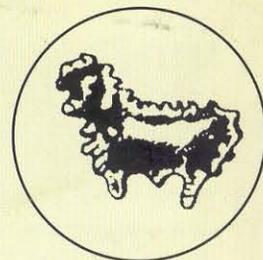


# TRIBULUS



Bulletin of the Emirates Natural History Group

Vol. 9.1

SPRING 1999



## NOTES FOR CONTRIBUTORS

TRIBULUS is the name of the Bulletin of the Emirates Natural History Group. The Group was founded in 1976, and over the next fourteen years, 42 issues of a duplicated Bulletin were published. The revised format of TRIBULUS, introduced in 1991, permits the inclusion of black and white and colour photographs, not previously possible.

TRIBULUS is published twice a year, in April and October. The aim of the publication is to create and maintain in standard form a collection of recordings, articles and analysis on topics of regional archaeology and natural history, with the emphasis on the United Arab Emirates and adjacent areas. Papers, short notes and other contributions are welcomed from anyone but should not have been published elsewhere. Guidelines are set out below. The information carried is as accurate as the Editorial Board and Advisory Panel can determine, but opinions expressed are those of the authors alone.

Correspondence and enquires should be sent to:

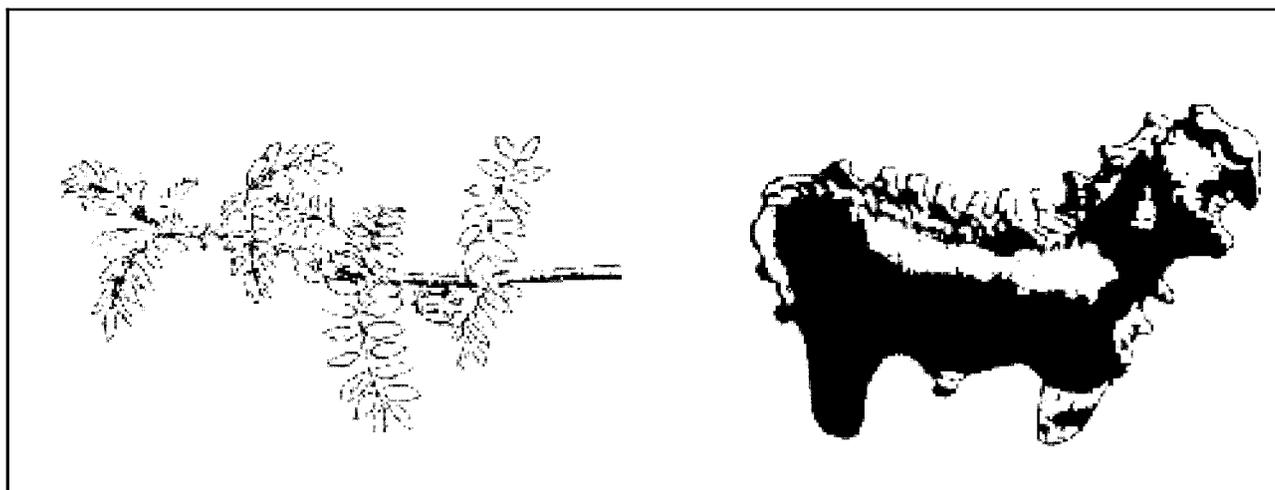
The Editor,  
TRIBULUS,  
Emirates Natural History Group,  
P.O. Box 2380,  
Abu Dhabi - U.A.E.

Editorial Board:

*H.E. Sheikh Nahayan bin Mubarak Al Nahayan, Patron,*  
*Rob Western, Chief Editor,*  
*Peter Hellyer, Managing Editor,*  
*Simon Aspinall, Deputy Editor,*  
*Dr. Michael Gillett*  
*Steve James*

Advisory Panel:

*Professor Jens Eriksen (Life Sciences)*  
*Professor Graham Evans (Earth Science)*  
*Professor Dan Potts (Archaeology)*  
*Dr. Saif Al Ghais (Marine Science and Conservation)*  
*Dr. David Jones (Fauna)*  
*Dr. Geoffrey R.D. King (Archaeology)*



The plant motif above is of the genus *Tribulus*, of which there are six species in the UAE. They all have pinnate leaves, yellow flowers with free petals and distinctive five-segmented fruits. They are found throughout the country, except in coastal *sabkha*.

The animal motif above is of a tiny golden bull, excavated from the early Second Millennium grave at Qattarah, Al Ain. The original is on display in Al Ain Museum, and measures above 5 cm by 4 cm.

Manuscripts should be typed, on one side only, and double-spaced, and should be accompanied by a disc for material in excess of 500 words in length. A short abstract should precede the article, with the address(es) of the author(s) at the end.

Photographs may be submitted and should be either glossy black-and-white or colour prints or colour slides, which should be clearly captioned. Line drawings and maps should be in black ink on strong white or translucent paper.

References should give the author's name, with the year of publication in brackets, and with the list of articles, showing title and publisher, in date order.

Scientific names should follow customary nomenclature in Latin, while the English and, if appropriate, available Arabic names should also be supplied.

International Standard Serial Number (ISSN): **1019 - 6919**.

# TRIBULUS

Vol. 9.1 Summer 1999

## Contents

	Page
Editorial .....	4.
Freshwater Snails of the UAE.....	5..
by Gary R. Feulner and Stephen A. Green	
An AMS radiocarbon chronology for the late Umm an-Nar type tomb at Tell Abraq .....	9
by D.T. Potts and Lloyd Weeks	
Sperm collection and oocyte retrieval in the Arabian Leopard <i>Panthera pardus nimr</i> .....	11
by Peter Wright	
The Finless Porpoise <i>Neophocaena phocaenoides</i> in the Arabian Gulf .....	13
by Simon Aspinall and Robert Baldwin	
Clam Shrimps (Branchiopoda, Crustacea) - a new discovery for the UAE .....	16
by Richard Hornby	
Notes and Queries .....	18
Arabia's oldest date stones; a new species of trigger fish for the Arabian Gulf; Conference notes; Research protocol for Endangered Arabian Wildlife Centre; Records of owl flies in the Al Ain area; Notes on newly recorded butterflies from UAE and northern Oman; A first record of Blackstart for the UAE; A first confirmed record of the Leopard Butterfly from Sharjah Emirate; Memorial unveiled to UAE's first oil well.	
Recent publications/Reviews .....	27.
Editorial Notebook .....	29..
Archaeological Review .....	30.
Recorders' Reports: Mammals and Miscellaneous .....	3.1
Bird Report .....	32..
Cover illustrations:	
Front: undersurface, UNS, of a small male <b>Pontia glauconome</b> - dry season form (top); upper surface, UPS, and UNS of male and female <b>P. glauconome</b> - wet season form (row 2); UNS and UPS of male and female <b>P. glauconome</b> - extreme dry season form (row 3); UPS of male <b>Pontia daplidice</b> extreme dry season form. (see article on P. 22)..... <b>Picture by Ashok Prasad</b>	
Back: A <b>Hottentota jayakari</b> with two tails ,from the Wadi Qawr..... <b>Picture by Dr. J. Kinne</b>	

---

The Editorial Board of TRIBULUS and the Committee of the Emirates Natural History Group acknowledge, with thanks, the support of the Group's Corporate members, a full list of whom can be found on Page 4, without whom publication in this format would be impossible. We also acknowledge the support and encouragement of our Patron, H.E. Sheikh Nahayan bin Mubarak Al Nahayan, the U.A.E. Minister of Higher Education and Scientific Research.

TRIBULUS is published for circulation to members of the ENHG, and is also available for subscribers in the UAE and overseas or through the Ornithological Society of the Middle East. Details on request.

The text of this issue is also available on the website of the UAE Ministry of Information and Culture: [www.uaeinteract.com](http://www.uaeinteract.com)

Published by the Emirates Natural History Group, P.O. Box 2380, Abu Dhabi, United Arab Emirates.

The Group is a non-governmental member of IUCN, the World Conservation Union.

**Printed for the ENHG by Dar Al Fajr Press, Printing, Pulishing and Advertising,  
P.O.Box 505, Abu Dhabi, UAE**

# Editorial

Awareness of all aspects of the environment and heritage of the United Arab Emirates is now gathering pace as we approach the millennium. A mere quarter of a century ago, knowledge of the natural history and archaeology of this country was extremely limited, but since then, a mass of information has been collected and published. Much is now known, often in great detail, of resident and migrant bird populations, of desert mammals and reptiles, of marine life and botany and of the archaeological background, to cite only a few areas. Books have been published, lectures delivered and seminars held, all affirming the vital role of environment and heritage to the well-being of we humans in this small part of our planet.

We pride ourselves that the Emirates Natural History Group, now heading towards completion of its own first quarter-century, has helped to play a role in that process, and in the development of environmental education as well, beginning all those years ago with amateur interest, but moving forward in association with professionals to the position that has been reached today.

Our duplicated Bulletin with its short and often unscientific notes had a value all of its own, for it was the only publication of its kind, and the early data collection on which it reported is now of great historical value. Today *Tribulus*, which with this issue commences its ninth year of publication, not only attracts a growing number of papers of real quality, but now has a group of academic referees to vet submissions prior to publication. This issue, to join Professor D.T. Potts, Professor G. Evans, Professor J. Eriksen and Associate Professor Saif Al Ghais, we are pleased to welcome Dr. David Jones, former CEO of the Zoological Society of London and of WWF-UK and Fauna and Flora International and now head of North Carolina Zoo, and Dr. Geoffrey King, of London's School of Oriental and African Studies, who has been instrumental both in archaeological excavations at Julfar and in the creation and development of the Abu Dhabi Islands Archaeological Survey. We are grateful to them all for their support and assistance.

This issue continued to spread the net wide over topics of heritage and natural history. New topics for *Tribulus* include a study of the UAE's freshwater snails, by Gary Feulner and Stephen Green, an account of the first successful *in vitro* fertilisation of the Arabian leopard, in Sharjah, by Peter Wright, and the discovery of clam shrimps on Jebel Hafit, by Richard Hornby. All are worthy examples of the quality and variety of papers we seek to publish and of what we believe, at the same time, makes this journal among the best of its kind in the

region.

Archaeological interest is found in the paper by Professor Potts and Lloyd Week on radio-carbon dating at Tell Abraq and the discovery of Arabia's oldest date stones on Dalma, while no issue would be complete without reference to ornithology, represented here by a note of the UAE's first Blackstart by Mike Dryden and Max Allan, who discovered it while on holiday from Jersey. The irrepressible Mike Gillett chips in three more notes on butterflies and other insects, while other papers and notes refer to the status of the endangered finless porpoise and a memorial to the UAE's first oil well first oil well. An extensive book review section, the usual seasonal reviews of archaeology and birds, along with a welcome return of notes on mammals, and this issue clearly has something for everyone.

It is particularly pleasing to see the winners of the two ENHG annual awards for 1998, Mike Gillett and Gary Feulner, among our contributors, yet again.

They are examples of the role played in studies of the country's natural history by keen enthusiasts following topics which are not their professions. By profession a biochemist, Mike Gillett has made very significant contributions to knowledge of the country's insects, while Gary Feulner, trained both as a geologist and a lawyer, has made his own contributions in fields ranging from molluscs to wadi fish, from botany to archaeology. Such is the nature of what has been described as 'the natural history movement' in the Emirates, where the contributions of non-specialists have not only paved the way for later studies by specialists, but often continue to lead the field. Much more remains to be done, and, indeed, is being done, as the contents of future issues will demonstrate.

At the same time, the growing number of specialists working in the Emirates has also been reflected in *Tribulus* over the years, something we are pleased to welcome and encourage.

The happy collaboration between specialists and non-specialists, between professional scientists and amateur enthusiasts, working with the benefit of consistent, and often very substantial support from top Government officials, like our own Patron, has been of enormous benefit to the study of the natural history and heritage of the Emirates. For those few of us who remember the early days of the Group over two decades ago, the community of enquiring minds that has thus been created is a pleasure to see.

**A.R. WESTERN**

---

## Corporate members of the ENHG

Production of *Tribulus*, and many of the other activities of the Emirates Natural History Group, including the grant programme of the Group's Conservation Fund, would not be possible without the generous support of the Group's Corporate members, many of whom have provided consistent assistance over many years. The Editorial Board and the Group Committee acknowledge, with thanks, the invaluable support of the following companies and bodies:

ABN Amro Bank, Abu Dhabi Company for Onshore Oil Operations, ADCO, Al Bawardi Enterprises, Al Fahim

Group, Al Nasser Holdings, Al Sayegh Richards Butler, ANZ Grindlays Bank, Bin Hamoodah, BritBank, The British Council, British Petroleum, Forte Grand Hotel, Gulf Automation Services and Oilfield Supplies, Jashanmal National Company, METCO, Mobil Abu Dhabi, Mohammed bin Masood & Sons, Motivate Publishing, National Bank of Abu Dhabi, Pencil International, Ready-Mix Abu Dhabi, Shell Gas Abu Dhabi, Stork Engineers and Contractors, B.V., Tebodin Middle East, Union National Bank and Van Oord ACZ BV.

# Freshwater Snails of the UAE

by Gary R. Feulner and Stephen A. Green

## Abstract

This paper lists the freshwater snails confirmed to occur in the United Arab Emirates, including the native species **Melanoides tuberculata**, **Lymnaea natalensis**, **Gyraulus piscinarum** and **Bulinus wrighti**, and the more probably introduced species **Thiara scabra**, **Physa cf. acuta** and **Biomphalaria arabica**. Brief descriptions are given for the benefit of non-specialists, along with photographs and salient basic information.

Seven species of freshwater snails have so far been recognised in the UAE. Of these, two are common, but the other five have been observed and positively identified only within the past year. At least four species appear to be well established residents of UAE mountain wadis, where they seem to have adjusted to the overall aridity and the instability of the freshwater environments there. The others have been found infrequently and only in association with agriculture or in other artificial environments and are, therefore, thought likely to be more recent arrivals introduced by man. In most cases the different species are easy to distinguish, as shown by the accompanying photographs.

## Native Species

### **Melanoides tuberculata** (Muller, 1774)

The shell of *Melanoides tuberculata* (Family Thiariidae, Fig. 1a) is a long, narrow cone with a relatively small aperture that can be sealed by the snail with a separate lid (properly called an operculum). Successive spirals increase gradually in width and the surface varies from relatively smooth to moderately ribbed and grooved. The colour is pale to medium brown with a pattern of intermittent darker red-brown longitudinal stripes that is usually not very pronounced. The shell is fairly sturdy. Specimens as large as 35 mm in length have been observed, but a length of c.20 mm is more typical.

*M. tuberculata* is generally considered to be the most common freshwater snail in Arabia [3,4,6,10], and this appears true of the UAE as well. It feeds on algae and detritus and is typically found in relatively still, shallow water in small pools, where it can be found on rock, gravel, sand, in layers of organic detritus, or on algae. It can also be found in flowing streams and falaj channels. In fact it can often be found in falaj systems even though it is not in evidence in the associated wadis.

*M. tuberculata* has a widespread Old World tropical and subtropical distribution including southern Europe, Africa and the Indo-Pacific region [3]. It is viviparous (live-bearing) and reproduces primarily asexually by parthenogenesis, which facilitates rapid dissemination. It is tolerant of salinity and can be found in brackish water, khors or estuaries [3,5], but is said to be intolerant of prolonged desiccation [6].

### **Lymnaea natalensis** (Krauss, 1848)

The shell of *Lymnaea natalensis* (Family Lymnaeidae, Fig. 1b) is dominated by the large, bulbous final chamber, which has a correspondingly large aperture. It normally appears a uniform pale to dark brown in life, but occasional specimens show light or dark spots. The colour is actually that of the mantle within, and empty shells are seen to be translucent and relatively fragile. The largest may reach 25 mm, but typical specimens are

c.15 mm.

*L. natalensis* ranks as the second most common freshwater snail in the UAE. Like *M. tuberculata*, it is typically found in still, shallow water in small pools. Despite the substantial differences in the form of these two species it is generally difficult to discern any consistent differences in their preferred habitats. In the falaj environment, however, *L. natalensis* has frequently been found at or just above the waterline on damp substrate, and only *L. natalensis* has so far been observed on underwater vegetation other than algae, or in situations in which any part of the shell was emergent. It is not uncommon to find both *M. tuberculata* and *L. natalensis* in the same pool or falaj, although one or the other is typically more abundant. Both may be present in numbers greater than commonly recognised. One of the authors (GRF) once witnessed a heavy shower over Wadi Asfani and its tributaries, after which the resulting muddy spate was found to carry sizeable numbers of floating shells (dead) of both species among its flotsam. *L. natalensis* is an aquatic pulmonate snail, i.e., it belongs to the primarily aquatic branch (Basommatophora) of the group of snails called Pulmonata, whose members have a sort of air breathing lung rather than gills, lack an operculum, and are typically specialised for either freshwater or terrestrial environments. Aquatic pulmonates are hermaphroditic and lay their eggs in a firm, clear gelatinous mass deposited on rocks or foliage [7,8]. Small linear masses of this sort can sometimes be seen on the underside of rocks in wadi pools in the UAE and in most cases are believed to be eggs of *L. natalensis*. Of the remaining freshwater snails reported below from the UAE, all except *Thiara scabra* are also aquatic pulmonates.

The genus *Lymnaea* is widespread and diversified in freshwater environments worldwide [7,10]. The proper taxonomic classification and the resulting nomenclature for the *Lymnaea* species (or subspecies or morph) found in the UAE and northern Oman has been the subject of disagreement. The morphology of shells from the Hajar Mountains is consistently somewhat thinner and more high-spired than the norm for either the Palearctic, *L. auricularia*, which is known from Saudi Arabia, or the pan-African *L. natalensis* [3,4,10]. As a result the name *L. arabica* (Smith, 1894) has sometimes been applied to specimens from the UAE and Oman [4,10].

The use of the name *L. natalensis* in this paper is not intended to express a definitive position on the question of taxonomy. Instead, it is the usage of Brown and Gallagher [3], on the basis that the dimensions of UAE specimens collected by the authors fall within the range of bivariate dimensional ratios reported by Brown and Gallagher for their specimens from Oman, which they declined to distinguish from *L. natalensis*, and do not exhibit the extreme ratios of the type specimens of the so-called *L. arabica* series.

### **Gyraulus piscinarum** (Bourguignat, 1852)

This tiny ramshorn snail (Family Planorbidae, Fig.1d) was first noticed and reported by one of the authors (SAG) in April 1998 in a rocky wadi near the town of Hatta. Specimens were collected and sent to The Natural History Museum, formerly the British Museum (Natural History), where Dr. David Brown kindly provided identification. The shell has the general form called a "ramshorn," i.e., a flat, disc-shaped spiral, resembling a coil of rope. However, in contrast to most of the more common European ramshorns, the aperture is slightly off

centre opening very obliquely to the direction of coiling, not perpendicularly, and the shell is not carried erect, but more horizontally. In life the snail appears dark brown, but the shell is actually a pale translucent brown and the darker colour is that of the animal within. Air spaces created as the body moves within the shell may give the superficial impression of golden streaks on the final whorl.

*G. piscinarum* was locally common in the wadi in which it was first observed in the UAE and has proved to be present in other wadis as well, including Wadi Maydaq, near Masafi, and Wadi Shi and Wadi Safad on the East Coast. It appears to be widespread. It may have heretofore escaped notice partly because of its small size and its habitat. The largest so far encountered is only 4.5 mm in diameter, most specimens being no more than 3 mm. In the wadi in which it was first seen, specimens were found only in isolated, still, shallow pools within the rocky wadi, never in pools constituting the main channel. Moreover, those specimens and others found since were normally found only on the underside of larger stream cobbles. This may not be their primary habitat, however. Instead the snail may be nocturnal, simply retiring during daylight hours. This possibility is considered likely, following observation at sunset when several specimens were seen on top of small stones in a likely pool. *M. tuberculata* and *L. natalensis* are also found in all of the wadis in which *G. piscinarum* has been found, but the relative abundance of the three varies widely. In a few instances all three species were found to share the same pool.

Brown and Wright [4] reported unpublished observations by I.S.Alio dating from 1967 of *G. convexusculus* in "interrupted perennial streams" in the Manama-Masafi area of what was then Trucial Oman. The genus *Gyraulus* includes a complex of closely related forms in Arabia and the Levant [4], and, in view of the current authors' observations, it seems probable that these early reports record what is now recognised as *G. piscinarum*. The previously reported range of *G. piscinarum* is

northern Oman, Lebanon and Turkey [3], but this seems almost certain to be a result of incomplete observation and/or identification.

