PROCEEDINGS
OF THE
SEMINAR FOR ARABIAN STUDIES

VOLUME 46
2016

Papers from the forty-seventh meeting of the Seminar for Arabian Studies held at the British Museum, London, 24 to 26 July 2015

SEMINAR FOR ARABIAN STUDIES

ARCHAEOPRESS
OXFORD

Copyright Archaeopress and the authors 2016
The Steering Committee of the Seminar for Arabian Studies is currently made up of fifteen academic members. The Editorial Committee of the Proceedings of the Seminar for Arabian Studies includes seven additional members as follows:

**STEERING COMMITTEE**

Dr Derek Kennet (Chair)
Dr Janet Starkey (Joint Editor of PSAS)
Dr Orhan Elmaz (Joint Editor of PSAS)
Dr Tim Power
Dr Robert Wilson (Treasurer)
Dr Sarah Doherty (Secretary)
Dr Rob Carter
Dr Nadia Durrani
Professor Robert G. Hoyland
Dr Julian Jansen van Rensburg
Mr Michael C.A. Macdonald
Dr Harry Munt
Dr Venetia Porter
Dr St John Simpson
Dr Lucy Wadeson

**EDITORIAL COMMITTEE: ADDITIONAL MEMBERS**

Professor Alessandra Avanzini
Professor Soumyen Bandyopadhyay
Dr Ricardo Eichmann
Professor Clive Holes
Professor Khalil Al-Muaikel
Professor Daniel T. Potts
Professor Christian J. Robin

Opinions expressed in papers published in the Proceedings are those of the authors and are not necessarily shared by the Editorial Committee.

The Proceedings is produced in the Times Semitic New font, which was designed by Paul Bibire for the Seminar for Arabian Studies.

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior permission of the publisher.
ISSN 0308-8421
The Steering Committee of the Seminar for Arabian Studies is most grateful to the MBI Al Jaber Foundation for its continued generosity in making a substantial grant towards the running costs of the Seminar and the editorial expenses of producing the Proceedings.
Contents

Guidelines and Transliteration ........................................................................................................... iii

Editors’ Foreword ................................................................................................................................. v

Peter J. Parr, The founding of the Seminar and the Society for Arabian Studies ....................................... vii

In memoriam Andrzej Zaborski (1942–2014) ................................................................................... xiii

Ann Andersson, Trade beads of Furayhah. Evidence of trade and connections of Qatar in the eighteenth and nineteenth centuries from a small-finds perspective .................................................. 1


Anne Benoist, Julien Charbonnier & Iwona Gajda, Investigating the eastern edge of the kingdom of Aksum: architecture and pottery from Wakarida .................................................................................. 25

Francesco Paolo Caputo & Francesco Genchi, Seashell discs from the Early Iron Age graves of Daba (Dibbā, Sultanate of Oman) (poster) ........................................................................................................... 41


Michel de Vreeze, The social significance of ceramic change at the start of the Wadi Suq period. Rethinking ceramic continuity and change based on recent evidence from the tombs at Qarn al-Ḥarf ........................................ 63

Michele Degli Esposti, Martina Renzi & Thilo Rehren, Iron Age metallurgy at Salūt (Sultanate of Oman): a preliminary note (poster) ...................................................................................................................... 81

Philipp Drechsler, Max Engel, Dominik Brill & Christoph Gerber, The Asaila depression, an archaeological landscape in Qatar .................................................................................................................. 89

Dennys Frenez, Michele Degli Esposti, Sophie Méry & Jonathan Mark Kenoyer, Bronze Age Salūt (ST1) and the Indus Civilization: recent discoveries and new insights on regional interaction ........................................................................ 107

María del Carmen Hidalgo-Chacón Diez, The divine names at Dadan: a philological approach ............................................................................................................................... 125

Will M. Kennedy, Reassessing the impact of natural landscape factors on spatial strategies in the Petra hinterland in Nabataean-Roman times ............................................................................................ 137


Maria Pia Maiorano, Lithic assemblage from FNS-7 (Wādī al-Ḥarīmah): new evidence about the fifth-millennium BC hunter-gatherers of coastal Oman (poster) ......................................................................................... 169

Copyright Archaeopress and the authors 2016
Clara Mancarella, *The Awām Temple cemetery in Marib (Ma‘rib) revisited* ................................................................. 179

Marjan Mashkour, Mark Jonathan Beech, Karyne Debeue, Lisa Yeomans, Stéphanie Bréhard, Dalia Gasparini & Sophie Méry, *Middle to Late Neolithic animal exploitation at UAQ2 (5500–4000 cal BC): an ‘Ubaid-related coastal site at Umm al-Quwain Emirate, United Arab Emirates* ................................................................. 195

Eric Olijdam, *Humble beginnings? A closer look at social formation during Early Dilmun’s formative phase (c.2200–2050 BC)* .............................................................................................................................................................................. 211


Martina Renzi, Andrea Intilia, Arnulf Hausleiter & Thilo Rehren, *Early Iron Age metal circulation in the Arabian Peninsula: the oasis of Taymā‘ as part of a dynamic network (poster)* .............................................................................................................................................. 237

