Evidence for deep-sea fishing and cultural identity during the Neolithic period at Akab Island, Umm al-Qaiwain, United Arab Emirates

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Analysis of the fish bones from the 5th millennium BC settlement on Akab Island in Umm al-Qaiwain emirate in the United Arab Emirates provides evidence of open ocean fishing. The discovery of numerous bones of tuna, as well as the presence of shell fish hooks at the site, suggests that fishing was at least part of the time carried out from boats in the open sea, beyond the shallow waters of the local lagoon. Some fishing was also carried on in these sheltered waters, and analysis of the molluscan and crab remains indicates that mangrove areas were also exploited. Some comments are made concerning the presence of shell fish hooks at the site, as well as certain types of beads and jewellery, which reinforce the idea of a coherent regional cultural entity during the 5th–4th millennia within this region.

Keywords deep-sea fishing, tuna, shell fish hook, 5th millennium BC, United Arab Emirates

Introduction

Between the Gulf and the Arabian Sea all the Neolithic settlements which have been excavated within the Oman peninsula are coastal sites. This is probably explained by the fact that this type of site is more easily detected and suffers less from deflation due to aeolian processes and the mobility of sand dunes on those sites located within the interior. These coastal habitats sometimes have significant stratigraphy, such as more than 2m thick, for example, in the case of the 5th–4th millennium BC site of Suwayh 1 in the Sultanate of Oman (Charpentier 2008). Due to the presence of large quantities of marine shells at these sites, the relatively high calcium carbonate content ensures that animal bones are much better preserved within these 'shell-middens'. This is particularly the case for stratigraphic levels associated with the 5th millennium BC settlement on Akab Island (UAE), which is characterised by a high degree of mineralisation.

Today, all of these Neolithic coastal sites reveal a material culture which is often a reflection of human activities related to the sea (Beech 2002; 2004). At the settlement of Akab, the presence of ceramic remains provide evidence of long distance maritime trade with the northern Gulf and the Ubaid Culture of Lower Mesopotamia, in particular. This article presents another aspect of the relationship between populations in the Gulf during the 5th millennium BC: not only fish production, but the conquest of the sea.

Akab Island, Umm al-Qaiwain emirate, United Arab Emirates

Akab Island is located 50km north of Dubai in the large lagoon of Umm al-Qaiwain in the United Arab Emirates (Fig. 23.1). The archaeological site, first investigated by a palaeontologist at the beginning of the 1990s, was initially interpreted as a butchering area for dugongs, and thus became known as the oldest known site of dugong hunting within the Gulf (Prieur & Guérin 1991; Jousse *et al.* 2002).

Subsequent excavations carried out by the French Archaeological Mission to the United Arab Emirates