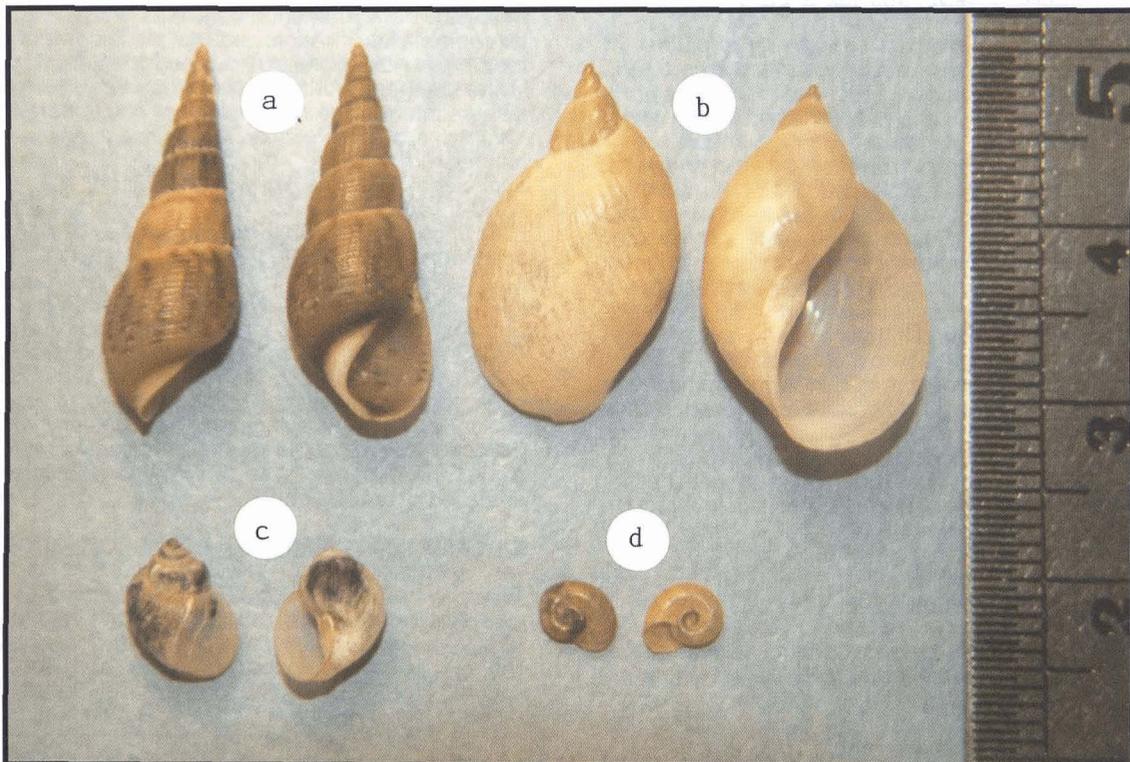
All of the foregoing species, *M. tuberculata*, *L. natalensis* and *G. piscinarum*, are found in association with archaeological remains at the site of the Dilmun Temple at Saar, in Bahrain (c. 1700-2200 B.C.), attesting to their relative antiquity in the region [5].

**Bulinus wrighti (Mandahl-Barth, 1965)**

*Bulinus wrighti* (Family Planorbidae, Fig.1c) is endemic to central and southern Arabia and has previously been reported from wadis of the Jebel Akhdar region of northern Oman [3,4,10]. The genus *Bulinus* is a potential intermediate host for the blood fluke parasite that causes bilharzia (schistosomiasis) in humans and *B. wrighti* is known to play this role in southern Yemen [3,10]. Studies at The Natural History Museum and elsewhere suggest that *B. wrighti* may be among the most archaic members of the genus *Bulinus*, since, unlike many of its congeners, it appears to be compatible with all species of schistosome belonging to the *S. haematobium* group [3,9].

*B. wrighti* was observed and specimens were collected and tentatively identified by one of the authors (GRF) in March 1997 from Wadi al-Ramthah in the area north of Mahdhah, Oman. Additional specimens were collected by the authors in May and November 1998 for identification, which was confirmed by Dr. David Brown, and for ongoing research use at The Natural History Museum. Subsequent exploration demonstrated the presence of *B. wrighti* in the UAE as well, in a tributary of Wadi Diftah near Masafi.

The shell of *B. wrighti* is small (maximum 10 mm), and its colour is a translucent pale blue-grey with dark grey apical whorls. It appears dark grey overall when the animal is alive within. Perhaps most distinctively, the shell is sinistral or left-handed [4] (i.e., the shell spirals in a counter-clockwise direction along the axis of coiling, so



**Figure 1:** a, *Melanoides tuberculata*; b, *Lymnaea natalensis*; c, *Bulinus wrighti*; d, *Gyraulus piscinarum*

that when the aperture is viewed with the axis held vertical and the apex uppermost, the aperture is to the left of the axis). This is a noteworthy characteristic because only about 10% of gastropod species are sinistral.

In Wadi al-Ramthah, *B. wrighti* was found only in the upper reaches of the wadi, above a stretch of more than a kilometre within which no surface water was observed. There the snails were relatively common in shaded, small to medium-sized pools in the ophiolite bedrock. Water depth was found to vary seasonally from about 150 cm in May to less than 30 cm in November. Snails were found on both bedrock walls and on coarse gravel within the pools. In one pool in particular, large numbers of small and presumed juvenile snails were found on bedrock walls. In Wadi Diftah, the shells of adult snails were found on coarse gravel at the edge of a "pothole" pool in the bedrock floor of a steep tributary at mid-wadi. The foregoing distribution is consistent with prior observations that *B. wrighti* seems to have relatively narrow ecological requirements, being found in isolated small pools among rocks, filled mainly by rainwater and free of vegetation other than perhaps a very thin layer of algae [3,4]. The importance of *B. wrighti* as an intermediate host for disease may be limited by its restricted distribution and remote habitat [4]. Although it has been bred in the laboratory for many years in connection with public health research, the natural history of *B. wrighti* in the wild remains largely unknown.

### Introduced Species

#### *Thiara scabra* (Muller, 1774)

This snail has only once been positively identified from the UAE. A single dead shell was collected from an irrigated terraced field in Wadi Maydaq by one of the authors (SAG) in June 1998 and identified by Mr. Fred Naggs of the (British) Natural History Museum (Fig. 2a).

*T. scabra* (Family Thiariidae) is a conical operculate species related to and similar in size and appearance to *M. tuberculata*. It is widespread in South Asia and the Indo-Pacific, including a few localities in East Africa [3]. In Arabia, however, it is known only from specimens collected at a few sites in northern and southern Oman and southern Yemen. All Omani specimens were associated with *M. tuberculata* and all live *T. scabra* were found in falaj systems [3]. On the basis of the foregoing, it seems best considered an introduced species.

The morphology of *T. scabra* is variable. Typical shells are "coronated," i.e., the suture at the top of each successive whorl is characterised by a distinct shoulder bearing vertical ribs which may project as short spines, making each whorl resemble a crown [3,4]. However, this tendency is less distinct in later whorls, and in specimens from northern Oman the entire shell may so closely resemble *M. tuberculata* as to make it extremely difficult to distinguish confidently in the field [3,10]. *T. scabra* exhibiting this morphology could therefore have been overlooked to date in the UAE. Among presumptive *M. tuberculata* seen by the authors at various UAE locations, local populations tend to be consistent. Those from natural wadi sites are typically moderately ribbed and have relatively deep sutures. Specimens from disparate locations may appear essentially identical in both form and colouration and none are so different as to actively suggest the possibility of a second species.

#### *Physa cf. acuta* (Draparnaud, 1805)

Specimens resembling *Physa acuta* (Family Physidae, Fig. 2b) were collected by the authors at the Za'beel Water Treatment Plant, Dubai (also known as the Dubai Fish Farm), in February 1998 and were tentatively identified by Dr. David Brown at The Natural History Museum. Better preserved specimens would resolve identification but access to the site has since been restricted. Human introduction is suspected. *P. acuta* is

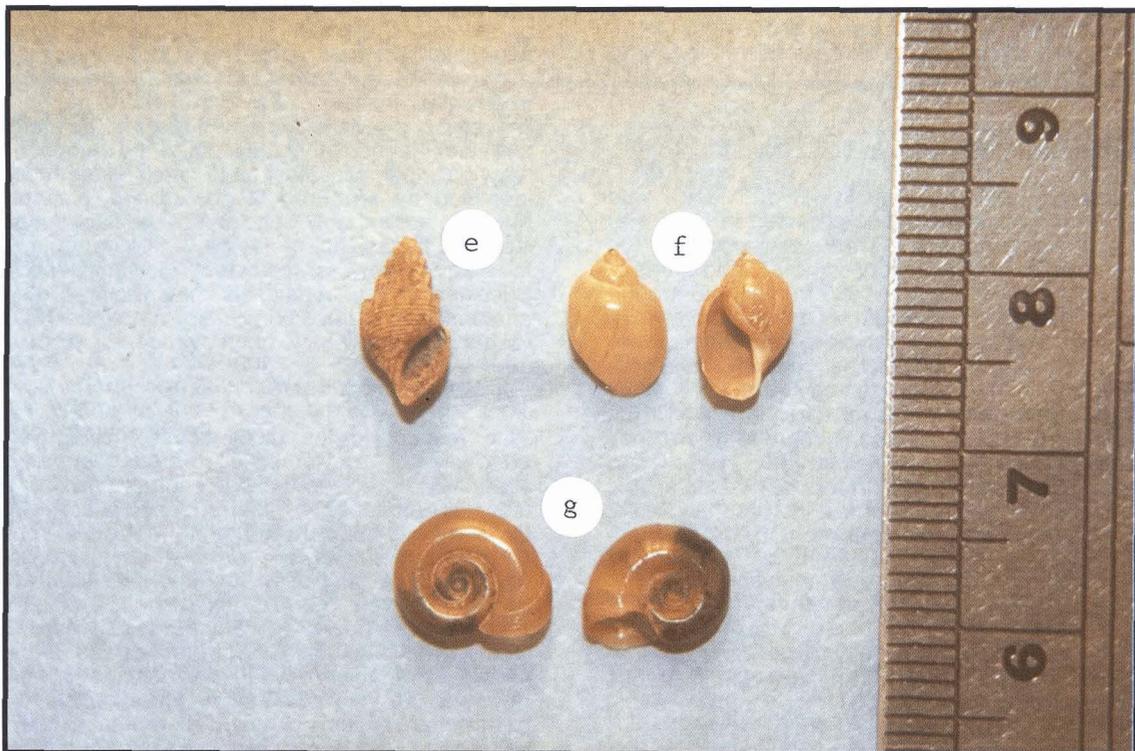


Fig 2: a, *Thiara scabra*; b, *Physa cf. acuta*; c, *Biomphalaria arabica*

widespread in ponds in Europe but has also been reported from scattered localities elsewhere, including Saudi Arabia and the Sinai Peninsula [4]. Adult shells typically measure 15 mm in height. They are smooth and have both a high, pointed spire and a high, elongated aperture. Like all members of the genus *Physa* (sometimes called bladder snails), *P. acuta* is sinistral [7].

#### *Biomphalaria arabica* [Melville & Ponsonby. 1896]

Apart from *Gyraulus piscinarum*, discussed above, several other species of ramshorn snails, all belonging to the aquatic pulmonate Family Planorbidae, have previously been reported from Arabia [4,10]. One of the largest and most common of these is *Biomphalaria arabica* (Family Planorbidae, Fig. 2c), considered to be a possible intermediate host for the parasite that causes bilharzia (schistosomiasis) in humans [3,10]. *B. arabica* is widespread in Saudi Arabia and is also found in Yemen and in the Dhofar region of Oman, where it is associated with aquatic plant growth. It was not known in the UAE until its very recent introduction to a private pond with water plants collected from Dhofar. It remains to be seen whether it will become established. Typical adult *B. arabica* have a diameter of 10-15 mm.

### **Other species that may occur in the UAE**

#### *Indoplanorbis exustus* (Deshayes. 1834)

This Indo-Pacific ramshorn snail (Family Planorbidae), another aquatic pulmonate, has been found at several locations along the coast and foothills of the eastern Hajar Mountains in Oman, southeast of Muscat [3,10] and could potentially be found on the East Coast of the UAE. It is very similar in size and appearance to *Biomphalaria arabica*, adult shells being somewhat larger than 10 mm in diameter and having a proportionately higher aperture than *B. arabica*. The two are depicted comparatively by Brown and Wright [4,10], but identification of soft parts is desirable in order to confirm identification.

#### *Paludestrina glaucovirens* (Melville & Ponsonby. 1896)

*Paludestrina glaucovirens* (Family Hydrobiidae) was described from three dead shells collected in Dhofar at the end of the last century. Three more dead shells assigned to this operculate taxon, some bearing areas of periostracum, were collected in 1980 from in and around the date groves of the coastal village of Qida, near Khasab on the Musandam Peninsula, where they were found in association with *M. tuberculata* [3]. Snails described as *Paludestrina* cf. *glaucovirens* have since been found alive and in abundance in Bahrain in slow-flowing irrigation ditches near springs, where they live in association with *L. natalensis* [5]. The shell is high-spired but with rounded contours. The Dhofar and Musandam specimens are all somewhat less than 5 mm, but it has been indicated that specimens of this size are immature [5].

#### *Hydrobia lactea* [Kuster. 1852]

This small operculate snail (Family Hydrobiidae) is known from Jordan, Iraq and eastern Saudi Arabia, where it is found in swampy areas, irrigation ditches and vegetable gardens [4]. It has been suggested that *H. lactea* may prove to be synonymous with congeneric and other species recognised from both North Africa and South Asia [4]. In particular, it has been suggested that it may be synonymous with *Paludestrina glaucovirens*,

described above. The shell of *H. lactea* is high-spired but with rounded contours. Its small size (< 5 mm) makes it easy for all but determined collectors to overlook.

In view of the long history of irrigation and cultivation within the UAE and their expansion in the modern era, it is reasonable to foresee the eventual presence of *H. lactea* or related species, e.g., *Paludestrina glaucovirens*.

#### *Melanoides* sp. cf. *plicaria* [Born 1780]

Brown and Gallagher [3] described specimens collected in 1982 at "Al Khona" (Ghunah), within the Omani enclave of Madha on the East Coast of the UAE, which they assigned to this unconfirmed taxon (Family Thiariidae). The specimens were found 5 km inland, apparently in association with *M. tuberculata*, which they closely resemble. They are said to be similar to specimens from Huqf in southern Oman. In relation to the associated *M. tuberculata* they are said to be relatively broader and smoother (although with stronger ribs on earlier whorls), to increase whorl size more rapidly, and to have shallower sutures, a more elongated aperture, and a paler grey-brown ground colour without significant red-brown markings.

Brown and Gallagher noted a resemblance to *M. plicaria*, a Pacific island species, but concluded that a more definite identification would depend on a revision of the genus *Melanoides* throughout the Indo-Pacific region. The present authors cannot advance this discussion and have not knowingly encountered this species in the UAE. Although considerable variation has been noted in presumed *M. tuberculata*, this is understood to be normal for the latter species and has not been systematically recorded or analysed.

#### Additional possibilities

Pulmonate snails of the genus *Succinea* (Family Succineidae), commonly called amber snails, are considered terrestrial snails, but several species live exclusively on emergent aquatic reeds and other plants, just above the waterline [1,8]. They occasionally enter or fall into the water and because they very closely resemble *Lymnaea natalensis* in both shell morphology and certain behaviour, they may be mistaken for freshwater snails [1,2,8]. One of the authors (SAG) collected a dead shell, thought to be *L. natalensis*, from cultivation immediately adjacent to the wadi bed of Wadi Maydaq near Masafi. This shell was subsequently identified by Mr. Fred Naggs of The Natural History Museum as probably *Succinea* sensu lato, suggesting at least the occasional presence of this group in the UAE. In many instances, confident discrimination between *Succinea* and *L. natalensis* may require reference to anatomical features, particularly antennae [8], and the former group may have been overlooked to date.

#### Further observations

With respect to the distribution of UAE wadi snails generally, it is tempting to suggest an inverse relationship between the presence of snails of any kind and the presence of the endemic wadi fish *Garra barreimiae*, a specialised bottom-feeding member of the carp family. While perhaps not surprising, this hypothesis has not been rigorously tested and remains as yet unproven. For example, in Wadi al-Ramthah, no wadi fish were found in the upper wadi where *B. wrighti* was found, although *G. barreimiae* was found in the middle and lower wadi, increasing in abundance downstream. No other snails were observed in Wadi al-Ramthah except in association with a falaj system serving cultivated fields at the settlement of Al-Ramthah near the mountain front, where *M. tuberculata* was abundant and *L. natalensis* occasional. No fish were observed within the falaj system itself, although *G.*

barreimiae was common in the collecting pool. Both *M. tuberculata* and *L. natalensis* are demonstrably abundant in at least two of the few wadis in which *Aphanius dispar*, the Arabian killifish, is present but *G. barreimiae* is absent. *A. dispar* is primarily a surface feeder and therefore may not be a regular predator on snails or snail eggs. In contrast, *G. barreimiae*, the most common wadi fish, is a specialised bottom feeder that in the typical nutrient-poor wadi environment is likely to be highly opportunistic and might be a significant predator on snail eggs and/or young snails. In a few instances, in pools where wadi fish were present, adult *M. tuberculata* and *L. natalensis* have been found in small numbers only under rocks, although this is not their typical habitat. In view of the limitations of current knowledge, readers are encouraged to be attentive to local freshwater snails, and the authors welcome further observations or information. In particular, the continuing "greening" of the country makes additional introductions likely. The authors wish to express their appreciation for the cooperation and encouragement of professionals at The Natural History Museum, and in particular Fred Naggs, David S. Brown and Vaughan Southgate.

## References

1. Abbott, R.T., Compendium of Landshells, American Malacologists Inc. (1989).
2. Brown, D.S., Freshwater Snails of Africa and their Medical Importance, Revised 2nd Ed., Taylor & Francis (1994).
3. Brown, D.S., and Gallagher, M.D., "Freshwater Snails of Oman, South Eastern Arabia" in Hydrobiologia, no.127 (1985).
4. Brown, D.S., and Wright, C.A., "Molluscs of Saudi Arabia: Freshwater Molluscs" in Fauna of Saudi Arabia, vol. 2 (1980).
5. Crawford, H., Killick, R., and Moon, J., eds., The Dilmun Temple at Saar, Kegan Paul International, London and New York (1997), at pp. 83-88 ("Molluscs").
6. Gebel, H.G., Hanss, Ch., Liebau, A. and Raekle, W., [1989] "The Late Quaternary Environments of 'Ain al-Faidah/Al-'Ain, Abu Dhabi" in Archaeology in the United Arab Emirates, Department of Antiquities and Tourism, Al-Ain.
7. Manuel, R., Pond Life, Collins Gem series, Harper, Collins, Glasgow (1991).
8. Naggs, F., The Natural History Museum, pers. com. various 1998-99.
9. Southgate, V.R., The Natural History Museum, pers. comm. , December 1998.
10. Wright, C.A., and Brown, D.S., "The Freshwater Mollusca of Dhofar" in The Scientific Results of the Oman Flora and Fauna Survey 1977 (Dhofar), Journal of Oman Studies, Special Report No. 2, Office of the Government Adviser for Conservation of the Environment (1980).

[Authors' note: Readers are also referred to E. Neubert, [1998] "Annotated checklist of the terrestrial and freshwater molluscs of the Arabian Peninsula", in Fauna of Saudi Arabia, vol. 17, pp. 333-461, published after submission of this paper, which reviews the reported freshwater and land molluscan fauna of Arabia generally. Neubert's checklist contains 70 species of terrestrial molluscs and 27 freshwater molluscs. His sources and discussion mention the UAE only three times, but this includes records of the presence in the UAE of shells of two additional "freshwater" snails not mentioned above. These are *Iravadia quadrasi*, actually a brackish water to fully marine species well known from the Indo-Pacific, and *Stenothyra arabica*, a newly designated species, both collected by M. Apel in 1995 from "excavations at the sea shore" south of Rams, Ras Al-Khaimah. These are best considered "marine" gastropods].

Gary R. Feulner  
P. O.Box 9342, Dubai, U.A.E.  
Stephen A. Green  
Al-Futtaim Willis Faber  
P.O. Box 152, Dubai, U.A.E.

---

# An AMS radiocarbon chronology for the late Urm an-Nar type tomb at Tell Abraq

by D.T. Potts and Lloyd Weeks

## Abstract

A series of accelerator mass spectrometry (AMS) radiocarbon dates from charcoal samples suggests a date at the end of the third millennium B.C. for the tomb of Urm an-Nar type at Tell Abraq.

During the seasons of 1993 and 1997/1998 at Tell Abraq, an archaeological site on the border between the emirates of Sharjah and Urm al-Qaiwain, a circular tomb of Urm an-Nar type was excavated just 10 metres to the west of the massive fortification tower which dominated the site at the end of the Third Millennium BC. The material from the tomb was sufficiently characteristic to suggest that it must have been in use near the very end of the Urm an-Nar period, named after the type site on the island of Urm an-Nar, adjacent to Abu Dhabi.

For example, instead of the 'classic,' high-shouldered, fine orange vessels with black-painted geometric decoration known from most Urm an-Nar tombs in the region, the tomb yielded short, squat vessels with very simplified

geometric decoration, and in every case the base of the vessel showed tell-tale signs of having been string-cut. This was a characteristic of the following Wadi Suq period, not of the Urm an-Nar period. In addition, there was little of the 'classic' Urm an-Nar softstone. Finally, we recovered nearly two dozen socketed bronze spearheads, long considered one of the type fossils of the Wadi Suq period. Observations such as these and others strongly suggested that the tomb at Tell Abraq must date to the very end of the Urm an-Nar period, perhaps to the very beginning of the Wadi Suq era. In other words, it seemed in every way, apart from its stone structure, to represent a transition between the better known Urm an-Nar and Wadi Suq periods.

