

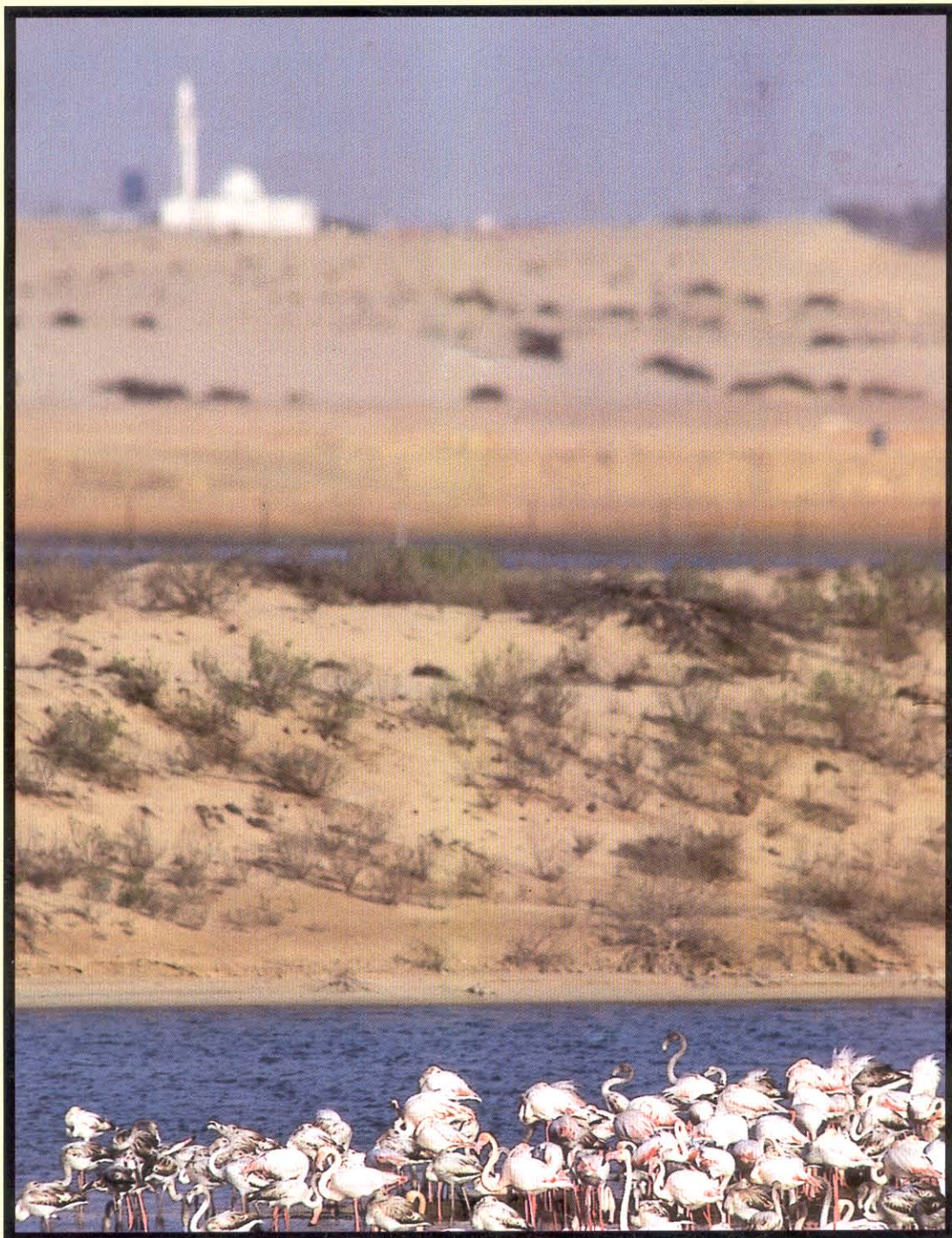
TRIBULUS



Bulletin of the Emirates Natural History Group

Vol. 9.2

Autumn/Winter 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.

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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.

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Front: **Greater flamingos** *Phoenicopterus ruber* at Al Wathba Lake (see article on P. 22).....**Picture by Simon Aspinall**

Back: **Opportunistic feeding by Cattle Egrets** *Bubulcus ibis* in Ra's al-Khaimah
.....**Picture by Simon Aspinall**

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 UAE Minister of Higher Education and Scientific Research.

TRIBULUS is published for circulation to members of the ENHG and is also available for sale to members of other natural history groups and similar bodies as well as subscribers in the UAE and overseas. It is also available through the Ornithological Society of the Middle East. Details on request.

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EDITORIAL

If one is to be strictly accurate, the Third Millennium AD actually begins on 1st January 2001. Whether it is a matter of marketing taking precedence over the truth, or simply a matter of poor mathematics, most of the world is marking the beginning of the Year 2000 as the beginning of the new millennium.

That offers both an opportunity to look forward and a chance to look back. Established over twenty years ago, the Emirates Natural History Group, publisher of **Tribulus**, has won, we would argue, the right to comment on what has been achieved in the Emirates over the last two or three decades in the field of environmental research and protection and also to lay down some markers for the years ahead.

The UAE has at one level been remarkably fortunate. In the person of His Highness President Sheikh Zayed, it has a leader whose heritage has instilled in him an awareness of the necessity for sustainable use of natural resources. He has recognised for decades the danger of the extinction of species through the impact of man. Indeed, nearly forty years ago, when he realised that the numbers of Arabian oryx in the deserts of the peninsula had been reduced to dangerously low numbers through over-hunting, he was one of the first people to take pairs of the animals into captivity so that a special breeding programme could be established.

Sheikh Zayed was a conservationist long before 'conservation' and 'environment' became internationally fashionable buzz-words and has long advocated that protection of the country's wildlife and environment should be an integral part of government policy.

Yet even with this leadership, it has taken many years for the UAE to develop the legislation and institutions through which measures to protect wildlife and the environment can be enforced. The federal environmental law is due to come into effect only in early 2000. Whether the skills and authority can be developed to implement the legislation effectively remains to be seen.

At the end of the millennium, however, both at a federal level and at the level of the individual emirates, Government structures now exist, with support from voluntary organisations and from the commercial sector. The framework is now largely in place.

There remains the task of public education, of ensuring that the public at large realises that the protection of the environment and wildlife is a matter of individual duties and responsibilities, not merely something for organisations and government. There also remains the task of ensuring that the UAE's legislation and administrative framework on environmental issues is matched by integration into the broader international community. Controls on marine pollution in the Arabian Gulf, for example, can only work through multi-lateral co-operation. That requires that the UAE should sign and participate in various international treaties.

On a different topic, it is admirable if the UAE introduces legislation to protect migrant birds, and the sites in which they over-winter, but if the birds themselves are under threat elsewhere, our own efforts are in vain.

We look forward in the years ahead to seeing the UAE playing a more active role in the international conservation community. This is already beginning to take place. The Environmental Research and Wildlife Development Agency, ERWDA, is a prime mover in the development of conservation plans for the houbara bustard and has agreed to host a new international secretariat on the Arabian Oryx. A decision by the Government to ratify the Convention on Biodiversity that emerged from the Rio de Janeiro world environmental summit was made just before the end of 1999.

Further action of this kind is required. There is an urgent need, for example, for the UAE to join the Ramsar Convention on the protection of wetlands, and to implement the MARPOL marine pollution agreement.

The momentum is, however, clearly in the right direction, both at home and internationally. More is required, but the basic groundwork has been done. Moreover, it is no longer a matter of lone voices (even if Presidential in tone) arguing for conservation. It is now accepted among the principles governing society.

The ENHG will continue to promote further measures in the years ahead. One way in which that can be done, of course, is by helping to encourage further scientific research, in particular through publication, a task to which we are happy to address ourselves.

In this issue of **Tribulus**, we report on new discoveries related to the UAE's mosses, ticks and damselflies as well as on a population of escaped hyrax. In a country where exotic flora and fauna have gained a strong foothold (count the thousands of Common Mynahs going to roost in Abu Dhabi every night!), it is important that they are not overlooked. The often neglected topic of geology is covered by a paper on an unusual wadi in the mountains, while the ever-popular topic of the country's birdlife also receives attention, with an account of the history of Abu Dhabi's first formally-designated nature reserve and a report on a successful autumn for the capital's birders.

The ENHG has always recognised that there is an important link between heritage and the environment, and the study of the country's archaeology is among the Group's objectives. The topic is addressed in two papers on archaeological studies in Fujairah, one of which, on the Portuguese fort at al-Bidiyya, was partly financed by the Group's Conservation Fund.

As usual, this issue of **Tribulus** tackles a variety of topics, sufficient to show that there is much in the UAE worthy of study. To continue to encourage this through publication is our own objective for the new millennium.

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, The British Council, British Petroleum, Forte Grand Hotel, Gulf Automation Services and Oilfield Supplies, HSBC, 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.

New Records of Mosses in the southern Musandam and the UAE (Jebel Hafit and Hajar Mountains)

by Harald Kurschner and Benno Boer

Abstract

The bryophyte flora (mosses & liverworts) of the Musandam Peninsula at the southeastern tip of the Arabian Peninsula is still one of the bryologically poorest known in Arabia. New collections from the southern part of this mountainous region (Ru'us al-Jebel, Hajar Mts.) and Jebel Hafit revealed five liverworts and twelve mosses new to the bryophyte flora of the United Arab Emirates (UAE), increasing the total number of species to 22 (7 liverworts, 15 mosses). These new records are a further step towards a better knowledge of the bryophyte flora, the distribution and the phytogeographical relationships of the different taxa on the Arabian Peninsula.

Introduction

Up to now, only two liverworts (*Cyanthodium cavernarum*, *Exorhthea pustulosa*) and three mosses (*Gyroweisa reflexa*, *Splachnobryum procerrimum*, *Timmiella barbuloidea*) have been reported from the United Arab Emirates (Long 1987, Frey & Kurschner 1988, Boer 1995), indicating the obviously unfavourable ecological conditions for bryophyte growth in this arid part of the Arabian Peninsula. Recent bryological collections on the Musandam Peninsula (Ru'us al-Jebel,

Hajar Mts.) and in Jebel Hafit south of Al Ain, impressively show by numerous new records that the bryofloristical research on the Arabian Peninsula is still incomplete and more collection is needed to get a better knowledge of these poicilohydric organisms, their distribution patterns and phytogeographical differentiations.

This holds true especially for the rocky, steep, wild and almost inaccessible mountains of the Musandam Peninsula, an under-explored area at the southeastern tip of the Arabian Peninsula which separates the Arabian Gulf from the Gulf of Oman (Fig.1). This mountainous area belongs to one of the last regions on the Arabian Peninsula about which nearly nothing is known on the bryophyte flora and other vegetation. Geologically it is a distinct entity of palaeozoic, metamorphic and igneous rocks (lavas, oozes and crusts) which have been formed at the site of a mid-oceanic ridge in the Indian Ocean. This mantle shifts to the edge of the Arabian Peninsula during Cretaceous times and was uplifted subsequently during the Tertiary (Western 1989). It is flanked by later Mesozoic calcareous sediments, typified by the Musandam limestone, and culminates in the 2087 metre high Jebel al-Harim and several other mountains, such as Jebel Yibir (1527 m), or Jebel Qaiwah (1794 m). Steep slopes with only little soil development beneath overhanging rocks and boulders, as well as huge wadi

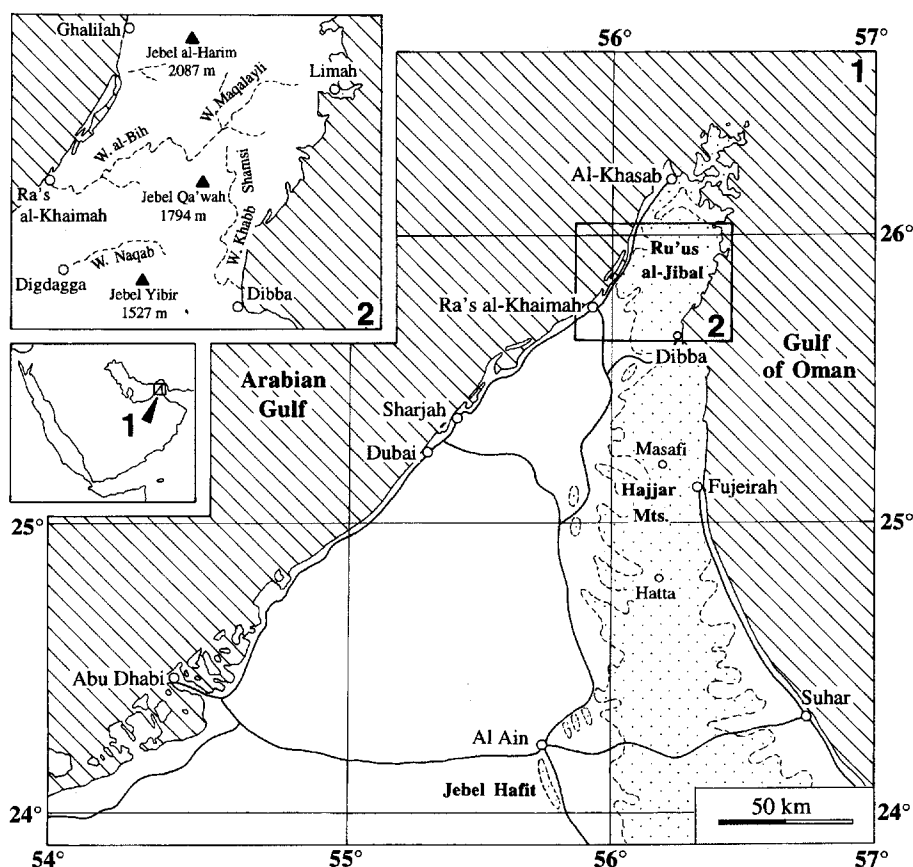


Fig. 1. Musandam Peninsula. Topography and collecting sites (2: sketch map of the southern Ru's al-Jibal, after Western, 1985).

systems (e.g. Wadi al-Bih, W. Ghalilah, W. Maqalayli, W. Khabb Shamsi, Fig.1), dissect these mountains. They are filled with conglomerate overlain with alluvial gravels and silt and periodically scoured by torrent floods. Except for a few minor pools, no source of surface water exists and the deeply-incised wadis are all dry except following winter rain (Western 1985).

The climate of the UAE is classified as hyper-arid. More rainfall and lower temperatures occur in the mountain area, with up to 190 mm average annual precipitation (Boer 1997). Dew at night and sometimes even fog, which may extend inland for up to 100 km also improves the water supply in the mountains, especially for poicilohydric organisms such as bryophytes (Deil & Muller-Hohenstein 1996, Western 1989). This reduces the harsh climatic conditions in winter and early spring. There is a large amount of scree, cliffs, overhangs, boulders and fissures where water has brought down silts and fine-earth, thus providing a great number of niches for drought-adapted or drought-tolerant desert mosses and liverworts of mainly circum-Tethyan and/or xerothermic Pangaeian origin (Frey & Kurschner 1988, 1998).

Similar ecological requirements can be observed in the Jebel Hafit area, a 10 km long foreland anticline south of the important oasis complex of Al Ain (Fig.1). Lower in height (1180 m), its main mass is late Miocene (calcareous mudstones and Eocene limestones) and along the western flank remains of severely eroded Oligocene reefs occur (Tourney *et al.* 1982). Due to its relatively isolated position from the Hajar range, rainfall is more limited here and most rainfall runs off extremely quickly, limiting niche availability for bryophytes.

Nevertheless, these new collections add 17 bryophytes (5 liverworts, 12 mosses) to the known sparse bryoflora of the UAE, increasing the total number to 22 (seven liverworts, 15 mosses). Outstanding among these new records are *Crossidium laevipilum* previously known from the Arabian Peninsula and adjacent areas only from Kuwait, Jordan, and the Levant, *Riccia*

crenatodentata (endemic to the Arabian peninsula) and *Asterella persica*, whose new records on the Musandam Peninsula now close a distributional gap between the type locality east of the Arabian Gulf (highlands of southwestern Iran) and its western occurrences in Saudi Arabia (Asir Mts.) and the Yemeni escarpment mountains.

The material is kept in the Herbarium Hausknecht Jena (JE), duplicates in the Herbarium H. Kurschner (Berlin).

Systematic List of new (asterisk *) and previously reported HEPATICAE taxa from the southern Musandam and the United Arab Emirates

Targioniaceae

Cyathodium cavernarum Kuntze in Lehm.

