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## To cite this version:

Vincent Charpentier, Jean-françois Berger, Rémy Crassard, Federico Borgi, Gourguen Davtian, et al.. Conquering new territories: when the first black boats sailed to Masirah Island. Proceedings of the Seminar for Arabian Studies, 2013, 43, pp.85 - 98. hal-01828586

**HAL Id: hal-01828586**

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Submitted on 4 Jul 2018

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# Proceedings
## of the
# Seminar for Arabian Studies

## Volume 43
## 2013

Papers from the forty-sixth meeting of the
Seminar for Arabian Studies
held at the British Museum, London,
13 to 15 July 2012

Seminar for Arabian Studies

Archaeopress
Oxford

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ISSN 0308-8421
ISBN 978-1-905739-65-3

*Proceedings of the Seminar for Arabian Studies* 43 (2013): 85–98

# Conquering new territories: when the first black boats sailed to Masirah Island

Vincent Charpentier, Jean-François Berger, Rémy Crassard, Federico Borgi, Gourguen Davtian, Sophie Méry & Carl S. Phillips

**Summary**
Along the 150-km coastline of Masirah, 127 archaeological sites were discovered through surveys carried out in January–February 2012. The island is the largest off the Sultanate of Oman and possesses great archaeological potential, especially for the Neolithic period, Bronze Age, and Iron Age. Shell middens, some of which are very large, and many small workshops are related to the production of ornaments in shell or stone. The site of Ra's Dah (SM-10) has proved to be the oldest identified Neolithic occupation in Oman today. Finally, more than 250 km south of Ra's al-Hadd, the discovery of two Early Bronze Age sites, dating to the Umm an-Nar period, considerably increases the area of the 'Magan Civilization', and with it that of the diffusion of goods from the Indus Civilization.

**Keywords:** Masirah, Neolithic, Bronze Age, Iron Age, palaeogeography

## Introduction

Along the coast of the Arabian Sea, Masirah is the largest island of Oman, measuring 65 km in length (Fig.1). A necessary stop along the shores of the Indian Ocean, it is a strategic space, mentioned since earliest antiquity and occupied by the Portuguese navy in the sixteenth century after its conquest by Alfonso de Albuquerque. Masirah also has the only deposit of copper along the coast of the Sultanate of Oman, a regional geological specificity, as most of the copper resources are located much farther north, in the foothills of the Jebel Akhdar. The island of Masirah has very high archaeological potential, partially revealed by the work of Ali Bakhit al-Shanfari, at the time honorary director of the Department of Antiquities of the Ministry of Heritage and Culture of the Sultanate of Oman (Shanfari 1987). A quarter of a century later, this pioneering work, carried out with the support of the Deutsches Bergbau-Museum, remains valid. In particular, he discovered the large Iron Age occupation on the island as well as the Wadi Suq necropolis of Sachrut al-Hadri, the rare traces of copper production in the inland mountains, and several Neolithic sites.

The early periods of occupation on Masirah Island still remain very poorly known, however, and the main objectives of the present study are to catalogue the known sites, to discover new ones, to determine whether certain occupations retain their stratigraphy, and finally, to estimate the density of the human occupation and its distribution along the coast of the island.

On the 150 km of the littoral, 127 sites were counted during the 2012 campaign. Some had already been discovered by A.B. al-Shanfari and colleagues (Shanfari 1987; e.g. sites 18, 25, 32, 60, etc.), but many others are new (e.g. Marsis, Wadi Fad, Maraib). Most of the sites are located on the west coast, whereas there are only a few on the east coast, which is more exposed to the winds. The palaeogeographical study is mainly focused on the most coherent archaeological entity: the environs of the village of Sur-Masirah, which is historically known to have been one of the principal medieval ports and docking zones on the island.

## Was Masirah inhabited during the Pleistocene and at the beginning of the Holocene?

On a geological timescale, the insular state of Masirah is a recent development. As it was attached to the continent during the Pleistocene, human presence at that time