In order to obtain confirmation for this view we applied to the Australian Institute of Nuclear Science and Engineering (AINSE) for a grant to undertake accelerator mass spectrometry (AMS) dating of carbon samples from the tomb. The application was successful and we were able to submit five samples. These were all chosen from within the eastern side of the two-chambered tomb, and derived from levels extending from an elevation of

-7.40-7.50 down to -7.87 m. below our site datum, coming from levels 3, 4 and 6 within the tomb. The levels, which did not represent archaeological strata, were arbitrary, 10 cm. deep delimitations of bone within the tomb. As the interior of the tomb contained well over 1 m. of dense bone deposit, the excavation of that deposit in notional layers was an attempt to retain control over the disposition of the skeletal material for further study and analysis.

Table 1 shows the results of the AMS measurements. The table gives not only the 'raw date', i.e. the uncalibrated radiocarbon date before present, but more importantly the calibrated date as obtained by using the calibration program CALIB 3.0.3c developed at the Quaternary Research Center, University of Washington (Seattle), by Minze Stuiver and Paula J. Reimer. As Stuiver and Reimer (1993: 1) note, 'The calculation of the radiocarbon age of the sample assumes that the specific activity of the 14C in the atmospheric CO<sub>2</sub> has been constant.' However, this is not true. The 14C activity in the atmosphere and other reservoirs, and thus in the initial activity of the samples dated, has varied over time...A calibration dataset is necessary to convert conventional radiocarbon ages into calibrated years (cal yr). By measuring the radiocarbon age of tree rings of known age...it is possible to construct decadal calibration datasets for the last 7950 cal yr and bidecadal sets for the last 9840 cal yr for samples in equilibrium with atmospheric CO<sub>2</sub>'.

The corrected dates have been calculated using the so-called 'probability distribution method'. As Stuiver and Reimer note, 'Probabilities are ranked and summed to find the 68.3% (1 sigma) and 95.4% (2 sigma) confidence intervals and the relative areas under the probability curve for the two intervals calculated' (Stuiver and Reimer 1993: 5). To put this in slightly plainer English, it is always important, in reading C14 dates, to find out whether the calibrated age range is given at the 1 sigma or 2 sigma confidence interval, since the 'real' date of a sample has only a 68.3% chance of being within the parameters given by a 1 sigma date, whereas that chance increases to 95.4% with a 2 sigma confidence interval. The calibrated age range may be much wider in the latter case, but when you consider that a date has, essentially, a 1 in 3 chance of not falling into the stated interval in the case of a 1 sigma date, it becomes clear why it is essential to know the 2 sigma confidence level.

Furthermore, this method of reporting dates shows clearly the relative importance of each of the date ranges. The relative probability of each age range is expressed as a decimal (e.g. .02, .48, .75) and all probabilities of a single determination sum to 1.0. However, this does not translate to a 100% certainty that the date lies within those ranges (since the 2 sigma confidence level is only a 95.4% chance of being 'correct').

Turning then to the dates themselves, we can see indeed that they are all very consistent, falling near the very end of the third millennium and the beginning of the second millennium B.C. In fact, when we ran a chi-squared test on them (T = 5.67, c<sub>2</sub> = 9.49) they turn out to be statistically identical at the 95% confidence level. This being the case, it was possible to calculate a pooled average which yielded a raw figure of 3738 ±26 before present (B.P.). When calibrated at the 1 sigma confidence level, this provided the following contributions to probabilities: 2188-2161 B.C. (.29), 2145-2126 B.C. (.23), and 2081-2044 B.C. (.48), while at the 2 sigma confidence interval we get a date of 2197-2036 B.C. (1.0). It must be remembered, however, that the material being dated is charcoal, not human bone. We do not know what the source of the charcoal was, and whether it is the residue of burnt offerings or fires lit inside the tomb. Whatever the case, it should be remembered that charcoal can represent the burnt remains of wood which was already old at the time of burning. Elsewhere in the settlement at Tell Abraq we have had the experience of getting radiocarbon dates on wood charcoal several centuries earlier than dates on short-lived samples, such as burnt reed matting or date stones (*Phoenix dactylifera*). Thus, the latest date ranges of the five dates are probably closer to the actual time of interment, than the earliest ones which simply offer us a terminus post quem for the chronology of the tomb deposit.

**References**

Stuiver, M. & Reimer, P.J. 1993. CALIB User's Guide Rev. 3.0.3A for Macintosh computers. Seattle: Quaternary Research Center, Univ of Washington.

**Daniel T. Potts & Lloyds Weeks,  
School of Archaeology,  
University of Sydney  
NSW 2006, Australia**

**Table 1. Radiocarbon determinations from the tomb at Tell Abraq (calibrated by L.R. Weeks using CALIB 3.0.3c).**

Sample*	Level (elevation)	14C age BP (before present)	Calibrated age range BC (1 sigma)	Calibrated age range BC (2 sigma)
OZD686	3 (7.40-7.50 m.)	3677 ± 58	2140-2070 (.41) 2070-1970 (.59)	2200-1890 (1.0)
OZD687	4 (7.60-7.70 m.)	3826 ± 57	2400-2390 (.05) 2340-2190 (.87) 2160-2140 (.08)	2460-2130 (.98) 2070-2050 (.02)
OZD688	6 (7.80-7.90 m.)	3742 ± 50	2200-2100 (.64) 2090-2040 (.36)	2290-1980 (1.0)
OZD689	6 (7.80-7.90)	3650 ± 70	2130-2080 (.25) 2050-1920 (.75)	2190-1870 (.96) 1840-1780 (.4)
OZD690	6 (7.87)	3779± 61	2290-2130 (.86) 2080-2050 (.14)	2450-2440 (.01) 2400-2030 (.98) 2000-1980 (.01)

\* The dates were run at the Australian Nuclear Science and Technology Organisation's (ANSTO) AMS facility at Lucas Heights, NSW, Australia, and were funded under grant 98/152R from the Australian Institute of Nuclear Science and Engineering (AINSE).

# Sperm collection and oocyte retrieval in the Arabian Leopard (*Panthera pardus nimr*)

by Peter Wright

## Introduction

The Arabian Leopard Breeding Programme in the Emirate of Sharjah was started in 1996 and has resulted in the raising of a single cub to date. Alternative methods to preserve the genes of the animals held at the Breeding Centre for Endangered Arabian Wildlife, Sharjah, and procedures to increase the birth rate, have been investigated and instituted. As a result, preliminary steps have been undertaken to establish the first known genome resource bank for endangered Arabian wildlife in the UAE.

## Background

Through the efforts of H.H. Dr. Sheikh Sultan bin Mohammed Al Qassimi, UAE Supreme Council member and Ruler of Sharjah, and the Arabian Leopard Trust a Breeding Programme for the critically endangered **Arabian Leopard** *Panthera pardus nimr* was established in the Emirate of Sharjah during 1996. A female leopard, Hesra (Lucy), bred in the comparable Breeding Programme in Oman, was received on breeding loan and paired together with Nimrod Felix (Arnold), a male leopard obtained from Yemen. Since this date another female, Lucy's mother Nesra (Maggie), was received on Breeding Loan from Oman, and a male, Nimr, caught in 1990 near Manama, having been first sighted in the nearby mountains of Fujairah, arrived on breeding loan from the Office of H.H. Sheikh Mohammed bin Rashid Al Maktoum, UAE Defence Minister and Crown Prince of Dubai.

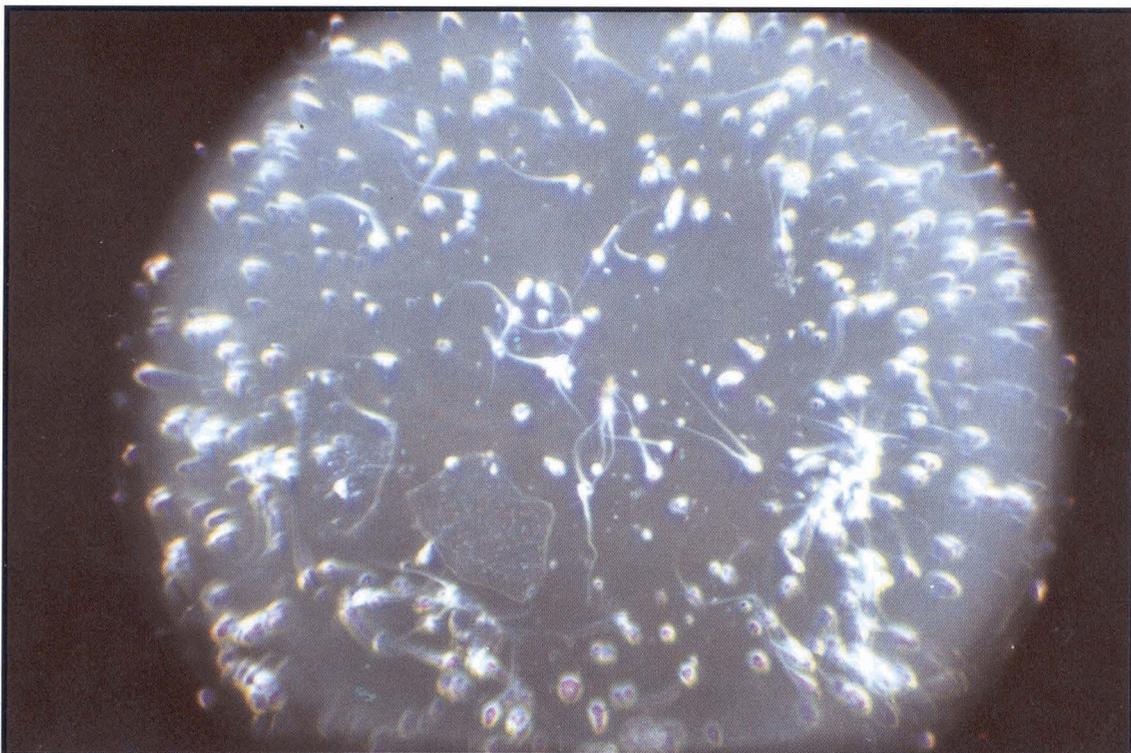
These four animals form the basis of the project, and by the end of February 1999 had produced a single hand reared cub, born on the 15th July 1998. These slow results can be attributed to cub mortalities, false pregnancies and the reluctance of one of the males to mate. It was therefore decided by the Project Management to investigate alternative methods, whilst still continuing the natural cycle of matings and births.

## Establishment

A team of specialists was assembled to design and implement a workable programme, initially by contacting Dr. Lulu Skidmore, of the Camel Reproduction Centre in Dubai, who has extensive experience in reproductive technology in camels and responsible for the first successful camel x llama crossing, resulting in the birth of a *cama*, in Dubai in 1998.

Through Dr. Skidmore the Henry Doorly Zoo in Omaha, Nebraska was approached. This zoo has for many years performed field breaking work in sperm preservation and embryo transfer in large felids, particularly **Tigers** *Panthera tigris*, to conserve the most important genetic lines of this threatened cat. As a result two further project members were recruited: Dr. Douglas Armstrong, a staff veterinarian with experience in over one hundred oocyte retrievals in tigers, and Dr. Naida Loskutoff, who achieved her doctorate in this field.

The surgery at the Breeding Centre was upgraded to allow the procedures to take place locally, thus minimising disturbance and risk to the leopards. This included a isoflurane gas anaesthesia machine and all



Nimrod's sperm under the microscope. Picture: Tipu Billah, Camel Reproduction Centre, Dubai

procedural medication. The balance of equipment, such as laparoscopic instrumentation and electro-ejaculator, was brought out by the individual specialists.

### Sperm retrieval

The male leopard on breeding loan from Dubai, Nimr, was immobilised on the 3rd of February and Dr. Loskutoff performed semen collection in the surgery at the Breeding Centre. An examination microscope was set up so that any seminal fluid collected could be analysed immediately during the procedure to check for viable sperm.

The seminal fluid was collected using an electro-ejaculation machine with a voltage regulator, which administers a mild variable electric charge to the reproductive organs of the leopard in a timed sequence. Since the procedure can last for a period of 45 to 60 minutes, it is necessary to chemically anaesthetise the leopard to avoid injury to the animal handlers. The immobilisation and continued sedation of the leopard is the most dangerous part of the entire procedure, and due to the skill showed by the staff on hand, Nimr was maintained at the optimum and safe sedation level.

The entire procedure was successfully completed, and enough viable sperm was collected to be frozen for future in-vitro fertilisation attempts. The sperm was processed at the Breeding Centre and transferred to the Camel Reproduction Centre where it was separated into twelve sterile straws, and frozen for long term storage in liquid nitrogen.

Since breeding by this particular leopard has not been observed, his fertility was in question. It was anticipated that no viable sperm would be collected during the first procedure. The recovery of live sperm was, therefore, a good achievement. It was also of vital importance, as it was the first preservation of Nimr's genes, he thus far being unable to pass his genes on through natural mating and births. Now with assisted reproduction techniques, such as in-vitro fertilisation, it may be

possible to produce Nimr offspring despite his reluctance to breed naturally.

On 3rd March Dr. Loskutoff returned, together with Dr. Armstrong, and a duplicate operation was performed on Nimrod, in which even better results were obtained. Some of the semen was prepared to be frozen, but the remainder was kept at body temperature, for the procedure which was to follow.

### Oocyte retrieval from Nesra

As soon as Nimrod was placed in recovery, Nesra was darted and prepared for surgery. This part of the project started on 26th February, when the Veterinary Staff of the Breeding Centre commenced a five day programme of administering Follicle Stimulating Hormone (FSH) to Nesra. This hormone treatment serves to bring the female leopard into the right physiological state for the retrieval of oocytes. If timed correctly, the follicles would be in a state close to rupturing, which they would do in a natural ovulation cycle to allow the "ripe" oocytes to be released for fertilisation during the mating period.

Dr. Armstrong and the team performed the oocyte retrieval using a surgical procedure known as laparoscopy. This entails the use of an endoscope attached to a miniature camera which the surgeon uses to view the ovaries. A needle attached to a suction pump is then inserted through the body wall to "suck" the oocytes from the developed follicles in the ovaries. This operation requires only two small incisions in the abdomen, which reduces the length and therefore risk of the operation, and prevents the formation of massive scar tissue, which means that the procedure can be performed again with small risk to the leopard.

Two oocytes were retrieved, a lower number than expected. This is ascribed to the following: Each species of cat is known to react differently to the FSH injections. The dose and timing are both critical, and the optimum of both varies between species, and is not directly related to the size of the animal. The dose to be



Female Arabian Leopard at the Breeding Centre, Sharjah. Picture: Jane Edmonds

administered to an Arabian leopard is not necessarily smaller than the dose for a tiger, and it will not react at the same rate.

Therefore, although the Henry Doorly Zoo team consulted with specialists in Cincinnati and New Orleans who work with smaller felids, the calculation was not 100 % correct. Nesra was operated on when some of the follicles were already starting to degenerate, and the dose was found to be a little on the low side. A more accurate calculation can now be made for the future.

An important discovery was that Nesra has an occlusion in her left Fallopian tube, which means that sperm cannot get through to the oocytes for fertilisation, and this is the most likely cause of her false pregnancies in recent years. To overcome this problem, embryos produced by in-vitro fertilisation could in future be inserted directly into her uterus, bypassing the blockage in the Fallopian tube.

#### **In-vitro fertilisation**

The recovered oocytes were successfully fertilised by Dr. Loskutoff, using Nimrod's sperm, on the 4th of March. After 48 hours the two embryos (two to four cell stages) were frozen for future ovary implantation. The remainder of Nimrod's sperm was also frozen in liquid nitrogen.

According to Dr. Armstrong this lengthy and complicated procedure is necessary with felids, as their cervix is too tight for artificial insemination procedures such as those routinely performed on livestock. This was discovered during his early work on tigers in the late 1980's.

#### **Discussion**

The use of advanced technology in the field of conservation has always attracted criticism from some sources as it is considered to be a manipulation of the natural order of things. For some species of animal, the only other option is extinction.

The Arabian Leopard is in very real danger of becoming extinct, through persecution of animals still in the wild,

and the reduced genetic pool of the remaining animals (including those in captivity). The Breeding Centre for Endangered Arabian Wildlife, Sharjah, and the other bodies associated with the programme have chosen to adopt the option of using advanced technology. The next few years will tell if these efforts have been successful. There are other opportunities which become available during projects of this type. DNA sampling is now being conducted of all the leopards to determine their genetic relationship. Such tests can indicate the genetic variance in the captive population. One point of interest is that the behaviour of Nimrod's sperm, which had a tendency to swim in circles. This could point to some degree of in-breeding in the wild population, as this has been shown to be an indicator of this condition in other species (N. Loskutoff, pers. comm.).

#### **Conclusion**

The initial outcome of this work has been the formation of a genome resource bank for the critically endangered Arabian Leopard. Plans are underway to extend this programme to other endangered Arabian wildlife.

#### **Acknowledgements**

The author wishes to thank the following people for their invaluable support for this project:

H.H. Dr. Sheikh Sultan bin Mohammed al Qassimi, UAE Supreme Council member and Ruler of Sharjah; H.H. General Sheikh Mohammed bin Rashid al Maktoum, UAE Minister of Defence and Crown Prince of Dubai; Abdul Aziz al Midfa, Director of the Environment and Protected Areas Authority, Sharjah; Dr. Lulu Skidmore and her staff of the Camel Reproduction Centre, Dubai; Dr. Douglas Armstrong and Dr. Naida Loskutoff of the Henry Doorly Zoo in Omaha, Nebraska; and the responsible staff at the Breeding Centre, Sharjah.

**Peter Wright,**  
**Breeding Centre for Endangered Arabian**  
**Wildlife, Sharjah UAE**  
Email: [chgross @emirates.net.ae](mailto:chgross@emirates.net.ae)

---

## **The Finless Porpoise *Neophocaena phocaenoides* (Cuvier, 1829) in the Arabian Gulf**

**by Simon Aspinall and Robert Baldwin**

The **Finless Porpoise** is a poorly known cetacean ranging across the Indian Ocean to the western Pacific, although it is apparently rare in the extreme western part and perhaps other reaches of this extensive range. The preferred habitat is described as being primarily coastal and riverine; the animal being known to enter delta systems e.g. of the Indus and Yangtze, even getting cut off temporarily in pools as the tide falls (Leatherwood & Reeves 1983).

In south Asia they are found in mangrove areas. The diet is reportedly shrimps, prawns, squid and small fish. Concentrations of up to 50 individuals are reported in Japan, in subgroups of 5-10 animals, although it is certainly more usual to encounter the species as singles or in groups of less than four. Information on the life history of the species is extremely scant.

Finless Porpoises attain a maximum length of 1.9 m, are grey (marginally paler ventrally), and lack a dorsal fin but have distinctive tubercles along the rear of the spinal ridge (peduncle), apparently for the young to retain a grip. Their appearance is rather like a diminutive **Dugong** Dugong dugon. The blowhole is on top of the head. The skull lacks a beak (snout) and has 13-22 teeth in each row, numbering at least 52 in total. Some teeth

have laterally compressed, spatulate crowns, as in the genus Phocoena (the so-called 'true porpoises').

Although they range from Japan, China, Korea, south-east Asia and Indonesia westwards around the Indian subcontinent and thence along the Pakistan and Iran coasts into the Arabian Gulf, they are apparently absent around the remainder of the Arabian peninsula - there being no records from the Gulf of Oman (Arabian Sea) or Red Sea.

Knowledge of the occurrence of Finless Porpoises in the Arabian Gulf rests largely on discovery of shoreline corpses, with very few confirmed sightings of live animals. The first live sighting that has been traced for the region came from the Straits of Hormuz, near Qishm island, Iran in 1973 (Pilleri, 1973). Since that time, records are known from Iran, Iraq, Saudi Arabia, Bahrain and the UAE, with more than half of all records coming from the UAE alone. Live sightings in the Gulf are only of singles and pairs (Pilleri, 1973; Preen 1989).

