A dugong bone mound: the Neolithic ritual site on Akab in Umm al-Quwain, United Arab Emirates

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The authors present a remarkable site with a remarkable interpretation: a structured platform of dugong bones, containing skulls laid in parallel and ribs in sets, together with artefacts of the Neolithic period. They propose that the bones have been symbolically arranged and the mound as a whole had a ritual purpose – an interpretation endorsed by analogy with dugong platforms noted in the Torres Strait in recent times.

Keywords: east Arabia, Neolithic, ritual, dugong

Introduction

The Neolithic period in the Oman Peninsula and the Gulf is relatively unexplored. Excavations remain rare, with 20 sites, at most, explored between Kuwait and the Sultanate of Oman. In eastern Arabia in general, the emergence, identity and chronology of the first Neolithic societies are still to be determined. We know that between 6500 and 4500 cal BC, despite the absence of agriculture, a fully Neolithic culture developed in the United Arab Emirates, in the Sultanate of Oman and in Yemen, for which pressure-retouched trihedral points are a distinctive feature, together with the domestication of ovicaprids. In the Gulf, pottery provides evidence for long-distance trade with the Ubaid populations of southern Mesopotamia. In the United Arab Emirates, many coastal occupations of the sixth–fifth millennia have been reported, but only those of Marawah, Dalma and Akab have been excavated (Figure 1).

At present, the fourth millennium appears to be under-represented in the United Arab Emirates, to the point that some have referred to a 'dark millennium' (Uerpmann 2003). Only the site of Akab has so far produced evidence of this period, which characterises the end of the Neolithic, although the period is better known on the Indian Ocean side, on the coast of the Sultanate of Oman. The beginnings of the Bronze Age, characterised by the appearance of oases based on the exploitation of the date palm and the local development of pottery, dates to 3100 cal BC.

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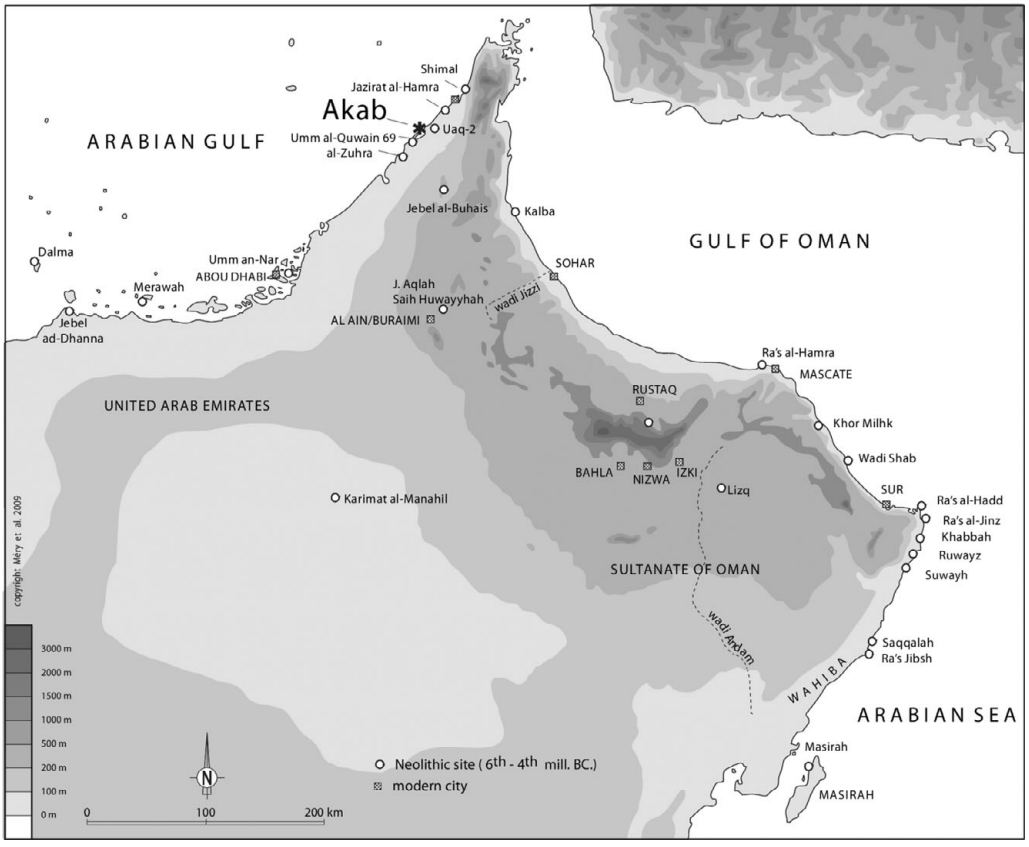