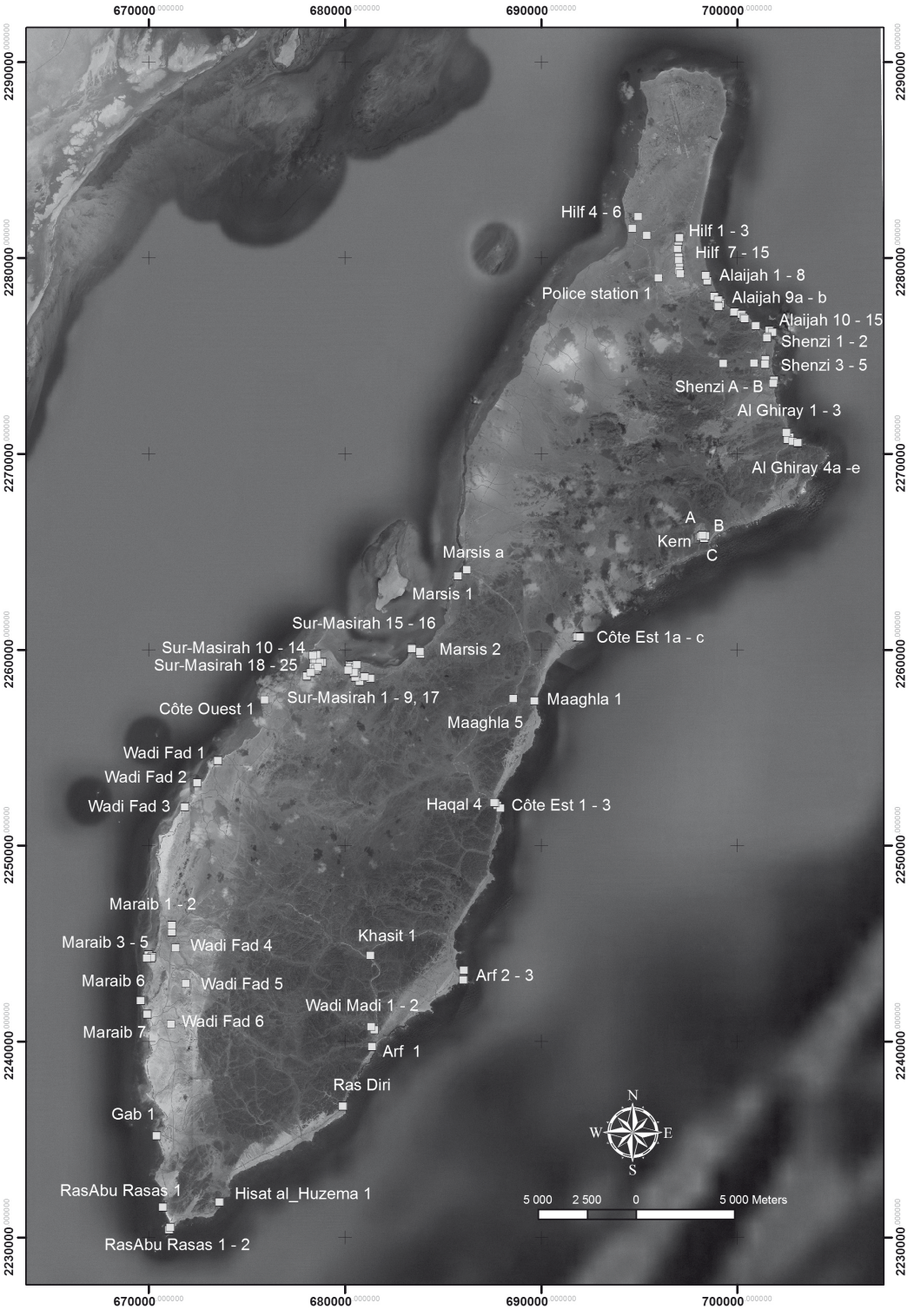


**Figure 1.** *The archaeological sites recorded on Masirah Island during the 2011–2012 campaign.*

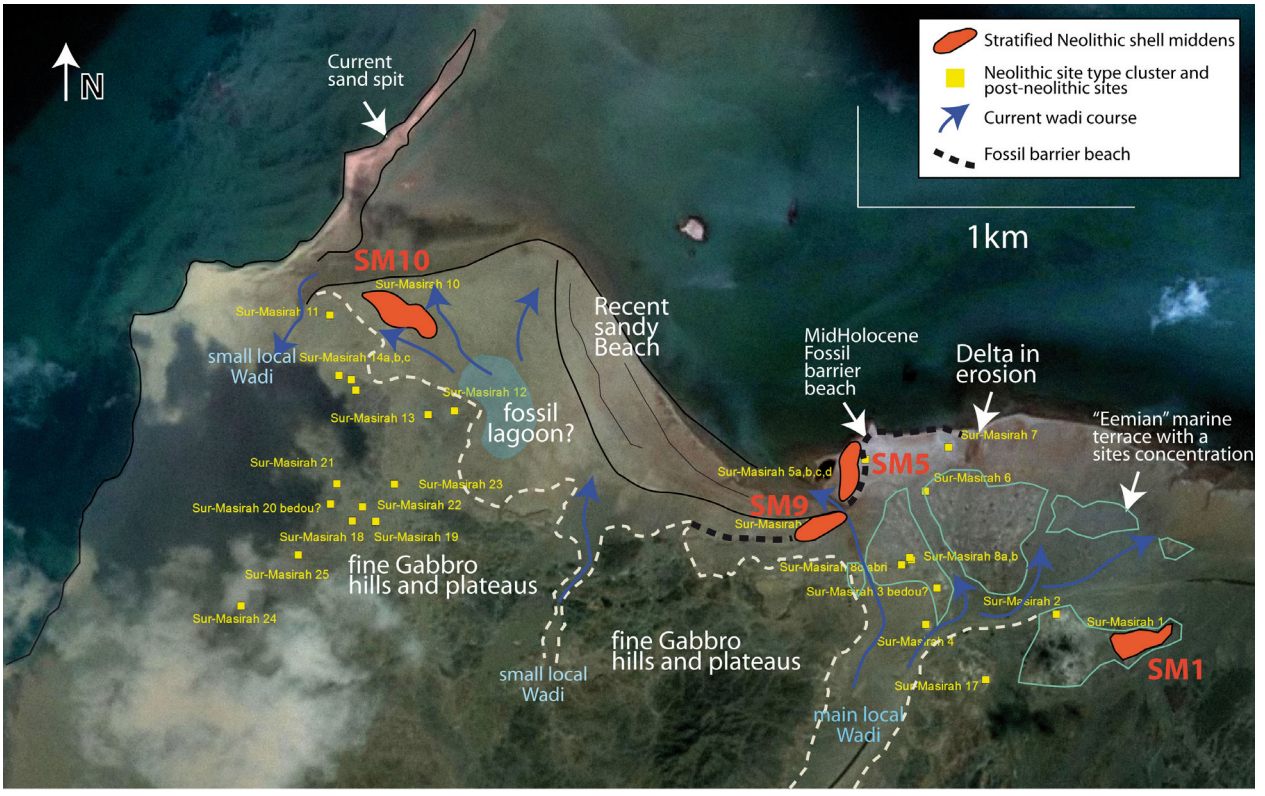


**Figure 2.** *The geomorphological and archaeological situation of the Sur Masirah Bay (from a Google Earth satellite image).*

would have been possible. Coastal environments are not favourable for discovering the Palaeolithic in Arabia, however, and on the island of Masirah only the site of Wadi Fad 4, located on a terrace of aeolianites, has produced a flake whose technology and surface condition suggest human presence in this period. This is also true for the beginning of the Holocene, for which no industry of Fasad or Wash'ah type has been identified at Masirah.

Known for its ophiolites and its copper deposits inland (Peters 2000), Masirah possesses ample workable lithic sources, concentrated around Shanzi in the north-east of the island. These were for the most part brown-red jaspers and radiolarites, often of very good clastic quality, which were exploited and diffused during the Neolithic period, Bronze Age, and Iron Age to all the sites of the island. The archaeological objects found at the deposit of Shanzi consist of tested cores and blocks, flakes from working, and percussion tools in gabbro. As is often the case at such deposits, the objects discovered were not extensively worked.

## The Neolithic on the island of Masirah: Ra'ʿs Dah SM-10

Little known during the 1980s, Neolithic occupations are numerous on the island. These include shell middens, the stratigraphy of which is sometimes very deep, and also many small workshops related to the production of ornaments in stone and shell.