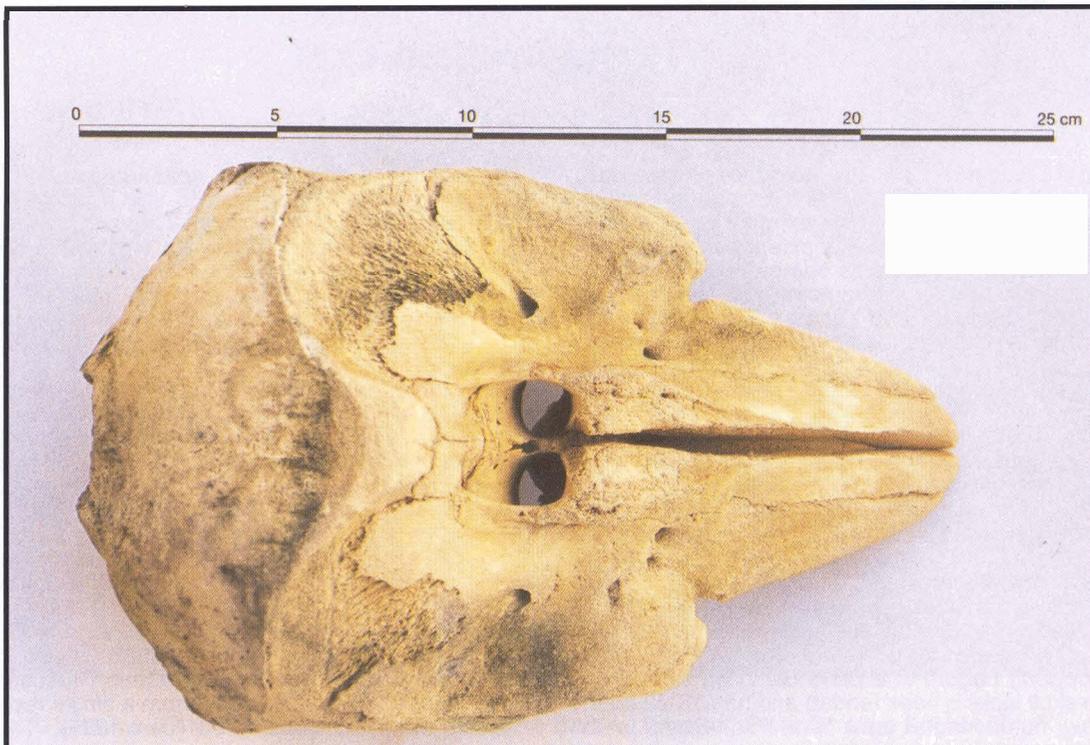
Sightings and stranded dead specimens in the Arabian Gulf account for a minimum total of 26 individuals (Baldwin et al. 1998; UAE Cetacean Database). Seven of these records (27%) come from a single recent survey along the UAE coast (7-12 Jan 1999). There is no

information on the population status of finless porpoise in the region. This, coupled with the lack of regular monitoring, reporting and investigation of marine mammal mortality, prevents a conclusion as to whether this relatively high concentration of corpses represents natural, background mortality levels or a significant die-off, whether from human-related or natural causes.

Throughout the world, seine-netting, set- and drift-nets account for an unknown quantity of premature deaths, e.g. 1 caught in gill-nets off Khorramshahr in March 1998. (IRFTO No. 21). Coastal pollution doubtless also takes a toll. Dredging is likely to displace animals or at least disrupt their feeding or breeding activities and, like much offshore and coastal development, accounts for



Above and below: the distinctive skull of a Finless Porpoise. Pictures: Simon Aspinall



loss of valuable habitat. In the Arabian Gulf, the marine reserve (Jubail Marine Sanctuary for the Gulf Region) off Jubail, Saudi Arabia, is the only protected area known to contain a population of the species (*Symens pers. comm.*), albeit of an unknown size or viability.

Further study is certainly warranted, but it is hard to see how this might be usefully achieved other than as a by-product of other more general research, such as systematic monitoring of marine strandings and fisheries by-catch, and by dedicated sampling for pollutant assays and DNA analysis. Nothing is known of the population size, although clearly (?apparently) the animal is rare in the Gulf, or of seasonal or diurnal movements, for example. Piecemeal addition to current knowledge is perhaps the best that can be achieved without resorting to satellite-tracking. A review of fishing methods and dredging activities may, however, contribute to the conservation of this species, and of other cetacean species and turtle stocks in UAE waters (as well as in other range states), while also facilitating recovery of coastal fisheries. It is, therefore, worthwhile on both conservation and commercial grounds.

**Note:** All UAE records, apart from three from Dubai, are from western Abu Dhabi waters. Distributional information derived from dead animals alone needs to be interpreted with caution. Corpses may drift some distance to collecting beaches. Nonetheless, concentrations in the Merawah Island area, (5 dead on Merawah, one dead on nearby Umm Amim), and in the Sila'a area (3 or 4 corpses/skeletons), is significant.

#### Acknowledgement

The Abu Dhabi-based Environmental Research and Wildlife Development Agency, ERWDA, kindly produced

the map (Figure 1). Their assistance is gratefully acknowledged.

#### References

Anon. 1998. *Neophocaena phocaenoides* in the Bushehr Province's waters. Iranian Fisheries Research and Training Organisation Newsletter (IFRTO) No. 21. Summer 1998: 7.

Baldwin, R.M., Van Waerebeek, K. and M. Gallagher. 1998. A Review of Small Cetaceans from Waters off the Arabian Peninsula. Document SC/50/SM6 presented to the IWC 50th Scientific Committee Meeting, Muscat, Oman. 33pp.

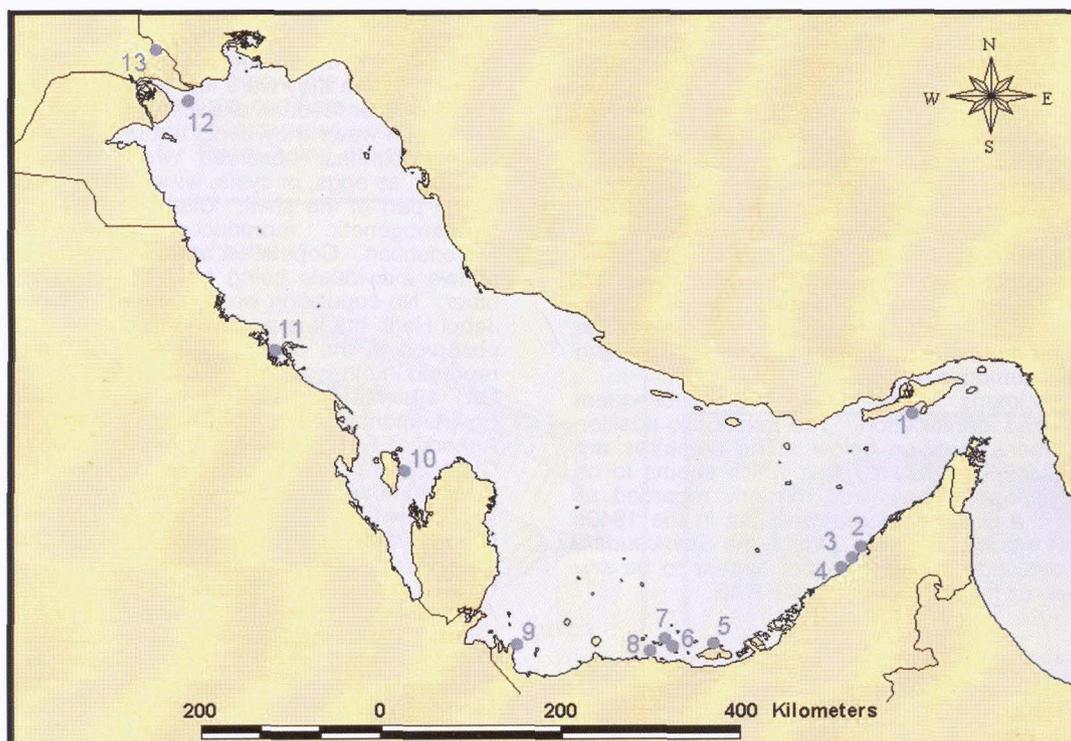
Leatherwood, S. & Reeves, R.R. 1983. *The Sierra Club Handbook of Whales and Dolphins*. Sierra Club Books, San Francisco. 302pp.

Pilleri, G. 1973. *Cetologische Expedition zum Indus Perzischen Golf und Forschungsreise nach Goa und Thailand im Jahre 1973*. Verlag Hirnanatomisches Institut. Waldau-Bern. 52pp. (In German)

Preen, A. 1989. *Dugongs*. Vol. II - The status and conservation of dugongs in the Arabian region. MEPA Coastal and Marine Management Series, Report No. 10. MEPA, Jeddah, Saudi Arabia. 200pp.

UAE Cetacean Database (compiled by R. Baldwin, updated by S. Aspinall)

**Simon Aspinall,**  
P.O.Box 45553,  
Abu Dhabi, U.A.E.  
& **Robert Baldwin,**  
P.O. Box 2531, CPO 111  
Muscat, Oman  
e-mail: wosoman @gto.net.om



**Figure 1 : Finless Porpoise records from the Arabian Gulf.** 1 : Qishm Island (Iran), 1973. 2: Jumeirah (Dubai), 1999. 3: Mina Seyaha (Dubai), c. 1987/188. 4: Jebel Ali (Dubai), 1996. 5: c. 15 n. of Abu Al Abyadh, 1995. 6: Umm Amim island, 1995. 7: Merawah, 1995 & 1999. 8: Qarn Al Aysh, 1999. 9: Ra's Mushairib, Sila'a, 1996 & 1998. 10: Bahrain island, 1976 & 1989. 11: Jubail marine sanctuary, Saudi Arabia, 1989 & 1994/95. 12: Iraq ('territorial waters'), 1974 & 1975. 13. Off Khorramshahr, Iran, 1998.

Mapping prepared by Environmental Research and Wildlife Development Agency, ERWDA.

# Clam Shrimps (Branchiopoda, Crustacea) - A New Discovery for the UAE

by Richard Hornby

## Abstract

Crustacea of the order Spinicaudata (clamshrimps) have been recorded and collected for the first time in the United Arab Emirates in ephemeral freshwater pools on *Jebel Hafit*, in eastern Abu Dhabi. The discovery represents a major range distribution for the genus *Eulimnadia*. Like other large Branchiopods, it appears to have a relict distribution in the Arabian peninsula.

## Introduction

On 17 March 1999, I noticed some unfamiliar invertebrate animals in a pool on the western flank of *Jebel Hafit* (Abu Dhabi Emirate, UAE). The pool, situated at UTM 40 3 732 - 26 625, was in the bed of one of the many steep wadis on this side of the mountain. About five metres long by two metres wide, and half a metre deep, it had steep sides sculpted out of the limestone bedrock by erosion, presumably mainly caused by rainwater. The pool had been dry on two previous occasions when the valley had been visited in 1998, and it is likely that it would normally hold water for only about two months of each year, after winter rains.

## Description

The animals were moving around throughout the water column at one end of the pool, it being this movement which attracted my attention. On external examination, the animals resembled bivalve molluscs, with what appeared to be a hinged, bilaterally symmetrical shell measuring about 9 mm by 5mm. However, the movement of the animals was very 'un-mollusc-like', as was the form of the creature within the 'shell', which suggested Crustacea. It was not difficult to see the animal as the shell-like valves were transparent, though clearly marked with concentric rings, resembling growth lines. Apart from slightly protruding antennae, about 3mm long, the whole animal was completely encased in the shell-like valves. The animals were swimming with the hinge uppermost and the distal part slightly open. Appendages attached to the trunk of the animal, i.e. the main part of the body, were constantly moving in waves, directing a stream of water through the open part of the carapace, and presumably through the mouthparts, and creating the locomotive power.

Several specimens were taken for subsequent examination and identification. The taxonomic position of the specimens is given below. The creatures are known as 'Clam Shrimps', a name which seems to be particularly apposite. They were formerly regarded as members of the Order Conchostraca, but in the 1940s this was split into two separate Orders, the Spinicaudata and the Laevicaudata. There do not appear to be any previous records for either Order in the UAE.

Phylum: Arthropoda  
Class: Crustacea  
**Subclass:** Branchiopoda  
Order: Spinicaudata  
Family: Limnadiidae  
Genus: *Eulimnadia* sp. (aff. *margaretae*)

Figure 1 shows the typical morphology of a Clam Shrimp, and Figure 2 is a photograph of a specimen collected on *Jebel Hafit*.

## Discussion

A review of the large Branchiopod (previously "Phyllopod") fauna of the Arabian Peninsula was published in 1996 by Alain Thiery (Fauna of Saudi Arabia, Volume 15). There can be little doubt from his diagrams and electron microphotography that the specimens from *Jebel Hafit* were of the family Limnadiidae. They correspond closely to the shape of *Eulimnadia* sp. (aff. *margaretae*). Expert confirmation of the identification is being obtained.

Thiery reviewed the taxonomy and distribution of about one thousand specimens of Branchiopod from Arabia and Syria. He attributed 47 specimens collected in Oman between 1986 and 1989 to *Eulimnadia* sp. (aff. *margaretae*), but he states that they seemed to differ from the single specimen of *Eulimnadia margaretae* collected in Aden, (now part of Yemen) by Bond (1934). He provides measurements and numbers of growth rings for both the Oman and the Aden specimens, suggesting a significant degree of morphological separation. The specimens I collected, which had four growth rings and averaged about 9mm in length, are intermediate between the Oman and the Aden material. This suggests that we are more likely to be dealing with one species rather than two.

The discovery of *Eulimnadia* on *Jebel Hafit* represent a major range extension for the genus. The specimens collected in Oman were from Hamad ('temporary pool on limestone underground, gravel and limestone boulders'), near Mintirib (near the Wahiba Sands), and well to the south of this, near Shaqq. *Jebel Hafit* is nearly 400 kilometres north-west of Hamad and Mintirib.

There were a maximum of about fifty Clam Shrimps in the pool where they were first discovered on *Jebel Hafit*. They are filter feeders, extracting microscopic items from the flow of water they direct through the shell. Some of the specimens observed were fertile (ovigerous) females, as eggs, or cysts, were clearly visible within the dorsal part of the shell. Clam Shrimps are capable of parthenogenetic reproduction as well as sexual reproduction. Copulation apparently involves the shells of two individuals being held at right angles to each other. No copulation was observed with the animals on *Jebel Hafit*, but it is possible that the swarming activity I observed in the pool was a form of 'breeding frenzy' reported in other large Branchiopods.

On 19 March, Tom and Theri Bailey of the Environmental Research and Wildlife Development Agency, ERWDA, visited the same wadi, and found Clam Shrimps not only in the same pool but also, in small numbers, in two other pools, with less clear water, lower down the same wadi. It is possible that they could occur in more of the ephemeral pools on *Jebel Hafit*, but there are no known previous sightings or published records of their occurrence in the UAE.

A further visit to the pools on 16 April indicated that the Clam Shrimps had all gone. The pools still contained water but were drying rapidly. Discussions with several individuals who have spent much time examining the fauna of wadi pools in the Emirates indicated that none of them had ever seen these very distinctive animals.

Clam Shrimps are always associated with ephemeral freshwater pools, and are well adapted to withstand periods of prolonged drought, and high temperature. It has been reported that they lay two types of eggs - thin-shelled eggs which can hatch quickly when conditions are good (to produce another generation before the pool dries out) and thick-shelled cysts which enter diapause and can survive in the dust for periods of

probably up to several years.

It is conceivable that some dispersal could be achieved by birds (most likely through the digestive tract), but Branchiopods are now regarded as having a relict distribution, reflecting a wider geographic range during a previous era of wetter climate, when conditions were more favourable. Any dispersal today must be extremely infrequent. Thiery (1966) used the distributions of Branchiopods and Notostraca to support general conclusions about zoogeographic affinities in the Arabian peninsula.

Clam Shrimps are particularly associated with pools which do not contain fish, and the absence of toads may also be significant. No fish or toads are known to have ever been seen in wadi pools on Jebel Hafit, presumably because rainfall and the catchment area are insufficient to sustain the minimum required flow and inundation period. Fish are present in the great majority of the wadis in the mountains of UAE and adjacent Oman (Feulner, 1998) as are toads and the semi-aquatic snake *Coluber rhodorachis* (Wadi Racer). The absence of these potential predators may have enabled Clam Shrimps to survive on Jebel Hafit, whereas predation may have been too heavy in the other mountain wadis.

This does not mean, however, that Clam Shrimps on Jebel Hafit have no predators. Tom and Theri Bailey took a few specimens away to photograph and had some in the same sample pot as a specimen of a **Poikadot Diving Beetle** *Prodacticus pictus*. They observed the beetle to be attacking Clam Shrimps, so immediately separated them.

Closely related to the *Spinicaudata* (Clam Shrimps) are the *Anostraca* 'Fairy Shrimps' and the *Notostraca* 'Tadpole Shrimps'. One species of each of these groups are known to occur in Bahrain, although this was not reported by Thiery. In Bahrain the appearance of these creatures was very infrequent, but each species appeared consistently in the same pool and the two never occurred together (Stephen Green, *pers. comm.*). When *Triops* (Notostraca) appears in its traditional pool, it is said to attract visitors to observe the spectacle, and the animals are present in large numbers, perhaps tens of thousands. These are conspicuous animals, the average sizes reported by Thiery being around 20mm.

From Thiery's information on distribution, the species in Bahrain is likely to be *Triops numidicus*.

The discovery of *Eulimnadia* in the UAE, and the lack of records from Bahrain, UAE and the southern part of the Arabian Gulf in Thiery's very useful review paper, indicates that there is much more to be learned about the distribution, ecology and life history of the large Branchiopods in Arabia. If their distribution is truly relict, only a gradual diminution of their range can be expected, emphasising the importance of recording as much as possible about them before the data, and indeed the species themselves, are lost.

Any further information on the occurrence of any of these groups in the UAE or elsewhere in Arabia would be most gratefully received by the author.

#### References

- Barnes, R.S.K., Callow, P. and Olive, P.J.W. 1993. The Invertebrates: A New Synthesis. Blackwell Science.  
 Bond, R.M. 1934. Report on Phyllopod Crustacea (Anostraca, Notostraca and Conchostraca) including a revision of the Anostraca of the Indian Empire. Memoirs of the Connecticut Academy of Art and Sciences 10 (5).  
 Feulner, G. R. 1998. Wadi Fish of the UAE. *Tribulus* 8.2:16-22.  
 Thiery, A. 1996. Large Branchiopods (Crustacea: Anostraca, Notostraca, Spinicaudata, Laevicaudata) from Temporary Inland Waters of the Arabian Peninsula. *Fauna of Saudi Arabia* 15:37-98.

#### Acknowledgements

I am very grateful to Stephen Green for initially putting me on to the right track with Clam Shrimps, and for his interesting discussions. I would also like to express my thanks to Marijcke Jongbloed, David Insall, Michael Gillett, Tom and Theri Bailey and Gary Feulner.

Dr. Richard J. Hornby,  
 P.O.Box 41922  
 Abu Dhabi, U.A.E.

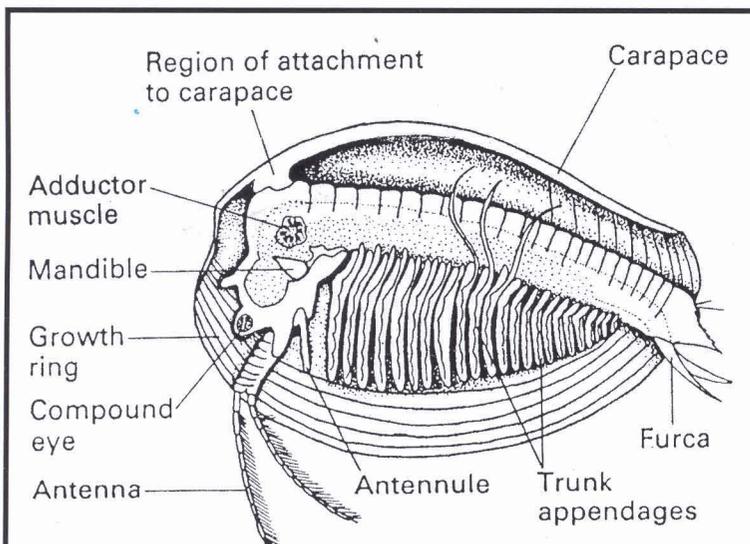


Figure 1: Morphology of a Conchostracan. Lateral view with the left-hand side of the carapace removed.  
 From Barnes, Callow and Olive, 1993.



Figure 2: A view of the carapace of a clam shrimp from Jebel Hafit.  
 Picture by Tom Bailey, ERWDA.

## NOTES AND QUERIES

---

### ***Dalma archaeological site yields Arabia's oldest date stones***

The results of radiocarbon dating of two date Phoenix *dactylifera* stones found by the Abu Dhabi Islands Archaeological Survey, ADIAS, on Dalma has shown that they are the oldest ever found in Arabia. The results suggested that one date stone can be dated to 4670 (+/-130) BC, and the other to 5110 (+/-160) BC, that is about 6,500 - 7,000 years ago.

The dating was carried out at the University of Arizona working in collaboration with the Scottish Universities Research and Reactor Centre radiocarbon laboratory at the University of Glasgow, in Scotland.

Both date stones, together with impressions of date stones on fragments of mudbrick, were recovered during excavations on a site in the compound of the Abu Dhabi Women's Association branch on Dalma, where ADIAS has been working for several years. They were identified during the course of work organised in early 1998 with the support of Minister of Information and Culture Sheikh Abdulla bin Zayed Al Nahyan.

The two Dalma date stones represent the oldest radiometrically dated evidence yet available for the consumption of dates within the Gulf region, as well as probably some of the earliest evidence of the date palm found anywhere in the whole of the Middle East. Previously, the earliest evidence for date palm remains in the UAE was excavated from the Hili 8 site in Al Ain, dated to around 3,000 BC. The Dalma date stones are at least 1,500 years, and perhaps over 2,000 years older.

The two date stones also represent some of the earliest remains of date consumption found within the entire Middle East. Although it cannot be determined if they represent wild or cultivated dates, they certainly confirm that dates were being consumed at this early time.

Other finds from the Dalma site include at least two round house-like structures with surviving post-holes and floors, one of which is at least 7 metres in diameter. There are also small quantities of imported painted pottery from the 'Ubaid culture of southern Mesopotamia. Since Dalma was already almost certainly an island at the time, the 'Ubaid pottery must have made at least part of its journey by sea, offering us the first confirmed evidence of the maritime trading connections of the people of the Emirates.