Figure 1. Location of the site of Akab. Drawing by H. David.

To date, the archaeology of the Arabian Peninsula has produced very little data on the beliefs and ritual practices which preceded Islam. Two Bronze Age temples were discovered on the island of Bahrain (Barbar and Saar), vestiges of the Dilmun civilisation of the third and second millennia BC. On the Oman Peninsula, no known sanctuary of the Bronze Age (3100-1500 BC) exists and it is not until the Iron Age, in the first millennium BC, that religious practices related to snakes appear.

The discovery of a Neolithic dugong bone mound at Umm al-Quwain on the island of Akab (Figure 1) now provides new evidence concerning the rituals practised by coastal societies of the Gulf in the fourth millennium. Thus far, these rituals have only been perceptible through funerary practices, in particular those in evidence in the necropolis of Ra's al-Hamra (Sultanate of Oman) (Salvatori 2007).

The fishermen of Akab

Deserted today, the island of Akab is located 190km from Abu Dhabi in the large lagoon of Umm al-Quwain (United Arab Emirates). The archaeological site, investigated by a

Figure 2. Dugong dugong, an herbivorous sea mammal, lives in the Indo-pacific area. They occurred in herds up to several hundreds but this is now rare (photographs © Pierre Larue).

palaeontologist at the beginning of the 1990s, was interpreted as a butchering area for dugongs, and therefore suggested to be the oldest known site of dugong hunting (Prieur & Guérin 1991; Jousse 1999; Jousse *et al.* 2002). The dugong (*Dugong dugon*), an herbivorous marine mammal which lives along the coast of the Indian Ocean and in the Pacific (Figure 2), is found today in the Arabian Gulf (Preen 2004); it is now protected and the United Arab Emirates plays a major role in its conservation (Das 2007). In adulthood the dugong measures up to 3-4m long and can weigh as much as 400kg. The ethnographic records of the Indo-Pacific zone indicate that for a given coastal society the number of dugongs captured is important (Haddon 1904-1912; Petit 1927; Marsh *et al.* 2002; McNiven & Bedingfield 2008). There are no published records of mass strandings of dugong, although individual strandings or dugongs being carried ashore during cyclones have been reported (Bryden *et al.* 1998).

The flesh, oil, hide and tusks of the dugong were long exploited in the region and the consumption of dugongs has been confirmed on many archaeological sites. Evidence for dugong hunting has been found from the sixth-fifth millennia, in the coastal occupations of Marawah MR11, Dalma DA11, Akab and Jezirat al-Hamra JH.57. On these sites, the most numerous dugong remains are the ribs, but scapulae are sometimes found, and more rarely, tusks (Vogt 1994; Beech 2000; Beech *et al.* 2005; Charpentier & Méry 2008). The dugong is also present at al-Markh, a fourth-millennium settlement site in Bahrain (Roaf 1976). Dating to the Bronze Age, the sites of Umm an-Nar, Tell Abraq, Shimal and Ra's Ghanadha (U.A.E.), as well as Qalat al-Bahrain 520 and Saar (Bahrain), have all produced dugong bones in varying numbers (Hoch 1979, 1995; Al Tikriti 1985; Uerpmann & Uerpmann 1994, 2005, 2007; van den Driesch 1994). Later sites have also produced evidence, such as Ed Dur and Marawah MR4.2 (U.A.E.), Failaka F.5 and Tell Akkaz (Kuwait) (Desse & Desse-Berset 1990; Van Neer & Gautier 1993; Tomé 2003).