A preliminary geomorphological and palaeo-geographical analysis of the sector of Sur-Masirah, based on photo-interpretation of satellite images and field observations, revealed the locations of the main Neolithic shell middens in their past environment, as well as the post-Neolithic and present-day evolution of the littoral. Later high mobility of the sandy coast has greatly modified the morphology of the coast of Sur-Masirah (Fig. 2), which had been previously greatly enlarged by sandy alluvia from the three local wadis, probably during the humid period of the early Holocene and the beginning of the middle Holocene. Thus on the 4 km of the coast that have

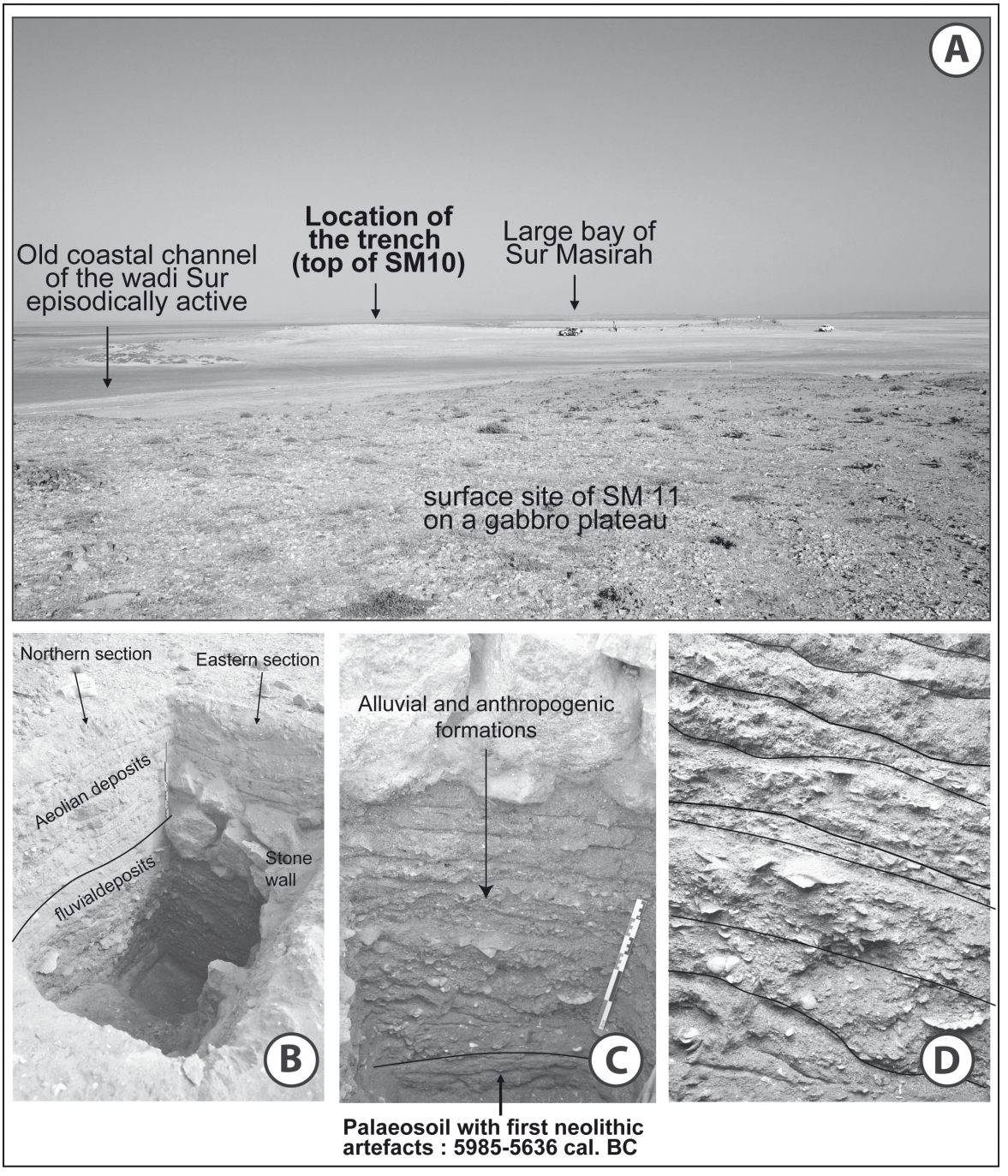


**Figure 3. A.** *A view of the Sur Masirah 10 shell middens from the southern plateau with the local geomorphological context; photographs of the Sur Masirah 10 trench;* **B.** *a view of the northern and eastern sections with the stone wall; the limit between alluvial and aeolian sediment is marked by the continuous black line;* **C.** *alluvial and anthropogenic formations under the stone wall; a dark brown to grey pedogeneized horizon is developed at the basis of the Neolithic sequence, dated 5885–5636 cal. BC on a* Rhizophora *sp.; charcoal;* **D.** *close-up view of the bottom part of the shell middens constituted by highly eroded sandy gravel oblique formations, containing redeposited archaeological material.*

been explored, certain zones show a clear aggradation by lateral redistributions, while others are being eroded. The main wadi, to the east of the sector, cuts strongly into strips of marine terraces that are highly cemented, situated at 2–3 m above the coastal plain and probably dating to the Eemian (Fig. 2). These topographical protuberances support Neolithic shell middens and many later sites (Iron Age, early to late Islamic period). The probable line of the Neolithic coast, corresponding to the local postglacial transgressive maximum, identified at about 2–3 m above sea level under shell middens SM-5 and SM-9 (black dots in Fig. 2), is today situated in a zone away from the shore. The taphonomic processes leading to the recent formation of a beach between SM-9 and SM-10 (Fig. 2) probably explain the absence of the discovery of earlier archaeological sites in this sector. The probably late formation of the long coastal spit west of the coast of Sur-Masirah by longshore drift currents was favoured by the existence of a large mass of sand, inherited from a build-up of alluvia from early–middle Holocene wadis, with the particles transported constantly along the shore (south–north) by the sea currents and by a reduced depth of the sea bed of the vast bay, which is clearly distinguishable in the satellite image (Fig. 2).

The search for stratified sites led us to investigate the site of Ra's Dah SM-10 (Shanfari 1987: no. 60), near the present-day village of Sur-Masirah. This is the largest Neolithic site on the island, located in a shallow bay situated in the western part of the island, at the bottom of which lies a series of four Neolithic shell middens concentrated along 3 km of coast (Fig. 2).

Many other Neolithic sites were thoroughly surveyed but do not seem to possess the stratigraphic depth of site SM-10. Framed by two rocky hills, this site is at its base highly eroded by the creation in the past of a wadi channel (Fig. 2). Its top has produced many artefacts characteristic of the fourth millennium BC (e.g. blades, net sinkers with longitudinal notches). A trench excavated on the summit revealed deep stratigraphy of over 1.50 m (Fig. 3/A).