Large quantities of what appear to be locally made gypsum plaster vessels of a type not known anywhere else in the Middle East have also been found. During an inspection visit to the Dalma site at the end of March, a large portion of one of these vessels was found which is the most complete vessel of this period ever identified in the Emirates.

The Dalma site has also yielded thousands of Late Stone Age flint flakes and a number of stone tools; other finds included ornamental beads, and huge quantities of food debris in the form of marine shells and animal and fish bones.

**Mark Beech**

---

### ***A new species of trigger fish recorded for the Arabian Gulf***

Teleostei, Tetraodontiformes, Balistidae, ***Canthidermis maculatus*** (Bloch, 1786) – the Spotted Oceanic Triggerfish

This note describes an unusual triggerfish purchased by the author in Ras Al Khaimah fish souq on 12 April 1998 which has been identified as the Spotted Oceanic Triggerfish *Canthidermis maculatus*. The record is the first for the Arabian Gulf. The fish had 3 dorsal hard spines and 23 soft dorsal rays, as well as 21 soft anal rays. Measurements were taken as follows:

Total length (TL): measured from the tip of the snout to the end of the upper lobe of the caudal fin = 33.5 cm.

Standard length (SL): measured from the tip of the snout to the end of the axial skeleton (determined by bending the tail upwards) = 28 cm.

Head length (HL): from the tip of the snout to the posterior edge of the gill cover (operculum) = 9 cm.

Body depth (BD): the deepest point from the origin of the dorsal fin vertically downwards to the pelvic fin = 11 cm.

The fresh capture weight of the fish was 735 g. Its colour was dark purplish to black with white patches on the lower ventral sides of its body. The caudal fin was slightly rounded with small notches present in moderately pronounced lobes.

Three triggerfish species commonly occur in the Arabian Gulf according to the most recently published surveys (Carpenter et al., 1997; Randall, 1995). These are:

- the starry triggerfish *Abalistes stellatus* (Lacepede, 1798),
- the picasso triggerfish *Rhinecanthus assasi* (Forsskal, 1775),
- the **flagtail** triggerfish Sufflamen *chrysopterus* (Bloch and Schneider, 1801).

The specimen from Ras Al Khaimah does not however match with any of these. Its distinctive colour as well as spine/ray counts and body/fin shapes preclude it from belonging to any of these previously recorded species. Outside the Gulf, in adjacent Omani waters, a number of other triggerfishes are known to also occur (Randall, 1995). These include:

- the largescale triggerfish *Canthidermis macrolepis* (Boulenger, 1887),
- the Indian Ocean durgon *Melichthys indicus* (Randall and Klausewitz, 1973),
- the **redtooth** triggerfish *Odonus niger* (Rüppell, 1836),
- the bridled triggerfish Sufflamen *fraenatus* (Latreille, 1804).

These latter three species have quite separate distinct colour and body/fin shapes. The Ras Al Khaimah triggerfish looks closest to the largescale triggerfish *Canthidermis macrolepis*, although there are a number

of clear differences. *Canthidermis macrolepis* has quite an elongate sort of body for a triggerfish, and is grey in colour, shading to pale grey ventrally. The edges of its second dorsal, anal and caudal fins are blackish. Its caudal fin is double emarginate with produced lobes (Randall, 1995: 393; Gill and Randall, 1997).

A closer match for the specimen purchased in Ras Al Khaimah souq is another species within the same genus as the largescale triggerfish, namely, the **spotted oceanic triggerfish** *Canthidermis maculatus* (Bloch, 1786), with which the specimen can be confidently identified.

This is a triggerfish which occurs **circumglobally** in both tropical and temperate seas. It has been recorded previously within the Western Indian Ocean (Smith and Heemstra, 1986). The head, body and fins of adults are dark; their body has elongated white spots that may disappear with growth (Smith and Heemstra, 1986). This species is **epipelagic** through nearly all its life, and is often associated with drifting objects (Myers, 1991). It can occur on deep rocky slopes (Robins and Ray, 1986), and appears to school in large numbers based on catches from set nets (Masuda *et al.*, 1975). In some parts of the world it is marketed fresh (Matsuura, 1997). It commonly occurs at a length of around 30 cm (Bussing, 1995), but can occur up to a maximum length of 50 cm (Edwards, 1990).

According to **FishBase98** (FishBase, 1998; Froese and Pauly, 1998), three of the localities nearest to the Arabian Gulf with records of *Canthidermis maculatus* are:

- Obock, Djibouti, in the Gulf of Aden, near the entrance to the Red Sea. Location: 11°58' N 043°20' E (a 56cm TL dry mounted specimen collected by Maindron, retained in the **Musée National d'Histoire Naturelle**, Paris - MNHN 18930072).

- Maldive Islands, Indian Ocean. Location: 03°40' N 073°49' E (recorded in the fish list for the Maldives by: Randall and Anderson, 1993).

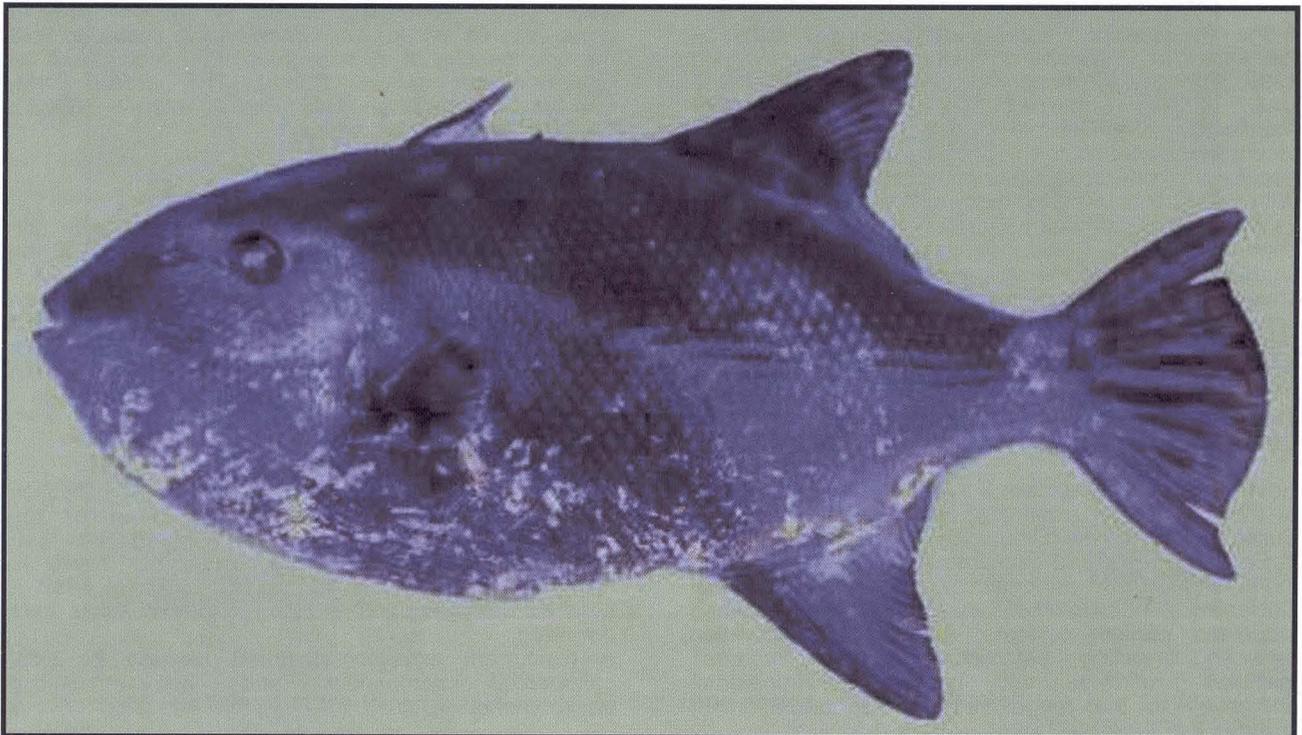
- **B.esperance(c.)**, South Africa. Location: 34°21' S 18°25' E (a 30.8 cm TL dry mounted specimen collected by Verreaux, retained in the **Musée National d'Histoire Naturelle**, Paris - MNHN A8511).

The discovery of **spotted oceanic triggerfish** within the Ras Al Khaimah fish market suggests that the northern part of its range in the Western Indian Ocean may be more extensive than previously realised. Fishing boats venturing out from Ras Al Khaimah rarely stay away from port for more than two days at a time, and the fishing grounds exploited are almost completely Arabian Gulf-based. Sailing around the **Musandam** peninsula involves too much time and is not deemed to be economically viable. It seems likely, therefore, that the specimen may have originated from the waters adjacent to Ras Al Khaimah, although it is not possible to be certain whether it was caught in the territorial waters of the UAE or of Iran or Oman, which also share control of waters around the Straits of Hormuz. Juvenile triggerfishes are, however, often found in association with floating debris and vegetation, so they may have drifted into adjacent regions some distance from their native territory.

#### **Acknowledgements:**

My 1998 field research trip to the UAE was financed by The British Council (Abu Dhabi), ERWDA (Environment Research and Wildlife Development Agency, Abu Dhabi), ADIAS (Abu Dhabi Islands Archaeological Survey) and the University of York. Accommodation and subsistence in Ras Al Khaimah was kindly provided by Sheikh Sultan bin Saqr al-Qassimi, Director of the Department of Antiquities and Museums of Ras al-Khaimah. Christian Velde, resident archaeologist at the National Museum of Ras al-Khaimah, also provided valuable support to the author during his stay.

Callum Roberts and Julie Hawkins (Environment Department, University of York) generously provided access to **FishBase98** and were helpful in providing



**Spotted Oceanic triggerfish from Ras Al Khaimah souq. Picture by Mark Beech.**

other bibliographic references. Both Tony Gill (Natural History Museum, London) and Jack Randall (Bishop Museum, Hawaii) gave advice concerning the identification of the triggerfish. Tony Gill kindly provided me with a copy of his and Randall's recent paper on *Canthidermis macrolepis*.

## References

Bussing, W.A. (1995). Balistidae. p. 905-909. In W. Fischer, F. Krupp, W. Schneider, C. Sommer, K.E. Carpenter and V. Niem (eds.) Guia FAO para Identificación de Especies para lo Fines de la Pesca. Pacifico Centro-Oriental. 3 Vols. FAO, Rome.

Carpenter, K. E., Krupp, F., Jones, D.A. and Zajonz, U. (1997). FAO species identification guide for fishery purposes. The Living Marine Resources of Kuwait, Eastern Saudi Arabia, Bahrain, Qatar, and the United Arab Emirates. Rome, FAO.

Edwards, A. (1990). Fish and fisheries of Saint Helena Island. Centre for Tropical Coastal Management Studies, University of Newcastle upon Tyne, England.

FishBase. (1998). FishBase 98 CD-ROM. ICLARM, Manila.

Froese, R. and D. Pauly (eds.) (1998). FishBase 98: concepts, design and data sources. ICLARM, Manila, Philippines.

Gill, A.C. and Randall, J.E. (1997). Redescription of and lectotype designation for *Balistes macrolepis* Boulenger, 1887, a senior synonym of *Canthidermis longirostris* Tortonese, 1954 and *C. villosus* Fedoryako, 1979 (Teleostei, Tetraodontiformes, Balistidae). Bull. Nat. Hist.

Mus. Lond. (Zool.) 63(1): 27-31

Masuda, H., C. Araga and T. Yoshino. (1975). Coastal fishes of Southern Japan. Tokai University Press, Tokyo, Japan.

Matsuura, K. (1997). Balistidae. Triggerfishes. In K.E. Carpenter and V. Niem (eds.) FAO Identification Guide for Fishery Purposes. The Western Central Pacific. (in prep).

Myers, R.F. (1991). Micronesian reef fishes. Second Ed. Coral Graphics, Barrigada, Guam.

Randall, J. E. (1995). Coastal Fishes of Oman. Bathurst, Australia, Crawford House Publishing.

Randall, J.E. and C. Anderson (1993). Annotated checklist of the epipelagic and shore fishes of the Maldives Islands., Ichthyol. Bull. of the J.L.B. Smith Inst. of Ichthyol. 59:47.

Robins, C.R. and G.C. Ray. (1986). A field guide to Atlantic coast fishes of North America. Houghton Mifflin Company, Boston, U.S.A.

Smith, M.M. and P.C. Heemstra. (1986). Balistidae. p. 876-882. In M.M. Smith and P.C. Heemstra (eds.) Smiths' Sea Fishes. Springer-Verlag, Berlin.

**Mark Beech**  
**Department of Archaeology**  
**The King's Manor**  
**University of York**  
**York YO1 2EP, UK**  
*E-mail: mjb1170york.ac.uk*

---

---

## CONFERENCE NOTES

---

---

### Reclaiming the Past - Shaping the Future

A one day symposium with the above title was hosted by the American University of Sharjah on February 11th 1999. Sub-titled "A symposium on material culture in the UAE," it was organised by the AUS School of Architecture and Design, and focussed primarily on recent research into the country's archaeology and on traditional architecture and its restoration.

With participants including many of the familiar names in Emirates archaeology, the Symposium provided a useful opportunity for discussion on ways in which university students could become involved in the study of the country's heritage. AUS is now planning to launch a special course in 'heritage management.' Proceedings are scheduled to be published later this year.

### 1st Abu Dhabi International Arabian Oryx Conference

Hosted by the Environment & Wildlife Management Unit of the Private Department of H.H. Sheikh Zayed bin Sultan Al Nahyan, the conference was held in Abu Dhabi in February 1999, and concluded with the drafting of a memorandum of understanding, the 'Abu Dhabi Declaration,' essentially an agreement between interested parties to foster increased collaboration between breeding establishments and research institutes worldwide and between environmental authorities in the range states. The facilitation of

successful reintroductions to the wild was an agreed major goal of attending parties. A regional advisory group is to be set up, with Oman having offered to host the first meeting of such a group. Proceedings will be published later this year. Contact: The Director, EWM, P.O. Box 77, Abu Dhabi, UAE. Fax: 00-971 +2 - 663033. Email: wildlife@dpanet.org.ae.

### ECO-ARABIA '99

Sponsored by Shell, a two day 'Eco-Arabia '99' conference in Dubai in April examined protection of the marine and coastal environments of the Middle East. Speakers, the majority from overseas but many from within the GCC, were from governmental ministries and research institutes, private business and public sector industry. Partnership, collaboration and communication were identified as key issues of mutual benefit.

### 'Arab Envirotec-I' Conference

The First Arab International Conference and Exhibition on Environmental Biotechnology, organised by the Emirates Heritage Club and under the patronage of UAE Deputy Prime Minister Sheikh Sultan Bin Zayed Al Nahyan, was held in Abu Dhabi from 5-8 March 1999. A series of technical and non-technical presentations were delivered.

A concurrent exhibition featured displays by local commercial companies and non-profit-making environmental NGOs.

## Endangered Arabian Wildlife Centre sets up research protocol

Since its origins in May 1996, when it was officially opened by H.H. Dr. Sheikh Sultan bin Mohammed al Qassimi, member of the Supreme Council of the United Arab Emirates and Ruler of Sharjah, the Breeding Centre for Endangered Arabian Wildlife in Sharjah has been involved in research on the local fauna of the Arabian Peninsula. This research has recently been formalised into a research protocol to achieve both short and long term objectives.

Focus has now been put on the reproductive cycle and behaviour of the **Arabian Leopard** (*Panthera pardus nimr*), now in the first phases of an intensive programme for breeding, which has shown very positive results (see P. 11).

**Blanford's foxes** (*Vulpes cana*) have been trapped, mapped and recorded in all suitable areas of the UAE, to allow for a clearer picture of the distribution and population densities of this canid. This, and other scientifically valuable data, has been described, and forms the basis of a paper now being prepared for publication.

Another project is under way to determine the ecological relationships between mammals and ecto-parasites, such as ticks, particularly with regard to host-specifics, habitat and seasonal variation. This documentation, involving extensive and intensive fieldwork, provides more scientific insights than merely cataloguing and recording species lists.

The **Omani Blind Cave Fish** (*Garra barreimiae*) has posed an intriguing puzzle since its discovery in 1980. In

all this time in captivity, the species has only spawned once, and the factors which triggered reproduction have never been discovered. The Breeding Centre staff have undertaken extensive experimentation to explore the various theories that have been put forward, and, through this manipulation of the artificial habitat, have made progress in unlocking the secrets of this fish's life-cycle.

The Sharjah Centre houses more than 140 species of local fauna, all of which are subject to research and investigation. The Centre has taken the first steps towards realising its main aim, which is to increase knowledge of Arabia's wildlife and provide solutions and suggestions for improved ecological management for the region, which is, like most remaining wild places globally, facing increasing environmental pressure. The Breeding Centre falls under the Environment and Protected Areas Authority of the Office of H.H. The Ruler, Government of Sharjah.

**Peter Cunningham\* and Peter Wright**  
Breeding Centre for Endangered  
Arabian Wildlife, Sharjah, U.A.E.

Fax: 00971 6 311156  
E-mail: [chgross@emirates.net.ae](mailto:chgross@emirates.net.ae)

\* to whom *all correspondence* should be addressed.



A Blanford's Fox female at the Breeding Centre for Endangered Arabian Wildlife, Sharjah.

Picture: Jane Edmonds

## Records of Owl Flies in the Al Ain Area (Neuroptera: Ascalaphidae)

Although neuropterous insects appear to be common components of the desert fauna of the UAE and N. Oman, the number of different species is not large. Under certain conditions some species may be abundant, with dozens of individuals coming to artificial light. These include a number of antlion species as well as the common green lacewing *Chrysoperla carnea* and the rather exotic threadwing *Halter halteratus*. A group with only few species and only rarely encountered are the owl flies of the family *Ascalaphidae*. Only three species are definitely known from the whole of Arabia (Holzel, 1983). These are *Tmesibasis larseni* Holzel 1983, a species with attractively marked wings from Dhofar, *Ascalaphus festivus* (Rambur, 1842) (northern Saudi Arabia) and *Bubopsis hamata* (Klug, 1834) (western Saudi Arabia). The latter two species have only a single small brown coloured area near the tips of their wings and look remarkably like dragonflies, except that

they have long, conspicuously clubbed antennae.

In April 1996, I took two examples of *Ascalaphus festivus* in a disused field in the plantation at Khutwah, Oman. The specimens were found, probably fortuitously, on different days resting on flower spikes of mullein (*Verbascum* sp., Scrophulariaceae). Two years later in April 1998, I accidentally encountered another owl fly resting on a wall in my garden in the Muwaiji district of Al Ain, UAE. On examination, the specimen proved to belong to a genus distinct from those already recorded for Arabia. It can not be identified and will be sent to an expert on the family. It is shown in Figure 1 together with an example of *A. festivus*.

### Reference

Holzel, H. (1983) Insects of Saudi Arabia. Neuroptera: Fam. Ascalaphidae. Fauna of Saudi Arabia 5. 235 - 239.

Dr. M. P. T. Gillett



Figure 1 Owl flies from the Al Ain area. Right, *Ascalaphus festivus*; left, an unidentified species from Al Ain.

Picture: Ashok Prasad.

## Preliminary notes on some newly recorded butterflies from the UAE and adjacent parts of northern Oman (Lepidoptera: Rhopalocera)

The last article in *Tribulus* recording butterflies from the UAE and neighbouring Oman documented the occurrence of two newly recognised polymorphs of *Danaus chrysippus chrysippus* in the Al Ain region (Gillett, 1998). These forms, *dorippus* and *alcippus*, were additional to the nominate form, *chrysippus*, but they did not change the total number of species known from the UAE and adjacent Omani territory in the Musandam and around Buraimi and Mahdah, then standing at 50 species (Gillett, 1997).

However, other discoveries have now added a total of four newly recognised species from the region. They include three species of the family Lycaenidae (which are not illustrated here, since they will be discussed and

figured in a future article on that family) together with one member of the Pieridae. The insects are briefly noted below in order of discovery.

***Euchrysops lois*** (Butler, 1885). **Somali Cupid** - Lycaenidae.

A provisional identification is hereby recorded of a widespread, but uncommon, mountain butterfly, associated sometimes with the plant *Dyerophtum indicum* (Plumbaginaceae), in wadis of the Hajar Mountains and on Jebel Hafit. Elsewhere, the butterfly is only poorly known from Somalia, but occurs extensively

in the Aden, Hadhramaut and Dhofar regions of southern Arabia. Specimens from the Al Ain region appear to be much more lightly coloured on the underside than other Arabian populations.

**Tarucus** sp. 'Jebel Hafit' Pierrot or Tiger Blue - Lycaenidae.

A single female example of this butterfly was discovered in April, 1998, on the western side of Jebel Hafit just over the Omani border from Abu Dhabi. Although clearly related to the other Arabian blue pierrots or tiger blues, including *T. rosaceus*, *T. balkanicus* and *T. theophrastus*, this insect has much bolder dark markings on the underside wings and has not yet been identified. Determination may depend upon the eventual collection of new material, especially that of a male specimen. The larval foodplant is likely to be *Zizyphus*.