The settlement

In 2002, archaeological excavations revealed that the dugong mound of Akab was only a small part of a much larger Neolithic site, periodically occupied in the fifth millennium, and including the remains of circular habitations (Charpentier & Méry 2008). Akab also has one of the rare stratified shell middens in the U.A.E. The early occupation of Akab is dated by four radiocarbon dates: 6275 ± 50 BP (4748-4441 cal BC, 2 sigma); 5970 ± 35 BP (4428-4114, cal BC); 5900 ± 50 BP (4331-4033 cal BC); and 5710 ± 30 BP (4160-3814, cal BC). The levels of the early occupations measure between 0.25 and 0.35m thick. Composed of brown-grey highly anthropic sediments rich in organic materials, they lie directly on top of a deposit of aeolian Pleistocene sand. The succession of soils is characterised by spreads or concentrations of shells, fish skeletons in connection, and various burnt or trampled materials.

More than 290 post holes were discovered in an 80m^2 excavation, and two circular structures were identified. Akab is therefore one of only two Neolithic sites (Dalma being the other) in this part of the Gulf which has produced architecture with load-bearing posts. The material culture is composed of substantial amounts of fishing equipment including fishhooks (Méry *et al*. 2008). Although the lithic tools are few, the side-scrapers or knives made from the bivalves *Callista erycina* and *Amiantis umbonella* are very frequent (Charpentier *et al*. 2004). Mesopotamian pottery of the Ubaid period was found in stratified layers. The domestic fauna found at Akab includes goat (*Capra hircus*), sheep (*Ovis aries*), cow (*Bos* sp.) and dog (*Canis familiaris*). The hunted fauna are represented by *Gazella gazella* and wild donkey (*Asinus africanus*). The occupants of Akab also produced discoid beads made from *Spondylus* sp. in such quantities that the site may be said to be one of specialised production.

Fishing, the principal activity of the populations of Akab, was practised with nets and with lines using hooks made from the shell of the pearl oyster *Pinctada margaritifera*. Although all the resources of the lagoon and the neighbouring mangrove (i.e. fish, shellfish and crabs), appear to have been exploited, from the beginning of the fifth millennium the fishermen of Akab also used shellfish hooks and fished tuna which necessitated expeditions in boats on the open sea (Mery *et al*. 2008). The dugong, a coastal animal, is also present in all the archaeological horizons of the settlement, although in modest quantity.

The latest levels of the fifth millennium occupation of Akab are sealed by a sterile aeolian deposit which can reach a thickness of 0.60m. The dugong mound lies above this sandy level, on the northern slope of the site. The stratigraphic relationship between the main excavated zone of the fifth-millennium occupation and the dugong mound has been the subject of particular attention. A 2.50m-long trench which joins the two sectors of the excavation reveals that a layer of aeolian sand corresponding to a desertification episode sealed the last level of occupation situated in the north. The dugong mound is therefore separated from the latest occupation of the settlement by an episode of wind-blown sand. The two occupations are, however, close in date, and possess elements of material culture in common, such as tubular beads in chlorite and shell.

In the fourth millennium, except for the dugong mound, the traces of human occupation appear more ephemeral at Akab, having perhaps been partially destroyed by deflation because they show through on the surface of the site at the present time.