A radiometric analysis by AMS on a charcoal sample of *Rhizophora mucronata* (determination by Margareta Tengberg, MNHN Paris) taken from the base of the stratigraphic sequence (Fig. 3/C) was carried out at the Poznan Radiocarbon Laboratory. The result obtained, 5985–5636 cal. BC, makes Ra's Dah SM-10 the oldest Neolithic coastal occupation on the Omani face of the Indian Ocean. The geoarchaeological study revealed that the top of the survey consists of aeolian formations, the base having been formed by high-energy alluvial deposits. The stratigraphic units 21 to 14 are characterized by anthropogenic levels and by erosion caused by the passage of sometimes strong alluvial currents that had mobilized a volume of coarse sand associated with ballast. Gray oblique alluvial stratifications, oriented towards the alluvial channel — still visible and episodically functional — south of the shell midden, have disturbed part of the archaeological material of the Neolithic occupation. They are concentrated in the lower part of the sequence (Fig. 3/D), lying above the horizon of dark gray-brown pedological alteration that developed during the early Holocene at the expense of the geological substratum outcropping locally (light grey granular gabbro). These signatures are associated with a period of abundant rainfall on Masirah Island, which occurred just after the beginning of the sixth millennium BC when the Arabian monsoon still reached farther north (Fleitman et al. 2007; Berger et al. 2012).

The trench partly revealed an imposing dry-stone structure of three courses, built at the base of aeolian deposits (Fig. 3/B), dating to a period of probably rapid climatic change at the local level (aridification). No more fluvial deposits appear subsequently in the upper half of the studied sequence. Several radiocarbon dates obtained within the framework of the Artemis tendering (CNRS, INSHS) will in the near future enable dating of this period of climato-sedimentary change on the site of Ra's Dah SM-10, associated with this stone construction.

Such structures, probably of a settlement, are rare in the Oman peninsula; only those of Marawah MR-11 (UAE) and to a lesser extent Suwayh 1 (Sultanate of Oman), have so far been identified (Charpentier, Marquis & Pellé 2003; Beech et al. 2005). The very good preservation of the charcoal has enabled a preliminary anthracological study that reveals the presence of *Rhizophora mucronata.* The mangrove was thus present on Masirah Island during the sixth to fourth millennia BC, probably where local wadis flowed into the sea. *Rhizophora mucronata* has not been present on the shores of the Arabian Sea for millennia, according to palynological analyses carried out south of the region of Ja'alan, some 100 km north of the island of Masirah (Lézine et al. 2002); at present, only a few stands of *Avicennia marina*, more resistant to high salinity, subsist in Dhofar and on the island of Mahut. No *Terebralia palustris* — a shellfish that is symbiotic with the Omani mangroves — has been reported during our surveys, although it is very frequent in these environments on the sites of the continent, especially during the Neolithic period.

The majority of the Neolithic sites of Masirah appear to have been eroded by the process of deflation on the

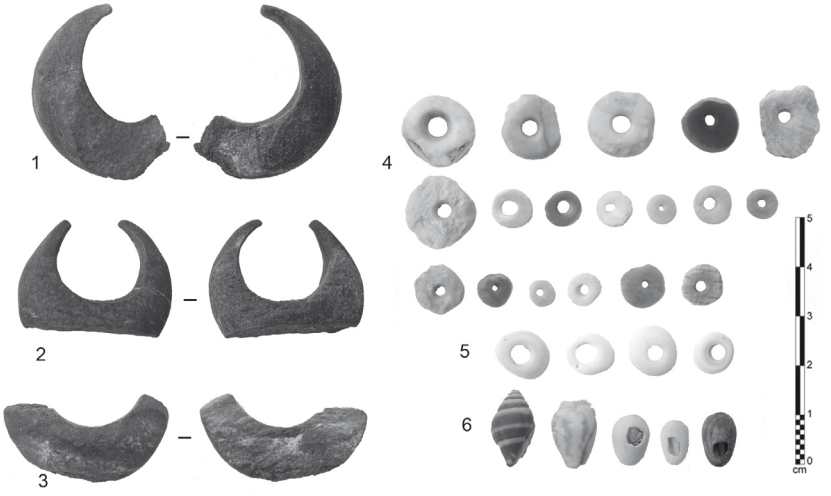


**Figure 4.** *Raʾs Dah.* **1–3.** *stone earrings;* **4.** *discoid beads;* **5.** *discoid beads;* **6.** *gastropods (*Engina mendicaria*, unidentified,* Prunum terverianum*).*

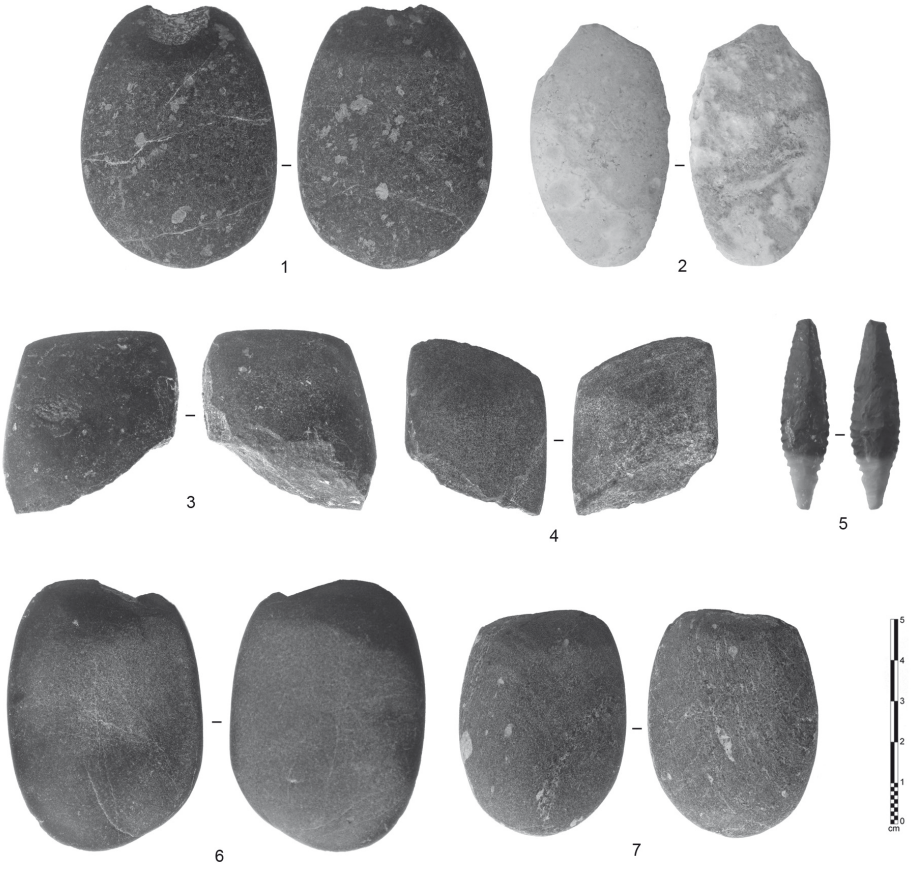


**Figure 5.** *Lithic industry: axes and projectile point.* **1–4.** *Raʾs-Dah SM10;* **5.** *projectile point Wadi Fad 1;* **6.** *Wadi Fad 1; Marsis 1.*

east coast and washed away by the torrential flows on the western shore, very probably related to the proximity of the wadis and the narrowness of the coastal plain. It is thus highly probable that, except for the sector of Ra's Dah, there are very few Neolithic settlements with good stratigraphy remaining on the island.