Collected in Wadi Difta near Masafi, 1000 m, water runnel. A pantropical species, widespread in tropical Africa, southern Africa, SE Asia and Brazil (African-Asian-American range). Reported from the Arabian Peninsula from Oman and Yemen (Long 1987, Frey & Kurschner 1988).

Targionia hypophylla L. *

Masafi area, between Dibba and Masafi, 500-900 m, on limestone deposits, in northern exposure. A species of xerothermic-Pangaeian origin, distributed throughout the warm temperate and subtropical parts of the world. Reported from the Arabian Peninsula from Oman, Saudi Arabia and Yemen (Frey & Kurschner 1988).

Aytoniaceae

Asterella persica (Steph.) Howe * Fig. 2

Wadi al-Bih, west of Ra's al-Khaimah, 200 m, on

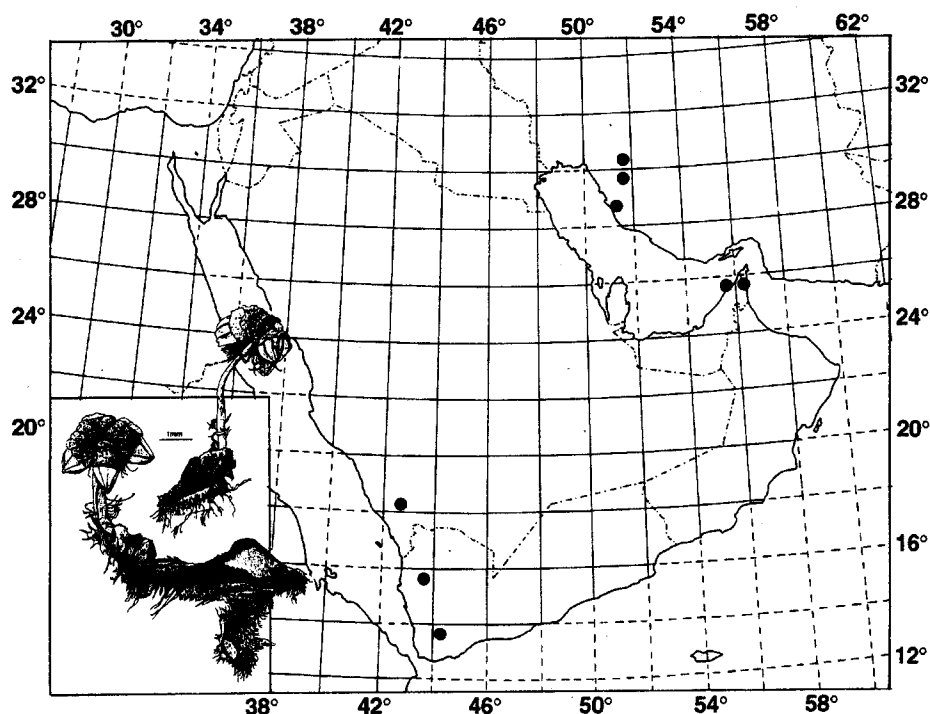


Fig. 2. Distribution of *Asterella persica* (Steph.) Howe in south west Asia.

limestone; also between Ra's al-Khaimah and Dibba 400 m, wadi ground, on moist soil; also between Dibba and Masafi, 500-900 m, on limestone deposits in northern exposure. A species of xerothermic-Pangaeian origin, known only from the Arabian Peninsula (Saudi Arabia: Asir Mts.; Yemen: escarpment mountains) and southern Iran (Fars province) (Frey *et al.* 1991). The new locality in the Musandam Peninsula closes the distributional gap between the Iranian and southwest Arabian localities.

Exormothecaceae

Exormotheca pustulosa Mitt.

Jebel Ruwaydah at head of Wadi Sidakh, 500 m; also Masafi area between Dibba and Masafi, 500-900 m, on limestone deposits in northern exposure. A species of xerothermic Pangaeian origin with Mediterranean-Atlantic distribution and a major disjunction in Central America (Mexico) and Africa.

Reported from the Arabian Peninsula from Oman, Saudi Arabia and Yemen (Al-Gifri & Kurschner 1996, Frey & Kurschner 1988).

Ricciaceae

Riccia atromarginata Lev. var. *atromarginata* *

Wadi al-Bih area between Ra's al-Khaimah and Dibba, 400 m, wadi ground on moist soil. A species of circum-Tethyan (Mesogean) origin widely distributed in Mediterranean areas, Macronesia and S.W. Asia. Reported from the Arabian Peninsula from Oman, Saudi Arabia and Yemen (Frey & Kurschner 1988).

Riccia atromarginata Lev. var. *jovet-astii* Rauh & Buchloh *

Masafi area between Dibba and Masafi, 500-900 m, on limestone deposits with northern exposure. A species of circum-Tethyan (Mesogean) origin known from Pakistan

and the south-eastern Arabian Peninsula. Reported from Oman (Frey & Kurschner 1991) and the Hadramaut in southern Yemen (Al Gifri & Kurschner 1996).

Riccia crenatodontata Volk * (Fig. 3)

Wadi al-Bih area, west of Ra's al-Khaimah, 200 m, on limestone sediments; also between Ra's al-Khaimah and Dibba, 400 m, wadi ground, on moist soil; also Masafi area between Dibba and Masafi, 500-900 m, on limestone deposits in northern exposure. A species of xerothermic-Pangaeian origin, endemic to the Arabian Peninsula. Previously reported from the Muscat area in Oman (Volk 1988) and from the Asir Mts. in Saudi Arabia (Frey & Kurschner 1988, 1991).

Systematic List of new (asterisk *) and previously reported *MUSCI* taxa from the southern Musandam and the United Arab Emirates

Pottiaceae

Aloina ambigua (B.S.G.) Limpr.*

Wadi al-Bih area between Ra's al-Khaimah and Dibba, 400 m, wadi ground, on moist soil. A species of circum-Tethyan origin with a wider distribution in S.W. Asia. Reported from the Arabian Peninsula from the Hadramaut in southern Yemen (Al Gifri & Kurschner 1996 as *A. aloides* (Schultz) Kindb., revised M.T. Gallego).

Crossidium crassinerve (De Not.) Jur.*

Masafi area, between Dibba and Masafi, 500-900 m, on limestone deposits in northern exposure. A species of circum-Tethyan (Mesogean) origin, distributed in Europe, N. Africa, N. America, Mexico, S.W. Asia and India. Reported from the Arabian Peninsula from Kuwait, Oman, Saudi Arabia and Yemen (Frey & Kurschner

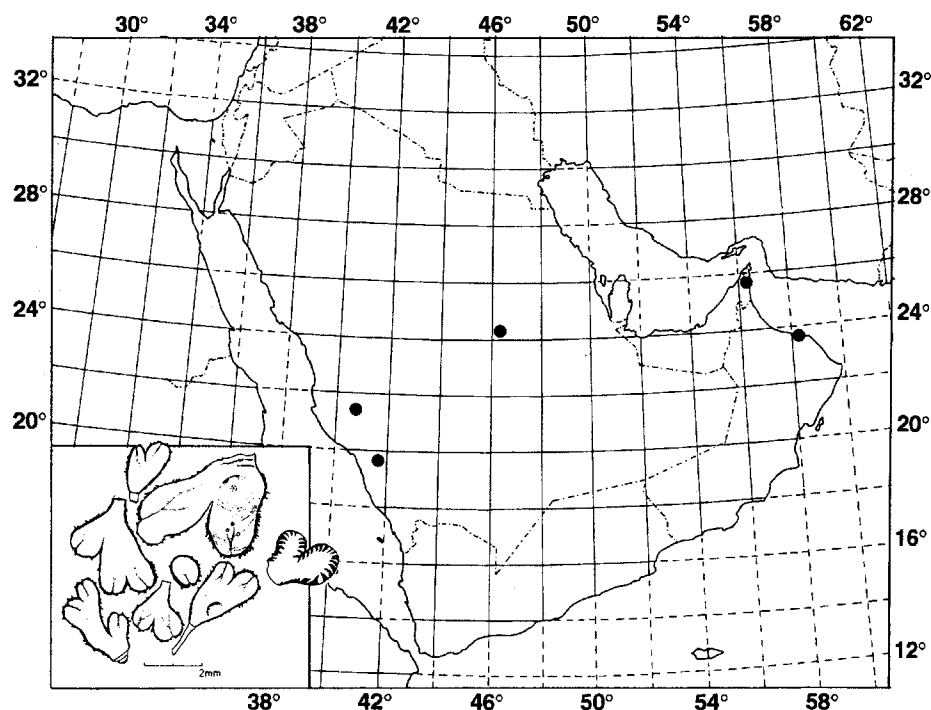


Fig. 3. Distribution of *Riccia crenatodontata* Volk, an Arabian Peninsula endemic.

1988).

Crossidium laevipilum Ther. & Trab.* (Fig. 4)

Masafi area, between Dibba and Masafi, 500-900 m, on limestone deposits in northern exposure. A species of circum-Tethyan (Mesogean) origin, distributed in southern Europe, N. Africa and S.W. Asia. Reported from the Arabian Peninsula up to now only from Kuwait (Kurschner 1996).

Crossidium squamiferum (Viv.) Jur. var. *pottioideum* (De Not.) Monk.*

Wadi al-Bih area between Ra's al-Khaimah and Dibba, 400 m, wadi ground, on moist soil. A species of circum-Tethyan (Mesogean) origin, widely distributed in Europe, N. Africa, N. America, and S.W. Asia. Reported from the Arabian Peninsula from Kuwait, Oman, Saudi Arabia, and Yemen (Frey & Kurschner 1988, Kurschner 1996)

Gymnostomum mosis (Lor.) Jur. & Milde *

Wadi al-Bih area, between Ra's al-Khaimah and Dibba, 900 m, on soil; also on Jebel Hafit south of Al Ain, 700 m, rock fissures. A species of circum-Tethyan (Mesogean) origin, distributed in S.W. Asia. Reported from the Arabian Peninsula from the Jebel Akhdar range in Oman, and the Midian Mts. and Jebel Aja, south of Hail, in Saudi Arabia (Frey & Kurschner 1988).

Gyroweisia reflexa (Brid.) Schimp.

Wadi Difta near Masafi, 1000 m, water runnel. A species of circum-Tethyan (Mesogean) origin, widely distributed in the Mediterranean area, N. Africa and SW Asia. Reported from the Arabian Peninsula from Saudi Arabia and Yemen (Frey & Kurschner 1988).

Pottia davalliana (Sm.) C. Jens.*

Masafi area, between Dibba and Masafi, 500-900 m, on limestone deposits in northern exposure. A species of circum-Tethyan (Mesogean) origin, widely distributed in Europe, N. Africa and S.W. Asia. Reported from the Arabian Peninsula from Kuwait and Saudi Arabia (Frey & Kurschner 1988).

Timmiella barbuloidea (Brid.) Monk.

Wadi al-Bih area, west of Ra's al-Khaimah, 200 m, on limestone sediments; also between Ra's al-Khaimah and Dibba, 900 m, on soil; also Wadi Difta near Masafi, 1000 m, water runnel; also between Dibba and Masafi, 500-900 m, on limestone deposits in northern exposure; also on Jebel Hafit south of Al Ain, 700 m, on soil in northern exposure. A species of circum-Tethyan (Mesogean) origin, widely distributed in the dry regions of the Northern Hemisphere, except N. America. Common in S.W. Asia and reported from the Arabian Peninsula from Oman (Mandaville 1985), Saudi Arabia (Frey & Kurschner 1988), and the Hadramaut in Yemen (Al-Gifri & Kurschner 1996).

Tortella nitida (Lindb.) Broth. *

Masafi area, between Dibba and Masafi, 500-900 m, on soil in northern exposure. A species of circum-Tethyan (Mesogean) origin, widely distributed in Europe, N. Africa, N. America and S.W. Asia. Reported from the Arabian Peninsula from Yemen, as well as from Socotra Island in Yemen (Al-Gifri *et al.* 1995, Al-Gifri & Kurschner 1996).

Trichostomopsis aaronis (Lor.) Agnew & Townsend *

Wadi al-Bih area, between Ra's al-Khaimah and Dibba, 900 m, on limestone sediments. A species of circum-Tethyan (Mesogean) origin, widely distributed in

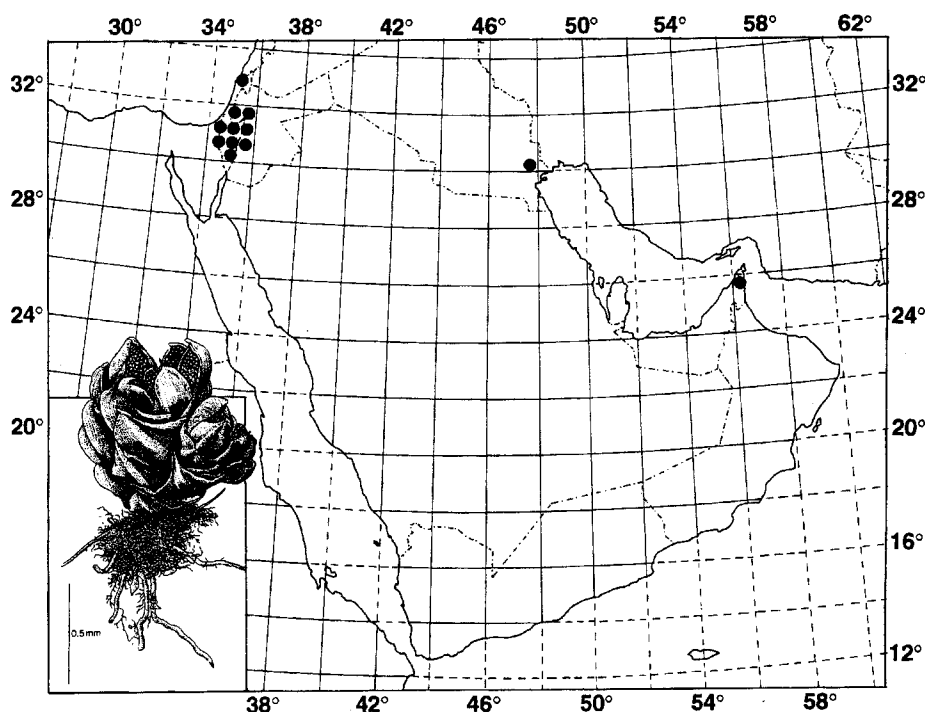


Fig. 4. Distribution of *Crossidium laevipilum* Ther. & Trab. in the Arabian Peninsula

N. Africa, Central and S.W. Asia. Reported from the Arabian Peninsula from Kuwait, Saudi Arabia and Yemen (Frey & Kurschner 1988).

Weissia condensa (Voit) Lindb. *

Masafi area, between Dibba and Masafi, 500-900 m, on soil in northern exposure. A species of Northern origin with sub-Mediterranean-sub-Atlantic character. Widely distributed in S. and W. Europe, the Mediterranean region, N. Africa, S.W. Asia and New Zealand. Reported from the Arabian Peninsula from Oman, Saudi Arabia and Yemen (Frey & Kurschner 1988, Al-Gifri & Kurschner 1996).

Funariaceae

Funaria muhlenbergii Turn. *

Masafi area, between Dibba and Masafi, 500-900 m, on soil in northern exposure. A species of circum-Tethyan (Mesogean) origin, distributed in Europe, N. Africa, N. America and S.W. Asia. Reported from the Arabian Peninsula from Saudi Arabia (Frey & Kurschner 1988).

Splachnobryaceae

Splachnobryum procerrimum Dix. & P. Varde

Between Dibba and Masafi, wall with dripping water below water course; also near Hatta, in a wet, shady site. A Palaeotropical species with S. & S.E. Asian (India, Burma, China) distribution. Reported from the Arabian Peninsula only from the United Arab Emirates (Frey & Kurschner 1988, Boer 1995).

Bryaceae

Bryum funckii Schwaegr. *

Jebel Hafit south of Al Ain, 700 m, on soil in northern exposure. A species of northern origin, distributed in Europe, N. Africa, Central and S.W. Asia. Reported from the Arabian Peninsula from Kuwait (Kurschner 1996).

Bryum sp.

Al Oha near Al Ain, 300 m, on cultivated ground (irrigated).

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A Preliminary Survey of the Archaeology of the Wadi Safad, Fujairah, United Arab Emirates, 13-15th April, 1995

by Geoffrey King and Henriette Maren-Griesebach

Introduction

Fujairah (*Cl. Ar.* al-Fujayra) [1], the capital city of the Emirate of Fujairah, is one of the seven constituent Sheikdoms of the United Arab Emirates, and the only Emirate whose coastline is entirely situated on the Gulf of Oman. Fujairah territory does, however, extend westwards as far as the village of Habhab, near Khatt. Like the other northern emirates in the mountainous area of the Hajar Mountains, Fujairah is far more fertile than the country further west, for the highlands enjoy a relatively heavy seasonal rainfall. On either side of the Jebel Hajar, major wadis descend through the mountains, carrying flood water to the adjacent plains.