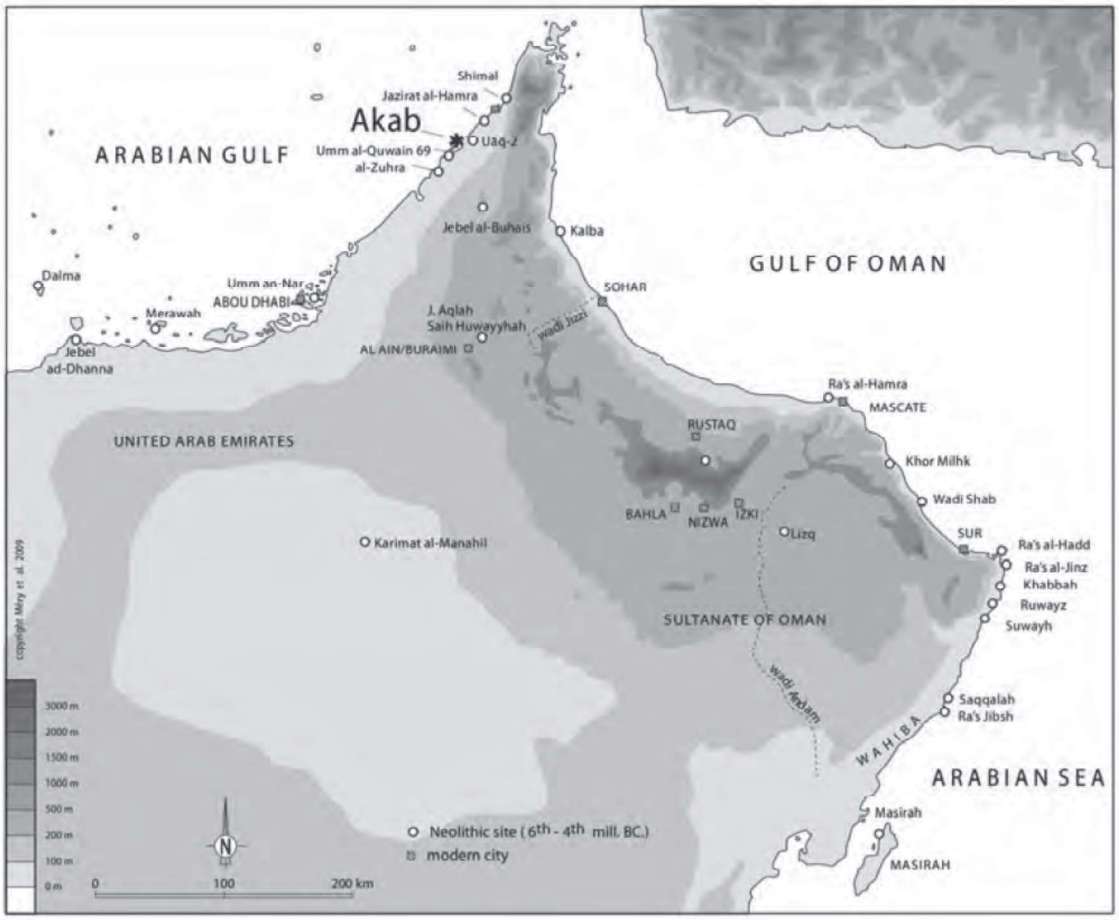

Fig. 23.1. Location of the site of Akab (source: French Archaeological Mission in the UAE).

(FAMUAE) revealed that the dugong mound of Akab was only a small part of a much larger Neolithic site, periodically occupied in the 5th millennium BC, which included the remains of circular habitations (Charpentier & Méry 2008). Radiocarbon dating indicates that this settlement was occupied between around 4700–4100 BC. In the 4th millennium BC, except for the dugong mound, traces of human occupation were more ephemeral, probably because they had been partially destroyed by deflation.

In 2006–8 the excavation of the dugong mound was resumed by a multi-disciplinary team of prehistorians and faunal experts (Charpentier & Méry 2012; Méry *et al*. 2009, Méry & Charpentier 2012). 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. This structure was built on a hillock of wind-blown sand and consisted of at least two stratified levels, about 40cm in height. Radiocarbon dating of a dugong bone sample attributed it to the 2nd half of the 4th millennium BC (5140±55 BP, Pa-2433, ca. 3568–3116 cal BC). The dugong bone platform contained the remains of about 40 dugongs. Its base consisted of mandibles laid flat, wedged by ribs. This provided a foundation upon which the skulls were placed upright in anatomical position. The skulls were carefully wedged by ribs (Fig. 23.2), and were arranged in a deliberate manner, with a row of eight aligned at the front. Adults, as well as juvenile, including very young, dugongs were well represented. No animal appears to have been deposited whole in the structure. Certain elements such as ribs, vertebrae and limbs were under-represented, which means that there is evidence of intentional selection (Méry *et al* 2009; cf. also Beech 2010, regarding the selection of particular elements of dugongs).

Several hundred objects were deposited in or inserted into this mound of dugong bones. These mainly consisted of ornamental jewellery in the form of beads (*Spondylus* sp*, Pinctada sp.*, *Ancilla* sp., etc). The Neolithic dugong bone mound at Akab is now interpreted as a monument with pre-conceived organisation which represents the oldest known ritual site in Arabia (Charpentier & Méry 2012; Méry *et al*. 2009; Méry & Charpentier 2012).

The purpose of this paper, however, is to discuss the preliminary analysis of the environmental remains associated with the earlier 5th millennium BC settlement site.

Fig. 23.2. Part of the ritual dugong bone platform – the dugong skulls at Akab are placed in anatomical position, aligned and wedged by ribs (source: French Archaeological Mission in the UAE).

The 5th millennium settlement site

Five excavation campaigns, carried out since 2002 by the French Archaeological Mission to the UAE, showed that the site of Akab had multiple occupations, dated by radiocarbon, to between 4750 and 3120 BC. Most of the excavated levels date back to the 5th millennium BC (Charpentier & Méry 2008). The site, which exceeds more than an acre (0.45ha), includes anthropogenic deposits without a trace of any major discontinuity for more than half a millennium. The remains of architectural traces in the form of post-holes indicate the repeated construction of structures during the 5th millennium BC.