The dugong bone mound

Since its abandonment, the site of Akab has not been subject to human disturbance, and has only suffered damage by small local fauna, particularly foxes. At the time of their discovery in 1989, the dugong bones were covered only by a very thin layer of wind-blown sand. The excavation of the dugong mound was resumed between 2006 and 2008 by a multidisciplinary team of prehistorians and faunal experts (Charpentier & Méry 2008). The mound was first thought to be a zone for the slaughter or butchering of dugongs, and the primary objective of our excavation was to test this hypothesis. The mound was excavated in area, removing the totality of the surface in successive stages, following the slope of the layers, in such a way as to have an overview of the site (thus there was no section cut through the mound). The mound was divided into $1m^2$ squares (H12-L16). Each square was also further sub-divided into $0.25m^2$, and sometimes into $0.0625m^2$ to record the objects and the smallest anatomical connections. The sediment (very loose sand) was removed using aspirators connected to plastic containers, then completely sieved with 1mm mesh. Drawings at 1:10, and photographs taken from overhead, were aids in the dismantling and the osteological and archaeological analysis of the remains *in situ*. Photographs taken with a kite provided wider views. The deposit was excavated in 12 different *démontages* (liftings) but 62 per cent of the bone fragments recovered was from *démontages* 1 and 2.

Skulls, ribs, forelimbs or other types of bone that appeared to be grouped together were designated and lifted as assemblages. Bones with special features, either because of their position on site, or because of a feature on the bone itself, were allocated 'os' numbers. All the bones exhibit signs of long exposure to the sun and wind. Weathering is predominately a rough surface caused by abrasion with the sand. The marine mammal bone (i.e. 97 per cent of the collection of bone fragments) and the terrestrial mammal bone were examined and assigned to a skeletal element. Each element was identified to a taxonomic group (order, family or species). Terrestrial animal bones, rib sets and selected dugong bones were sent to Edinburgh following the 2008 Akab season and compared by S. Fraser with the reference collection at the National Museum of Scotland, Natural History Section. Other comparative collections used for the analysis of the bone material in 2006 by E. Pelle were those of the Muséum d'Histoire Naturelle de Paris (France).

The hypothesis of a butchering site, which had been advanced previously, was rapidly put into question when the mound was discovered to be a *structured* accumulation of bones, a complex arrangement whose layout had been accomplished in stages. The deposit rose on a hillock of wind-blown sand and consisted of two main stratigraphic levels forming a platform structure, low in elevation (Figure 3). The structure is ovoid in plan extending to $10m^2$ and 0.30-0.40m in height, but truncated in the south-west (Figure 3A and C). Only a few highly fragmented bones remain in the missing part of the structure. A ^{14}C dating carried out on a dugong bone rib sample coming from the base of the top level of the structure attributes it to the second half of the fourth millennium (5140 ± 55 BP, Pa-2433, *c*. 3568-3116 BC). The platform therefore dates to well after the fifth millennium, between 4700-4100 BC (see Technical Note below for a discussion of the marine reservoir effect in the Gulf).