To the north of Fujairah is the Musandam Peninsula, the Ru'us al-Jibal territory of the Sultanate of Oman. Fujairah is also bordered on the coastal plain by enclaves of Sharjah at Khawr Fakkan, Kalba and, in the north, Dibba; further south is the territory of Oman proper. From Dibba southwards, the Batina coastal plain gradually widens through Fujairah and the Sharjah enclaves into Oman: the coastal plain is semi-tropical, and differs to some degree from the coast on the western side of the Hajar Mountains, which lies largely in the Emirate of Ra's al-Khaimah, on the Arabian Gulf side of highlands. The villages and hamlets in the valleys and on the high plateaux are characterised by stone buildings and field terracing [2].

Fujairah's archaeology was not investigated until Beatrice de Cardi included the area in fieldwork that she carried out in February, 1968 [3]. Subsequently further survey and excavation at al-Bithna and Husn Madhab was carried out by the Swiss-Liechtenstein Foundation for Archaeological Research Abroad in 1994 [4]. Excavations were also carried out at al-Bidiyya by Dr W. al-Tikriti of the Department of Antiquities and Tourism in Abu Dhabi's Eastern Region [5] and later at al-Qidfa, the latter being thus far unpublished.

The work of these teams, and work elsewhere subsequent to the date of the survey reported here, including excavations by the University of Sydney, under the direction of Prof. D.T. Potts of an Iron Age fort at Awhala and of a Wadi Suq tomb from Sharm, revealed important tombs and other sites of Bronze and Iron Age date [6].

Much of this fieldwork concentrated on Fujairah's early antiquities. In recent years, however, extensive work has been undertaken by a Sydney University expedition under the direction of Prof. Potts on the archaeology of the Islamic period. This work has included surveys of coastal sites and of petroglyphs, a survey of the palace in the Wadi al-Hayl, a survey of copper mining sites, many from the Islamic period, and preliminary excavations at the site of a Portuguese-period fort at al-Bidiyya (*see Page 19*)

Fujairah has a number of important sites from the Islamic period. In the north is Dibba, a settlement which predates Islam. It is associated with Al Julanda, the 7th C. AD rulers of Oman, who were the first rulers in the region to accept Islam. In the Ridda wars, the Muslims put down a rebellion at Dibba where the graveyard associated with the battle is still shown outside the modern town, in Omani territory. For the later Islamic period, the best known monument in Fujairah territory is the mosque at al-Bidiyya; there are also a number of fortresses and fortified buildings in Fujairah city, at al-Bithna, at Awhala, at Wadi Hayl and at al-Bidiyya itself [7], for example. Other fortifications date from the Portuguese period, recorded in varying degrees of detail

in 16th and 17th century maps [8]. The Fujairah forts have yet to be studied in detail [9].

The Wadi Safad [10]

Several valleys descend eastwards from the mountains to the Batina coastal plain; among these is Wadi Safad, in the southern part of Fujairah territory. The Wadi is 10.7 kms north of Fujairah city, and just inland from the coastal village of al-Qurayya [11]. It is one of two wadis that flow down to the coastal plain at this point: of these, Wadi Safad is the more southerly, while a second valley, Wadi al-Thayb (Theeb), lies to the NW of al-Qurayya. Immediately north of al-Qurayya is the rocky outcrop of Jebel al-Qurayya. The fan onto which the two wadis flow opens out to the east on to the coastal plain, to the Sabkha Murbah to the north and to the Sabkha Masfayt to the south. The asphalt road running north from Fujairah to al-Qurayya and Khawr Fakkan traverses the coastal plain.

The Wadi Safad flows from the west, between high mountains, collecting water from the Jebel Hajar before it broadens and debouches onto the fan inland from al-Qurayya. The flood channel winds through a boulder-strewn landscape that characterises the course of the lower Wadi Safad. There is evidence of considerable erosion from the mountain sides. At the time of the 1994 survey, a graded unpaved track from al-Qurayya was motorable through the Wadi for over 10 kms from the asphalted Fujairah/Khawr Fakkan main road. The unmetalled track was widened and asphalted in May 1994, and this work has since transformed the Wadi in its lower course and affected sites described here [12].

The site of the old village of al-Qurayya, at the mouth of the wadi, (Site FS 2) has now been used for the building of a new village, and the site recorded here has disappeared. There has also been extensive disturbance immediately inland of the village, in the area of Site FS 3.

However, in April, 1994, the Wadi Safad had not been much affected by development. Modern buildings were concentrated in the large village of al-Qurayya, with some at the village of Safad at 6.9 kms along the narrow higher course of the Wadi. At 10.5 kms the motorable track stopped at another small hamlet.

Settlement in Wadi Safad was sustained in the past by water tapped from springs in the mountainsides. Examples of this process are represented by a still functioning ancient *falaj* (FS 19), and a blocked *falaj* (FS 16). We were also shown dry water channels that related to an abandoned irrigation system. It is said by the present inhabitants of the wadi that the available water in the Wadi Safad has declined in recent times. Based on these water sources, Wadi Safad supported the numerous terraced gardens and palm-groves which run along the valley above the level of the flood channel. Many terraces had been abandoned by 1994, but the past extent of cultivation in Wadi Safad was obvious everywhere. Although we did not ascend the mountains, we were informed that on the summits are flat areas which were formerly farmed. According to our informants, the high farms are now largely abandoned. There are numerous terraced farms on the high plateaux all over the Hajar range and those above Wadi Safad are clearly of the character of those recorded elsewhere. Dostal has given an account of the architecture of similar mountain farmsteads in Ra's al-Khaimah [13], while Costa has described farms and their architecture further north in Ru'us al-Jibal in Oman [14].

Methodology

Inspection of sites in Wadi Safad in 1994 was entirely visual and non-destructive. No finds were removed from the sites and where sherds were photographed, this was done with the sherds *in situ*. No groups of sherds was gathered together for photographic purposes. Our intention was to preserve the integrity of sites for future research.

The Archaeology of the Wadi Safad

The oldest archaeological sites noted in the Wadi consisted of a series of stone cairns which are of pre-Islamic date. They recall the cairns and tombs in southern Ra's al-Khaimah at Wadi al-Qawr, although a parallel might also be made with the Wadi Suq graves further south near to Suhar in Oman. These stone mounds were accompanied by little or no pottery. In the short time available to us we noted six stone mounds either on the fan (FS 3, FS 4) or to the sides of the track through the Wadi (FS 5, FS 6, FS 7, FS 9). Those on the fan appeared to have belonged to the group noted by De Cardi in 1968, but those within the Wadi Safad valley do not seem to have been recorded hitherto. We were told by Mr 'Ali Ahmad, a resident of the Wadi, that there were other stone mounds of this type in the Wadi Safad.

We noted no Early Islamic sites, although according to a local legend, a king of Persia once built a great dam in the Wadi. There is no suggestion as to when this occurred, nor is there any trace of a monumental dam. The local people recognise that this may be a folk memory of the distant Sassanian period, although "Persian" armies were also present in the region at various times during the Islamic era.

Although no Early Islamic pottery was found, it must be stressed that examination of the surface was visual, and only dealt with surface sherds. Given the erosion movement of gravels off the hillsides, it is unwise to attach too much significance to the absence of early finds on the present surface. Experience in a similar environment at Wadi Haqil in Ra's al-Khaimah in 1992

shows that earlier sites tend to become masked, buried deep under the eroded material from the hillsides, and this may have happened in the Wadi Safad. However, cairns FS 3-FS 7, which are obviously of considerable age, indicate that in that part of the Wadi at least, the present surface is the same as it was in much earlier times.

There are a number of structures and terraced field systems related to the Later Islamic period which suggest a larger settlement and population within the past 500 years or so than at present. Mr 'Ali Ahmad told us that there is a local belief that, in the past, the Wadi supported a far larger population (a view probably based on the number of abandoned field terraces, houses and Islamic graves). In the more recent past, Friday prayers and Eid prayers were held at Safad. Today, Eid prayers are held at al-Qurayya or Fujairah instead rather than Safad. The decline of Safad is associated with the diminution of water flow in the springs of the valley, which has been happening in living memory.

The view of the local people is that the current population has been settled in Wadi Safad for some two hundred years but they have no sense of connection with the numerous abandoned Later Islamic sites along the Wadi: they do not have any tradition that their forefathers lived in them. The origin of these Late Islamic sites is thus a matter of some mystery at present, although there may have been some disjuncture of collective local memory.

The Later Islamic presence is especially characterised by field terraces, defined by stone buttressing with associated irrigation systems. The main structures in the Wadi Safad of Later Islamic date include a fortified *husn*, a neighbouring mosque, and a variety of houses and store-structures. Houses include stone-built winter houses which survive only as stone foundations and stone walls rising about a metre. There would have been a single door in the narrow end of each of these houses. Roofing on these low stone walled structures would have been reed gabling resting on the stone foundations. By contrast, summer houses were much more fragile: square, level roofed structures, with a *hasir* cover of



Plate 1: Tower (Site FS-1) on the edge of the village of al-Qurayya

palm matting [15]. The local accounts imply that the Later Islamic sites of the valley fall into a period preceding the 18th century and the numerous scatters of Islamic period sherds that we noted in the Wadi Safad sites fall quite appropriately into the Julfar horizon, suggesting a ca 16th C. -18th C. date range. Sherds present included Julfar-type red painted unglazed wares, Julfar-type unglazed undecorated sherds, incised white-wares and glazed Persian imports.

Gazetteer [16]

Distances are measured from 0 kms at the turn off by a blue Safad road sign at al-Qurayya which was in place at the junction with the main coast road in April, 1994. Distances have changed with the building of the new road to and through Wadi Safad, which provides a new route of access, skirting to the south and west of the old village of al-Qurayya (Site FS 2). Many of the buildings of the old village have subsequently disappeared as a result of the building on the same site of a new village, following heavy flooding of buildings adjacent to the main road in winter 1997-1998.

FS 1
Tower
2 kms
Plate 1

There is a mud-brick and stone tower north of the track. It has massive collapse revealing round wadi stones used in the wall structure. The tower measures 5.8 m. E.-W. x 6.00 m. N.-S. A mud-brick building lay to the NW. To the south is a palm plantation. There is a late Islamic pottery scatter in the area of the tower.

FS 2
Village
2.3 kms
Plate 2

To the south of the track is an extensive village of

gable-roofed houses, all deserted and now roofless. The houses recall buildings on the island of Ghagha' in the Western Region of Abu Dhabi Emirate [17].

FS 3
Cairn
3.3 kms.

This cairn of rounded, selected wadi stones lay 79 paces south of the track. It was a sub-circular cairn, measuring 4.4 m. NW-SE / 2.75 N.-S., and 1.20 m. in height. Two rows of stones formed a parallel row through the central area of the mound. B. de Cardi had noted this same feature in cairns near al-Qurayya [18]. The cairns of Wadi Safad deserve comparison with cairns at Wadi Suq north of Suhar in Oman and others at Wadi al-Qawr in southern Ra's al-Khaimah.

FS 4
Cairn
3.3 kms
Plate 3

The cairn lay 35 paces south of the track. It had collapsed and was damaged, forming a circle of rounded boulders, measuring 4.40 m. N.-S., 4 m. E.-W. It is of the same character as FS 3.

FS 5
Cairn
5.9 kms

This was a circular stone cairn of rounded boulders, located 82 paces south of the track. The cairn measured 7.1 m. N.-S. x 7.1 E.-S. and was 80 cms-1 m. in height. There was a raised outer circle with an inner ring of collapse masonry.

FS 6
Cairn
6.1 kms

A circular cairn of rounded boulders, 51 paces south of the road, measuring 9.1 m. N.-S. x 8.4 m. E.-W.

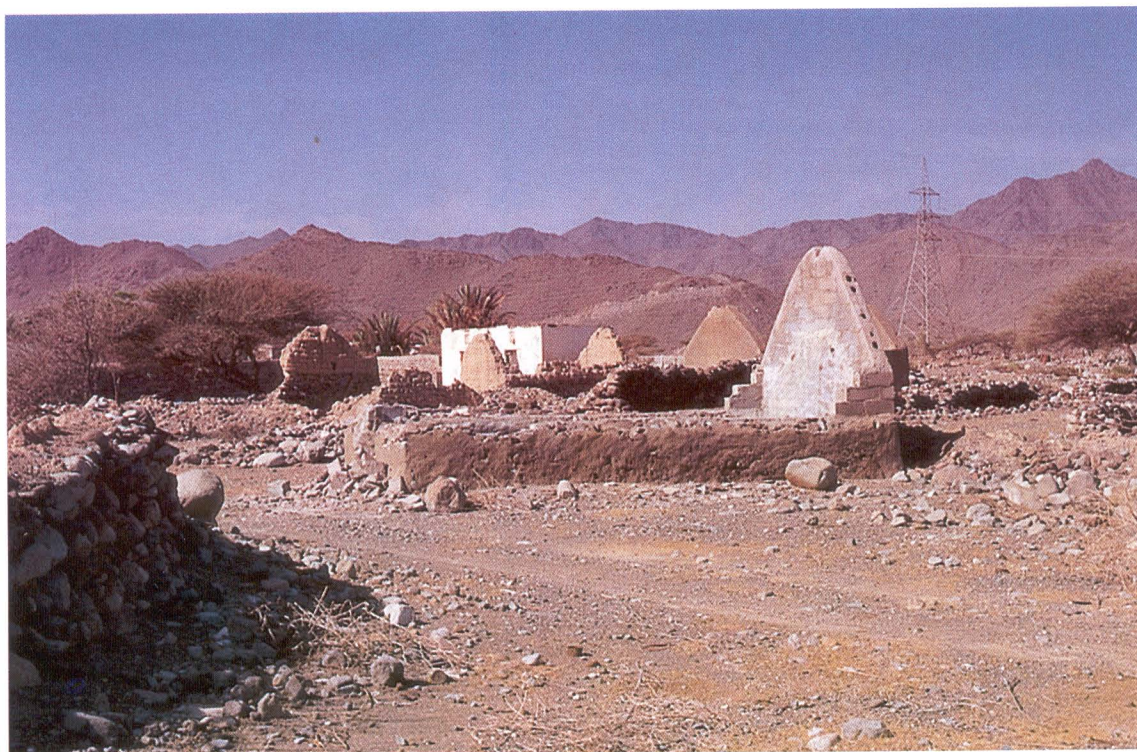


Plate 2: Buildings in the old village of al-Qurayya (Site FS 2)



Plate 3: Site FS 4, a collapsed cairn of wadi boulders



Plate 4: Site FS 7, a sub-circular stone cairn

FS 7
Cairn
6.45 kms
Plate 4

A sub-circular stone cairn, 15 paces south of the road, measuring 7.1 m. N.-S. x 9.7 m. E.-W.

FS 8
House
7.25 kms.

A stone house, formerly with a gabled roof, set on the bank above the Wadi bed, 70 m. north of the track, and north of the flood channel. It measures 5.3 m. x 2.4 m.

FS 9
Stone mound
7.25 kms

This mound is situated immediately NE of FS 8. It is a rectangular mound of rounded stones measuring 5.4 m. x 2.7 m.

FS 11
Field terraces
7.65 kms
Plate 5

A group of abandoned field terraces lying south of the track. They have not been farmed in the memory of local people. They are probably to be associated with the other deserted Later Islamic sites and structures in the Wadi Safad

7.7 kms.
To the north of the track are terraces and retaining walls. Later Islamic Julfar painted pottery and related Late Islamic local wares were noted here.

FS 12
Houses

7.7 kms

Stone house foundations lie to the south of the road and measure 3.65 m. x 2.45 m. They are set on a SSE-NNW. orientation. There is a single doorway at the SSE end.

FS 13
Water channel
7.7 kms
Plate 6

To the north of the track is a disused water channel that fed the abandoned Late Islamic field terraces. It runs from the western upper end of the Wadi Safad and descends eastwards. It is to be associated chronologically with the Late Islamic field terraces.

FS 14
House
7.7 kms

Stone house foundations lie to the north of the track near terraces; the foundations measure 3.5 m. x 2.05 m. There is a single doorway at the east end. It is to be attributed to the Later Islamic period.