No significant abandonment phase has been identified at the site, which was not occupied until after 3100 BC. The site was abandoned during a period corresponding to the late Neolithic in the Oman Peninsula, a period consistent with a phase of aridification. No significant later remains have been discovered on Akab Island, but some remains dating to the Islamic period are attested, including fire places.

Akab 2002 excavations – some preliminary results of the environmental remains

The first author was asked to undertake an analysis of the archaeozoological remains from the 2002 excavations at the Akab settlement site. All material was identified using the first author's comparative osteological collection of the Gulf mollusca, crabs, fish and marine shells from the region, which is curated in Abu Dhabi in the United Arab Emirates. Quantification of the material was made using a rapid semi-quantitative system as indicates in Table 23.1.

Molluscs

At least six families of mollusc are present at the site (Fig. 23.3 & Table 23.1). These include an as yet undetermined species of Cerithiidae, *Terebralia palustris*, *Cypraea* sp., an undetermined species of Dentaliidae, *Pinctada* sp. and *Spondylus* sp.

The presence of *Terebralia palustris* in three levels at the site (S1 L1; S2 L6; and S5 G9 L6) is of some interest here. This large gastropod, known as a mudcreeper, prefers intertidal habitats on the surface of mud in mangroves and soft water logged soil. Large quantities of these have been found within the Gulf at a number of prehistoric sites in the northern Emirates. They used to form a major food resource in ancient times. This species is, however, now extinct within the Gulf. It can only be found in a small number of locations on the east coast of the UAE at the present time. Its extinction within the Gulf may be due to the loss of suitable mangrove habitats along the coast due to the over-exploitation of mangroves for timber and fodder.

Some of the pearl oyster shell fragments (*Pinctada* sp.) are very large (S5 L5), and appear to belong to the species, *Pinctada margaritifera*. A total of 18 pearls was found during the excavation of the settlement, when sieving the sediments (Charpentier *et al*. 2012). Pearl oysters would clearly have been gathered as a food item, as well as for their pearls.

Crabs

Two types of crabs were identified amongst the Akab material (Fig. 23.3 and Table 23.1). The most common type represented was swimming crabs, Portunidae, from the genus *Portunus* sp. The remains of these predominantly consisted of their characteristic elongated *chelae* (pincers). The second less common type was the mud or mangrove crab, *Scylla serrata*. This had much more massive *chelae* with large molariform teeth.

Large quantities of *Portunus* crab remains were noted in some levels of the site (S1 L1 and S2 L6), and moderate levels in others (S2 L5; S5 G8 L6; S5 G9 L6; and S5 L6-7). The remains of *Scylla serrata* were only discovered

Table 23.1. Marine Mollusca and crabs identified from the 5th millennium BC settlement at Akab