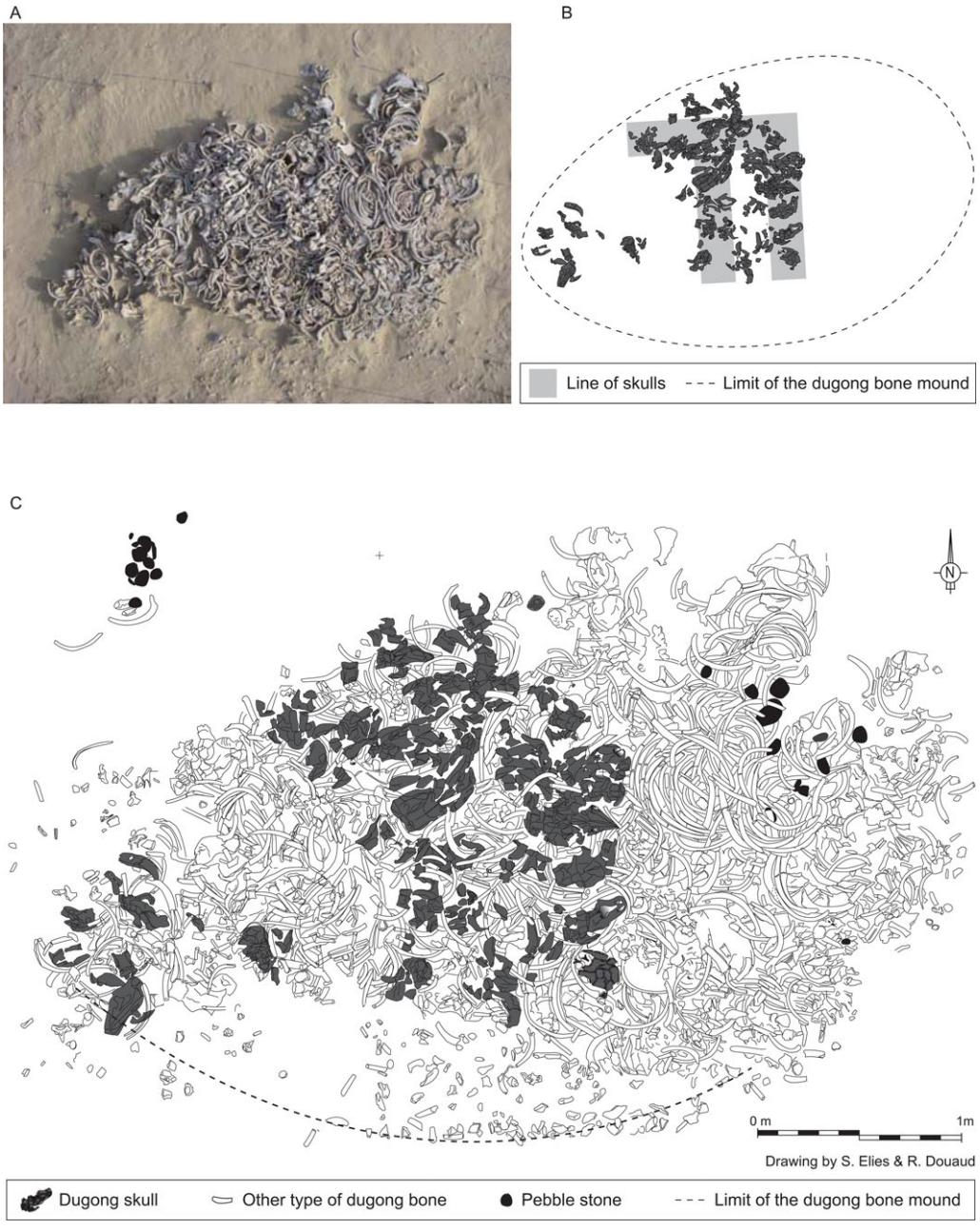

Figure 3. A) Aerial view of the Akab dugong bone mound; B) the skulls were aligned in rows on the platform of bones; C) the rostra of dugongs are directed towards the east; bundles of ribs are located in front of the eastern row of skulls (photograph: T. Sagory, drawings S. Eliès and R. Douaud/French Archaeological Mission to the U.A.E.).

The base of the structure consists of mandibles laid flat, wedged by ribs. They provide a foundation upon which the skulls, placed in anatomical position, were aligned. The skulls were carefully wedged by ribs and disposed in a preferential manner, with a row of eight

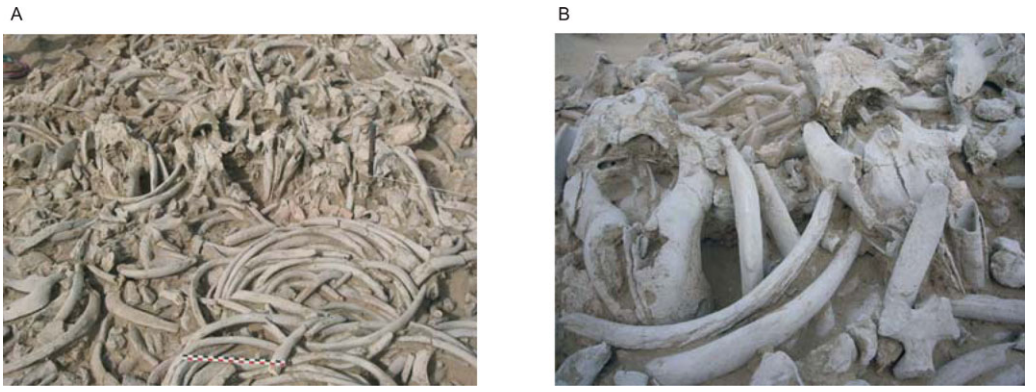

Figure 4. The rostra of animals are deeply embedded and the skulls placed in anatomical position, aligned (A), and wedged by ribs (B) (photographs: V. Charpentier, French Archaeological Mission to the U.A.E.).