**Brephidium exile** (Boisduval, 1852). Western Pygmy Blue - Lycaenidae.

This American butterfly is one of the smallest known and is very easily overlooked. Its native haunts include much of the western USA and Mexico and it ranges southwards to Venezuela and eastwards, in pockets, to Florida. Although only discovered in the UAE for the first time in Al Ain in April, 1998, the species is apparently common, widely distributed and present all year round. Recorded localities in the Arabian Gulf, besides Al Ain, include Dubai, Das and Merawah Islands in the UAE and Buraimi and Mahdah in Oman. Doubtlessly it is more widespread than this and is probably now established on both sides of the Gulf. As it is an obvious recent arrival in the region, these observations argue for an introduction several years before its discovery, perhaps at the time of the American build-up for the 1991 Gulf War. In the USA, the larval foodplants include *Chenopodium album*, *Atriplex* and other *Chenopodiaceae*. No larvae have been discovered in the UAE, but besides plants of *C. album*, the butterfly seems to be associated with *Aizoaceae*, including *Mesembryanthemum nodiflorum* and *Sesuvium verucosum*, but only where these occur under full exposure to the sun.

This latter plant is currently being propagated extensively along roadsides and around urban developments in the UAE, a factor which may encourage both the spread and the consolidation of this alien butterfly species. A year after its discovery, the butterfly continues to be common in Al Ain and Dubai.

**Pontia daplidice** (Linnaeus, 1758). Bath White - Pieridae.

Although expected to occur in the Al Ain region, at least as a migrant, this species has remained elusive, partly perhaps because it is very similar in appearance to the closely related and common Desert White *P. glauconome*. The Bath White has a very extensive range from N. Africa and S. Europe to the Middle East, NW India and across the former Soviet Union to the temperate Far East.

In Arabia, there are many records that include Yemen and southern Oman, but the butterfly is also known from

the Sumail Gap. A single male representing an extreme dry seasonal form of the Bath White was netted in the upper reaches of Wadi Masah on 19 March, 1999.

Although very similar to dry seasonal forms of the Desert White, this specimen differs in a number of features. Despite the reduced underside markings, the upperside markings are bold black rather than washed-out as in *P. glauconome* and the thorax and abdomen are dark rather than white as in the dry season form of that species. More importantly, in the Masah specimen the veins observed on the hindwings are clearly not yellow. Larsen (1984) gives this as the key distinguishing character between Arabian *P. daplidice* and *P. glauconome* (see Front Cover illustration).

## References

Gillett, M.P.T. (1997) The butterflies of the United Arab Emirates and neighbouring areas of northern Oman -

three newly recognised species and some other interesting records (Lepidoptera: Rhopalocera). **Tribulus** 7.1: 15 - 18.

Gillett M.P.T. (1998) Butterflies of the United Arab Emirates and neighbouring areas of northern Oman - the polymorphic status and phyto-chemical associations of the Plain Tiger, *Danaus chrysippus chrysippus* (Linnaeus) in the region. (Lepidoptera: Rhopalocera). **Tribulus** 8.1: 8 - 13.

Larsen T.B. (1983) Insects of Saudi Arabia Lepidoptera; Rhopalocera (A monograph of the butterflies of the Arabian Peninsula). **Fauna of Saudi Arabia** 5: 333 - 478.

Dr. M. P. T. Gillett

## Editors' Note

*Coeliades anchises jacunda* (Butler) Giant Skipper - Hesperidae

A specimen of the Giant Skipper was also recently located on Jebel Hafit by Dr. Reza Khan, during a survey visit on behalf of the Abu Dhabi Oil Company for Onshore Oil Operations, ADCO.

This butterfly, predicted by Dr. Michael Gillett as likely to occur in this site, was finally sighted by Khan in Wadi Tarabat on the north-east flank of the mountain on 12 November 1998.

Only a single specimen was seen, nectar-feeding from the Oriental cherry *Acridocarpus orientalis* (known locally as 'qafaf' or 'qafas.' This plant is the exclusive larval foodplant of the Giant Skipper.

Qafaf is presently only known in the UAE from Jebel Hafit, where it is largely confined to this wadi, although it is relatively widespread in the Omani sector of the jebel. Khan notes that flowering by the species in November is not known to have been previously recorded.

(This note is based on a report by Dr. M.I.R. Khan, Director, Dubai Zoo, Dubai Municipality, P.O.Box 67 Dubai).

---

## A first record of Blackstart *Cercomela melanura* for the United Arab Emirates

The following note describes the discovery of the first Blackstart *Cercomela melanura* for the United Arab Emirates, and is adapted from the formal Rare Bird Record submission to the Emirates Bird Records Committee, which maintains the national database of bird records for the UAE, and which also reviews and adjudicates upon claims submitted by observers.

The EBRC is also responsible for the compiling and updating of the national checklist.

Further details of the EBRC, as well as Rare Bird record forms, can be obtained from the Secretary, (Colin Richardson), P.O.Box 50394, Dubai, UAE.

**Date & location:** 14 April 1997 - Khalidiya spit, (Ras al-Akhdar), Abu Dhabi.

**Weather:** Clear, bright and sunny.

**Circumstances:** Following two days of strong north westerly winds, MD & JMA were making a systematic check of the Khalidiya spit (Ras al Akhdar) area for recently arrived migrants. Already some eight White-throated Robins *Irania gutturalis*, 20-30 Common Redstarts *Phoenicurus phoenicurus* and several Rufous Bushchats *Cercotrichas galactotes* had been noted, when, at 10.00, the bird identified as a Blackstart was located in an area of patchy scrub and bare ground. It was watched at a distance of c. 100m for 20-30 minutes with 10x40 Zeiss Dialyt binoculars and a 20x60 ED fieldscope.

### Description

**Size & shape:** The size of a small wheatear *Oenanthe* spp. It appeared slim bodied, with medium length tail and relatively short wings. At a distance it appeared as an all grey slim chat, paler grey below than above, with a black tail and rump.

**Head:** Entirely mid-grey in colour, 'slightly paler on the throat with a paler area stretching back around the lower edge of the ear coverts, which were maybe a shade browner. Head quite rounded, with a dark eye and typical shortish, chat-shaped bill which was also dark.

**Underparts:** pale grey, just a shade paler than upperparts.

**Upperparts:** mid grey on mantle and back, becoming black on rump and tail. Medium length tail, frequently flicked. The wings were dark brown to black, darker than

the mantle. The tertials had some pale fringing, showing as one of the only features visible when perched.

**Softparts:** Legs black; bill & eye dark.

**Behaviour:** Flycatching by perching on an upright twig and leaping upwards to catch prey in the air, then either returning to the same perch, or to ground. When on ground, stood like, for example, a Black Redstart *Phoenicurus ochruros* - rather upright; it also drooped wings whilst flicking tail. When catching in the air, had a buoyant and 'floating' flight, almost like a flycatcher.

**Characters considered to exclude similar species:** Combination of grey and black plumage and obvious chat shape eliminate most other species. Spotted flycatcher *Muscicapa striata* also present for comparison, but greyness of the bird and its "performance" when on the ground including tail flicking and wing drooping as well as lack of streaks on head and breast eliminate this possibility.

Both observers have previous experience of this species and of similar or related species (cf wheatears, chats, redstarts).

\* **Michael Dryden,  
Roblea, Route des Genets,  
St. Brelade, Jersey, JE3 8LF,  
Channel Islands, via UK  
& J.Max Allan,  
Brookside, Rue du Huquet,  
St. Martin, Jersey.**

\* to whom all correspondence should be addressed.

The Emirates Bird Records Committee commented "Blackstart is generally considered a sedentary species and is known to breed no closer to the UAE than in central Saudi Arabia and southern Oman, both some 750 km from Abu Dhabi. It has, however, occurred previously on the Arabian Gulf coast of Saudi Arabia, near Jubail, well outwith the breeding range. Whilst an autumn or winter record might have been more probable in the UAE, as this species would generally be feeding young at the time when this observation was made, this record was accepted unanimously on its first circulation of the EBRC. The EBRC commended the quality of the documentation, as reproduced here, (of an essentially monochrome plumaged species with a diagnostic behaviour), which it is hoped other observers will treat as a template for any submissions of their own".

## A first confirmed record of the Leopard Butterfly, *Apharitis acamis* (Klug) from Sharjah Emirate (Lepidoptera: Lycaenidae: Theclinae)

Of the 50 or so species of butterflies known from the UAE and nearby areas of Oman, the two species of myrmecophilous (ant-loving) butterflies of the genus *Apharitis* are both amongst the least known and the most threatened of all regional insects. Of the two, the Desert Leopard Butterfly, *A. myrmecophila myrmecophila* (Dumont), is the lesser documented, but was recorded by Brown (1992) for the UAE, without any exact locality. For Arabia as a whole, only a few specimens are known, including material from the Rub al Khali (Empty Quarter) and a singleton from Masirah Island in Oman. These specimens are remarkably variable, but have been provisionally referred to the nominate subspecies known from N. Africa to the Sinai Desert (Larsen, 1983), rather than to the Iranian subspecies, *farsica* (Rose & Schurian, 1977).

The Leopard Butterfly, *A. acamis* (Klug, 1834) is only marginally better known, but appears to fly in Arabia in two, or possibly three, subspecies. Larsen (1983) has suggested that the name of the nominate subspecies, *A. acamis acamis* (Klug, 1834), be restricted to Syrian populations, but it is also clearly stated that such forms might be expected to occur in the northern Hejaz and perhaps in eastern Arabia. This subspecies is essentially intermediate in characteristics to the two documented subspecies known from Arabia. These are the Arabian subspecies, *bellatrix* (Butler, 1886), known from Aden, Hadhramaut and Dhofar regions in southern Arabia and the Indian subspecies, *hypargyros* (Butler, 1886), known from a few localities in northern Oman and from around Al Ain, but without exact locations having been given. Most recent records are from mature date palm plantations in oases, where eggs are laid directly on palm trunks in which *Crematogaster* ants live in the old borings of rhinoceros beetles, *Oryctes* sp. Under these conditions, there appear to be no larval foodplants, and hatchling larvae are taken directly by the ants to their nests where the larvae either feed on the ant brood or

are fed by the ants. Other records are from Masirah Island and a nearby islet, where there are no palms. The Arabian subspecies is smaller, paler and less extensively marked with black than the Indian subspecies and often closely resembles the Desert Leopard butterfly.

The Indian subspecies is known to the author from the Aboule region of Oman and on gravel plains close to small date groves in the Mahdah area. Butterflies from these localities are dark and extensively marked with black, like other known Omani specimens. At Aboule the species has also been observed ovipositing directly onto palm trunks. It was, therefore, surprising to encounter numbers of Leopard butterflies in scrub desert near the Sharjah University City at around mid-day on 4 March 1999. The butterflies occasionally perched on vegetation, but, if approached, they sped off too rapidly to be followed by eye. It was first thought that they might be Desert Leopard butterflies, but eventually a single male was netted. It proved to be only a Leopard butterfly, but is a very interesting find. It is provisionally recorded here as *A. acamis hypargyros*, but though extensively marked with black, the insect is much paler than Omani specimens (Figure 1). This suggests a possible subspecific distinction between oasis and desert populations of the Leopard butterfly in this region, with the former clearly being referable to *hypargyros* and the latter possibly to *acamis*. More observations and additional specimens will be needed to resolve this.

### References

- Brown J.N.B. (1992) Butterflies of the United Arab Emirates. *Tribulus* 2.1: 10 - 11.  
Larsen T.B. (1983) Insects of Saudi Arabia Lepidoptera; Rhopalocera (A monograph of the butterflies of the Arabian Peninsula). *Fauna of Saudi Arabia* 5: 333 - 478.

Dr. M. P. T. Gillett



Figure 1 Upperside of Leopard butterflies from the UAE/northern Oman region: A. male from Sharjah, possibly referable to subspecies *acamis*; B. female subspecies *hypargyros* from the Aboule region of northern Oman.

## Memorial unveiled to UAE's first oil well

Nearly fifty years after it was first drilled, the first exploratory oil well in the United Arab Emirates is now marked by a special memorial, to commemorate its place at the very beginning of the country's recent development.

The well, named Ras Sadr-1, is on the coast at Ras Sadr, around 40 km north east of Abu Dhabi. Spudded in on 15th February 1950, it was not completed until April 1951. Although it proved to be a dry hole, it reached a depth of 13,001 feet, and was, at the time, the deepest oil well ever drilled in the Middle East.

The drilling operation was very different from the highly sophisticated technology of today, while considerable difficulties were also created by the remote location of the well site. At the time, there was no port in Abu Dhabi, and all the supplies, both for the drilling rig and for its crew, had to be landed from barges at Ghanadha, a spot on the coast several kilometres away, these then being brought laboriously across country to the rig site.

The well was drilled by a consortium of international firms who, through the Iraq Petroleum Company and its local subsidiary, Petroleum Concessions (Trucial Coast), at the time held concessions for all of the sheikhdoms then known as the Trucial States, but which now comprise the United Arab Emirates. IPC, whose shareholders were BP, Shell, Total, Exxon, Mobil and Partex, had signed an exploration concession with the Emirate of Abu Dhabi in January 1939. Sixty years later, the same companies, through what became known as the Abu Dhabi Petroleum Company, ADPC, still own 40 per cent of the Abu Dhabi Company for Onshore Oil Operations, ADCO, which operates the Emirate's onshore fields, with the remaining 60 per cent being owned by the Abu Dhabi National Oil Company, ADNOC.

The Second World War delayed the beginning of

exploration in the Trucial States, and it was not until the late 1940s that geologists began the search to identify the site for the first well.

The Ras Sadr-1 well was followed by a number of other unsuccessful wells, and it was not until the late 1950s, with the Murban-3 well, that ADPC made its first commercially viable discovery, the giant Bab field. Today, Abu Dhabi has an installed capacity of over 2.5 million barrels a day, and the fourth largest proven oil reserves in the world. Ras Sadr-1, however, represents the real beginning of the UAE's oil industry, and to mark its importance, a special memorial has now been erected on the site by ADCO. The inauguration of the memorial, on 28th February, was attended by three UAE senior citizens who had themselves worked on the well, two of whom are still associated with the company.

ADCO is a corporate sponsor of the Emirates Natural History Group, and has provided extensive support to the Group since it was formed over twenty years ago, in particular funding a recent ENHG survey of Jebel Hafit.

It has also supported a number of other projects designed to study the country's natural history and heritage, including research by London's Natural History Museum into the palaeontology of the late Cretaceous and late Miocene periods and studies of seagrass, corals and algae in inshore waters of Abu Dhabi. It recently commissioned the first-ever survey for archaeological sites in the oilfields, carried out between November 1998 and January 1999, (see *Archaeology Review*), part of a continuing programme of support for the Abu Dhabi Islands Archaeological Survey.

**Peter Hellyer**  
P.O.Box 45553,  
Abu Dhabi, U.A.E.



Ras Sadr-1: the first oil well drilled in the UAE, the site of which has now been preserved by the Abu Dhabi Company for Onshore Oil Operations, ADCO, whose predecessor drilled it in 1950-1951. Seated are three UAE nationals who worked on the well, along with the ADCO General Manager.

## Recent Publications

---

**Hidden Riches: An Archaeological Introduction to the United Arab Emirates.** Peter Hellyer. Union National Bank, Abu Dhabi. (1998) (Price n.a). 226pp.hdbk

With a Foreword by HE Sheikh Nahayan bin Mubarak Al-Nahayan and a preface by Professor D.T. Potts.

Peter Hellyer's latest publication provides a much needed, up-to-date and accessible overview of current archaeological and historical research on the United Arab Emirates. Hidden Riches is based on his close personal experience of the archaeological scene in the country over the past decade and it reflects his extensive knowledge of the sites and his close relations with many archaeologists working in the UAE.

Apart from its intrinsic virtues, one of the most important aspects of Hidden Riches is that it provides in English (and, of particular value, in Arabic, introducing the UAE's heritage to its own people), a comprehensive account of recent research at the main archaeological sites in the Emirates. It should be of great benefit for students of archaeology and history and also for the general public.

Unjustifiably, Arabia has long been a rather isolated and esoteric element within Near Eastern studies and although much has been discovered over the past 50 years or so, results of scholarly research on the Peninsula tend to be found in academic journals with limited circulation, held only in specialist libraries; new knowledge rarely seems to penetrate to a wide academic or to a popular constituency interested in Arabia's past, or if it does, it takes a very long time to do so.

Peter Hellyer's book bridges the gap between current research and popular interest with an up to date account of current work in the UAE which is informative and very well illustrated. Along with the author, Union National Bank is to be especially complimented on its willingness to take on a social responsibility and bring this record of the UAE's past within reach of a broad readership.

It is a peculiarity of the UAE and of so much of the rest of Arabia that its long history is not contained in written records. However, in contrast to the paucity of the literary record, there is a vast body of geological, palaeontological and archaeological records that go back over a vast period of time to provide a quite detailed picture of the distant history of SE Arabia. Thus, the oldest UAE geological formations belong to the Cambrian period while the oldest fossils from the Hajar mountains are dated to some 200 to 125 million years ago. However, perhaps most striking from early times is the result of palaeontological studies which in recent years have revealed evidence of a far wetter Arabia in the past with a great river that flowed a million and more years ago from the Empty Quarter desert through Abu Dhabi's Sabkhat Matti into the then still unborn Arabian Gulf: at that time, an environment rather like that of modern East Africa prevailed in the UAE with crocodiles, hippopotami and elephants among the animals that roamed the river banks of Abu Dhabi's vanished waterway.

The picture is no less dramatic in later times, but, once more, it is based on archaeologically retrieved evidence. The earliest evidence of human settlement in the UAE is associated with Late Stone Age sites dated to ca 7000-6000 Before Present at Dalma and Merawah in Abu Dhabi Emirate and at Jebel Buhays in Sharjah Emirate. These sites are characterised by the elegant and finely cut lithic tools and weapons of the so-called Arabian Bifacial Tradition that is found up and down the Gulf. First properly studied in Qatar, these lithics are now to be seen as a part of a widespread lithic-based technology all over the region in the Late Stone Age. Without the information provided by archaeology, the

UAE's history would be extremely meagre, and Hidden Riches underlines this point for every period with which it deals.

Hellyer's account of the Umm an-Nar period, in particular, shows the breadth of settlement in the Emirates that relates to this sophisticated cultural period when the UAE was a major exporter of bronze along the Gulf and perhaps to the Indian Ocean coasts. It is pleasing to see so many less familiar Umm an-Nar and Bronze Age sites well illustrated including those in the Emirates of Ajman, Fujairah and Ra's al-Khaimah. These underline how widespread Umm an-Nar period settlement was in the UAE, stretching far beyond the more familiar bounds of the sites of Hili near Al Ain, in Abu Dhabi Emirate. Peter Hellyer has also achieved something of a coup, with his visits to the restricted zone that encompasses Umm an-Nar itself near Abu Dhabi city, and he publishes a new photograph of the site. This are visits which many an archaeologist working in the UAE will envy him.

The "Hellenistic" sites at Mleiha (Sharjah Emirate) and al-Door (Umm al-Qaiwain Emirate) are among the most important in the Gulf for the period down to the 4th C. AD and the additional information that is provided here shows how important they are. One hopes that the present book may prompt more published results for this period, especially from the al-Door excavations.

The Islamic period in the Gulf was perhaps the most neglected period until recent years and the complexities of early Islamic settlement (with many questions still unanswered) is a matter of continuing research and re-interpretation. The recent discoveries at Kush in Ra's al-Khaimah are of great importance for our understanding of the early and the middle Islamic periods, a time span which is one of the most tantalising in the region. As to the later Islamic period remains which Hellyer discusses, they are ubiquitous, but this sheer ubiquitousness is sufficiently complex to indicate the need for more research, both on the UAE mainland and on the Arabian Gulf coast, from Ra's al-Khaimah in the north to the western borders of Abu Dhabi's interior, on Abu Dhabi's islands, and down through Fujairah on the East Coast.

The value of Hidden Riches lies very much in the synthesis and the overview that it provides. But beyond this, Peter Hellyer has gone a long way to countering the long out-dated view that there is no archaeology in the UAE because the country's archaeological sites lack the monumental remains of Mesopotamia or the Nile Valley. It is to be hoped that Hidden Riches will help challenge this view and that it will contribute to showing UAE nationals, expatriates and students of Arabia the diversity and the wealth of the archaeology and the history of the country.

It is fitting that Peter Hellyer should have undertaken this enterprise for he has been intimately involved and has personally stimulated a great deal of UAE archaeology through his personal commitment and his enthusiasm. It is no less appropriate that HE Sheikh Nahayan b. Mubarak Al Nahayan should have written the introduction for he has generated so much of the archaeological research that Hellyer describes, especially that in Abu Dhabi and on its islands.

**Dr Geoffrey King,  
Reader in Islamic Art and Archaeology,  
School of Oriental and African Studies,  
University of London**

**Wild About Cats.** Marijcke Jongbloed. Barker Trident Communications (sponsored by Shell Markets [Middle East]). 1998. (Dh 75). 84pp sftback. ISBN 0 963 4689 0 9

The wild cats of Arabia are a mystery to most of the younger generation and all but those fortunate enough to dwell in the peninsula's wilder places. All endangered, their future is uncertain. In *Wild about Cats*, Marijcke Jongbloed, founder of the Arabian Leopard Trust, ALT, and manager of the Sharjah Desert Park & Museum, introduces readers to the UAE's wild cats. This book of heartwarming anecdotes transforms them from the stuff of legend, which is what they are to most of us, to living residents of the UAE and neighbouring countries.