COMMON NAME	FAMILY	TAXON	S1 L1	S1 L1 C1	S1 L2 C3	S1 L1 D1	S1 L1-2 D2	S1 L1 D3	S1 L1 D4	S1 L1 E1	S1 L2 C4	S2 L5	S2 L6	S3 L1A	S5 L1	S5 2e passe 22/01/2002	S5 3e passe	S5 4	S5 L2 C4	S5 L5	S5 G8 L6	S5 G9 P5-6 93cm	S5 G9 L6 75-90cm	S5 G9 L6	S5 L6-7 93cm	S5 H9 L6 93cm
Ceriths	Cerithiidae	indeterminate	*										+										+			
Mudcreeper	Potamididae	*Terebralia palustris* (Linnaeus, 1767)	+										*										+			
Cowrie	Cypraeidae	*Cypraea* sp.																					+			
Elephant tusk shell	Dentaliidae	indeterminate																						+		
Pearl oyster	Pteriidae	*Pinctada* sp.																					*	*		
Spiny oyster	Spondylidae	*Spondylus* sp.																		*						
Mollusc indeterminate		Mollusc, indeterminate																		*	*		*			
Swimming Crab	Portunidae	*Portunus* sp.	***									**	***		*	*					**	*	**	*	**	
Mud/Mangrove Crab	Portunidae	*Scylla serrata* (Forskål, 1775)	*										+													
Shark		Chondrichthyes, indeterminate	+																							
Marine Catfish	Ariidae	*Arius* sp.	*									+	+			+				+			*			
Needlefish	Belonidae	indeterminate							+								*			*	+	+	+	*	+	
Grouper	Serranidae	*Epinephelus* sp.														+				+		*	+			
Golden Trevally	Carangidae	*Gnathanodon speciosus* (Forskål, 1775)																					+		*	
Jack/Trevally	Carangidae	indeterminate	*										*			*				*	*	*	*	+	**		
Seabream	Sparidae	*Rhabdosargus* sp.	*									+				+					+	*				
Emperor	Lethrinidae	*Lethrinus* sp.	+																							
Barracuda	Sphyraenidae	*Sphyraena* sp.																							+	
Tuna/Mackerel	Scombridae	Thunninae, indeterminate	*												*		*			*	*		**	*	*	
Fish indeterminate		Pisces, indeterminate										*			*		*			*			*		*	*
Sheep/Goat/Gazelle	Bovidae	*Ovis* or *Capra* or *Gazella* indeterminate																			+				*	
Gazelle	Bovidae	Gazella sp.											+	+												
?Dog	?Canidae	*?Canis lupus familiaris* (Linnaeus, 1758)															+									
Dugong	Dugongidae	*Dugong dugon* (Müller, 1776)	*	+	+		+	+	+	+	+			*		*	*	*			+			*		*	+
Mammal indeterminate		Mammalia, indeterminate																	+		+					
?Human		? *Homo sapiens*				+																				

+ = single example, * = 2–9 examples, ** = 10–49 examples, and *** = 50+ examples

in two levels at the site (S1 L1 and S2 L6). These same levels also contained examples of the gastropod species, *Terebralia palustris* (see above), confirming that mangrove environments were being exploited during these particular occupation horizons.

Fishes

The majority of the environmental remains retrieved from the excavations consisted of fish bones (Table 23.1 & Fig. 23.4). This demonstrates the importance of fishing to the peoples of the lower Gulf during the Neolithic period. At least nine families of fishes are present at the Akab site including sharks (Chondrichthyes, indet.), marine catfish (Ariidae), needlefish (Belonidae), groupers (Serranidae), jacks/trevallies (Carangidae), seabream (Sparidae), emperors (Lethrinidae), barracudas (Sphyraenidae) and tuna (Scombridae: Thunninae).

A single large shark vertebra was identified. This came from a requiem shark (Carcharhinidae). Judging from the relative sise of the vertebra the shark must have been at least 2m in length. Marine catfish (Ariidae) were represented by neurocranial fragments as well as by otoliths. Needlefish (Belonidae) were identified in six levels by dentaries, premaxillae and vertebrae fragments. Groupers (Serranidae) occurred in three levels. These all belonged to the genus *Epinephelus*. Jacks/trevallies (Carangidae) were quite common in the material, occurring in nine levels. Some of these remains belonged to the golden trevally (*Gnathanodon speciosus*). Seabreams (Sparidae) were represented in five levels by the genus *Rhabdosargus*, identified on the basis of its characteristic oval rear molar, present in both its dentary and premaxilla. Emperors (Lethrinidae) were represented by a single otolith from the genus *Lethrinus*. A single dentary from barracuda (Sphyraenidae) was noted. Bones from tuna (Scombridae: Thunninae) occurred in no less than eight levels at the site, being common in level S5 G9 L6. These all consisted of vertebrae, which judging from their relative sise probably belonged to fishes around a metre or less in size. The species *Thunnus tonggol*, known as longtail tuna, is the type of tuna commonly sold in fish markets in the UAE at the present day. This generally attains a maximum length of only 140cm (Randall 1995). It may well be this relatively small tuna which was also caught in the past.

Mammals

At least three types of mammals were recorded (Table 23.1). Some small bone fragments could only be classified as belonging to either domestic sheep/goat or gazelle. At least two specimens, a calcaneum and 2nd phalanx, could be definitively assigned to gazelle. An almost complete 3rd metatarsal was identified as belonging to dog (from level S5 3^{e} passe). The commonest mammal occurring in the deposits at Akab was dugong. Traces of this animal in the form of skull, rib and vertebrae fragments occurred in 16 out of the 24 units or levels excavated at the site. This confirms the importance of Akab for the hunting and exploitation of dugong.