aligned at the front (Figure 3B-C and 4A-B). The structure was deliberately oriented, as the premaxilla of animals, deeply embedded, are always directed towards the east or the north-east (with a maximum gradient of 30°) and bundles of ribs were deposited just in front of the eastern row of skulls. The mandibles were separated from the skulls prior to deposition on the bone mound. The lower level of the platform, still under excavation, consists of broken dugong bones compacted by trampling. It is strongly impregnated with an ochre solution which has reddened the bones and the natural sediment. To judge by the presence of postholes all along the edge of the structure, the platform was perhaps covered, or at least protected by an array of poles.

The laboratory analysis is still in progress, but the dugongs deposited in the mound were a mixture of adults and sub-adults with juveniles at less than 10 per cent. The bone fragment collection is dominated by rib and skull fragments. No animal was deposited whole in the structure, or even a large part of an animal. Moreover, certain anatomical parts, such as the ribs, vertebrae or limbs are under-represented, which is evidence of intentional selection. Very little evidence of butchering was found on the bones. The deposition of portions of freshly killed animals is verified by the presence of the ulna and the radius, and in one case, an ulna, radius, humerus and carpals in anatomical order. At the same time, there is also evidence for the deposit of anatomical elements in different states of decomposition.

Several hundred objects were deposited in or inserted into this mound of bones. These are mainly ornamental elements. Beads made from shells (*Spondylus* sp., *P. margaritifera*, *Strombus decorus persicus*, *Ancila* sp. etc.) are present, but the most frequent are the tubular beads with angled distal double perforation, of a type which is very rare in other Neolithic sites of the Gulf. Some of these beads are in soft stone (steatite or chlorite), and their origin, exogenous to the shores of the Gulf, lies probably in the foothills of the Oman mountains; there are also examples fashioned from the columns of Murcidae shells. These ornamental elements were found in association with tools (bone punches, shell knives, flint flakes) and pebbles. Finally, the remains of domestic sheep, goats and cattle, sometimes partly articulated, were incorporated into the structure.

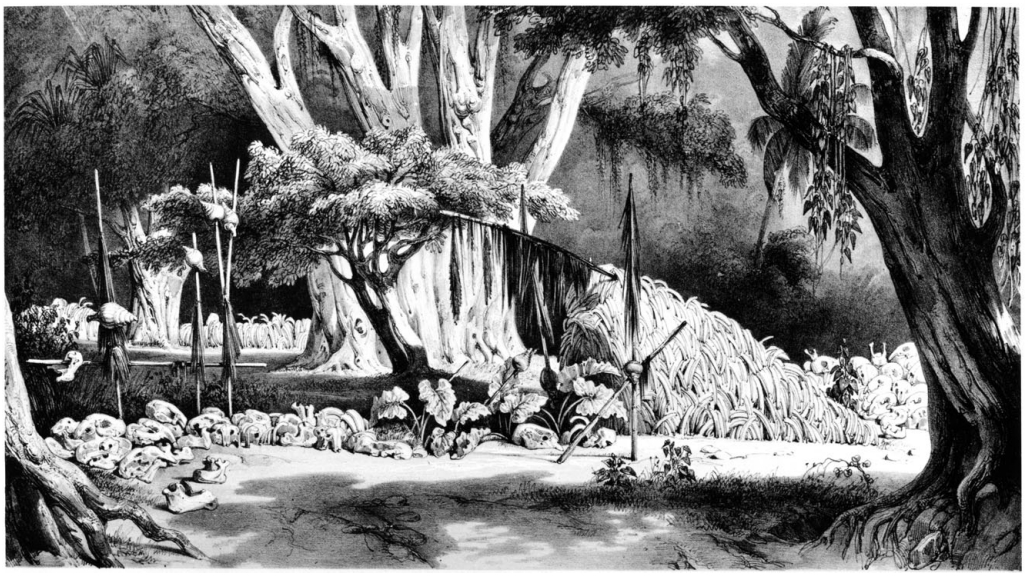

Figure 5. A dugong bone mound in Tudu island, Torres Strait, Australia, in 1840 (Dumont D'Urville 1846: pl. 189).