Conrad Schmidt & Stephanie Döpper, *Umm an-Nar pottery assemblages from Bāt and al-Zībā and their functional contexts* .............................................................................................................................................................................. 247

Peter Stein, Tobias J. Jocham & Michael J. Marx, *Ancient South Arabian correspondence on wooden sticks: new radiocarbon data* .............................................................................................................................................................................. 263

Laurent Tholbecq, Thibaud Fournet, Nicolas Paridaens, Soline Delcrois & Caroline Durand, *Sabrah, a satellite hamlet of Petra* .............................................................................................................................................................................. 277

Papers read at the Seminar for Arabian Studies held at the British Museum, London, on 24–26 July 2015 .......... 299
Middle to Late Neolithic animal exploitation at UAQ2 (5500–4000 cal BC): an Ubaid-related coastal site at Umm al-Quwain Emirate, United Arab Emirates

Marjan Mashkour, Mark Jonathan Beech, Karyne DeBue, Lisa Yeomans, Stéphanie Bréhard, Dalia Gasparini & Sophie Méry

Summary

The subsistence strategies of coastal Neolithic groups in eastern Arabia, reliant upon the exploitation of marine and terrestrial animal resources, are not yet fully understood. A central question in relevant literature is the issue of mobility. This is the reason for excavations in Umm al-Quwain (UAQ2), UAE, from 2011 by the French Archaeological Mission. UAQ2 is a site with obvious potential, occupied for 1500 years from the mid-sixth millennium BC. It has an area of approximately 6 ha with 3.2 m or more of imposing and unusual stratigraphy. A large quantity of faunal remains, including terrestrial and marine vertebrates, was recovered from UAQ2. The terrestrial mammals are composed mainly of domestic herbivores including caprines, cattle, and dogs. The most striking feature is the number of newly born and young animals among the small herbivores, a clear indication of occupation during late winter/spring. As for the fish bones, the following taxa were identified: requiem sharks, shark-suckers, marine catfish, needlefish, jacks/trevallies, milkfish, mojarra, emperors, snappers, mullet, flatheads, shortfin flounders, parrotfish, kawakawa, tuna, groupers, sea bream, barracuda, puffer, and tripod fish. These indicate that most fishing was carried out in the shallow lagoon area, but some fishing for tuna may have been carried out in the open seas beyond the local lagoon. Besides fish were also the remains of cuttlefish and swimming crabs. This assemblage provides new information on the mixed exploitation of inland and marine resources during the sixth to fifth millennium BC. The integrated study of the faunal remains contributes to the proposal of a possible year-round residency, not excluding coastal mobility.

Keywords: UAQ2, Neolithic, archaeo-zoology, domestic herbivores, fishing

Introduction

In the absence of firm data on the transition from the last hunter-gatherers to the first farmers of the Neolithic, the process of ‘Neolithization’ remains unknown in eastern Arabia. Most of the data to hand belong to Middle Neolithic sites (sixth to fourth millennium BC) and the variety and richness of the material culture of these sites allows for a clear characterization of eastern Arabian human communities. In this paper we will present the results of faunal analyses of marine and terrestrial vertebrate remains, and define the subsistence economy of the site that constitutes one of the cornerstones of the characterization of coastal Neolithic sites in the Emirate of Umm al-Quwain.

The Neolithic of south-eastern Arabia

On the Omani coastline, the Neolithic era dates back to the seventh and sixth millennia BC and is represented by sites discovered on the coasts of the Sultanate of Oman from the 1980s between the capital Muscat and Suwayh (al-Suwayh) in the Ja‘alān region; and with sites discovered since 2010, on Masirah Island (Jazīrat Ma‘īrah) and in the Dhofar (Zufār) region (Fig. 1).

On the coastlines of the United Arab Emirates, research by the French Archaeological Mission has recently brought to light evidence of Middle Neolithic occupation in the north of the country, at Ra’s al-Khaimah and Umm al-Quwain, from at least the mid-sixth millennium BC. Studies on both sides of the Straits of Hormuz have demonstrated an overall common chronology of Middle Neolithic communities (Méry & Charpentier 2013). From the sixth millennium BC, hunting of wild herbivores such as gazelle, oryx, and tahr was well represented. In addition, an important contribution by domesticates including caprines, cattle, and dogs can also be detected during this period. According to Hans-Peter and Margarethe Uerpmann, these domesticates could have originated from the Levant...
This hypothesis suggests human and animal mobility, a possibility that in the present state of knowledge is difficult to detect in the material culture (Charpentier & Crassard 2013).