FS 15
Structures

Stone house foundations to the north of the track near terraces. They measure 3.6-3.7 m. x 2.05 m. There is a doorway to the east. The house is attributed to the Later Islamic period.

FS 16
Falaj
7.95 kms.

A blocked *falaj* lies to the north of the terraces and of the flood channel of the Wadi Safad. It included a plaster (*juss*) lined water tank that provided a catchment below



Plate 5: Field terraces in the Wadi Safad (Site FS 11)

the *falaj*. It was already destroyed when we saw it in April, 1994. We were told by 'Ali Ahmad that formerly there had been a rock cut *falaj* here, comparable to FS 19.

FS 17
Courtyard house
8.2 kms

A courtyard house lies to the south of the track. It was still occupied in 1994. It included a reed ('*arish*) hut and a stone hut. There was also a garden and a palm grove.

FS 18
House
8.8 kms.

Ruined house structure.

9.1 kms
Terraces to the north of the track.

9.3 kms
Palm groves.

FS 19
Falaj
10.15 kms
Plate 7

The mouth of a *falaj* channel was noted, with extremely well cut masonry forming a rectangular opening, with a channel cut back into the mountain on the north side of the Wadi Safad. The date is unknown and there were no finds in association with the *falaj* but it is almost certainly ancient. The cutting of the masonry is superior to any work seen in the region in more recent times. It still has a flow of water which feeds into a pool below the *falaj* outlet.

FS 20
Mosque

9.5 kms

A mosque is located to the SW of the track at the northern foot of a hill surmounted by a fortress (*husn* FS 22). The mosque is ruined and no longer in use. Its *qibla* is at 259°. It is stone built, and now roofless. There is a single door on the east side, with a central *mihrab* recess which is curved on the interior surface and squared on the exterior. The overall E.-W. internal measurement is 8.05 m. and 9.15 m. with the *mihrab* included. The mosque has a maximum width N.-S. of 5.73 m. It includes a summer mosque to the east which was once covered in palm thatch, with rectangular openings in the walls to provide natural air-conditioning. The winter mosque occupies the west side towards the *qibla* wall and the *mihrab*. The roofing of the winter mosque is now lost. The mosque is to be associated with the Later Islamic period of settlement. It seems likely that it is older than the past two centuries or so, for it is not remembered as having been in use in recent times.

FS 21
Structure

This stone structure served as a store room (*makhzin*, *mastawda*) for grain or dates. It is situated to the SE of the mosque.

FS 22
Husn
9.5 kms
Plate 8

To the SW of the track is a *husn* on the summit of a hill that dominates the valley and the track at this point. One local estimate suggests that this fortification is 90 years old, but another suggestion dates it to over 200 years ago. This latter view seems more plausible. There is Julfar horizon pottery and glazed Persian imports (Plate 9) scattered around the interior of the fortress and on the SE and south slope in FS 23 (a graveyard site). The



Plate 6: Disused Late Islamic water channel (Site FS 13)

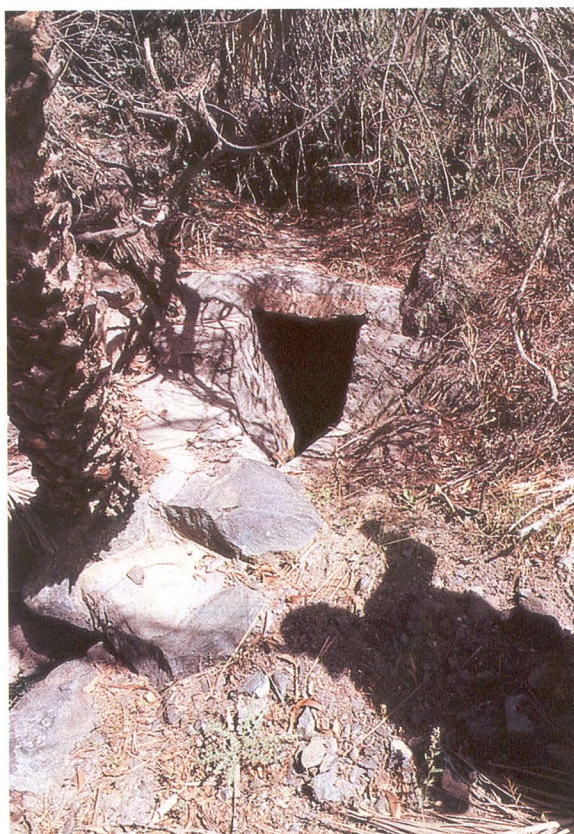


Plate 7: Mouth of a falaj cut into the mountain (Site FS 19).



Plate 8: Husn Safad, the Late Islamic hill-top fort. Site FS 22

fortification consists of a larger tower to the north, and lesser towers with defensive parapets around the perimeter. There is also a well constructed walk-way around the parapet on the southern-western side of the *husn*. In the open area between the towers and walls, there is a fine *juss* plastered tank to collect rain water.

FS 23
Graveyard
9.5 kms

On the south and SE side of the *husn* hill are a very large number of Islamic graves, all associated with the inhabitants that preceded the present population, according to the local people. In many cases, there is an individual terrace for each grave. The graveyard is no longer in use. Sherds found at the site belong to the Julfar horizon and include Persian imports of the same period.

(Sites FS 20 - FS 23 have subsequently been studied by Longden and Garfi, see Editors' Note at end).

9.5 kms-10 kms
Plate 9

The Wadi Safad opens out to a broader plain with cultivated fields. This is the main agricultural area along the Wadi with a number of farms.

10 kms.

The Wadi narrows beyond the field system, flanked by field terracing.

10.1 kms.

Terracing continues until the end of the motorable track. We did not examine the Wadi Safad beyond this point and the results of further survey are awaited.

Acknowledgements

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Notes

1. J.G. Lorimer, *Gazetteer of the Persian Gulf, 'Oman and Central Arabia*, 1908-1915. Calcutta.
2. A.H. Kamal, *Encyclopaedia of Islam* (new ed.) "al-Fudjayra".
3. The most useful description of this environment and architecture appears in W. Dostal, *The Traditional Architecture of Ra's al-Khaimah (North)*, Wiesbaden (1983).
4. B de Cardi, "Archaeological Survey in the Northern Trucial States", *East and West*, vol.21, Nos. 3-4 (Sept.-Dec.1971). pp. 225-289.
5. P. Corboud, A.-C. Castella, R. Hapka and P. Im-Obersteg, "Archaeological Research in the Emirate of Fujairah in 1994". Unpublished report to the Government of Fujairah.
6. P. Corboud, A.-C. Castella, R. Hapka and P. Im-Obersteg, "Archaeological Survey of Fujairah" 3, Swiss Liechtenstein Foundation for Archaeological Research Abroad, Berne, Vaduz, Geneva and Neuchatel (1994).
7. W.Y. al-Tikriti, "The Excavations at Bidya, Fujairah: the 3rd and 2nd Millennia BC culture", *Archaeology in the United Arab Emirates* V (1989), pp. 101-111.
8. Apart from the above, see also P. Hellyer, *Fujairah: An Arabian Jewel*, Dubai (1990); P. Hellyer, "Iron Age Fort in Fujairah", *Tribulus*, Bulletin of the Emirates Natural History Group, Vol. 3.2 (October 1993), p. 17; P. Hellyer, *Hidden Riches: An Archaeological Introduction to the United Arab Emirates*, Abu Dhabi (1998); Potts, D.T., Weeks, L.R., Magee,



Plate 9: A view of Wadi Safad from the *husn* (Site FS 22)

- P., Thompson, E. & Smart, P. Husn Awhala: A late prehistoric settlement in southern Fujairah. *AAE* 7: 1996: 214-239; Petrie, C. The Iron Age fortification of Husn Awhala (Fujairah, U.A.E.), *AAE* 9: 1998: 246-260 and Barker, D.E. *A Typological and Scientific Analysis of Wadi Suq and Iron Age Period Ceramics from Fujairah, United Arab Emirates*, BA Honours thesis, Univ. of Sydney, (1997).
7. N.H. al-'Abudi, *Masjid al-Bidiyya (Dirasat arkeulujiya tarikhiya)*, Al Ain (1992).
8. A Cortesao, A.T. da Mota *Portugaliae Monumenta Cartographica*, Lisbon (1960). I. For a plan of Kalba, V. pl. 581, M. Godinho de Eredia, ca 1620.
- de Resende, *Livro do Estado da India Oriental* (1646), British Museum Sloane MS, 197; fol. 149-150 for the fortifications of Dibba (Doba); fol. 143-144 for the fort of al-Bidiyya (Libidia).
- A. Cortesao, A. T. da Mota, *Portugaliae Monumenta Cartographica*, op. cit. I, Pl. 40 a; II, pl. 22) for Khawr Fakkan (Corfacan).
9. C. G. Constable and Lieutenant A.W. Stiffe, *The Persian Gulf Pilot* (1890). Captain G.B. Brucks, (1822 or 1830). Chart by Brucks and Haines (1828).
10. Between 13th-15th April 1995, the authors conducted an initial examination of the Wadi Safad to estimate the archaeological potential of the valley. It was part of a broader environmental review for the Fujairah Government to assess the Wadi Safad as a protected heritage site.
- As far as the authors are aware, the only archaeological survey prior to the present work that had taken place in the al-Qurayya area was that conducted by B. de Cardi (B. de Cardi, op. cit., p. 256), although the Swiss team led by P. Corboud worked in the area immediately to the north. Subsequent work has been carried out by M. Ziolkowski *et al*, (University of Sydney) in the al-Qurayya area, in particular Sites FS 1 and FS 2, and by S. Garfi and G. Longden (Trinity College, Carmarthen).
11. Wadi Safad is located at DC 320 891 and DC 338 89. The turn-off to the old metalled road to Safad from al-Qurayya in 1994 was 10.7 kms. north of Fujairah (measured from the Hilton Hotel at Fujairah). Safad was marked on a blue signpost on the outskirts of al-Qurayya. With the building of the new asphalt road skirting al-Qurayya and leading into the Wadi Safad, the location references given are now less useful than they were at the time when there was simply a motorable track.
12. S. Garfi and G. Longden subsequently undertook further survey work after completion of the asphalt road, although this was confined primarily to the *husn* and its environs, (FS 20 - FS 23). Their report is in preparation for publication.
13. Dostal, op. cit., *passim*
14. P.M. Costa, *Musandam. Architecture and material of a little known region of Oman*, London, (1991), p. 95-143.
15. Dostal shows such a roofing system, op. cit. p. 36, plate 8.
16. Site Code: FS = Fujairah: Safad
17. Geoffrey King and Cristina Tonghini, "The Western Islands of Abu Dhabi: Notes on Ghagha", in: *Arabia and Its Neighbours: Studies in Honour of Beatrice de Cardi*, (Phillips, C.S., Potts. D.T. & Searight, S. [eds.]) Brussels (1998).
18. De Cardi, op. cit. p. 236.

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(Editors' Note: Further work in the Wadi Safad, by Gareth Longden and Salvatore Garfi, of Trinity College, Carmarthen, UK, focussing on the *husn* and associated structures, was undertaken in December 1998, and received a small grant from the Conservation Fund of the Emirates Natural History Group. Further work was undertaken in December 1999. A preliminary report on the first season of their work will be published in the next issue of *Tribulus*).

Excavations at al-Bidiyya: new light on the Portuguese presence in the Emirates

by Michele Ziolkowski

Abstract

A preliminary season of excavation was undertaken in early 1999 at the site of a fort at al-Bidiyya, Fujairah, believed to have been constructed by the Portuguese during their presence in the Gulf region. Dating of charcoal from foundation levels suggests that the fort was constructed in the 16th Century, although ceramic and porcelain evidence from the site suggest a date range for its use from the 16th to the early 20th Centuries. Architectural remains and Carbon 14 dates suggest that the fort is, indeed, the Portuguese garrison in al-Bidiyya mentioned in the Portuguese archives.

Introduction

A team consisting of Australian and local archaeologists completed a two month field season at the site of the supposed Portuguese fort at al-Bidiyya, Fujairah in January and February 1999. The team included Michele Ziolkowski, Diane Barker and Melissa Riley from the University of Sydney, Australia, Dr. Walid Yasin al-Tikriti (Al Ain Museum), and Mr. Salah Ali, Fujairah Museum. The excavations at al-Bidiyya were undertaken with the kind permission of His Highness Sheikh Hamad bin Mohammed Al Sharqi, Ruler of Fujairah and Member of the UAE Supreme Council.

The support of Mr. A.K. al-Shamsi, Director of Antiquities and Heritage, The Fujairah Museum, must also be acknowledged. Several grants were obtained for the excavations at al-Bidiyya. These included The Gertrude Bell Memorial Grant (British School of Archaeology in Iraq, London) and grants from the PhD Students Research Support Scheme (University of Sydney, Australia) and the Emirates Natural History Group. The grant received from the Conservation Fund of the Emirates Natural History Group provided the funding for charcoal samples to be analysed using Carbon 14 dating.

Background

Until recently the port of Julfar in Ra's al-Khaimah has served as the archaeological key site for historical archaeology in the United Arab Emirates. However, the East Coast, including Fujairah, is starting to reveal a rich and diverse cultural history. This is due mainly to recent work carried out by students from the University of Sydney, Australia, who have been concentrating on the archaeology of the Islamic periods in Southeastern Arabia.

The work undertaken at the Fort at al-Bidiyya is of considerable significance for the understanding of the theory of 'contact archaeology'. The entire Batinah Coast of the UAE and Oman served as a major point of transit in the trade of spices and other commodities from the Far and Near East. Over the centuries trade in the Gulf has been undertaken by Arab and Gujerati merchants, later contested by the Portuguese, the Ottoman Turks, the Dutch, and finally the British. Historical sources for the region are sparse, but reveal enough information for an historical picture to be developed. The challenge now facing archaeologists is to compare the historical documentation with the archaeological evidence. This is one of the major components for the current study of the East Coast of Fujairah.

The Portuguese entry into the Indian Ocean, led by the

pioneering rounding of the Cape by Bartholomew Diaz in 1487, the voyage from Egypt to India by Pero de Covilhao, also in 1487, and subsequent voyages of Vasco da Gama approximately ten years later, was a bloody affair, much regretted by the Arab traders who had for centuries been sailing to India and back without fear of attack (Vine 1993: 89).

As their first objective, the Portuguese aimed to block the Red Sea to Muslim shipping at its southern end, but, in 1507 Affonso da Albuquerque resolved to cut the other main artery of the India trade running through the Gulf. En route he attacked seaports tributary to the Hormuz Kingdom at Qaryat, Muscat, and Khor Fakkan, sacking and burning them (Serjeant 1978: 157). Whilst sailing along the Batinah Coast, Albuquerque made a point of seizing every port of any size. In many cases he destroyed not only shipping in the harbour, but the towns themselves, burning even the fisherman's reed huts and nets, and cutting down the date groves (De Cardi 1970: 292). The port of Khor Fakkan was taken last; the inhabitants had received news of the fleet's approach by a boat from Sohar, and made a great display of horse and foot on the beach, hoping to deter the Portuguese from attack by mere bravado (Tomkinson 1975: 184). In the *Commentaries of the Great Afonso Dalboquerque*, Khor Fakkan is described:

"Orfação is a large town of the Kingdom of Ormuz, and contains very good houses; it is very strong on the land side, and the reason of this, that it was more fearful of being attacked by land than by sea. Many worthy merchants of Gudjerat lived there. The town lies at the foot of a very high mountain, and on the land side it has a very strong wall, which is carried along to the sea...." (Commentaries: Book I, Ch.XXVII: 100).

The Portuguese rarely intervened locally in the Gulf as long as local officials did not oppose their overlordship or interfere with the India trade. Instead, having reduced the Kingdom of Hormuz to the status of a vassal, they tended to operate through Hormuz. Control of the whole Indian Ocean was, however, too great a task for their small resources. By the late 16th century rival powers commenced to attack the position and trade monopoly of the Portuguese (Serjeant 1978: 158). By 1536 the Ottoman Turks had succeeded in reaching the head of the Gulf overland (Serjeant 1978: 158). The English and the Dutch had already begun to appear in the Gulf towards the close of the 16th century (Serjeant 1978: 159). In 1622, the Safavid dynasty in Iran conquered the island of Hormuz, surviving members of its ruling family fleeing to Portuguese-controlled Muscat. The new dynasty of the Ya'aribah in Oman (dating from the election of Nasir b. Murshid as Imam in Rustaq) then drove out the Portuguese from Khasab and Muscat in 1650, and Omani fleets made raids on the Portuguese establishments on the western coast of India, and East Africa, where they took Mombasa in 1696-8 (Serjeant 1978: 159-60).