Discussion

We interpret the Neolithic dugong bone mound of Akab as a monument, with a preconceived organisation, constructed to last. The skulls were intended as the focal point and the presence of many selected objects (mainly ornaments but also tools) confirms its special status. Several hypotheses of acquisition have been advanced: selective gathering of the bones, or organised hunting and fishing, followed by selective sampling among the animals captured. These selections were carried out for purposes other than sustenance alone, which obviously does not exclude that a large part of the mass of this marine game could have been removed for consumption, either domestic or during ceremonies of installation of the dugong elements, for example.

The Akab site has no parallel in the Arabian Peninsula, and no site of this type is known for the Neolithic in other parts of the world. However, comparable monuments do exist on the Australian coasts of the Torres Strait at a much later date (fourteenth-twentieth century AD) (Figure 5). These Australian dugong bone mounds were mostly part of totemic ceremonial sites, known as *kod* sites, which were sacred sanctuaries usually reserved for men (Haddon 1904-1912; McNiven & Feldman 2003). They were constructions containing the bones of dugongs (from tens to several thousand) among which objects were deposited (individual ornaments, various tools, imported objects, and ochre) as well as terrestrial and marine fauna (Table 1). The mounds are associated with hunting magic rituals (McNiven & Feldman 2003). In Australia, and in Madagascar as well, for example, the dugong is an animal of special status, which was the subject, and still is, of propitiatory rites concerning the preparations for its capture, the transport of its remains to land, its dismemberment and/or its consumption (Haddon 1904-1912; Petit 1927; Crouch *et al*. 2007; McNiven & Bedingfield 2008).

Table 1. Comparison between the assemblage of dugong bone mounds at Akab and in Torres Strait, Australia. We find in both contexts structures containing the bones of dugongs among which objects were deposited as well as terrestrial and/or marine fauna.

Site	Chronology	Dugongs (MNI)	Type of dugong bone	Other fauna	Artefacts and other items	Reference
AKAB ISLAND	3500-3200 BC	>40	Ribs, skulls, tusks, mandible, scapula, limbs	Sheep, goat, cattle, fish, shell fish	Shell beads, soft-stone beads, bone tools, shell tools, shellfish hooks, flint flakes, ochre	This paper
KOEY NGURTAI mounds 6,17 & 18	AD 1510-1690 to 1870-1880	141 (average: 47)	Ribs, skull bones, cranium elements	Shellfish, fish, bird, crab	Clay pipe, glass and metal fragments, flaked quartz	David & Badulgal 2006
MABUYAG ISLAND Goemu mound 87	19th c. AD	8	Ribs, skull elements	Shellfish	Glass, stone artefacts, coral, rock fragments	Ghaleb 1990; McNiven & Wright 2008
MABUYAG ISLAND Dabangai Mound	AD 1600-1900	Estimate: 9971/ 10 954	Skull fragments, rear skull bones	Shellfish	Flaked quartz. European items: copper, nails fragments of bottle glass, ceramic	McNiven & Bedingfield 2008
PULU ISLET Moegi Sibuy	AD 1630-1780/ 1530-1870	Estimate: 250	Ribs, tusks, rear skull bones	Marine turtle, fish	Flaked quartz	McNiven & Feldman 2003
TUBU ISLAND	Early 20th c. AD	Estimate: 200	Ribs, tusks, rear skull bones	Fish, bird, shellfish	Hundreds of items. European items: glass trade beads, copper snails, coin, buttons, shotgun cartridges, flaked bottle glass, clay pipe, American brass clock. Pellets of red ochre, bead from pearl shell	McNiven & Feldman 2003

At Akab, nothing was left to chance in the making of the platform, or in the course of its use: care was taken in the display of the large bones, the deposit of the remains of wild and domestic terrestrial mammals and the choice of objects. Because several indications (deposits of objects, manipulation of bones and preferential dispositions) demonstrate the existence of rules, we believe that the dugong bone mound of Akab was a ritual site.