## The Neolithic material culture of Masirah

Three earrings in local stone, probably phyllites, come from the surface of the site of Ra's Dah SM-10 (Fig. 4/1–3). This type of ornament, usually in chlorite or chloritite, talc, or phyllite, occurs frequently between the Strait of Hormuz and the shores of the Arabian Sea (e.g. Bimmah, Wadi Shab GAS-1, Ra's al-Jinz RJ-1, Suwayh SWY-1, 4, 20; Usai, forthcoming). These ornaments are one of the elements that demonstrate the roots of the material culture of Masirah Island in the Neolithic of northern Oman. Four polished axes probably also come from SM-10. They are fashioned from flat pebbles, black or white, of which the edge is usually the only part worked (Fig. 5/1–4). Previously, only three axes had been discovered on the sites of Neolithic settlements in Oman. Ra's al-Hamra RH-6, dated to the fifth millennium BC, produced two, including a whole one (Biagi 1999); the third one from the site of Raʾs al-Hadd RH-6 belongs to the very end of the final Neolithic and the beginning of the early Bronze Age (3100–2700 BC) (Maurizio Cattani, personal communication). Two other sites on Masirah Island, Marsis 1 and Wadi Fad 1, each produced an axe on the surface (Fig. 5/6–7). The exact function of these objects remains to be determined: tools for cutting wood, objects of prestige, or weapons related to conflicts between groups? Indeed, the excavations of the necropolis of Jebel al-Buhais BHS-18 have shown that the fifth millennium BC was a period of rivalries on the Oman peninsula (Kutterer & Uerpmann H-P 2012).

The fishing equipment is composed essentially of net sinkers with lengthwise transverse notches, made from various materials (hard stone, calcarenite, and shell, particularly *Pecten* species); examples present on the coastal sites date to between the middle of the fifth to the end of the fourth millennium BC. No fish hooks in mother-of-pearl were found, but we know that they have been found not far away, on the continent, particularly on the site of Khuwaymah 2, discovered in 2010 (Charpentier et al. 2012). The sieving of all the sediments from the excavation has produced several bi-point fish hooks in bone, tools that are frequently found on the coastal sites of Arabia.

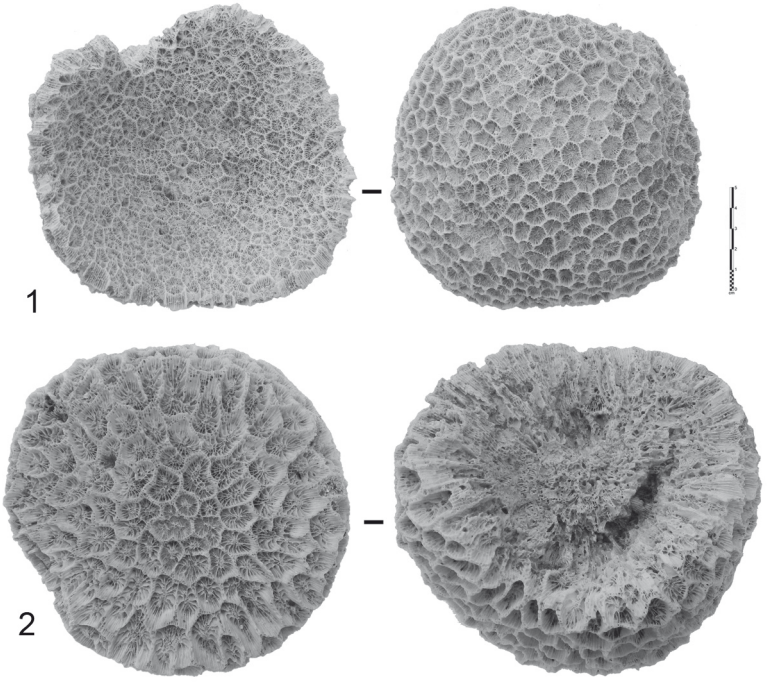


**Figure 6.** *Coral containers.* **1.** *Raʾs Dah SM10 sounding 1;* **2.** *Côte ouest 1.*

Shell containers are quite frequent on the Neolithic sites of the Omani coast, in particular those fashioned from *Scarfarca inflata* and more rarely, from cut-up *Lambis truncata sabae* (see Suwayh 20 and Ra's al Hamra 6; Biagi 1999; Méry & Charpentier 2009); stone vessels are much rarer. Under the stone structure of the excavation at Ra's Dah, a vessel in coral was found under a sandy deposit, the first such example in Arabia (Fig. 6/1). This receptacle has a convex bottom (diam. 15.2 cm) and was carved from a madreporian coral. Its wall is thick (9 to 16 mm) and the external surface has not been abraded. A second vessel in madreporian coral, but with a flat base (diam. 13 cm), was collected on the site of West Coast 1 (Fig. 6/2). This object could be an unfinished piece, as the bottom of the vessel has not been carved out. A series of experiments was carried out this year and shows that this type of object could have been produced with rudimentary tools and techniques. Coral was exploited very little in this part of the Indian Ocean, but it was widely exploited in the island societies of the Pacific. The channel separating Masirah from the continent is one of the richest zones of coral in the Sultanate of Oman, and this discovery demonstrates once again the developed exploitation of marine resources by the coastal societies of south-eastern Arabia.

The large helmet-like structures ('casques') of *Cypraecassis rufa* are symbiotic shells from coral zones. Their present distribution is limited to the bay of Masirah and to the southern waters of Dhofar and Yemen. We know from ethnography that the thick rim of this shell lends itself very well to the fabrication of tools and several rims of this sort, often polished by the sea, have been collected, sometimes in multiple examples, on the sites of Masirah (Ra's Dah SM-10, SM-11, Arf2, Al-Ghuray 4[E], C ouest 1). At Sur-Masirah SM-11 one of these *C. rufa* presents two small, incomplete perforations. This type of rim of a large casque has been found on only three continental sites of the Oman peninsula, all in the Ja'alan: Ra's al-Hadd 99 and Ra's al-Hadd 6, but above all Bandar al-Jedidh, where the object was transformed into a chisel, in every way similar to those produced on the Pacific islands (Charpentier, Cremaschi & Demnard 1997; Sinoto 1970; Weisler 1999). Can it be said that these objects are evidence of trade between more or less southern populations? Probably not, as the coral zones and the natural habitat of *Cypraecassis rufa* are unknown to us for the early–middle Holocene. In any case, this type of object is henceforth integrated into the material culture of the Neolithic groups of the Arabian Sea.