The port of Dibba features quite prominently in many historical texts prior to the arrival of the Portuguese and during their reign in the Gulf. The Portuguese historical source entitled, *Il Livro do Estado da Índia Orientale*, written in 1646 by P. Barretto de Resende, details the possessions held by the Portuguese in the Indian Ocean (Kennet 1995: 6). Contained within this document is an illustration of the Portuguese fort at Dibba showing the layout of the town and the three forts which have now entirely disappeared (Kennet 1995: 6).

Description of the fortress at Dibba (Resende, folio 151-2):

"The fortress of Dobá is two leagues from Libidia, northwards along the coast. It is built in the shape of a square with four round bastions in the corners and an artillery tower (cavalro) in the middle with a well. Each wall is seven braças long and four in height and eleven palmos in width. It is made of stone and has parapets. Inside the fortress there is a house for the captain, a church and an underground warehouse for ammunition; there are hollow space among the bastions for storing provisions. As well as this the fortress has an outer fence which is very long and is built in the shape of a square with five bastions, one of them over the gate and the other four in the corners. The gate is used as a guard's quarters. Each wall is 25 braças long and two and a half braças high; it is made of adobe with loopholes because there are no parapets. There are houses for the soldiers inside this enclosure."etc., (Kennet 1995: 7).

The name Libidia is most likely that of al-Bidiyya.

The Site at al-Bidiyya

The site at al-Bidiyya consists of a large square enclosure constructed with large boulders at the foundation level and smaller mountain and wadi rocks used for the successive courses. Much of the building material used in constructing the fort at al-Bidiyya was appropriated from the nearby 3rd Millennium BC, or Umm al-Nar period, tower. The fort walls are each around 60 metres in length. The north western tower is the most prominent tower present at the site, although, by the end of the season remnants of the north eastern tower were also located.

Excavation was concentrated on the north western tower and both the northern and western fort walls. The western wall has one interior wall running perpendicular to it, and continuing into the fort interior. Only the large foundation rocks remain on the exterior of the western

fort wall. The interior wall facing comprises up to three courses. The interior wall fill consists of rubble and a mud-based mortar. Towards the northern end of the western wall, a clay oven, square in shape with rounded corners was located.

The northern fort wall is constructed in a similar manner to the western fort wall and is preserved to a maximum height of one metre (Figure 1). The northern fort wall contains five interior walls running perpendicular to it. Excavations on the southern side of the wall, close to the north western tower revealed that these walls do in fact form small room units with entrances. The finds from within this area include ceramics, small finds and charcoal. The small finds consist of groundstone tools, Late Islamic period 'fulus' (copper coinage), glass Kohl applicators and a pair of decorated bronze tweezers (Figure 2). Three semi-complete water vessels of Julfar type were located within the wall interior (Figure 3). Many ceramic rim fragments with pointed triangular lugs were also recovered from the excavations.

These sherds are comparable to material found on the coast in Ra's al-Khaimah, at Khashm Nadir and northern Julfar, and made at the kilns on the Lishkari plain and Wadi Bih (Stocks 1996: 154). These ceramics have been dated to the 17th and 18th centuries (Stocks 1996: 154).

Two charcoal samples, both from foundation levels, were analysed using the radiocarbon method (Sample codes, Beta-129789 and Beta-129790). The calibration curve used is Calib.3.0.3c. (Stuvier & Reimer: 1993). The calibrated dates are as follows: Sample, Beta-129789, AD 1450-1670 (98%); Sample, Beta-129790, AD 1510-1600 (78%). These dates fall securely within the context of the Portuguese presence in the Gulf.

The north western tower was unfortunately damaged at some point in time by a bulldozer. The western wall line of the tower also appears to have been altered or partially damaged, either in antiquity or in the recent past. However, the shape of the tower is determinable from the remaining wall lines. The tower would have been a diamond shape, with slightly rounded corners.



Plate 1: The northern fort wall, with the north-western tower in the background

The estimated lengths of the two missing tower walls would most likely have been around five and a half metres each.

On the basis of the architectural remains and the Carbon 14 dates, it may be suggested that the fort is in fact the Portuguese garrison of al-Bidiyya (*i.e.* Resende's Libidia). However, the material evidence found within the structure does little to support a strong Portuguese presence at the site. It is possible that the fort continued to be used well after Portuguese power in the Gulf was in decline.

Ceramic and porcelain evidence from the site suggests a date range of 16th Century to the early 20th Century. Much of the late material was found on the surface of the site, where the remains of recent structures are still present. It is feasible that the Portuguese military presence in this area of the Batinah coast consisted of a garrison, either manned or not. Conceivably, the Portuguese built such forts as a way of reminding the local population of their presence and control throughout the Gulf.

It is apparent from the Portuguese historical documents that sites such as Julfar, Muscat, Hormuz, Bahrain and Goa were far more important strategically than the smaller ports. Overall, the excavations at the fort at al-Bidiyya have added considerably to understanding of Fujairah's historical past. It is hoped that future excavations will allow for more conclusive statements regarding the history and function of the square building at al-Bidiyya.

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Late Islamic vessels of Julfar type from the fort at al-Bidiyya

The History & Development of Al Wathba Lake , Abu Dhabi

by Simon Aspinall and Peter Hellyer

Abstract

Some forty kilometres east of the UAE capital, Abu Dhabi, along either side of the truck road to Al Ain, is an area of *sabkha* long known to ENHG members as Al Ghar. On the instructions of President His Highness Sheikh Zayed bin Sultan Al Nahyan, the area has been designated as a nature reserve, with the name 'Al Wathba Lake,' and is now under the management of Abu Dhabi's Environmental Research and Wildlife Development Agency, ERWDA.

The following account documents how a permanent lake came to be formed, and how, in 1998/1999, flamingos bred here successfully in what constituted the first ever recorded occasion on the Arabian mainland and the first such time anywhere in the Arabian peninsula since 1922.

Discussion

The area marked on the maps as 'Al Ghar' had long been known to become at least saturated during the winter months, this presumably as a result of sub-surface through flow and hydrostatic back up during spring high tides. Rain, when it fell, itself by no means a predictable or regular event, invariably resulted in surface water lying for up to several months thereafter.

Water formerly drained away through the *sabkha* to the south. The construction of the truck road to Al Ain, which cut across a low-lying area of the *sabkha*, created, however, an artificial barrier that dammed back water on the northern side. While this overflowed to the south, the construction of further bunds to the south to permit vehicular movement had the effect of creating accidentally yet more areas where water could collect.

Following heavy winter rains in 1989/1990, a substantial amount of water collected on the northern side. This wetland, albeit ephemeral, drew in many waterfowl, including Kentish Plover *Charadrius alexandrinus* and Black-winged Stilt *Himantopus himantopus*, both of which bred in 1990. For the latter, of which an estimated 50+ pairs were present, it was the first recorded breeding in Abu Dhabi Emirate, at a time when the species was only just beginning to colonise districts in the southern Arabian Gulf. It was previously only a scarce visitor to Abu Dhabi. Several hundred non-breeding Greater Flamingos *Phoenicopterus ruber* were also present (Brown & Hellyer, 1991).

Illegal shooting was noted by ENHG members in November 1990, and was reported by Peter Hellyer (PH) to the Group Patron H.E. Sheikh Nahyan bin Mubarak Al Nahyan, who mentioned the incident to H.H. the President. Police patrols were then instituted, with signs being erected banning all shooting. The waterfowl returned.

In March 1991, some 125 flamingos were present, rising to 180 in July and then all but doubling to 350 in September. In November 1991, numbers rose to a peak of 650 before declining, while by the summer of 1992, numbers had risen again to around 300 birds.

By the autumn the lakes were dry, but following rains in January 1993, flamingos soon started to reappear. Fifty were seen in late February, rising to nearly 600 in the summer.

On 7th June 1993 Simon Aspinall (SA) and Erik Hirschfeld (EH) discovered Greater Flamingos already incubating as a small colony on a lake to the south of the truck road, which had been created accidentally by the effect of a *gatch* bund, *playa*-like in character and rapidly dwindling in area (Aspinall and Hirschfeld 1993, Hellyer 1993). The Group Patron and the Office of H.H. Sheikh Mohammed bin Zayed Al Nahyan were informed and

police patrols were re-instituted although, in the event, this proved inadequate to guarantee eventual success of the colony.

Abu Dhabi-based ornithologists kept an eye on the colony, at all times viewing from a safe distance, and maintained a running log. On 7th June when SA/EH first visited, there were fifteen completed nest-mounds and six birds incubating, with two eggs being clearly seen. Twenty-two completed nests were noted by 10th June. Observations continued through the month into early July, with two newly hatched chicks being seen on 5th, followed by four the next day. As the incubation period of Greater Flamingo is known to last 28-31 days, those eggs seen on 7th June must, therefore, have been very recently laid.

The colony was intact on 8th July, but a visit the following day by EH and Robert Quested showed it to have been deserted. PH and Richard Hornby waded out to inspect the nest-site on the 11th and found clear evidence of human intrusion. All but one of the eggs had been removed; that remaining was floating in the water nearby. One dead chick was also noted. However, a total of 79 complete and part-built nests were counted and it seems that this incipient colony had greater potential than had hitherto been realised (*see below*). Moreover, some 571 birds, most not yet adult, had been present locally during the early stages of the incubation period, although many spent much of their time on the larger body of water on the north side of the truck road, the area now designated as the wetland reserve. This number fell as the lakes shrank progressively during June and July, being no more than 150 at the time the colony deserted.

Nigel Jarrett commented that some of the nest mounds looked to be more than a year old, suggesting that they had been used in 1992, if not even earlier. This seems improbable, but not entirely fanciful, although PH, who had watched this wetland since March 1990 when flamingos first "found" the area, is firmly of the opinion that nesting birds had not been overlooked previously, although practice nests may have been thrown up. Insufficient winter rainfall fell in the 1991-1992 winter to create lakes of any size on the southern side of the truck road, this precluding any serious nesting attempt.

One obvious factor in the failure of the 1993 attempt was the fact that the sandy islet which served as the nest-site at the start of the summer eventually became reconnected to the surrounding *sabkha*, as water levels fell, with no open water to deter mammalian intruders, whether feral dog, fox or human. Regulation of water levels was clearly going to be the single most important issue to tackle.

In late 1993, the prospect of further breeding attempts by Greater Flamingo appeared to have been removed following a decision by the Municipality to fill in much of the *sabkha* on the south side of the road, where the colony had been established (Hellyer 1994). An attempt to do the same on the north side of the road was rendered ineffective following winter rains which promptly not only flooded the in-filled area, but covered a wider area, albeit with shallower water.

Efforts to continue to generate official interest in the potential of the lakes continued, however, and in early 1994, Mohammed Al Bowardi, Managing Director of the National Avian Research Centre, NARC, (now part of ERWDA), took the authors around the outskirts of the adjacent Muqatara base, to the south of the truck road, to scout out a potential replacement site. Although several low points were identified, this proposal never got off the drawing board. Nor, with hindsight, we are

glad to say, did the somewhat expensive and hardly foolproof proposal to excavate a lake in the middle of the Al Wathba camel racetrack circuit, although some interest in official circles was initially shown. 1994 went by without any progress being achieved, although possible options were still being evaluated throughout.

Attention then turned to the lakes on the northern side of the road, where some flamingos were generally to be found whenever the *sabkha* here flooded and formed what amounted to, at times, a substantial lake. Besides the flamingos, the lakes attracted significant numbers of other waterfowl, with both Black-winged Stilts and Kentish Plovers continuing to breed in considerable numbers.

This area was still unreclaimed and part-hidden by flanking dunes, but, more importantly, as it turned out, it was close to the Abu Dhabi Municipality-run water treatment plant at Mafraq and immediately downhill of it. Some interest was shown by senior Municipality officials in the possibility of creating a wildlife sanctuary in the area, with the proposal being endorsed at one stage by the visiting Director General of the United Nations Environment Programme, who visited the lakes together with the Municipality Under Secretary and PH.

Following a mention of the proposal in the now-defunct government newspaper, *Emirates News*, in early 1995, a secondee from Welsh Water, Geoff Gunson, who had previous experience of creating and managing wildlife reserves in Wales and was then working at the Mafraq plant, became involved as a go-between. There then began a long period of official correspondence, often prompted by the Wildlife Management Unit of NARC.

While there was broad agreement that the creation of a permanent lake reserve was a worthwhile idea, arranging for the necessary orders to be issued proved somewhat difficult to achieve.

Since the Municipality had by this time abandoned plans to in-fill the northern group of lakes, the birds, meanwhile, continued to make use of the area. Annually in the summer from 1995 through to 1998 inclusive, small numbers of flamingos displayed in different areas of the northern lakes, with between nine and eighteen nests being built in at least three of the years. The rapidly dropping water levels apparently prevented each attempt getting far, and no eggs were laid on any occasion. The inability to regulate the water-level appeared to be the key factor. The lack of significant winter rains, except in 1995/96, meant that by summer the area of the lake was so greatly reduced as to prove unsuitable for nesting by most species, flamingos included. Ultimately, however, they bred in the winter.

In December 1995, in an attempt to ensure that protected habitat was created, three small islands free of mammalian predators were created, with necessary plant and manpower being generously loaned by Mace Contracting. The work was completed and the plant removed just before winter rains raised the water level.

In the summer of 1996, nearly 30 pairs of Black-winged Stilts *Himantopus himantopus* found the islands suitable for nesting. The flamingos, however, frustratingly confined themselves to making use of the islands for loafing, choosing another area to the east for another attempt at breeding, once again being frustrated by falling water levels. By way of consolation, however, a pair of Avocets *Recurvirostra avosetta* took up residence on one of the islands and bred successfully in 1996, the first documented such attempt by this species in the country. It had hitherto been considered a nationally rare (not even annual) migrant or winter visitor.

In the same summer, 1996, following claims of Greater Flamingos breeding on Khor Dubai, (later proven to be unsubstantiated), H.H. Sheikh Abdullah bin Zayed, then Under-Secretary and now Minister of Information and Culture, and the Office of H.H. Sheikh Mohammed bin Zayed requested photographs of the 1993 breeding attempt at Al Wathba and a briefing on the current status

of Greater Flamingos at the lakes, an indication of continued high level interest in the evolving scheme to have the area declared a wildlife reserve.

By now, the lakes, dubbed Al Ghar or, familiarly, 'The Ghar,' had also become well-known among birdwatchers abroad as well as in the UAE.

Obtaining the appropriate permission to discharge treated water (described in the trade as "final effluent"), surplus to requirement, was still not proving easy, however. A standing Municipality order prevented discharge to the desert, except in emergency. (Fear of mosquitos proliferating were unfounded, as the lake would be far too saline). The 'except in emergency' was enough to make us persevere, as, quite clearly, it was possible on occasion. Up until this point, only water lost as seepage and leakage was entering the lake, albeit of a volume nowhere near sufficient to counter-balance evaporative loss into the summer.

A source of water was then identified to which nobody else had laid or would lay claim: the treated water used for irrigation at the Al Wathba camel racetrack fodder fields. To prevent salination, this water was being under-drained and pumped back up to Mafraq to a holding tank and from there discharged gravitationally to Mussafah i.e. to the sea. Since by percolating downward at the fodder fields it had become saline, and thus unsuitable for other users, it was, however, ideal for the lakes.

Saline water was, in fact, just what was needed. The preferred food of flamingos is the brine shrimp *Artemia* sp.. This organism requires an absence of competition to thrive, something only generally available when a water body is hypersaline (80-120 ppt. appears optimal) at which time, while the shrimp is able to breed unaffected, most other organisms expire. Brine shrimps may then become superabundant, something suiting the flamingos very well. Arrangements were made to stock the lakes, should the need arise, but inspection of the lake waters revealed the existence of already high populations of *Artemia*.

In early 1996, the Municipality's Sewage Projects Committee, under the (Deputy) Chairmanship of HE Saeed Trais, finally cleared the way for treated water to be released to the lake, when this was not required by Agriculture Section. Since the under-drained saline water was preferred in any case, this potential conflict was avoided.

With this approval secured, it was possible to pursue another idea, that of encouraging the growth of reedbeds. One such area had started to form naturally where leaking water escaped, and, following a burst one weekend, (when the system overloaded and water was discharged in an uncontrolled fashion to the desert), another sandy wadi-like channel was cut which was to prove an ideal opportunity to develop a second riparian habitat. The Mafraq plant soon took care of pipe connections and installed discharge pipes in predetermined spots. As a result, not only was there saline water going into the lake, there was also a supply of fresh, or at worst, brackish water tolerable to *Phragmites* sp., to saturate the reedbeds and foster their rapid growth. The high nutrient loading of the treated water permitted an accelerated growth rate of the latter and probably, very usefully, catalysed *Artemia* into mass-producing almost without limitation.