Along the eastern coasts of the Arabian Peninsula many fishing camps belonging to Neolithic fishermen or herders are indicated by shell middens. The technologies and material cultures found on the coast in this region are very similar to one another, a regional pattern being evident (Méry & Charpentier 2013). Similar aspects are found within Neolithic communities from Kuwait to Dhofar (2013). From the first phase of the Middle Neolithic (5500/5300–5000 BC) in the UAE, the development of coastal communities with a range of intensive and diversified activities indicates an optimization of the exploitation of marine and terrestrial resources (Beech 2003; 2004a; 2013) in the sea, lagoons, mangroves, wadis, arboreal savannahs, and piedmonts. All available biomes and resources were known and exploited by prehistoric coastal communities, including the gathering and hunting of molluscs, fish, marine mammals, and turtles. The availability of resources depended upon the geomorphology of the rocky or sandy coasts, and the presence or absence of lagoons and mangrove biomes. In UAQ2 the collection of pearl oysters is known from the mid-sixth millennium BC (Charpentier, Phillips & Méry 2012), making this pearling site among the earliest known in its geographical zone and, to date, in the world.
The use of boats during the fifth millennium BC has been demonstrated at al-Ṣabiyyah in Kuwait (Carter & Crawford 2010); indirectly at Dalma Island (Jazīrat Dalmā), about 40 km from the UAE coastline; and at Masirah Island, about 12 km from the Omani coast. How widespread was the building and use of boats among south-eastern Arabian communities is still a matter of discussion.

The existence of a deep-sea fishery for tuna is still debated because of the lack of sufficient ethnological observations in comparative environmental settings. Furthermore, the plasticity of tuna in relation to their ecological requirements in various seasons makes interpretation difficult (P. Bearez, personal communication). Tuna could have been caught using fish hooks made of *Pinctada margaritifera* in the region of Muscat and Ja‘alan, and more recent evidence of the use of shell fish hooks has been discovered in the UAE (Méry, Charpentier & Beech 2008).

**The site of Umm al-Quwain 2 (UAQ2)**

The site is near a place called Shobekah (Shubīkah), 14 km north of the capital of the Emirate of Umm al-Quwain (Fig. 1) and is located on the edge of a lagoon, by an ancient stand of mangroves. It is the oldest Neolithic, coastal, stratified shell midden known today on the Arabian side of the Persian Gulf. It sits on top of a 400 m long, 6 m high sand dune, oriented east–west, which is a relic of a mega-dune that was oriented north–south, which formed at the end of the Pleistocene. It was cut by a lagoon during the Holocene period.

Umm al-Quwain UAQ2 was discovered in 1992 by Carl S. Phillips and Philip Treveil (Phillips 2002). During
the 2000s, when a team of the French Archaeological Mission to the UAE was excavating the Neolithic site of Akab and surveying around the same lagoon, it became clear that the site was not only a graveyard but also a large, stratified shell-midden site. It contained a settlement area and the graveyard, which was excavated during the 1990s, was only a small part of a much larger area of occupation (Fig. 2/a). In 2009, a section was opened by V. Charpentier, approximately 20 m from the graveyard. Radiocarbon dates on shells indicated that the upper layer belonged to the fifth millennium BC. One of the earliest visible layers in the section contained Ubaid pottery sherds from the last third of the sixth millennium BC.

From 2011, four excavation campaigns were conducted under the supervision of Sophie Méry. A series of new radiocarbon dates of shells indicates repeated occupation of the dune over 1500 years without any obvious gaps. This occupation occurred during the Middle Neolithic and the first phase of the Late Neolithic era (c.5500–4000 BC). In Sectors 1 and 2 (Fig. 2/a), where extensive excavations took place, the work mainly focused on earlier periods in the sequence, and residential occupation levels were identified. The floors of the occupation levels were dated to the sixth millennium cal BC, and the earliest known phase of the regional Middle Neolithic era (MN1) to 5500/5300–5000 cal BC, a period that is, as yet, hardly documented. The following phase, Middle Neolithic 2 (MN2), dates to the first half of the fifth millennium BC (c.5000–4500 cal BC). Finally, the last phase of the Neolithic period documented on the site is Late Neolithic 1 (LN1), which was dated to the second half of the fifth millennium BC (c.4500–4000 cal BC).

The various levels were not only well preserved but also extensive enough to allow a spatial analysis of the site, indicating that it comprises a residential area and a graveyard. In the excavated part of the settlement in Sectors 1 and 2 comprises seven occupation levels (Levels 15 to 9; see Fig. 2/a) with architectural vestiges in the form of groups of post-holes, and specialized areas for the preparation of food and small workshops (Méry 2015; Méry et al., in press). These are materials that are typically found in the camps of fishermen and herders, the material assemblages recovered being identical or only a little different from one another. Specialized zones for food preparation correspond to hearths and large dumps of cooked foodstuffs: shells and fish, bird, and mammal bones.

The levels of the first half of the fifth millennium BC (Levels L8/7 to L5/4) correspond in Sectors 1 and 2 to sandy layers and occupations with a relatively low density of artefacts. Archaeological layers, well defined and thicker than the lower layers, seem to have formed very quickly. This may mark the beginning of an aggradation phase and may correspond to the beginning of the aridification of the climate, a hypothesis to be confirmed by ongoing research by J-F. Berger, A.G. Parker, G. Preston, and S. Méry.

