Fig. 2).

Tomb F4170

Tomb F4170 was extensively modified and did not yield any human remains. It is preserved on only a few courses, totalling *c.*12 cm, with a diameter of no more than 3.5 m (Fig. 8/A,C). The structure seems to have been looted and partially dismantled, as attested by a hole perforating the base of the chamber in the western part. A single shell bead was recovered while sifting the fill of the chamber (Fig. 8/B).

[7] The funerary exploration was led by Olivia Munoz assisted by Kaïna Rointru.

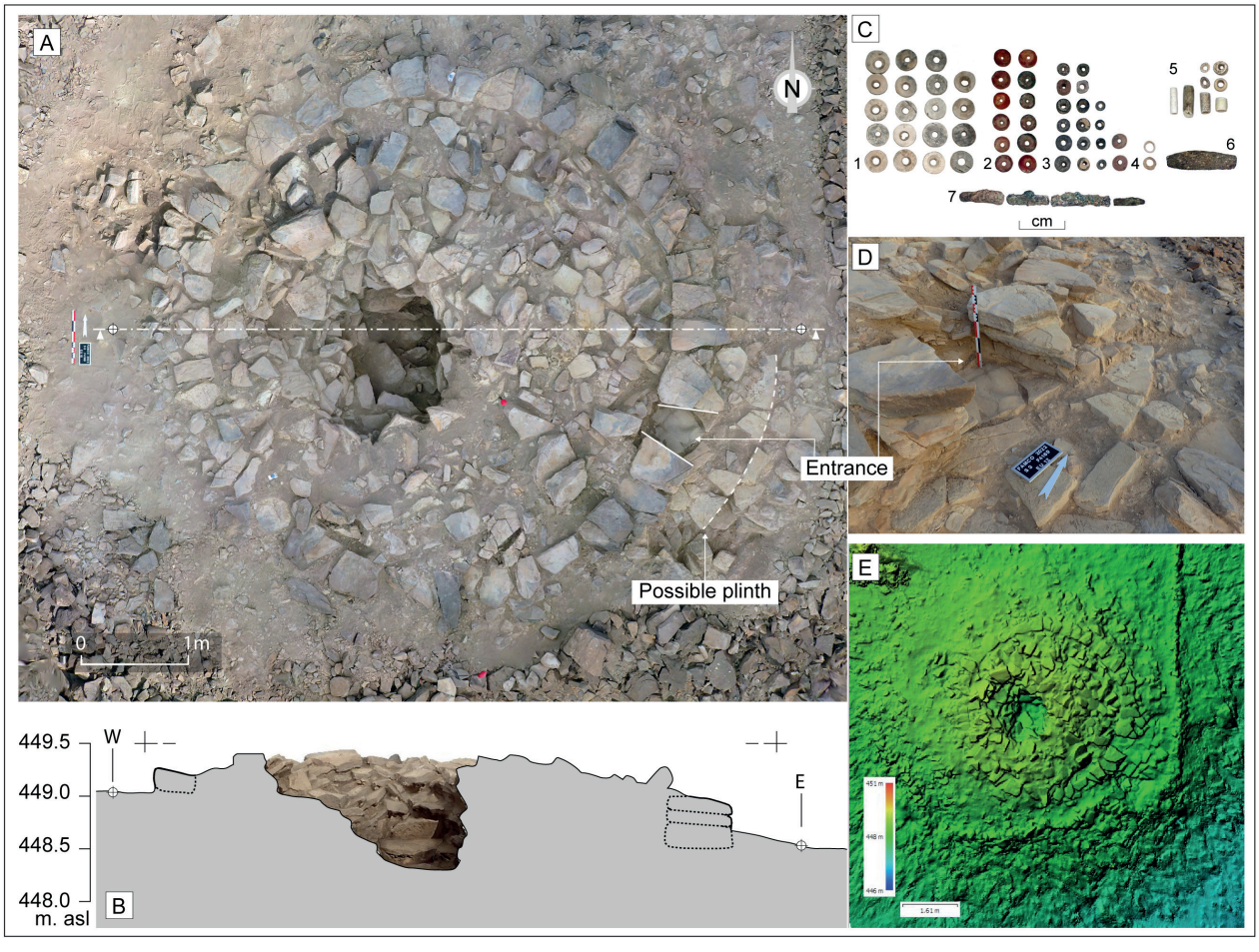

Figure 9. *Tomb F4169 from Al-Dhabi 2:* **A.** *orthophotograph;* **B.** *west–east section;* **C. 1–3,6** *stone beads;* **4** *shell beads;* **5** *artificial material beads;* **7** *copper alloy fragments;* **D.** *detail of the entrance at the end of the 2022 field season;* **E.** *digital elevation model (© FAMCO/O. Munoz).*