Once a family doctor, Jongbloed has become a full-time conservationist, breeding, nurturing and learning from the Caracal, Gordon's Wild Cat, Sand Cat and, of course, the elusive Arabian Leopard. *Wild about Cats* is a personal exploration, ideal for the tyro conservationist and to serve as part of a child's education, with the language simple yet well informed with facts learned through the author's own experiences. The tales of how Arabia's wild cats are endangered, and of the frustrations and delights of raising them in captivity are all described in this book which will make you laugh and cry, but, most of all, will inspire.

Jongbloed, affectionately known as the 'cat lady' since her arrival in the UAE fifteen years ago, because of her love for the domestic feline, came to the country to practice medicine. To her surprise she found not a barren desert but a country with a cornucopia of wild flora and fauna, and the mountains of the Emirates soon became a favourite stamping ground. Jongbloed soon became an amateur naturalist but became captivated by the wild cats and, seeing their plight, determined to do something positive for their future.

Jongbloed's achievements prove that one person's efforts can change the future for our wildlife. A former recipient of the ENHG's Sheikh Mubarak Award, she has also received accolades internationally, including the Golden Ark Award of the World Wide Fund for Nature, WWF, and a knighthood from her native Holland.

Though the battle to save the Arabian Leopard is far from over, Jongbloed has gained the support and respect of people of all ranks, from the man in the street to senior government officials. With the publication of this short book, sponsored by Shell Markets (Middle East) as part of its support for conservation and the environment in the UAE, the ALT hopes to gain even more support and recognition.

**Toni Potts**

**Filling In The Blanks: recent archaeological discoveries in Abu Dhabi.** Peter Hellyer. Motivate Publications for the Abu Dhabi National Oil Company, ADNOC. 1998. (Dh 120). 80pp. hdbk. ISBN 1 8606 3 024 3.

The title of this book is that of a 1992 lecture given by Dr. Geoffrey King, Academic Director of the Abu Dhabi Islands Archaeological Survey, ADIAS, in which he outlined its initial results in pursuing its aim of 'filling in the blanks on the historical map of Arabia.' Prior to the launching of ADIAS, virtually nothing was known of the archaeology of Abu Dhabi's islands. Subsequently, however, a number of major discoveries have been made, many reported in previous issues of **TRIBULUS**.

Written by the Survey's Co-ordinator, *Filling In The Blanks* reports on the first six years of ADIAS, and provides a useful introduction to the previously unknown heritage of Abu Dhabi's coast and islands. Appropriate credit is given to the work of ENHG members who first identified unrecorded archaeological sites on some of the key islands, including Sir Bani Yas, Qarnein and Merawah. Sponsored by ADNOC, long a supporter of

ADIAS, it has an Introduction by ADIAS Patron Lt.-Gen. Sheikh Mohammed bin Zayed Al Nahyan.

**Vegetation of the Arabian Peninsula.** S.A. Ghazanfar & M. Fisher (eds.), 1998. Kluwer Academic Publishers, Dordrecht. 362 pp. ISBN 0-7923-5015-4.

*Vegetation of the Arabian Peninsula* is the first book to cover all aspects of the vegetation, phytogeography and conservation of Arabia and synthesises the current state of knowledge, including lower plants such as bryophytes and lichens. Only algae are not dealt with extensively.

Edited by Shahina Ghazanfar and Martin Fisher, and with contributors including Dr. Benno Boer of Abu Dhabi's ERWDA, it includes chapters on the vegetation, ecology and phytogeography of the mountains, wadis, plains, sand deserts, coasts, sabkhas and water bodies. Also included are chapters on climate and geology, the uses of plants for medicines, dyes, perfumes, cosmetics, building materials, utilitarian objects and fodder and one on diversity and conservation, detailing the region's species richness and endemism, current threats to plant diversity and measures taken in the form of protected areas and legislation in each country.

It makes an invaluable contribution to scientific knowledge of Arabia.

### Publications Received

#### Journals:

**Arabian archaeology and epigraphy, Vol. 9:2,** Nov. 1998. Munksgaard, Denmark. ISSN 0905-7196.

UAE-related papers as follows:

Some issues in the study of the pre-Islamic weaponry of southeastern Arabia, (D.T. Potts), 182-208; A preliminary study of the ground stone tools from Muweilah, Sharjah Emirate, UAE, (K.M. Davis), 209-235; New evidence for specialised ceramic production and exchange in the southeast Arabian Iron Age, (P. Magee, P. Grave, W.Y. Al-Tikriti, M. Barbetti, Z. Yu & G. Bailey), 236-245; The Iron Age fortification of Husn Awhala, Fujairah, UAE, (C. Petrie), 246-260; More pre-Islamic coins from Southeastern Arabia, (E. Haerinck), 278-301.

**Bulletin of Archaeology, The University of Kanazawa, Japan, no. 24.**

UAE and Gulf related papers in English as follows: 1997 excavations at Jazirat al-Hulayla, Ras Al-Khaimah, U.A.E, p. 99-196; 29 figures, 94 plates (Tatsuo Sasaki and Hanae Sasaki); Comments of two vertebrate samples from early Islamic Jazirat al-Hulaylah and Islamic Julfar, United Arab Emirates, p. 194-203; (Mark Beech). Paper in Japanese with English summary: South-eastern Arabia in the Historical Sources before the Sasanian rule; p. 20-38; (Yuzou Shitomi). Cobalt-Blue Decoration Painted on Early Islamic White Glazed Wares. p. 39-59; (Katsura Hato). Archaeological Museums in the UAE [in Japanese] (Hanae Sasaki).

#### Books:

(Mention here does not preclude a review in future issues)

D. Whitehouse, **The Glass Vessels (The University of Ghent South-East Arabian Archaeological Project. Excavations at ed-Dur. Umm al-Qaiwain, United Arab Emirates. vol. I)**, with an Appendix by R.H. Brill, Illustrations E. Smekens, preface E. Haerinck, ed.), Leuven, 1998, 120 p., 12 fig., 15 pl., 2 colour pl. (ISBN 90-429-0662-6) (1800 BF) (orders at Peeters Press, Bondgenotenlaan 153, B- 3000 Leuven, Belgium (fax: 32 16 22 85 00; e-mail: peeters@www.peeters-leuven.be

# Editorial Notebook

## Research Notes

### 'Breeding Birds of the UAE' update

An update of the ADNOC-sponsored book 'Status and Conservation of the Breeding Birds of the UAE' is now under way, prior to planned publication in Arabic. Since publication in January 1996, when 101 species were recognised as having at least attempted to breed in the UAE, a further 41 species, including exotics, have been recorded in circumstances requiring inclusion. As a result, the author has been asked to complete an update. Although only five years has passed since data-collection slowed in order for the first edition to be written, many population changes have been detected and the status of many species is now quite different. The revised edition will contribute to the formulation of an action plan to aid bird conservation nationally. Contact: Simon Aspinall, P.O.Box 45553, Abu Dhabi, U.A.E.

The following unpublished papers related to UAE archaeology have been completed at the School of Archaeology, University of Sydney, NSW 2006, Australia.

Diane E. Barker (1997): Sharm. A Typological and Scientific Analysis of Wadi Suq and Iron Age Period Ceramics from Fujairah, United Arab Emirates. (Honours thesis).

Soren Blau (1998): Finally the Skeleton: An Analysis of Archaeological Human Skeletal Remains from the United Arab Emirates. (PhD thesis).

Melissa Riley (1998): Bayt Sheikh Abdullah bin Hamdan al-Sharqi. A Study of the Sheikh's Palace and its Associated Buildings, Wadi al-Hayl, Fujairah. (Honours thesis).

Michele Ziolkowski (1998): Survey Catalogue of Islamic Sites on the East Coast of Fujairah, United Arab Emirates. AH 1418 / 1997-98.

## ENHG Annual Awards

Winner of the 1998 Sheikh Mubarak bin Mohammed Prize for Natural History was Dr. Michael Gillett, Associate Professor in the Department of Biochemistry of the Faculty of Medicine and Health Sciences of the Emirates University.

Gillett, a frequent and prolific contributor to *Tribulus* since his arrival in the UAE several years ago, was awarded the prize for his major contribution to the study of the country's insect life. Simply put, he has made a greater contribution in the field than any other single person.

The Sheikh Mubarak bin Mohammed Prize was instituted by ENHG Patron and Minister of Higher Education and Scientific Research Sheikh Nahayan bin Mubarak Al Nahayan, who presented Gillett with his award in a ceremony in late December 1998.

Recipient of the annual Bish Brown Award, named after the ENHG founder, was Gary Feulner, another regular *Tribulus* contributor, who, when not masquerading as a corporate lawyer, has evolved over the years into a latter-day Brown himself, with a breadth of interests and curiosity that have enabled him to make discoveries in fields as widely separated as geology, botany, molluscs, freshwater fish and archaeology.

Both polymaths in their interests, they are worthy winners. Reports on some of their latest work appears elsewhere in this issue.

## Tribulus Advisory Board

Dr. David M. Jones has agreed to serve on the *Tribulus* Advisory Panel, with special responsibility for Arabian mammals and for conservation.

Currently Director of the North Carolina Zoological Park in Asheboro, North Carolina, Dr. Jones is a former Chief Executive Officer of the Zoological Society of London and has nearly 30 years experience in the zoological and conservation world, with particular experience of Europe, the United States, the Middle East and Africa.

A former Chairman of Fauna and Flora International, he served as Chairman of the Conservation Committee of the World Wide Fund for Nature, WWF, - UK, and is currently on the Council of both WWF-UK and WWF-US. Major projects in the Gulf have included planning of the new Kuwait National Zoo, founding and management of the King Khalid Wildlife Research Centre in Saudi Arabia and stocking and management of the Doha (Qatar) Zoological Gardens, as well as master-planning for the new Dubai Zoo. He has also carried out a detailed study for the Government of Abu Dhabi on plans for the upgrading of Al Ain Zoo.

Also joining the Advisory Panel is Dr. Geoffrey R.D. King, Reader in Islamic Art and Archaeology at the School of Oriental and African Studies of the University of London. Formerly employed at the American University of Cairo, King Saud University in Riyadh, Saudi Arabia, and at King's College, University of London, Dr. King is also currently the Academic Director of the Abu Dhabi Islands Archaeological Survey, ADIAS, which was established in 1992 as a result of discussions between him, ENHG Patron H.E. Sheikh Nahayan bin Mubarak Al Nahayan and *Tribulus* Managing Editor Peter Hellyer.

Formerly Director of the British Archaeological Expedition at Julfar, Ras Al Khaimah, from 1989-1992, Dr. King has also undertaken archaeological surveys, excavations and other fieldwork in Jordan, Syria, (where he is currently Director of Excavations at the citadel in Homs), Saudi Arabia and Yemen. Author of several books, (including one on the work of ADIAS), and of numerous academic papers, he is a past contributor to this journal.

It is the intention of the Editorial Board to invite further people to join the Advisory Board in due course, in order that the quality of the journal may be further enhanced.

## Arabic language section

Regular readers will note that there is no Arabic language material in this issue. This is for two reasons. First, all the material being submitted is in English, despite the original hope of the Editorial Board that contributions in Arabic would be submitted. The Board has a policy of seeking to publish accepted contributions without undue delay, in order to place the information therein contained into the public record as soon as possible. The additional space made available will help us to achieve this.

Second, we are pleased to announce that the ENHG has agreed with the Abu Dhabi Cultural Foundation, (PO Box 2380, Abu Dhabi), that selected papers from *Tribulus* will now be translated and published in the Foundation's own magazine, including papers from previous issues of the journal. We are grateful to the Cultural Foundation for this initiative.

# Archaeological Review

## The UAE's winter season

The usual flurry of activity took place throughout the UAE over the winter, with teams working from October 1998 until early May 1999. A partial review follows.

In Abu Dhabi, the Department of Antiquities and Tourism in the Eastern Region undertook work in four different areas. In Al Ain, work took place just outside the Hili Archaeological Garden, to determine the extent of sites in the vicinity. At Bida bint Saud, north of Al Ain, where an Iron Age settlement had been found in previous seasons, work was focussed on a search for evidence that a second falaj exists in the area.

Under the aegis of the Department, a two-person team from the University of Freiburg carried out a season of survey for archaeological sites in and around the Liwa Oasis, while the Department also continued its maintenance and conservation work at the site of Umm an-Nar, adjacent to Abu Dhabi Island.

Elsewhere in Abu Dhabi, teams from the Abu Dhabi Islands Archaeological Survey, ADIAS, were active throughout the Western Region. With the assistance of the Abu Dhabi Company for Onshore Oil Operations, ADCO, ADIAS identified a number of previously unrecorded sites throughout ADCO's field areas, including sulphur mines at Jebel Dhanna, a group of hearths on the island of Rufayq, and a number of camp sites with associated pottery in the Sahil area.

The sulphur mines, including around 100 shafts and a number of trenches with small galleries, are the first to be recorded in the UAE, although there have also been unverified oral reports of sulphur mining in the past on Sir Bani Yas, which, like Jebel Dhanna, is a diapiric salt dome. Pottery found in association with the mines and on a nearby coastal strip has been provisionally assigned a date between the 17th - 18th Centuries.

ADIAS also carried out a further examination of hearth sites on the islands of Balghelam and Merawah. Also on Merawah, mapping continued of the major MR-1 Late Stone Age site, while an Australian team excavated two large lime kilns, the first of their type to be studied in the UAE. Dating of material from the kilns is now under way, but a preliminary examination of pottery from the site suggests that they may date to the 1st Millennium AD.

C14 dating of date stones from a site on Dalma provided dates of around 5,000 BC, (see P. 17), while the MR-1 Late Stone Age site on Merawah and another lithics site on the western island of Ghagha' have now been confidently assigned to this period following the identification of ceramics from the 'Ubaid period. The pottery is being studied for ADIAS at the Centre National des Recherches Scientifiques in Paris.

In Fujairah, further surveying and mapping was undertaken in the Wadi Safad. Carried out by a two-man team from Trinity College, Carmarthen, the work focussed on the abandoned husn and associated settlement and terraced field system, and will resume later this year. On the coast, a team from the University of Sydney, led by Michelle Ziolkowski, began excavations of the small 'Portuguese' fort at Bidiya. Much robbed, and itself having been built partly with stones robbed from an adjacent Third Millennium BC tower from the Umm an-Nar period, the fort is the first fortification from the period of the Portuguese presence along the UAE's northern coastline to have been examined by archaeologists.

Both Fujairah projects received small grants from the ENHG's Conservation Fund.

In Sharjah Emirate, the usual variety of excavations were undertaken, both by the local team and by visiting teams. These included further excavation of Iron Age burials on Jebel Buhays, as well as a further season of work by the University of Tübingen on the major Late

Stone Age mass burial site, and a geomagnetic survey of the Iron Age village at Muwailah, near Sharjah airport. This work, led by a University of Sydney team, provided evidence that the area of the village was significantly more extensive than had previously been suspected.

On Sharjah's East Coast, a team from the Institute of Archaeology at London University continued work on the tell in the Kalba data plantations, which is now providing evidence of a sequence of occupation from the Umm an-Nar period through until the late Iron Age. Although much obscured as a result of the deposition of outwash from the nearby mountains, the tell is broadly similar in dimensions to the better known site at Tell Abraq on the borders of Sharjah and Umm al Qaiwain, and is one of the country's most important archaeological sites.

The key focus of work in Ras Al Khaimah was at the late Sasanian/early Islamic tell at Kush (see below).

**Peter Hellyer**

## Excavations at Kush, 1998

The fourth season of excavation at the important Sasanian/Islamic site of Kush in Ras al-Khaimah was conducted during November and December 1998. The main trench has now reached a depth of more than 3.5 metres and the deepening stratigraphy is beginning to elucidate the development and origins of the tell.

The site was clearly defended from its foundation, which now looks as if it occurred in the late Parthian or early Sasanian period. Various phases of growth are represented by sequences of walls and ditches. During the 5th or perhaps 6th century AD (precise dating is still uncertain), the site was redefined by the construction of a substantial mud-brick defensive wall standing over 3 metres tall and 2 metres wide. This wall probably defined a large rectangular area on top of the tell. The structure is believed to have been a Sasanian fortress. It was not in use for much more than a century before there it seems to have been destroyed and the site was almost completely abandoned for about two hundred years. It is, of course, tempting to equate this destruction and abandonment with the overthrowing of the Sasanian colonists by the early Islamic Arab tribes under the Julanda kings. This theory still needs to be confirmed by C14 dates.

The site was reoccupied in the 9th century and began to grow and to re-establish itself as the major local urban centre. By the late 13th century the commercial success of the site and the silting up of its adjacent lagoonal harbour caused it to be abandoned in favour of the more favourably located al-Mataf Julfar some two km. away.

This is the story that is emerging so far from the excavations. Considerable insight has been gained into the origins and early history of Islam in historic "Uman". Further details will be added when the full analysis of the palaeobotanical and palaeofaunal material and the pottery is completed.

The project is a collaboration between the Ras al-Khaimah Department of Antiquities and Museums and the University of Durham and is being supported by Shell Markets (Middle East) Ltd, The National Bank of Ras al-Khaimah, the British Museum and the British Academy. Permission for the project has been granted by Supreme Council member and Ruler of Ras al-Khaimah His Highness Sheikh Saqr bin Mohammed Al Qassimi, to whom project members extend their thanks and appreciation.

**Derek Kennet,  
Advisor, Dept. of Antiquities and Museums,  
Ras al-Khaimah  
Department of Archaeology,  
University of Durham,  
Durham DH1 3LE. U.K.**

# Recorders' Reports: Mammals and Miscellaneous

Reports of sightings of mammals and reptiles in recent issues of **Tribulus** have been few and far between, largely because little in the way of the results of fieldwork has been reported to us. The following notes of recent sightings are in no way exhaustive, and are printed for the record and to encourage the submission of further records. Details have been supplied to the Environmental Services Department of the Environmental Research and Wildlife Development Agency, ERWDA, PO Box 45553, Abu Dhabi, which is currently expanding the collection of material for inclusion in its national database.

## Mammals

### Egyptian Fruit Bat *Rousettus aegyptiacus*

One at the Faculty of Medicine and Health Sciences, Emirates University, Al Ain on 18 January 1999. The individual was presumably sick, since it died later the same day. The body is frozen, pending preservation.

One found dead in the Manhal Palace Nursery, in central Abu Dhabi, 20 November 1998. Body collected. Other animals reported by nursery staff to be present. This is a first confirmed record for the species on Abu Dhabi island (SA).

Previous records for the Emirates have come from Ras al Khaimah and Al Ain, although the species is probably more widespread. Although it has been suggested that the excessive use of pesticides may have taken a heavy toll of the species, (Gross 1996), the expansion of date palm cultivation in recent years may have a beneficial effect on numbers and distribution. Further work is required to determine current status.

### Arabian (Cape) Hare *Lepus capensis*

One at, and two in the vicinity of, Abu Dhabi Airport Golf Club on 6 May 1999 (SNPH). Previous sightings have also been made at this location, where the species appears to have adapted without undue difficulty to extensive human activity and associated development. Three individuals were seen and extensive evidence of the presence of hares was noted during a survey in the large dunes of Bu Hasa oilfield between 4-9 February 1999, confirming the ability of the species to survive in areas with very sparse vegetation, in this case mainly the grass *Cyperus conglomeratus* (SA).

Hares have also been reported in recent months from the area of the Al Ghar Lakes nature reserve, 40 km east of Abu Dhabi (SA).

Chris Drew, of the Terrestrial Ecology Research Centre of ERWDA, is currently engaged in detailed studies of the country's hare population, and is particularly interested to receive details of sightings of baby hares. E-mail address: [crdl@erwda.gov.ae](mailto:crdl@erwda.gov.ae)

### Ethiopian Hedgehog *Hemiechinus aethiopicus*

One individual on a garden in the Muwajji district of Al Ain on 15 & 16 February 1999 (MG).

### Brandt's Hedgehog *Hemiechinus hypomelas*

Road kill near camel race track, Al Ain, on 3 March 1999 (MG).

### Sand Gazelle *Gazella subgutturosa marica*

Counts of 38 on Futaisi island and 5 on Bahrani island were made on 18 October 1998 (SA). Those on Futaisi, at least, are said by UAE national Khalifa Saif Al Qamzi to be of wild origin, and to be descended from a herd

hunted by his father in the 1950s as they crossed shallow channels from the mainland.

Animals are also frequently seen along the track between Musaffah and Bu Khushaishah (Al Aryam), 13 being seen on 23 October 1998, including young (CG).

Three were seen east of the Sahil oilfield, Abu Dhabi, on 9 January 1999 in the vicinity of GPS Location 40Q 023 7717 / 261 5541 (SNPH)

### Arabian (Mountain) Gazelle *Gazella gazella*

Three sight records of separate groups in the desert near the eastern end of the Liwa Oasis, as follows (GD):  
19 March 1999: 1 female, 1 young, (estimated 1 week old). Position: N23.09.565..E054.07.970.

1 April 1999: 2 females.

Position: N22.55.414..E054.30.754..

1 April 1999: mixed herd of 7 animals.

Position: N22.55.046..E054.30.725.