The sandy layers poor in organic residues (ash) have delivered less abundant cultural material and faunal assemblages than the earlier Levels L15 to L9. The levels of the second half of the fifth millennium BC (Levels L3 to L2) correspond to Sectors 1 and 2, and to very dense levels of ecofacts, mostly composed of molluscs. These accumulations are dump areas and contain very few artefacts. The discovery of a semi-circular structure with post-holes in Sector 4 of the site, showing evidence of multiple reorganization (Méry et al., in press: fig. 11), indicates that this part of the settlement was a residential area as well, despite the very dense accumulation of waste shells.

Finally, in the graveyard, apart from the forty graves excavated in 1992 and 1993 (Phillips 2002), which were attributed to the fifth and fourth millennia BC, new inhumations were found in 2012 under previous graves (Méry et al., in press: fig. 4). The two new tombs date from the first part of the sixth millennium BC according to the stratigraphic study. The faunal assemblage was divided into three chronological periods: Middle Neolithic 1 (MN1) and 2 (MN2), and Late Neolithic 1 (LN1). Some of the remains could not be precisely allocated to these periods and were divided accordingly.

**Vertebrate faunal remains of UAQ 2**

The faunal material was separated into terrestrial, avian, and fish remains. The two former groups were studied by Marjan Mashkour, Karyne Debue, and Stéphanie Bréhard at the Laboratory of Archaeozoology and Archaeobotany of the Muséum d’Histoire naturelle in Paris. Fish remains were studied in Abu Dhabi by Mark Beech and Lisa Yeomans using Mark Beech’s personal reference collection. Faunal remains from the site were collected from all periods but the most abundant can be dated to Middle Neolithic 1.

**Mammalian and avian remains**

In total, out of the 10,500 mammalian and avian bones only 22% could be identified taxonomically (Figs 3 & 4), the mammalian and avian remains of UAQ2 being in
general badly preserved, with an average bone weight of only 1.8 g. Heavy to medium concretion is the main factor responsible for this bad conservation and the high rate of unidentified remains. We believe that the concretion was deposited quickly because many carpal or tarsal bones were still articulated (Fig. 5). The concretion on the bones also made the reading of traces on the bone surface quite difficult. Many bones were either carbonized or calcined and fragmented, and derived from consumption refuse. The high fragmentation may indicate trampling.

<table>
<thead>
<tr>
<th>Taxa</th>
<th>NISP</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MN1</td>
<td>MN1/MN2</td>
</tr>
<tr>
<td>Caprini</td>
<td>1476</td>
<td>4586.9</td>
</tr>
<tr>
<td>Bos</td>
<td>115</td>
<td>1172.7</td>
</tr>
<tr>
<td>Gazella</td>
<td>28</td>
<td>135.6</td>
</tr>
<tr>
<td>Oryx</td>
<td>5</td>
<td>14.9</td>
</tr>
<tr>
<td>Canis</td>
<td>28</td>
<td>63.3</td>
</tr>
<tr>
<td>Vulpes</td>
<td>5</td>
<td>8.6</td>
</tr>
<tr>
<td>Felis</td>
<td>4</td>
<td>7.5</td>
</tr>
<tr>
<td>Mustelidae</td>
<td>1</td>
<td>0.6</td>
</tr>
<tr>
<td>Erinaceus</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Lepus</td>
<td>0</td>
<td>13.9</td>
</tr>
<tr>
<td>Mesofauna</td>
<td>11</td>
<td>1.0</td>
</tr>
<tr>
<td>Rodentia</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Aves</td>
<td>10</td>
<td>8.5</td>
</tr>
<tr>
<td>Squamata</td>
<td>2</td>
<td>1.5</td>
</tr>
<tr>
<td><strong>Total identified</strong></td>
<td><strong>1685</strong></td>
<td><strong>6015.0</strong></td>
</tr>
</tbody>
</table>

**Figure 3.** Distribution of mammalian and avian remains in different phases of the occupation of UAQ2 by the number of identified specimens (NISP) and weight (only for Middle Neolithic 1).

**Figure 4.** Representation of the faunal spectra in UAQ2.
Although limited, the identified remains bear precious taxonomic, morphological, and demographic information. For the identification of mammal and avian remains we used the comparative collections of the Muséum national d'Histoire naturelle in Paris.

The exploited species are predominantly caprines — goat (*Capra*) and sheep (*Ovis*) — with goats representing two thirds of the caprines. Cattle (*Bos*) is the second most important group of herbivore exploited. The remains of *Capra* and *Ovis* are of a size compatible with domestic forms as recorded from other samples of the population of the region such as Qal'at al-Bahrain (Uerpmann & Uerpmann 1994), and are larger than at al-Buhais (Jabal al-Buḥays (Skorupka & Mashkour 2013: fig. 2). Furthermore, an unusual number of medium-size canid (*Canis*) bones were identified and most of them are compatible with dogs. According to the multiple cut-marks sometimes visible on the bones, this animal formed part of the diet. The practice seems to be widespread in the region, as witnessed by faunal assemblages in Oman (Martin 2003; Maini & Curci 2013). Among the wild ungulates, only gazelle (*Gazella*) bones could clearly be identified. Only five specimens could be allocated to a species of oryx — *Oryx leucoryx*. Very few remains of small carnivores including *Felis margarita* and *Vulpes vulpes* were identified. The remains of marine turtle could not be clearly identified although some elements probably belong to this group.