Neolithic sites are numerous on Masirah, often in the form of small zones with tools or concentrations of shells. The *Pecten* species were favoured shells. They were widely consumed, along with *Lunella coronota*, in place of other species such as *Martia* sp. and *Murex* sp. The excavation of SM-10 produced a series of *Pecten* sp. shells in piles. On these sites, one of the constants is the presence of small workshops for bead making in soft stone or in *Spondylus* shells, with appropriate tools (small *pièces esquillées*, burin spalls, borer rods or 'mèches', micro-drills). This is the case at Al-Aijah 3, Aqal 1, and Wadi Fad 1, for example. Notched net sinkers are also present, sometimes in great number, as at Marsis 1.

Wadi Fad 1 is a very large site in which most vestiges have been disturbed by water flow, but a small hillock forming the top of the site has been preserved. It is on this small surface area that an axe in black stone, an arrowhead, and various shell ornaments were collected. The projectile point of violet-brown and white radiolarite, tending towards a fusiform shape, was worked by pressure (Fig. 5/5). Its morphology is reminiscent of the projectile points of Suwayh (Ja'alan) and belongs to Late Neolithic I (about 4300–3700 BC), but we know that quite similar points have a longer chronology, from the second half of the sixth millennium to the beginning of the fourth millennium BC. Among the ornaments, two long beads with parallel edges and perforation at the top, were fashioned in the mother-of-pearl of *P. margaritifera*. They are a new type and so far have no parallel in the archaeological record of south-eastern Arabia.

## Lithic industry and production of Neolithic ornaments

In her study made in 1988, Margarethe Uerpmann (2000) reported the presence of many *pièces esquillées* and a few bladelets retouched as piercing tools on the sites of Masirah. In her opinion, the *pièces esquillées* were intended to open the shellfish to be consumed — the famous *Terebralia palustris* (Uerpmann & Uerpmann 2003: 142–162) — or to produce beads. Since the excavations carried out at Akab (UAE), however, it is now accepted that this type of tool was used for cutting beads made from shell, especially *Spondylus* sp. (Charpentier & Méry 2008). As in the UAE, the discovery on Masirah of many beads at different stages of production indicates the importance and recurrence — and perhaps, even the specialization — of this activity on the sites of the Oman peninsula.

Based on the data from the excavation of Akab, the series of operations in the production of these discoid beads in *Spondylus* has been defined (2008). First,

the shell was broken into fragments, cut into squares or hexagons by a *pièce esquillée*, then perforated by a drill. The creation of a biconical perforation is one of the most delicate phases and many unfinished beads broken at this stage were found. The last phase corresponds to the calibration of the beads on a thread with the aid of a soft-stone bead calibrator. No tool of this type has been recognized in Arabia, except at the fourth-millennium settlement of Ra's al-Khabbah KHB-1 in Oman (excavations by G. Trapani, unpublished).

At Ra's Dah, and on many coastal sites of the island, the series of operations could be defined thanks to the discovery of an exceptional number of tools of different types, all related to the production of beads in shell or stone. The artisans used a soft-stone anvil to break the shell elements and perforate the *Spondylus* discs (Fig. 4/4). The same anvil was used to polish the edges of the discs. This multi-functional object presents on its upper face traces of impact of splintered pieces and a series of notches on its edges. In parallel to the use of this anvil with many functions, burin spalls were extracted from flakes or long flakes. These long fine spalls were retouched to produce long micro-drills, borer rods or *mèches*. Too fragile to be retouched by direct percussion, their edges were probably shaped by rubbing or crushing on the anvil. The *mèches* obtained were thus used to drill the disc in shell or stone in its centre. Thanks to systematic sieving, the *mèches* on burin spalls were discovered in the entire sequence of the trench, down to its base, dated to the beginning of the sixth millennium BC. The production of *mèches* from burin spalls has not been previously observed in Arabia and shows high standardization in the technical processes on Masirah. The entire toolkit used in the production of ornaments made in shell and in stone has been found on many of Masirah's coastal sites. Thus, we now know that the *pièces esquillées* previously recognized by A.B. Shanfari and published by M. Uerpmann are in fact tools used in the production of ornaments in stone and shell.

## The Early Bronze Age and the Indus Civilization on Masirah Island

Henceforth considered in Oman to be the 'Magan Civilization' (2700–2000 BC), the Umm an-Nar period was marked by the intensification of trade, especially between the Indus, the Oman peninsula, and Mesopotamia. This entity stretched from the UAE to the shores of Jaʾalan. The southernmost known site was until recently Asseelah, a few dozen kilometres south of Ra's al-Hadd (Cleuziou & Tosi 2007). We now know that Umm an-Nar material culture extended beyond the Wahiba Sands and was present at Khuwaymah (Charpentier et al. 2012). The exploitation of copper at Masirah, however, does not appear to be certain for the Early Bronze Age (3100–1500 BC) as no object has been analysed, at least according to the most recent archaeometric research based on isotopes and chemical signatures of archaeological objects from Oman, the Gulf, and Mesopotamia (Begemann et al. 2010). The first extractions of copper on the island certainly occurred in the Wadi Suq period (*c.*2000–1500 BC) and developed during the Iron Age. Could the island of Masirah be included in the Umm an-Nar period? A very brief reference, without drawing or commentary, reporting the presence of 'Umm an-Nar sherds' has so far been the only indication of human presence on the island in this period (Shanfari 1987: 102).

At the edge of the *barasti* (palm frond) village of Marsis, a small hillock measuring a few tens of metres in diameter and 3 m high has provided us with much Iron Age pottery and evidence for the Wadi Suq period. Some copper-base objects are also present. In the assemblage, two sherds having a red paste (Fig. 7:1–2), one of which is decorated with black lines, have all the characteristics of pottery belonging to the Indus Civilization and date to the Umm an-Nar period. The sampling is limited so far, but the site possesses stratigraphy.