Although apparently wild, and in an area where wild animals are believed to have survived the hunting pressure that continued until the passing of legislation in the late 1970s, it is not possible to be certain of the origin of these animals. Extensive releases of gazelles, both *G. gazella* and *G. subgutturosa*, are known to have occurred in Abu Dhabi, although the bulk of the releases have probably been in the western Baynunah region, from captive-bred stock from the island of Sir Bani Yas.

## Amphisbaenians

### Diplometopon *zarudnyi* (Trogonophidae)

One, around 14 cm total length, under wooden board in desert scrub near Sharjah National Park on 28 January 1999 (MG). The species is widespread, but is rarely recorded. Records have previously been published from the western desert of Abu Dhabi, including Liwa and the Asab oilfield (Hellyer 1994), and along the border between Abu Dhabi and Dubai (Osborne 1996), but it has also been found in Dubai gardens and even in flowerpots, while its tracks are seen regularly at the Sharjah Natural History Museum (MJ). More records should be easy to come by, to permit a proper mapping of the distribution of this common, if somewhat secretive, animal.

### Acknowledgements:

Records in this summary were contributed by Simon Aspinall, George Duncan, Michael Gillett, Colin and Joy Glendenning, Peter Hellyer and Marijcke Jongbloed.

### References:

Gross, C. [1996]. Terrestrial Mammals, in Vine, P. (ed.) Natural Emirates, Trident Press. p. 224.  
Hellyer, P. [1994]. Amphisbaenian *Diplometopon zarudnyi*. **Tribulus** 4:1. p. 22.  
Osborne, P. (ed.) Desert Ecology of Abu Dhabi, Pisces, Newbury. p.144.

compiled by Peter Hellyer

# Bird Report

## October 1998 to March 1999

Note: Many records remain unsubstantiated. The Emirates Bird Records Committee should be consulted prior to quoting from this summary report.

### OCTOBER 1998

Temperatures remained above average and a Dubai October record of 41 C was measured on the 2nd, with still conditions bringing uncomfortable humidity. Such daytime highs on the Gulf coast meant even higher temperatures inland with storm clouds building over the mountains but no measurable rain. From the 17th, daytime temperatures were back to normal, a more comfortable 34 C which remained so to month end. The 28th was particularly pleasant with clear, dry air and a high of 32 C, even inland. The skies were virtually cloudless throughout.

It was mid-month before any eyebrow-raising sightings were reported. A Sooty Falcon, always rare on the mainland, was found at Ras al Khaimah on the 13th, just a fly-past and probably on its way to Madagascar. Three White-tailed Plovers were at Ramtha tip on the 16th, the same day that a much rarer Little Bunting (13th record) was found on Das Island. The season's first Bimaculated Larks, four of them, returned to the Al Ain camel track on the 20th. Meanwhile, back in Ras al Khaimah, a White-breasted Kingfisher (5th record) was found at the edge of the town mangroves on the 23rd. On the 24th, a Savi's Warbler was at the Emirates golf course and two Blyth's Pipits were at Al Habab while two Small Skylarks were found at the Fujairah National Dairy Farm on the 26th. The find of the month, by a visiting tour/group, was two Pectoral Sandpipers at the last reservoir at Hatta on the 27th. This was the first record for the country and was one of less than eight records in Arabia. They were successfully 'twitched' by Abu Dhabi EBRC members a few days later. The month dramatically came to an end with a Pin-tailed Sandgrouse (2nd record, if accepted as a wild bird) which flew into the scrubby area adjacent to Khor Dubai, early on the 30th. This was followed the next day by a Little Swift (16th record) at Ramtha tip.

Amongst other interesting finds for the month were a Steppe Buzzard at Umm an Nar golf course on the 1st, a Booted Warbler on the 4th and a Barred Warbler at Das Island on the 5th, a Grasshopper Warbler and a Common Rosefinch at the Emirates golf course on the 9th, two Long-billed Pipits on the 9th and three Lesser Kestrels at Qarn Nazwa on the 16th, a Namaqua Dove at the Fujairah National Dairy Farm on the 21st and a Steppe Eagle at Khor Dubai on the 25th. Single Short-eared Owls were found at Khor Dubai on the 25th and at Das Island on the 27th. Das Island also produced a Hume's Yellow-browed Warbler and a male Spanish Sparrow on the 29th and a Hume's Lesser Whitethroat on the 31st. A very tired Baillon's Crake was reported from the NARC field office in Sweihan in mid October and 45 Marsh Sandpipers were counted at Al Ghar lake in the week ending the 15th.

### NOVEMBER 1998

Temperatures continued to drop to a more comfortable daily high of around 30 C, though still 2-3 degrees above normal. No rain was reported during the month, but

severe fog occurred on the mornings of the 23rd and 24th, not clearing until 10 am, severely disrupting early-morning birding activities. Fresh north-westerlies were experienced intermittently as troughs passed across the upper Gulf.

The month's highlights included 12 Bimaculated Larks at Al Wathba on the 5th, a Long-toed Stint (14th record) at Hatta lake on the 6th, two Wattled Starling (2nd record) at Al Wathba on the 7th, two Mourning Wheatears at Jebel Dhanna on the 12th, up to three Olive-backed Pipits on Khalidiyah spit from 13-14th and a Yellow-browed Warbler (3rd record) there on the 13th. A Red-billed Tropicbird was seen two miles off Jebel Ali Port on the 14th, the nearest inshore report for many years, while on the 15th, a Ruddy Shelduck, destined to over-winter, and a Crested Honey Buzzard (c.7th record) were at Khor Dubai and a Hume's Lesser Whitethroat was at Qarn Nazwa. A Black-shouldered Kite (9th record) was at Ras al Khaimah airport and surrounding fields from the 18th, a Barred Warbler at Qarn Nazwa, also on the 18th, one or two Black-throated Thrushes in Safa Park from 19th - 21st plus another at Al Mamzar park from 28th - 29th. A White-breasted **Waterhen** (8th record) was at the Emirates golf course from the 21st - 23rd.

Also on the 21st a report came in of a flock of 10 possible Yellow-breasted Buntings in Wadi Ghubbah (near Shawkah), which if accepted, would be only the 2nd record of this species in the country. Other good finds continued to be discovered at the end of the month, with a female Eversmann's Redstart at the Emirates golf course attracting visiting birders from the 22nd - 24th, two Shikras at Zabeel fish ponds on the 24th, while at Dhaya, north of Ras al Khaimah a string of finds, including a Black Stork (5th record) from 21st - 26th, a Reed Bunting (6th record) on the 26th and a Pied Kingfisher from the 27th (which would stay until 19 Jan 1999). Two Blyth's Pipits were at the Al Ain camel track on the 17th and two more, plus an Oriental Skylark were at Al Wathba fields on the 18th. A peak of 54 White Storks were found at Al Wathba on the 23rd and a Ruddy Shelduck was at Al Ghar Lake on the 27th. A Short-eared Owl and a **Scops** Owl were at Das Island on the 29th, while 48 Great Knot were at Khor al Beidah on the 30th.

### DECEMBER 1998

Temperatures continued well above average for the time of year, the maximum mean being 2.6 degrees above the norm. A cyclone in the Arabian Sea on the 16th, bringing strong easterly winds on the 17th, triggered cloud and rain throughout the country from the 18th to the 20th, with a maximum of 8.5mm falling in Ras al Khaimah on the 18th. There was a high incidence of fog, beating all December records in the second week.

The month started off with a surprise, but brief, stumbling upon a Yellow-breasted Bunting (possible 2nd or 3rd record) at Al Wathba camel track on the 3rd. It was unfortunately never relocated. Also there were a rather late Red-rumped Swallow and two Long-billed Pipits. In Dubai eight Cream-coloured Coursers were at Nadd al Sheba golf course on the 5th, a first report of the species there, while out on Das Island the following week a Long-eared Owl, newly dead (7th record) was found on the 6th. At Al Ghar Lake from 4th-10th were notably three Shelduck - it was to be the best ever

winter for this species, with 15 counted at Khor Dubai on the 11th - two Ferruginous Duck (increasing to five on the 18th), 22 Avocets, six White-tailed Plovers, 54 Pacific Golden Plovers and 34 wintering Red-necked Phalaropes. A gazelle survey in the 'hunting triangle' inland from Ghantoot revealed seven Bar-tailed Desert Larks on the 11th. Das Island observers reported a Houbara from 12th to the 20th, a male Eversmann's Redstart on the 14th, and a Hume's Yellow-browed Warbler from the 16th - 23rd. Abu Dhabi hosted numerous Honey Buzzards, including two Crested Honey Buzzards (c.8th & 9th records) from the 17th, plus a rather unseasonal European Nightjar at the Equestrian Club on the 16th & 17th. Following a big storm on the East Coast, three Noddies were seen off Kalba on the 19th, though too far away to be identified as to species. An Alpine Swift (17th record) was over Jebel Hafit on the 20th. On the 24th Al Ghar Lake held a record 182 Black-necked Grebe, while on Christmas Day at least four Hypocottus and a singing Robin were present in thick fog on Khalidiyah spit and a Masked Shrike was at Mushrif Palace Gardens. A Crested Honey Buzzard was seen roosting at the Zabeel fish ponds on the 26th and the Black-shouldered Kite was relocated at Ras al Khaimah airport on the 27th, while on the 31st a Short-eared Owl was at Khor Dubai, a Lappet-faced Vulture flew over Ras al Khaimah airport and a female Blackbird was found in an oasis 150 km. south-west of Abu Dhabi.

## JANUARY 1999

A rather unsettled month, with morning fog on the 1st and 2nd followed by thundery conditions and rain on the 3rd. A shamal occurred from 10th - 12th bringing some cloud and brisk north-westerlies with highs of 24 C most days. Strong south-easterly winds from the 16th raised temperatures to 28 C before rain arrived on the 18th from the west, followed by another north-west shamal until the 23rd when dawn broke to a bracing calm 10 C.

Further light rain was reported on the 25th and it was foggy on the 31st. Temperatures were generally about 2 degrees above normal for January.

There were several interesting finds in January, thanks to some visiting experts and the vigilance of local observers. The month started with a record 36 Glossy Ibises flying to roost at Ras al Khaimah mangroves and an Olive-backed Pipit at Khalidiyah on the 1st. The EBRC regard Yellow-legged Gull *L. cachinnans* as specifically distinct, so when a Herring Gull *Larus argentatus* was found amongst the gull roost at Khor Ajman on the 8th, it was a 1st record, (subject to acceptance, of course). A White-crowned Black Wheatear was feeding high on the Ru'us al Jebel, above Hulaylah on the 8th - details are awaited for this possible 7th record. At the Dubai pivot fields, next to the sewage works, a puzzling pratincole sp. was found on the 9th, believed to be an Oriental Pratincole (possible 2nd record), but the debate rages on to this day. A Jack Snipe and two White-tailed Plovers were at the nearby gravel pits on the 10th. A pair of Golden Eagles (around 10th record) was found at a nest site in Liwa on the 8th, the first proven breeding record in the country.

Off Kalba 300 Persian Shearwaters were flying on the 12th while a Common Gull (7th record) was at Khor Kalba on the 15th. On the same day a Shikra - a species of uncertain status - was at Al Ain compost plant. By the end of the 15th another vagrant had been found, this time a Little Bunting (11th record) at the Fujairah National Dairy Farm, and was still present on the 16th. A Long-tailed Skua (5th record) was seen at Sha'am on the 17th. Also on the 17th, there was a report of two Lappet-faced Vultures, thought to be all but extinct in the Emirates, over the desert at Al Habab. A Greylag Goose was at the Emirates golf course and a

Scops owl sp. was at Safa Park on the 18th and an Egyptian Goose and a probable Blackbird were at the Emirates golf course on the 19th - the latter confirmed on the 29th and last seen on the 31st. Also on the 19th, a Hen Harrier was reported from Abu Dhabi's Equestrian Club, though could not be subsequently relocated. A large heavy snipe-like bird deemed to be a Woodcock flew out of cover near the Emirates golf course wetland sanctuary on the 20th. It was found again on 11th February, confirming the 9th record for the country. One Namaqua Dove and an Egyptian Nightjar, a foretaste of large numbers which would be found later in the spring, were at Al Wathba from the 20th - 29th. A male Blackbird was seen by a visiting birder at Mushrif Park on the 24th. The bird was nearly dismissed as not worth reporting, but although this has been an exceptional year there are still less than 20 records.

Two more Little Buntings (12th & 13th records) were on Das Island on the 21st. A Little Swift (17th record) was at Ras al Khaimah airport on the 24th and a Black-winged Kite (9th record) was at the Fujairah National Dairy Farm on the 29th. Meanwhile, a Greylag Goose was reported north of Dreamland Beach, in Umm al Qaiwain and a record 14 Bar-tailed Desert Larks were found inland of Ghantoot also both on the 29th. The country as a whole was well-covered on the 29th, with observers at the Al Ain camel track reporting huge numbers of aerial species, including 900 Pallid Swifts, c. 300 Swallows and c. 200 Sand Martins. The first Cuckoo was heard at Ras al Khaimah on the 31st.

The annual winter wildfowl count took place again this month, with Khor Dubai hosting 16,645 birds (including 8,230 gulls). Full details are available from the EBRC Secretary on request.

## FEBRUARY 1999

The month was noted for its high temperatures, with the previous records broken yet again on the 27th and 28th of the month, when a maximum of 36°C was reached. It was unsettled too, with overcast skies on the 3rd & 4th, with south-easterlies bringing a rise in temperature and very dusty conditions on the 6th. Humidity rose on the 10th with a light shamal cooling the air and bringing scattered local showers for several days including heavier squalls and a heavy rainstorm on the 13th, which persisted the 14th. The latter half of the month was calm and hot, except for a few cooler days from 22nd to the 26th.

There were many interesting birds found this month, including a couple of 2nd and 3rd country records. A Golden Plover at Umm al Qaiwain on 4 Feb, was the 10th record, while a Kittiwake two days later at Fujairah on the 6th, was the 2nd record. A visit to Qarn Nazwa on the 6th turned up the country's 2nd confirmed mainland record of White-crowned Black Wheatear (7th UAE overall). It remained there until the 8th and was the 11th wheatear species to be recorded at this site. A Mourning Wheatear seen at Bu Hasa on the 5th, in the vicinity of a Yellow-browed Warbler, was followed up a few days later by another on 'Fine Peak' plateau, Ras al Khaimah on the 11th. Always getting a mention in this column, a Blackbird, seen on Das Island from the 6th - 8th, was finally the ±20th record....however its rarity value surely fell when it was finessed by yet two more at Al Maqam, Al Ain on the 11th. To remind everyone that sea watching at all times of the year brings rewards, an early Bridled Tern was seen off the Beach Hotel in Sharjah on the 7th. Surprised observers at the Emirates golf course on the 9th watched two Pin-tailed Sandgrouse (3rd record) fly in briefly to the wetland sanctuary to immerse their belly feathers in the pool. This species is a potential vagrant, yet there have been disturbing reports of many birds being imported and

released locally, so caution is required in their assessment. Single **Black-shouldered Kites** were reported from Khor Dubai (10th record) on the 10th and the wintering bird at Ras al Khaimah Airport, first seen in November, showed again on the 13th. Probably the most exciting, but exasperating discovery of the month was a **Blue-and-white Flycatcher** seen by some visiting birders at Masafi on the 11th. News of this bird, only the 2nd record for the UAE and 3rd for Arabia - the first was in Ras al Khaimah in 1980 - did not reach excited local birders for several days, by which time the bird had gone. Meanwhile, back in Abu Dhabi, two **Olive-backed Pipits** were a welcome find at Khalidiyah on the 11th, followed up by a **Hume's Yellow-browed Warbler** on the 12th. An elusive **Woodcock** (9th record) was confirmed at the Emirates golf course from the 11th -16th, while a **Mistle Thrush** (11th record) was seen on Jebel Ali Village green on the 12th, both rare appearances indicating a hardening of the weather on mainland Asia. Also found by a visiting birder, a dapper-looking **White-breasted Waterhen** (the 9th) spent a few days feeding on the lawns at Dubai's Creekside Park from the 13th - 16th. Three **White-tailed Plovers** at the Wimpey pits in Dubai started displaying from the 15th, only the second breeding record for this species in the UAE. The high quality of birds continued with a number of **Egyptian Nightjars**, one each, seen at Umm al Qaiwain corniche on the 18th and at Ruwayah on the 19th. Up to four confiding **Cream-coloured Coursers**, a species usually absent during winter and spring and becoming quite an attraction for visiting birdwatchers, continued their presence at the Emirates golf course into March.

## MARCH 1999

The month was generally warmer than normal for the time of year, due to a dry south-easterly air flow. The month opened with a moderate, dusty south-east wind accompanied by temperatures of around 36oC, although cooler, unsettled weather arrived on the 2nd, with some heavy rain early on the 3rd and again overnight on the 4th. It was positively fresh on the 6th (24oC) and continued so until the 12th, when southerly winds returned, but soon a shamal developed and by the 17th, the north-west wind was at its height. This brought in a noticeable fall of migrants when the wind dropped on the 19th. A south-east wind redeveloped and the hottest day of the month was the 27th, at 40.5oC, only 1 degree below the all time March maximum set only the previous year.

It was the best month for birding so far this year, with migration going on at a steady, and ever-increasing pace. After a comparatively quiet spell, an exciting fall of migrating species occurred on the 19th, and this heralded an amazing trio of **Pied Stonechats** at the end of the month.

Of rarities, a **Cetti's Warbler** was heard at Ain al Faydah on the 4th, a potential 2nd record but unfortunately it could not be located. A **Crag Martin** was at Qarn Nazwa on the 6th and a **Little Swift** (16th record) was at the Emirates golf course from the 7th - 8th. Also on the 7th, was a **White-breasted Kingfisher** (6th record) perched on power cables beside the road, near Khatt lake. 120 **Hypocolius** were feeding on *Salvadora persicus* berries in the Al Ain camel track car park on the 13th and a **Namaqua Dove** was on the nearby fields the same day. Two **Trumpeter Finches**, more regular just over the border in Oman, were near the Al Ain cement works on the 14th and a **Cinereous Bunting** was at Abu Dhabi Equestrian Club from the 15th - 18th, while a **Crested Honey Buzzard** (10th record) was at Dibba on the 17th. On the 18th, a **Buff-bellied Pipit** (3rd or 4th record) was at Rams rubbish dump and at Hamraniyah the same

day, 40 **Red-rumped Swallows** were hawking insects over the fields. There was an evident fall of birds along the Gulf coast on the 19th - for example a small patch of scrub on Umm al Qaiwain corniche had a packed assortment of **Sand, House and Crag Martin, Red-throated Pipit, Citrine Wagtail, Siberian Stonechat**, four **Pied Wheatears** and an **Orphea Warbler**. Later the same day in Mushrif Park there was a **White-throated Robin** and a **Masked Shrike**, while Al Wathba turned up two **Caspian Plovers**, a rather flighty **River Warbler** (2nd record), a **Grasshopper Warbler** and a **Common Rosefinch**, plus extraordinary numbers of other migrants including 249 **Pied Wheatears**, 117 **Isabelline Wheatears**, 21 **Northern Wheatears** and 41 **Isabelline Shrikes** - all good stuff indeed.

A pratincole which had been at the Wimpey Pits since January, was relocated on the 20th still suspected of being an **Oriental Pratincole** (a potential 2nd record). Up to two **Cinereous Buntings** were at the Emirates golf course from 23rd - 25th. Meanwhile, a visiting birder, with amazing good fortune, discovered three male **Pied Stonechats** one after the other, at the Emirates golf course on the 26th, at the Fujairah National Dairy Farm on the 30th and at the Al Ain camel track on the 31st, each 150 km apart, providing the country's 4th, 5th and 6th records! Three more **Caspian Plovers** were at Sir Bani Yas on the 26th and an Abu Dhabi team managed to find five **Egyptian Nightjars** at the Al Wathba camel track and nine at the Al Ain camel during the hours of darkness on the 30th.

**Observers:** Göran Andersson, Simon Aspinall, Mike Barker, Phil Brett, David Bradford, Alan Brown, John Castree, Adrian Chapman, Barbara Couldrey, Adrian Dally, Nils van Duivendijk, Kari Eischer, Gary Feulner, Dick Forsman, Frank Gardner, Colin Glendenning, Abdul Hakim, Peter Hellyer, J. Holmes, Dick Hornby, Ian Hunter, Kevin Hyland, Steve James, Adrian Jordi, Alex Kirschel, Tom Lawson, Peter Leigh, Keith Macgregor, Tapani Numminen, Trevor de Pattenden, Nora Powell, Ray O'Reilly, Len Reaney, Bruce Reynolds, Markku Rantala, Colin Richardson, Clive Saunders, Leslie Sharpe, David Sheldon, Marti Sipponen, Richard Smith, Andrew Twyman, Paul Willoughby, Mike Wood, Pentti & Teija Zetterberg.

**Colin Richardson,  
Secretary,  
Emirates Bird Records Committee,  
P.O. Box 50394, Dubai, UAE.  
Fax: Dubai (+971 4) 472276  
Email - colinr@emirates.net.ae**



# تريبيكوس

جمعية الامارات للتاريخ الطبيعي

ربيع ١٩٩٩م

المجلد ٩، ١