Finally, a small fragment of what appears to be a human vertebra was noted in level S1 L1 D1. Special care should be given during future excavations at the site to check whether further human skeletal material is present in this part of the site. It should be noted that the nearby broadly contemporary site excavated by Carl Phillips consisted of midden material in association with a cemetery (Phillips 2002).

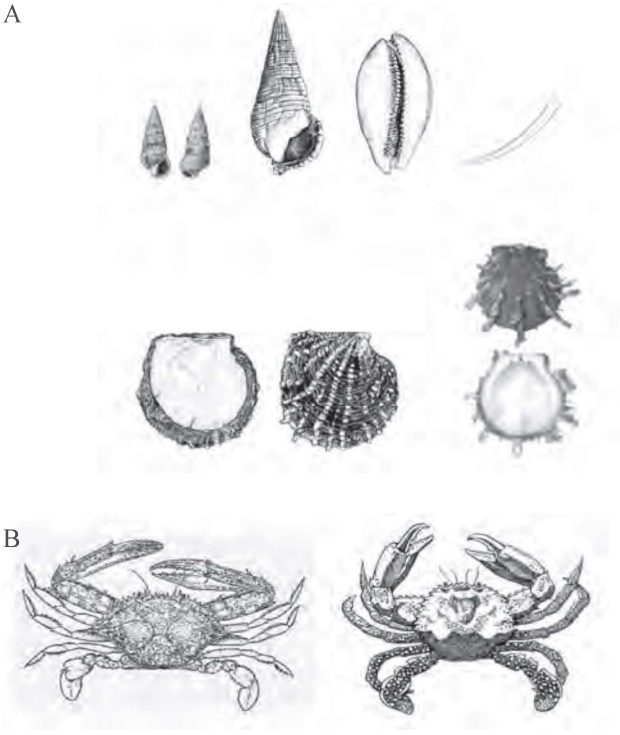

Fig. 23.3. Marine molluscs and crabs identified from the 5th millennium BC settlement at Akab. From left to right: A. Top: Cerithium, Terebralia palustris, Cypraea sp. and Dentaliidae; Centre: Pinctada margaritifera and Spondylus sp. B. Bottom: Portunus pelagicus and Scylla serrata.

Discussion

During the 5th millennium BC on Akab Island, it is clear that resource exploitation primarily concentrated on mangroves and on the local lagoon environment, but the inhabitants also fished for tuna on the high seas. This meant that they had to use boats (although we do not have any direct remains of these), and fishing gear suitable for deep water fishing. Although the net weights are quite small and few in number, it was noted that the inhabitants of the site were making shell fish hooks (Mery *et al*. 2008). This is contrary to the hypothesis raised by Margarethe and Hans-Peter Uerpmann (1996), who suggested that these