Bird remains are represented by only ten specimens (Figs 3 & 4) and their identification has not yet been completed. They obviously did not have an important role in the diet of UAQ2 human communities.

‘Kill-off patterns’ and residential seasonality at UAQ2

One of the key problems is documenting the residential seasonality of the prehistoric human communities occupying coastal sites in this part of the world. Demographic data were fortunately and exceptionally available in Umm al-Quwain as, paradoxically, the mineralized concretion on the surface of the specimens helped to preserve fragile bones and teeth. This is the reason it was possible to reconstruct the ‘kill-off patterns’ (i.e. the relative representation of different age groups in the sample) for caprines based on the tooth eruption and wear methods developed by Payne (1973) and Helmer and Vigne (2007). Figure 6 shows the ‘kill-off patterns’ based on caprines and *Capra* dental remains for the Middle Neolithic 1 and 2.

The number of teeth recovered for the Late Neolithic was too small for this kind of analysis. The calculation is based on the number of teeth (Vigne 1988). The analysis of tooth remains allows the following observations:

— the presence of very young animals (age class A; 0–2 months old). They have also been identified in post-cranial elements. These individuals most probably result from natural mortality;
— the notable presence of very young to young animals (age classes A and B; 0–6 months old; 9–17% of the teeth) clearly indicates that herds (or at least part of the herds) and herders were present at the site during at least the period of birth and a few weeks afterwards. The analysis of tooth remains raises the question of the birth season. Although difficult to reconstruct without an ethnographic or traditional case study, considering the temperature and isolation in this part of the world, the birth season would have been quite early in the year, between January and
March. According to this hypothesis, herders and their flocks were at the site at least from January until June; the high frequency of adults dying after the age of two (54% and 66% of the teeth; 42% and 48% of the teeth belonging, surprisingly, to animals that died after four years) is a notable and unusual pattern to be carefully analysed, considering that the majority of the animals are domestic. The presence of domestic ungulates is also attested at Akab, al-Buhas, Marawah Island, and Dalma Island (Beech et al. 2005; Beech & Glover 2005; Charpentier & Méry 2008; Méry et al. 2009; Uerpmann & Uerpmann 2000; 2008). Farther east in Oman the same observations can be made in the Ras al-Hamra (Ra’s al-Ḥamrā’) 5 and 6 shell middens (Uerpmann, Uerpmann & Schölar 2003: 210–235; Mashkour & Debue, in preparation).

**Figure 6.** ‘Kill-off patterns’ based on caprines and Capra dental remains for Middle Neolithic 1 and 2 at UAQ2.
For *Ovis* not much can be said due to a lack of data. For *Capra*, the proportion of adults is of course less important (40% of the teeth over two years and 18% over four years old) because the sample is smaller and three of the five individuals (based on MNI) in class HI could not be allocated precisely to *Capra* or *Ovis*. This is why it is important to interpret the kill-off profile for goats while having in parallel the global caprine profile. Given this fact and since at least 40% of the *Capra* teeth represent reproductive adults, we can propose that the *Capra* population was viable, though fragile. Cattle (*Bos*) tooth remains were not abundant enough to allow a similar analysis.

### Fish remains

A total of 7653 fish bone fragments were recorded of which 5476 could be identified to the level of family, genus, and/or species, and attributed to the three periods Middle Neolithic 1, Middle Neolithic 2, and Late Neolithic (Fig. 7). A total of nineteen fish families are represented at UAQ2 including requiem sharks, milksfish, sea catfish, needlefish, flatheads, groupers, shark-suckers, jacks or trevallies, mojarra, snapper, emperor, sea bream, mullet, parrotfish, barracuda, tuna or mackerel, shortfin flounder, tripod fish, and puffer. This included at least twenty-nine genera or species (Fig. 8).