Although some ten or so pairs of flamingo exhibited courtship display in 1996 and 1997, as in other years, and made rudimentary nest-mounds, both seasons passed without further breeding progress being made. The level of human disturbance remained low and the perennial problem of the lakes progressively drying up in summer still appeared to be the principal factor preventing the formation of a successful colony. Some eighteen pairs built nests in late May 1998, but again no eggs were laid and the attempt essentially came to an end by mid-June.

On this occasion, however, the renewed breeding

attempt by the flamingos was brought to the attention of H.H. Sheikh Hamdan bin Zayed Al Nahyan, Deputy Chairman of ERWDA, who informed H.H. the President. Orders were promptly given that the area was to be closely guarded, with a permanent police patrol. The formal designation of the area as a reserve dates to this time, with a decision that once proper plans were prepared, it was to be placed under the supervision of ERWDA, as Abu Dhabi's first formal wetland reserve. With this decision achieved, it remained only for the birds themselves to perform.

Water levels were, by now, being watched much more closely. It was still felt that islands ought to be constructed to counter, at least in part, fluctuating water levels. Artificial nest mounds would then have been constructed to entice birds ashore. This technique has a proven effectiveness, pairs swiftly taking over and adapting such mounds. Time passed and this plan never came to fruition, although it remains a possibility for the future.

Following the failed breeding attempt in the summer of 1998, numbers of flamingos began to build up again in the late autumn. This was not altogether unusual or unexpected, and had, indeed, become an established pattern. Atypically, a group of adult birds began building nest-mounds in late November. Even though there was no reason to suppose that this was anything of particular significance, progress of the colony was followed more closely than before. It was still suspected that there would be a long wait before anything more transpired. There was, after all, no recorded precedent (other than for captive birds) for anything other than summer breeding by this species. Flamingos are present *throughout* the year on an purpose-built bank at Khor Dubai, often modifying and sitting on artificial nests that have been provided, although in almost ten years they have never proceeded further.

When Steve James and Andrew Twyman visited the lakes on 27th November 1998, they recorded a fairly typical winter total of up to 1500 birds and also some 89 nests already constructed, of which 50 or so were in 'active use'. The Office of H.H. Sheikh Hamdan was

again informed and the area was immediately declared completely off-limits. The police guard was strengthened, and was ordered to stop all visitors, on one occasion intercepting and questioning Sheikh Hamdan on an inspection visit.

Approaches were also made to Chief of Staff H.H. Lt.-General Sheikh Mohammed bin Zayed Al Nahyan to ensure that pilots from the nearby Muqatara base did not overfly the lakes. Apache helicopters, until then practising in the immediate area, had been observed to cause pandemonium in the colony.

At least a dozen nests contained eggs by 11th January 1999, these being seen by ERWDA staff. As many as forty were suspected of containing eggs the next day, and up to 44 two days later. Clearly most of those birds settled on nests were actually incubating. Abdul Latif Al Hadidi, assigned by Sheikh Hamdan to oversee matters relating to the lake, filmed the colony on 17th January without realising, until playing back the recording later in the day, that a chick was stirring in one of the nests. The wait from 1993 had been long and now the prospect of successful nesting appeared within reach. Even at this point, however, disaster was only narrowly averted.

Over the 16-17th January a large and unplanned release of water from the Mafraq plant raised the water level to a critical level. Many nests collapsed and wave action during a strong westerly wind (but not *shamal*) washed eggs off a number of the mounds. On the 18th, only 16 birds were still sitting, one or two precariously so. The next day only 12 remained. Any attempt to rescue the eggs from the surviving mounds or to have retrieved any of the others would have caused complete desertion.

A number of the eggs that had been floated off the nest mounds were eventually retrieved from the shore and placed in an incubator at NARC, but all the chicks were found to be dead, presumably from chilling or drowning. One had been in the process of emerging from the egg at the time it was washed off its mound and drowned.

A slight amelioration of the situation was achieved through prompt action by Abdul Latif Al Hadidi, who arranged on 18th January, the first day of the Eid holidays, to borrow a back-hoe from the Municipality and



Greater flamingos at Al Wathba Lakes. Picture by Simon Aspinall

undertake some shrewdly-sited trenching work at the western end of the lake, nearly a kilometre away. The run-off of thousands of gallons of water into an adjacent depression that ensued managed to reduce the water levels by a small but critical amount. Over the course of the next day, the wind died down and the danger passed.

The chick first noted on the 17th January survived the onslaught of wind and water, and was seen standing on the nest edge on the 19th. Ten other nests were still being tended, but none had apparently hatched by the 23rd. Three chicks were seen on 2nd February, with six other adult birds still sitting (brooding or incubating) and one exposed egg also noted. By 9th February there were nine chicks huddling in a creche, these joined by a tenth on the next day. The first chick to have hatched was foraging on its own from mid-month, while the nine others remained most often in a tight-knit creche. There was a marked hatching asynchrony, with the oldest chick fully three weeks ahead of the youngest.

The young flamingos finally fledged in April - the first to take to the sky in Arabia in over 75 years.

The success of other species has also been remarkable. Breeding by Avocet is now an annual fixture in the area, still the only UAE site, although not always at the main lakes, while the Black-winged Stilt and Kentish Plover populations have also been restored to their former high levels. The by now extensive reedbeds have proved attractive to several other species, including migrant warblers, hirundines and wagtails. Over fifteen species of birds are now breeding in the reserve, while over 5,000 waterfowl may be present at any one time in winter, including record numbers for the UAE of species like **Black-necked Grebe** and **Shoveler**. While the turnover of passage wader populations can only be surmised, certainly many tens of thousands of birds must use the lake through the course of the year.

Al Ghar, officially named by H.H. President Sheikh Zayed as the Al Wathba Lake, is now formally a protected reserve under the management of ERWDA, the first such reserve to be designated in Abu Dhabi. H.E. Sheikh Mohammed bin Butti Al Hamed, Chairman of the Abu Dhabi Municipality & Town Planning Department, has guaranteed the essential services of the Municipality, including those of the Mafraq sewage treatment plant, while the inauguration of the reserve by Britain's Prince Charles, himself a knowledgeable birdwatcher, took place on 19th November 1999. Appropriately, he was briefed by then ENHG Vice Chairman Steve James, who had actively studied the birds of the lake for several years.

Around 350 flamingos were at Al Wathba Lake for the

inauguration, many engaged in courtship display and in the repairing of the nest mounds that had survived from the previous year. A further breeding attempt initially seemed likely to ensue, but the birds eventually abandoned the colony, although several hundred continued to feed at the lake.

As a corollary to this account, it should be noted that the original intention was always to create a wetland close to the capital, suitable for flamingos to breed at, but which would serve primarily as an attraction for residents of the UAE and to visitors to the country, quite apart from presenting an unrivalled educational resource. In pursuit of this objective, in May 1999, Board members of ERWDA requested the initiation of discussions with the Abu Dhabi office of BP-Amoco to see if the company would be willing to participate in the long-term management and planning of the reserve. Following a visit by a senior environmentalist working for BP-Amoco, agreement was reached between ERWDA and the company.

To this end, ERWDA, in collaboration with BP-Amoco, has now embarked on a scheme to provide over the next few years a nature trail, observation hides and a interpretative centre for visitors.

The spectacle of wildlife at the Al Wathba Lake, ('The Ghar') enjoyed by local and visiting birdwatchers for nearly a decade, will now become something for all to enjoy. With the bird checklist for the reserve up to late October 1999 standing at exactly 200 species, its long-term potential is evident.

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A Mountain Wadi that Flows to Both the Arabian Gulf and the Gulf of Oman

by Gary R. Feulner

Introduction

In *Tribulus* no.7.2 (Winter 1997) I described the unusual hydrological phenomenon of two Hajar Mountain wadis that fork within the mountains in the downstream direction. Subsequent review of the geography of UAE watersheds for other purposes revealed a still more unusual phenomenon - a wadi that forks at the mountain front and flows to both the Arabian Gulf and the Gulf of Oman. This feature is, in fact, shown on some area maps and I have confirmed it in the field in company with Michel de Martigny of the Dubai Natural History Group (Fig. 1).

Description

Wadi Hadf is the uppermost tributary of the Wadi Hatta watershed, which flows to the Gulf of Oman coast in the area between 'Aqr and Wadiyat. Wadi Hadf has its source near the summit of Jebel Hatta, from which it first flows NW through the mountain enclave of Hadf. It is joined near the mountain front by several smaller tributaries, some of which today support agriculture, before exiting the mountains through a 200 metre-wide gap at Sinadil, a site popularised in a local off-road guide. Thereafter, it flows eastward across the gravel plains of the broad corridor west of Hatta (called Sayh Muzayri'), before joining several other tributaries at Hatta to form the main Wadi Hatta.

At the Sinadil gap itself, the main wadi flows NNE through a steep, narrow gorge cut mostly in cemented

gravel deposits. Just above the head of the gorge, however, a second, westerly channel departs from the main wadi and runs north along the western edge of the gap. Between the two channels there remains a wedge-shaped "island" of semi-consolidated gravels devoted to agriculture. It is this cultivated area that carries the name of Sinadil and it is apparently of relatively long standing. The second channel is much less conspicuous than the gorge because it is shallower and heavily vegetated, in part because it has been silted up behind a series of small man-made dams and planted for agriculture (although present day cultivation in the area of the channel is subordinate to cultivation on the "island" itself).

The entrance to the westerly channel is located approximately 110 metres upstream from the head of the Sinadil gorge at a point where the main channel, flat bottomed and composed of loose, coarse gravel, is approximately 35 metres wide. At that point the entrance to the second channel is estimated to be 1 to 1-1/2 metres higher than the lowest point in the floor of the main wadi. The upper end of the second channel is today modified and somewhat isolated from the main wadi by the low berm of an earthen *falaj* serving the main agricultural "island".

About a kilometre downstream, where the agriculture in it ends, this second channel becomes a full-fledged wadi cut approximately 5-6 metres deep into the semi-consolidated sediments of the gravel plain. At this same point downstream, at the base of the gorge, the main wadi is approximately four times as deep (20-25



The two outlets of Wadi Hadf at Sinadil (viewed from the SW). The westerly overflow channel follows the base of the slope in the foreground. The main channel and its deeply incised gorge are clearly visible at the right.

Photo by Michel de Martigny.

metres) and cuts through approximately 10 metres of semi-consolidated gravels, 10 metres of cemented gravels (a horizon which appears to dip and/or taper out towards the plains), at one point cutting into ophiolite bedrock. Both wadis traverse the gravel plains as steep-sided, flat-bottomed channels.

The second, westerly wadi can be traced continuously downstream along the mountain front to the ENE, where it cuts off several northern outliers of foothills before emptying onto the Madam Plain. The Madam Plain also receives the outflow from several other major wadis draining the west flank of the Hajar Mountains. These waters regroup near Madam as Wadi Fayah.

Today Wadi Fayah ends in the desert, but in the past it has flowed to the sea in the area of the Sharjah-Ajman border. It nearly did so again in 1988 when runoff from heavy rains was augmented by the failure of the old Shuwayb dam.

Origins

What can be said about the genesis of this phenomenon? The following interpretation is proposed. The presence of the "island" indicates that both channels were originally cut into thick gravels (tens of metres thick) deposited across the gap at Sinadil and on the plains beyond. The deposition of those gravels must have occurred during an extended period of increased rainfall in the past, enabling Wadi Hadf and its tributaries to carry a much greater sediment load down from the mountains. In that environment, the stream emerging from the mountains complied with theory and, on reaching the relatively flat plain, dropped much of its sedimentary load and dispersed into separate, but shifting and often intertwining, channels.

The fortuitous position of Wadi Hadf, emerging from the mountains just at the almost imperceptible topographic

divide between east and west along the gravel plains at Sayh Muzayri', permitted the westernmost of these multiple channels to flow west just far enough to enter the Arabian Gulf watershed, while those to the east flowed east to Wadi Hatta and the Gulf of Oman.

Thereafter, conditions became more arid and the pre-existing channels began to cut themselves more deeply and more permanently, resulting in one major channel to the east and one to the west. This incision may also have been correlated with relative uplift along the mountain front, for which evidence exists in the form of disruption of drainage features in nearby areas. The present state of affairs is the result of the progressive relative enlargement of one channel of those original two, with the second, westerly channel increasingly being active only as an overflow conduit in times of extreme high water.

The reasons why one of the two "sibling" channels initially became dominant over the other are difficult to identify precisely after the event has taken place. Many factors might have made one channel a preferred or easier path for flowing water, including, inter alia, the relative strength or coherence of the underlying bedrock or sediment, the presence or absence of favourable patterns of fracturing, and the hydrodynamics of the stream as it flowed into the area in question. Once begun, however, the differentiation of the two channels would have been self-perpetuating.

Wadi Hadf therefore represents a special example of the more general phenomenon of stream capture. When two channels are competing for the same water, the ultimate victor will almost always be the one with the steeper gradient in the immediate downstream area. That is what happened at Sinadil, and in this instance the difference in local gradients is a relatively direct reflection of the steeper overall gradient from Sinadil to the Gulf of Oman (a drop of 450 metres over 45

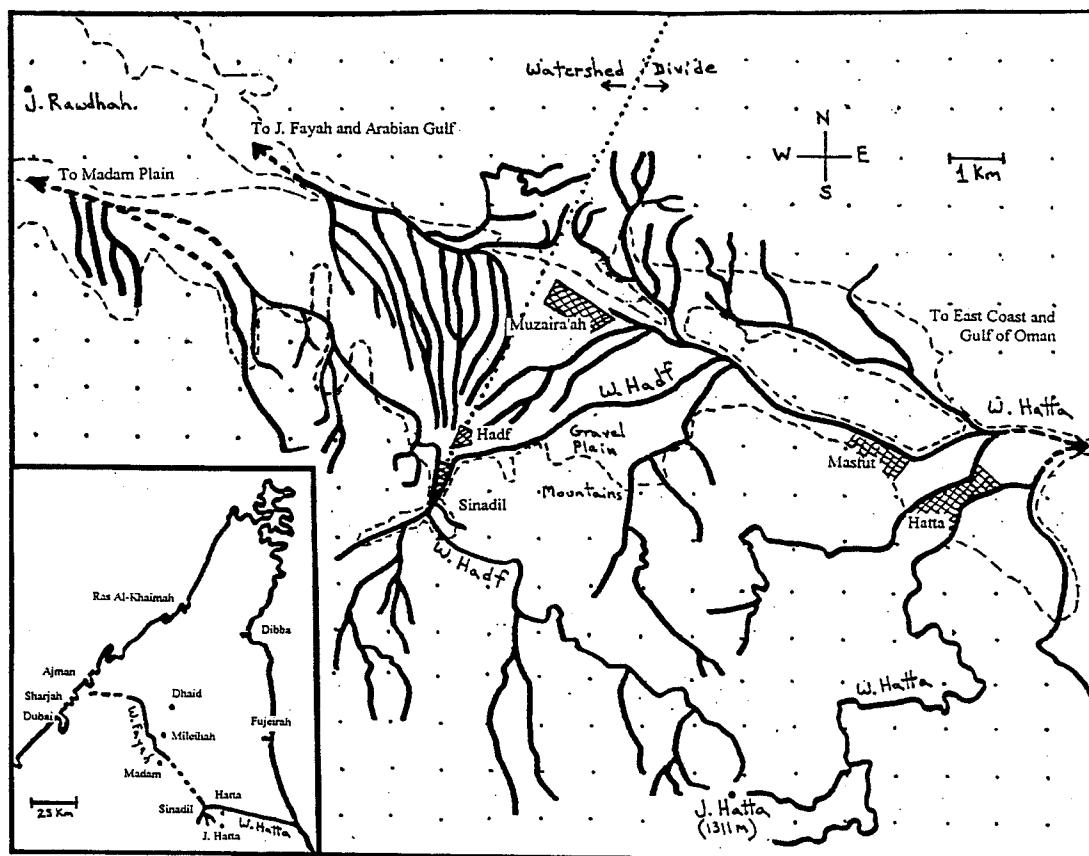


Fig. 1: Plan view of Wadi Hadf and its two divergent outlets at Sinadil.

kilometres) in comparison to the gradient in the direction of the Arabian Gulf (450 metres over more than 100 kilometres).