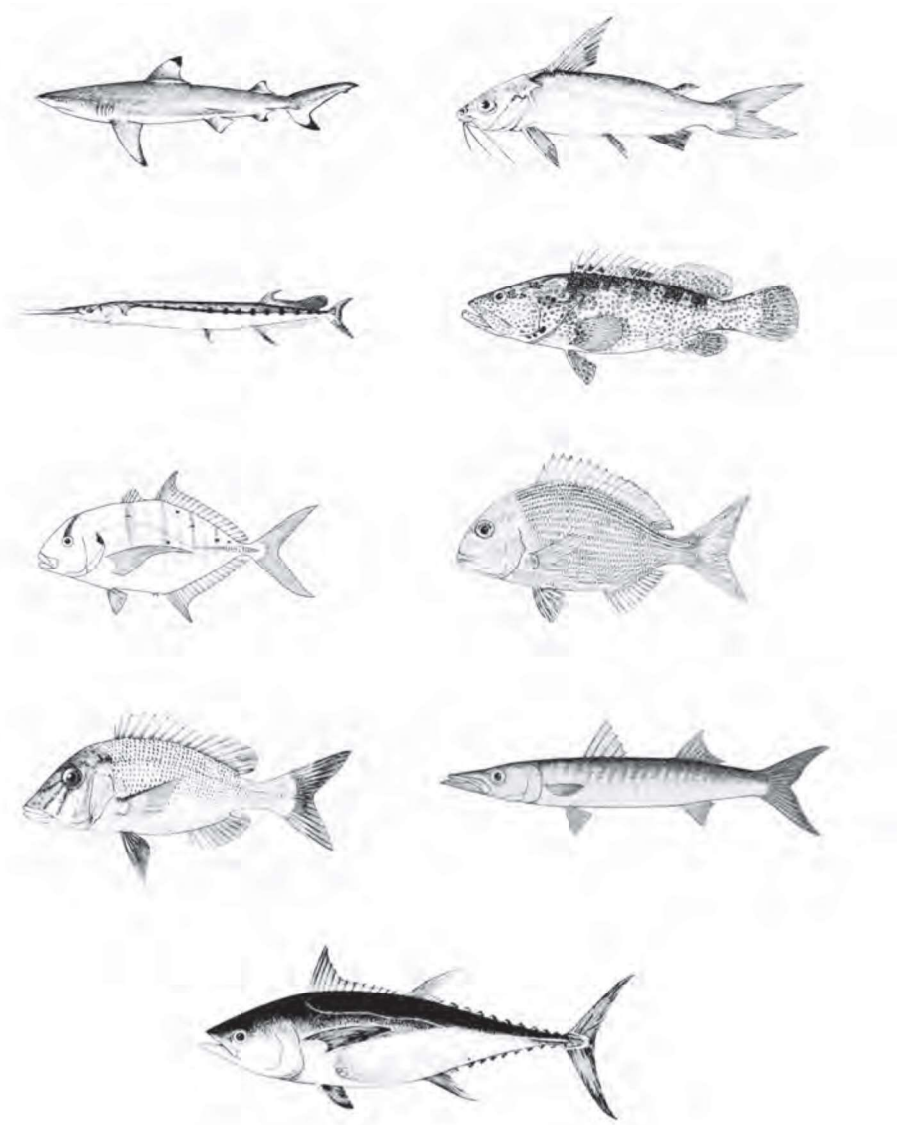

Fig. 23.4. Marine fishes identified from the 5th millennium BC settlement at Akab. From left to right: Top: Carcharhinidae: Carcharhinus melanopterus and Ariidae: Arius thalassinus; 2nd row: Belonidae: Ablennes hians and Serranidae: Epinephelus coioides. 3rd row: Carangidae: Gnathanodon speciosus and Sparidae: Rhabdosargus sarba; 4th row: Lethrinidae: Lethrinus nebulosus and Sphyraenidae: Sphyraena putnamiae; Bottom: Scombridae: Thunnus tonggol.

technologies were absent during the time the lagoon of Umm al-Qaiwain was first occupied.

Assuming that much of the environmental material from Akab was retrieved locally, the presence of the gastropod species, *Terebralia palustris*, as well as the mud crab, *Scylla serrata*, suggests that the site was located in the vicinity of mangroves. Neither of these species are now present in the Umm al-Qaiwain area. Although some mangrove cover occurs in this area at the present time, this is largely concentrated on the eastern side of Akab island and towards the central area in the Umm al-Qaiwain lagoon (Al-Ghais & Cooper 1996, 411, fig. 1). It may be the case that mangrove habitats were more widespread in the past (Beech & Hogarth 2002).

A modern study of crabs in the Umm al-Qaiwain lagoon noted three species of swimming crabs (Portunidae), *Portunus pelagicus*, *Thalamita crenata* and *Thalamita poissoni* (Al-Ghais & Cooper 1996, 423–425). It was reported that *Portunus pelagicus* was the largest and most commonly encountered species in the area. Much of the archaeological crab remains from Akab probably belong to this species judging from their relative sise. *P. pelagicus* is commonly found in shallow sublittoral waters and can even be caught offshore in locally-made gargoor fish traps by traditional fishermen.

It is clear from an examination of the types of fish caught at Akab that fishing largely took place in shallow water habitats. A study of the modern fishes present

within the Umm al-Qaiwain lagoon reported moderate numbers of requiem shark, *Carcharhinus dussumieri* and marine catfish, *Arius thalassinus* (Department of Fisheries 1984). At least three species of grouper were noted, *Epinephelus areolatus*, *E. coioides* and *E. polylepis*, although only *E. coioides* was abundant. A number of jacks/trevallies were common within the lagoon, *Gnathanodon speciosus* being particularly abundant. The seabream species *Rhabdosargus sarba*, emperors (*Lethrinus* spp.) and barracudas (*Sphyraena* sp.), were all reported as being abundant within the lagoon. Thus, the majority of the species represented amongst the archaeological material are still present in the lagoon today. Such fish could have been caught using various techniques including tidal traps (known locally as '*hadrah*'), nets, basket traps, as well as the occasional use of hook and line.