On the site of Jebel Sfaiq (MT-1), Early Bronze Age pottery is abundant, characterized by a few Omani productions (fine red pottery), but especially by Indus Civilization pottery. The first characteristic element of this distant culture is represented by black-slipped jars, measuring *c.*70 cm high with a capacity of 30–40 litres. The base of these jars is narrow and the maximum diameter is in the upper part of the vessel; the mouth is no wider than 15 cm. The two surfaces of the jars are usually covered by a black slip. The paste is dense, with a variable content of mica visible to the naked eye and more rarely, quartz grains. The black-slipped jars make up the Indus pottery that is most frequently found in the Oman peninsula, whereas it appears that they represent only a minority within the pottery assemblage in the Indian sub-continent (Méry & Blackman 2000). From the UAE to the Sultanate of Oman, they have been discovered on many settlement sites dating to the second half of the third millennium BC. Chemical analyses carried out some ten years ago have shown that all the jars tested come from the region of Mohenjo-daro, rather than that of Harappa (2000). Based on the stratigraphy and the material culture of the sites of Hili 8 and Umm an-Nar (Emirate of Abu Dhabi) and of Raʾs al-Jinz (Sultanate of Oman), the black-slipped jars

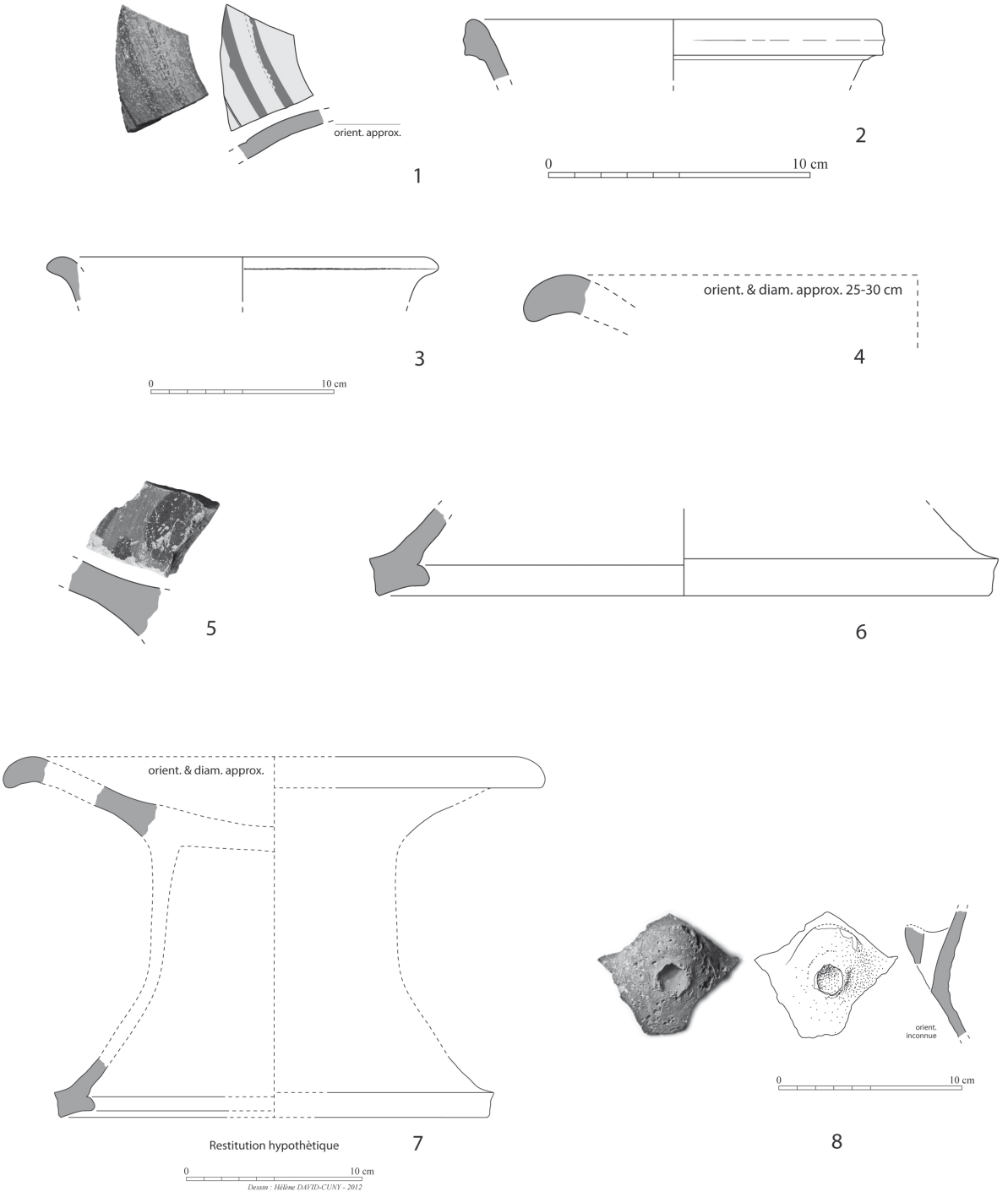


**Figure 7. 1–2.** *Marsis A: Indus sherds with a red micaceous fabric, no. 1 has a red slip and a black decoration;* **3–6.** *Jebel Sfaiq MT-1;* **3.** *possible Indus rim;* **4–6.** *elements of an Indus pedestalled dish with a red micaceous fabric;* **4.** *red slip and a black decoration;* **6.** *traces of a black decoration;* **7.** *hypothetical reconstruction of the pedestalled dish;* **8.** *Sur-Masisah 1, Iron Age sherd from a spouted vessel. (Drawings Hélène David-Cuny.)*

appear to have been in use in the region between 2500–2400 and 2100–2000 BC. On the site of Jebel Sfaiq, other sherds having the same light red paste contain mica — as do the sherds of black-slipped jars covered with red slip — and integrate well into the pottery production of the Indus. The other types of Indus Civilization pottery found in the Oman peninsula represent only a small fraction of the assemblages from the Indus. This is mostly pottery associated with settlements, such as the pedestalled dishes, and not with Omani burials. The most impressive example discovered at Masirah is a pedestalled dish (Fig. 7/4–7) comparable to examples discovered at Mohenjo-daro (Dales & Kenoyer 1986). A rapid survey of shapes suggests that three ceramic elements could belong to the same vessel or to the same type of vessel: a base, a rim, and a sherd with a black motif on a red slip. Such a vessel is at present unique in the Indus Civilization assemblage found in the Oman peninsula.

Bones of the green turtle, *Chelonia mydas*, were found on the surface of Jebel Sfaiq. This marine reptile is abundantly present between Masirah Island and the mainland, and was widely hunted by the populations of the same period at Ra's al-Jinz RJ-2.