As the main channel developed, the entrance to the second, westerly channel would have found itself outside the main current, water flow would have been slower there and sediment and debris would have been deposited, further segregating it. Low water volumes and slower flow would also have encouraged the accumulation of silt in the upper portion of the westerly channel. This may have led originally to its use for agriculture. The earthen *falaj* today constitutes an additional small but significant barrier to overflow, as does the uppermost of the stone dams beyond it.

Accordingly, the dominance of the main wadi over the westerly channel can be expected to continue to increase over time. If the head of the gorge retreats as much as another 125 metres upstream, the westerly channel will be bypassed entirely.

It is worth noting that the Sinadil gorge, although it is the most dramatic feature of the present day landscape, probably played little part in the triumph of the main wadi. Instead, it is more correctly viewed as a product of that success. Until the main channel had been eroded to the level of the cemented gravels in the gap, it would have had a more typical broad, flat-bottomed cross-section and a more uniform longitudinal profile.

Once the cemented gravels were encountered, they formed a barrier resistant to rapid erosion, creating a "step" in the wadi, below which the channel had to deepen disproportionately in order to maintain the same overall downstream gradient. The gorge is an evolving feature that is migrating headward and would not have

achieved either its present position or its present depth until relatively recently.

Erosion rates in the Hajar Mountains are not well studied and the time scale of the foregoing events can only be speculative. However, the time

periods involved need not have been very long. Even for the main channel of Wadi Hadf, an age of 10,000-12,000 years (the interval since the end of the last glacial period) would correspond to an average increase in depth (at the base of the present day gorge) of only 0.17-0.25 cm per year. A study of fluvial terraces in Wadi Bih in Ra's al-Khaimah has inferred ages of 10,000-150,000 years for the several most recent cutting and filling cycles recognised there.

One element missing from the foregoing discussion is historical information concerning whether floodwater from Wadi Hadf has actually overflowed into the westerly channel in modern times. The existence and scale of established agriculture there give the impression that this has not happened, or at least not to a significant extent, for a decade or more. This is consistent with the statement of a foreign agricultural labourer currently employed at the site that water is "never" found in the westerly channel. However, it would be enlightening to obtain reliable information for a somewhat longer period of time. In all likelihood, such information would be available only in the form of accounts by older local residents of the nearby villages of Hadf and Muzayri'.

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A population of Rock Hyrax *Procavia capensis* on Jebel Hafit, UAE

by Peter L. Cunningham

Abstract

A breeding population of **Rock Hyrax** has been observed on the eastern flank of Jebel Hafit, near Al Ain. Visual identification suggests that they are either *Procavia capensis syriaca* or *Procavia capensis jayakari*. Although the first record in the wild for the UAE, it is suggested that they are the survivors or descendants of animals that have escaped from captivity or have been released.

Introduction

Procavia capensis is a small, stocky distinctive mammal, widely distributed throughout the drier regions of southern and north eastern Africa and Arabia (Kingdon 1971 and Skinner and Smithers 1990). In the Levant and the Arabian Peninsula, it occurs naturally in Lebanon, Palestine, Jordan, Saudi Arabia, Yemen and the Dhofar region of Oman (Harrison 1975; Gasperetti 1981; Nader 1990; Harrison & Bates 1991). The sub-species *Procavia capensis syriaca* was described from Lebanon while *Procavia capensis jayakari* was described from Oman (Harrison & Bates 1991).

Results and Discussion

In mid-May 1999, six individuals were observed in a gully between boulders on the eastern slope of Jebel Hafit, an outcrop immediately south of Al Ain, in the Eastern Region of Abu Dhabi, United Arab Emirates. The sighting was within UAE territory and represents a first record of the species in the wild in the Emirates.

Two adults, one sub-adult and three juveniles were observed. The colouration of the adults, which is subject to much individual variation, was light brown with a yellowish mid-dorsal spot.

According to the literature, *P. capensis* does not occur naturally in the UAE, although Hornby (1996) states that *P. capensis* formerly probably occurred in the wild. He indicated that no reliable evidence thereof could be obtained. The closest sub-species, *P. c. jayakari*, has been documented from the Dhofar region in Oman (Harrison 1975; Nader 1990; Harrison & Bates 1991).

According to Hellyer (*pers. comm.*) a population has been established since at least 1996 on Abu Dhabi's western island of Sir Bani Yas as a result of escapes. The origin of the imported stock is unknown.

The yellowish mid-dorsal spot, which marks the dorsal scent gland, is indicative of the two Middle East sub-species *P.c. syriaca* and *P.c. jayakari*, as the African sub-species, *P.c. capensis*, has a black mid-dorsal spot (Skinner & Smithers 1990 and Harrison & Bates 1991). The visual identification of the animals on Jebel Hafit suggests that they are either *P.c. syriaca* or *P.c. jayakari*.

It is highly unlikely that the population of *P. capensis* on Jebel Hafit is a relict population of *P.c. jayakari*, which had not previously been noticed, since *P. capensis* are diurnal and relatively conspicuous as well as vocal animals, and therefore relatively easy to observe.

The most likely explanation for the presence of *P. capensis* on the mountain is that they are escapes from private animal collections in the vicinity. According to Abbal (*pers. comm.*), no *P. capensis* have been housed at the Zoo since 1990 while Jongbloed (*pers. comm.*) suggests that none were at the Zoo between 1982-1990. There were, however, specimens of *P. capensis* in a collection at the foot of Jebel Hafit until September 1999. This is the probable source of the population now present on Jebel Hafit. According to the keeper of the collection, 20 animals were obtained from Saudi Arabia

in 1993. Numbers grew to approximately 200 before the collection was removed. If from Saudi Arabia, these animals are probably *P.c. syriaca* (Khan, *pers. comm.*). No estimate can be given of numbers currently present. Mixed feeders (browsers and grazers), *P. capensis* would compete on Jebel Hafit both with domestic stock and with the remnant population of wild ungulates. *P. capensis* is a voracious feeder which can utilise poisonous plants unpalatable to most other animals, and is also independent of permanent water supply. (Skinner and Smithers 1990 and Harrison and Bates 1991). This hardiness makes *P. capensis* a possible threat to the ecology of Jebel Hafit.

In Palestine, *P. capensis* forms part of the diet of **Arabian Leopard** *Panthera pardus nimr*, (Yosef & Bartov 1998). Although there are no recent records of leopards on Jebel Hafit, *P. capensis* would provide a source of food for these and for other larger predators. The combined effect that predators, food availability, competition with domestic stock and adverse environmental conditions could have on the population of Rock Hyrax on Jebel Hafit is at present unknown.

Conclusion

It is probable that the individuals of *P. capensis* observed on Jebel Hafit in mid-May 1999 are survivors and/or descendants of escapees or released animals from the nearby private collection. Capture and study of specimens is desirable in order to determine the sub-species present.

The effect of a *P. capensis* population on the ecology of Jebel Hafit can, at present, be only a matter for speculation, but monitoring is advisable, to determine potentially adverse effects in the future.

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Taweela: a coastal area suitable for protection?

by Simon Aspinall

The possibility of a network of protected areas being established in the UAE has been widely discussed over the last few years. While discussion continues, no areas have yet been formally designated, although the necessary legislation is now in force. Substantial survey effort has identified a number of areas of regional (international) importance (see **Tribulus 6.1**: 5-9), which should, therefore, almost certainly be priority sites for designation. Selection of such sites has been undertaken on a scientific basis and in an objective manner using tried and tested qualifying criteria.

A network of such sites will ensure that the regional biodiversity is adequately safeguarded and, without elaborating greatly, this has been the basis of the thinking that has gone into the preparation of a shortlist of valuable areas. For interested parties, something of the rationale behind conservation can be gleaned from a number of recent publications, (e.g. Aspinall 1996a; Evans 1994; Scott 1995), which describe the floral and faunal interest of many of the UAE's top wildlife sites and outline the protected area assessment criteria of the World Conservation Union, IUCN.

Continuing survey efforts, by the Sharjah-based Arabian Leopard Trust, ALT, the Abu Dhabi Government's Environmental Research & Wildlife Development Agency, ERWDA, and by private individuals, has brought to light not only much more data with which to 'fine tune' any existing protected area plan, but also add additional sites to the list of potential reserves, into whatever category they may ultimately fall (Aspinall 1996a).

The purpose of this note is to draw attention to one 'new' area which, although previously known to be of some wildlife interest, proved, upon further examination, to be of substantial importance as the best example of its type. It is generally accepted that representatives of each differing biotope should feature in any national conservation strategy and for this reason this area is also proposed for inclusion in the overall masterplan.

The area immediately to the north of the existing Taweela power station up to Khor Ghurabi, which effectively isolates the privately owned island of Ghanadha from the former area, is a stretch of humid coastal desert little more than 4km in length. The vegetated sandsheets extend inland from the shore for 2.5 - 3 km before changing abruptly to an extensive and mainly barren *sabkha* of limited interest to wildlife.

The floral community of the relatively undisturbed and little grazed sandsheets is dominated by salt-tolerant goosefoots *Chenopodiaceae* and *Cyperus* sedge, interestingly also with healthy stands of sea lavender *Limonium axillare* and *Heliotropium kotschy*. Amongst vertebrates, the bird community is the typical association expected in this habitat type, with co-dominant Black-crowned Finch Lark *Eremopterix nigriceps* and Hoopoe Lark *Alaemon alaudipes*, but with two national priority breeding species (see Aspinall 1996b), namely Chestnut-bellied Sandgrouse *Pterocles exustus* and Lesser Short-toed Lark *Calandrella rufescens*, both present at densities and in numbers higher than anywhere else in the country. For this reason alone the site should warrant designation as a local nature reserve.

Chestnut-bellied Sandgrouse shows a predilection to nest in the coastal strip, primarily between Abu Dhabi and Dubai and only sparsely elsewhere, and it is this very zone that is under greatest threat from development. The species may be (and almost certainly

is) declining in number concomitant with coastal development, including greening, in traditional nesting sites. Lesser Short-toed Lark is similarly restricted, with only two known regular breeding sites in the country and a national population probably numbering under 100 pairs. Other fauna present in the Taweela area is less well studied, but includes apparently healthy populations of reptiles of at least seven species, Jayakar's Agamid *Agama flavimaculata* and Saw-scaled vipers *Echis carinatus* being especially conspicuous.

The Taweela shoreline is of moderately high wave energy, there being no sheltering 'barrier' islands, and the intertidal is therefore of limited interest faunistically. However, the subtidal area may well be worth including in a reserve area. Not only may it qualify in its own right as a valuable wildlife asset (some survey work has been carried out but the data is not in the public domain) but it would add to the diversity of what is already encapsulated in an essentially microcosmic multi-purpose reserve. Extension of the reserve, if the concept is entertained, should also take in the *sabkha*, on geomorphological grounds, and where one of only about five known mainland nesting pairs of Osprey *Pandion haliaetus* has an eyrie, while yet another nationally threatened species, Eagle Owl *Bubo bubo ascalaphus*, has also been recorded.

The area is extremely small and the proposition to gazette it as a reserve area is perhaps therefore more likely to be received favourably, provided that it can be integrated with plans for expansion of the existing Taweela power station and associated facilities. It would also form a natural 'green belt' (not to be altered by tree-planting which would be as equally damaging to the community as if it had been converted into a port facility). Even if only this small area is safeguarded, there seems to be every prospect that the breeding population of sandgrouse will remain viable.

It was only as a result of a specially commissioned study being undertaken, as part of the mandatory pre-development environmental assessment of the site, that its importance for wildlife was fully realised. Whether the findings of that might have influenced the 'final result' is now academic, but it remains important to make a bid to have the area made over as a small but valuable example of an intact, but increasingly rare, coastal desert community containing viable populations of two or more species of national priority breeding bird.

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Two New UAE Damselflies: *Ceriagrion glabrum* and *Pseudagrion decorum*

In **Tribulus 8.2** (Winter 1998) Graham Giles published an illustrated and annotated checklist of the Odonata (dragonfly and damselfly) species known to occur in the UAE [1]. In his notes he speculated that additional species would no doubt be found, and he predicted the occurrence of at least one likely candidate.

Consistent with that prediction, *Ceriagrion glabrum*, a small but striking red and yellow damselfly with bright green eyes, was observed in March 1999 by Stephen Green and the author at the Wadi Qawr dam. This unmistakable damselfly is known from Oman and had been previously recorded by Giles and by Dr. Michael Gillett at Omani mountain front plantation sites near Al Ain, including Aboule, Musah and Khatwah. A photograph accompanied the UAE checklist. In Wadi Qawr it was seen among thick dead reeds beside water ponded in silt behind the now-breached earthen dam. This habitat differs from the rocky wadi environment described for it in *Insects of Eastern Arabia* [4], but is consistent with Giles' advice to look for it among dead reeds. This habitat may account for its otherwise conspicuous colouration.

The same observers also documented the existence at the Wadi Qawr dam site of a second species of damselfly new to the UAE. Giles has examined photographs and agrees that this is a damselfly that he saw and photographed in Oman, which he identifies as *Pseudagrion decorum*. Descriptive notes for the species are included in Schneider (1988) [2]. It is common in the Indian subcontinent and Burma [5] and is now also recognized throughout the Sultanate [3]. *P. decorum* has a bright blue-green head and thorax, a bright blue ventral stripe along the otherwise dark abdomen, and two closely-spaced, bright blue rings near the tip of the

abdomen. It should be distinguished from both the endemic and uniformly coloured "powder blue damselfly" *Arabicnemia caerulea* and the similar-looking but shorter male of the "blue-banded Ischnura" *Ischnura evansi*, which has only a single blue band on the relatively enlarged tip of its abdomen. *P. decorum* has since been observed near plantations in Wadi Maydaq, near Masafi. It was common at Wadi Qawr and at both sites it typically perched low on emergent vegetation.

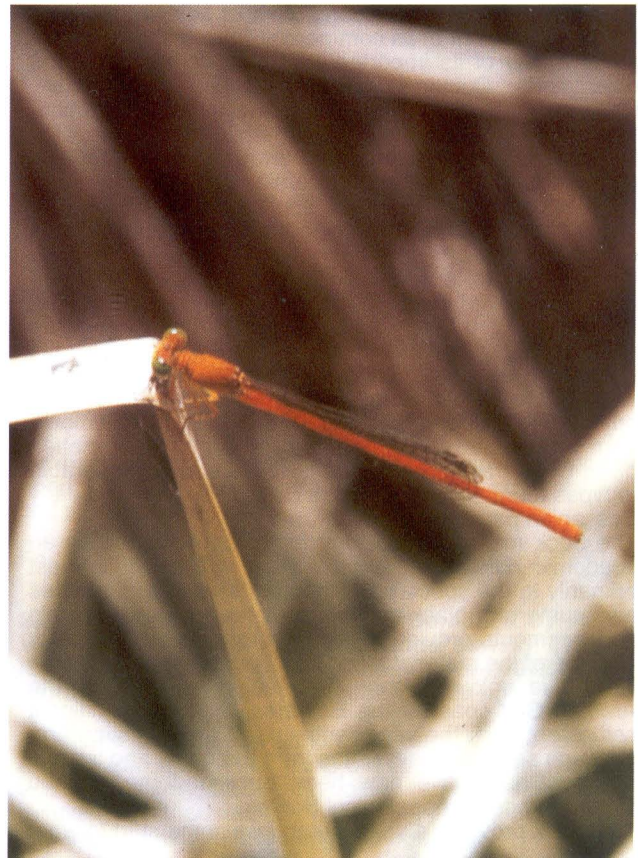
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Gary R. Feulner



Pseudagrion decorum



Ceriagrion glabrum

Reviews and Research Notes

Recent Publications

Excavations at ed-Dur (Umm al-Qaiwain, United Arab Emirates): Vol. 1 - The Glass Vessels. The University of Ghent South-Eastern Arabian Archaeological Project. D. Whitehouse, with an Appendix by Robert H. Brill and preface by Ernie Haerinck. Peeters, Leuven (1998). 120 pp, softback.

It is now thirteen years since archaeological excavations by teams from Denmark, Britain, France and Belgium commenced at the site of ed-Dur (al-Door) in Umm al-Qaiwain. The teams from the first three worked for three seasons, while Professor Ernie Haerinck and his team from Belgium's University of Ghent continued on until 1995. When they ceased, the potential for work on the site was still far from finished. Haerinck estimated in 1993 that there might be as many as 20,000 graves at ed-Dur (1). It was rather that excavation had been halted and that there were already a massive number of finds to analyse, study and publish.