Was its function similar to that of the Australian dugong bone mounds? It is clear that the discovery, or rather the rediscovery, of Akab gives rise to new questions concerning the Neolithic populations which occupied the island, but also those of the coast of the Arabian Gulf and the Gulf of Oman in the same period. It is known that, in a number of regions in the world, fishing rites are related to totemic factors (Leblic 1989; McNiven 2003). In the Pacific Ocean, there are many examples of fishing clans with marine totems, such as the shark, the marine turtle and the dugong; the ritual interdependence of the clans is linked to the fact that each economic activity is controlled by a totem. The associated propitiatory rites are varied and can be accompanied by prayers and offerings in particular places, which are ritual sites. The Australian *kod* sites are linked to such totemic factors.

At Akab, manipulations and actions were certainly precisely prescribed but is it possible to envisage that the Neolithic fishermen of Akab belonged to a society in which beliefs and prohibitions were linked to animals? We cannot confirm this but we think that, at Akab, the dugong held the role attributed in the same period to the green turtle (*Chelonia mydas*) in the necropolis of Ra's al-Hamra 5 in the Sultanate of Oman. The green turtle at Ra's al-Hamra was the subject of spectacular deposits between 3700 and 3300 BC: skulls were placed near the face of the dead, the body of the dead covered with elements of turtle carapace or pebbles in imitation of turtle eggs (Salvatori 1996, 2007). The coastal populations of Akab and Ra's al-Hamra were separated by several hundred kilometres, but it is known that they shared a number of elements in their material culture, as well as a number of technologies. They also had in common very particular relations of a spiritual order, with certain marine animals, whether dugongs or green turtles.

Conclusion

Akab today is the oldest known ritual site in Arabia and the world's oldest known ritual site associated with the dugong. Its excavation has provided new data on the relations between humans and their environment in Neolithic Arabia, in particular on the symbolic use of animals, which lies at the core of the system of cultural and social representations. Although the site of Akab has no parallel in the Arabian Peninsula, the presence of dugong in many archaeological sites shows how widespread was its importance in the Gulf. If our interpretation of the Akab site is correct, a key part of that importance was ritual and symbolic.

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Technical note: ^{14}C and calibration (ΔR of the Gulf)

We know that the general marine reservoir effect causes an apparent aging of 400 years in the radiocarbon dating of shells and marine bones. In Arabia, the dating of this type of evidence must take into account the regional marine reservoir effect correction factor (ΔR), which corresponds to the difference in relation to the general marine reservoir effect and varies over time according to climate change. In the Arabian Sea, climatic fluctuations had a strong impact during the Holocene on the flux of the Indian monsoon and of upwelling, consequently affecting the content of dissolved inorganic carbon mobilised during the formation of the shells of living organisms. The present data for this region provide a ΔR of 210 ± 15 years, $n = 12$, which has remained constant from 4560 cal BC to the present (Saliège *et al*. 2005). At Qatar, in the Arabian Gulf, the reservoir effect is less well established but would be about 163 years for the same period.

The radiocarbon data for Akab to which we refer were calculated by Dr J.-F. Saliège, CNRS, UMR 7159, Université Pierre et Marie Curie, Paris. They are liquid scintillation analyses on the purified bioapatite fraction (there is no collagen in archaeological bone in Arabia). Calibration program for marine dates by Hughen *et al*. 2004. A sample of 120g of bone was analysed. As Akab is located near the Strait of Hormuz, the ΔR should be situated between 210 and 163. We observe, however, that the results differ little, whatever the method of calculation.

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