Similar evidence that much fishing was carried out in local shallow waters was obtained from other 5th millennium BC excavations in the vicinity of Umm al-Qaiwain (Beech 2003; 2004; Uerpmann & Uerpmann 1996), as well as at the nearby later site of Ed-Dur (Van Neer & Gautier 1993).

Whilst the majority of the fish could have been caught in the neighbouring Umm al-Qaiwain lagoon, tuna (Scombridae – Thunninae) were probably caught outside the lagoon in open waters. Their presence was not noted in the study of modern fishes caught within the lagoon (Department of Fisheries 1984). An important point to bear in mind is that whilst small quantities of tuna can be caught all year round they are far more abundant at certain times of year in the Gulf waters of the northern emirates. For example, in Ras Al-Khaimah waters most of the annual catch of tuna was caught during the months of April and May during 1982 (Ali & Cherian 1983). The catching of tuna may have therefore been seasonal.

Bead making and jewellery

The presence of numerous traces of *Spondylus* shell bead production in all settlement levels was another important finding. It indicates that some sites within the Gulf were specialised in craft production (Charpentier & Méry 2008; and cf. the production of *Spondylus* beads at As-Sabiyah in Kuwait; Carter & Crawford 2010).

The bead-making remains are indeed extremely abundant and occur throughout the stratigraphy of the site. In addition, even if we have no indication of manufacture of the famous 'Akab type' of tubular beads (made from chlorite and murex), their discovery in the 5th millennium BC settlement at Akab suggests that they are not a chronological marker at the very end of the 4th millennium, but rather a cultural marker. Indeed, they appear from around 4600 BC and persist until about 3100 BC, such beads having been discovered on sites ranging from Qatar to Oman. It should be noted that this is the first time, in southeast Arabia, that we can observe such a wide distribution of Neolithic ornamental elements. Their distribution (with the exception of Qatar) corresponds with two other types of ornamental elements very characteristic of the Neolithic of this region; namely, laurel leaf-shaped pendants made from *Pinctada margaritifera* and composite bracelets carved from large Conidae (Charpentier & Méry 2008).

Regional cultural identity

The archaeological excavations at Akab are not the only excavations to be carried out on coastal Neolithic sites in the UAE, but they do represent the first investigation of this type of site that has been conducted over such a large area, with 70m^2 total surface being excavated down to virgin soil. Data on the Neolithic period are scarce in the Gulf, where only a few coastal sites have been excavated or surveyed, for instance Dalma and Marawah in the United Arab Emirates, Al-Markh in Bahrain, Khor and Shagra in Qatar, and As-Sabiyah in Kuwait (Roaf 1976; Desse 1988; Flavin & Shepherd 1994; Uerpmann & Uerpmann 1996; Beech & Elders 1999; Beech *et al.* 2000; 2005; Beech & Glover 2005; Carter & Crawford 2010). Important issues concerning the chronology of the Neolithic across southeast Arabia remain to be resolved, as well as the lifestyles of local people and their trading networks. The role of indigenous cultures in the appearance of these early societies remains to be determined, as well as the influence of the PPNB of the Levant in the emergence of the Neolithic within the Oman Peninsula.

If one considers the bead making and other jewellery items discovered on coastal Neolithic sites, these observations support the hypothesis of a common cultural entity within the Oman Peninsula during the 5th–4th millennia BC. Recent studies of flint arrowheads have also helped to define a similar geographic area, two distinct areas being recognised with distinct regional techno-cultural characteristics for the period 6500–3800 BC (Charpentier 2008). The fact that some technology, including the use of pearl shell fish hooks, was shared by the coastal populations of the UAE and the Sultanate of Oman, reinforces the image of a coherent regional cultural entity during the 5th–4th millennia within this region.

This new evidence that the people living in the Akab settlement were able to venture out on the high seas, fishing beyond the safety of their own lagoon for tuna, shows that Neolithic peoples had indeed developed ocean-going boats. The fact that shell fish hooks are only known within the Gulf from two locations, Akab in Umm al-Qaiwain and Shimal in Ras Al-Khaimah, both located in the northern Emirates, may be a reflection that both these areas have deeper water in close proximity, compared with other areas with much shallower waters in the southern and western sides of the Gulf. This may also have helped to reinforce connections between these people and those living on the coast of the Sultanate of Oman, who also fished for tuna using similar technology.

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