Tomb F4169

Tomb F4169 is over 1 m high and its outer structure shows a well-organized circular wall with a diameter of 5.5 m (Fig. 9). An entrance was found in the south-eastern part outside the tomb, measuring 0.70 m wide at the threshold. This entrance is formed by a break in the outer wall, of which 3–4 well-arranged layers are preserved on each side of the access (Fig. 9/A–B,D). The entrance width decreases at the level of the preserved upper courses, suggesting that it was a triangular opening whose original height can be estimated at 0.70 to 1 m. In a small test pit (1.3 x 3.2 m) opened to the south-east of the tomb on the hill slope, a possible plinth *c.*25 cm wide was discovered, recognizable by the careful arrangement of flat stones at the base of the outer wall (Fig. 9/A–B,D). During the 2022 season, for safety reasons and due to lack of time, clearance of the collapsed stones between the entrance and the burial chamber was not completed, nor was clearance of the external wall to its base. This work will be carried out in the next season and should enable a better observation of the tomb structure and the way it is embedded in the rocky hill.

Several human bone fragments were found in the chamber in several layers of fill, mixed with collapsed stones from the vault and with no apparent organization. This indicates considerable post-depositional

disturbance. Osteological analyses are ongoing and although the bone fragments are very poorly preserved, initial observations suggest a minimum number of three individuals, including an adult, a juvenile (14–22 years old), and probably an infant. Bone samples were collected for ^{14}C analyses. The study will be completed once excavations are concluded, in order to understand the chronology of the deposits and the number of individuals in this tomb.

As well as the collapsed wall, potsherds were recovered from the chamber, including fragments ascribed to the Umm an-Nar period and imports from eastern Iran. One sherd of painted grey ware is especially typical of third-millennium pottery from Kech Makran period IIIc (2600–2500 BC; Didier 2013); it could provide a preliminary date for the use of the tomb. In addition, several beads made of different materials (soft stone, carnelian, artificial material, shell) were found, as well as a small copper alloy fragment (possibly a needle fragment) (Fig. 9/C). Interestingly, a shark's tooth was also found, again attesting to contacts with the coast.

Survey at al-Ghudhaifat necropolis

Thanks to the cooperation of the MHT team, a brief preliminary survey was carried out at al-Ghudhaifat, 4.5 km north-east of ad-Dhabi (see Fig. 2). The area includes a significant necropolis with burial mounds distributed along the slope and on the top of the relief. Our objective was to conduct an initial reconnaissance of the site, to list the different types of burial structures and, where possible, to collect samples to carry out ^{14}C dating to understand the chronology of the necropolis (Fig. 10). We have already established that the cairns in this necropolis, leaning against the slope, have different typologies. We were able to collect half a dozen bone samples that appeared on the surface of the cairns, as well as some pottery sherds. These should make it possible to assess the period(s) of use of the necropolis through relative and absolute (radiocarbon) dating, pending more intensive excavation and survey work.

Perspectives for funerary research

In summary, the 2022 excavations at al-Dhabi 2 have documented a tomb whose construction can be attributed to the Hafit period (Tomb F4170); and a tomb (Tomb F4169) that may be transitional, located on the ridge, whose use is attested at least in the Umm an-Nar period and whose excavation remains to be completed. Since the site includes at least one tomb from the Umm an-Nar period (perhaps as many as six according to the topographical survey), one of the future objectives will be to gain a better understanding of the relative chronology of the different tombs that appear to have been used during this period, and whose locations are different (rocky ridge/plain) and to analyse their differences (architectural, material deposits, and buried population). Radiocarbon dating and further excavation will lead to a better understanding of the use of the tombs over time. Furthermore, the artefacts prove the existence of trans-marine exchange and contact with the coast during the Early Bronze Age. It will be interesting to see how these exchange dynamics developed over time by analysing foreign artefacts found in the tombs and settlements in the long term.

Finally, our mission will benefit in the coming years from a partnership with the ARABIANCAIRNS project[8] funded by the French National Research Agency. It aims to understand the origin and distribution of the megalithic cairn tombs phenomenon that characterizes proto-historic Arabia. This multidisciplinary project, involving several experts from Arabia, includes a programme of surveys, excavations, bio-anthropological and isotopic analyses, ^{14}C dating, and geospatial analyses. One of its ambitious goals is to propose an open-access WebGIS with a database that will bring together data from several teams working on proto-historic cairn tombs in the Arabian Peninsula.