Located more than 250 km south of Ra's al-Hadd and 200 km from Aseelah in the Ja'alan, the discoveries at Masirah considerably increase the area of the Magan Civilization, and thus the area of diffusion of goods from the Indus Civilization.

## The Bronze Age workshops for rings made from *Conus* sp.

Several sites on Masirah have disclosed workshops for the production of rings made from Conidae. This production does not belong to the Neolithic but to the Early Bronze Age (Hafit period, 3100–2700 BC), developing in the Umm an-Nar period (2700–2000 BC). It persisted during the Middle Bronze and Early Iron Ages. On Masirah, it could characterize the Wadi Suq period, as rings (although in mother-of-pearl) are present in the necropolis of Sachrut al-Hadri (Shanfari 1987). This production was until now only linked to the Ja'alan (e.g. the settlements of Ra's al-Hadd HD-1 and HD-6, Ra's al-Jinz RJ-1 and RJ-2, Ruways RWY-2, etc.). It usually took place within dwellings, in the form of little workshops where a few *Conus* sp. shells (about thirty in number) were worked, often associated with traces of the working of rings in mother-of-pearl from *Pinctada margaritifera*. These ornaments were widely diffused and are found in many collective burials in Oman and the UAE (e.g. tombs of Jebel Hafit). Some reached Mesopotamia, where such a production based on shells from the Gulf could also have been present (e.g. Susa, Ur, Khafajah, Kish, Mari) (Charpentier 1994).

On Masirah Island, the sites of Sur-Masirah SM-5 and SM-8 are the best examples of these workshops. The series of operations (and its variants) used for the production of rings during the Bronze Age in the Ja'alan has been described several times, as well as the particular tools employed (fabricators or indented blades, macroborers on blades, etc.) (Charpentier 1994; 2002). The systematic excavation of several square metres in the workshop of SM-5 produced evidence for a different series of operations and probably other tools. On Masirah, it appears that after the apex was cut off by a sharp tool, possibly a *pièce esquillée*, the whorl was abraded on the two sides; but the series of operations does not include the perforation of the whorl by a pointed tool, with the help of a macro-drill, as is the case in the Ja'alan. The vestiges of the first three sequences of the series of operations were numerous in the workshops of Ra's al-Jinz, while this was not the case in the workshops of Masirah. The final phases are rarely in evidence in the Ja'alan, however, but quite frequent at Masirah. It thus appears that the series of operations at Masirah, although more tedious, occasioned less breakage.

### Iron Age and Islamic period shell middens and shell clusters on Masirah

Sur-Masirah SM-1 (Shanfari 1987: no. 18) is the largest post-Neolithic shell midden on the island. This very large Bronze Age and Iron Age occupation is partly situated under the present *barasti* village of Sur-Masirah. The latest surveys enabled the collection of several objects of the Wadi Suq period (sherds, chlorite bowl fragments with decoration of double dotted circles), fragments of copper-base artefacts, many Iron Age sherds (Fig. 7/8), and a large quern. At Maraib 1, part of an incense-burner, fragments of copper-base vessels, a long carnelian bead, and a fragment of ostrich egg were collected. Many sites on Masirah, however, possess no diagnostic material at all and large *pièces esquillées* are often the only type of artefact found. These pieces differ from the Neolithic industries and probably date to the Bronze and Iron Ages.

Sur-Masirah SM-1, SM-5, and SM-10, as well as Marsis 1 and Marsis A, are true shell middens, that is, continuous and stratified concentrations of shells. Another type of small shell midden exists, usually several metres in diameter, lying directly on the rocky

substratum. These 'heaps', as they were described by A. Shanfari (1987), are organized in the form of little hillocks, separated from each other and found all around the edge of the island. Usually situated between 200 and 500 m from the shore, some of these groups are located, as at Sur-Masirah, more than 1 km from the coast. Some of them appear to be organized in lines, as at Shanzi. Each unit consists of a heap of shells, a hearth, and one or several crushing stones. Compared to the shell middens, these 'shell clusters' indicate a different management of resources, perhaps more individual and occasional. Certain pottery sherds present suggest that some of them belong to the Iron Age, while others are clearly of the middle Islamic period, dating to the thirteenth–fifteenth centuries AD.

A great fishing centre, Masirah still possesses some very beautiful boats and its maritime archaeology remains to be studied. Very many fixed fish traps have been observed. These differ from those of the Gulf and are built in stone. They are in every point similar to those described by Agatharchides of Cnidos, Pliny, and many other ancient authors (Burstein 1989).

## Conclusions and perspectives

Masirah Island, with its coastline of 150 km, possesses great archaeological potential, especially for the Neolithic period and the Bronze Age. For the earliest settlements, shell middens, often with deep stratigraphy, as well as many small workshops, are related to the production of shell and/or stone ornaments. The site of Ra's Dah SM-10 is the earliest Neolithic settlement so far identified in the Sultanate of Oman (5985–5636 cal. BC). The preliminary archaeological operations that have been carried out have revealed a large pedo-sedimentary sequence, composed of fluviatile, then aeolian deposits between which more or less anthropogenic occupation levels are superimposed.

The discovery of two Early Bronze Age sites, dating to the Umm an-Nar period (2700–2000 BC), is one of the major results of the 2011–2012 mission. More than 250 km south of Ra's al-Hadd (Ja'alan), the discoveries made on Masirah considerably increase the area of the Magan Civilization as well as that of the diffusion of goods from the Indus Civilization. A break appears to have occurred, however, between the end of the Neolithic period and the Early Bronze Age. Indeed, in our present state of knowledge, no structure of the Hafit period has been discovered. As recognized by A. Shanfari, however, the Iron Age is widely represented on the island. Today, three sites could be the focus of an excavation programme by the mission: the Neolithic site of Ra's Dah and the Early Bronze Age sites of Jebel Sfaiq and Marsis A.

What could these excavations reveal? They could certainly reveal the arrival of the famous 'black boats of Magan', loaded with products from far away 4500 years ago, as well as that of other, earlier boats, made of reeds or even logs. Eight thousand years ago, Neolithic populations would have easily crossed the 20 km that separated the island from the continent. This history of the first Neolithic peoples seeking new territories has yet to be written.

## Acknowledgements

The French archaeological mission wishes to thank the archaeological authorities of the Sultanate of Oman, especially Dr. Sultan Al-Bakri, director of the Department of Excavations and Archaeological Studies, and Prof. Maurizio Tosi, Ministry of Heritage and Culture. In France, the mission would like to thank the 'consultative commission for excavations abroad' of the Ministry of Foreign and European Affairs.

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