<table>
<thead>
<tr>
<th>Family</th>
<th>Taxa</th>
<th>Common name</th>
<th>MN1</th>
<th>MN2</th>
<th>LN1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carcharididae</td>
<td><em>Carcharinus</em> sp.</td>
<td>Requiem Shark</td>
<td>11</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Chanidae</td>
<td><em>Chanos chanos</em></td>
<td>Milksfish</td>
<td>9</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Ariidae</td>
<td>indet.</td>
<td>Sea catfish</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Belonidae</td>
<td>indet.</td>
<td>Needlefish</td>
<td>7</td>
<td>24</td>
<td>11</td>
</tr>
<tr>
<td>Platyccephalidae</td>
<td><em>Platyccephalus</em> sp.</td>
<td>Flathead</td>
<td>9</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>Serranidae</td>
<td><em>Epinephelus</em> sp.</td>
<td>Grouper</td>
<td>9</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Serranidae</td>
<td>indet.</td>
<td>Grouper</td>
<td>92</td>
<td>18</td>
<td>11</td>
</tr>
<tr>
<td>Echeneidae</td>
<td><em>Echeneis naucrates</em></td>
<td>Sharksucker</td>
<td>7</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Carangidae</td>
<td><em>Atule mate</em></td>
<td>Yellowtail scad</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Carangidae</td>
<td><em>Carangoides</em> sp.</td>
<td>Jack</td>
<td>8</td>
<td>20</td>
<td>5</td>
</tr>
<tr>
<td>Carangidae</td>
<td><em>Gnathanodon speciosus</em></td>
<td>Golden Trevally</td>
<td>33</td>
<td>11</td>
<td>8</td>
</tr>
<tr>
<td>Carangidae</td>
<td><em>Scomberoides</em> sp.</td>
<td>Queenfish</td>
<td>0</td>
<td>11</td>
<td>1</td>
</tr>
<tr>
<td>Carangidae</td>
<td>indet.</td>
<td>Jacks/Trevallies</td>
<td>21</td>
<td>23</td>
<td>2</td>
</tr>
<tr>
<td>Gerreidae</td>
<td><em>Gerres</em> sp.</td>
<td>Mojarra</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Lutjanidae</td>
<td><em>Lutjanus</em> sp.</td>
<td>Snapper</td>
<td>3</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Lethrinidae</td>
<td><em>Lethrinus</em> sp.</td>
<td>Emperor</td>
<td>1277</td>
<td>582</td>
<td>28</td>
</tr>
<tr>
<td>Sparidae</td>
<td><em>Acanthopagrus</em> sp.</td>
<td>Seabream</td>
<td>206</td>
<td>74</td>
<td>72</td>
</tr>
<tr>
<td>Sparidae</td>
<td><em>Argyrops</em> <em>spînifer</em></td>
<td>King Soldierbream</td>
<td>92</td>
<td>19</td>
<td>2</td>
</tr>
<tr>
<td>Sparidae</td>
<td><em>Rhabdosargus</em> sp.</td>
<td>Haffara/Gold Striped Seabream</td>
<td>896</td>
<td>290</td>
<td>114</td>
</tr>
<tr>
<td>Sparidae</td>
<td>indet.</td>
<td>Seabream</td>
<td>759</td>
<td>149</td>
<td>70</td>
</tr>
<tr>
<td>Mugilidae</td>
<td>indet.</td>
<td>Mullet</td>
<td>22</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Scaridae</td>
<td>indet.</td>
<td>Parrotfish</td>
<td>9</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Sphyraenidae</td>
<td><em>Sphyraena</em> sp.</td>
<td>Barracuda</td>
<td>117</td>
<td>27</td>
<td>11</td>
</tr>
<tr>
<td>Scombridae</td>
<td><em>Euthynnus</em> <em>affinis</em></td>
<td>Kawakawa</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Scombridae (Thunninae)</td>
<td>indet.</td>
<td>Tuna</td>
<td>130</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Scombridae</td>
<td>indet.</td>
<td>Tuna/Mackerel</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Paralichthyidae</td>
<td><em>Pseudorhombus</em> sp.</td>
<td>Shortfin Flounder</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Triacanthidae</td>
<td>indet.</td>
<td>Tripodfish</td>
<td>3</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>Tetraodontidae</td>
<td>indet.</td>
<td>Puffer</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Unknown Perciformes</td>
<td></td>
<td></td>
<td>1090</td>
<td>107</td>
<td>64</td>
</tr>
</tbody>
</table>

**Figure 7.** Quantification of the UAQ2 fish bones by period.
All major anatomical elements were represented for the major fish species, including cranial, vertebral, and appendicular items. This means that fish were brought to the site in a relatively complete form. Cranial elements such as premaxilla and dentary were the most common anatomical elements recorded, and there were a considerable number of otoliths (calcified structure within the ears of the fish). These elements have preferentially survived because of their hard and compact nature and their ability to be easily identified and quantified. Most commonly represented were sea bream (*Sparidae*) 51%, followed by emperors (*Lethrinidae*) 35%; tuna/mackerel (*Scombridae*), barracuda (*Sphyraenidae*), groupers (*Serranidae*), and jacks/trevallies (*Carangidae*) all represented 3% of the sample, with other species representing 1% or less.

Fishing for tuna seems to have taken place mostly during the earliest period of occupation at the site, during the Middle Neolithic 1. More tuna was present in Levels 11 and 12 at the site than in the upper levels of the site. The apparent increase in the proportion of sea bream (*Sparidae*) in the later phase of occupation at the Late Neolithic site suggests that fishing became even more focused on local exploitation of the shallow waters of the neighbouring lagoon.

One exceptional find was the complete tooth of a tiger shark (*Galeocerdo cuvier*) (Fig. 9), discovered in the earliest levels at the site (Level 10, Middle Neolithic 1). Such teeth have been previously identified in Bronze Age levels at Umm an-Nar, as well as from Oman (as reported by Charpentier et al. 2009), where it has been suggested they were used as weapons. The morphology of tiger shark teeth is clear. Whether the inhabitants of UAQ 2 caught tiger shark or simply collected the tooth from a stranded individual and used it as an amulet is not clear. Tiger sharks can be extremely large and...
dangerous to handle. They commonly attain a length of 3–4 m and can weigh from 385–635 kg. Male tiger sharks can grow up to 4.5 m, and females up to 5.5 m, in length. Tiger sharks are common worldwide and are often found close to the coast, mainly in tropical and subtropical waters. They often visit shallow reefs, harbours, and canals, creating the potential for encounters with humans. The only taxa discovered in the archaeological samples from UAQ2, which cannot be found in the lagoon today, are:

— Carcharhinidae: the tiger shark (*Galeocerdo cuvier*), a common wide-ranging coastal pelagic shark occurring in a wide range of habitats throughout the area;

— Sparidae: king soldier bream (*Argyrops spinifer*) found in inshore waters at moderate depths on sandy bottoms to offshore habitats;

— Scombridae: kawakawa (*Euthynnus affinis*), an epipelagic species (i.e. relating or inhabiting the uppermost layer of the water column of the open ocean, into which enough sunlight enters for photosynthesis to take place, extending in clear waters to a depth of c.200 m).

Possibly these fish were caught by fishermen venturing into the open seas and coastal areas outside the confines of the local Umm al-Quwain lagoon.

A modern study of the marine biology of the Umm al-Quwain lagoon identified the presence of more than 110 species of fish (United Arab Emirates — Ministry of Agriculture and Fisheries 1984: 36). This study, however, did not identify tiger shark, king soldier bream, or tuna as being present within the lagoon. Almost all of the taxa identified on the archaeological site at UAQ2 were noted as being medium to abundant in quantity in a study of the modern fisheries of the lagoon.

**Size of fish and fishing strategies**

Most of the fishes caught during the Middle Neolithic 1 are emperors (*Lethrinidae*) and sea bream (*Sparidae*), which are between 10 and 30 cm in length. This is clear if one reconstructs the size classes for all the fish remains based on key diagnostic elements (articular, cleithrum, dentary, hyomandibular, maxilla, premaxilla, post-temporal, quadrate, and vomer). An examination of the relative size of all the fish vertebrae recovered confirms that the majority were small fish.

Most of the other species caught during the Middle Neolithic 2 were medium-sized individuals from 30 to 50 cm in length. The only larger fish to be caught were members of the jack/trevally family, such as *Carangoides* sp. and golden trevally (*Gnathanodon speciosus*) which were 60 to 70 cm in size and, in the case of tuna species such as kawakawa (*Euthynnus affinis*), between 70 and 80 cm in size.

A similar pattern of exploitation of predominantly small fish is obtained from examination of the relative size of the vertebrae of all recorded specimens of the entire species. A considerable number of fish otoliths were recovered from the excavations carried out at UAQ2. Thanks to the adoption of sieving at the excavation site and careful retrieval practices, this has helped to recover a rich sample of finds. These otoliths primarily belonged to emperors (*Lethrinidae*). They were consistent in size throughout all the periods represented, being usually between 5 and 9 mm in length across the longest axis and 4 to 7 mm in height. This suggests the regular targeting of a particular size and age class of emperors within the Umm al-Quwain lagoon.

An earlier investigation carried out on a sample of these otoliths suggested that they were primarily caught between the late spring/early summer (April to June) and the early autumn months of late September to early October (Beech 2004a: 198–207; 2004b). A modern study concerning the growth and maturity of *Lethrinus lentjan* in the UAE revealed that these two periods are the two main spawning seasons in the year for the species (Ali, Thomas & Marjii 1984).
The ancient inhabitants of UAQ2 were well aware of the importance of the lagoon as nursery grounds for fish stocks and deliberately targeted aggregations of key species spawning there.

Judging from the species represented in the archaeological samples, the majority of fishing took place in the nearby lagoon using techniques such as beach seine nets, gill nets, cage traps, set nets, and hand lines.

**Comparison of the UAQ2 fish bone assemblage with those from other Ubaid-related sites**

The fish fauna identified from the work carried out at UAQ2, can be compared with other fish bone assemblages known within other Ubaid-related sites in the area, namely H3 (al-Sabiyah) in Kuwait, Dosariyah (Dawsariyyat al-Jubayl) (trenches 1 and 7) in Saudi Arabia, Site ALM–J19 in al-Markh in Bahrain, Khor ‘P’ in Qatar, sites DA11 on Dalma Island, and MR11 on Marawah Island in the UAE (Desse 1988a; 1988b; Beech & Elders 1999; Beech 2000; 2002; 2010; Beech, Elders & Shepherd 2000; Driesch & Manhart 2000; Beech & Glover 2005; Beech & al-Husaini 2005; Beech et al. 2005).

Several key families are represented at all these sites, with significant quantities of groupers (Serranidae), jacks/trevallies (Carangidae), emperors (Lethrinidae), sea bream (Sparidae), barracuda (Sphyraenidae), and tuna (Scombridae) also being exploited at other Ubaid-related sites in the region.

**Conclusion**

Today, the mangrove site of UAQ2 provides one of the largest Neolithic archaeo-zoological assemblages for Neolithic eastern Arabia. Its importance also relies on the fact that these bio-archaeological remains belong to the most ancient phases of the Neolithic in the region.