Conclusion

Bisya is considered one of the leading archaeological areas of the EBA Oman peninsula, as it brings together multiple innovations from this period: the development of sedentary sites, monumental architecture, the renewal of subsistence strategies, the sustainable management of resources, and the implementation of local craft productions. This archaeological phenomenon in the EBA testifies to the emergence of a complex

[8] The project is coordinated by O. Munoz and is planned to last for four years (2022–2026, #ANR-22-CE27-0001).

Figure 10. *Examples of tombs observed in the necropolis of al-Ghudaifat (© FAMCO/O. Munoz).*

social organization based on a common structure, with specialized skills, local and trans-marine trade, and shared culture within the Oman peninsula. In this regard, the 2022 exploration at al-Dhabi 2 revealed an emblematic site with a large tower, a dense settlement quarter, and a necropolis. The site clearly dates to the EBA: the chronology of the necropolis spans the Hafit to the Umm an-Nar period according to the types of tombs, while pottery indicates that the settlement dates mostly to the Umm an-Nar period. Absolute ^{14}C dating will soon provide more precise information on the chronology of the occupation.

The results presented in this paper are the first step in EBA Bisya/al-Dhabi studies. In the future, our regional survey will focus on the identification of EBA structures, especially on the geolocation and dating of tombs, in collaboration with the ARABIANCAIRNS research programme. We shall also undertake the study of settlement patterns by comparing al-Dhabi 2 with Salut ST1,[9] the other EBA site excavated at Bisya. The contemporaneity and comparative organization of the two sites will offer new insights into the evolution of occupation and the development of local communities. Furthermore, the geolocation and on-site survey of other EBA sites, particularly towers, will stimulate regional-scale analysis.

At al-Dhabi 2, future excavations will focus on extending the settlement trench to complete the plan of the buildings and to open several new trenches at selected parts of the tower (entrance, centre) to document its structure, building techniques, and function. Test trenches in unidentified structures east of the site will provide information on the occupation and

[9] International collaboration at Bisya encourages shared research with the FAMCO team, the Italian Mission to Oman (co-headed by Andrea Zerboni, Milan University, and Michele Degli Esposti, Polish Academy of Sciences, Warsaw) and the Ministry of Heritage and Tourism of the Sultanate of Oman.

use of the peripheral zones of al-Dhabi 2. As for the tombs, we shall complete the excavation of Tomb F4169 and ^{14}C dates will make it possible to establish the preliminary chronology of the necropolis regarding the Hafit and Umm an-Nar tomb types. We shall collect evidence to highlight the possible existence of transitional or reused structures. In terms of the artefacts, the study of the pottery assemblage will help to understand the emergence of craft productions by implementing a wide range of analytical methods (petrography, technology, geochemistry). Particular attention will be paid to characterizing local production and hypothesizing the influence of Indus potters on the early development of pottery at Bisya, as already shown at Salut ST1 (Frenez et al. 2016; Méry et al. 2017). Finally, environmental studies are a major issue in the understanding of the use of natural resources for human subsistence. Anthracological analysis of charcoals from the settlement area will provide new insights into the Umm an-Nar botanic environment and domestic practices, as well as indications on the possible development of early agriculture — especially palm-tree cultivation, which is considered a key resource in arid environments.[10] Geomorphological investigations will contribute to the reconstruction of ancient environmental conditions, settlement strategies, and water management.[11]

The new project led by the French Archaeological Mission in Central Oman has already provided exciting results in 2022. It will extend its activities in the coming years, at the site of al-Dhabi 2 and on a regional scale with thematic surveys. Moreover, FAMCO is strongly involved in collaborative projects and skill-transfer opportunities as the team gathers experienced international researchers and students. Cooperation with the MHT at Bisya and the French Embassy in Muscat will also open broad perspectives to share knowledge of Omani archaeology: school visits will be scheduled and dissemination projects implemented in the future. This dynamic research programme hopes to contribute to the knowledge and valorization of the Early Bronze Age archaeological heritage of central Oman.

[10] Anthracological study will be led by Lucas Proctor (Goethe University, Frankfurt).

[11] Geomorphologist Tara Beuzen-Waller (Tübingen University) will carry out the landscape study in the coming years.

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