Brief season by season reports had been published in journals like *Arabian Archaeology and Epigraphy* (2), but the corpus of material was such that it was clear that several detailed individual volumes would be required in order to do ed-Dur justice. This book, on the glass vessels from the site, is the first to appear.

As Haerinck notes in his preface, which provides an admirable overview of the significance of the site, the main phase of occupation at ed-Dur commenced in the First Century BC, with the coastal town flourishing between the First Century AD and the first decades of the Second Century AD, although there was a limited occupation in the 3rd and 4th Centuries.

When at its height, ed-Dur was a major coastal settlement linked to the inland town of Mileiha, south of Dhaid. The extent of its commercial links is shown by the great variety of its imported ceramics, coins, glass and other finds. Coinage included examples of Roman, Characenean (northern Gulf), Nabatean, Parthian, Indian and South Arabian types, while there were also Roman/Eastern Mediterranean bronzes and intaglios, pottery from southern Mesopotamia, south-east Iran and India, and stone vessels from South Arabia.

The glass vessels also testify to the commercial contacts of ed-Dur, which has been tentatively identified by Haerinck and others with the port of Omana mentioned in the Periplus of the Erythraean Sea and in Pliny.

Whitehouse lists every piece of glass from the Belgian excavations, with the exception of beads, and concludes that many are from the Roman Empire, although some are late Hellenistic. Some are familiar from the Levant, but others appear to belong to types known primarily from the Western Mediterranean, a further confirmation of ed-Dur's trading connections. Others are comparable to types found in Mesopotamia during Parthian and early Sassanian periods.

The book makes no apology for being designed as an academic catalogue, and as such will be of interest primarily to the specialist, although its 10 colour pictures and numerous black-and-white plates of glass vessels and fragments provide a good impression of the quality of some of the material found at the site.

Ed-Dur is unique among archaeological sites on the Arabian Gulf coast of the Emirates, the only significant settlement from the very beginning of the Christian era, although several smaller sites from the coast and islands of Abu Dhabi have now been published by the Abu Dhabi Islands Archaeological Survey.

This book provides a valuable and welcome start to what

one hopes will be a series of several volumes explaining the historical significance of this key UAE site.

References:

1. Hellyer, P. [1993]. 20,000 graves at Ad Door site. *Tribulus* 3.1: 24.
2. e.g. E. Haerinck, "Excavations at ed-Dur (Umm al-Qaiwain, U.A.E.) - Preliminary Report on the Fourth Belgian Season (1990), *AAE*, v. 3, 1992, pp. 190-208
- E. Haerinck, "Excavations at ed-Dur (Umm al-Qaiwain, U.A.E.) - Preliminary Report on the Fifth Belgian Season (1991), *AAE*, v. 4, 1993, pp. 210-225.
- and
- E. Haerinck, "Excavations at ed-Dur (Umm al-Qaiwain, U.A.E.) - Preliminary Report on the Sixth Belgian Season (1992), *AAE*, v. 5, 1994, pp. 184-197.

Peter Hellyer

Arabia and Its Neighbours: Essays on prehistorical and historical developments presented in honour of Beatrice de Cardi. Eds.: C.S. Phillips, D.T. Potts & S. Searight. Abiel II: New Research on the Arabian Peninsula series, Brepols, Belgium (1998) 372 pp., softback.

Beatrice de Cardi has been described as 'the doyenne of Emirates archaeology.' She first undertook survey work here in the late 1960s, laying the foundations for much that was to follow. Now in her mid-80s, she can still be found every winter, over three decades later, ensconced in the National Museum of Ra's al-Khaimah examining the ceramic or softstone collection, and, on a quiet afternoon, venturing out to a previously unexplored area to find yet more undiscovered archaeological sites. Her contribution to the study of Emirates archaeology has been acknowledged by the award to her by Ra's al-Khaimah Ruler H.H. Sheikh Saqr bin Mohammed al-Qasimi of the Al Qasimi Order, of which she is the only female holder.

Beatrice's archaeological career began before the Second World War, and took off in Pakistan just afterwards. She subsequently worked in south-eastern Iran before turning her mind to south-eastern Arabia, a record of over 50 years in the archaeology of the region. This book is a *festschrift*, a celebration of her work, with a total of 28 individual papers by leading specialists, many of whom have worked with, and learned from, Beatrice. The authors include many of the most familiar names in UAE archaeology.

The range of papers is broad, impressive and informative. Topics include excavations at Mileiha, Rumailah and Kush, surveys on Abu Dhabi's western islands, examinations of petroglyphs in Fujairah and Oman, abandoned coastal villages in Qatar, pottery from Dilmun found in the UAE, a review of the archaeological and environmental relationship between mangroves and the gastropod *Terebralia palustris* and a host of other locally-related material, as well as papers dealing with topics from Bahrain, Yemen and South Asia.

The archaeologist will find this collection invaluable, a mine of material for discussion, debate and enlightenment. The interested amateur will find its range stimulating and informative, an essential introduction to the heritage of the entire region. It is to be hoped that the publisher will get together with an imaginative local distributor to ensure it is easily available.

PH

Ancient Magan: The Secrets of Tell Abraq. By D.T. Potts. Trident Press (*InDepth Guide series*) (2000). ISBN 1-900724-31-6 (hardback); 1-900724-40-5 (softback). 144 pp.

Near the Umm al-Qaiwain junction on the main road from Sharjah to Ra's al-Khaimah, a large hill rises on the edge of the *sabkha* plain.

The hill, Tell Abraq, is one of the most important archaeological sites in the UAE, with evidence of continued occupation for over 2,000 years, from the Umm al-Nar period in the Third Millennium BC to the last centuries of the pre-Christian era. Within it lie the walls of a great fortress, over 4,000 years old and still standing to a height of more than 10 metres. No other building of a similar size is known to have been constructed anywhere in south-eastern Arabia before the great fort at Nizwa in the 1660s, over three and a half thousand years later. Excavations at Tell Abraq began in 1989. In the seasons of work that followed, discoveries there have vastly increased knowledge about the evolution of settlement and trade through the succeeding Umm al-Nar, Wadi Suq, Iron Age and late pre-Islamic periods. This useful layman's guide is written by Professor Dan Potts, formerly of the University of Copenhagen and now of the University of Sydney, who directed the excavations. Widely respected for his academic skills, Potts has the ability to communicate both the excitement and the results of archaeology to a non-specialist audience, an ability shown to its full in this book.

Tell Abraq was one of the centres of 'Ancient Magan,' the name given by the empires of Mesopotamia to a southern land whence copper and other goods came, and that lay astride trade routes with the East.

Dan Potts unveils not only the excavators' results, but also explains the techniques used by archaeologists to extract as much information as possible from their discoveries. Carbon 14 dating, the analysis of traces of organic residues on vessels, the analysis of metals to determine their composition and perhaps, therefore, their source. All this and more is explained in a style that the layman can easily understand. The acknowledged position of Potts as a leading academic authority provides the assurance that no fact is misinterpreted and that hyperbole is carefully avoided.

That's not to say that there is no drama in the story. From the largely undisturbed Umm al-Nar tomb at the mound's base came discoveries that are, in their way, among the most effective yet uncovered by local archaeologists in terms of bringing to life the UAE's long-gone inhabitants. One is the skeleton of a young girl afflicted with polio, laid to rest in a way that indicates she was affectionately cared for by her community. Another is of several skeletons of girls found buried with jewellery and other accoutrements, including fine ivory combs. In one case, slight traces of hair remained between the comb and the skull of its owner, suggesting that she had been buried with her hair dressed and tied up for a last time. A third is a shell with traces of atacamite pigment, a make-up accessory for the girls (most probably?) of four thousand years ago.

Dan Potts has earned respect for his academic expertise as well as his teaching skills. Others can, and do, vie with him in those spheres, but few, if any, now working in the Gulf can match him in the communication of the results of archaeology to the general public. This book will be of interest to anyone interested in the UAE's history.

PH

Counting Houbara Bustard. Edited by Dr. Fred Launay and Theri Bailey. ERWDA, PO Box 45553, Abu Dhabi (1999). 30 pp., softback.

This slim A4 softback technical publication of the

IUCN/SSC/BirdLife Working Group on the Houbara Bustard contains more acronyms than you can fly a falcon at. IUCN, the World Conservation Union, together with the well-known BirdLife International (thoughtfully shortened) and Species Survival Commission, SSC (of IUCN), have drawn together five individual papers tackling the range of methodologies used to census Houbara Bustard, non-destructively. The geographical reach extends from the Canary Islands, through Saudi Arabia to Uzbekistan and Kazakhstan and therein lies the rationale behind its production. The whole issue of Houbara conservation, it is clear, hinges on international cooperation, but can only truly gain support when based on sound scientific information gathered in the field. How such information can be amassed is addressed in this publication.

The National Avian Research Center, NARC, part of Abu Dhabi's Environmental Research and Wildlife Development Agency, ERWDA, hosts the secretariat for the SSC Houbara Bustard Working Group and took the initiative to produce this useful collection of papers, each of which was written by one or more reputed scientists. The introduction by Colin Bibby, research director at BirdLife International, contends that 'the houbara bustard should benefit from the improved knowledge that should result', while the backing of several separate organisations, advocating, without emotion, the sustainable use of wildlife is a non-confrontational approach to which most would give support. Fred Launay, director of NARC, who co-edited this publication with colleague Theri Bailey, mirrors Bibby's outlook. The gameplan is clear - to be in a position 'to propose sound solutions to ensure the longterm survival of the Houbara Bustard.' **Counting Houbara Bustard** will form a valuable contribution toward this, the only satisfactory endpoint.

For further information, contact: ERWDA, P.O. Box 45553, Abu Dhabi.

Simon Aspinall

Publications Received

Books:

(mention of titles here does not preclude subsequent review)

Ecosystems, Anthropogenic Impacts and Habitat Management Techniques in Abu Dhabi. by Dr. Benno Boer. PGS Paderborner Geographische Studien. University of Paderborn, Germany (1999). 142 pp. ISBN 3-9804893-2-9. Softback.

Written by the leading habitat researcher for ERWDA, this book provides an invaluable scientific introduction to the habitat of the Emirate of Abu Dhabi and the impact upon it by man. Future researchers into these topics will find it essential.

For further information, contact: Benno Boer, ERWDA, P.O. Box 45553, Abu Dhabi.

Sir Bani Yas : An Arabian Ark. Compiled by Peter Vine. Trident Press (*InDepth Guide series*) (1999). ISBN 1-900724-37-5 (hardback); 1-900724-4103 (softback); 1-9007124-41-3 (Arabic). 160 pp.

A visitor's guide to the island of Sir Bani Yas, devised as a geographical tour that picks out aspects of the island's ecology, history and archaeology and examines the results of the captive breeding programme for endangered wildlife. Stunning photography.

Journals:

Arabian Archaeology and Epigraphy, Vol. 10: No.1,
May 1999. Munksgaard, Denmark. ISSN 0905-7196

As usual, the latest issue of AAE, edited by Dan Potts, includes several papers relating to the archaeology of the Emirates:

One woman and her dog: an Umm an-Nar example from the United Arab Emirates, (S. Blau and M. Beech), 34-42; *Writing in the Iron Age: the earliest South Arabian inscription from southeastern Arabia* (P. Magee), 43-50; *Zur Inschrift auf einem Krugfragment aus Muweilah* (W.W. Muller), 51-53; *The excavation of a camel cemetery at Mleiha, Sharjah, U.A.E.*, (S.A. Jasim), 69-101; *Camel and horse skeletons from proto-historic graves at Mleiha in the Emirate of Sharjah, (U.A.E.)*, (H.-P. Uerpmann), 102-118; *A site from the early first millennium AD at Ra's Bilyaryar, Abu Dhabi, U.A.E.* (P. Hellyer and G.R.D. King), 119-123 and *Abi'el, the ruler of Southeastern Arabia*, (E. Haerinck), 124-128.

Bulletin of the Society for Arabian Studies No.4
Spring 1999. London. ISSN 1361-9144.

The main feature in the annual Bulletin of the Society for Arabian Studies is on a UAE topic - the 'Ubad period settlement on Dalma discovered by the Abu Dhabi Islands Archaeological Survey ADIAS.

Beech, Mark and Elders, Joseph [1999] *An 'Ubad-related settlement on Dalma Island, Abu Dhabi Emirate, United Arab Emirates*. pp. 17-21.

Pages 26 to 30 in the **Recent News and Research** section cover the UAE, with contributions relating to work undertaken by ADIAS and in Sharjah, Ra's al-Khaimah and Fujairah.

Proceedings of the Seminar for Arabian Studies, (PSAS) Vol. 28 - 1998. Seminar for Arabian Studies / Brepols, Belgium, 1999. ISSN 0308-8421; ISBN 2-503-50632-1.

For those interested in the UAE, there are only two short papers on local topics, although there are several on Oman.

Blau, Soren. "Studies of human skeletal remains in the United Arab Emirates: where are we now?" pp. 7-13

Sasaki, Hanae & Sasaki, Tatsuo. *Scientific analysis of white glazed ware from Julfar, Ra's al-Khaimah*. pp. 247-250.

RESEARCH NOTES

Archaeology and Marine Resources

Notes on the analysis of fish bones from archaeological sites on Sir Bani Yas and in Umm al-Qaiwain were presented by Mark Beech of the Abu Dhabi Islands Archaeological Survey, ADIAS, and the University of York, UK, to the 10th meeting of the International Council for Archaeozoology, ICAZ, Fish Remains Working Group Conference, in New York last September. An edited abstract follows:

The paper examined one of the key issues connected with the archaeology of south-east Arabia; namely, whether the earliest coastal inhabitants were fully

sedentary or practised a transhumant pattern of occupation along the coasts in the winter, moving to their residences in the interior during the summer months. This pattern is well-attested in the historical and recent ethnographic record in south-eastern Arabia, but has not yet been proven archaeologically. Two UAE coastal sites were discussed: Umm al-Qaiwain (UAQ 93/4), an Ubaid-related 5th millennium BC midden and cemetery, and Sir Bani Yas (SBY 9), a Christian pre-Islamic monastery dating to the 5th -8th Centuries AD. Fish otoliths were well preserved in the deposits at both sites, the majority of them belonging to *sha'ri* (emperors) *Lethrinidae*. Thin sectioning of the otoliths reveals clear evidence of apparent seasonal banding which is matched on otoliths collected from modern fishes caught within the same coastal waters. This confirms that fishing was predominantly carried out during the winter and early spring. Modern ecological data concerning water temperature and salinity was also discussed, as well as the seasonal occurrence of certain fish taxa at the present day, along with a consideration of the seasonal availability of marine resources for early coastal inhabitants of south-east Arabia.

Late Stone Age dugongs

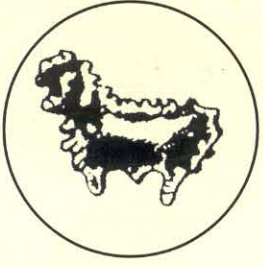
Helene Jousse, Centre des Sciences de la Terre, Universite Claude Bernard, Lyon, 1, France, has been awarded her PhD for a thesis entitled "**The fossil dugongs of Akab Island (Umm al-Qaiwain, UAE).**" A translated abstract of the thesis follows:

The Neolithic site of Akab Island (Umm al-Qaiwain, UAE), 6,000 years old, is the oldest site containing remains of the dugong (*Dugong dugon* [Muller 1776]). The fossils are very close to modern representatives of the species and there is no criterion that allows recognition of an endemic subspecies in the Gulf. The former environment of the lagoon of Umm al-Qaiwain differs little from the modern one.

This archaeozoological study has yielded better understanding of the function of this site: dugong hunting seems to have been seasonal, and focused on young individuals, the bones show signs of butchering. The inhabitants of the site utilised dugong meat and oil, but certainly the hide as well. The presence of other animal remains, notably those of small ruminants and molluscs, indicates that the subsistence activities of the human population were diversified.

(Source: *Sirenews, Newsletter of the IUCN/SSC Sirenia Specialist Group*, no. 32, October 1999)

Editors' Note: Although as yet unpublished, dugong bones have been identified by the Abu Dhabi Islands Archeological Survey, ADIAS, on the Late Stone Age settlement site at Dalma, Abu Dhabi. C 14 dating of date stones has produced results suggesting a date of ca. 5,200 - 5,000 BC, or 7,200 - 7,000 years ago, a thousand years older than the Akab site. Dalma is, therefore, now the oldest archaeological site - in Arabia at least - with evidence of human utilisation of the dugong).



تريبلوس

جمعية الامارات للتاريخ الطبيعي

خريف/شتاء ١٩٩٩م

المجلد ٩، ٢