The shell-midden dwellers of UAQ2 from the middle of the sixth millennium BC were relying for their subsistence on fishing and collection of molluscs and, in parallel, on hunting and herding of wild and domestic ungulates. Fish and molluscs constituted the most abundant resource in UAQ2. Within the mammalian

---

**Figure 10. A reconstruction of the annual cycle of animal exploitation at UAQ2.**
remains, domestic herbivores represent between 85 and 95% of the remains throughout the stratigraphy. A variety of carnivores (canids and felids) were also exploited and dog-sized canids were eaten. One of the remarkable features of the UAQ2 mammalian material is the presence of a high proportion of newly born and juvenile goats, most probably born during the first quarter of the year.

Fish remains are dominated by emperors (*Lethrinidae*) and sea bream (*Sparidae*); their size estimation indicates that they were caught small, measuring between 10 and 30 cm in length and probably caught in the local lagoon. Fishing for tuna was most probably conducted in the open sea, outside the lagoon, an assumption based on the observations of modern fishing methods. Fishing in the open sea requires the use of boats but at present we cannot positively demonstrate the use of boats at UAQ2. No bitumen or boat models have been found at UAQ2 although some have been found at some sites in the Arabian Peninsula that date to the sixth–fifth millennium BC (Carter & Crawford 2010). Moreover, we should bear in mind that the actual shape and evolution of the Umm al-Quwain lagoon over the 1500 years of occupation of the site is not yet known, and such information may offer up other ecological possibilities that could have attracted tuna into the lagoon.

Finally, this integrated study of the faunal remains has clearly contributed to the documentation of the question of the seasonal mobility or settlement of these coastal human communities. The question of the mobility of the Neolithic groups in the UAE and Oman was recently reassessed although no firm conclusions were drawn (Méry 2015: 365). As a result of the current studies it seems that we are able to propose a reliable scenario, compatible with observations in Ra‘s al- Hamra 5 in Oman, based on human diet and stable isotope analyses (Zazzo, Munoz & Saliège 2014). In UAQ2 an almost monthly reconstruction of subsistence activities throughout the year was possible and clarifies our observations (Fig. 10).

Fishing was carried out during the wintertime, but the study of emperor otoliths also indicates that autumn and spring fishing coincides with the bi-annual spawning aggregations of this species. As for pastoral activities, the presence of newly born individuals and the study of ‘kill-off patterns’ show that births took place in the first quarter of the year. Finally, during the two presumably worst months of the year in these areas — July and August — Umm al-Quwain seemed to be well favoured with a gentle wind, as is still observed in this location today, which provided some relief from the heat. These reconstructions may be refined by a study of molluscs, currently being carried out by D. Gasparini, and will probably improve our understanding of the management of these complementary animal resources throughout the year.

**Acknowledgements**

We would like to thank Will Higgs for his help in copy-editing the text. Sophie Méry also thanks Federico Borgi and Kevin Lidour for their work in the field and on the post-excitation treatment of materials.

**References**


Beech M. & Elders J.

Beech M. & Glover E.

Beech M. & Al-Husaini M.

Beech M., al-Abdessalaam T.Z. & Hoolihan J.P.

Beech M., Elders J. & Shepherd E.

Beech M., Cuttler R., Moscrop D., Kallweit H. & Martin J.


Charpentier V. & Crassard R.

Charpentier V. & Méry S.

Charpentier V., Phillips C.S. & Méry S.

Charpentier V., Méry S., Fortini E. & Pellé E.

Desse J.

Driesch A. von den & Manhart H.

Helmer D. & Vigne J-D.

Maini E. & Curci A.

Martin L.A.

Mashkour M. & Debue K.

Méry S.

Méry S. & Charpentier V.

Méry S., Charpentier V. & Beech M.

Méry S., Charpentier V., Auxiette G. & Pellé E.

Méry S., Gasparini D., Basset G., Berger J-F. et al.

Payne S.

Phillips C.S.
Skorupka M. & Mashkour M.  

Uerpmann M. & Uerpmann H-P.  


Uerpmann M., Uerpmann H-P. & Schöler S.  

United Arab Emirates — Ministry of Agriculture and Fisheries.  

Vigne J-D.  

Zazzo A., Munoz O. & Saliège J-D.  

Authors’ addresses

Marjan Mashkour, Archéozoologie, Archéobotanique (UMR 7209), Sorbonne Universités, MNHN, UPMC, CNRS; CP55, 55 rue Buffon, 75005 Paris, France.  
*e-mail* mashkour@mnhn.fr

Mark Jonathan Beech, Historic Environment Department, Abu Dhabi Tourism and Culture Authority (TCA Abu Dhabi), PO Box 2380, Abu Dhabi, United Arab Emirates.  
*e-mail* mark.beech@tcaabudhabi.ae

Karyne Debue, Archéozoologie, Archéobotanique (UMR 7209), Sorbonne Universités, MNHN, UPMC, CNRS; CP55, 55 rue Buffon, 75005 Paris, France.  
*e-mail* kdebue@mnhn.fr

Lisa Yeomans, Department of Cross-Cultural and Regional Studies, University of Copenhagen, Karen Blixens Vej 4, 2300 Copenhagen S, Denmark.  
*e-mail* zhr605@hum.ku.dk

Copyright Archaeopress and the authors 2016